




Capitol Expressway Light Rail

Transportation Study for the Environmental Impact Statement

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1.0 INTRODUCTION

The Santa Clara Valley Transportation Authority (VTA) proposes to extend the light rail transit (LRT) service in the Downtown/East Valley corridor. The current Alum Rock – Santa Teresa light rail line terminates at the Alum Rock Station, south of the South Capitol Avenue / Alum Rock Avenue intersection. This proposal is an extension of the LRT system to the Eastridge Transit Center along Capitol Expressway. The current connection from the Alum Rock LRT Station to the Eastridge Transit Center is via VTA bus services (#43, #103 and #522). A Bus Rapid Transit (BRT) service has been proposed to serve this connection in the future before the final implementation of this project. This analysis assumes BRT service operating out of downtown San Jose along Santa Clara / Alum Rock and then on Capitol Expressway to Eastridge as part of the No Build condition. The BRT service would consist of two separate lines; Route # 522 to Palo Alto on 12-minute headways and Route # 523 to Cupertino also on 12-minute headways. The combined routes on Santa Clara / Alum Rock and Capitol Expressway would provide 6-minute headways. This report provides an evaluation of traffic and transportation issues related to the proposed LRT expansion. It also summarizes the existing transportation conditions along Capitol Expressway and outlines the impacts of this proposed project on the local and regional transportation network. The report addresses transportation issues in terms of roadway, automobile traffic, transit (including bus, light rail and commuter rail), pedestrians, bicycle facilities, goods movement, parking and community access.

1.1 Project Overview & Alignment

The proposed LRT line is a 2.3 mile extension of the Alum Rock – Santa Teresa LRT line. The extension begins on South Capitol Avenue at Wilbur Avenue, enters Capitol Expressway and continues along Capitol Expressway to a terminus at the Eastridge Transit Center. Figure 1-1 shows the location of the project and the proposed stations.

This project would add up to three new stations along its length as presented in Figure 1-1. The northern most station is at Story Road and is an elevated station. The next station is at Ocala Avenue and this would be an optional at-grade station. The final station is at the Eastridge Transit Center. This station is proposed to be at-grade but an optional elevated station is also being considered. Transfers between the Alum Rock – Santa Teresa and Mountain View – Winchester Lines can occur at any station between downtown San Jose and Tasman Station. Figure 1-2 presents a schematic view of the LRT operations, the existing and proposed segments.

Light rail trains would generally operate in the median of Capitol Expressway with a dual track configuration, although at the southern end of the line, the alignment transitions to the side of the corridor for a limited distance. Three vehicle travel lanes would be provided on each side of the tracks. At intersections, turning lanes would accommodate access to side streets.

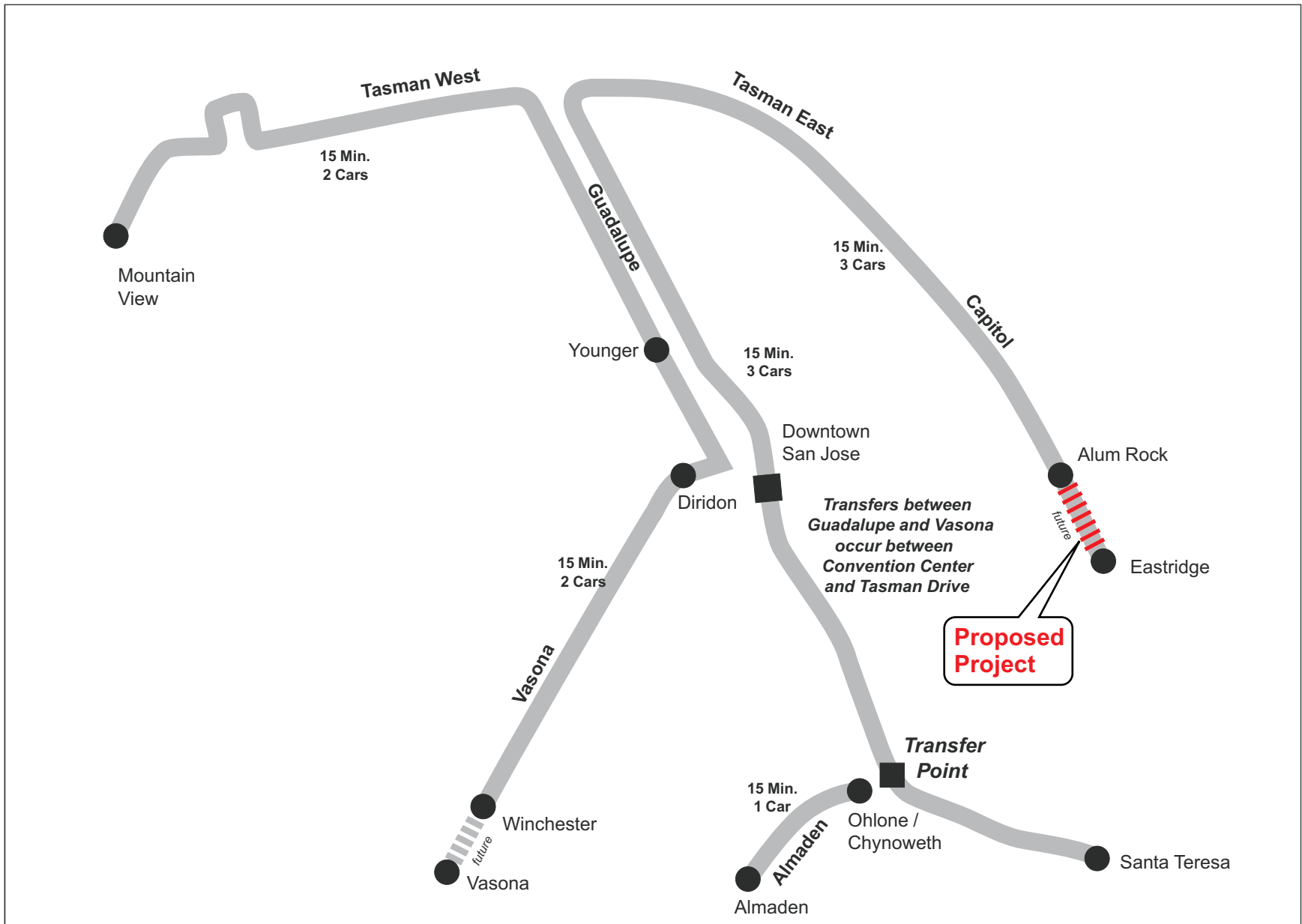
Travel time from the Alum Rock Station to the Eastridge Station would be approximately 5 minutes. The proposed LRT extension would be fully accessible in accordance with the Americans with Disabilities Act (ADA).



DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 1-1

PROPOSED STATION LOCATIONS



Schematic Plan.cdr

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 1-2

SCHEMATIC LRT OPERATING PLAN

1.2 Stations & Parking

Three stations are proposed for this project, as listed in Table 1-1. All proposed stations are center platform configurations with a single platform located between the inbound and outbound tracks. Park-and-ride facilities currently exist at the Alum Rock and Eastridge stations. The Alum Rock park-and-ride lot would be maintained in its present configuration and the Eastridge park-and-ride lot would be enhanced to serve demand. Analysis in this report evaluated design options with and without the Ocala Station.

**Table 1-1
Proposed Capitol Expressway Light Rail Corridor Stations**

Station	Park-and-Ride	Platform Type	Comments
Story	No	Center (elevated)	The station platform is elevated at this location, with a pedestrian overcrossing accessing the platform.
Ocala*	No	Center (at-grade)	The station platform is a center platform located at Ocala Avenue within the median.
Eastridge	Yes	Dual Center (at-grade)**	The at-grade station platform would be on the west side of the Expressway. A park-and-ride lot will be available at this station.

Note: * Optional station

** An optional station configuration is an elevated platform over the transit center. An elevated platform does not affect the transportation analysis.

1.3 Project Scheduling

A detailed funding plan for construction has not been developed; therefore a complete construction schedule is not available at this time. The environmental review process is expected to be completed in 2013. Engineering design would be reinitiated following the environmental review. Under any circumstances, revenue service would not begin until 2018, or beyond.

1.4 Traffic Analysis Alternatives

This report outlines the impacts of the proposed LRT extension on the local and regional transportation network. The impacts of the project were evaluated using the policy guidelines of VTA, the Santa Clara County Congestion Management Program (CMP) and the City of San Jose.

The CMP level of service (LOS) methodology for intersection analysis is based on the 2000 Highway Capacity Manual (HCM) methodology. The 2000 HCM methodology uses average control delay at signalized intersections for LOS determination. The software associated with the level of service methodology is version 8 of the TRAFFIX software package.

1.4.1 Background - Development of Project Alternatives

As background to the genesis of these alternatives, it is important to take into account prior decisions related to Capitol Expressway made by the City of San Jose and the County of Santa Clara. In 1991, the San Jose City Council approved the Evergreen Specific Plan project and the

Evergreen Development Policy. The Evergreen Specific Plan consisted of the construction of approximately 2,856 dwelling units, commercial uses and associated infrastructure improvements on an 865-acre site. In addition, there were 1,353 residential units planned for the remainder of the Evergreen Area for which additional traffic capacity improvements would be required in order to comply with the Evergreen Development Policy.

The construction of this development in the Evergreen area was dependent on the implementation of transportation mitigation measures that were the subject of an EIR approved by the San Jose City Council in April 1994. These transportation mitigation measures, which included the construction of HOV (outside) lanes on Capitol Expressway, between the interchanges of US 101 and I-680, provided the necessary traffic mitigation to allow development of up to 4,209 dwelling units in the Evergreen area. As it relates specifically to Capitol Expressway, upon completion of the transportation mitigation measures, the expressway would consist of three mixed flow and one HOV lane (outside) in both the northbound and southbound directions, between interchanges with US 101 and I-680, until such time as the LRT was implemented.

In 1992, the County Board of Supervisors approved the City's request to be the lead agency for the preparation of the EIR for the Capitol Expressway improvements with the understanding that the City was proposing an interim eight-lane facility on Capitol Expressway by adding four additional lanes (two new mixed flow lanes and two new HOV/commuter lanes) between its intersections with US 101 and I-680. At the time, it was acknowledged that the build-out proposed for Capitol Expressway (six mixed flow lanes plus two HOV lanes) would not allow sufficient room for the future LRT project within the existing right-of-way. However, it was also acknowledged that LRT service with 10-minute headways could provide approximately the same level of passenger throughput as a lane of traffic on Capitol Expressway. Thus, the EIR stated that "given support mechanisms to encourage passenger demand, the LRT could replace one travel lane in each direction while still maintaining adequate traffic levels of service on the expressway." The eight lane facility ultimately approved was to be designed to provide for the future elimination of the two inside lanes and the installation of a potential double track light rail system (with stations) in the median while minimizing the need to reconstruct the remaining six lanes of the expressway.

In the City's EIR, the construction of the LRT facility was considered as an alternative to the roadway improvements proposed by the Evergreen Specific Plan development. At the time, the LRT alternative was determined to be the environmentally superior alternative. However, it was also determined that private developers did not have the financial ability to substantially fund LRT as mitigation for their approved and pending Evergreen development projects. The City further stated in their EIR that it was not the objective of the proposed Evergreen Specific Plan project to provide transportation capacity that would exceed demand for traffic capacity generated by this project. Therefore, the City approved the project to include the construction of two additional general purpose and two HOV lanes. These mitigation improvements were constructed and have been operating since 1996.

In 2008, the City of San Jose City Council approved the Evergreen-East Hills Development Policy (EEHDP) that replaces the Evergreen Development Policy. This proposed Capitol LRT extension was accounted for in the transportation impact analysis as 'background

improvements' where the proposed LRT would operate in the median with the HOV lanes being removed. The EEHDP also established the need for transit facilities improvement (e.g. upgrading of bus shelters and transit stations) and improved connectivity to these facilities. Improvements to pedestrian and bike facilities were also spelled out in the EEHDP.

As part of VTA's planning process, the following alternatives were considered during Conceptual Engineering but were rejected primarily due to substantial right-of-way requirements:

- Light rail alternative with four mixed flow and two HOV lanes on Capitol Expressway between South Capitol Avenue and US 101.
- Light rail alternative with six mixed flow and two HOV lanes on Capitol Expressway between South Capitol Avenue and US 101.

This report analyzes the study intersection operations for the following traffic conditions. The future year traffic projections were developed using the VTA travel demand forecasting model.

- Existing – Transportation evaluation based on existing traffic counts and existing intersection geometry. Existing conditions are those that occurred in 2009.
- 2018 No Build - Transportation evaluation based on the 2018 projections without construction of this project and with existing roadway geometry. The existing HOV lanes are assumed to remain. In addition, the No Build condition includes BRT services (#522 and #523) and considered the use of queue-jump lanes along Capitol Expressway. There would be BRT stations near the intersections of Wilbur Avenue, Story Road, Ocala Avenue and at the Eastridge Transit Center. The 2018 projections were derived from interpolating between 2009 counts and 2035 forecasts.
- 2035 No Build – Transportation evaluation based on the 2035 projections without construction of this project and with existing roadway geometry. The existing HOV lanes are assumed to remain. In addition, the No Build condition includes BRT services (#522 and #523) and considered the use of queue-jump lanes along Capitol Expressway. There would be BRT stations near the intersections of Wilbur Avenue, Story Road, Ocala Avenue, and at the Eastridge Transit Center.

With Project Design Options

- 2018 With LRT – Transportation evaluation based on 2018 projections with the construction of this proposed LRT project. The conditions and roadway geometry from '2018 No Build' are assumed, except as modified because of the proposed LRT resulting in the removal of HOV lanes. This alternative assumes a terminus of the project at the Eastridge Transit Center and is considered the base design.
- 2035 With LRT – Transportation evaluation based on 2035 projections with the construction of this proposed LRT project. The conditions and roadway geometry from '2035 No Build' are assumed, except as modified because of the proposed LRT resulting in the removal of HOV lanes. This alternative assumes a terminus of the project at the Eastridge Transit Center and is considered the base design.

- Removal of Ocala Station - Transportation evaluation based on 2018 and 2035 With LRT condition except that the Ocala Station would not be designated to serve the LRT service but remains as a BRT stop.
- Elevated Eastridge Station - Transportation evaluation based on 2018 and 2035 With LRT condition. The Eastridge Station would be elevated over the transit center with vertical circulation between light rail and buses but would have no effect on the traffic analysis.

2.0 EXISTING CONDITIONS

This chapter presents a summary of the existing transportation conditions in the study area. A description of the existing roadway network, public transit, bicycle and pedestrian facilities, along with goods movement, parking and community access are summarized.

2.1 Roads & Highways

This section presents the existing traffic conditions in the study area, including existing roadway facilities, traffic volumes, intersection geometries and operating conditions at key locations during the weekday AM and PM peak periods.

The study corridor can be regionally accessed by freeways, expressways and arterials, as well as VTA transit buses and light rail. The study area is defined by the alignment of the proposed LRT extension to the Eastridge Station. The study intersections are illustrated in Figure 2-1. A total of eight signalized intersections along the Capitol Expressway corridor are included in the study area.

2.1.1 Congestion Management Program Network

The CMP legislation requires the development of a County CMP roadway network. It consists of four types of facilities: freeways, county expressways, urban arterials and rural highways. The County CMP network is monitored annually to determine conformance with CMP traffic level of service standards.

In the vicinity of the study area, the following roadways are contained within the Santa Clara County CMP roadway network (as defined by the *2008 Monitoring and Conformance Report*, March 2009).

2.1.1.1 Freeways

US Highway 101 (US 101) is an 8-lane freeway that runs parallel to the study area. Two of the eight lanes are HOV lanes that travel in the north-south direction. South of the study area, US 101 has one interchange with Capitol Expressway. The interchange is a full cloverleaf design with collector/distributor roadways between the Capitol Expressway ramps and the Yerba Buena ramps to the south. The on-ramps onto US 101 from Capitol Expressway are metered. US 101 is posted for 65 mph through the study area. Daily traffic volumes on US 101 range from 139,000 vehicles per day south of Capitol Expressway to 180,000 vehicles per day north of Capitol Expressway. The peak hour traffic volumes immediately north of Capitol Expressway are 14,390 vehicle per hour in the AM peak and 14,190 in the PM peak.

The 2008 Monitoring and Conformance Report for the Congestion Management Program indicates that during the AM peak hour, US 101 operates at level of service F in the northbound direction and level of service C/D in the southbound direction for the mixed flow lanes. The HOV lanes operate at level of service D/E in the northbound direction and at level of service A in the southbound direction during the AM peak. During the PM peak hour, the northbound mixed flow lanes operate at level of service D



⊗ Signalized Study Intersection

DOWNTOWN EASTVALLEY CAPITOL EXP

Figure 2-1

STUDY INTERSECTIONS

and the southbound mixed flow lanes operate at level of service F. The HOV lanes operate at level of service A in the northbound direction and at level of service C/D in the southbound direction during the PM peak hour.

Interstate 680 (I-680) is an eight-lane freeway that travels in a north-south direction. The highest traffic volume along this freeway in the proximity of this project occurs between King Road and Jackson Avenue, just south of the Capitol Expressway interchange. The Average Annual Daily Traffic (AADT) for this section is 214,000 vehicles. There are ramps entering and exiting the study area at Alum Rock (State Highway 130) and at Capitol Expressway. I-680 is posted for 65 mph through the study area.

The 2008 CMP Monitoring Report notes that I-680 operates at level of service F in both directions during the AM peak hour. During the PM peak hour, I-680 at Capitol Expressway operates at level of service C in both the northbound and southbound directions.

2.1.1.2 Expressways

Capitol Expressway is a limited access expressway that extends from its interchange with I-680 in the north end of the study area. The Capitol Expressway is a county owned and operated facility. Capitol Expressway consists of mainly three general purpose lanes in each direction with an HOV lane in the project area as the outside fourth lane from near its interchange with US 101 northward to its interchange with I-680. On-street parking is not permitted along the expressway and no designated bicycle lanes exist along the project corridor. The posted speed limit is 45 mph. Full-movement access is restricted to signalized intersections spaced from $\frac{1}{4}$ mile to over $\frac{3}{4}$ mile apart.

2.1.1.3 Arterials

The following arterials are under the jurisdiction of the City of San Jose:

Alum Rock Avenue is a four-lane arterial under the jurisdiction of City of San Jose. It travels in an east-west direction through the northern part of the study area. Alum Rock Avenue is designated as a grand boulevard east of Capitol Expressway, connects with I-680 with a full freeway interchange and extends westward across US 101 where its name changes to Santa Clara Street. The street then becomes the major east-west arterial to enter the City of San Jose's Central Business District (CBD) from the east. East of I-680, Alum Rock extends further east to Mount Hamilton Road in the foothill area of eastern San Jose. East of Capitol Expressway, Alum Rock Avenue is designated as a main street. The posted speed limit is 35 mph.

South Capitol Avenue intersects with Capitol Expressway near the project's northern end and extends north and is designated as a grand boulevard under the currently adopted Envision San Jose 2040 General Plan. There are two travel lanes in each direction. North of its intersection with Alum Rock Avenue, the road is named North Capitol Avenue. The Alum Rock – Santa Teresa LRT line runs along the median of South Capitol Avenue. Bicycle lanes are designated and signed in both directions for

the length of South Capitol Avenue. The posted speed limit is 35 mph. The intersection of South Capitol Avenue with Capitol Expressway is a CMP intersection. The Congestion Management Agency monitors all CMP intersections on an annual basis for traffic operations during the PM peak hour. The 2008 monitoring report indicates that the intersection of South Capitol Avenue with Capitol Expressway operates at level of service E+.

Story Road crosses Capitol Expressway just south of South Capitol Avenue. Story Road is a 6-lane divided arterial west of Capitol Expressway with a posted speed of 35 mph designated as a main street. To the east of Capitol Expressway, Story Road is a 4-lane divided arterial, also with a posted speed of 35 mph. Story Road provides local east/west access in southeast San Jose as an extension of Keyes Street near US 101 to its terminus at Fleming Avenue. The Story Road / Capitol Expressway intersection is a CMP intersection. The 2008 monitoring report indicates the current operation is level of service E.

Ocala Avenue crosses Capitol Expressway south of Story Road. Ocala Avenue is a 4-lane, undivided roadway to the east of Capitol Expressway with a posted speed of 35 mph designated as a city connector street. Ocala Avenue becomes Marten Avenue at White Road. To the west of Capitol Expressway, Ocala Avenue has a single lane in each direction with a two-way left turn lane in the center. At the intersection with Capitol Expressway, Ocala widens to accommodate turning lanes. This portion of Ocala Avenue is also posted for 35 mph and extends to King Road. Ocala Avenue at Capitol Expressway is not a CMP intersection.

Cunningham Avenue provides access to Reid-Hillview Airport from Capitol Expressway and extends to White Road to the east along the northern boundaries of Lake Cunningham Park. This section of Cunningham Avenue is a single lane in each direction with a speed of 35 mph. It is considered a residential street. Cunningham Avenue at Capitol Expressway is not a CMP intersection.

Tully Road is a principal arterial designated as a main street that runs generally east-west through the study area. On both sides of Capitol Expressway, Tully Road has three lanes in each direction separated by a raised median. The posted speed west of Capitol Expressway is 40 mph and the posted speed east of Capitol Expressway is 45 mph. Tully Road extends from the foothills on the east to Monterey Highway on the west where it becomes Curtner Avenue. The Tully Road/Capitol Expressway intersection is a CMP intersection. The 2008 monitoring report indicates the current operation is level of service D-.

Quimby Road connects from Mount Hamilton Road (SR 130) in the foothills to Tully Road adjacent to the Eastridge Shopping Center and is designated as a city connector street. East of Capitol Expressway, Quimby Road has two travel lanes in each direction. At the intersection with Capitol Expressway, the median is raised. Farther to the east, the raised median is replaced by a two-way left turn lane. The posted speed is 40 mph. To the west of Capitol Expressway along the shopping center frontage, Quimby Road has two lanes in each direction, a raised median and is posted for 35 mph. The Quimby Road / Capitol Expressway intersection is a CMP intersection. The 2008 monitoring report indicates the current operation is level of service E-.

Nieman Boulevard extends from a ‘T’ intersection at Capitol Expressway southeastward to Yerba Buena Avenue where it transitions into Silver Creek Valley Road. It is designated as a local connector Street under the currently adopted Envision San Jose 2040 General Plan. At Capitol Expressway, Nieman Boulevard provides one travel lane in each direction and a continuous left turn lane. Left turns from Nieman Boulevard to Capitol Expressway are not permitted. The posted speed limit is 35 mph. Nieman Boulevard / Capitol Expressway is not a CMP intersection.

Table 2-1 shows the signalized intersections, the designation of each cross street according to the City’s General Plan, the spacing of intersections in feet and the average daily traffic volume (ADT). The spacing of the intersections along the expressway varies from 1200 feet to over 4000 feet.

**Table 2-1 Signalized Capitol Expressway Intersection
 Cross Street Designation, Distances and ADT**

	Cross Street	Cross Street Designation ¹	Distance to Next Intersection ² (feet)	ADT (west/east) (vehicles/day)
1	Capitol Ave	Grand Boulevard	1,800	3,000 / 17,000
2	Story	Main Street	4,200	34,000 / 29,000
3	Ocala	City Connector Street	1,200	15,000 / 20,000
4	Cunningham	Residential Street	2,700	2,000 / 3,000
5	Tully	Main Street	1,200	30,000 / 32,000
6	Eastridge	N/A	1,600	8,000 / N/A
7	Quimby	City Connector Street	2,800	30,000 / 31,000
8	Nieman	Local Connector Street	1,700	N/A / 12,000

Source: City of San Jose, 2005

For this study, the Capitol Expressway corridor is considered to run north/south from South Capitol Avenue to Nieman Boulevard.

¹ Designations derived from Envision San Jose 2040 General Plan.

² Distances are rounded to the nearest 100 feet.

Grand Boulevards are major transportation corridors that connect city neighborhoods. They are often served by VTA LRT, BRT and other public transits. Transit has priority over vehicles on these streets. Grand Boulevards accommodate moderate to high traffic volume and are provided with ample sidewalks on both sides to serve pedestrians.

Main Streets are streets that support retail and service activities that serve the local neighborhoods. High pedestrian volumes are encouraged through the provision of ample pedestrian amenities.

City Connector Streets have four or six traffic lanes and are meant to accommodate moderate to high vehicular volume. Sidewalks are provided for pedestrians.

Local Connector Streets have two traffic lanes for low to moderate vehicular traffic. Sidewalks are provided for pedestrians.

Residential Streets are primarily to provide access to properties. They accommodate low volumes of local traffic and pedestrians are provided with sidewalks or paths.

2.2 Traffic Operations

2.2.1 Existing Traffic Volumes

Figure 2-2 shows the annual average daily traffic volumes on major streets within the study area. Within the study area, Capitol Expressway is noted as carrying 59,000 to 78,000 vehicles per day depending on the location.

The analysis of existing traffic conditions focused on 8 intersections during the AM and PM peak hours along Capitol Expressway. Peak hour traffic operations are a more accurate gauge of traffic congestion than daily traffic.

Table 2-2 notes the intersections included in the study area, the source of the traffic counts and the date of the counts. Figure 2-3 and Figure 2-4 present the existing study intersection geometry and traffic volumes respectively.

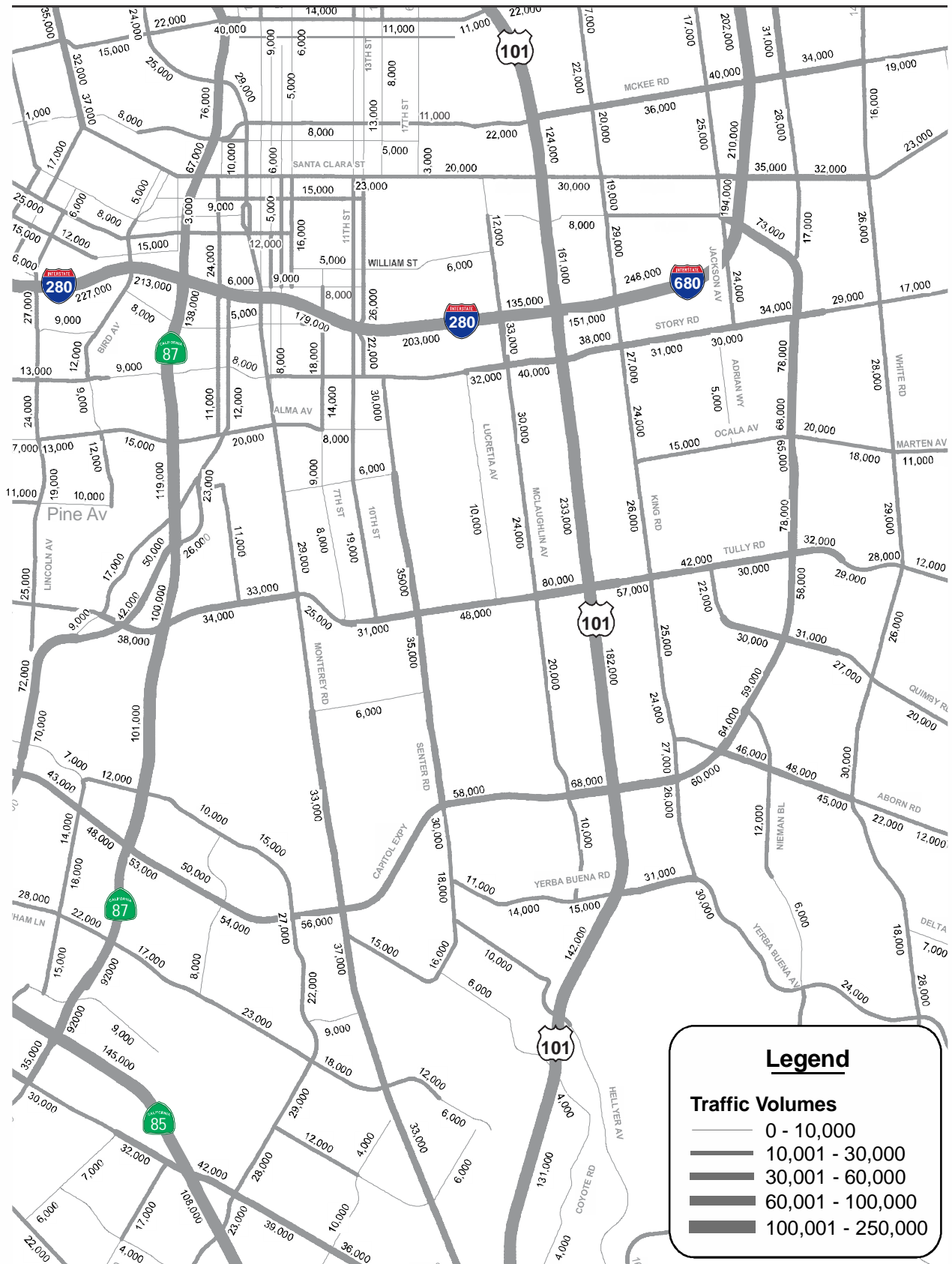
**Table 2-2
Traffic Count Sources & Dates**

Cross Street		AM	
		Count Source	Count Date
1	South Capitol Avenue	AECOM	June 2009
2	Story Road	AECOM	June 2009
3	Ocala Avenue	AECOM	June 2009
4	Cunningham Avenue	AECOM	June 2009
5	Tully Road	AECOM	June 2009
6	Eastridge Access	AECOM	June 2009
7	Quimby Road	AECOM	June 2009
8	Nieman Boulevard	Korve Engineering	February 2005

Note: New traffic counts were collected for the corridor. Since traffic volumes have not changed appreciably since 2005, the volumes at the Nieman Boulevard intersection were not recounted.
Source: AECOM, 2009

2.2.2 Level of Service Analysis

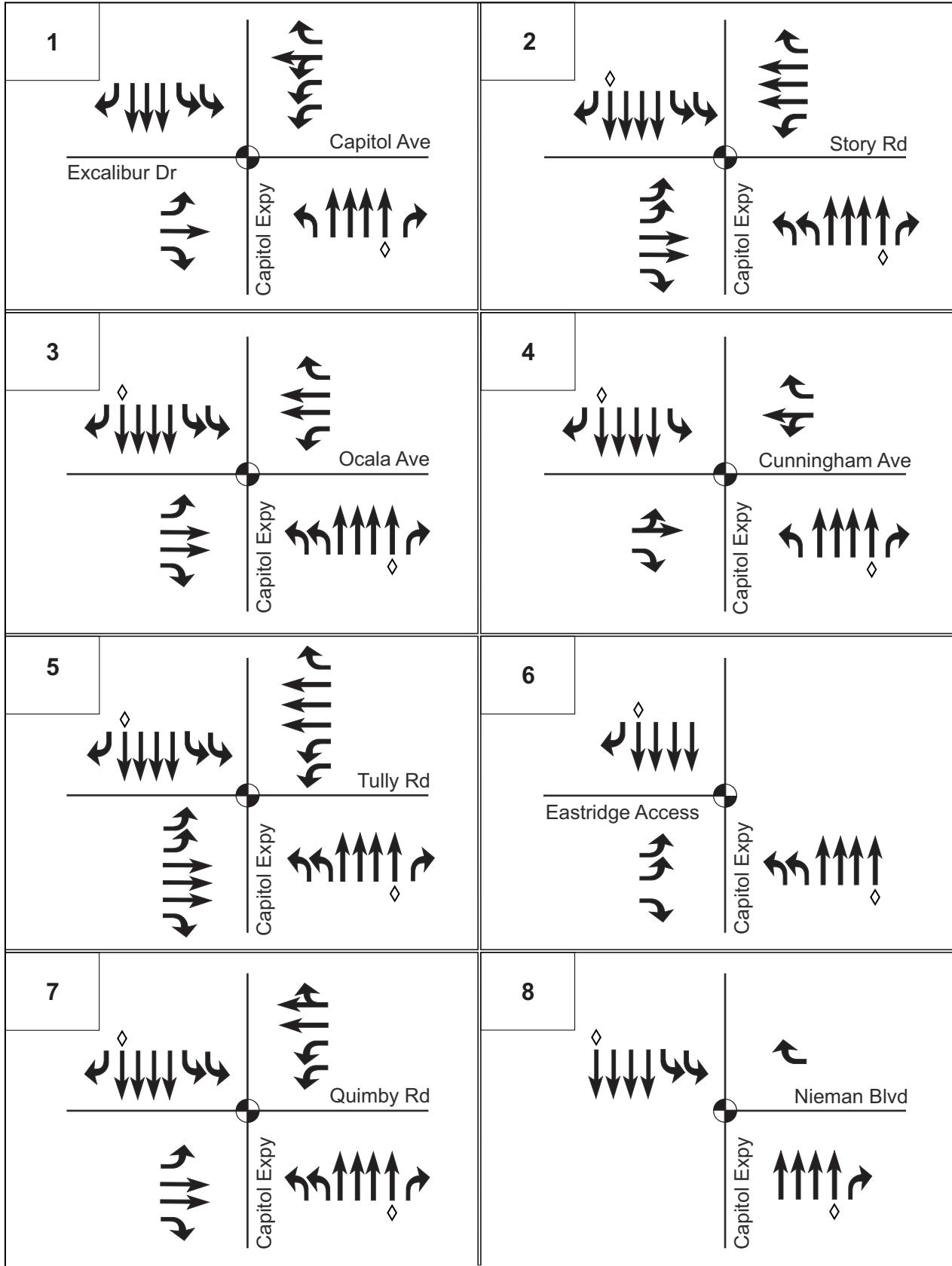
Consistent with the City of San Jose's database and the scope of this study, intersections were analyzed based on the CMP *Traffic Level of Service Analysis Guidelines* (June 2003). The latest version 8 of the TRAFFIX software program is used, which is based on the Highway Capacity Manual methodology. TRAFFIX estimates the operations of intersections and assigns a letter-grade level of service to the intersections based on the average control delay per vehicle.



SOURCE: City of San Jose Traffic Flow Map (2005)

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Figure 2-2
2005 DAILY TRAFFIC VOLUMES

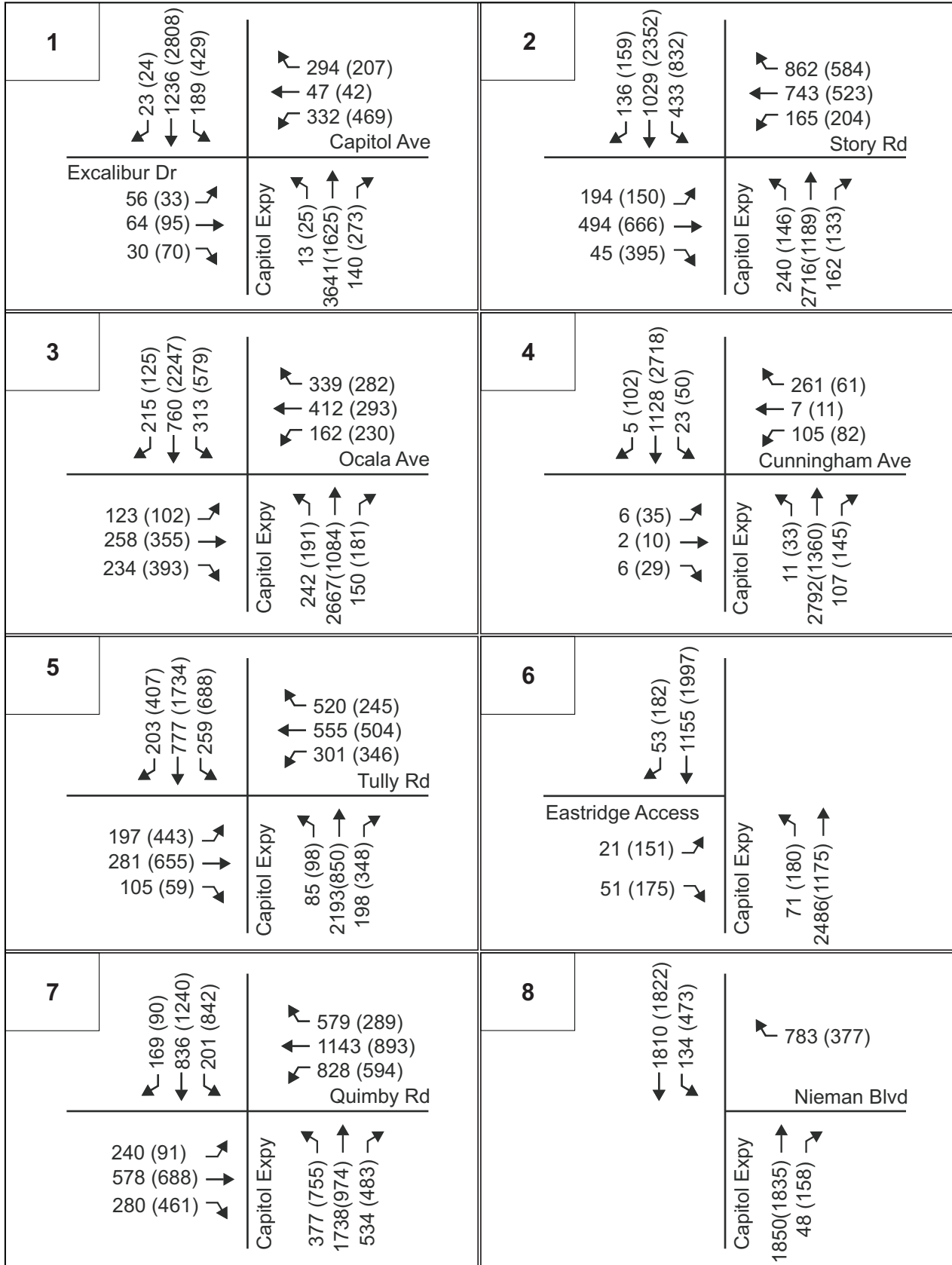


Traffic Signal 

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-3

EXISTING STUDY INTERSECTION GEOMETRY



AM (PM) Peak Hour

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-4

EXISTING STUDY INTERSECTION TRAFFIC VOLUMES

For signalized intersections in an urban environment, an intersection that has an operational level of service D or better is generally considered to perform satisfactorily. A level of service E designation suggests that the intersection is unstable, teetering between successful operations and breakdown, with critical volumes approaching saturation. An intersection with a level of service F designation is considered to have failing operations and excessive delay due to overcapacity. Table 2-3 shows the average stopped delay thresholds associated with each level of service interval in accordance with the CMP methodology.

Table 2-3
CMP Level of Service Thresholds

LOS	Average Control Delay (seconds/vehicle)
A	delay < 10.0
B+	10.0 < delay < 12.0
B	12.0 < delay < 18.0
B-	18.0 < delay < 20.0
C+	20.0 < delay < 23.0
C	23.0 < delay < 32.0
C-	32.0 < delay < 35.0
D+	35.0 < delay < 39.0
D	39.0 < delay < 51.0
D-	51.0 < delay < 55.0
E+	55.0 < delay < 60.0
E	60.0 < delay < 75.0
E-	75.0 < delay < 80.0
F	delay > 80.0

Source: CMP Transportation Impact Analysis Guidelines, March 2009.

2.2.3 Existing Levels of Service

Table 2-4 shows the calculated average stop delay and the resultant LOS for each of the study intersections. A discussion of the findings of existing traffic operations for the corridor is presented below. The Appendix includes detailed TRAFFIX printouts for each study intersection.

Table 2-4
Existing Intersection Levels of Service

Intersections with Capitol Expressway		CMP	AM			PM		
			LOS	Average Delay (s)	V/C	LOS	Average Delay (s)	V/C
1	South Capitol Avenue	Yes	D+	36.6	0.809	D	42.0	0.772
2	Story Road	Yes	E-	75.4	1.039	D-	54.3	0.843
3	Ocala Avenue	No	D	43.1	0.717	D	50.1	0.675
4	Cunningham Avenue	No	B	12.7	0.609	A	9.0	0.515
5	Tully Road	Yes	D	47.7	0.745	D	49.7	0.618
6	Eastridge Access	No	A	5.4	0.41	B	12.6	0.434
7	Quimby Road	Yes	E	72.3	0.998	F	81.6	0.993
8	Nieman Boulevard	No	D	42.5	0.757	C+	20.7	0.515

Shaded cells indicate LOS E or F
Source: AECOM 2010

The intersections along Capitol Expressway vary between acceptable operations to intersections having unstable operations (LOS E) or failing operations (LOS F). Generally, volumes are quite heavy along Capitol Expressway and often along the cross-streets as well, resulting in diminished operational performance. LOS at Cunningham Avenue, Eastridge Access and Nieman Boulevard are good because the cross street volumes are lower during both peak hours. Levels of service at South Capitol Avenue, Ocala Avenue and Tully Road are also within acceptable range as the cross street volumes are moderate during both peak hours.

In the AM peak hour, the intersections at Story Road and Quimby Road operate at LOS E (unstable). At both intersections, the high southbound left turn volume combined with the heavy northbound through and left turn volumes on Capitol Expressway cause these intersections to operate at level of service E in the AM peak hour.

In the PM peak hour, the Story Road intersection operates at LOS D, which is considered acceptable. The Quimby intersection operates at LOS F during the PM peak hour. Table 2-5 presents the intersections along Capitol Expressway that currently operate at unstable or failing levels of service. It also summarizes which intersection movements likely contribute most to the poor operations.

**Table 2-5
 Existing Unstable & Failing Intersections**

Cross Street	Period		Comments
	AM	PM	
Story Road	Unstable	Ok	Heavy SB left turn & NB through volumes in AM.
Quimby Road	Unstable	Failing	Heavy left turn movements, heavy NB through movements during AM and heavy SB through movements during PM.

Source: AECOM 2010

2.2.4 *Queuing Analysis*

A left turn queuing analysis was conducted for the eight study intersections along Capitol Expressway. Table 2-6 presents the summary of the existing left turn queuing conditions at these 8 intersections. The existing AM and PM peak hour left turn queues were calculated based on the existing available left turn traffic volumes. TRAFFIX 8 software package is used to estimate the queues and were compared to existing left-turn storage. Left turn storage bays that have the potential to overflow are highlighted in Table 2-6. An indication of over capacity does not necessarily imply that the lane will overflow since signalization and progressions will tend to minimize queues. Field observations were conducted to determine the correlation between actual queues and those estimated by the TRAFFIX software. AM and PM peak hour queues were measured at Story Road and Ocala Avenue. During the AM peak hour, the actual queues were approximately half of those projected by TRAFFIX. During the PM peak hour the queues in the northbound direction were nearly identical to those estimated by TRAFFIX, but in the southbound direction the field measurements were again about half of the TRAFFIX calculation.

In the northbound direction, only the left-turn pocket for Capitol Expressway at the intersection of Quimby Road could not meet the demand during both peak hours. Six left-turn pockets along Capitol Expressway experience queuing outside of the existing bays in the southbound direction as noted by the shadings in Table 2-6. During the AM peak hour, the queue at the intersections of Story Road, Ocala Avenue and Tully Road exceeded the storage provision. The left-turn

pockets at the intersections with South Capitol Avenue, Story Road, Ocala Avenue, Tully Road, Quimby Road and Nieman Boulevard could not meet the demand during the PM peak hour.

**Table 2-6
Arterial Queuing Summary – Existing Conditions**

No.	Intersections with Capitol Expressway	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	South Capitol Avenue	AM	10	86	120	104	79	102	18	ST
		PM	21	166	153	141				
2	Story Road	AM	98	189	90	130	99	130	53	91
		PM	67	298	68	158				
3	Ocala Avenue	AM	87	135	100	127	99	114	61	46
		PM	86	206	83	169				
4	Cunningham Avenue	AM	8	19	5	79	91	96	ST	ST
		PM	28	38	35	72				
5	Tully Road	AM	37	114	89	130	99	114	84	61
		PM	44	229	173	141				
6	Eastridge Access	AM	29	N/A	10	N/A	91	N/A	38	N/A
		PM	77	N/A	66	N/A				
7	Quimby Road	AM	158	93	187	293	91	110	56	58
		PM	297	317	75	246				
8	Nieman Boulevard	AM	N/A	61	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	169	N/A	N/A				

Source: AECOM, 2010

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

Along the cross streets, demand exceeded the storage lane provision for South Capitol Avenue, Story Road, Ocala Avenue, Tully Road, Eastridge Access and Quimby Road for at least one approach during one or both of the peak hours. For South Capitol Avenue, Story Road, Ocala Avenue, Tully Road and Quimby Road, the eastbound storage lane experienced excessive queuing during the AM and PM peak hours. At Eastridge Access during the PM peak hour, demand for eastbound left turns also exceeded supply. In the westbound direction, left-turn demand exceeded storage lane capacity at Story Road, Ocala Avenue, Tully Road and Quimby Road during both peak hours.

2.2.5 Travel Times

Travel time surveys along the corridor were conducted during the AM and PM peak hours in June 2009. Seven travel time runs in each direction were completed during the AM peak and 8 runs in each direction were conducted during the PM peak. The travel time runs were separated by direction and the times averaged.

Table 2-7 summarizes the travel times for the mixed flow lanes and HOV lanes along the corridor by direction for the peak hours. The survey details are presented in the Appendix. The travel times are also shown graphically on Figure 2-5 through Figure 2-8. Figure 2-5 shows the northbound AM travel time and Figure 2-6 shows the northbound PM travel time. Figures 2-7 and 2-8 show the AM and PM peak hours travel time respectively for southbound.

As seen from Table 2-7, the overall travel time for the mixed lanes between South Capitol Avenue and Eastridge Access is similar for the southbound direction during both peak hours, giving an overall average speed along Capitol Expressway of about 33 mph. During the PM peak hour however, the overall travel time in the northbound direction is adversely longer than during the AM peak. As a result, the average speed along Capitol Expressway differs by 10 mph between the two timeframes.

The overall travel time for the HOV lanes is shorter when compared to the mixed lanes. It is noted that, since the data for the mixed flow and HOV lanes were collected at two different periods, the travel patterns would differ slightly, resulting in some HOV segments having higher travel times than the mixed lanes. Travel time for the mixed flow lanes were collected in June 2009 whereas data for the HOV lanes were subsequently collected in March 2010. However, the HOV lanes still have an overall reduction in travel time along the whole corridor. It is also noted that from the 2008 County Expressway Study Report, high violation rates along the HOV lanes could contribute to the lower performance of the HOV lanes. It is likely that performance would improve as traffic returns to the 2001 levels. In addition, most of the HOV lanes along Capitol Expressway would be eliminated when the planned LRT is built.

2.3 Transit Network

The transit network in the study area includes a variety of modes. Bus and light rail services are provided by VTA while heavy commuter rail travel between San Francisco and Gilroy is provided by Caltrain.

2.3.1 VTA Public Transit

VTA operates public transit services in Santa Clara County. The following information is based on routes and schedules prior to January 11, 2010 when VTA implemented major service changes. These services include light rail transit on three lines (2 main lines and a spur line) and bus service on 86 routes. VTA would also operate this proposed light rail extension.

Existing transit service in the East Valley is dominated by long-haul bus service. VTA operates several bus routes on major cross-town and local streets, connecting the area to the rest of the region. Connections within the system are focused on the Eastridge Transit Center, which currently serves 11 bus routes. The existing transit network in the project vicinity is presented in Figure 2-9.

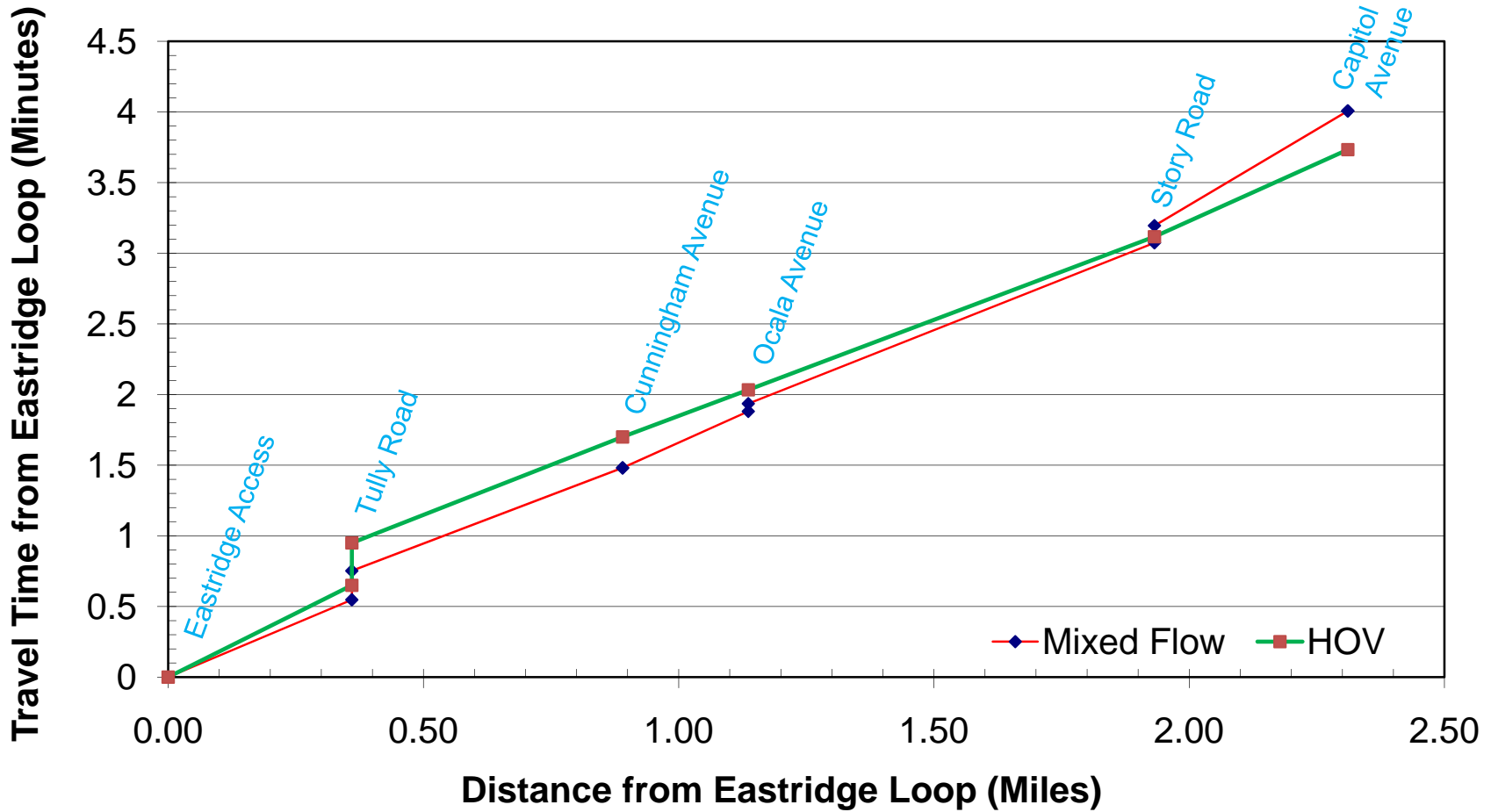
The majority of regular bus routes run weekdays from early in the morning (5:00 am to 6:00 am) until late in the evening (10:00 pm to midnight) and weekends from early in the morning until mid-evening (8:00 pm to 10:00 pm). An exception is Line 22 which operates 24 hours, seven days a week. Limited stop and express bus services operate only during the peak periods from Monday to Friday. Table 2-8 lists the bus lines that serve the East Valley study area along with their hours of operation and general headways.

**Table 2-7
Automobile Travel Times**

Segment	Cumulative Distance (miles)	Northbound (Mixed Flow / HOV)				Segment	Cumulative Distance (miles)	Southbound (Mixed Flow / HOV)			
		AM		PM				AM		PM	
		Travel time	Speed	Travel time	Speed			Travel time	Speed	Travel time	Speed
		(min)	(mph)	(min)	(mph)			(min)	(mph)	(min)	(mph)
Eastridge Access to Tully Road	0.36	0.75 / 0.95	28.8 / 22.7	1.37 / 0.58	15.8 / 37.2	South Capitol Avenue to Story Road	0.38	0.62 / 0.65	36.8 / 35.1	1.31 / 1.42	17.4 / 16.1
Tully Road to Cunningham Avenue	0.89	1.48 / 1.70	43.6 / 42.4	2.21 / 1.30	37.9 / 44.2	Story Road to Ocala Avenue	1.17	1.83 / 2.07	39.2 / 33.4	2.49 / 2.57	40.2 / 41.2
Cunningham Avenue to Ocala Avenue	1.14	1.94 / 2.03	32.6 / 45.5	2.7 / 2.60	30.6 / 11.5	Ocala Avenue to Cunningham Avenue	1.42	2.19 / 2.47	41.7 / 37.5	2.84 / 2.90	42.9 / 45.5
Ocala Avenue to Story Road	1.93	3.17 / 3.12	38.5 / 43.5	5.11 / 4.87	19.7 / 20.9	Cunningham Avenue to Tully Road	1.95	3.70 / 3.17	21.1 / 45.4	3.61 / 3.60	41.3 / 45.4
Story Road to South Capitol Avenue	2.31	4.01 / 3.73	27.1 / 37.4	5.72 / 5.55	37.4 / 33.5	Tully Road to Eastridge Access	2.31	4.27 / 3.70	37.9 / 40.8	4.13 / 4.08	41.5 / 45
Overall	2.31	4.01 / 3.73	34.6 / 37.2	5.72 / 5.55	24.2 / 25	Overall	2.31	4.27 / 3.70	32.5 / 37.5	4.13 / 4.08	33.6 / 34

Note: Shaded Cells indicate HOV data
Mixed lane data collected in 2009, HOV data collected in 2008
Source: AECOM 2009

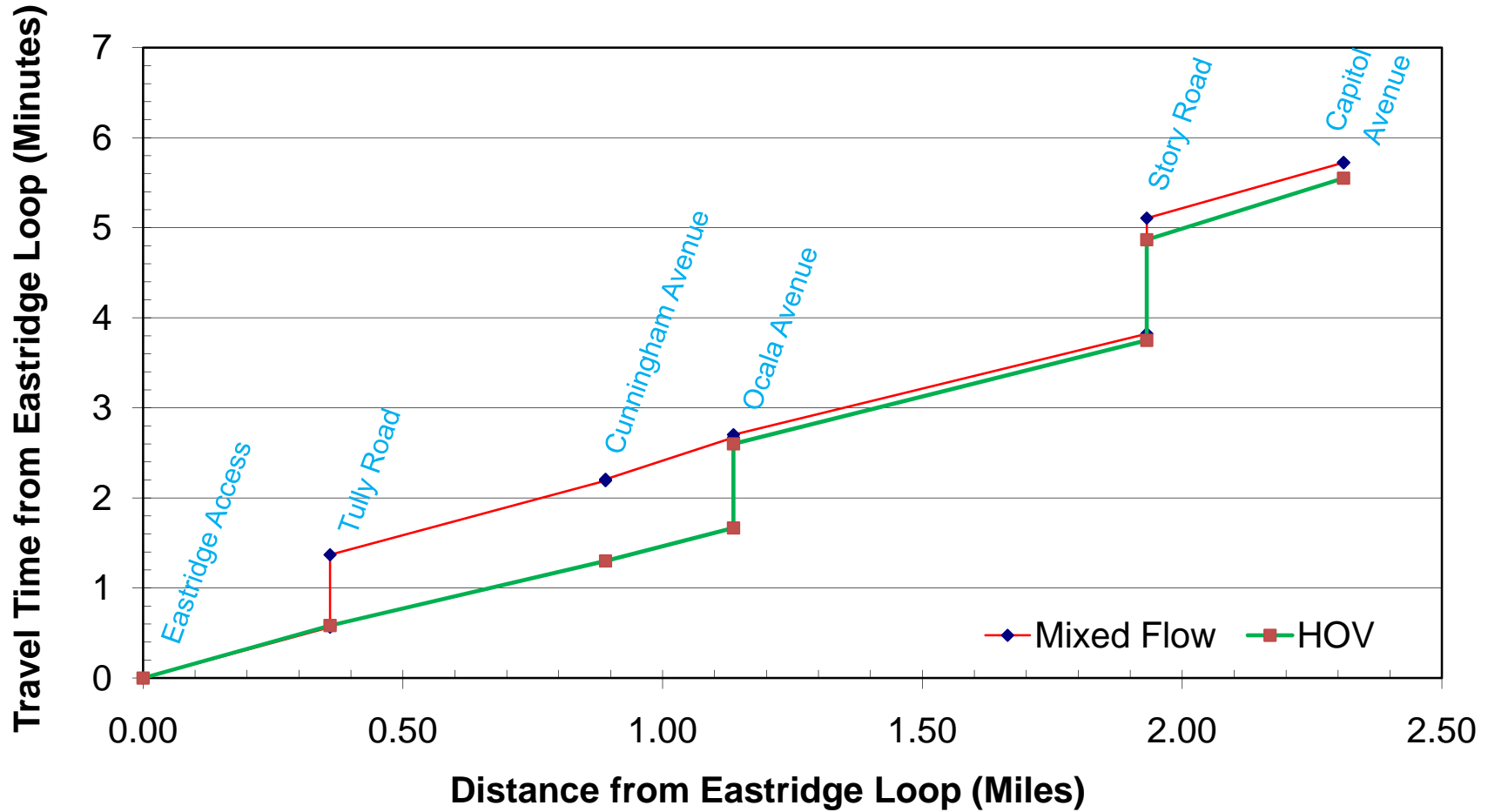
Capitol Expressway Travel Time (AM Peak - Northbound Direction)



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Figure 2-5
AVERAGE TRAVEL TIME
AM - Northbound Direction

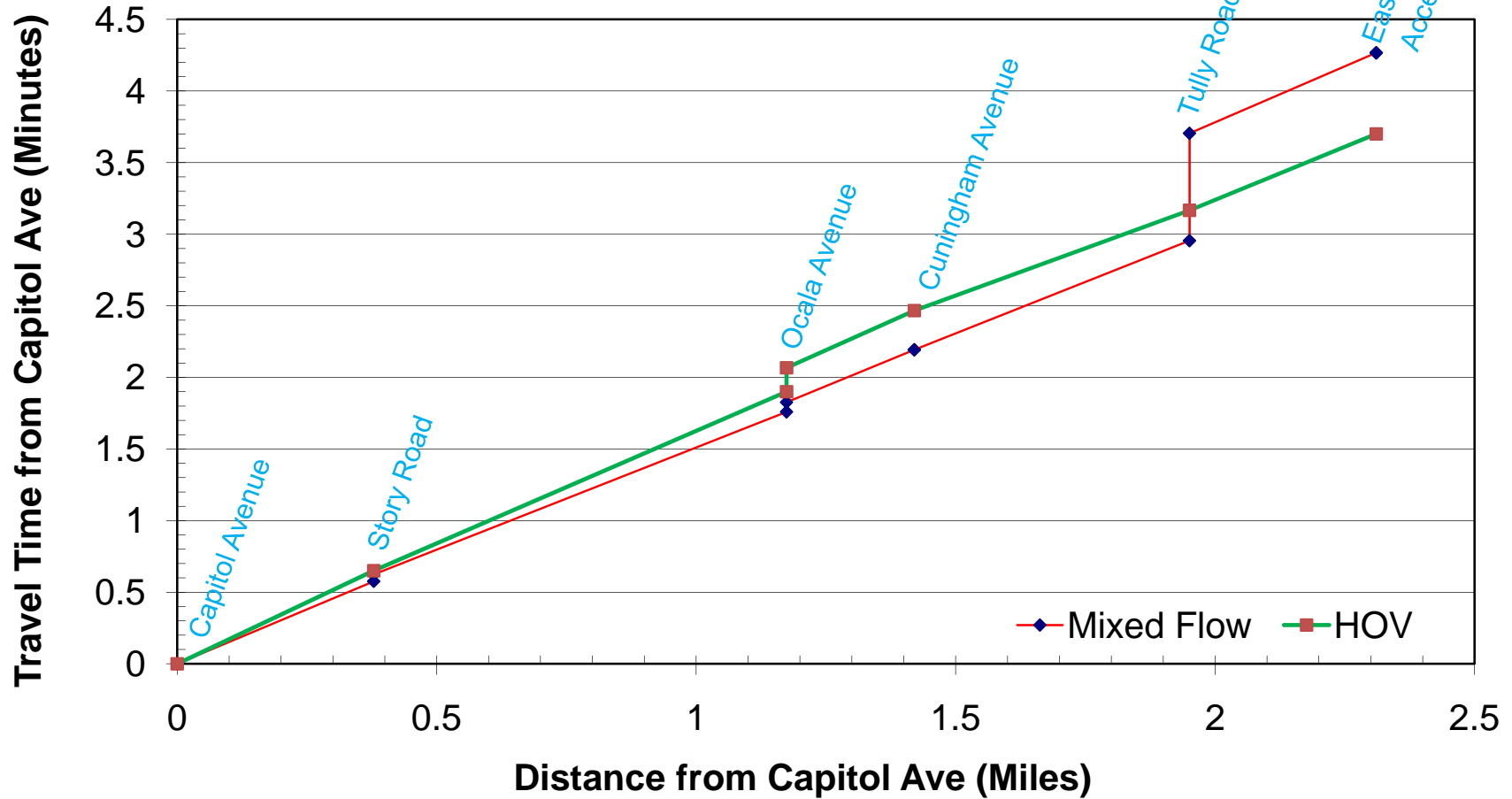
Capitol Expressway Travel Time (PM Peak - Northbound Direction)



DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-6
AVERAGE TRAVEL TIME
PM - Northbound Direction

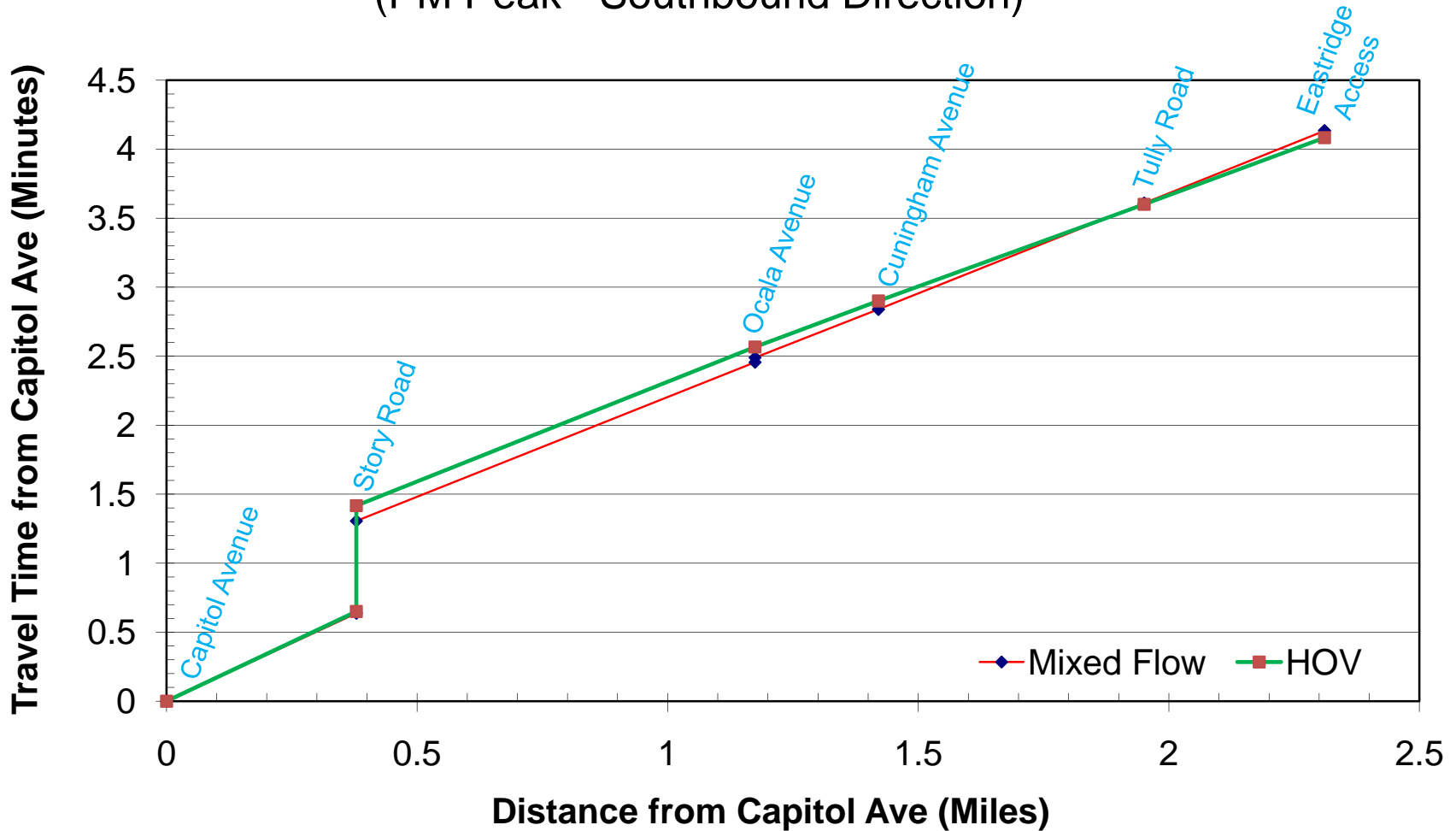
Capitol Expressway Travel Time (AM Peak - Southbound Direction)



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Figure 2-7
AVERAGE TRAVEL TIME
AM - Southbound Direction

Capitol Expressway Travel Time (PM Peak - Southbound Direction)



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Figure 2-8
AVERAGE TRAVEL TIME
PM - Southbound Direction

**Table 2-8
Bus Service Hours & Headways at Eastridge Transit Center**

Line	Description	Weekday Service				Weekend Hours of Operation
		Hours of Operation	Headways			
			Peak (5am – 9am 3pm – 6pm)	Midday (9am – 3pm)	Night (After 7pm)	
Local Routes						
12	Eastridge – San Jose Civic Center via San Jose Flea Market	Weekends and Holidays Only				9:30am – 7:00pm
22	Eastridge – Palo Alto Transit Center	24 hours	11	12	20-60	24 hours
26	Eastridge - Lockheed Martin	5:00 am – 11:45 pm	20-30	15-30	30-60	6:30 am – 10:30 pm
31	Eastridge - Evergreen College	5:45 am – 10:30 pm	15	30	30-60	7:30 am – 7:00 pm
39	Eastridge – The Villages	5:45 am – 7:30 pm	30	60	-	7:45 am – 7:00 pm
43	Eastridge – Alum Rock Transit Center	Sundays Only				9:15 am – 6:30 pm
70	Capitol LRT Station – Great Mall / Main Transit Center	5:00 am – 11:30 pm	15	15	30-60	6:15 am – 11:30 pm
71	Eastridge - Great Mall / Main Transit Center	5:30 am – 10:15 pm	15	30	30-60	7:00 am – 9:30 pm
77	Eastridge - Great Mall / Main Transit Center & Calaveras	5:30 am – 10:00 pm	15	15	30-60	6:45 am – 9:00 pm
Express Routes and BRT						
103	Eastridge – Palo Alto	5:15 am – 8:15 am 2:45 pm – 6:15 pm	40-60	-	-	-
522	Eastridge to Palo Alto	5:00 am – 9:00 pm	15	15	30	6:15 am – 8:30 pm (Saturdays)

Source: VTA website, July 2009

The study area is served by several of the most heavily-used bus routes in the VTA system. Lines 22 (King Road to Santa Clara Street), 25 (Story Road), and 70 (Capitol Expressway and Jackson Avenue) each carry more than 5,000 passengers on an average weekday over the full length of their routes (not just the portions in the project vicinity). Table 2-9 presents the average weekday ridership for the bus lines that serve the East Valley study area.

**Table 2-9
Average Weekday Bus Ridership by Route**

Route	Daily Ridership	Route	Daily Ridership
12	795	43	85
22	16,365	45	384
23	8,350	70	5,566
25	7,316	71	2,263
26	4,362	77	2,342
31	1,030	103	113
39	367	522	6,105

Source: VTA Reporting and Systems Department, 2009

Major intersections and transit centers are the principal locations where passengers may make connections between routes. It is at these locations that passenger activity (i.e., boarding and alighting) is focused. Along the project corridor, the Eastridge Transit Center has the highest levels of passenger activity in the study area, with 4,482 daily boardings and alightings. The next highest level of passenger activity occurs at Story Road with 290 daily boardings and alightings. Table 2-10 summarizes the daily passenger activity for the bus stops at major intersections and transit centers along the project corridor. The total passenger activity for these locations is presented graphically in Figure 2-10.

Table 2-10
Daily Passenger Activity at Major Bus Stops & Transit Centers

Location	# of Lines	Bus Stop				Total
		NB	SB	EB	WB	
Story Road	4	72	61	76	81	290
Ocala Avenue	1	75	54	0	0	129
<i>Eastridge Transit Center</i>	11	3,872	610	0	0	4,482
Nieman Boulevard	1	18	21	0	0	39

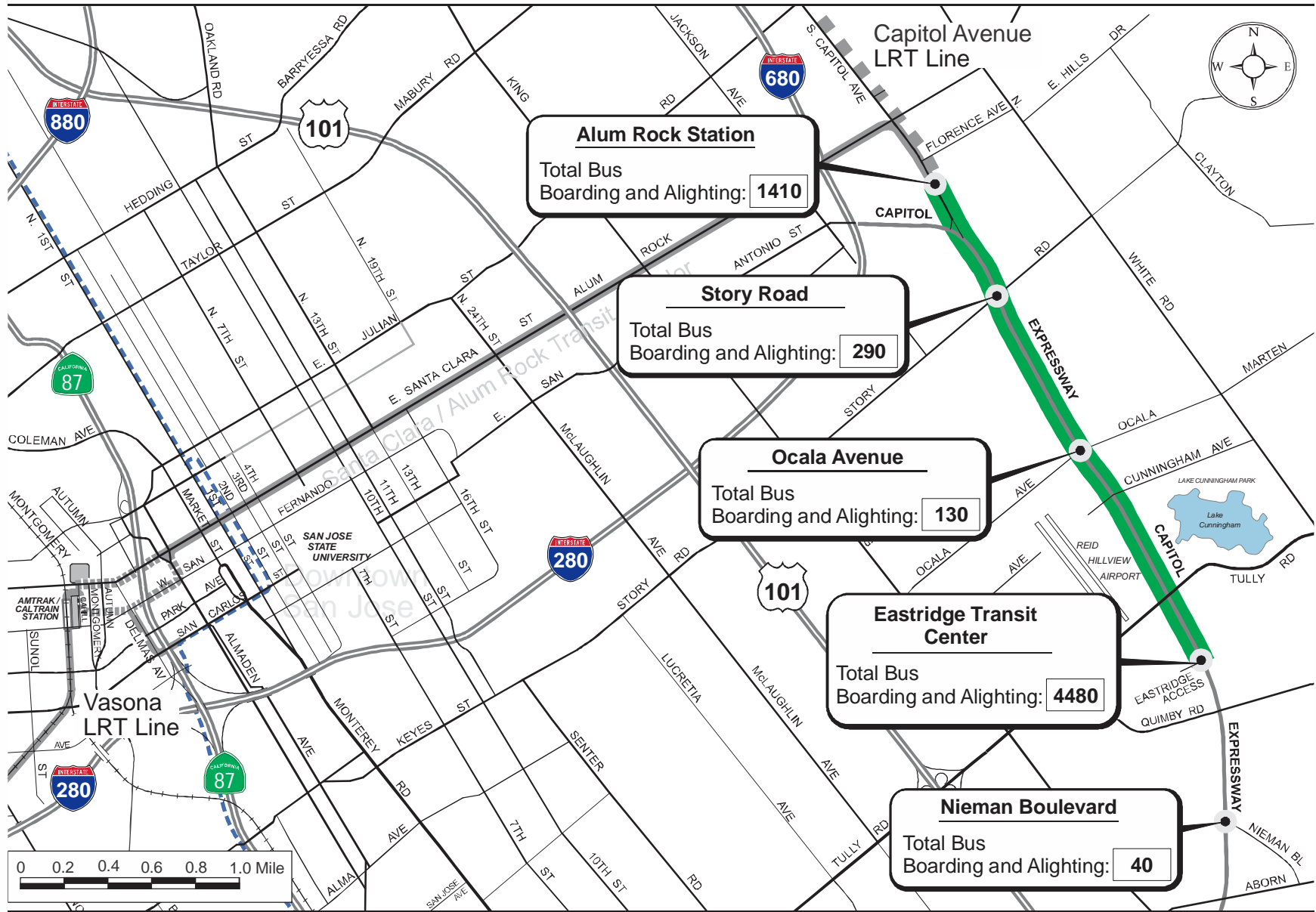
N/A = no bus stop
Transit centers are in italics.
Passenger activity includes both boarding and alighting.
Source: VTA Reporting and Systems Department, 2009

Transit passengers in the East Valley have access to the VTA light rail network via the Alum Rock – Santa Teresa Line. Direct service is available at the Capitol Light Rail Station, located near the Capitol Expressway / SR 87 (Guadalupe Parkway) interchange, and the Alum Rock Station near the Capitol Expressway / South Capitol Avenue intersection. Table 2-11 presents the existing LRT service details. All three LRT lines operate seven days a week with frequency ranging from 15 minutes to one hour depending on time of the day.

Table 2-11
Light Rail Service Hours & Headways

Light Rail Line	Weekday Service				Weekend Hours of Operation
	Hours of Operation	Peak (5am – 9am / 3pm – 6pm)	Midday (9am – 3pm)	Nights (After 7pm)	
Alum Rock – Santa Teresa	4:30 am to 2:00 am	15	15	15-60	4:30 am to 2:00 am
Mountain View – Winchester Avenue	5:00 am to 12:30am	15	30	15-30	5:15 am to 12:30am
Ohlone/Chynoweth – Almaden	5:45 am to 10:30 pm	15	15	15	7:00 am to 10:30 pm

Source: VTA Bus and Rail Map, July 2009



As of December 2009

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-10

DAILY PASSENGER ACTIVITY AT BUS STOPS NEAR MAJOR INTERSECTIONS

For both the bus and light rail operations in the system, the VTA offers an integrated fare structure. Riders pay the same fare to ride regular and limited stop buses as they do to ride light rail. The fare structure is based off of an adult single ride fare of \$2.00 and a day pass fare of \$6.00. Discounted fares are available to youth and senior riders, as well as to frequent system users through monthly and annual passes. Higher fares are charged for express bus lines to account for the higher level of service they provide; however, discount fares are also available for these lines. Table 2-12 lists the current fare structure for the VTA transit services.

Table 2-12
VTA Transit Fares

Fare Type	Adult	Youth (5-17)	Senior (65+)/Disabled/Medicare
Single Ride	\$2.00	\$1.75	\$1.00
Express Single Ride	\$4.00	*	*
Day Pass	\$6.00	\$5.00	\$2.50
Express Day Pass	\$12.00	*	*
Day Pass Tokens (Pack of 5)	\$27.00	\$22.50	--
Community Bus Single Ride	\$1.25	\$0.75	\$0.50
Monthly Flash Pass	\$70.00	\$45.00	\$25.00
Express Monthly Flash Pass	\$140.00	*	*
Annual Flash Pass	\$770.00	\$495.00	\$275.00
Express Annual Flash Pass	\$1,540.00	*	*
8-Hour Light Rail Pass	\$4.00	\$3.50	\$2.00

Source: VTA website, November 2009

*All Youth and Senior/Disabled/Medicare fares are valid on VTA Express Bus service without an upgrade payment.

2.3.2 Caltrain Service

The Peninsula Corridor Joint Powers Board includes representatives from San Francisco, San Mateo, and Santa Clara Counties. It operates Caltrain commuter rail service along a 77-mile right-of-way between Gilroy and San Francisco. Service in the East Valley study area is operated by the VTA with the cooperation of the Union Pacific Railroad (UPRR), which owns the right-of-way between Gilroy and Tamien Station.

In the East Valley study area, Caltrain runs along the west side of Monterey Highway where it passes under Capitol Expressway. The Caltrain station nearest to this project is the Capitol Station located near the intersections of Fehren Drive and Monterey Highway. Commuter rail service at this station is offered by three northbound trains in the morning and two southbound trains in the afternoon as summarized in Table 2-13. Travel via the Caltrain from Capitol Station takes approximately 15 minutes to Downtown San Jose and 1 hour and 30 minutes to San Francisco. The nearest direct light rail connection to Caltrain (along the Alum Rock – Santa Teresa Line) is at Tamien Station.

Table 2-13
Weekday Caltrain Service at Capitol Station

Northbound (To San Jose & San Francisco)	Southbound (To Morgan Hill & Gilroy)
6:41 am 7:04 am 7:39 am	6:29 pm 7:09 pm

Source: Caltrain, 2009

2.4 Park & Ride Facilities

Two existing park-and-ride facilities lie adjacent to the proposed light rail line. Bus passengers at the Eastridge Transit Center are served by a facility with approximately 135 stalls, while a park-and-ride lot with 110 stalls is available at the Alum Rock Station to serve bus and LRT passengers. Table 2-14 summarizes the details of these facilities, while Figure 2-11 locates them graphically.

Table 2-14
Details of Existing Facilities

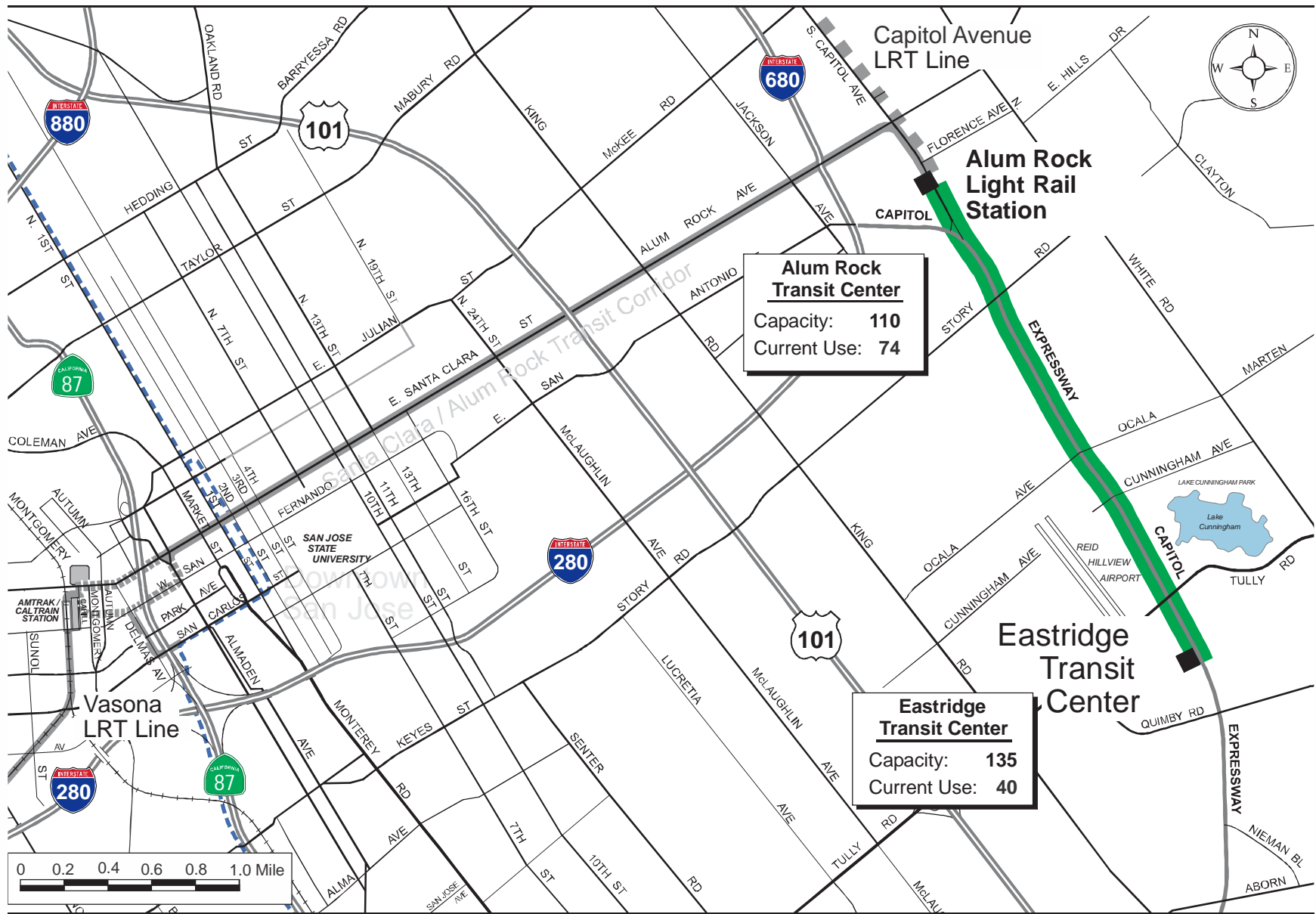
Location	Size (ft²)	Capacity	Area per Stall (ft²)	Current Peak Use
Alum Rock	45,000	110	425	74
Eastridge	61,200	135	460	40

Source: VTA Reporting and Systems Department, 2009

2.5 Pedestrians & Bicycles

Historically, pedestrian and bicycle activity on Capitol Expressway has been fairly limited by the corridor's automobile-dominated nature. Foot-travel along the corridor has been limited due to discontinuous sidewalks and pedestrian crossings only at signalized intersections. The lack of sidewalks was particularly acute on the northern segments of the corridor where the only sidewalks run short distances to link cross-streets with bus stops. Frontage roads do offer sidewalks in sections from South Capitol Avenue to Ocala Avenue. However, the Capitol Expressway Pedestrian Improvements Program, currently under construction, would make area more pedestrian friendly. The sidewalk facilities after the proposed improvements are presented in Figure 2-12.

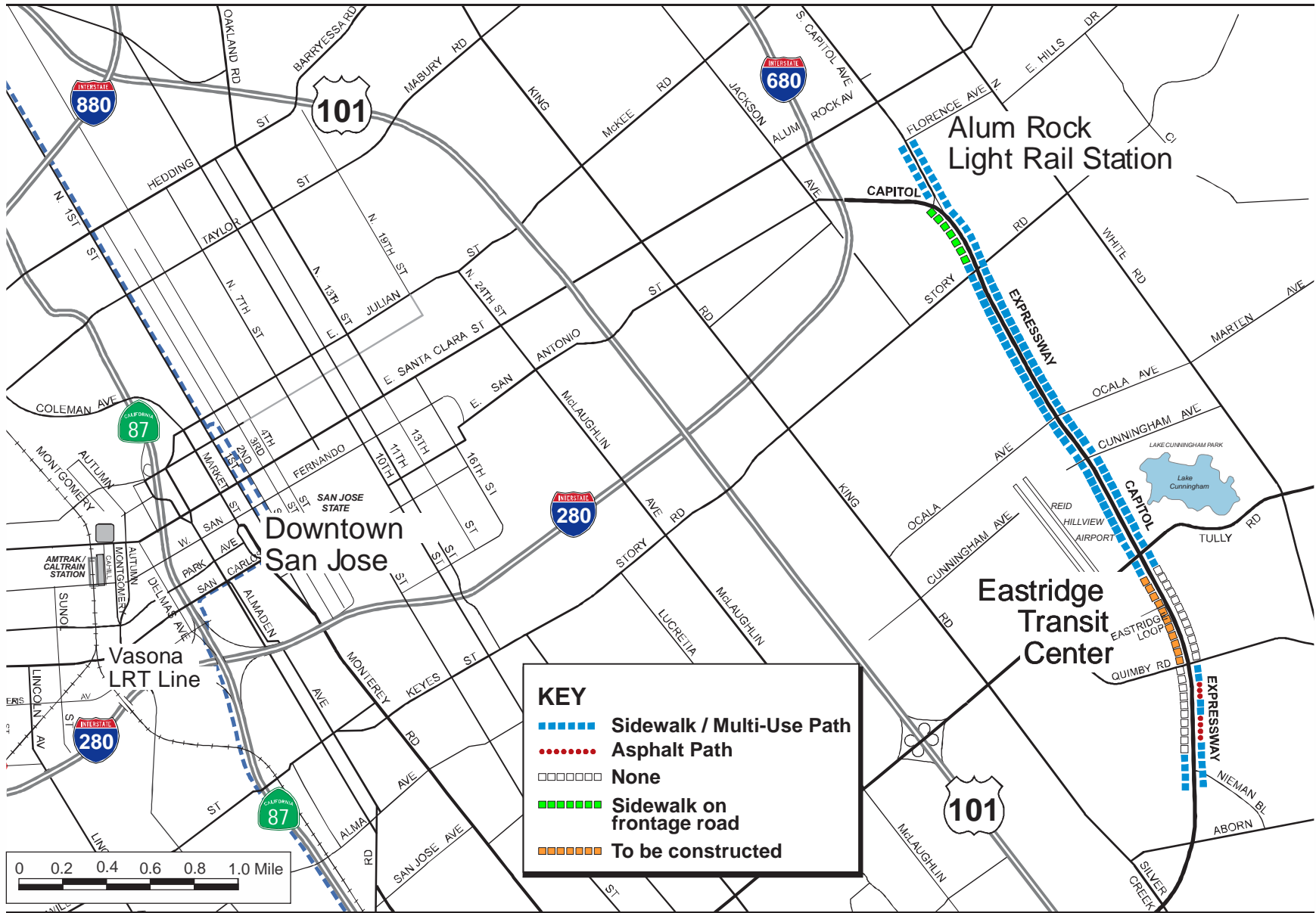
The majority of signalized intersections along the corridor provide for pedestrian crosswalks, although not all approaches to an intersection may permit crossings. The intersections at South Capitol Avenue and Nieman Boulevard prohibit pedestrian crossings on one intersection leg. The intersection at Eastridge Access provides no crosswalks or signals for pedestrians in any direction. Table 2-15 and Figure 2-13 summarize the locations of crosswalks and pedestrian push buttons (PPB).



DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-11

PARK AND RIDE CAPACITY AND CURRENT USE



As of September 2012

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-12

EXISTING PEDESTRIAN SIDEWALKS

**Table 2-15
Capitol Expressway Crosswalk Locations**

Cross Street	Crossing Location at Intersection			
	North	South	East	West
S. Capitol / Excalibur	Yes	Yes	No	Yes
Story	Yes	Yes	Yes	Yes
Ocala	Yes	Yes	Yes	Yes
Cunningham	Yes	Yes	Yes	Yes
Tully	Yes	Yes	Yes	Yes
Eastridge¹	No	No	N/A	No
Quimby	Yes	Yes	Yes	Yes
Nieman¹	No	Yes	Yes	N/A

Notes: ¹Eastridge Access and Nieman Boulevard are T-intersections.

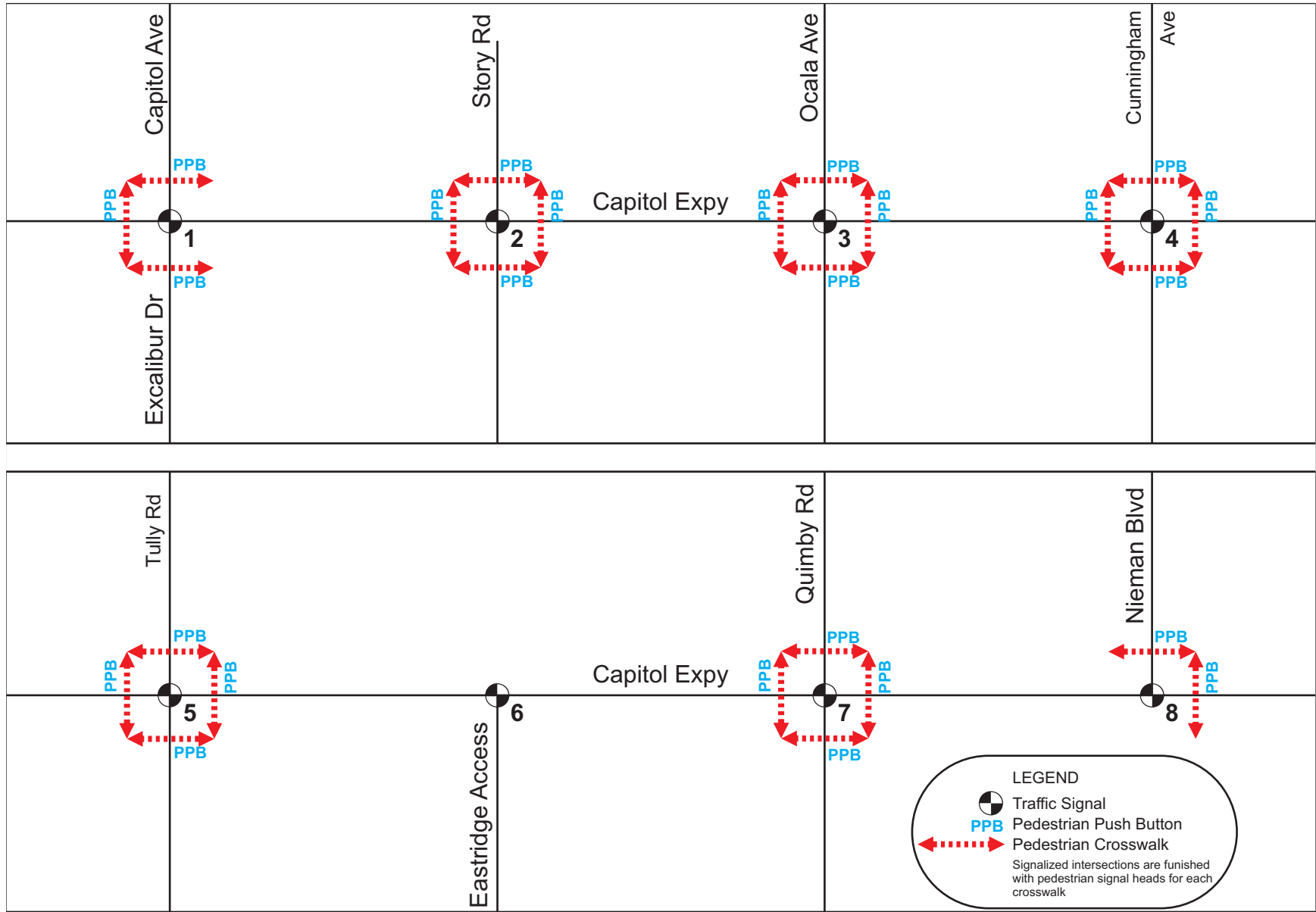
As might be expected in such an automobile-oriented environment, pedestrian crossings are relatively few. Pedestrian use, as surveyed in 2006, was highest at Story Road where over 250 pedestrian crossings occur during each of the morning and afternoon peak hours. Other intersections with moderate crossing volumes (over 75 in a peak hour) include Ocala Avenue. Pedestrian counts at the signalized intersections are included in Table 2-16 and Table 2-17.

An area of particular concern is near the intersections of Capitol Expressway and Ocala Avenue. There are several schools along Ocala Avenue, between White Road and US 101. Under the Capitol Expressway Pedestrian Improvements Project currently under construction, permanent sidewalk would be provided from Ocala Avenue to Cunningham Avenue, east of the expressway and from Sussex Drive to the bus-stop north of the Ocala intersection. An interim sidewalk would continue to be provided up to the Ocala intersection. An interim sidewalk would also be provided west of the expressway between Foxdale Drive and Cunningham Avenue. This interim sidewalk would be further enhanced in the future to become a permanent multi-use path with landscaping. However, there is a design option that would make the sidewalk permanent in order to avoid the partial acquisition of backyards from a number of residences.

Cyclists may use the shoulders along the expressway. Some major cross-streets offer bicycle routes or lanes (Ocala Avenue & Tully Road). Existing bicycle activity in the study area is low despite the availability of some bicycle facilities. Bicycle counts for the major intersections are included in Table 2-18 and Table 2-19. Both the interim and permanent sidewalks provided under the Capitol Expressway Pedestrian Improvements Project would allow the use of bicycles. Figure 2-14 illustrates the bicycle network around the study area.

2.6 Goods Movement

Capitol Expressway serves the movement of commercial goods into and through the East Valley. Capitol Expressway connects to three freeways (I-680, US 101, and SR 87) and Monterey Highway. The connectivity of the corridor to regional and intrastate facilities accentuates its function as a commercial route. The corridor provides for the free flow of commercial traffic except for delays caused by existing traffic congestion. Access into out of commercial facilities along the corridor is provided by signalized intersections at full movement locations and by right turns only at other minor access points. The spacing of access along the corridor minimizes the need for extensive circulation by commercial traffic onto local streets not specifically designated for such purposes.



As of December 2009

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Figure 2-13

EXISTING PEDESTRIAN CONDITIONS

**Table 2-16
AM Pedestrian Counts**

AM Peak	Capitol runs...		North X-walk			South X-walk			N-S Total	West X-walk			East X-walk			E-W Total	Grand Total
	NB/SB	EB/WB	WB	EB	Tot	WB	EB	Tot		SB	NB	Tot	SB	NB	Tot		
South Capitol Ave / Excalibur Dr		X	2	1	3	5	2	7	10	0	0	0	N/A	N/A	N/A	0	10
Story Rd	X		51	49	100	46	39	85	185	35	15	50	7	13	20	70	255
Ocala Ave	X		8	21	29	2	16	18	47	8	8	16	19	15	34	50	97
Cunningham Ave	X		1	0	1	1	3	4	5	6	5	11	2	5	7	18	23
Tully Rd	X		1	2	3	4	2	6	9	3	4	7	0	0	0	7	16
Eastridge Access	X		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Quimby Rd	X		8	12	20	0	2	2	22	8	3	11	6	2	8	19	41
Nieman Blvd	X		N/A	N/A	N/A	26	10	36	36	N/A	N/A	N/A	5	8	13	13	49

N/A – crosswalk not available
AECOM, 2006

**Table 2-17
PM Pedestrian Counts**

PM Peak	Capitol runs...		North X-walk			South X-walk			N-S Total	West X-walk			East X-walk			E-W Total	Grand Total
	NB/SB	EB/WB	WB	EB	Tot	WB	EB	Tot		SB	NB	Tot	SB	NB	Tot		
South Capitol Ave / Excalibur Dr		X	1	2	3	6	6	12	15	0	0	0	N/A	N/A	N/A	0	15
Story Rd	X		53	45	98	36	44	80	178	33	26	59	36	34	70	129	307
Ocala Ave	X		8	5	13	11	11	22	35	15	3	18	14	11	25	43	78
Cunningham Ave	X		1	1	2	0	0	0	2	2	8	10	1	7	8	18	20
Tully Rd	X		2	4	6	4	3	7	13	6	6	12	0	0	0	12	25
Eastridge Access	X		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Quimby Rd	X		13	14	27	5	9	14	41	7	15	22	6	1	7	29	70
Nieman Blvd	X		N/A	N/A	N/A	8	10	18	18	N/A	N/A	N/A	14	13	27	27	45

N/A – crosswalk not available
AECOM, 2006

Table 2-18
Existing AM Bicycle Volumes

AM Peak	Capitol runs...		SB			SB Total	NB			NB Total	EB			EB Total	WB			WB Total	Total
	NB/SB	EB/WB	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R		
South Capitol Ave		X	1	0	0	1	0	0	0	0	0	0	0	0	0	1	2	3	4
Story Rd	X		0	0	1	1	0	0	1	1	0	3	1	4	0	4	1	5	11
Ocala Ave	X		1	0	0	1	0	1	2	3	0	8	0	8	0	8	1	9	21
Cunningham Ave	X		0	1	0	1	0	2	5	7	0	0	0	0	1	0	0	1	9
Tully Rd	X		0	2	1	3	0	3	1	4	0	1	0	1	0	9	0	9	17
Eastridge Access	X		0	3	0	3	0	1	0	1	0	0	0	0	0	0	0	0	4
Quimby Rd	X		0	3	0	3	0	2	0	2	0	0	0	0	1	5	0	6	11
Nieman Blvd	X		0	2	0	2	0	4	0	4	0	0	0	0	0	0	0	0	6

AECOM, 2006

Table 2-19
Existing PM Bicycle Volumes

PM Peak	Capitol runs...		SB			SB Total	NB			NB Total	EB			EB Total	WB			WB Total	Total
	NB / SB	EB / WB	L	T	R	L	T	R	L	T	R	L	T	R	L	T	R		
South Capitol Ave		X	4	0	0	4	0	0	0	0	0	1	0	1	0	0	5	5	10
Story Rd	X		0	3	2	5	3	2	1	6	0	5	2	7	2	1	0	3	21
Ocala Ave	X		0	3	1	4	2	5	4	11	0	3	1	4	1	2	0	3	22
Cunningham Ave	X		0	4	0	4	0	4	2	6	0	0	0	0	2	0	0	2	12
Tully Rd	X		0	5	1	6	1	5	3	9	1	2	0	3	0	2	0	2	20
Eastridge Access	X		0	3	2	5	3	3	0	6	0	0	1	1	0	0	0	0	12
Quimby Rd	X		0	5	1	6	3	1	3	7	0	1	0	1	0	2	1	3	17
Nieman Blvd	X		0	4	1	5	0	6	0	6	0	0	0	0	2	0	0	2	13

AECOM, 2006



Source: City of San Jose Bikeway Network

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 2-14
EXISTING BICYCLE NETWORK

2.7 Community Access

Capitol Expressway serves as the principal thoroughfare in the East Valley study area. As such, it links the various neighborhoods in the corridor and provides access for residents to the amenities and public buildings nearby. Schools, community centers, libraries, cemeteries, major parks, and fire stations are all important features in a community.

Table 2-20 lists the community features in the study area near Capitol Expressway. The table also provides the addresses, the nearest major intersections on Capitol Expressway, and the existing access to the features. Figure 2-15 presents the locations of the major community features.

**Table 2-20
Community Features Inventory**

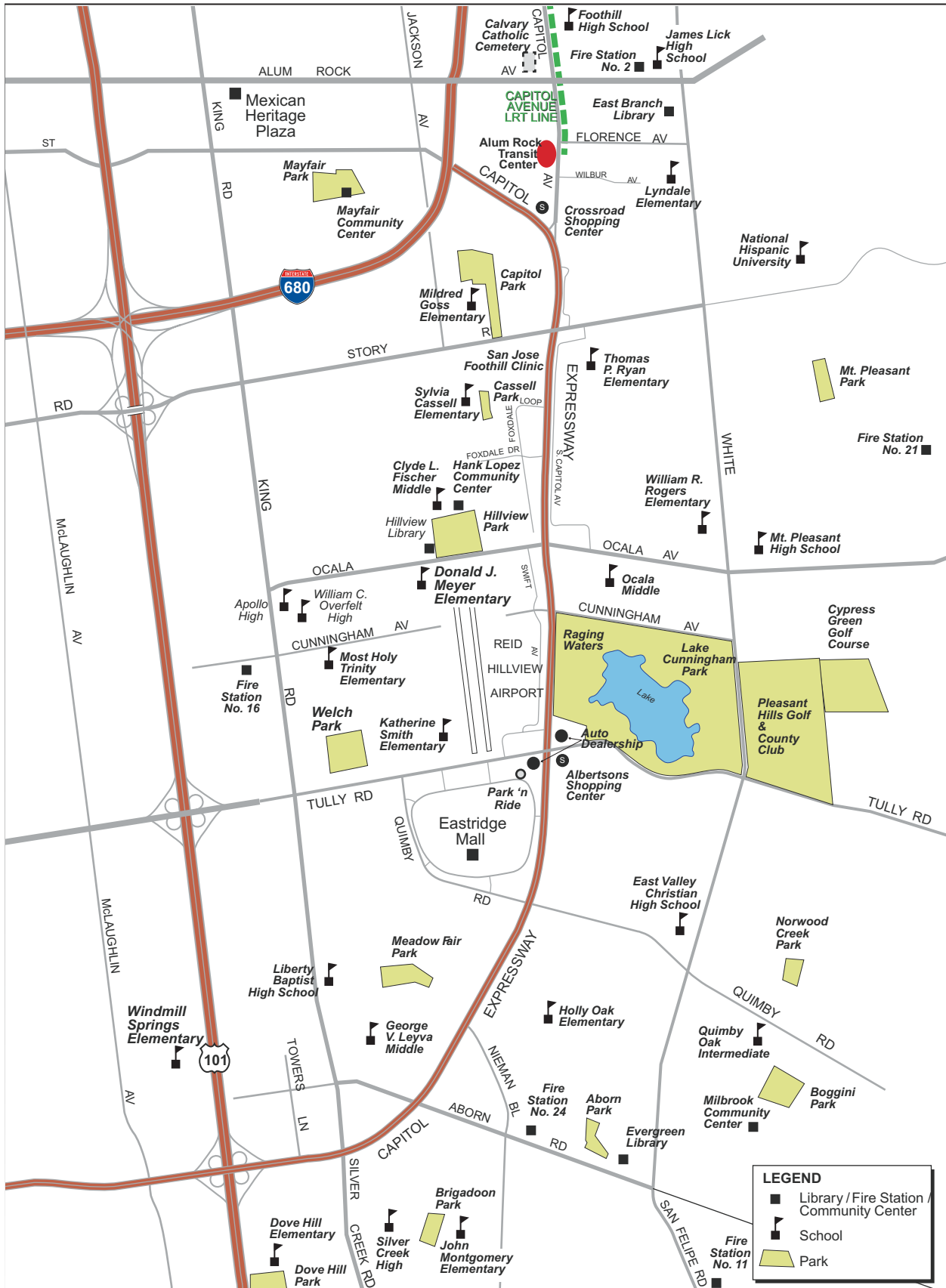
Feature	Address (Nearest Major Cross Street)	Capitol Expressway Access
Elementary Schools		
Donald Meyer	1824 Daytona Drive (Ocala Avenue)	0.4 mile west on Ocala Avenue to Daytona Drive
Katherine Smith	2025 Clarice Drive (Tully Road)	0.5 mile west on Tully Road to Quimby Road to Clarice Drive
Lyndale	13901 Nordyke Drive (White Road)	0.4 mile east on Wilbur Avenue
Mildred Goss	2475 Van Winkle Lane (Story Road)	0.1 mile west on Story Road to Galahad to Van Winkle Lane
Most Holy Trinity	1940 Cunningham Avenue (King Road)	0.6 mile west on Ocala Avenue to Winter Park Way to Cunningham Avenue
Sylvia Cassell	1300 Tallahassee Drive (Story Road)	0.3 mile west of Capitol Expwy between Story Road & Ocala Avenue; No direct access
Thomas Ryan	1241 McGinness Avenue (Story Road)	0.2 mile east on Story Road to McGinness Avenue
William Rogers	2999 Ridgemont Drive (Ocala Avenue)	0.4 mile east on Ocala Avenue to Ridgemont Drive
Junior High / Intermediate / Middle Schools		
Clyde Fischer Middle	1720 Hopkins Drive (Ocala Avenue)	0.6 mile west on Ocala Avenue to Hopkins Drive
Ocala Middle	2800 Ocala Avenue (Capitol Expressway)	0.2 mile east on Ocala Avenue
High Schools		
Apollo High	1835 Cunningham Avenue (King Road)	0.5 mile west on Ocala Avenue to Winter Park Way
Mount Pleasant High	1750 South White Road (Ocala Avenue)	0.6 mile east on Ocala Avenue to White Road
William C. Overfelt High	1835 Cunningham Avenue (King Road)	0.5 mile east on Ocala Avenue to Winter Park Way
Community Centers		
Hank Lopez	1694 Adrian Way (Ocala Avenue)	0.3 mile west on Ocala Avenue to Adrian Way
Libraries		
Hillview Branch	1600 Hopkins Drive (Ocala Avenue)	0.64 mile west on Ocala Avenue to Hopkins Drive
Cemeteries		
Calvary Catholic	2655 Madden Avenue (Alum Rock Avenue)	0.6 mile north on North Capitol Avenue to Madden Avenue

Feature	Address (Nearest Major Cross Street)	Capitol Expressway Access
Major Parks		
Capitol	Bambi Lane (Capitol Expressway)	0.2 mile west on Bambi Lane
Hillview	2251 Ocala Avenue (Capitol Expressway)	0.3 mile west on Ocala Avenue
Lake Cunningham	2305 South White Road (Tully Road)	0.2 mile east on Tully Road
Welch	1900 Santiago Drive (Tully Road)	0.6 mile west on Tully Road to Brahms Drive
Fire Stations		
Station No. 2	2933 Alum Rock Avenue (White Road)	0.2 mile east on Alum Rock Avenue
Station No. 16	2001 South King Road (Cunningham Avenue)	0.9 mile west on Ocala Avenue to King Road
Station No. 21	1749 Mount Pleasant Road (Marten Avenue)	1.4 miles east on Ocala Avenue to Mount Pleasant Road
Major Attractors		
Eastridge Shopping Center	1 Eastridge Center (Capitol Expressway)	At Eastridge Access
National Hispanic University	14271 Story Road (White Road)	0.7 mile east on Story Road
Raging Waters	2333 South White Road (Tully Road)	0.2 mile east on Tully Road
Reid Hillview Airport	2350 Cunningham Avenue (Capitol Expressway)	0.2 mile west on Cunningham Avenue
Little League Baseball Fields	Capitol Expressway/ Cunningham Avenue	0.1 mile west on Airport access roadway

2.8 Parking

On-street parking is prohibited on Capitol Expressway. Parking is permitted along South Capitol Avenue, north of the project corridor and the frontage roads parallel to Capitol Expressway that serve the residential areas on both sides of the expressway. A parking survey was conducted to gauge the current demand for parking. On-street parking counts were conducted on June 23, 2009 at 10:00 pm when residential parking demand is at its peak. Table 2-21 presents the existing demand observed along South Capitol Avenue.

On-street parking is permitted along the east side of South Capitol Avenue (main road), between Westboro Drive and Highwood Drive, for the adjacent residential developments. It was observed that more than half of the available parking spaces were occupied at the end of the day. While parking is not allowed between Excalibur Drive and Bambi Lane along South Capitol Avenue and the west end of Capitol Expressway, it was observed that the section between Bambi Lane and the end of the road was well used by residents parking at the end of the day. More than 30 cars were observed to park along this section of South Capitol Avenue. To the east of Capitol Expressway, parking is permitted between Kollmar Drive and to the end of the road, past Woodmoor Drive. It was observed that this section was the most heavily parked, with 71 cars parked.



As of December 2009

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Figure 2-15

EXISTING COMMUNITY FEATURES

**Table 2-21
Existing Parking Demand along South Capitol Avenue**

Section ¹	Block Face	Existing Parking		
		Demand (PM)	Provision	
ON S. CAPITOL AVENUE				
1	Westboro Dr - Highwood Dr	Eastside	4	5
		Westside	N/A	N/A
2	Highwood Dr to Terminus	Eastside	7	12
		Westside	N/A	N/A
Total			11	17
3	Excalibur - Bambi Lane ²	Eastside	N/A	N/A
		Westside	2	29
Total			2	29⁴
4	Bambi Lane - Terminus ²	Eastside	17	22
		Westside	18	33
Total			35	55⁴
5	Kollmar Dr - Sussex Dr ³	Eastside	3	3
		Westside	9	9
6	Sussex Dr - Tudor Ct ³	Eastside	3	3
		Westside	11	11
Total			26	26
7	Tudor Ct - Capitol Ct ³	Eastside	1	7
		Westside	5	11
8	Capitol Ct - Murtha Dr ³	Eastside	0	8
		Westside	0	11
9	Murtha Dr - Bristol Dr ³	Eastside	3	7
		Westside	0	12
Total			9	56⁴
10	Bristol Dr - Dublin Dr ³	Eastside	0	7
		Westside	0	11
11	Dublin Dr - Belfast Dr ³	Eastside	0	4
		Westside	0	11
12	Belfast Dr - Coventry Dr ³	Eastside	1	6
		Westside	2	12
Total			3	51⁴
13	Coventry Dr - Cornwall Dr ³	Eastside	0	3
		Westside	3	11
14	Cornwall Dr - Woodmoor Dr ³	Eastside	6	9
		Westside	9	17
Total			18	40⁴
15	Woodmoor Dr - End ³	Eastside	5	15
		Westside	10	14
Total			15	29⁴

Notes:

¹ Sections 1 - 2 are along the main South Capitol Avenue. Sections 3 - 15 are along the frontage road

² Eastside of Roadway = nearer to Capitol E'way; Westside of Roadway = residential side

³ Eastside of Roadway = residential side; Westside of Roadway = nearer to Capitol E'way

⁴ From Rajappan & Meyer

Source: AECOM, 2009 and Rajappan & Meyer, 2009

3.0 FUTURE CONDITIONS

The purpose of an assessment of the future traffic conditions along the corridor is to compare the proposed LRT project to the ‘No-Build’ alternative. The future transportation benefits and impacts of constructing the light rail line are identified. Where appropriate, mitigation measures are identified to improve traffic operations.

3.1 Project Alternatives

Two project alternatives, the ‘No-Build’ and ‘With LRT’, are analyzed for the corridor in 2018 and 2035. On top of the base design proposal, the ‘With LRT’ alternative has a design option that eliminates the Ocala LRT Station. A second design option does not provide for a multi-use path between Ocala Avenue and Foxdale Drive. A third design option with an elevated Eastridge Station will not be further analyzed as it would not result in different transportation impacts from the base proposal. BRT station locations do not change for the LRT alternative and design options. Table 3-1 summarizes the alternatives analyzed for the Capitol Expressway LRT corridor.

**Table 3-1
 Project Corridor Alternatives and Options**

Description	LRT on Capitol Corridor in 2018 and 2035
No-Build	None, however, BRT is assumed to operate along the corridor. BRT stations are located at Story Road, Ocala Avenue and at the Eastridge Transit Center.
With LRT (Base)	LRT from Alum Rock LRT Station to Eastridge Transit Center with an elevated station at Story Road and two at-grade stations at Ocala Avenue and Eastridge Transit Center.
With LRT No Ocala Station (Option)	LRT from Alum Rock LRT Station to Eastridge Transit Center with an elevated station at Story Road and one at-grade station at Eastridge Transit Center. There is no proposed station at Ocala Avenue.
With LRT No Multi-Use Path between Ocala Avenue and Foxdale Drive (Option)	LRT from Alum Rock LRT Station to Eastridge Transit Center. No Multi-Use Path will be proposed between Ocala Avenue to Foxdale Drive. This option will be further discussed under the pedestrian and bicycle impact section.
With LRT and Elevated Eastridge Station (Option)	LRT from Alum Rock LRT Station to Eastridge Transit Center. The proposed Eastridge Station will be elevated. This option will not be further discussed as no traffic operation impacts are expected.

3.1.1 *No Build Alternative*

The No Build alternative in 2018 and 2035 includes the operation of the planned BRT services. As a result, queue jump lanes for BRT would be provided at the intersection of Story Road, northbound and southbound. Both bus and right turning vehicles would use the queue jump lanes. A separate bus turn-out would also be provided south of the Ocala intersection in the southbound direction to minimize disruption due to the stopped buses to mainline traffic along Capitol Expressway. The intersection configurations under the No Build alternative would be similar to existing conditions other than noted above. Figure 3-1 illustrates the lane geometry of all study intersections under the No Build alternative.

Two BRT routes along the Capitol Expressway corridor have been included in the analysis. #522 connects the Eastridge Transit Center to the Palo Alto Transit Center and it runs along Capitol Expressway connecting the Alum Rock Transit Center to Eastridge. This service exists today and would be upgraded to be part of the BRT project. A second BRT route, #523, would connect the Eastridge Transit Center to Cupertino. Similarly, it would run along Capitol Expressway connecting the Eastridge Transit Center to the Alum Rock Transit Center. These services would operate at 12-minute headways (jointly from downtown San Jose to Eastridge at 6 minutes). A third bus route, #103, which operates along Capitol Expressway today, is expected to continue running in 2035. The No-Build Alternative represents the conditions that would be reasonably expected to occur in the foreseeable future if none of the proposed LRT alternatives were implemented.

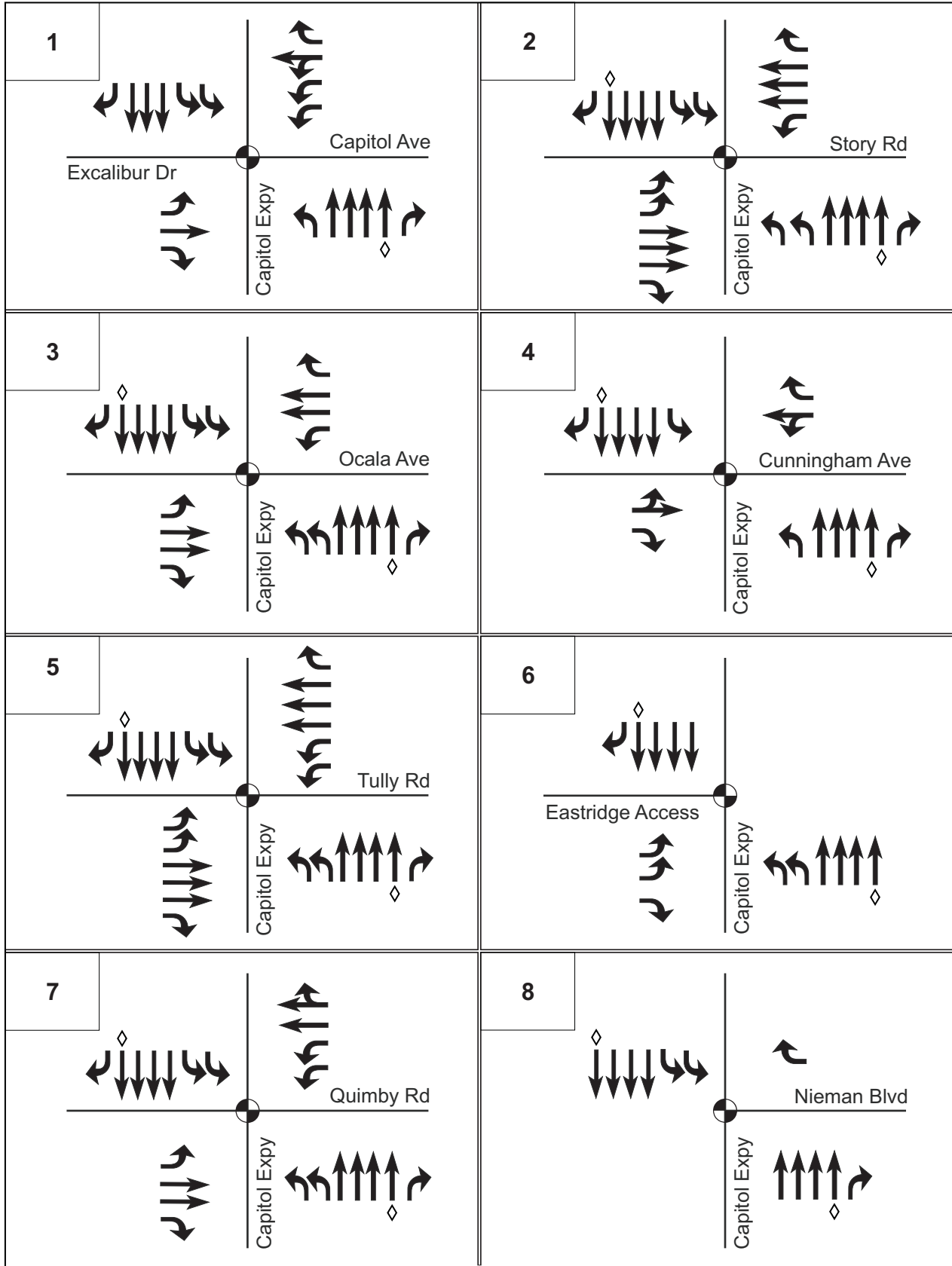
3.1.2 *With LRT Alternative*

The proposed LRT project would extend the existing Alum Rock – Santa Teresa LRT Line approximately 2.3 miles south along Capitol Expressway to the Eastridge Transit Center. This line currently terminates at the Alum Rock Station. As part of a separate project, pedestrian and bicycle facilities would be improved and extended to the Quimby Road intersection, south of the Eastridge Transit Center.

The alignment would operate in exclusive and semi-exclusive rights-of-way and would include both grade-separated and at-grade intersection crossings. The alignment would operate primarily in the median of Capitol Expressway.

The proposed extension would be designed to reduce transit travel time by allowing higher-speed transit operations with signal priority at intersections and grade separation at congested intersections.

Construction of the light rail guideway and grade-separated structures under this project would alter the roadway geometry along some portions of Capitol Expressway. The main design change to the expressway would be the removal of existing HOV lanes between Capitol Avenue and Tully Road to provide the additional right-of-way to accommodate the light rail project. One northbound left-turn lane at the Ocala Road and Story Road intersections are removed under the With LRT alternative. BRT, as described above, is also in place under the 'With LRT' condition.



DOWNTOWN EASTVALLEY CAPITOL EIR

Traffic Signal

Figure 3-1

2018 / 2035 NO BUILD INTERSECTION GEOMETRY

BASE DESIGN

The With LRT alternative includes a base plan and three design options. The 'Base' proposal provides for three stations along the extension at Story Road, Ocala Avenue and the Eastridge Transit Center. The proposed Story Road Station would be grade-separated across the Capitol Expressway / Story Road intersection. A pedestrian overcrossing would also be built across Capitol Expressway, south of the intersection, as part of this alternative. LRT passengers could make use of the overcrossing to access the station platform from either side of Capitol Expressway. Pedestrians not accessing or alighting from LRT could use the pedestrian overcrossing, which is at a lower mezzanine level from the station platform, to cross the expressway to avoid crossing at-grade. Passengers could also get to the center median via an elevator provided at the platform level. The existing pedestrian crosswalks would be maintained.

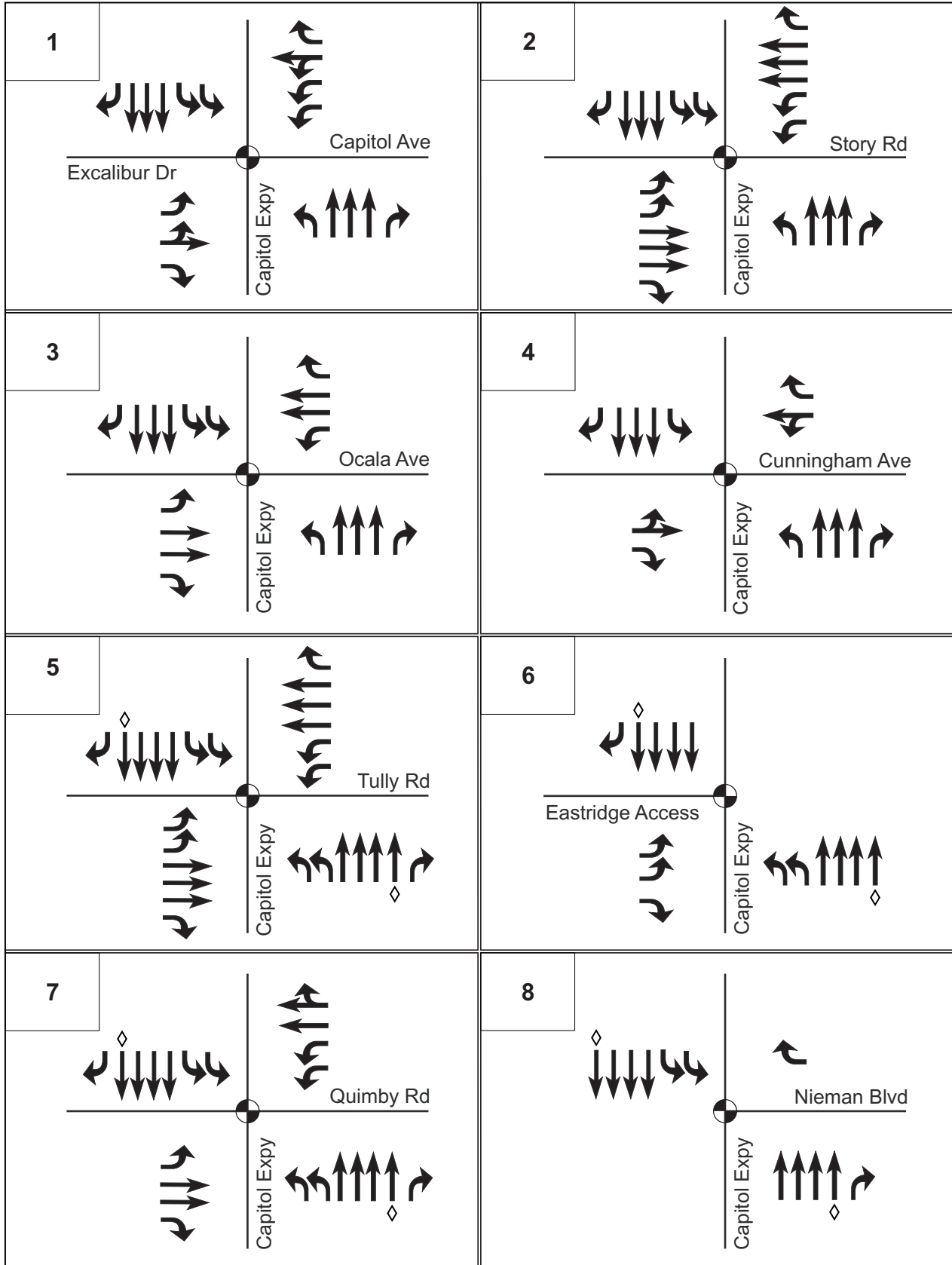
The proposed Ocala Station would have a center platform with tracks running on either side along the median of Capitol Expressway. This at-grade station would be located south of the Capitol Expressway / Ocala Avenue intersection. Passengers would access this station from both ends of the platform; from Ocala intersection at the north and from Cunningham intersection at the south. A pedestrian walkway would be provided in the median of Capitol Expressway from the southern end of the station platform to Cunningham Avenue.

The third proposed station under the base alternative is the terminus station at the Eastridge Transit Center. This station would be at-grade and integrated with a reconfigured transit center.

The vertical alignment of the proposed LRT would transition from at-grade to elevated after leaving Alum Rock Transit Center. The intersection of Capitol Expressway / South Capitol Avenue would be reconfigured to accommodate this design. The guideway remains elevated along the center median of Capitol Expressway before descending south of the Story Station and be at-grade at the Ocala Station. It would run at-grade, crossing the Ocala and Cunningham intersections. The LRT would then transition to an elevated guideway north of the Capitol Expressway / Tully Road intersection and transition over the southbound expressway lanes to the west side of Capitol Expressway and remain elevated over the west approach to the Capitol Expressway / Tully Road intersection, thus avoiding an at-grade crossing at Tully Road. It would then descend to an at-grade platform at the Eastridge Station. With the removal of HOV lanes, all study intersections between South Capitol Avenue and Eastridge Access would be reconfigured. Figure 3-2 shows the proposed lane geometry under this alternative.

NO OCALA STATION OPTION

This first design option is similar to the 'Base' proposal except it would not have a station near the Capitol Expressway / Ocala Avenue intersection. The vertical alignment of this proposal would be the same as the base proposal and the same geometry changes to the study intersections would apply.



Traffic Signal

DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 3-2

GRADE-SEPARATED EASTRIDGE STATION OPTION

Instead of an at-grade station at the Eastridge Transit Center, the third design option would be to have an elevated station platform. However, this design would not affect any transportation component of the project and therefore no specific analysis of this option will be presented.

3.2 Person Through Volume on Capitol Expressway

To extend LRT to the Eastridge Transit Center within the existing Capitol Expressway right-of-way, a travel lane would be removed between South Capitol Avenue and immediately north of Tully Road. The current proposal removes the HOV lane in each direction. The analysis in this section illustrates the difference in total person through volume, in one direction, if the HOV lane is removed under the LRT project alternative.

Table 3-2 presents the person through volume on northbound Capitol Expressway at Story Road during the AM peak for three different conditions. These conditions are described below.

**Table 3-2
Person Through Volume on Capitol Expressway at Story Road**

	Configuration	Vol / Occ / Total	Northbound AM Peak Hour			Total Person Through Volume
			Solo Drivers	HOV	Transit ⁶	
Existing	Existing 3 MLs + HOV	Volume ¹	2,744	374	-	3,591
		Occupancy	1	2.2 ²	-	
		Total Persons	2,744	823	24	
2035 No Build with BRT (No LRT)	Existing 3 MLs + HOV	Volume ⁴	3,756	513 ⁵	-	5,194
		Occupancy	1	2.2 ²	-	
		Total Persons	3,756	1,129	309	
2035 Build with LRT and BRT	3 MLs + LRT To Eastridge	Volume ⁵	3,692		-	5,194
		Occupancy	1.2 ³		-	
		Total Persons	4,430	N/A	764	

- Notes: 1. Existing count, AECOM, June 2009.
 2. Occupancy from Capitol Expressway Study, Santa Clara County, Spring 2003.
 3. Weighted average occupancy assume 12% of carpool as existing.
 4. Volume from VTA model runs.
 5. Carpool proportion is assumed at 12% of total through volume, as existing.
 6. Existing and future (BRT & LRT) transit ridership from VTA, July & November 2009.

EXISTING – 3 MIXED LANES (MLs) AND 1 HOV LANE

The existing lane configuration consists of three mixed lanes and one high occupancy vehicle lane. The existing volumes were obtained from counts conducted for this project in June 2009 while the occupancy rates for the existing condition were obtained from the Capitol Expressway Study (Spring 2003) prepared by the Santa Clara County Roads and Airports Department. The existing HOV proportion is estimated to be approximately 12% of the total traffic. Existing transit included VTA #522 and #103 which travel along Capitol Expressway during the weekday peak hours. Average daily ridership for these two bus routes along the project corridor were obtained

from VTA. It is assumed that 15% of daily passengers would travel during the AM peak hour. The existing total person through volume is calculated to be 3,591.

2035 NO BUILD - 3 MIXED LANES (MLs) + 1 HOV LANE AND BRT

This condition assumes the existing lane configuration consisting of three mixed lanes and one high occupancy vehicle lane. The traffic projections were obtained from the VTA travel demand model and the split to HOV was assumed to remain at 12 percent.

In addition, the BRT (#522 and #533) service is assumed to be in operation. Queue jump lanes for BRT would be provided at the intersection of Story Road, northbound and southbound. Both bus and right turning vehicles would use the queue jump lanes. A separate bus turn-out would also be provided south of the Ocala intersection in the southbound direction to minimize disruption due to the stopped buses in mainline traffic along Capitol Expressway. Existing transit, VTA #103, will continue to travel along Capitol Expressway during the weekday peak hours. Average daily ridership for all bus routes along the project corridor were obtained from VTA. It is assumed that 15% of daily passengers would travel during the AM peak hour. The total person through volume is calculated to be 5,194.

2035 WITH PROJECT - 3 MIXED LANES AND BRT + LRT

This condition assumes the HOV lane is removed and light rail is extended to Eastridge. In addition, the BRT (#522 and #523) service is assumed to be in operation. The traffic projections were obtained from the VTA travel demand model and the split to HOV was assumed to remain at 12 percent.

This alternative assumes that the same proportion of carpool vehicles (12%) as existing would remain. The resulting weighted average occupancy is 1.2 persons per vehicle.

Based on the projected LRT and bus service (BRT included) boarding at the Eastridge Transit Center in 2035, the total AM peak hour northbound passenger volume (15% of daily volume) is calculated to be 764 passengers. The total person through volume for the With LRT configuration is 5,194, or about 44 percent increase from existing through volume.

CONCLUSION

The existing roadway carries just under 3,600 persons per hour northbound on Capitol Expressway at Story Road in the AM peak hour. This section was selected as a typical portion of the expressway and similar volume characteristics would occur on other parts of the expressway. If BRT is implemented and operates in the HOV lanes, the person through volume would increase by about 44 percent over existing. If light rail is constructed by replacing the HOV lane, the total carrying capacity of the roadway would remain the same as the BRT scenario or about 5,200 persons per hour in 2035.

3.3 Traffic Impact Significance Criteria

The traffic impact significance criteria vary with jurisdiction and are detailed below. Table 3-3 summarizes the relevant significance criteria for the City of San Jose and VTA. It should be noted that the City's criteria apply to all intersections in San Jose, including CMP intersections.

**Table 3-3
Impact Significance Criteria**

Significance Criteria	
TRAFFIC	
City of San Jose	LOS declines from LOS D or better for 'No Project' condition to LOS E or F for 'With Project' condition; or, Critical movement delay increases by four seconds or more <i>and</i> volume-to-capacity ratio increases by 0.01 or more at intersections already operating at LOS E or F under background conditions.
VTA	Cause an intersection's LOS to deteriorate from LOS E (when compared to 'No Project') Cause an increase in the critical volume delay by four seconds or more <i>and</i> increase the critical v/c ratio by 0.01 or more at an intersection already operating at LOS F under "No Project" conditions; Result in a change of two letter grades at an intersection operating at LOS A or B under "No Project" conditions; Add new trips totaling more than one percent of the freeway capacity if a freeway segment is already operating at LOS F Cause a substantial increase in regional vehicle miles traveled (VMT) or vehicle hours traveled (VHT); Cause a substantial diversion of traffic onto a residential street; and Substantially disrupt traffic operations and/or substantially affect emergency vehicle response.
PARKING	
VTA	Parking Impacts are generally considered significant by VTA if the proposed project would result in: Loss of parking spaces such that the loss results in substantial adverse economic impacts to businesses in the area; A park-and-ride lot where demand is projected to be 105% or more of the lot's planned capacity.
PEDESTRIAN & BICYCLE ACCESSIBILITY	
VTA	Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit. Conflict with an applicable congestion management program, including but not limited to travel demand measures or other standards. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Note: Santa Clara County follows VTA's CMP criteria
Sources: City of San Jose, VTA 2009

3.4 Traffic Impacts

This section presents the traffic analysis results of the future alternatives and design option analyzed:

- 2018 No Build
- 2018 With LRT from Alum Rock Transit Center to Eastridge (Base)
- 2018 With LRT from Alum Rock Transit Center to Eastridge without Ocala Station
- 2035 No Build
- 2035 With LRT from Alum Rock Transit Center to Eastridge (Base)
- 2035 With LRT from Alum Rock Transit Center to Eastridge without Ocala Station

Traffic impacts of each case were assessed for the AM and PM peak hours for the horizon years of 2018 and 2035. Traffic volumes used for analysis were derived from the VTA Santa Clara County regional forecasting model. Figure 3-3 to Figure 3-8 present intersection volumes for the three analysis conditions.

Traffic operations are defined by levels of service (A through F) based on the average (control) delay for all vehicles traveling through an intersection as previously defined in Table 2-3. Congested traffic operations at intersections under any alternative do not in or of themselves represent an adverse impact requiring mitigation. Adverse impacts are determined by the criteria established in Section 3.3. Traffic impacts use volume-to-capacity ratios (V/C) and critical delay to determine adverse impacts. The V/C is a simple numeric value of the traffic volume through the intersection divided by the intersection capacity. Critical delay is the average delay experienced by drivers executing the critical movements.

3.4.1 2018 With LRT (Base)

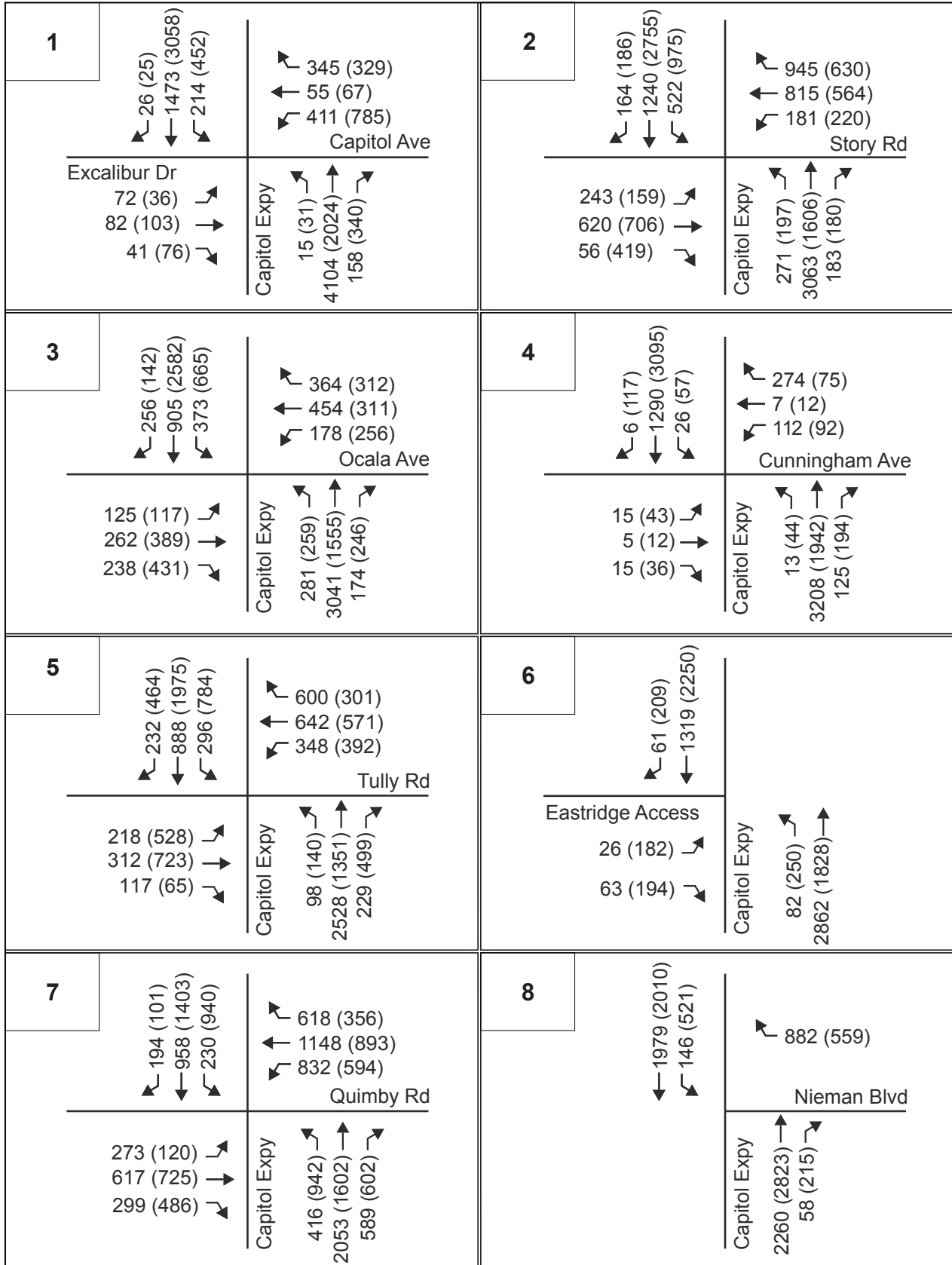
Table 3-4 summarizes the 2018 AM peak hour traffic operational conditions for 'No Build' and 'With LRT' (base). Intersections that are adversely impacted are shaded in the table. Table 3-5 shows the PM peak hour traffic operational conditions for the same two conditions. Adversely impacted intersections are also shaded. Details of TRAFFIX analysis and the adjustments due to BRT/LRT signal priority are contained in the Appendix.

There are three intersections that would operate at congested levels indicated by levels of service E or F under the No Build condition in the AM peak hour as shown in Table 3-4. However, based on the significance criteria for intersection analysis, one intersection would be adversely impacted by the LRT project in the AM peak hour:

- Capitol Expressway / South Capitol Avenue (#1) – LOS changes from D to F. This CMP intersection is considered to be adversely affected by the project.

As seen from Table 3-5, only one intersection would be adversely impacted in the PM peak hour:

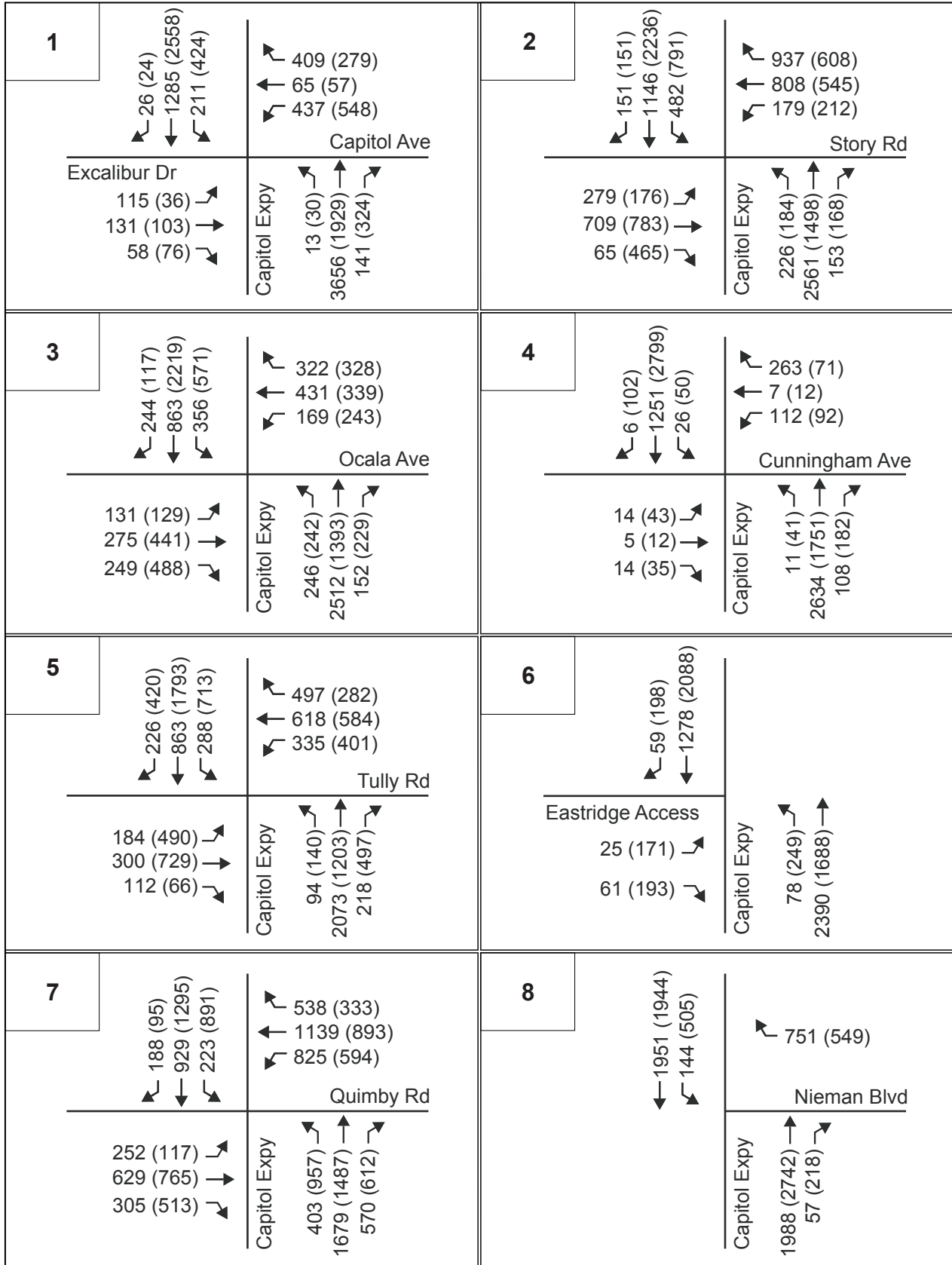
- Capitol Expressway / Ocala Avenue (#3) – LOS remains at LOS E but V/C and critical delay increases by more than 0.01 and four seconds respectively. It is therefore adversely affected by the project.



AM (PM) Peak Hour

DOWNTOWN EAST VALLEY CAPITOL EIR

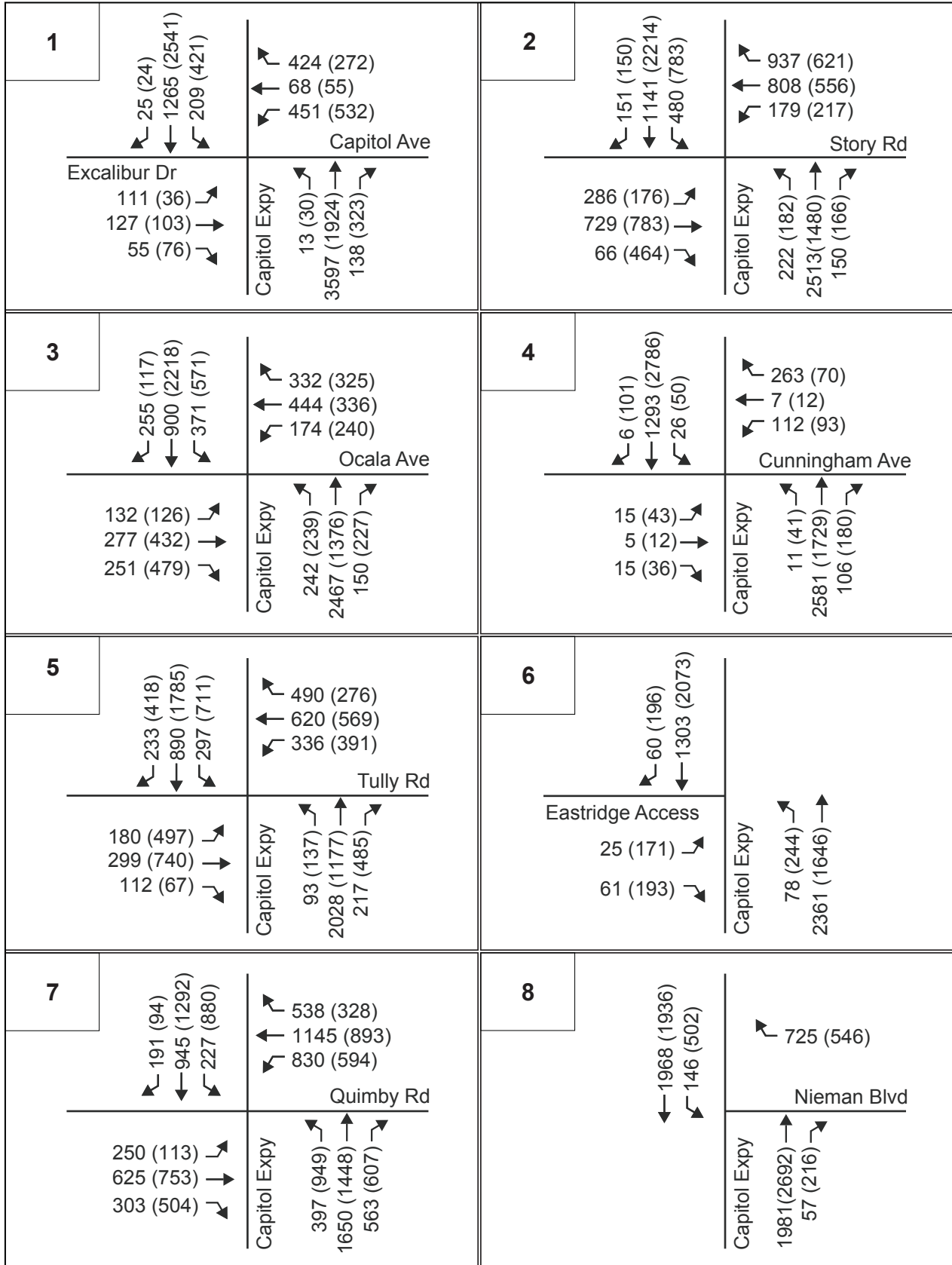
Figure 3-3
2018 NO BUILD INTERSECTION TRAFFIC VOLUMES



AM (PM) Peak Hour

DOWNTOWN EAST VALLEY CAPITOL EIR

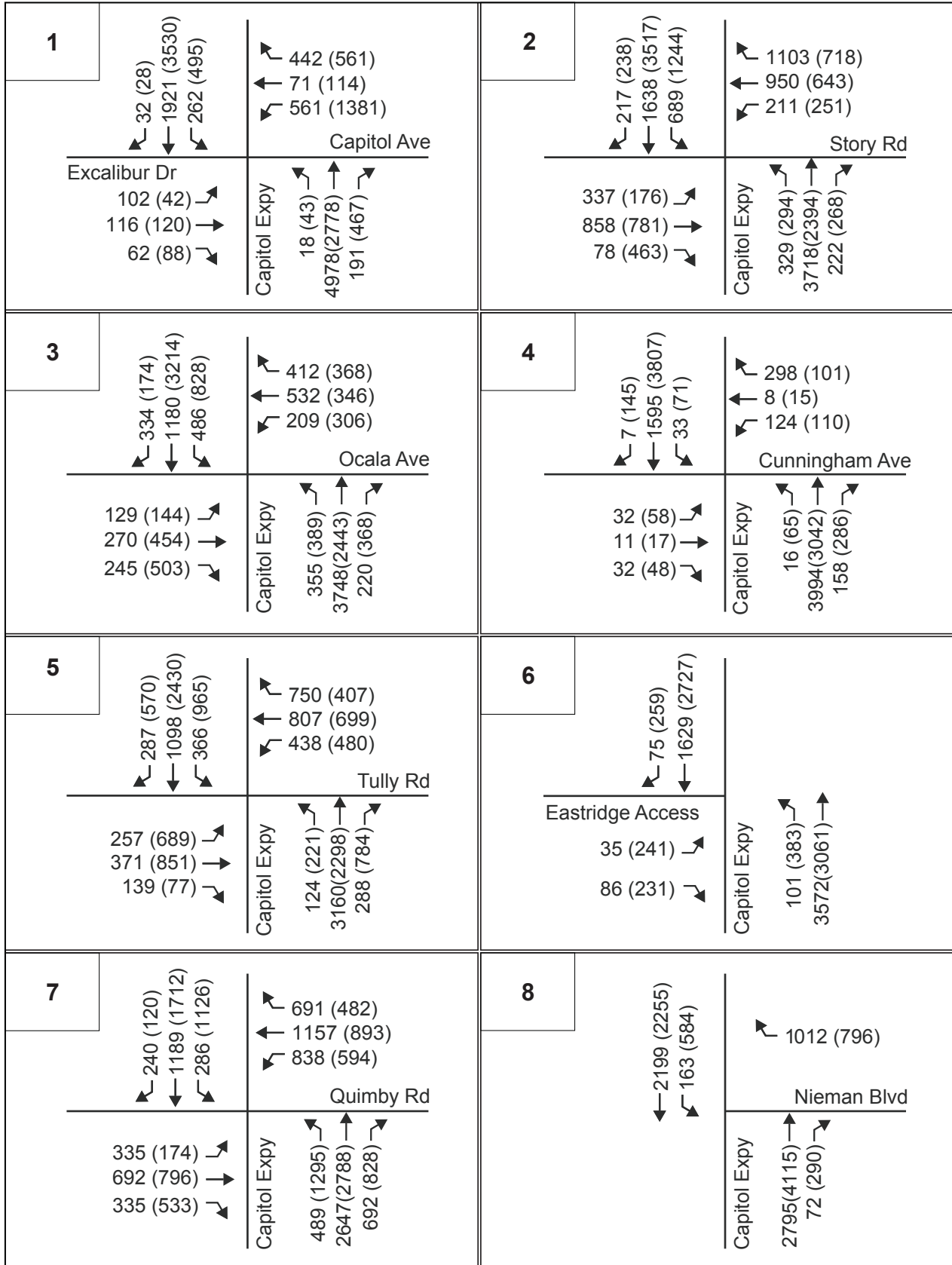
Figure 3-4
2018 WITH LRT INTERSECTION TRAFFIC VOLUMES (BASE)



AM (PM) Peak Hour

DOWNTOWN EAST VALLEY CAPITOL EIR

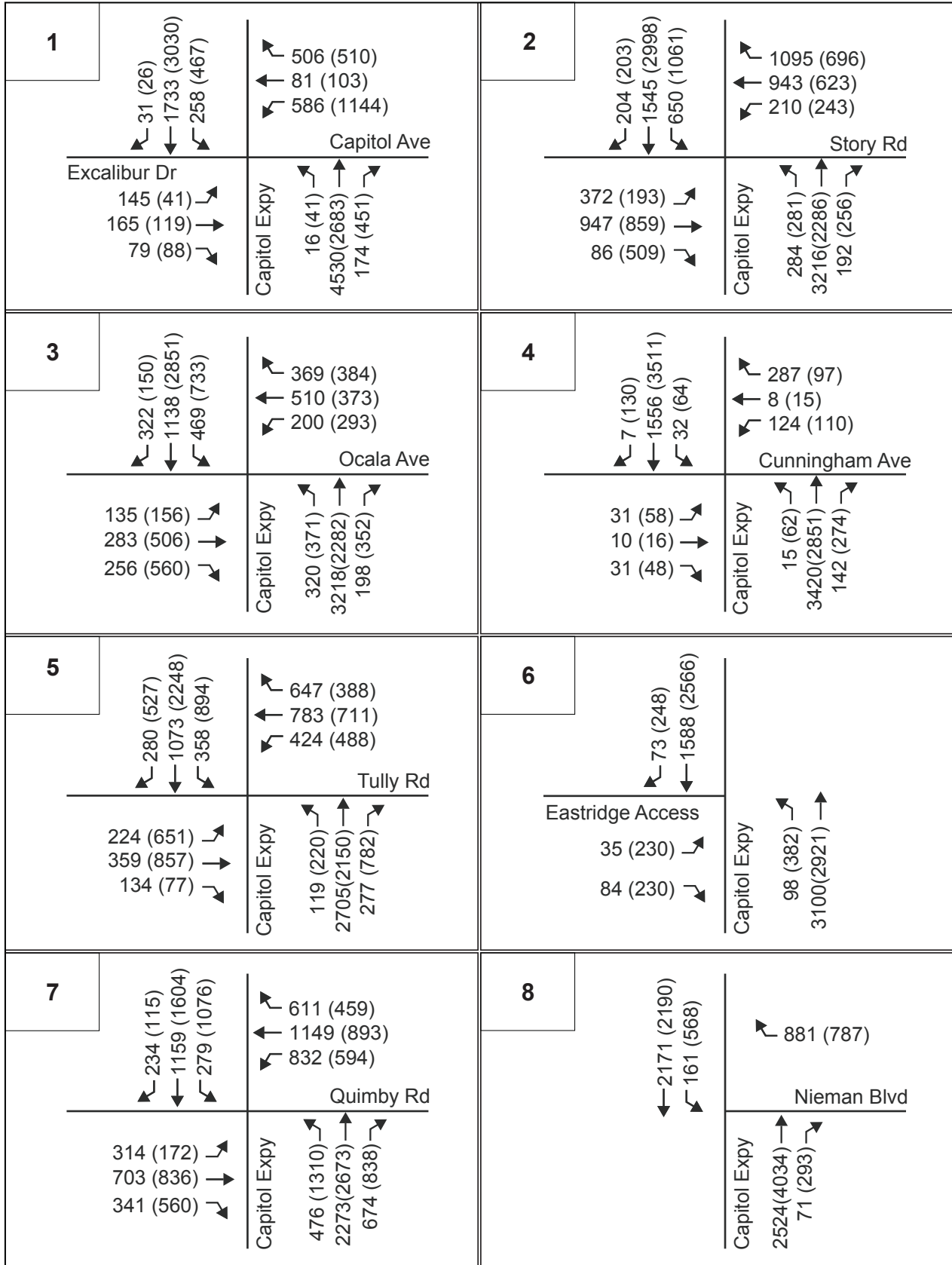
Figure 3-5
2018 WITH LRT INTERSECTION TRAFFIC VOLUMES
(NO OCALA STATION)



AM (PM) Peak Hour

DOWNTOWN EAST VALLEY CAPITOL EIR

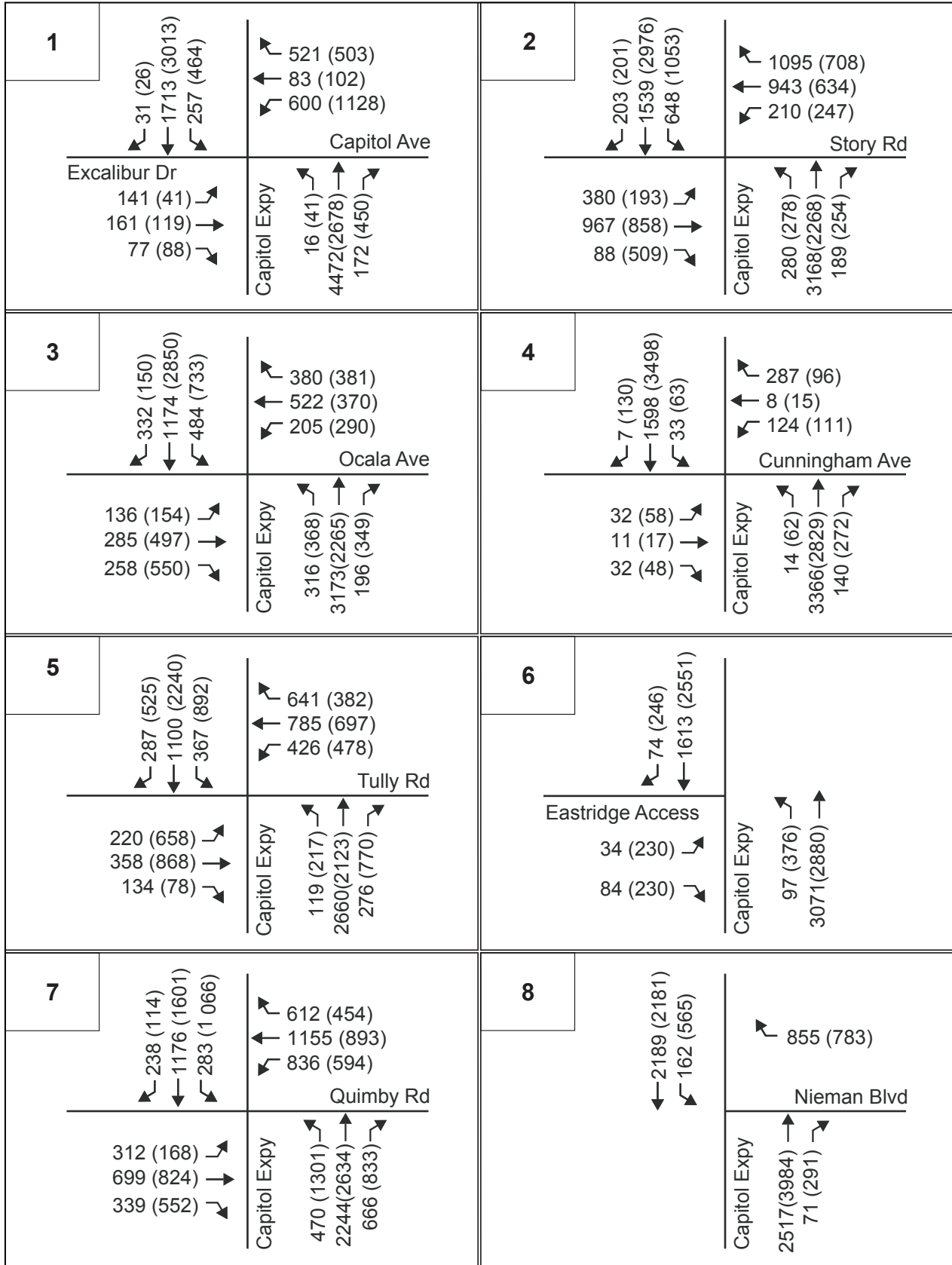
Figure 3-6
2035 NO BUILD INTERSECTION TRAFFIC VOLUMES



AM (PM) Peak Hour

DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 3-7
2035 WITH LRT INTERSECTION TRAFFIC VOLUMES (BASE)



AM (PM) Peak Hour

DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 3-8
2035 WITH LRT INTERSECTION TRAFFIC VOLUMES
(NO OCALA STATION)

**Table 3-4
Comparison of Intersection Performance – 2018 AM With LRT (Base)**

#	Intersection with Capitol Expressway	CMP Intersection	2018 AM - No Build				2018 PM With LRT (Base)				Δ in Crit Del (sec)
			LOS	Avg Del (sec)	Crit V/C	Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit Del (sec)	
1	South Capitol Avenue	Yes	D	47.5	0.899	52.4	F	91.1	1.12	113.4	61.0
2	Story Road	Yes	F	100.7	1.163	134.8	F	95.5	1.146	128.6	-6.2
3	Ocala Avenue	No	E+	58.1	0.81	64.9	E	62.5	0.771	72.0	7.1
4	Cunningham Avenue	No	B+	11.6	0.684	8.2	B+	11.6	0.643	8.4	0.2
5	Tully Road	Yes	D-	51.4	0.857	54.1	D	46	0.609	46.7	-7.4
6	Eastridge Access	No	A	5.3	0.472	1.0	A	5.8	0.396	1.1	0.1
7	Quimby Road	Yes	F	88.1	1.092	119.5	E	72.8	0.99	87.8	-31.7
8	Nieman Boulevard	No	D	40.2	0.881	49.6	C-	33.4	0.76	41.2	-8.4

■ Shaded cells indicate significant impacts
Source: AECOM 2010

**Table 3-5
Comparison of Intersection Performance – 2018 PM With LRT (Base)**

#	Intersection with Capitol Expressway	CMP Intersection	2018 PM - No Build				2018 PM With LRT (Base)				Δ Crit Del (sec)
			LOS	Avg Del (sec)	Crit V/C	Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit Del (sec)	
1	South Capitol Avenue	Yes	D-	52.9	0.907	56.7	D	46.3	0.759	44.8	-11.9
2	Story Road	Yes	E	68.4	0.985	104.2	E	60.7	0.904	79.9	-24.3
3	Ocala Avenue	No	E+	58.6	0.779	58.0	E	74.4	0.835	87.3	29.3
4	Cunningham Avenue	No	A	9.0	0.589	5.0	A	8.7	0.601	4.4	-0.6
5	Tully Road	Yes	D-	54.5	0.774	72.0	D-	53.7	0.715	68.7	-3.3
6	Eastridge Access	No	B	13.5	0.509	17.8	B	13.9	0.478	18.5	0.7
7	Quimby Road	Yes	F	112.0	1.133	145.5	F	111.3	1.117	139.1	-6.4
8	Nieman Boulevard	No	C	28.2	0.780	43.4	C	27.7	0.761	42.7	-0.7

■ Shaded cells indicate significant impacts
Source: AECOM 2010

Additional congestion would occur at the intersections of Story Road/Capitol Expressway and Quimby Road/Capitol Expressway during the PM peak hour for the 2018 With LRT condition. However, they are not adversely impacted as the change in LOS, V/C or critical delay did not exceed the criteria thresholds.

3.4.2 2035 With LRT (Base)

Table 3-6 summarizes the 2035 AM peak hour traffic operational conditions for 'No Build' and 'With LRT' (base). Intersections that are adversely impacted are shaded in the table. Table 3-7 shows the PM peak hour traffic operational conditions for the same two conditions. Adversely impacted intersections are also shaded. Details of TRAFFIX analysis and the adjustments due to BRT/LRT signal priority are contained in the Appendix.

**Table 3-6
Comparison of Intersection Performance – 2035 AM With LRT (Base)**

#	Intersection	CMP Intersection	2035 AM - No Build				2035 AM With LRT (Base)				Δ Crit Del (sec)
			LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	
1	South Capitol Avenue	Yes	F	106.1	1.176	136.8	F	172.5	1.394	231.9	95.1
2	Story Road	Yes	F	161.8	1.400	237.7	F	156.2	1.396	236.0	-1.7
3	Ocala Avenue	No	F	102.9	0.986	143.1	F	118.1	0.963	168.1	25.0
4	Cunningham Avenue	No	B	12.5	0.826	9.7	B	12.1	0.802	9.6	-0.1
5	Tully Road	Yes	E	72.6	1.065	90.8	E+	56.3	0.916	60.6	-30.2
6	Eastridge Access	No	A	5.4	0.590	1.2	A	5.8	0.514	1.2	0.0
7	Quimby Road	Yes	F	129.1	1.271	193.2	F	106.1	1.169	151.0	-42.2
8	Nieman Boulevard	No	E	61.9	1.043	82.0	D	41.1	0.922	52.1	-29.9

■ Shaded cells indicate significant impacts
Source: AECOM 2009

**Table 3-7
Comparison of Intersection Performance – 2035 PM With LRT (Base)**

Intersection with Capitol Expressway	CMP Intersection	2035 PM – No Build				2035 PM With LRT (Base)				Δ Critical Delay (sec)
		LOS	Avg Delay (sec)	V/C	Critical Delay	LOS	Avg Delay (sec)	V/C	Critical Delay	
1 South Capitol Avenue	Yes	F	116.6	1.162	146.0	F	86.9	1.081	113.7	-32.3
2 Story Road	Yes	F	137.8	1.252	221.7	F	121.9	1.18	172.7	-49.0
3 Ocala Avenue	No	F	105.4	0.997	134.8	F	126.6	1.081	166.3	31.5
4 Cunningham Avenue	No	A	10.0	0.729	6.4	B+	10.4	0.757	6.3	-0.1
5 Tully Road	Yes	F	87.1	1.07	133.6	E-	78.2	1.011	112.6	-21.0
6 Eastridge Access	No	B	15.7	0.65	23.6	B	15.8	0.62	24.1	0.5
7 Quimby Road	Yes	F	199.4	1.426	267.8	F	195.6	1.409	260.8	-7.0
8 Nieman Boulevard	No	E-	78.6	1.126	113.5	E	73.8	1.107	106.3	-7.2

■ Shaded cells indicate significant impacts
Source: AECOM 2009

There are six intersections that would operate at congested levels indicated by levels of service E or F under the No Build condition in the AM peak hour as shown in Table 3-6. However, based on the significance criteria for intersection analysis, one intersection would be adversely impacted by the LRT project in the AM peak hour:

- Capitol Expressway / South Capitol Avenue (#1) – LOS remains at F but V/C and critical delay increases by more than 0.01 and four seconds respectively. This CMP intersection is therefore adversely affected by the project.

Congestion would occur at the intersections of Story Road, Ocala Avenue, Tully Road, and Quimby Road and Nieman Boulevard for the 2035 With LRT condition in the AM peak hour.

However, they are not adversely impacted as the change in LOS, V/C or critical delay did not exceed the criteria thresholds.

As seen from Table 3-7, one intersection would be adversely impacted in the PM peak hour:

- Capitol Expressway / Ocala Avenue (#3) – LOS remained at F but V/C and critical delay increased by more than 0.01 and four seconds respectively. It is therefore adversely affected by the project.

Congestion would occur at the intersections of South Capitol Avenue, Story Road, Tully Road, Quimby Road and Nieman Boulevard for the 2035 With LRT condition in the PM peak hour. However, they are not adversely impacted as the change in LOS, V/C or critical delay did not exceed the criteria thresholds.

3.4.3 2018 With LRT (No Ocala Station Option)

Tables 3-8 and 3-9 summarize the 2018 AM and PM peak hour traffic operational conditions respectively, comparing the 'No Build' and the 'With LRT No Ocala Station' option. Intersections that are adversely impacted are shaded in the table. Details of TRAFFIX analysis are contained in the Appendix.

Based on the significance criteria for intersection analysis, one intersection would be adversely impacted in the AM peak hour as seen in Table 3-8:

- Capitol Expressway / South Capitol Avenue (#1) – LOS changes from D to F. This CMP intersection is therefore adversely affected by the project.

Table 3-8
Comparison of Intersection Performance – 2018 AM With No Ocala Station

Intersection with Capitol Expressway	CMP Intersection	2018 AM - No Build				2018 AM With LRT No Ocala				Δ Critical Delay (sec)
		LOS	Avg Delay (sec)	V/C	Critical Delay	LOS	Avg Delay (sec)	V/C	Critical Delay	
1 South Capitol Avenue	Yes	D	47.5	0.899	52.4	F	87.0	1.105	107.7	55.3
2 Story Road	Yes	F	100.7	1.163	134.8	F	94.1	1.139	126.8	-8.0
3 Ocala Avenue	No	E+	58.1	0.81	64.9	E	63.8	0.772	74.4	9.5
4 Cunningham Avenue	No	B+	11.6	0.684	8.2	B+	11.6	0.633	8.4	0.2
5 Tully Road	Yes	D-	51.4	0.857	54.1	D	46.0	0.605	47.4	-6.7
6 Eastridge Access	No	A	5.3	0.472	1.0	A	5.9	0.391	1.1	0.1
7 Quimby Road	Yes	F	88.1	1.092	119.5	E	72.5	0.987	87.0	-32.5
8 Nieman Boulevard	No	D	40.2	0.881	49.6	C-	32.1	0.744	39.9	-9.7

■ Shaded cells indicate significant impacts Source: AECOM 2010

From Table 3-9, there is one intersection that would be adversely impacted in the PM peak hour:

- Capitol Expressway / Ocala Avenue (#3) – LOS remains at E but V/C and critical delay increases by more than 0.01 and four seconds respectively. It is therefore adversely affected by the project.

Congestion occurred at the intersections of Story Road and Quimby Road for the 2018 With LRT No Ocala Station option in the PM peak hour. However, they are not adversely impacted as the change in LOS, V/C or critical delay did not exceed the criteria thresholds.

Table 3-9
Comparison of Intersection Performance – 2018 PM With No Ocala Station

#	Intersection with Capitol Expressway	CMP Intersection	2018 PM - No Build				2018 PM With LRT No Ocala				Δ Crit Del (sec)
			LOS	Avg Del (sec)	Crit V/C	Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Crit Del (sec)	
1	South Capitol Avenue	Yes	D-	52.9	0.907	56.7	D	45.7	0.751	44.1	-12.6
2	Story Road	Yes	E	68.4	0.985	104.2	E	60.4	0.899	79.3	-24.9
3	Ocala Avenue	No	E+	58.6	0.779	58.0	E	73.8	0.829	85.1	27.1
4	Cunningham Avenue	No	A	9.0	0.589	5.0	A	8.6	0.600	5.0	0.0
5	Tully Road	Yes	D-	54.5	0.774	72.0	D-	53.5	0.710	68.7	-3.3
6	Eastridge Access	No	B	13.5	0.509	17.8	B	13.9	0.474	18.4	0.6
7	Quimby Road	Yes	F	112.0	1.133	145.5	F	109.2	1.101	133.4	-12.1
8	Nieman Boulevard	No	C	28.2	0.780	43.4	C	27.5	0.751	42.5	-0.9

■ Shaded cells indicate significant impacts
Source: AECOM 2010

3.4.4 2035 With LRT (No Ocala Station Option)

Tables 3-10 and 3-11 summarize the 2035 AM and PM peak hour traffic operational conditions respectively, comparing the 'No Build' and the 'With LRT No Ocala Station' option. Intersections that are adversely impacted are shaded in the table. Details of TRAFFIX analysis are contained in the Appendix.

Based on the significance criteria for intersection analysis, one intersection would be adversely impacted in the AM peak hour as seen in Table 3-10:

- Capitol Expressway / South Capitol Avenue (#1) – LOS remains at F but V/C and critical delay increases by more than 0.01 and four seconds respectively. It is therefore adversely affected by the project.

**Table 3-10
Comparison of Intersection Performance – 2035 AM With No Ocala Station**

#	Intersection	CMP Intersection	2035 No Build AM				2035 Build AM _ No Ocala Station				Δ Crit Del (sec)
			LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	
1	South Capitol Avenue	Yes	F	106.1	1.176	136.8	F	167.6	1.379	225.2	88.4
2	Story Road	Yes	F	161.8	1.400	237.7	F	154.4	1.390	233.7	-4
3	Ocala Avenue	No	F	102.9	0.986	143.1	F	116.9	0.963	167.0	23.9
4	Cunningham Avenue	No	B	12.5	0.826	9.7	B	12.2	0.792	9.7	0
5	Tully Road	Yes	E	72.6	1.065	90.8	E+	55.8	0.904	59.3	-31.5
6	Eastridge Access	No	A	5.4	0.590	1.2	A	5.7	0.509	1.2	0
7	Quimby Road	Yes	F	129.1	1.271	193.2	F	105.7	1.167	150.4	-42.8
8	Nieman Boulevard	No	E	61.9	1.043	82.0	D	39.2	0.906	49.7	-32.3

■ Shaded cells indicate significant impacts
Source: AECOM 2009

Additional congestion would occur at the intersections of Story Road, Ocala Avenue, Tully Road, Quimby Road and Nieman Boulevard for the 2035 With LRT No Ocala Station option in the AM peak hour. However, they are not considered adversely impacted as the change in LOS, V/C or critical delay did not exceed the criteria thresholds.

From Table 3-11, the one intersection that is adversely impacted in the PM peak hour is:

- Capitol Expressway / Ocala Avenue (#3) – LOS remains at F but V/C and critical delay increases by more than 0.01 and four seconds respectively. It is therefore adversely affected by the project.

Additional congestion occurred at the intersections of South Capitol Avenue, Story Road, Tully Road, Quimby Road and Nieman Boulevard for the 2035 With LRT No Ocala Station option in the PM peak hour. However, they are not adversely impacted as the change in LOS, V/C or critical delay did not exceed the criteria thresholds.

3.5 Intersection Queuing

Left-turn queuing analysis has been performed for the signalized intersections along the corridor. Queues at intersections were estimated using TRAFFIX 8 software package and then compared to the corresponding left-turn storage. Table 3-12 and Table 3-13 summarize the projected queues for 2018 and 2035 No Build condition respectively. Table 3-14 and Table 3-15 summarize the projected queues for 2018 and 2035 With LRT condition respectively. Table 3-16 and Table 3-17 summarize the projected queues for 2018 and 2035 With LRT No Ocala Station condition respectively.

**Table 3-11
Comparison of Intersection Performance – 2035 PM With No Ocala Station**

#	Intersection	CMP Intersection	2035 No Build PM				2035 Build PM _ No Ocala Station				Δ Crit Del (sec)
			LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	LOS	Avg Del (sec)	Crit V/C	Avg Crit Del (sec)	
1	South Capitol Avenue	Yes	F	116.6	1.162	146.0	F	85.6	1.078	112.6	-33.4
2	Story Road	Yes	F	137.8	1.252	221.7	F	119.6	1.176	169.8	-51.9
3	Ocala Avenue	No	F	105.4	0.997	134.8	F	126.3	1.075	164.9	30.1
4	Cunningham Avenue	No	A	10.0	0.729	6.4	A	9.8	0.756	7.0	0.6
5	Tully Road	Yes	F	87.1	1.070	133.6	E-	77.3	1.006	111.8	-21.8
6	Eastridge Access	No	B	15.7	0.650	23.6	B	15.8	0.615	23.9	0.3
7	Quimby Road	Yes	F	199.4	1.426	267.8	F	192.1	1.396	255.2	-12.6
8	Nieman Boulevard	No	E-	78.6	1.126	113.5	E	71.0	1.097	102.4	-11.1

■ Shaded cells indicate significant impacts

Source: AECOM 2009

**Table 3-12
Arterial Queuing Summary – 2018 No Build**

No.	Intersection of Capitol Expy With:	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	Capitol Avenue	AM	12	98	155	125	79	102	18	ST
		PM	26	184	168	225				
2	Story Road	AM	114	229	113	147	99	130	53	91
		PM	91	369	73	177				
3	Ocala Avenue	AM	109	166	103	145	99	114	61	46
		PM	117	260	95	198				
4	Cunningham Avenue	AM	10	22	14	86	91	96	ST	ST
		PM	37	45	43	81				
5	Tully Road	AM	42	132	99	151	99	114	84	61
		PM	64	288	218	168				
6	Eastridge Access	AM	34	N/A	12	N/A	91	N/A	38	N/A
		PM	105	N/A	80	N/A				
7	Quimby Road	AM	174	106	213	304	91	110	56	58
		PM	358	365	98	253				
8	Nieman Boulevard	AM	N/A	60	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	208	N/A	N/A				

Source: AECOM, 2010

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

Under the 2018 No Build condition shown in Table 3-12, several left turn bays were found to have queues that exceed capacity in the future design year. In the northbound direction along Capitol Expressway, two left-turn bays could not meet the demand during both the AM and PM peak hours. The intersections are Ocala Avenue and Quimby Road. The northbound left-turn storage lane at the intersection of Story Road would experience queuing greater than capacity during the AM peak hour only and at Eastridge Access during the PM peak hour only. In the southbound direction, left-turn demand exceeded the provided storage lane at Story Road, Ocala Avenue and Tully Road intersections during both peak hours. Southbound left-turn vehicles at South Capitol Avenue, Quimby Road and Nieman Boulevard exceeded the storage lane provision during the PM peak only.

Under the 2035 No Build condition shown in Table 3-13, several left turn bays were also found to have queues that exceed capacity in the future design year. In the northbound direction along Capitol Expressway, three left-turn bays could not meet the demand during both the AM and PM peak hours. The intersections are Story Road, Ocala Avenue and Quimby Road. The northbound left-turn storage lane at Tully Road and Eastridge Access would experience queuing greater than capacity during the PM peak. In the southbound direction, left-turn demand exceeded the provided storage lane at South Capitol Avenue, Story Road, Ocala Avenue, Tully Road and Quimby Road intersections during both peak hours. Southbound left-turn vehicles at Nieman Boulevard also exceeded the storage lane provision during the PM peak.

Table 3-13
Arterial Queuing Summary – 2035 No Build

No.	Intersection of Capitol Expressway With:	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	South Capitol Avenue	AM	15	121	221	171	79	102	18	ST
		PM	36	213	200	374				
2	Story Road	AM	139	302	156	175	99	130	53	91
		PM	135	491	81	207				
3	Ocala Avenue	AM	139	216	106	172	99	114	61	46
		PM	175	339	116	242				
4	Cunningham Avenue	AM	12	28	31	97	91	96	ST	ST
		PM	55	58	59	98				
5	Tully Road	AM	54	164	118	188	99	114	84	61
		PM	100	379	293	205				
6	Eastridge Access	AM	43	N/A	16	N/A	91	N/A	38	N/A
		PM	156	N/A	105	N/A				
7	Quimby Road	AM	203	132	262	321	91	110	56	58
		PM	468	452	143	263				
8	Nieman Boulevard	AM	N/A	67	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	249	N/A	N/A				

Source: AECOM, 2009

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

Along the cross streets in the eastbound direction, demand for left-turn storage at five intersections exceeded the capacity during both peak hours for both analysis years of 2018 and 2035. The affected intersections are South Capitol Avenue, Story Road, Ocala Avenue, Tully Road and Quimby Road. Left-turning vehicles coming from the Eastridge Transit Center and the mall along Eastridge Access also exceeded the left-turn bay provided during the PM peak in 2018 and 2035. In the westbound direction, four cross streets would experience queues greater than the left-turn bay capacity during the AM and PM peak hours for both 2018 and 2035. The streets are Story Road, Ocala Avenue, Tully Road and Quimby Road.

With LRT in 2018, the same intersections as in the No Build alternative would experience northbound left-turn queuing over capacity during both peak hours. The intersections are Ocala Avenue and Quimby Road as highlighted in Table 3-14. For the Story Road intersection, the northbound left-turn queue would exceed capacity in the AM peak hour but not in the PM peak hour. Northbound Capitol Expressway at Tully Road intersection would be provided with longer left-turn storage with the LRT project that meets the demand. The northbound left-turn storage bay at Cunningham Avenue would be reduced with the project. However, available storage is expected to continue to meet the demand.

Table 3-14
Arterial Queuing Summary – 2018 With LRT (Base)

No.	Intersection of Capitol Expy With:	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	Capitol Avenue	AM	10	98	235	136	79	102	ST	ST
		PM	25	176	163	163				
2	Story Road	AM	166	213	128	82	156	233	53	91
		PM	147	302	81	98				
3	Ocala Avenue	AM	175	161	108	138	145	164	61	46
		PM	192	244	104	203				
4	Cunningham Avenue	AM	9	22	14	87	46	90	ST	ST
		PM	34	41	41	78				
5	Tully Road	AM	41	125	84	144	124	117	84	61
		PM	64	261	201	171				
6	Eastridge Access	AM	32	N/A	12	N/A	57	N/A	43	N/A
		PM	103	N/A	75	N/A				
7	Quimby Road	AM	170	102	195	298	91	155	56	58
		PM	365	349	96	252				
8	Nieman Boulevard	AM	N/A	59	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	202	N/A	N/A				

Source: AECOM, 2010

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

With LRT in 2018, there are several locations where the southbound left turn storage bays on Capitol Expressway will be increased as part of the LRT project. These include the intersection with Story Road, Ocala Avenue and Quimby Road. As a result, the southbound left-turn queues

during the AM peak at Story Road and during the AM peak at Ocala Avenue would not exceed the provided storage capacity. All other southbound queues exceeded capacity with the LRT project as in the No Build condition.

Under the With LRT base design in 2018, an additional left-through lane would be added to eastbound South Capitol Avenue. Queuing analysis therefore would not be applicable to this approach as left-turn vehicles would not be queuing separately from the through traffic. In the eastbound direction, three intersections have more left-turning vehicles than the storage lanes could hold in both peak hours. The intersections are Story Road, Ocala Avenue and Quimby Road. Eastbound left-turn queues from Tully Road and the Eastridge Access would also exceed capacity in the PM peak hour.

Intersections that would experience excess queuing in the westbound direction during both peak hours are Ocala Avenue, Tully Road and Quimby Road. Westbound left-turn at Story Road would exceed the storage capacity during the PM peak hour but not in the AM peak hour.

With LRT in 2035, the same intersections as in the No Build alternative would experience northbound left-turn queuing over capacity during both peak hours. The intersections are Story Road, Ocala Avenue and Quimby Road as highlighted in Table 3-15. However, northbound Capitol Expressway at Tully Road intersection would be provided with longer left-turn storage that meets the demand. The Tully Road intersection would no longer experience excess queuing in the northbound direction during both peak hours. Due to the reduction of the northbound left-turn storage bay at Cunningham Avenue, this movement would experience queuing greater than capacity in the PM peak hour.

Table 3-15
Arterial Queuing Summary – 2035 With LRT (Base)

No.	Intersection of Capitol Expressway	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	South Capitol Avenue	AM	13	120	303	182	79	102	ST	ST
		PM	34	204	195	316				
2	Story Road	AM	208	287	171	97	156	233	53	91
		PM	223	420	89	113				
3	Ocala Avenue	AM	230	214	111	164	145	164	61	46
		PM	301	317	126	246				
4	Cunningham Avenue	AM	12	27	30	98	46	90	ST	ST
		PM	52	54	55	94				
5	Tully Road	AM	52	158	103	184	124	117	84	61
		PM	99	351	276	208				
6	Eastridge Access	AM	41	N/A	16	N/A	57	N/A	43	N/A
		PM	154	N/A	100	N/A				
7	Quimby Road	AM	199	128	244	316	91	155	56	58
		PM	474	435	141	263				
8	Nieman Boulevard	AM	N/A	66	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	242	N/A	N/A				

Source: AECOM, 2009

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

For southbound Capitol Expressway, the same four intersections as in the No Build alternative would have more left-turn vehicles than the storage lanes could accommodate during the AM and PM peak hours. The intersections are South Capitol Avenue, Story Road, Ocala Avenue and Tully Road. There are several locations where left turn storage bays on Capitol Expressway will be increased as part of the LRT project. These include the southbound left-turn at Story Road, the southbound left-turn at Ocala Avenue and the southbound left-turn at Quimby Road. With a longer left-turn lane proposed at the Quimby intersection with LRT, this intersection would no longer experience excess queuing in the AM peak hour although demand would still exceed the capacity during the PM peak hour. Southbound left-turn vehicles at Nieman Boulevard would still exceed the storage lane capacity during the PM peak for the With LRT alternative.

Under the With LRT base design in 2035, an additional left-through lane would be added to eastbound South Capitol Avenue. Queuing analysis therefore would not be applicable to this approach as left-turn vehicles would not be queuing separately from the through traffic. In the eastbound direction, four intersections have more left-turning vehicles than the storage lanes could hold in both peak hours. These are the same intersections as the No Build option. The intersections are Story Road, Ocala Avenue, Tully Road and Quimby Road. Eastbound left-turn queues from the Eastridge Access would also exceed capacity in the PM peak hour, as in the No Build alternative.

Intersections that would experience excess queuing in the westbound direction during both peak hours under the No Build alternative would also experience it with the proposed LRT project in 2035. These four intersections are Story Road, Ocala Avenue, Tully Road and Quimby Road.

Table 3-16 presents the queuing analysis results for the LRT alternative without the Ocala Station in 2018. Intersection geometry would be similar to the base design. It can be seen that the same intersections, the same approaches and the same time periods would experience left-turn queuing greater than capacity when compared to the base option.

Table 3-17 presents the queuing analysis results for the LRT alternative without the Ocala Station in 2035. Intersection geometry would be similar to the base design. It can be seen that the same intersections, the same approaches and the same time periods would experience left-turn queuing greater than capacity when compared to the base option.

3.6 Travel Times and Speeds on Capitol Expressway

The roadway and light rail travel times and speeds have been estimated for Capitol Expressway with and without the light rail project in 2018 and 2035. The travel times and speeds are summarized in Table 3-18 and Table 3-19.

The corridor has been separated into two segments. The first segment is from South Capitol Avenue to Ocala Avenue. The second segment is from Ocala Avenue to Eastridge Access. Average travel times and speeds are noted for each segment, during each peak hour and in each direction along the corridor. The total travel times and speeds are also noted on Table 3-18 and Table 3-19. Travel time for each segment is determined by adding the calculated average intersection delay to the segment's estimated running time at a free flow speed of 45 mph (posted speed limit) providing an approximation of future conditions along the expressway.

Table 3-16
Arterial Queuing Summary – 2018 With LRT No Ocala Station

#	Intersection of Capitol Expy With:	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	Capitol Avenue	AM	10	97	220	142	79	102	ST	ST
		PM	25	174	158	162				
2	Story Road	AM	163	212	131	82	156	233	53	91
		PM	145	299	81	100				
3	Ocala Avenue	AM	171	168	108	142	145	164	61	46
		PM	190	244	101	200				
4	Cunningham Avenue	AM	9	22	14	89	46	90	ST	ST
		PM	34	40	43	84				
5	Tully Road	AM	41	128	82	144	124	117	84	61
		PM	62	260	203	167				
6	Eastridge Access	AM	32	N/A	12	N/A	57	N/A	43	N/A
		PM	101	N/A	75	N/A				
7	Quimby Road	AM	169	104	194	298	91	155	56	58
		PM	363	344	92	251				
8	Nieman Boulevard	AM	N/A	60	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	200	N/A	N/A				

Source: AECOM, 2009

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

Table 3-17
Arterial Queuing Summary – 2035 With LRT No Ocala Station

No.	Intersection of Capitol Expressway	Peak Period	Queue (m)				Storage (m)			
			NBL	SBL	EBL	WBL	NBL	SBL	EBL	WBL
1	South Capitol Avenue	AM	13	120	287	190	79	102	ST	ST
		PM	34	202	189	321				
2	Story Road	AM	206	286	175	97	156	233	53	91
		PM	221	417	89	115				
3	Ocala Avenue	AM	226	222	112	168	145	164	61	46
		PM	298	318	124	243				
4	Cunningham Avenue	AM	11	28	32	101	46	90	ST	ST
		PM	52	52	60	102				
5	Tully Road	AM	52	161	101	185	124	117	84	61
		PM	98	350	278	204				
6	Eastridge Access	AM	41	N/A	16	N/A	57	N/A	43	N/A
		PM	152	N/A	100	N/A				
7	Quimby Road	AM	197	130	242	317	91	155	56	58
		PM	472	430	138	262				
8	Nieman Boulevard	AM	N/A	67	N/A	N/A	N/A	107	N/A	N/A
		PM	N/A	241	N/A	N/A				

Source: AECOM, 2009

Shaded cells show queue lengths that are larger than the corresponding storage capacities

The queue length and storage area shown are for each lane in a left-turn lane group

N/A = movement does not exist

ST = shared with through

Table 3-18
2018 Capitol Corridor Average Travel Time and Speed Data

Segment	Distance (miles)	Traveling Northbound				Traveling Southbound			
		AM		PM		AM		PM	
		Travel Time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)
Existing Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	2.07	33.91	3.02	23.25	1.83	38.36	2.49	28.19
Between Ocala Avenue & Eastridge	1.14	1.94	35.26	2.7	25.33	2.44	28.03	1.64	41.71
TOTAL	2.31	4.01	34.56	5.72	24.23	4.27	32.46	4.13	33.56
Existing HOV Lane									
Between South Capitol Avenue & Ocala Avenue	1.17	1.7	41.29	2.95	23.80	2.06	34.08	2.56	27.42
Between Ocala Avenue & Eastridge	1.14	2.03	33.69	2.6	26.31	1.64	41.71	1.52	45.00
TOTAL	2.31	3.73	37.16	5.55	24.97	3.7	37.46	4.08	33.97
2018 No Build Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	3.22	21.80	3.25	21.60	2.52	27.86	2.46	28.54
Between Ocala Avenue & Eastridge	1.14	2.65	25.81	2.87	23.83	2.02	33.86	2.02	33.86
TOTAL	2.31	5.87	23.61	6.12	22.65	4.54	30.53	4.48	30.94
2018 No Build HOV Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	2.07	33.91	2.59	27.10	2.44	28.77	2.17	32.35
Between Ocala Avenue & Eastridge	1.14	2.25	30.40	3.21	21.31	2	34.20	1.96	34.90
TOTAL	2.31	4.32	32.08	5.8	23.90	4.44	31.22	4.13	33.56
2018 BRT (along HOV lane)									
Between South Capitol Avenue & Ocala Avenue	1.17 ¹	2.7	26	3.03	23.17	3.03	23.17	2.78	25.25
Between Ocala Avenue & Eastridge	1.14	2.2	31.09	2.89	23.67	1.97	34.72	1.94	35.26
TOTAL	2.31	4.9	28.29	5.92	23.41	5	27.72	4.73	29.30
2018 With LRT (Base) Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	3.05	23.02	3.24	21.67	2.83	24.81	3.01	23.32
Between Ocala Avenue & Eastridge	1.14	3.1	22.06	3.34	20.48	1.97	34.72	1.99	34.37
TOTAL	2.31	6.15	22.54	6.58	21.06	4.8	28.88	5.01	27.66
2018 BRT (With LRT) Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17 ¹	3.2	21.94	3.65	19.23	3.5	20.06	3.69	19.02
Between Ocala Avenue & Eastridge	1.14	3.45	19.83	3.05	22.43	1.97	34.72	1.99	34.37
TOTAL	2.31	6.65	20.84	6.7	20.69	5.47	25.34	5.68	24.40
LRT									
Between Alum Rock TC & Ocala Station	1.3	3.02	25.82	3.02	25.82	3.02	25.82	3.02	25.82
Between Ocala Station & Eastridge TC	1.03	1.98	31.21	1.98	31.21	1.98	31.21	1.98	31.21
TOTAL	2.33	5	27.96	5	27.96	5	27.96	5	27.96

1. Dwell time of 2 BRT stops included in this segment
Sources: AECOM (automobile travel times), 2008 and 2010
Manuel Padron & Associates, 2001 (LRT travel times)

Table 3-19
2035 Capitol Corridor Average Travel Time and Speed Data

Segment	Distance (miles)	Traveling Northbound				Traveling Southbound			
		AM		PM		AM		PM	
		Travel Time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)
Existing Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	2.07	33.91	3.02	23.25	1.83	38.36	2.49	28.19
Between Ocala Avenue & Eastridge	1.14	1.94	35.26	2.7	25.33	2.44	28.03	1.64	41.71
TOTAL	2.31	4.01	34.56	5.72	24.23	4.27	32.46	4.13	33.56
Existing HOV Lane									
Between South Capitol Avenue & Ocala Avenue	1.17	1.7	41.29	2.95	23.8	2.06	34.08	2.56	27.42
Between Ocala Avenue & Eastridge	1.14	2.03	33.69	2.6	26.31	1.64	41.71	1.52	45.00
TOTAL	2.31	3.73	37.16	5.55	24.97	3.70	37.46	4.08	33.97
2035 No Build Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	6.14	11.43	6.83	10.27	2.53	27.7	4.48	15.66
Between Ocala Avenue & Eastridge	1.14	4.56	15	6.02	11.36	2.01	33.99	2.13	32.1
TOTAL	2.31	10.69	12.97	12.86	10.78	4.55	30.48	6.61	20.96
2035 No Build HOV Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	2.1	33.43	3.18	22.08	2.42	29.01	2.18	32.2
Between Ocala Avenue & Eastridge	1.14	2.35	29.11	2.9	23.59	2.47	27.69	2.01	34.03
TOTAL	2.31	4.45	31.15	6.08	22.8	4.89	28.34	4.20	33.00
2035 BRT (along HOV lane)									
Between South Capitol Avenue & Ocala Avenue	1.17	2.72	25.81	3.19	22.01	3.01	23.32	2.8	25.07
Between Ocala Avenue & Eastridge	1.14	2.29	29.87	2.93	23.34	2.11	32.42	1.99	34.37
TOTAL	2.31	5.02	27.61	6.12	22.65	5.12	27.07	4.79	28.94
2035 With LRT(Base) Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	8.03	8.74	7.1	9.89	2.88	24.38	7.29	9.63
Between Ocala Avenue & Eastridge	1.14	5.85	11.69	5.78	11.83	2.4	28.50	2.08	32.88
TOTAL	2.31	13.88	9.98	12.88	10.76	5.22	26.55	9.37	14.79
2035 BRT (with LRT) Mixed Flow Lanes									
Between South Capitol Avenue & Ocala Avenue	1.17	8.7	8.07	7.77	9.03	3.55	19.77	7.96	8.82
Between Ocala Avenue & Eastridge	1.14	5.85	11.69	5.78	11.83	2.12	32.26	2.08	32.88
TOTAL	2.31	14.55	9.53	13.55	10.23	5.67	24.44	10.04	13.80
LRT									
Between Alum Rock TC & Ocala Station	1.3	3.02	25.83	3.02	25.83	3.02	25.83	3.02	25.83
Between Ocala Station & Eastridge TC	1.03	1.98	31.21	1.98	31.21	1.98	31.21	1.98	31.21
TOTAL	2.33	5.00	27.96	5.00	27.96	5.00	27.96	5.00	27.96

Sources: AECOM (automobile and BRT travel times), 2008 and 2010
Manuel Padron & Associates, 2001 (LRT travel times)

The top section of each table indicates the existing travel times for the mixed flow lanes and HOV lanes along the corridor presented earlier in Chapter 2. Total travel time for both the northbound and southbound directions along the mixed flow lanes during the AM peak hour is less than four minutes 30 seconds. During the PM peak hour, the northbound travel time is almost six minutes and the southbound travel time is just over four minutes. Travel times on the HOV lanes in both directions are lower when compared to the mixed lanes during both peak hours.

The next section of Table 3-18 is the 2018 No Build alternative. In this alternative, two BRT routes are assumed to be in operation. The roadway geometry would be very similar to the existing configuration except at the Story Road intersection where the exclusive right-turn lane (along Capitol Expressway) also functions as a queue jump lane for the BRT buses. The travel times are increased and the travel speeds are decreased over the existing conditions because of an increase in traffic volumes. The through traffic volume along Capitol Expressway is projected to increase by approximately 300 vehicles in both direction in 2018. In addition, the intersections would continue to operate with a relatively long cycle time of 190 seconds, consistent with the existing conditions. Overall, the travel speeds are lower and the travel times are greater in 2018 than the existing conditions.

Travel times along the HOV lanes are expected to be shorter than the mixed lanes, similar to the existing conditions. However, due to the expected volume increase, the travel times would be longer than those under the existing conditions.

The next group of travel times and speeds represents the condition where the light rail project replaces the two HOV lanes. The travel times in the prevailing directions; northbound in the AM and southbound in the PM, are further increased and the resulting travel speeds further decreased even though the through volumes remained relatively similar to the 'No Build' conditions. The increase in travel time is expected under this case due to capacity reduction (HOV lane removal).

Travel time for the non-prevailing direction; southbound in the AM and northbound in the PM, does not differ very much between the No Build and With LRT alternatives. The non-prevailing direction has lower traffic volumes which can more readily be accommodated by the three mixed flow lanes. The proposed LRT also operates under transit signal priority which tends to benefit the through traffic along the expressway.

Under the No Build conditions, the BRT would operate along the HOV lane. There are two BRT stops along the corridor; one at the far side of Story Road intersection and one at the far side of Ocala Road intersection. The travel time for BRT, assuming a dwell time of 20 seconds per stop, is estimated by adding the average delay at each intersection along the HOV lane and the dwell time to the segment running time. The AM peak hour northbound travel time for BRT along the HOV lane is estimated to be 4.9 minutes; southbound travel time is estimated to be 5 minutes. The PM peak hour northbound travel time for BRT along the HOV lane is estimated to be 5.92 minutes; southbound travel time is estimated to be 4.73 minutes.

With LRT, the BRT would operate along the mixed flow lanes as the HOV lanes would be removed. The estimated travel time for BRT, in this case, is obtained by adding the dwell time (20 seconds per stop) to the average mixed flow travel times presented in Table 3-18. The AM

peak hour northbound travel time for BRT along the mixed flow lane is estimated to be 6.65 minutes; southbound travel time is estimated to be 5.47 minutes. The PM peak hour northbound travel time for BRT along the HOV lane is estimated to be 6.7 minutes; southbound travel time is estimated to be 5.68 minutes.

The last group of travel times and speeds on Table 3-18 are for light rail. The proposed LRT would operate in semi-exclusive right-of-way and is only affected by automobile traffic at the intersections of Ocala Avenue and Cunningham Avenue. Not only would LRT have signal priority at these intersections, there would not be traffic queues like the adjacent automobile traffic. As such, the travel times for the LRT are consistently shorter than the adjacent automobile traffic and are more consistent. These travel times are consistent for both 2018 and 2035 (also presented in Table 3-19).

The first section in Table 3-19 is a repeat of the existing mixed flow lanes and HOV lanes travel times and speeds. These are the same as shown in Table 3-18.

The second section of Table 3-19 is the 2035 No Build alternative. In this alternative, two BRT routes are assumed to be in operation. The roadway geometry would be very similar to the existing configuration except at the Story Road intersection where the exclusive right-turn lane (along Capitol Expressway) also functions as a queue jump lane for the BRT buses. The travel times are increased and the travel speeds are decreased over the existing conditions because of an increase in traffic volumes. The through volume along Capitol Expressway is projected to increase by approximately 1,000 vehicles in the northbound direction and approximately 500 in the southbound direction, on the average in 2035, over the existing volume. In addition, the intersections would continue to operate with a relatively long cycle time of 190 seconds, consistent with the existing conditions. Overall, the travel speeds are lower and the travel times are greater in 2035 than the existing conditions.

Travel time along the HOV lanes under the No Build Conditions is expected to be lower than the mixed lane travel time in 2035. There is capacity along the HOV lanes to accommodate the expected increase in future HOV volumes. On the other hand, the HOV travel times along the corridor are higher than the existing HOV travel times as a result of the volume increase.

Under the No Build conditions, the BRT would operate along the HOV lane. There are two BRT stops along the corridor; one at the far side of Story Road intersection and one at the far side of Ocala intersection. The travel time for BRT, assuming a dwell time of 20 seconds per stop, is estimated by adding the average intersection delays along the HOV lane and the dwell time to the segment running. The AM peak hour northbound travel time for BRT along the HOV lane is estimated to be 5.02 minutes; southbound travel time is estimated to be 5.12 minutes. The PM peak hour northbound travel time for BRT along the HOV lane is estimated to be 6.12 minutes; southbound travel time is estimated to be 4.79 minutes.

The next group of travel times and speeds represents the condition where the light rail project replaces the two HOV lanes. The travel times are further increased and the resulting travel speeds further decreased even though the through volumes decreased slightly from the 'No Build' conditions. The increase in travel time is expected under this case due to capacity reduction (HOV lane removal).

During peak hours, travel time for the non-prevailing direction, southbound in the AM and northbound in the PM, does not differ very much between the No Build and With LRT alternatives. The non-prevailing direction has lower traffic volumes which can more readily be accommodated by the three mixed flow lanes. The proposed LRT also operates under transit signal priority which tends to benefit the through traffic along the expressway. Travel time for the prevailing direction, however, increases approximately three minutes during both peak hours when comparing the With LRT condition to the No Build condition.

With LRT, the BRT would operate along the mixed flow lanes as the HOV lanes would be removed. The estimated travel time for BRT, in this case, is obtained by adding the dwell time (20 seconds per stop) to the mixed flow travel times presented in Table 3-19. The AM peak hour northbound travel time for BRT along the mixed flow lane is estimated to be 14.55 minutes; southbound travel time is estimated to be 5.67 minutes. The PM peak hour northbound travel time for BRT along the HOV lane is estimated to be 13.55 minutes; southbound travel time is estimated to be 10.04 minutes.

The last group of travel times and speeds on Table 3-18 are for light rail. The proposed LRT would operate in semi-exclusive right-of-way and is only affected by automobile traffic at the intersections of Ocala Avenue and Cunningham Avenue. Not only would LRT have signal priority at these intersections, there would not be traffic queues like the adjacent automobile traffic. As such, the travel times for the LRT are consistently shorter than the adjacent automobile traffic and are more consistent. These travel times are consistent for both 2018 and 2035.

3.7 Transit Network

The more comprehensive and seamless a transit network is, the more success it is likely to achieve. Connections between different public transport modes and systems tend to attract more transit riders and bolster patronage for all connecting services. As such, the VTA emphasizes multi-modal public transport connections wherever those connections are feasible.

3.7.1 VTA Public Transit

The connectivity of the transit network in the East Valley will largely depend upon linkages between LRT and the supporting bus services. Current bus services in the study area focus on the Eastridge Transit Center for the terminus of most local and regional routes, with connections available here between most lines in the area.

Once light rail is constructed on Capitol Expressway, VTA will have the opportunity to restructure the area's bus lines to interface with the high level of transit service provided by the new fixed rail link.

Specific future operating plans for bus lines will be finalized closer to the time that the proposed LRT service goes into operation. However, certain possible route changes have been identified in order to size transit facilities and complete the environmental studies. Specifically, the routes around the Eastridge Transit Center have been reviewed to assess how many bus bays would be needed at this facility. Table 3-20 outlines potential actions that may be taken to reorganize the bus network.

**Table 3-20
Potential Future Bus Integration Actions**

Line	Proposed Action	Integration
12	Delete service	Replaced by LRT service
22	Keep	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center
26	Keep	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center
31	Keep	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center
39	Revise circle route	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center
43	Delete service	Replaced by LRT service
70	Keep	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center (Terminates at Capitol LRT Station as existing)
71	Reroute along Tully instead of Quimby	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center Service on Quimby replaced by circle route(s)
77	Keep	Meets LRT at Eastridge Station Needs stop in Eastridge Transit Center
103	Keep	Meets LRT at Story, Ocala and Eastridge Station Needs stop in Eastridge Transit Center
522	BRT Service	Meets LRT at Story, Ocala and Eastridge Station Needs stop in Eastridge Transit Center Articulated Bus
523	New BRT Service	Meets LRT at Story, Ocala and Eastridge Station Needs stop in Eastridge Transit Center Articulated Bus

Source: VTA and AECOM, 2009

At the Eastridge Transit Center, the majority of existing routes are assumed to still be operating when light rail service opens. However, the new light rail line would replace weekend service #43 that serves as a shuttle between the Alum Rock Transit Center and the Eastridge Transit Center. Another weekend only line, #12 that connects the Eastridge Transit Center to the San Jose Civic Center, would be replaced with the LRT. With approximately 10 bus lines using the facility (nine as a terminus), no less than 11 bus bays would be needed to provide a bay for each route, in each direction. Including two bays for future expansion, the reconstructed bus access should provide approximately 13 bays for active buses in addition to layover areas for the nine terminating bus routes.

In the Eastridge Transit Center, some bays would be required to be designed to accommodate articulated buses, namely Line 522 and Line 523. These bays are included in the total bay estimates. Table 3-21 summarizes the requirements of the proposed Eastridge Transit Center with the construction of light rail in the corridor. The existing transit center at Eastridge would be redesigned and expanded as part of a locally-funded project.

**Table 3-21
Proposed Transit Center Requirements**

	Eastridge
Existing lines	11
Existing bus bays *	10
Proposed Bus Bays**	
For projected service	11
For light rail expansion	2
Layover spaces required ***	5
Total	18

Source: VTA and AECOM, 2009

* Not all bus bays are currently in use.

** Bus bay requirements include two bays for each through route (one for each direction) and one bay for each terminating route. They do not include any shared bus stops which could reduce the number of total bays needed.

*** Layover spaces have been estimated based on one layover space for every two terminating routes.

The proposed design for the expanded Eastridge Transit Center would provide 13 bays (including four for articulated buses) and five layover spaces. Bay and layover space sharing among the bus routes would be necessary in order to accommodate the future bus services at the Eastridge Transit Center.

3.7.2 Caltrain Service

Caltrain commuter rail service links Gilroy and San Francisco via San Jose, Palo Alto, and Redwood City. In the East Valley study area, Caltrain runs parallel to Monterey Highway. The closest Caltrain station to Capitol Expressway is located approximately 2,000 feet north, at the intersections of Monterey Highway and Fehren Drive. Bus connections would be used by passengers transferring between the Alum Rock – Santa Teresa LRT line and Caltrain. Direct LRT connection to Caltrain is available at Tamien Station in addition to Diridon Station near downtown San Jose.

3.7.3 Ridership

The VTA travel demand model was used to determine ridership along the project corridor. Ridership for the horizon year 2035 was projected by mode. Access mode to the LRT stations is also provided.

Table 3-22 summarizes the project corridor ridership by station and mode for the four stations. The modes of travel are LRT, BRT and other bus transit. The ridership figures in Table 3-22 are daily boardings in the future with LRT. Total corridor daily boardings for the No Build alternative in 2018 and 2035 is 11,124. The two With LRT alternatives have similar corridor boardings; 11,271 for the LRT Base option and 11,346 for the No Ocala Station option.

**Table 3-22
Station Boardings by Mode for the Future**

Station	Mode	Daily Boardings		
		No Build	With LRT (Base)	With LRT No Ocala
Eastridge	LRT	N/A	1,541	1,563
	BRT	2,086	1,580	1,577
	Other Bus	2,289	2,433	2,439
	Total	4,375	5,554	5,579
Ocala*	LRT	N/A	250	N/A
	BRT	537	416	530
	Other Bus	N/A	N/A	N/A
	Total	537	666	530
Story*	LRT	N/A	1,053	1,179
	BRT	2,033	1,672	1,734
	Other Bus	23	22	22
	Total	2,056	2,747	2,935
Alum Rock	LRT	2,043	923	921
	BRT	1,764	1,137	1,137
	Other Bus	349	244	244
	Total	4,156	2,304	2,302
Total		11,124	11,271	11,346

*Bus stops for BRT and other buses are located within walking distance from proposed LRT station along Capitol Expressway
Source: VTA, 2009

Table 3-23 summarizes the mode of access to the LRT stations. At the Eastridge Station, most of the light rail boardings are transfers from buses using the transit center, followed by park and ride, walking to the station and finally being dropped off by someone. At the Ocala Station, all passengers walk to the LRT station. At the Story Station, the access is split fairly evenly between walk and transfer from a bus. At the Alum Rock Station, most passengers walk, followed by transfer and then park-and-ride and drop off.

**Table 3-23
Passenger Access Mode to LRT Stations for the Future**

Station	Walk (%)	Park and Ride (%)	Drop Off (%)	Transfer from Bus (%)
Eastridge	19	26	5	50
Ocala	100	0	0	0
Story	55	0	0	45
Alum Rock	42	18	4	36

Source: AECOM, 2009

3.8 Park and Ride / Kiss-and-Ride Facilities

Park-and-ride facilities would be available for use by LRT passengers. Two locations, the Alum Rock Station and the Eastridge Transit Center, along the proposed LRT extension already have

park-and-ride lots as part of the existing facilities. For the facility at Alum Rock, no modification to the current configuration is anticipated. The facility at the Eastridge Station would be redesigned and expanded to satisfy future demand with the light rail station construction. Table 3-24 provides information about the areas around the two park-and-ride lots.

**Table 3-24
Estimated Demand for Park-and-Ride Sites for the Future**

Location	No Build	Build LRT (Base)	Build LRT No Ocala	Notes
Alum Rock	110 ¹	129	128	Existing park and ride facility would remain. No expansion has been planned.
Eastridge	164	476	481	Existing park and ride of 135 spaces would be expanded to 417 to partially address the new demand.

¹ Existing park-and-ride spaces
Source: VTA 2009

The expected park and ride demand in the future for the project alternatives were projected using the VTA Santa Clara County regional forecasting model. The modeling process used to estimate park-and-ride demand tends to overestimate the number of people arriving at a light rail station and parking their car for the day. Historically, VTA has found more individuals arrive by walking, being dropped off or transferring from a bus than estimated by the model, resulting in an overestimation of the park-and-ride demand.

The expected demand at the Eastridge Transit Center park-and-ride in both 2018 and 2035 without the project is 164 spaces while the demand with the proposed LRT is approximately 480 spaces. Approximately 417 spaces have been planned for the project.

Because of the extensive bus access to the Eastridge Transit Center, the full demand for park-and-ride might not be realized, or not realized in the time periods indicated by the travel demand model. VTA will monitor park-and-ride demand at Eastridge and expand parking when demand warrants.

Due to space constraints, the park-and-ride lot at the Alum Rock Station would not be expanded in the future. The existing number of spaces (110) might be slightly less than of the future estimated demand with the project. The estimated demand for park-and-ride at Alum Rock is 117% of supply. Since this is greater than 105% it is considered an adverse impact.

Table 3-25 presents the projected kiss-and-ride trips for both the Alum Rock and Eastridge Station in both 2018 and 2035. It can be seen that the demand for kiss-and-ride at the Alum Rock Station would decrease when the LRT is extended to Eastridge; the kiss-and-ride trips at the Eastridge Station is expected to increase as a result.

**Table 3-25
Estimated Kiss-and-Ride Demand for the Future (2018 and 2035)**

Station	No Build	With LRT (Base)	With LRT No Ocala
Eastridge	77	220	223
Alum Rock	201	66	65

Source: VTA, 2009

3.9 Pedestrians & Bicycles

Pedestrian activity on Capitol Expressway has been fairly limited by the corridor's automobile-dominated nature. For example, before the currently under construction pedestrian sidewalk improvements, the lack of continuous foot paths deters pedestrian traffic along the expressway apart from getting to bus stops that are usually located near an intersection. The urban, high volume and high speed environment also discourages the use of alternative non-motorized modes of transportation, like cycling.

3.9.1 *Proposed Crossing Improvements*

In order to make the corridor more pedestrian and cyclist friendly, a series of improvements to the pedestrian facilities have been proposed as part of a locally-funded project that will be constructed in advance of the LRT. Where only interim improvements can be provided by the Capitol Expressway Pedestrian Improvements Project, the LRT project will include permanent pedestrian improvements, making the interim provisions permanent. No additional pedestrian mitigation is considered necessary.

In regard to intersections, the following are proposed:

- ◆ Pedestrian countdown signals will be added to all signalized intersections. The countdown signals would inform pedestrians of the time remaining to complete the crossing of the intersection.
- ◆ Pedestrian audio devices will be added to all pedestrian signals to facilitate crossing by the visually impaired and also enhance safety.
- ◆ Pedestrian push button signal actuation would be added to the median at light rail stations. The pedestrian push buttons would enable light rail passengers to activate a walk indication after disembarking from a train.
- ◆ Curb return radii have been reduced in the conceptual design and right-turn channelization islands have been removed in most locations. These changes reduce the speed of vehicles executing right turns which improves pedestrian safety. This also results in all pedestrian crossings being controlled by signals.
- ◆ A pedestrian overcrossing would be provided south of the Story Road intersection for access to the aerial station at Story Road. This overcrossing would not only serve light rail passengers but also pedestrians seeking to avoid crossing the expressway at-grade. Crossing the expressway at-grade at Story Road will remain with the project.
- ◆ Pedestrian refuge areas would be provided in the median of Capitol Expressway at Story Road, Ocala Avenue and Cunningham Avenue intersections. LRT passengers could cross to either side of Capitol Expressway from the median.
- ◆ A pedestrian crosswalk would be added across Eastridge Access Road to facilitate crossing this roadway.

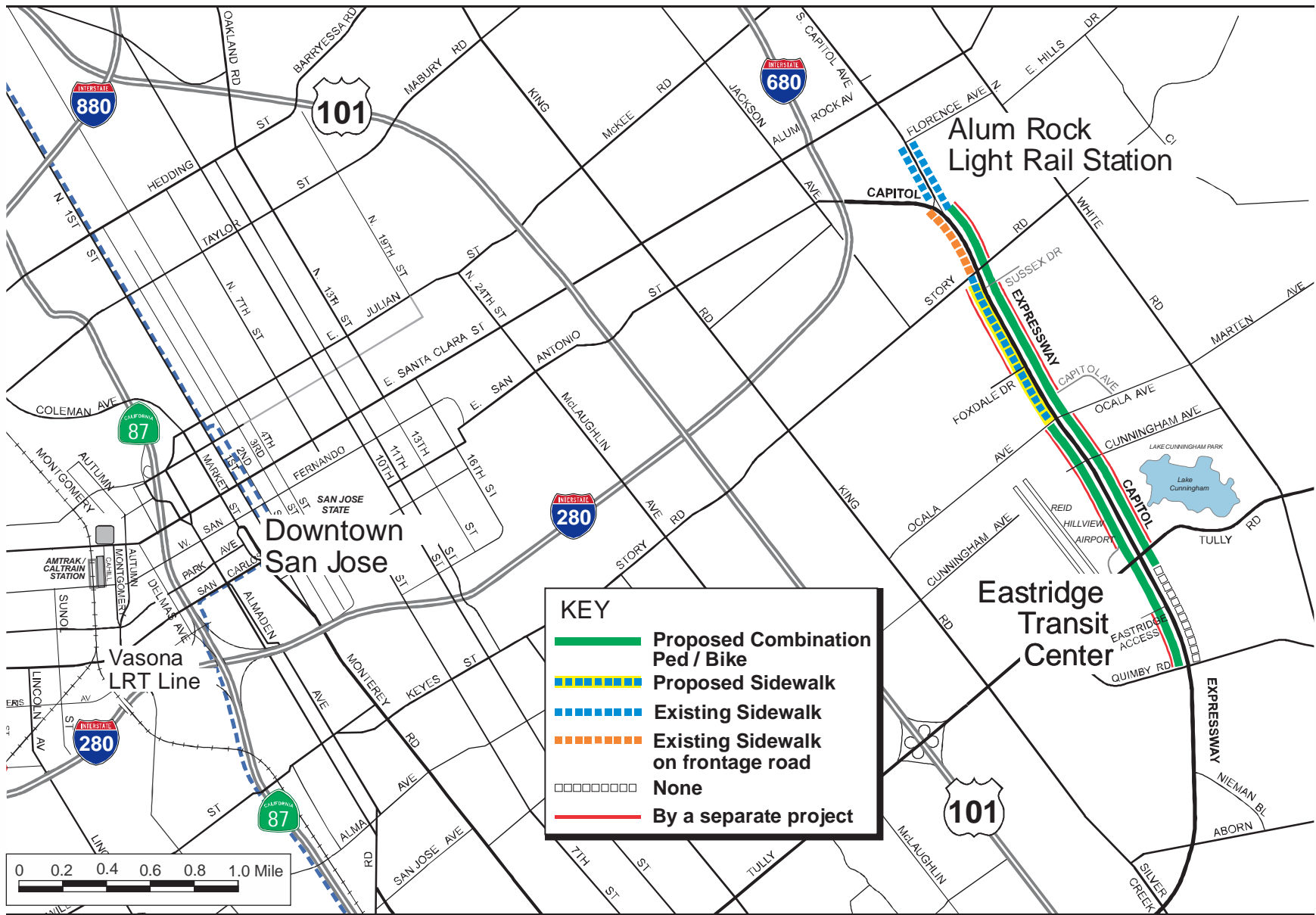
- ◆ The light rail project would maintain pedestrian intersection crossings. Where pedestrian crossings are permitted under existing conditions, those crossings would be retained in the future, although some crossings may be extended by a wider expressway cross-section.
- ◆ At intersections where school children are prevalent, for example at the intersection with Ocala Avenue, adult crossing guards should be provided to further enhance safety. The VTA will conduct pedestrian safety talks at nearby schools to heighten awareness. This is particularly important as the LRT is quiet and pedestrians crossing the tracks at-grade may not realize a vehicle is approaching. However, all crossings will be signalized and the signals will be timed to allow pedestrians to travel from one side of the expressway to the other in a single movement. Generally, pedestrian signals are timed for a walk speed of 3.5 feet per second. If such timing is found to be inadequate after construction of the project at locations such as Ocala with a high concentration of school children, the signal timing could be changed to a walk speed of 3.0 feet per second.
- ◆ The project would also lengthen some pedestrian crosswalks due to removal of 'pork chop' islands for right-turns. As a result, walk time during the pedestrian phase would be adjusted to accommodate the longer walking distance. Pedestrians crossing Capitol Expressway at the Ocala and Cunningham intersections would walk across the rail tracks. However, ample crossing time would be provided once the pedestrian phase is activated; 'flashing don't walk' would be fully served.

3.9.2 *Proposed Corridor Improvements*

The streetscape concept envisioned for the corridor would transform Capitol Expressway from a single-purpose urban arterial to a multi-modal landscaped boulevard. The modified expressway would be designed as a pedestrian-friendly tree-lined street featuring a continuous pedestrian/bicycle path along the roadway. The frontage roads would be incorporated as an integral part of the overall right-of-way designed to improve pedestrian transitions from existing residential neighborhoods to the urban boulevard.

The Capitol Expressway Pedestrian Improvements Project currently under construction would expand the existing sidewalk network along Capitol Expressway to include a multi-use path of greenway approximately 16 feet wide that includes a 10-foot pathway dedicated to pedestrians and bicyclists. The LRT project is proposing to augment the planned corridor improvements as depicted in Figure 3-9. The proposed improvements are:

- 10-foot wide combined pedestrian / bicycle pathway at various locations on both sides of the expressway, from just south of Capitol Avenue to just south of Tully Road.



DOWNTOWN EASTVALLEY CAPITOL EIR

Figure 3-9

2018 / 2035 WITH LRT (BASE) PEDESTRIAN / BICYCLE PATHS

- Landscaping elements will be added along the light rail median and at various locations along the curb edge of Capitol Expressway.

Proposed Station Pedestrian Safety Features

Specific pedestrian safety features would be installed at the proposed LRT stations to enhance safety of the passengers or pedestrians needing to cross the LRT tracks.

- At the Eastridge Station, pedestrian safety gates would be installed at track crossings to prevent pedestrians/passengers from crossing when an LRT vehicle is approaching.
- Tactile warning bands would also be installed at the gate locations to warn visually impaired users of the pedestrian safety gates; pedestrians would become aware that they are approaching a different area and to exercise caution.
- At the Ocala Station, tactile warning bands would be installed on both sides of the median crosswalk to warn visually impaired users that they are approaching track crossings.
- Elevators would be provided at the median and sidewalk accesses to the proposed Story Road Station and the overcrossing levels to provide convenient access to these facilities.

3.10 Goods Movement

The proposed LRT would not impact the movement of goods as there would not be changes to access along the corridor. All vehicle movements that currently occur would be allowed with construction of the proposed LRT.

3.11 On-Street Parking

The construction of the proposed LRT extension will not change the parking conditions on Capitol Expressway. Currently, parking is prohibited on the expressway and future conditions will not include parking on the roadway. Table 3-26 indicates the amount of existing parking demand along the affected roads by segment. Existing parking use was observed through field investigations between 10:00 pm – 11:00 pm on a weekday. The land uses along the affected roads are residential and the demand after 10:00 pm would represent the maximum demand. Also noted on Table 3-26 is the future parking supply with and without the implementation of BRT and LRT in the corridor. The No Build analysis includes the parking loss resulting from a locally-funded project that will remove parking on one side of the frontage roads parallel to Capitol Expressway. The parking loss will result from the widening of sidewalks and the addition of landscaping.

- As indicated in Table 3-26 on-street parking along the east side of South Capitol Avenue, north of the Capitol Expressway / South Capitol Avenue intersection, would be removed for the LRT construction. An estimated nine spaces would be removed between Westboro Drive and the end of the road (south of Highwood Drive) for the roadway and intersection reconfiguration. No adverse impact is expected as the adjacent developments are single family homes with garages and on-street parking is available on Westboro Drive, Highwood Drive and Dover Way.

Table 3-26
On-street Parking Analysis

Segment	Existing		Proposed		Parking Excess or Shortfall		
	Demand (Evening)	Provision	No Build	With LRT	No Build	With LRT	
On S. Capitol Avenue, east of Capitol Expressway							
1	Westboro Drive to Highwood Drive	4	5	5	0	1	-4
2	Highwood Drive to Terminus	7	12	12	8	5	1
SUBTOTAL		11	17	17	8	6	-3
On S. Capitol Avenue, west of Capitol Expressway							
3	Excalibur to Bambi	2	29	29	29	27	27
4	Bambi Lane to Terminus	35	55	31	16	-4	-19
SUBTOTAL		37	84	60	45	23	8
On Capitol Avenue, east of Capitol Expressway							
5	Kollmar Dr to Tudor	26	26	21	10	-5	-16
6	Tudor Ct to Bristol	9	56	36	36	27	27
7	Bristol Dr to Coventry	3	51	35	35	32	32
8	Coventry Dr to Woodmoor	18	40	37	37	19	19
9	Woodmoor Dr to End	15	29	15	15	0	0
SUBTOTAL		71	202	144	133	73	62
TOTAL		119	303	221	186	102	67

*Same parking supply for LRT Base and Option designs

■ Shaded cells indicated parking deficiency

Source: AECOM 2009 and Rajappan & Meyer 2009

Sections of the frontage roads on both sides of the expressway would be narrowed and parking will only be allowed on one side with the project, resulting in less on-street parking than currently exists. With the implementation of pedestrian and landscaping improvements (No Build alternative), parking supply along South Capitol Avenue (west of Capitol Expressway) would be reduced by a total of 24 spaces. With the proposed LRT in place, an additional 15 spaces would be removed. While the section of South Capitol Avenue between Bambi Lane to the end of the road is expected to see some shortage in parking spaces (up to 19 spaces), there would be excess capacity north of this section, between Excalibur Drive and Bambi Lane. Parking would also be available along Bambi Lane (between South Capitol Avenue and Sinbad Avenue). As such, the overall supply along South Capitol Avenue would still be sufficient to meet the expected demand.

Parking would also be reduced along South Capitol Avenue, east of Capitol Expressway. Up to 16 spaces would be removed between Kollmar Drive and Tudor Court with the implementation

of LRT. Along this section, demand exceeds supply by 16 spaces. Field investigations did not record any vacancies along the nearby side streets (Kollmar Drive and Sussex Drive) under existing conditions due to the relatively high density residential developments in this area. Drivers would have to park on the adjacent block to the south, past the Tudor Court intersection. All segments south of Tudor Court, along South Capitol Avenue, would also have some parking spaces removed as a result of pedestrian and landscaping improvements (No-Build Alternative); the number of spaces to be removed ranges from 3 spaces to 20 spaces. However, none of these blocks have existing demand that is greater than the amount of future parking supply. In these segments there would be no additional parking spaces removed with the implementation of LRT.

In conclusion, three segments of South Capitol Avenue would have on-street parking demand greater than supply after implementation of BRT and LRT; between Westboro Drive and Highwood Drive, between Bambi Lane and the terminus of South Capitol (west of Capitol Expressway) and between Kollmar Drive and Tudor Court (east of Capitol Expressway). However, with sufficient parking available in the immediately adjacent blocks to offset the projected shortfalls, the parking impact is not considered adverse.

3.12 Community Access

The proposed LRT expansion would not impede any access that is currently available from the expressway. All intersection movements that are possible before construction would be retained after this project is implemented. As the proposed LRT would operate primarily in the median of the expressway, no right turn in/out access to commercial developments would be removed. Thus, all community features in the study area would have their access maintained.

The project would, however, disrupt access along South Capitol Avenue. Between Wilbur Avenue and Capitol Expressway, Westboro Drive (east of South Capitol Avenue) would be converted to right in/out only due to the construction of the light rail. Westboro Drive has alternative access from within the neighborhood that motorists on southbound South Capitol Avenue can access from Wilbur Avenue. Another minor change in local circulation occurs near the intersections of Capitol Expressway and Story Road. Immediately north of Sussex Drive, South Capitol Avenue would be one-way, in the southbound direction. Two-way circulation would be maintained on South Capitol Avenue, in front of the apartment complex, connecting to Kollmar Drive. One-way flow would only occur in front of the duplex immediately north of Sussex Drive. Vehicles traveling south on South Capitol Avenue from Kollmar Drive could either turn left onto Sussex Drive or could continue south on South Capitol Avenue. Vehicles traveling north on South Capitol Avenue would be required to turn right onto Sussex Drive. Vehicles traveling west on Sussex Drive would be required to turn left onto southbound South Capitol Avenue; they would be prohibited from turning right onto northbound South Capitol Avenue.

3.13 Safety & Security

3.13.1 *Safety*

In addition to the pedestrian improvements discussed in Section 3.9.1, this project would meet CPUC requirements for safety. At station peripheries, guardrails and fencing would segregate tracks to prevent unauthorized crossing or entry. At applicable locations, walkways would be designated within station areas to connect the light rail platform to the parking areas, bus stops and automobile passenger pick-up and drop-off areas. Fencing will also be installed in the median of Capitol Expressway for the elevated portion of LRT; from south of Capitol Avenue to south of Story Road and again from south of Cunningham Avenue to Tully Road.

Along the expressway, there are currently periodic pullouts for disabled vehicles. The proposed LRT extension project would eliminate vehicle refuge areas within the project limits. However, a shoulder area would enable disabled vehicles to move to the side of the roadway and out of the through lane of travel.

All traffic signals along the corridor will be upgraded to improve safety. Upgrades will include the addition of audio signals and pedestrian countdown timers. At crosswalks that cross the LRT tracks at grade, signs advising pedestrians to “Look Both Ways” for approaching trains will be installed.

3.13.2 *Security*

Station platforms would be designed and located to be visible from the adjacent roadways. All platforms and park-and-ride lots would be lit in the evening and night-time hours to enhance security. VTA security would patrol and remotely monitor all facilities on a regular basis to maintain passenger security.

3.14 Construction Effects

Construction of light rail transit on Capitol Expressway would take place over approximately four years. At the height of construction, a number of construction employees and equipment would occupy portions of the street including the median at active construction locations. In the most active areas, construction would periodically reduce Capitol Expressway from six lanes to four lanes, two in each direction at various times during non peak hours. As a result, construction activity on Capitol Expressway would impact traffic and the LOS at intersections and the capability of transit service to adhere to the published schedules.

The construction schedule, mitigations of construction impacts and public outreach would be coordinated by VTA throughout the process.

3.14.1 *Construction Effects on Traffic*

Construction of the proposed LRT would be a continuous, year-round process with construction taking place within specific segments at any one time. The peak of daily construction activity in any one area would take place during the off-peak commute hours when the LOS on Capitol

Expressway at most major intersections is better. Reducing the effects of the project construction on traffic would be achieved by means of the following coordinated resources:

- VTA, in concert with the City of San Jose, would prepare a Construction Mitigation Traffic Management Plan that would be a part of the construction contract for the proposed project.
- Based on the Construction Mitigation Traffic Management Plan, contractors would use flagmen and follow a daily construction schedule that would restore traffic capacity during peak periods on weekdays wherever possible (the morning commute period is 6:00 to 9:00 AM and the evening commute period is 3:00 to 7:00 PM).
- VTA would oversee construction to assure all mitigation measures are met. VTA would establish a field office along the project that would be open to the public during specific hours of the week.

Construction equipment traffic from the contractors would be controlled by flagmen and the procedures contained in the Construction Mitigation Traffic Management Plan. For example, storing large pieces of equipment overnight at the center median would not be allowed. Traffic that may attempt to use neighborhood streets to avoid construction areas would be controlled by two characteristics of the roadway network adjacent to Capitol Expressway:

- First, while there are no efficient, directly parallel detours around Capitol Expressway, some arterials are capable of handling traffic diverted from Capitol Expressway. White Road, King Road and Tully Road would most likely handle the diverted traffic. Portable electronic variable message signs and other static signs would be strategically positioned at approaches of individual construction zones to warn motorists in advance of the construction and direct traffic to use alternative routes where feasible. Flagmen would be at all major construction points to assist in the control of traffic and support the use of these roads as a detour.
- Second, there are very few paths of travel through neighborhood streets that offer parallel routes to Capitol Expressway. Therefore, neighborhood streets would be protected from being used as cut-through streets by motorists.

3.14.2 *Construction Effects on Transit*

Transit service on-time performance can be expected to drop slightly during the construction period. Since the construction period would be limited in duration, no specific mitigation measures are proposed. Alternative bus stops would be located temporarily whenever existing bus stops are disrupted by construction.

3.14.3 *Construction Effects on Pedestrians*

In areas along Capitol Expressway where sidewalks exist, alternative paths would be provided. If no sidewalk currently exists, replacement facilities during construction would not be provided. Signs would be posted to direct pedestrians to cross at intersections in order to proceed along Capitol Expressway and avoid the construction area.

3.14.4 *Construction Effects on Bicycles*

Currently, bicyclists are able to use the shoulders of the expressway as a bicycle lane. During construction of the light rail project, the shoulders would not be maintained to allow bicyclists to effectively use the corridor. Detour signs would be posted directing bicyclists to use alternative corridors during construction.

3.14.5 *Construction Effects on Residential Access and Parking*

Several residential properties along the corridor would be affected by construction activities. During short periods of time, access may be restricted and parking eliminated. VTA would coordinate the construction activities with the home owners/tenants. Residents would be notified at least one month in advance of construction and provided with a detailed schedule. Any adjustments to the schedule would be conveyed to the residents upon determination of the need to adjust the schedule. The construction duration and disruptions to residents would be kept to a minimum.

3.14.6 *Construction Impacts on Business Access and Visibility*

Several businesses along the corridor would be temporarily affected by construction. During short periods of time, access may be restricted. However, access to the businesses would be maintained. Property owners and businesses would be notified at least one month in advance of construction and provided with a detailed construction schedule if their access will be restricted. Changes to the construction schedule would be conveyed as soon as possible. Construction duration would be kept to a minimum. Signs would be provided along Capitol Expressway indicating the business is open during construction and that access is available. Businesses shall be notified seven days in advance of any traffic circulation that may affect them.

4.0 PROJECT MITIGATION

This chapter discusses potential improvements to the transportation network in the project vicinity that would alleviate any significant impacts caused by the proposed LRT extension to the roadways, intersections, transit facilities, parking, pedestrian and bicycle facilities, goods movement, community access, safety and security or construction impacts along the corridor in 2035.

4.1 Traffic Mitigation

The No Build alternative assumes that the HOV lanes remain and the With LRT alternative and design options assume that the HOV lanes are removed to provide sufficient width for the light rail tracks. The HOV lanes were constructed as temporary improvements until light rail was to be constructed in the corridor. The Evergreen Specific Plan EIR prepared in 1993 stated:

“...traffic mitigation improvements proposed as part of the Evergreen Specific Plan include adding additional lanes to a portion of Capitol Expressway that would use the median section of the right-of-way where a light rail line would be located. These lanes would be replaced by the light rail transit if the Capitol Corridor is implemented.”

While potential mitigation measures are identified below, it may not be desirable or feasible to actually construct these improvements. The City of San Jose’s desired minimum overall performance for City streets during peak periods is level of service D. A proposed amendment to the City’s 2020 General Plan states:

“Development projects should be required to provide appropriate mitigation measures if they have the potential to reduce the level of service to E or worse. These mitigation measures can include a combination of street improvements and/or improvements to transit, bicycle, or pedestrian facilities when the mitigation for vehicular traffic compromises community livability... [or] would result in an unacceptable impact on an affected neighborhood or City street.”

Mitigation measures are described below. The significant investment in an improved transit service along this corridor would provide multi-modal benefits for the region. The decrease in traffic level of service at some intersections should be viewed as an opportunity to divert more people from their automobiles to transit.

4.1.1 2018 With LRT (Base) Alternative

One intersection would result in adverse traffic impacts in the AM peak hour and one other would be impacted in the PM peak hour only. These intersections are discussed below.

4.1.1.1 Capitol Expressway / South Capitol Avenue Intersection

The Capitol Expressway / South Capitol Avenue intersection is projected to operate at level of service F in the AM peak hour for the With LRT conditions, degrading from level of service D for the No Build condition. A change in level of service from D to F represents an adverse impact for this CMP monitored intersection.

A potential mitigation measure would be to maintain the HOV lanes between Capitol Avenue and Story Road. While it is feasible to maintain the HOV lanes without acquiring additional property or removing pedestrian improvements in the area, it is inconsistent with the urban design principles of this project which seeks to transform the expressway from an auto-oriented corridor to a multi-modal boulevard. As a result, this mitigation measure is not recommended to be incorporated in this project.

Mitigation: There is a feasible mitigation for this effect, but it is not recommended to be incorporated in this project.

4.1.1.2 Capitol Expressway / Ocala Avenue Intersection

The Capitol Expressway / Ocala Avenue intersection is projected to operate at level of service E with or without LRT during the PM peak hour. Under the With LRT alternative, the delay value and V/C ratio for the intersection would exceed the thresholds for an intersection that already operates at LOS E, resulting in an adverse effect.

A potential mitigation measure would be to construct additional lanes to restore the HOV lanes removed as part of the project. However, right-of-way is not available for the HOV lanes replacement. Because the HOV lanes would be removed to provide space for the light rail tracks, right-of-way would need to be acquired from adjacent property in order to implement this mitigation. Replacement HOV lanes would only be effective if they extended the length of the corridor. Approximately 37 properties along the corridor would need to be either partially or fully acquired to replace the HOV lanes.

Because the implementation of this mitigation measure would result in adverse property and construction-related impacts for which no mitigation is feasible, this impact is considered a substantially adverse effect for which there is no feasible mitigation.

Mitigation: There is no feasible mitigation for this effect.

4.1.2 *2035 With LRT (Base) Alternative*

One intersection would result in adverse traffic impacts in the AM peak hour and one other would be impacted in the PM peak hour. The adverse impacts and necessary mitigation are the same as with the base project in 2018 for Capitol Expressway/South Capitol Avenue and Capitol Expressway/Ocala Avenue.

4.1.3 *2018 With LRT No Ocala Station Alternative*

One intersection would result in adverse traffic impacts in the AM peak hour and one other in the PM peak hour. The adverse impacts and necessary mitigation as noted in Section 4.1.1.1

and Section 4.1.1.2 are the same with the base project in 2018 for Capitol Expressway/South Capitol Avenue and Capitol Expressway/Ocala Avenue. The 2018 with LRT No Ocala Station Alternative requires the additional mitigation discussed below.

4.1.4 2035 With LRT No Ocala Station Alternative

One intersection would result in adverse traffic impacts in the AM peak hour and one other in the PM peak hour. The adverse impacts and necessary mitigation are the same with the base project in 2035 for Capitol Expressway/South Capitol Avenue and Capitol Expressway/Ocala Avenue.

4.2 Intersection Queuing Mitigation

Intersection queuing for the No Build, With LRT and With Project No Ocala Station alternatives have been calculated. The calculated left turn queues have been found to exceed field observations for the existing condition. Therefore, the projected queues may not actually occur. As part of the design of the LRT project, computer simulation of the corridor should be undertaken to determine the actual queues. Several left-turn pockets, both on the expressway and on the cross streets, have queues that exceed the available left-turn storage under the No Build condition. These intersections also experience left-turn queuing greater than capacity for the two With LRT options. One location, the northbound Cunningham Avenue left-turn bay, has queuing greater than capacity for the 2035 With LRT option, but not for the No Build condition because the With LRT design would shorten the existing left-turn bay.

While queuing is not identified as a significant criteria by the City of San Jose or VTA, instances where queuing exceeds capacity should be corrected in the project design, if possible. At Cunningham Avenue where the With LRT condition has queuing over capacity but the No Build condition does not, additional northbound left-turn storage should be required.

On the other hand, there are locations where left-turn storage lane can be extended to accommodate the future demand. The possible locations are southbound along Capitol Expressway at the intersection with South Capitol Avenue and at the intersection with Nieman Boulevard. At the intersection of Capitol Expressway / Story Road and Capitol Expressway / Tully Road, extension of the southbound left-turn storage lane may be possible depending on the location of the LRT track columns.

Mitigation: Increase left-turn queue capacity at locations that do not require additional right-of-way.

4.3 Transit Mitigation

This project does not adversely impact the transit facilities in the project vicinity. On the contrary, transit experience along the Capitol Expressway would be enhanced with the implementation of the proposed LRT extension to Eastridge. The proposed LRT extension to the Eastridge Transit Center would provide users in the area an additional access to regional transportation from the regional highway and arterial roadway network, by intersecting transit

routes and by walking. However, the project does affect the person through volume on the corridor and the travel time for buses. Section 3.2 of this report discussed the person through volume on Capitol Expressway for various improvement options. The specific information is contained in Table 3-2. The existing person through volume for a representative segment of corridor is estimated at 3,591. The addition of the BRT project by 2035 increases the person through volume to 5,194 or an increase of 44 percent over existing. With construction of LRT in 2035 the HOV lanes are removed but the through capacity of the corridor is maintained. The person through volume for 2035 with BRT and LRT is estimated at 5,194. This also represents an increase of about 44 percent over existing.

Section 3.6 of this report contains a discussion of travel times and speeds along the Capitol Expressway corridor for the various improvement options. Generally, travel times increase and speeds decrease in future years as traffic volumes increase and as the project changes the expressway roadway geometry.

For the existing condition, the mixed flow lanes travel speed ranges from 24 mph to 35 mph and for the existing HOV lanes the speeds range from 25 mph to 37 mph. In the 2018 No Build condition the mixed flow lanes have speed ranges of 22 mph to 31 mph and the HOV lanes have speed ranges of 24 mph to 34 mph. Bus service travel in the HOV lanes will experience up to an approximate 7 mph decrease in travel speed from existing to 2018 as a result of increase traffic volume on the corridor. With the LRT project the HOV lanes are removed and bus service, including BRT, would be accommodated in the mixed flow lane along the curb. In 2018 the BRT travel speed ranges from 21 mph to 25 mph, or between 2 mph to 5 mph less than the No LRT condition.

The same relationships hold for the 2035 scenario. The 2035 No Build condition has mixed flow lanes travel speeds ranging from 13 to 30 mph and the HOV lanes have speed ranges of 23 to 33 mph, up to about 4 mph less than existing. With LRT, the BRT travel speeds range from 10 to 25 mph, or approximately 8 mph to 13 mph less than the No LRT condition.

4.4 Park and Ride / Kiss and Ride Mitigation

At the Eastridge Transit Center, the proposal is to reconfigure the existing VTA park-and-ride facility in conjunction with the LRT extension. As part of this reconfiguration, additional parking to partially address demand will be identified within the existing shopping center.

The full park-and-ride demand at Eastridge is estimated to be approximately 480 spaces with the proposed LRT. About 417 spaces have been proposed at the Eastridge Transit Center on property currently owned by VTA and on property to be acquired from Eastridge. While less than the estimated demand of parking spaces, this supply is proposed because the travel demand model tends to overestimate park-and-ride demand and there is extensive bus service to the Eastridge Transit Center. Based on current observations, VTA has found that most light rail passengers either walk to the station or transfer from buses.

The existing park-and-ride facility at Alum Rock Transit Center is built to maximum capacity. The projected demand in the future, if the proposed LRT extension is built, would be 128

spaces. This is 18 spaces more than the current capacity. As mentioned, it is likely that the projected demand is overestimated. In addition, with LRT extended to Eastridge, demand at Alum Rock could be reduced as it would no longer be an end-of-the-line facility.

There is currently no designated drop-off / pick-up area at Eastridge Transit Center. With the expanded layout in the future when the proposed LRT is implemented, a new drop-off / pick-up area adjacent to the proposed LRT station would be provided. This would allow kiss-and-ride passengers of the LRT to be dropped off and picked up.

4.5 Pedestrian and Bicycle Mitigation

There are no pedestrian or bicycle impacts caused by the proposed project. On the contrary, this project would augment planned pedestrian and bicycle improvements along the corridor. The pedestrian and bicycle improvements associated with the project include:

- A pedestrian and bicycle path is proposed at various locations along the corridor from the Alum Rock Station to south of Tully Road.
- The Project would accommodate connections to pedestrian and bicycle facilities.
- All existing pedestrian crosswalks and pedestrian signal indications will be maintained.
- At Story Road, a pedestrian overcrossing south of the intersection has been proposed to serve both passengers accessing the light rail platform as well as pedestrian traffic crossing the expressway.
- Pedestrian push buttons will be added to all location with at-grade platforms to allow disembarking passengers to call the pedestrian signal phase.
- Pedestrian audible warning devices will be installed at all intersection with at-grade pedestrian access to the light rail platform.
- Pedestrian countdown heads indicating the remaining time for a pedestrian to cross an intersection would be incorporated into the signal system at all intersections with at-grade pedestrian access to the light rail platform.

At the Ocala intersection, in particular, where school children are prevalent, adult crossing guards should be provided to guide crossing children. VTA will conduct pedestrian safety talks at nearby schools to heighten awareness. This is particularly important as the LRT is quiet and pedestrians crossing the tracks at-grade may not realize an approaching vehicle.

Generally, pedestrian signals are timed for a walk speed of 3.5 feet per second. If such timing is found to be inadequate after construction of the project at locations such as Ocala with a high concentration of school children, the signal timing should be changed to a walk speed of 3.0 feet per second.

Mitigation: With the project components noted above, no bicycle or pedestrian impacts are anticipated. No mitigation is needed.

4.6 Goods Movement Mitigation

The proposed project is not expected to adversely impact goods movement along Capitol Expressway. No existing access to commercial or residential developments would be removed with the proposed project. While local circulation at two areas (Westboro Drive at South Capitol Avenue and Sussex Drive at South Capitol Avenue frontage road) would be re-configured, a re-routing alternative is available. As such, no mitigation measures are necessary.

Mitigation: None required.

4.7 Parking Mitigation

The proposed LRT project would affect the on-street parking provisions along South Capitol Avenue and the frontage roads along Capitol Expressway. It would also reduce the number of parking spaces at Eastridge Mall.

4.7.1 *On-Street Parking*

Currently, on-street parking is not permitted along Capitol Expressway. The project would not remove any parking near businesses and therefore, there will not be an economic impact to any adjacent businesses resulting from a loss of on-street parking. The impact is not adverse.

The project would remove some on-street parking spaces along South Capitol Avenue, between Westboro Drive and Highwood Drive and along different segments of South Capitol Avenue frontage road on both sides of the expressway. In all cases, replacement parking could be found in adjacent blocks. As such, the proposed removal would not be adverse.

Mitigation: None required.

4.7.2 *Eastridge Mall Parking*

With the proposed parking expansion at Eastridge Transit Center in conjunction with the LRT project, approximately 635-685 existing Eastridge Mall parking spaces would be removed. These existing mall parking spaces are not usually occupied. The project would encourage the use of transit to the mall instead of automobiles due to the improved transit accessibility. Therefore, the impact of removing the parking spaces is not expected to be adverse.

Mitigation: None required.

4.8 Community Access Mitigation

The proposed LRT expansion would not impede accesses that are currently available from the expressway. All intersection movements that are possible before construction would be retained after this project is implemented. Thus, all community features in the study area would have their access maintained.

While local circulation at two areas (Westboro Drive at South Capitol Avenue and Sussex Drive at the South Capitol Avenue frontage road) would be re-configured, the grid pattern of the local

street network provides alternative circulation. As such, no mitigation measures for vehicular access to community facilities are necessary.

The project would also lengthen some pedestrian crosswalks due to the removal of 'pork chop' islands for right-turns. Walk time for the pedestrian phase would be adjusted to accommodate the longer distance. A series of pedestrian improvements have been proposed as part of this project.

Mitigation: None required.

4.9 Safety & Security Mitigation

There are no specific criteria to measure safety impacts and mitigation. The safety of the light rail corridor will be addressed in detail as the project moves through its design and construction phases. A key part of the safety review will be the Diagnostic Field Review and Evaluation conducted by VTA, the California Public Utilities Commission (CPUC), the City of San Jose, Santa Clara County and Caltrans. At that time a hazards analysis will be prepared. The hazards analysis will address protection of all forms of travel in and along the corridor, including automobiles, light rail vehicles, pedestrians, and bicyclists.

The project will conform to CPUC General Order 143-B, along with any waivers approved by the CPUC. The alignment classification is semi-exclusive with a fenced right-of-way and at-grade crossings. According to Table 1 of G.O. 143-B, the speed between crossings is 45 mph without an automatic block signal system (ABS). At at-grade crossings the speed will be restricted to 35 mph without flashing lights and gates, unless a waiver is granted by CPUC. At this time, flashing lights and gates are not proposed by VTA. However, VTA may seek a waiver to allow light rail vehicles to travel at a speed equal to the posted speed of the expressway.

This project will be designed and constructed to meet CPUC requirements.

Mitigation: None required.

4.10 Construction Impact Mitigation

Construction of the proposed LRT project would impact the project vicinity in several ways. However, the City of San Jose has guidelines that regulate construction related activities on public streets. In addition, together with VTA, the lead agency of this project, a Construction Impact Mitigation Plan would be prepared. The plan would detail processes and measures to minimize the impacts of the project construction.

Mitigation: Prepare Construction Mitigation Traffic Management Plan and update it as necessary during project construction.

street network provides alternative circulation. As such, no mitigation measures for vehicular access to community facilities are necessary.

The project would also lengthen some pedestrian crosswalks due to the removal of 'pork chop' islands for right-turns. Walk time for the pedestrian phase would be adjusted to accommodate the longer distance. A series of pedestrian improvements have been proposed as part of this project.

Mitigation: None required.

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This project will be designed and constructed to meet CPUC requirements.

Mitigation: None required.

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Construction of the proposed LRT project would impact the project vicinity in several ways. However, the City of San Jose has guidelines that regulate construction related activities on public streets. In addition, together with VTA, the lead agency of this project, a Construction Impact Mitigation Plan would be prepared. The plan would detail processes and measures to minimize the impacts of the project construction.

Mitigation: Prepare Construction Mitigation Traffic Management Plan and update it as necessary during project construction.

APPENDIX C

BRT and LRT Signal Priority Adjustment Methodology

LEVEL OF SERVICE ANALYSIS METHODOLOGY

The analysis was performed for all signalized intersections in the corridor using TRAFFIX 8.0 software. This software calculates and outputs levels of service for the intersections analyzed. Level of service (LOS) is a qualitative measure of intersection performance. Intersection LOS ranges from A, which indicates free flow or excellent conditions with insignificant delays, to F, which indicates congested or over-saturated conditions with unacceptable delays.

LOS Analysis Methodology

Table 1 summarizes the 7-step method used to estimate LOS at the signalized intersections on Capitol Expressway that will be affected by the project due to signal priority being provided for the BRT and/or LRT for the future conditions in 2018 and 2035. BRT adjustments will be applied to intersections at Story Road, Ocala Avenue, Cunningham Avenue and Tully Road while LRT adjustments will be applied to intersections at Ocala Avenue and Cunningham Avenue.

Table 1 LOS Methodology Summary

Step	Process
1	Input estimated future traffic volumes into TRAFFIX.
2	Input future lane geometry into TRAFFIX
3	Adjust minimum green times for crossing pedestrians.
4	The software outputs green times and levels of service. This output does not take into account any BRT or LRT signal priority treatment.
5	Calculate and apply green time adjustments due to BRT signal priority to TRAFFIX green time output (Step 4) at Story Road, Ocala Avenue, Cunningham Avenue and Tully Road.
6	Calculate and apply green time adjustments due to LRT signal priority to TRAFFIX green time output (Step 4 and 5) at Ocala Avenue and Cunningham Avenue for With LRT alternatives and design options.
7	Enter adjusted green times (Step 5 or 6) into TRAFFIX which outputs delays and levels of service (after BRT and/or LRT signal priority impacts on green times are incorporated).

Steps 1 to 4 produce intersection green times, which are then adjusted in Step 5 and Step 6 for signal priority to accommodate BRT and LRT running at-grade. In Step 7, the total adjusted green times calculated in Step 5 and Step 6 are re-entered into TRAFFIX which outputs levels of service. These steps are outlined below.

Step 1. Input Volumes into TRAFFIX

For each alternative and design option, the estimated future traffic volumes are entered into TRAFFIX analysis software.

Step 2. Input Intersection Geometry into TRAFFIX

The proposed intersection geometry for the future to accommodate BRT and the proposed LRT alternatives and design options is entered into the TRAFFIX analysis software.

Step 3 Adjust Minimum Green Times for Pedestrians

The impact of pedestrians is included by adjusting the minimum green times for vehicle phases during which pedestrians cross. The average minimum green time for the phase in which pedestrians may cross is calculated based on the proportion of cycles during which pedestrians would cross and the minimum green time when pedestrians are crossing. Equation 1 is used to estimate the average minimum green times for phases during which pedestrians cross.

$$\text{Average Min Green Time} = \frac{\text{Proport. of Cycles with No Peds} \times \text{Min Green with No Peds}}{\text{Proport. of Cycles with Peds} \times \text{Min Green with Peds}} \text{----- Equation 1}$$

The first term in Equation 1 represents the proportion of cycles during which pedestrians are not crossing, while the second term represents the proportion of cycles during which pedestrians are crossing. Field observations and future patronage projections are used to determine the proportion of signal cycles in which pedestrians would cross Capitol Expressway. These proportions are shown in Table 2. The minimum green time for crossing pedestrian is the amount of time a pedestrian needs to walk across the intersection walking at 3.5 feet/ second. Hence, each approach could have different minimum green time due to different distance.

Step 4. Green Times and Levels of Service with no BRT and LRT Signal Priority

After the adjustments in Steps 2 and 3, TRAFFIX optimizes each intersection and provides green times that will be used in the subsequent stages. TRAFFIX also provides results for the no-build (BRT only) and build (BRT and LRT) with no signal priority. This allows for subsequent comparisons with the final levels of service, so that the incremental effect of the BRT and LRT priority adjustments on the LOS of the affected intersections could be estimated.

Table 2 Proportion of Cycles with and without Pedestrians

No.	Intersection of Capitol Expy With:	Peak Hour	Existing		2018 / 2035 (No-build)		2018 / 2035 with LRT		2018 / 2035 with LRT (No Ocala Station Alternative)	
			w/o Peds	w/ Peds	w/o Peds	w/ Peds	w/o Peds	w/ Peds	w/o Peds	w/ Peds
1	Capitol Avenue	AM	0.53	0.48	0.33	0.67	0.47	0.53	0.47	0.53
		PM	0.37	0.63	0.33	0.67	0.47	0.53	0.47	0.53
2	Story Road	AM	0	1	0	1	0	1	0	1
		PM	0	1	0	1	0	1	0	1
3	Ocala Avenue	AM	0.53	0.48	0	1	0	1	0	1
		PM	0.21	0.79	0	1	0	1	0	1
4	Cunningham Avenue	AM	0.84	0.16	0.92	0.08	0.83	0.17	0.92	0.08
		PM	0.84	0.16	0.97	0.03	0.65	0.35	0.97	0.03
5	Tully Road	AM	0.21	0.79	0.25	0.75	0.30	0.70	0.30	0.70
		PM	0.84	0.16	0.25	0.75	0.30	0.70	0.30	0.70
6	Eastridge Loop	AM	1	0	1	0	1	0	1	0
		PM	1	0	1	0	1	0	1	0
7	Quimby Road	AM	0.21	0.79	0	1	0	1	0	1
		PM	0.21	0.79	0	1	0	1	0	1
8	Nieman Boulevard	AM	0.84	0.16	0.32	0.68	0.32	0.68	0.32	0.68
		PM	0.84	0.16	0.63	0.37	0.63	0.37	0.63	0.37

Step 5. Calculate LRT Signal Priority Green Time Adjustments

The LRT signal phases at each intersection are associated with two compatible auto phases, namely the through movement phases on the Capitol Expressway corridor. When there is signal coordination for autos along the corridor and the LRT phases are associated with the coordinated phases, the interruption of the coordination is not recommended. However, it is possible to adopt an LRT partial priority operation. This entails giving priority to the LRT via two methods, which gives time in the signal cycle for an LRT to pass through the intersection. The changes to the signal cycle to provide the LRT green also affect the associated auto phases.

Early Green – the vehicle phases prior to the insertion of the LRT phase (vehicle phases from time of LRT detection until arrival of LRT at the intersection) are shortened to display a green signal for the LRT earlier than would normally occur with the associated vehicle phase during normal operation of the signal cycle.

Extended Green – the vehicle phases following the LRT phase (any or all non-coordinated phases) are shortened to extend the green signal displayed for the LRT.

In both cases, the green times for the shortened uncoordinated phases cannot be shortened beyond allowable minimum green times; nor can active pedestrian phases be shortened, stranding pedestrians in the crosswalks.

This study adopted operational procedures similar to the Guadalupe Corridor LRT Traffic Signal System. A 25-second maximum early green and a 10-second maximum green extension were chosen. At intersections where the associated coordinated through movement green times are exceptionally high (so that it is not practical to provide full early green or green extension), the values are incrementally lowered until practical green time adjustments, if any, are established.

The green time adjustment process for this study assumes the following:

- LRT detection is sufficiently in advance of each intersection.
- LRT arrives randomly within the auto signal cycle.

Once the traffic signal controller has decided to provide the LRT early green priority, the controller does not have the ability to shorten the pre-programmed LRT early green time.

The traffic signal controller can shorten the extended LRT green time by utilizing a checkout (release) detection call.

The LRT phase may be called at any time during the associated vehicle phase if there is enough remaining time within the associated vehicle phase to completely serve the LRT phase. If there is not enough time in the associated vehicle phase to serve the LRT phase, then the vehicle green extension would be provided.

An LRT that has asked for an early green and is delayed for some reason can extend the green of the associated phase(s) until check-out or force-off occurs during each cycle. However, only one LRT call may be served per cycle.

There are no restrictions placed on accumulation of early and extended greens (partial priority), except that demanded pedestrian service would not be suppressed in consecutive cycles.

An estimate of the average green time adjustment for every auto cycle during which LRT arrives is calculated using the following formula:

$$\text{Green Time Adjustment} = \text{Adjustment}_1 + \text{Adjustment}_2 + \text{Adjustment}_3 \text{ ----- Equation 2}$$

Where:

$$\text{Adjustment}_1 = \frac{\text{Maximum Early Green}}{\text{Cycle Time}} \times \text{Maximum Early Green}$$

$$\text{Adjustment}_2 = \frac{\text{Maximum Green Extension}}{\text{Cycle Time}} \times \frac{\text{Maximum Green Extension}}{2}$$

$$\text{Adjustment}_3 = \frac{[\text{Non - Associated Phases} - \text{Maximum Early Green} - \text{Maximum Green Extension}]}{\text{Cycle Time}} \times \text{Maximum Early Green}$$

Each of the three adjustments in Equation 2 has two parts. The first part is the proportion of the cycle during which the LRT is expected to arrive at the intersection. The second part is the average green time adjustment when the LRT arrives during that portion of the cycle.

These three adjustments are estimates, respectively, of:

- The average early green when the LRT is expected to arrive at the intersection during the early green,

- The average green extension when the LRT is expected to clear the intersection during the time of the maximum green extension, and
- The average early green when the LRT is expected to arrive at the intersection at times other than during associated coordinated through phase(s), the maximum early green and maximum green extension.

When the LRT is expected to arrive at and clear the intersection during the associated coordinated phase greens, there is no green time adjustment necessary.

The green time adjustment is then factored to account for the frequency of LRTs each hour.

To make the adjustments for the analysis, the green times for the associated through phases are increased by the calculated green time adjustment. The non-associated phases are each shortened by multiplying the green time adjustment by the proportional difference between the actual green times of the non-associated phases and their minimum green times.

Step 6. Calculate BRT Signal Priority Green Time Adjustments

Similar to LRT signal priority green time adjustment calculation, average green time adjustment is calculated using Equation 2 with a 10-second maximum early green and a 10-second maximum green extension.

The BRT signal phase in each direction is associated with different compatible auto phases, one left-turn movement phase and two through movement phases on the Capitol Expressway. The left-turn movement phase in the northbound direction is associated with BRT phase in the northbound direction. Likewise, the left-turn movement phase in the southbound direction is associated with bus rapid phase in the southbound direction. Since each direction has different associated phases, the BRT signal priority green time adjustments are separately calculated for northbound and southbound direction along Capitol Expressway.

Step 7. Enter Green Time Adjustments into TRAFFIX, which Outputs Delays and Levels of Service

The adjusted green times are entered into the TRAFFIX analysis software as actual green times. The software outputs delays and levels of service after bus rapid and light rail impacts on green times are incorporated. The process produces levels of service with estimated BRT and LRT signal priority impacts included.