

8.7 TRANSPORTATION AND MOBILITY ASSUMPTIONS



**SANTA CLARA
GENERAL PLAN**

8.7 TRANSPORTATION AND MOBILITY ASSUMPTIONS

This Appendix provides an overview of the assumptions and methodology used to develop the Mobility and Transportation Diagram goals and policies. Included is a description of existing Level of Service definitions, a list of intersections and roadways that are part of the Santa Clara County Congestion Management Program, information about the City's Travel Demand Model, and a comparison of anticipated vehicle miles traveled (VMT) between 2008 and 2035.

8.7.1 Level of Service Definitions

The Level of Service (LOS) definitions in Table 8.7-1 and Table 8.7-2 apply to all intersections and roadways in the City.

TABLE 8.7-1: SIGNALIZED INTERSECTION LEVEL OF SERVICE DEFINITIONS

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

Source: Traffic Level of Service Analysis Guidelines, VTA Congestion Management Program, June 2003; Highway Capacity Manual, Transportation Research Board, 2000.



TABLE 8.7-2: ROADWAY SEGMENT DAILY LOS DEFINITIONS

Level of Service	Traffic Conditions	Daily Per Lane Roadway Capacity ¹			
		Collector	Arterial	Expressway	Freeway
A	Little or no congestion	n/a	n/a	n/a	5,500
B	Small amount of congestion	n/a	n/a	n/a	10,050
C	Average traffic congestion	3,400	4,500	5,400	14,400
D	High traffic congestion	6,600	8,850	10,600	17,850
E	Very high traffic congestion	7,700	9,300	11,200	20,050
F	Oversaturated, stop-and-go conditions	>7,700	>9,300	>11,200	>20,050

Source: Fehr & Peers, 2009

¹ Capacities defined based on ten times the calculated peak-hour capacity from the Highway Capacity Manual

8.7.2 Congestion Management Program Facilities

Congestion Management Program (CMP) facilities in Santa Clara include U.S. 101, SR 237, I-280, Lawrence Expressway, San Tomas Expressway, Central Expressway, Great America Parkway, El Camino Real and Stevens Creek Boulevard. CMP intersections with a Level of Service standard E are listed below:

- Bowers Avenue/Scott Boulevard
- El Camino Real/Kiely Boulevard-Bowers Avenue
- El Camino Real/Lafayette Street
- El Camino Real/Lincoln Avenue
- El Camino Real/Monroe Street
- El Camino Real/Scott Boulevard
- El Camino Real/The Alameda
- Great America Parkway/Mission College Boulevard
- Great America Parkway/Tasman Drive
- Great America Parkway/U.S. 101 Northbound off-ramp
- Bowers Avenue/U.S. 101 Southbound off-ramp
- Lawrence Expressway/El Camino Real*
- Lawrence Expressway/Homestead Road
- Lawrence Expressway/Stevens Creek Boulevard*

*Both of these locations have existing grade separations in a tight diamond configuration which includes two different signalized intersections for the on- and off-ramps at each location.

Stevens Creek Boulevard/I-280 Southbound off-ramp

Montague Expressway/Mission College Boulevard

Montague Expressway/De La Cruz Boulevard

San Tomas Expressway/Saratoga Avenue

San Tomas Expressway/Homestead Avenue

San Tomas Expressway/El Camino Real

San Tomas Expressway/Monroe Street

San Tomas Expressway/Scott Boulevard

San Tomas Expressway/Stevens Creek Boulevard

Central Expressway/Oakmead Parkway-Corvin Drive

Central Expressway/Bowers Avenue

Central Expressway/Scott Boulevard

Central Expressway/Lafayette Street

Central Expressway/De La Cruz Boulevard

8.7.3 Travel Demand Forecasting

The City of Santa Clara's newly developed Travel Demand Model (Model) was completed as part of this General Plan Update. The Model was developed to provide improved City-wide travel demand forecasting as part of continued planning efforts to address transportation infrastructure needs and assist in the update of the City's General Plan. The Model was developed from the Valley Transportation Authority (VTA) Countywide Travel Demand Model, which uses a four-step process to forecast person trips. The process begins with identifying trip generation by estimating the number of trips that would occur with the proposed General Plan land uses. The Santa Clara Model includes person trip generation that is based on the regional Metropolitan Transportation Commission (MTC) Travel Demand Model. Trip generation is estimated based on the type and density/intensity of land uses (for example, the number of households) within each traffic analysis zone (TAZ). Trip generation rates are also cross-classified by income quartile to provide a more realistic estimate of trip-making patterns.



The Model produces trip estimates in person trips (as compared to vehicle trips, which are often quoted in transportation analyses). Table 8.7-3 summarizes the number of trips estimated by the Model for existing (2008) and future (2035) projected development.

TABLE 8.7-3: NET CHANGE IN CITY-WIDE TRIP GENERATION FROM EXISTING CONDITIONS

<i>Time Period</i>	<i>Existing Conditions (2008)</i>	<i>Future Conditions (2035)</i>
Peak Period	253,766	+38,057
Off-Peak Period	292,135	+42,806
Total (Daily)	545,900	+80,863

Source: Fehr & Peers, 2010.

Once trip generation is determined by the Model, the trips are distributed to various internal and external gateways. The Model pairs trip origins and trip destinations (starting and ending points) for each person trip based on the type of trip (from home-to-work, home-to-school, etc.) and typical distances a person is willing to travel for that purpose. Next, the model determines the route for travel between the trip origin and destination and assigns the trips to the Roadway Network in a way that minimizes travel time between the start and end points of the trip.

Lastly, the choice for transportation mode is identified by the Model. This determines the mode a person will choose for each trip based on the availability of a vehicle, the trip distance, and the trip purpose. Subsequent trip distribution, assignment, and mode choice iterations are completed by the Model to account for roadway congestion until the Model identifies an acceptable combination.

Future Traffic Volume Projections

Future year (2035) traffic volume projections for the major roadways and study intersections in the City were developed using the Santa Clara Travel Demand Model. Forecasts were estimated by adding the difference between the base (2008) and future year (2035) outputs to existing traffic counts. Daily traffic forecasts were completed for General Plan build-out as defined in Appendix 8.6: General Plan Land Use Assumptions. Tables 8.7-4 and 8.7-5 and Figure 8.7-1 summarize the existing (2008) and future daily roadway forecasts. The information on these tables indicates that the average VMT for Santa Clara’s estimated 154,990 resident population in 2035 for trips originating and/or ending in Santa Clara will be reduced from the VMT for the City’s 2008 resident population of 115,503 with the implementation of the General Plan (14.35 VMT per person in 2008 vs. 12.19 VMT per person in 2035). This means that the future General Plan land use mix will result in shorter trips for residents within the City of Santa Clara due to closer proximity of jobs and services to housing as well as the increased availability and accessibility to other modes of travel, such as bicycle and walking.

TABLE 8.7-4: SUMMARY OF VEHICLE MILES TRAVELED

	<i>Existing (2008)</i>	<i>Future (2035)</i>
Daily VMT	3,188,015	3,753,870
VMT/VT	5.09	5.99
VMT per Service Population	14.35	12.19

Sources: Santa Clara Citywide Travel Demand Model, 2008; and Fehr & Peers, 2010.

Table 8.7-5 provides a more detailed breakdown of vehicle miles traveled by roadway and LOS. This information is graphically illustrated on Figure 8.7-1.

TABLE 8.7-5: AVERAGE ROADWAY SEGMENT DAILY VEHICLE LOS

<i>Roadway Segment</i>	<i>Existing (2008)</i>		<i>Future (2035)</i>	
	<i>ADT</i>	<i>LOS</i>	<i>ADT</i>	<i>LOS</i>
Lawrence Expressway between US 101- Central Expressway	79,010	D	92,760	D
Lawrence Expressway between Central Expressway- Kifer Road	63,970	D	80,378	D
Lawrence Expressway between Kifer Road-Monroe Street	67,960	D	82,710	D
Lawrence Expressway between Monroe Street-Cabrillo Avenue	52,890	C	64,493	D
Lawrence Expressway between Cabrillo Avenue-El Camino Real	63,490	D	78,430	D
Lawrence Expressway between El Camino Real-Benton Street	58,230	D	70,607	D
Lawrence Expressway between Benton Street-Homestead Road	65,410	D	66,869	D
Lawrence Expressway between Homestead Road-Pruneridge Avenue	66,600	D	73,081	D
Lawrence Expressway between Pruneridge Avenue-Stevens Creek	62,890	D	68,750	D
Great America Parkway between SR 237-Tasman Drive	23,800	C	29,450	D
Great America Parkway between Tasman Drive-Mission College	36,590	D	39,270	D
Great America Parkway between Mission College-US 101	39,600	D	40,837	D
Bowers Avenue between US 101-Scott Boulevard	38,370	D	49,440	D
Bowers Avenue between Scott Boulevard-Central Expressway	16,410	C	23,309	C
Bowers Avenue between Central Expressway-Monroe Street	18,170	D	20,540	D
Bowers Avenue between Monroe Street-El Camino Real	13,460	C	14,850	C
Kiely Avenue between El Camino Real-Benton Street	12,640	C	13,696	C
Kiely Avenue between Benton Street-Homestead Road	8,970	C	12,711	C
Kiely Avenue between Homestead Road-Pruneridge Avenue	12,050	C	14,603	C
Kiely Avenue between Pruneridge Avenue-Stevens Creek	14,220	C	16,440	C
Lafayette Street between SR 237-Tasman Drive	5,560	C	7,731	C
Lafayette Street between Tasman Drive-Montague Expressway	18,370	D	31,660	D
Lafayette Street between Montague Expressway-US 101	11,600	C	17,603	C
Lafayette Street between US 101-Central Expressway	18,190	D	24,230	D
Lafayette Street between Central Expressway-Walsh Avenue	18,060	D	20,745	D



<i>Roadway Segment</i>	<i>Existing (2008)</i>		<i>Future (2035)</i>	
	<i>ADT</i>	<i>LOS</i>	<i>ADT</i>	<i>LOS</i>
Lafayette Street between Walsh Avenue-Reed Street	15,140	C	20,773	D
Lafayette Street between Reed Street-El Camino Real	21,580	D	29,790	D
Lafayette Street between El Camino Real-Benton Street	15,660	D	25,369	F
Lafayette Street between Benton Street-Market Street	16,500	D	26,093	F
Washington Street between Market Street-Newhall Street	15,720	C	23,126	D
Bascom Avenue between Newhall Street-I-880	26,860	C	39,260	F
Scott Boulevard between City Limit-Bowers Avenue	12,090	C	14,780	C
Scott Boulevard between Bowers Avenue-San Tomas Expressway	13,120	C	19,775	D
Scott Boulevard between San Tomas Expressway-Central Expressway	16,160	C	16,905	C
Scott Boulevard between Central Expressway-Walsh Avenue	8,980	C	15,521	C
Scott Boulevard between Walsh Avenue-Monroe Street	8,540	C	13,267	C
Scott Boulevard between Monroe Street-El Camino Real	8,610	C	9,900	C
Scott Boulevard between El Camino Real-Benton Street	9,390	C	13,660	C
Scott Boulevard between Benton Street-Homestead Road	11,530	C	16,002	C
Scott Boulevard between Homestead Road-Saratoga Avenue	14,070	C	19,991	D
Newhall Street between Saratoga Avenue-Winchester Boulevard	13,190	C	21,219	D
Montague Expressway between N 1st Street-De La Cruz Boulevard	52,670	D	85,760	F
Montague Expressway between De La Cruz Boulevard-Lafayette Street	60,570	D	93,595	D
Montague Expressway between Lafayette Street-Mission College Boulevard	58,070	D	95,430	E
Montague Expressway between Mission College Boulevard-US 101	83,210	D	107,353	F
San Tomas Expressway between US 101-Scott Boulevard	66,510	D	98,400	F
San Tomas Expressway between Scott Boulevard-Central Expressway	64,450	D	90,946	D
San Tomas Expressway between Central Expressway-Walsh Avenue	70,620	D	90,897	D
San Tomas Expressway between Walsh Avenue-Monroe Street	72,800	D	81,233	D
San Tomas Expressway between Monroe Street-Cabrillo Avenue	56,910	D	74,672	D
San Tomas Expressway between Cabrillo Avenue-El Camino Real	46,950	C	65,360	D
San Tomas Expressway between El Camino Real-Benton Street	49,940	D	68,674	D
San Tomas Expressway between Benton Street-Homestead Road	52,160	D	70,496	D
San Tomas Expressway between Homestead Road-Pruneridge Avenue	43,490	C	58,962	D
San Tomas Expressway between Pruneridge Avenue-Saratoga Avenue	46,160	D	65,549	D
San Tomas Expressway between Saratoga Avenue-Stevens Creek	36,100	C	51,280	D

<i>Roadway Segment</i>	<i>Existing (2008)</i>		<i>Future (2035)</i>	
	<i>ADT</i>	<i>LOS</i>	<i>ADT</i>	<i>LOS</i>
Calabazas Boulevard between Monroe Street-Cabrillo Avenue	7,160	C	10,810	C
Calabazas Boulevard between Cabrillo Avenue-El Camino Real	7,360	C	9,229	C
Calabazas Boulevard between El Camino Real-Pomeroy Avenue	5,000	C	8,052	C
Pomeroy Avenue between Calabazas Boulevard-Benton Street	4,100	C	6,694	C
Pomeroy Avenue between Benton Street-Homestead Road	7,300	C	6,875	D
Pomeroy Avenue between Homestead Road-Pruneridge Avenue	6,800	C	8,355	D
Lick Mill Boulevard between Tasman Drive-Montague Expressway	6,610	D	17,951	D
Tasman Drive between City Limit-Great America Parkway	12,790	C	25,910	D
Tasman Drive between Great America Parkway-Lafayette Street	16,290	C	30,810	D
Tasman Drive between Lafayette Street-City Limits	17,590	C	33,360	D
Wildwood Avenue between City Limits-Mercado Driveway	7,770	D	8,750	D
Mission College Boulevard between Mercado Driveway-Great America Parkway	16,000	D	17,499	D
Mission College Boulevard between Great America Parkway-Agnew Road	10,180	C	17,247	D
Mission College Boulevard between Agnew Road-Montague Expressway	28,530	D	29,981	D
Agnew Road between Lafayette Street-Montague Expressway	14,820	D	15,970	D
Trimble Road between City Limits-De La Cruz Boulevard	31,070	D	59,550	F
De La Cruz Boulevard between Montague Expressway-Trimble Road	11,910	C	19,370	D
De La Cruz Boulevard between Trimble Road-US 101	57,670	F	84,330	F
De La Cruz Boulevard between US 101-Central Expressway	55,990	F	81,960	F
De La Cruz Boulevard between Central Expressway-Coleman Avenue	20,170	C	40,022	D
Coleman Avenue between De La Cruz Boulevard-City Limits	31,230	D	45,240	F
Central Expressway between Lawrence Expressway-Bowers Avenue	39,960	D	71,170	F
Central Expressway between Bowers Avenue-San Tomas Expressway	37,330	D	67,098	E
Central Expressway between San Tomas Expressway-Scott Boulevard	40,250	C	60,735	D
Central Expressway between Scott Boulevard-Lafayette Street	47,550	D	68,715	D
Central Expressway between Lafayette Street-De La Cruz Boulevard	59,700	D	75,485	E
Kifer Road between Lawrence Expressway-Bowers Avenue	11,180	C	12,860	C
Walsh Avenue between Bowers Avenue-San Tomas Expressway	14,680	D	15,875	D
Walsh Avenue between San Tomas Expressway-Scott Boulevard	12,580	C	15,679	D
Walsh Avenue between Scott Boulevard-Lafayette Street	5,530	C	6,267	C



<i>Roadway Segment</i>	<i>Existing (2008)</i>		<i>Future (2035)</i>	
	<i>ADT</i>	<i>LOS</i>	<i>ADT</i>	<i>LOS</i>
Monroe Street between Lawrence Expressway-Calabazas Boulevard	13,190	C	17,030	D
Monroe Street between Calabazas Boulevard-Bowers Avenue	11,400	C	16,885	D
Monroe Street between Bowers Avenue-San Tomas Expressway	15,780	D	16,740	D
Monroe Street between San Tomas Expressway- Scott Boulevard	15,260	D	17,273	D
Monroe Street between Scott Boulevard-El Camino Real	17,740	D	21,260	D
El Camino Real between Lawrence Expressway-Calabazas Boulevard	32,800	D	39,310	F
El Camino Real between Calabazas Boulevard-Kiely Boulevard	36,530	E	40,752	F
El Camino Real between Kiely Boulevard-San Tomas Expressway	32,040	D	41,243	F
El Camino Real between San Tomas Expressway-Scott Boulevard	25,690	D	33,802	D
El Camino Real between Scott Boulevard-Lincoln Street	26,260	D	32,650	D
El Camino Real between Lincoln Street-Monroe Street	25,190	D	32,606	D
El Camino Real between Monroe Street-Lafayette Street	23,640	D	31,393	D
El Camino Real between Lafayette Street-De La Cruz/Coleman	25,450	D	38,542	F
El Camino Real between De La Cruz/Coleman-Benton Street	28,820	D	41,644	F
El Camino Real between Benton Street-The Alameda	30,800	D	43,000	F
Benton Street between Lawrence Expressway-Pomeroy Avenue	9,750	C	12,664	C
Benton Street between Pomeroy Avenue-Kiely Boulevard	9,240	C	13,580	C
Benton Street between Kiely Boulevard-San Tomas Expressway	10,260	C	12,469	C
Benton Street between San Tomas Expressway-Scott Boulevard	10,540	D	10,857	D
Benton Street between Scott Boulevard-Lincoln Street	8,430	D	8,824	D
Benton Street between Lincoln Street-Monroe Street	8,800	D	9,051	D
Benton Street between Monroe Street-Lafayette Street	8,750	D	9,138	D
Benton Street between Lafayette Street-El Camino Real	8,220	D	8,560	D
Homestead Road between Lawrence Expressway-Pomeroy Avenue	14,370	C	21,367	D
Homestead Road between Pomeroy Avenue-Kiely Boulevard	20,610	D	23,390	D
Homestead Road between Kiely Boulevard-San Tomas Expressway	14,330	C	18,926	D
Homestead Road between San Tomas Expressway-Scott Boulevard	9,170	C	11,758	C
Pruneridge Avenue between City Limit-Lawrence Expressway	13,600	C	19,510	D
Pruneridge Avenue between Lawrence Expressway -Pomeroy Avenue	11,560	C	18,391	D
Pruneridge Avenue between Pomeroy Avenue-Kiely Boulevard	11,140	C	19,310	D
Pruneridge Avenue between Kiely Boulevard-San Tomas Expressway	13,830	C	23,681	D

<i>Roadway Segment</i>	<i>Existing (2008)</i>		<i>Future (2035)</i>	
	<i>ADT</i>	<i>LOS</i>	<i>ADT</i>	<i>LOS</i>
Pruneridge Avenue between San Tomas Expressway-Saratoga Avenue	9,110	C	16,908	C
Pruneridge Avenue between Saratoga Avenue-Winchester Boulevard	10,830	C	22,561	D
Stevens Creek between Lawrence Expressway-Kiely Boulevard	24,940	C	28,680	D
Stevens Creek between Kiely Boulevard-Saratoga Avenue	24,990	C	28,729	D
Stevens Creek between Saratoga Avenue-San Tomas Expressway	33,540	D	38,570	D
Stevens Creek between San Tomas Expressway-Winchester Boulevard	38,910	D	44,738	D
Saratoga Avenue between Stevens Creek-San Tomas Expressway	22,460	D	33,960	D
Saratoga Avenue between San Tomas Expressway-Pruneridge Avenue	13,300	C	20,610	D
Saratoga Avenue between Pruneridge Avenue-Scott Boulevard	11,120	C	14,276	C
Saratoga Avenue between Scott Boulevard-Winchester Boulevard	9,810	C	11,925	C
The Alameda between Market Street-El Camino Real	11,890	D	14,374	D
The Alameda between El Camino Real-I-880	31,170	D	43,540	F
Park Avenue between Bellomy Street-I-880	6,500	C	8,410	D
Winchester Boulevard between Newhall Street-Pruneridge Avenue	11,260	C	15,920	C
Winchester Boulevard between Pruneridge Avenue-Stevens Creek Blvd	20,550	D	25,330	D
US 101 - De La Cruz to Montague	240,100	F	263,700	F
US 101 - Montague to Great America	241,800	F	263,200	F
US 101 - Great America to Lawrence	216,600	F	242,200	F
SR 237 - N. 1st to Great America	166,500	F	202,600	F
SR 237 - Great America to Lawrence	162,200	F	190,400	F
I 880 - Bascom to Alameda	195,400	F	226,600	F
I 880 - Alameda to Coleman	205,600	F	232,600	F
I 280 - Saratoga to Lawrence	251,200	F	283,900	F

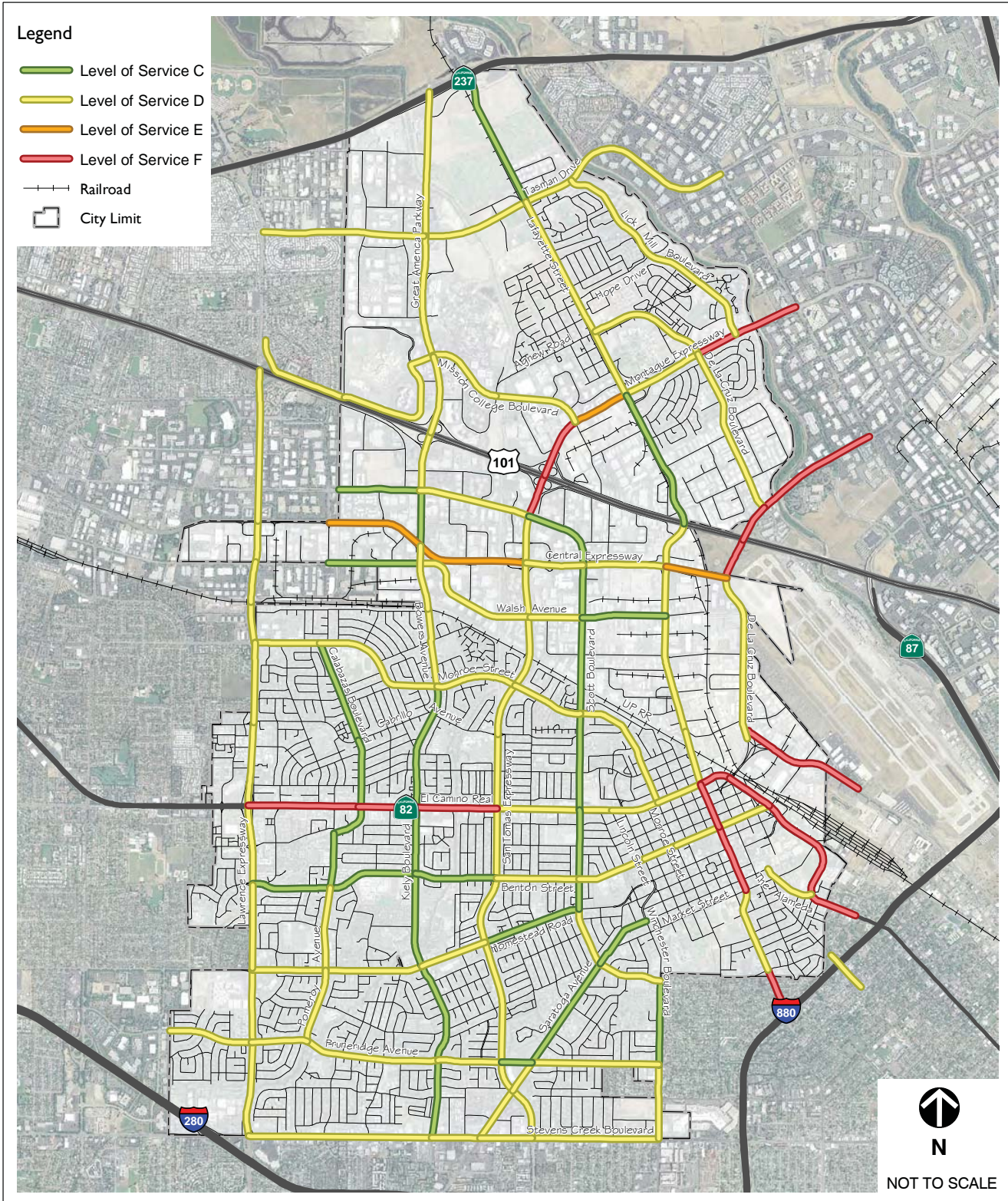


Figure 8.7-1: 2035 Daily Roadway Segment Operations

Forecasts for study intersections were completed using a similar methodology to the roadway segment forecasts. The difference between Model outputs for the existing and future years was added to existing traffic counts. This forecast represents the effects of the implementation of the General Plan in conjunction with the regional trips assumed by VTA and foreseeable development in cities adjacent to Santa Clara. The LOS results are shown in Table 8.7-6 for the weekday AM and PM peak hours.

TABLE 8.7-6: FORECASTED INTERSECTION LEVEL OF SERVICE CONDITIONS

Intersection	Traffic Control	Peak Hour	2008 Existing Conditions		2035 Future Conditions	
			Delay ²	LOS	Delay ²	LOS
1. Great America Parkway/Mission College Boulevard ¹	Signal	AM	33	C	45	D
		PM	73	E	70	E
2. Great America Parkway/Tasman Drive ¹	Signal	AM	41	D	47	D
		PM	52	D	69	E
3. Agnew Road/Mission College Boulevard	Signal	AM	21	C	19	B
		PM	22	C	22	C
4. Lawrence Expressway/El Camino Real ^{1,3}	Signal	AM	28	C	27	C
		PM	30	C	42	D
5. Lawrence Expressway/Homestead Road ¹	Signal	AM	51	D	151	F
		PM	61	E	152	F
6. Bowers Avenue/Scott Boulevard ¹	Signal	AM	31	C	40	D
		PM	39	D	48	D
7. Scott Boulevard/Walsh Avenue	Signal	AM	21	C	35	C
		PM	23	C	142	F
8. Kiely Boulevard/Homestead Road	Signal	AM	31	C	40	D
		PM	32	C	43	D
9. El Camino Real/Benton Street	Signal	AM	18	B	22	C
		PM	24	C	23	C
10. El Camino Real/Campbell Avenue-Accolti Way	Signal	AM	11	B	15	B
		PM	18	B	18	B
11. Coleman Avenue/Brokaw Road	Signal	AM	26	C	29	C
		PM	63	E	99	F
12. Saratoga Avenue/Pruneridge Avenue	Signal	AM	24	C	37	D
		PM	21	C	139	F
13. Winchester Boulevard/Pruneridge Avenue-Hedding Street	Signal	AM	53	D	55	D
		PM	34	C	56	E

¹ Designated CMP intersection.

² Average control delay per vehicle in seconds.

³ This location has existing grade separations in a tight diamond configuration which includes two different signalized intersections for the on- and off-ramps at each location.



**SANTA CLARA
GENERAL PLAN**