2013 Transportation Systems Monitoring Program Report


Curb and Gutter

Graffiti


Freeways

Litter


Pavement and Striping

August 2013

Table of Contents

List of Tables

List of Figures

Executive Summary

The concept of the developing a countywide transportation systems monitoring program stemmed from an earlier effort by Santa Clara Valley Transportation Authority's (VTA's) Technical Advisory Committee (TAC) to study the issue of litter control and landscape maintenance along the freeways in Santa Clara County. These efforts lead to the development of the Transportation Systems Monitoring Program (TSMP) that was later adopted by the VTA Board of Directors in September 2008.

The initial TSMP report was completed in March 2010 with this first report evaluating specific components of Santa Clara County's existing transportation systems for the 2009 calendar year following guidance provided by VTA's TAC using certain measures. The second report that was approved by the VTA Board of Directors in September 2011 provided information on the 2010 conditions on selected components and made comparisons of Santa Clara County with other Bay Area counties for certain measures where data was available.

This third report (2013 TSMP) provides information on 2011 and 2012 conditions and compares these conditions to those documented in the previous year's report. The information in this report helps to shed light on the areas of the transportation system in Santa Clara County that require immediate or future attention. Each new report has focused on specific transportation infrastructure components and provided new information on transportation system components not covered in previous reports that might be of interest to the residents of Santa Clara County. For example, a new measure that was added to the previous TSMP was the monitoring of litter control and landscape management along freeways. This TSMP report includes the inventory and conditions of traffic signal systems in Santa Clara County and monitoring of express lanes.

WHY MONITOR?

The residents of Santa Clara County have made significant investments in its transportation infrastructure. A concern raised by local agencies is their ability to maintain Santa Clara County's transportation systems to acceptable standards. To address this concern, VTA's TAC initiated an effort to develop a transportation system monitoring program for Santa Clara County.

The primary purposes of the Transportation Systems Monitoring Report are to serve as an asset management tool for the county's transportation system infrastructure and to provide a comprehensive report on the conditions and performance of Santa Clara County's key transportation systems in single report. The secondary uses for the TSMR are as follows:

- Enable the county and external stakeholders to better understand the performance of the county's transportation system and the effectiveness of transportation investments
- Communicate progress towards stated transportation system goals and objectives
- Provide additional context for funding and policy decisions
- Establish a foundation for evaluating the implications of future funding scenarios in terms of their impact on future transportation system performance
- Build an information database that could be used for developing grant application to enhance, maintain and/or remedy deficient areas of the county's transportation system infrastructure.

- *Follow the goals of Moving Ahead for Progress in the 21st Century Act (MAP-21), the federal reauthorization transportation funding program signed into law on July 6, 2012, that emphasizes performance based management of transportation infrastructure assets.*

2013 TRANSPORTATION SYSTEM MONITORED COMPONENTS

The 2013 TSMR tracks 13 components of Santa Clara County's transportation systems and 20 measures. A list of the components and measures are identified in the Table ES.

Table ES.1 System Components and Measures

System Components	Measures
1. Pavement condition	a. Average pavement condition *(based on pavement inspections)*
2. Freeway mobility	c. Percent of freeways with traffic moving freely *(based on level of service)*
3. Express Lanes	d. Utilization of express lanes *(based on traffic volumes and tolls collected)*
4. Bridge condition	e. Percent of bridges in good condition *(based on bridge Sufficiency Rating)*
5. Traffic signals	f. Percent of signals in useful condition *(based on self-assessment survey)*
	g. Average age of traffic signals *(based on local agency self-assessment survey)*
6. Pavement markings	h. Percent of markings in useful condition *(based on self-assessment survey)*
7. Roadway signs	i. Percent of signs in useful condition *(based on self-assessment survey)*
8. Light poles	j. Percent of light poles in useful condition *(based on self-assessment survey*)
9. Curb and gutter	k. Percent of curb and gutter in useful condition *(based on self-assessment survey)*
10. Freeway litter and landscape management	l. Percent of roadside with virtually no or some litter (*based on self-assessment survey)*
	m. Condition *(based on visual inspection)*
11. Bicycle mobility	n. Percent of on and off streets cross county bike network completed *(based on number of projects completed from VTA Bicycle Expenditure Program)*
	o. Percent of planned across barrier connections completed *(based on number of projects completed from VTA Bicycle Expenditure and Highway Programs)*
12. Bus and light rail	p. Percent of on-time transit performance *(based on annual transit operations report)*
	q. Percent of planned transit service provided *(based on planned service vs. actual service)*
	r. Transit trips per person *(based on annual boarding riders)*
	s. Remaining years of service life of transit vehicles *(based on age of transit vehicles)*
13. Sustainability	t. Percent of journey to work mode splits *(based on Census surveys)*
	u. Number of days recorded with air quality infractions *(based on air quality standards)*

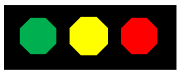
METHODOLOGY

One of the goals established when developing the TSMP was to take advantage of available data from existing sources and incorporate them into a report. Where data was unavailable, a survey was used to fill in gaps of the information being sought such as the conditions of the county's roadside assets (e.g. traffic signals/controllers, roadway signs, and street light poles). For evaluation of litter and landscaping along the freeways and highways in Santa Clara County, a visual assessment was used based on criteria established from the Litter Control and Landscape Maintenance Study and Caltrans FY 2012 Maintenance Level of Service District 4 Report.

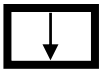
2011-12 CONDITIONS

The Executive Summary presents highlights from the findings on the conditions and performance of the selected monitored areas. Details on the findings are provided in Chapter 3 of this report.

Metrics/Indicators: A green-yellow-red traffic signal metrics is used to indicate the condition level of the monitored areas and a directional arrow is used to indicate the change between findings from the previous TSMP report.



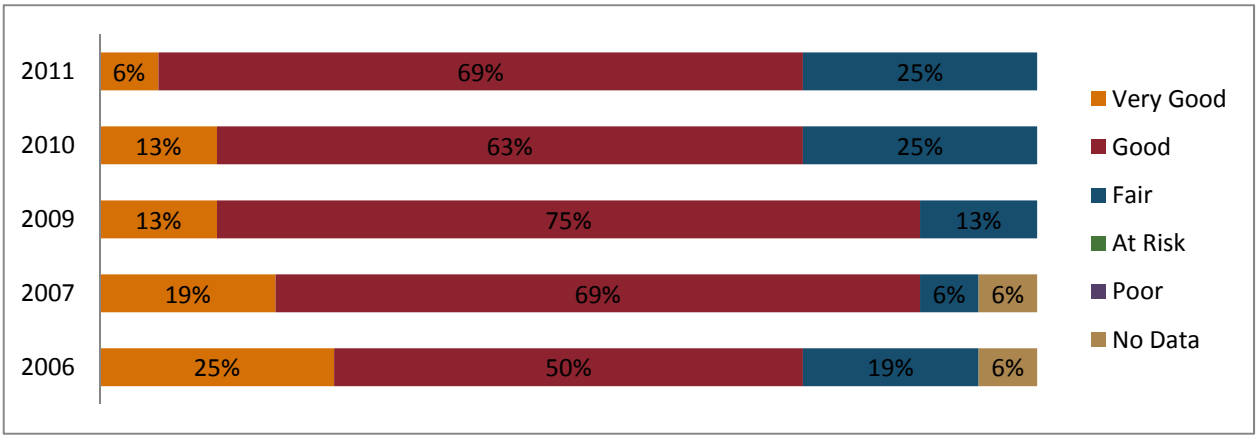
Green light = Good Condition, *Yellow light* = Fair Condition, *Red light* = Poor Condition/ In need of attention

 = Increase/Upward trend, =  Decrease/Downward trend, =  No change

Pavement Conditions

There are approximately 9,900 lane miles maintained by the local agencies in Santa Clara County. Figure ES.1 shows a trend on the pavement conditions of Santa Clara County's roadways from 2004 to 2012. The general pavement condition in 2011 was rated as "Good" on a scale of "Very Good, Good, Fair, At-Risk, and Poor." This conditioned remained unchanged from 2010. However, the percentage of roadways in "fair" condition increased by 6%, thus indicating that there will be a growing need of resources to rehabilitate Santa Clara County's local roadways to the current condition level in the near future.

Figure ES.1 Pavement Conditions on Santa Clara County Roadways



Source: MTC, *2011 Pavement Condition Index for Bay Area Jurisdictions,* November 2012.
Notes: A lane mile is the measurement used to indicate the number of miles on a road multiplied by the number of lanes.

Peer County Comparison

There are approximately 42,600 lane miles of local roads in the Bay Area. The majority of these lane miles lie within the counties of Alameda, Contra Costa, and Santa Clara, with Santa Clara County having the most miles or 23% of the Bay Area's roadways.

Table ES.2 below shows a comparison of the local pavement condition by county. In general, the average pavement conditions in the Bay Area remained unchanged from 2007 to 2012. Contra Costa, San Mateo and Santa Clara counties had the best roadway conditions with of "Good" in 2012, compared with the rest of the Bay Area counties. Marin and Napa counties had the worst road conditions with an "At risk" rating. **Pavement Condition Index:** *Very Good = 80-100, Fair = 60-69, At Risk = 50-69, Poor < 49*.

Table ES.2 Local Pavement Condition by County in the Bay Area (2012)

County	Center Line Miles	Lane Miles	Percent of Total Lane Miles in Bay Area	Average Pavement Condition (2008)	Average Pavement Condition (2010)	Average Pavement Condition (2012)
Alameda	3,534	7,982	19%	66 Fair	67 Fair	**68** **Fair**
Contra Costa	3,346	7,060	16%	72 Good	70 Good	**71** **Good**
Sonoma	2,373	4,960	11%	53 At risk	50 At risk	**50** **Fair**
San Mateo	1,872	3,912	9%	69 Fair	70 Good	**71** **Good**
Solano	1,715	3,623	8%	66 Fair	66 Fair	**67** **Fair**
San Francisco	940	2,134	5%	62 Fair	63 Fair	**65** **Fair**
Santa Clara	4,162	9,381	23%	70 Good	69 Fair	**73** **Good**
Marin	1,021	2,059	5%	61 At risk	61 At risk	**61** **At risk**
Napa	716	1,489	4%	53 At risk	60 At risk	**59** **At risk**
Total	19,679	42,600	100%			
Average Score				64	64	**65**
Median Score				66	66	**67**

Source: MTC, *2011 Pavement Condition Index for Bay Area Jurisdictions,* November 2012; Nichols Consulting Engineering, *California Statewide Local Streets and Roads Needs Assessment*, January 2013.

Note: Scores are based on weighted average Pavement Condition Index by number of lane miles.

Roadside Assets

Roadside assets consist of roadway infrastructure features such as traffic signals, signs, and street lighting. The conditions of these assets for TSMP purposes were estimated through the use of a self-assessment survey. In general, the conditions of these assets essentially exhibited no changes when comparing the roadside elements at a county level from the previous report. Table ES.3 shows the roadside asset conditions expressed as percent in useful conditions (in comparison to expected useful life of the asset itself) and the agencies' ability to maintain them using a scale from 1 to 3 where *1=Poor* (maintained on an as needed basis), *2=Fair* (minimum maintenance performed with some work being deferred and *3=Good* (enough resources to routinely maintain assets).

Since the first report on 2009 conditions, there were minimal changes in the percent of local and state maintained assets in useful condition with the exception of traffic signals and light poles. The condition of the traffic signals showed an increase in useful life of 10% in 2010, partially owing to the efforts of the City of Los Altos of replacing all of their 13 traffic signal controllers; the useful life of the light poles decreased by 9% due to the natural aging of this asset indicating a future need for replacement. As for the roadside assets maintained by Caltrans, there was a slight decline on the conditions of their assets, specifically the traffic signals and roadside litter. Table ES.3 highlights the changes from 2009 to 2011 and summarizes the conditions of the roadside assets for both the local and state (Caltrans) agencies and their abilities to maintain them.

In general, Santa Clara County's local and state maintained roadside assets are in fair condition and the agencies abilities' to maintain these assets are also fair, meaning that there are only enough resources to provide minimal maintenance with some maintenance work being deferred.

Table ES.3 Roadside Asset Condition and Resource Availability

Asset	Local Assets[1]						Caltrans Assets					
	Percent in Useful Condition[2]			Ability to Maintain with Existing Resources			Percent in Useful Condition			Ability to Maintain with Existing Resources		
	2009	2010	**2011**	2009	2010	**2011**	2009	2010	**2011**	2009	2010	**2011**
Traffic Signals	73	83	**83**	2.4	2.4	**2.4**	75	75	**70**	3	3	**3**
Pavement Markings	70	67	**68**	1.9	2	**2.2**	60	60	**60**	2	3	**2**
Signs	70	71	**72**	2.1	2.1	**2.1**	80	80	**80**	2	2	**2**
Light Poles	59	75	**66**	1.8	1.8	**1.8**	65	65	**65**	2	2	**2**
Curb and Gutter	84	83	**81**	2.3	1.4	**1.4**	85	75	**75**	na	2	**2**
Roadside Litter [3]	80	67	**69**	1.6	2.1	**2.1**	25	20	**50**	na	2	**2**
Average	72.7	74.3	**73.2**	2.0	2.0	**2.0**	65.0	62.5	**66.7**	2.3	2.3	**2.2**

Source: VTA, *2011 Transportation System Monitoring Program Self Assessment Survey*, May 2012.

[1] These values represent a weighted average for the county. Averages were determined by weighting the results from each jurisdiction by its roadway lane miles.

[2] *Percent in Useful Condition* - Refers to percentage of expected life cycle. (e.g. 83% of traffic signal controllers are working within its expected life cycle of 20 years and the remaining 17% are operating beyond the expected life cycle.)

[3] *Roadside Litter* – Percentage roads that are clean/have no litter. Example: 69% of roadways are clean

Scale: *1=Poor* (maintained on an as needed basis), *2=Fair* (minimum maintenance performed with some work being deferred and *3=Good* (enough resources to routinely maintain assets)

Notes: 1. City of Los Altos reported replacement all of their signals (13 controllers) in 2010; 2. City of Los Altos also reported that they were in the process of replacing their roadway signs; 3. The data set from 2009 was either incomplete or not available, so the data presented may be slightly skewed.

Traffic Signal Inventory (New)

Traffic signal controllers are an integral component of the transportation and complete streets network. They are used to assign vehicular, bicycle and pedestrian right-of-way and promote safe, orderly movement of traffic through intersections. These controllers also increase capacity of the intersection and can provide continuous movement of vehicles along a given route. Table ES.4 presents a summary of Santa Clara County's traffic signal systems.

Table ES.4 Traffic Signal Inventory Summary

Jurisdiction	Quantity (Units)	Average Age (Years)	Number of Controller Types (Models)	Number of Intersections with Vehicle Detectors (by Type)	Number of Intersections with Bicycle Detectors
Local	1,818	10	8	1,587	409
Caltrans	160	7	7	NA	NA
Summary	1,978	8 - 14	15	1192 - Loops 199 - Video 52 - GPS 6 - Magnetometers	409

Source: Survey using *MTC's Bay Area Signalized Intersection Systems* spreadsheet template, June 2012.
Notes: The data presented in this summary are based on information provided by the local agencies including some missing information that was not available at the time of the survey.

As shown in Table ES.4, there are nearly 2,000 signalized intersections with controllers in Santa Clara County with an average age between 8 to 14 years old. This information is important in assessing current and future maintenance needs including eventual replacement of controller unit itself. The National Cooperative Highway Research Program (NCHRP) Report 713 "Estimating Life Expectancies of Highway Assets," 2012 estimates that the average life cycle for traffic signal controllers with proper maintenance is 15-20 years. In addition, there are 15 different traffic controller models and nearly 1,600 vehicle detectors and 400 bicycle detectors operating in field today.

Freeway Litter, Landscape and Graffiti Management

The monitoring of graffiti along the freeways was added to this section of the 2013 TSMP report in response to the increasing number of vandalism incidents on Santa Clara County's roadway. A general assessment is shown in Table ES.5.

As for monitoring of litter and landscaping along the local roads and freeways and the ability of the agencies with their respective jurisdictions to maintain them, twelve locations were selected with input from the Systems Operations and Management Working Group the Litter and Landscape Visual Standards established in VTA's Litter Control and Landscape Maintenance Study. Table ES.4 shows the corresponding scores of the visual scales used in the litter control and landscaping assessment.

Overall, the cleanliness and neatness of landscaping of the selected monitoring locations along the freeways are in fair conditions. The cleanliness of the freeways is in between Slightly Littered and Littered for litter control and Decent and Neglected for landscape maintenance. The most littered and neglected locations were at US 101/Trimble Road-De La Cruz Boulevard, US 101/Story Road and I-680/Montague Expressway in San Jose. The least littered locations with decent landscaping were US 101/SR 152 in Gilroy, I-280/Page Mill Road in Palo Alto, and SR 85/Saratoga Avenue in San Jose. Photos of the typical conditions observed at each of the selected monitored locations and nearby areas are provided in Chapter 3 of this report.

Table ES.5 Litter Control and Landscape Maintenance Scoring

Litter Control	Score
No Litter	4
Slightly Littered	3
Littered	2
Extremely Littered	1

Landscape Maintenance	Score
Attractive	3
Decent	2
Neglected	1

Table ES.6 Litter Control and Landscape Maintenance Assessment

No.	Route	Monitored Locations	Jurisdiction	Litter	Landscaping
1	US 101	SR 152 Interchange	Gilroy	3	2
2	**US 101**	**Story Rd**	**San Jose**	**3**	**2**
3	**US 101**	**Trimble Ave / De La Cruz**	**San Jose**	**2**	**1**
4	US 101	N. Mathilda Ave/SR 237	Sunnyvale	3	2
5	US 101	Oregon Expwy / Page Mill Rd	Palo Alto	3	2
6	**I-680**	**Montague Expwy**	**San Jose**	**2**	**1**
7	I-880	Montague Expwy	San Jose	3	2
8	I-880	US 101 Interchange	San Jose	3	2
9	I-280	Page Mill Rd	Palo Alto	4	3
10	SR 237	N. Mathilda Ave	Sunnyvale	3	2
11	SR 87	SR 87/Capitol Expwy	San Jose	3	2
12	SR 85	Saratoga Ave	San Jose	3	2
			Average Score	**2.9**	**1.9**

Sources: VTA, *2011 Transportation System Monitoring Program Self-Assessment Survey*, June 2012

Notes: **Litter score of 2.8** = Between Slightly Littered and Littered, **Landscaping score of 1.6** = Between Decent and Neglected

Peer County Comparison

Based on Caltrans FY 2011 Maintenance Level of Service District 4 Report, the median score for Roadside attributes (e.g. litter/debris control, vegetation/landscape management and graffiti control) among the Bay Area Counties was 67 out of 100 points, which is a 3 point improvement from the previous year.

Table ES.7 Litter Control, Landscape and Graffiti Maintenance Assessment

County	Percent of Total Lane Miles in Bay Area	Overall Roadside Assessment (Litter, Landscaping, Graffiti)		Graffiti Assessment	
		2010	**2011**	2010	**2011**
Napa	4%	82	84	95	98
Solano	8%	65	79	88	88
Sonoma	12%	69	73	87	98
Contra Costa	16%	69	72	71	72
San Mateo	9%	60	67	64	67
San Francisco	5%	56	62	38	50
Santa Clara	**23%**	**63**	**58**	**84**	**70**
Marin	5%	62	57	91	69
Alameda	19%	61	56	67	51
Average Score	-	65	**68**	76	**74**
Median Score	-	63	**67**	84	**70**
Rank	-	5th of 9	7th of 9	5th of 9	5th of 9

Source: Caltrans, *FY 2011 Maintenance Level of Service District 4 Report Executive Summary*, February 2012.
Notes: The Caltrans FY 2012 Maintentance Level of Service report was not available for inclusion of this report.

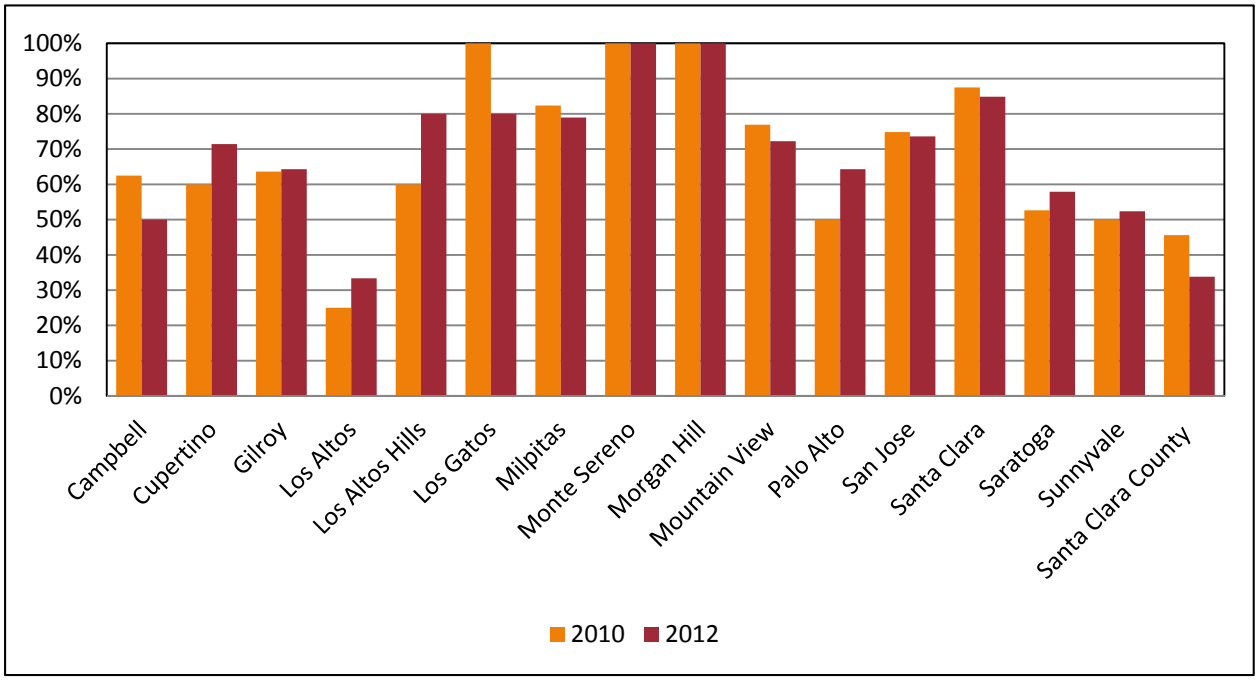
However, for Santa Clara County, the overall Roadside Assessment score decreased from 63 points in FY 2010 to 58 out of 100 points in FY 2011. There was also a decrease in the Graffiti Assessment score from 84 points to 70 points for the same years. This negative trend is consistent with the increase in the number of graffiti related vandalisms being reported in the local news media.

In comparison with the rest of the nine Bay Area counties, Santa Clara County ranked 7th of 9, dropping 2 positions from the previous report. The top three counties with the cleanest and best groomed freeways in the Bay Area were Napa, Solano and Sonoma Counties with scores of 84, 79 and 73 points respectively, and the bottom counties with the most littered freeways and least maintained landscaping were Santa Clara, Marin and Alameda Counties with scores of 58, 57 and 56 points as shown in Table ES.7.

Bridge Conditions

There are 447 bridges maintained by local agencies in Santa Clara County. The average age of these bridges is 48 years old. Nearly 75% of these bridges were rated as being in "Good condition" based on the standard bridge sufficiency rating (SR) of 80 out of 100 points or greater. The Federal Highway Administration (FHWA) uses a sufficiency rating system to assess the conditions of bridges (whether or not a bridge is deficient or obsolete) for rehabilitation or bridge replacement funding eligibility. Local agencies with bridges rated under SR 80 qualifies for federal funding for bridge rehabilitation work and bridges with a score under SR 50 qualifies for funding to replace structurally deficient or obsolete bridges. The fact that a bridge is classified under the federal definition as "structurally deficient" does not imply that it is unsafe. Additional details regarding FHWA's bridge sufficiency rating system is provided in Section 3.4 of this report.

Figure ES.2 Percent of Bridges in Good Condition by City/Town (SR>80)

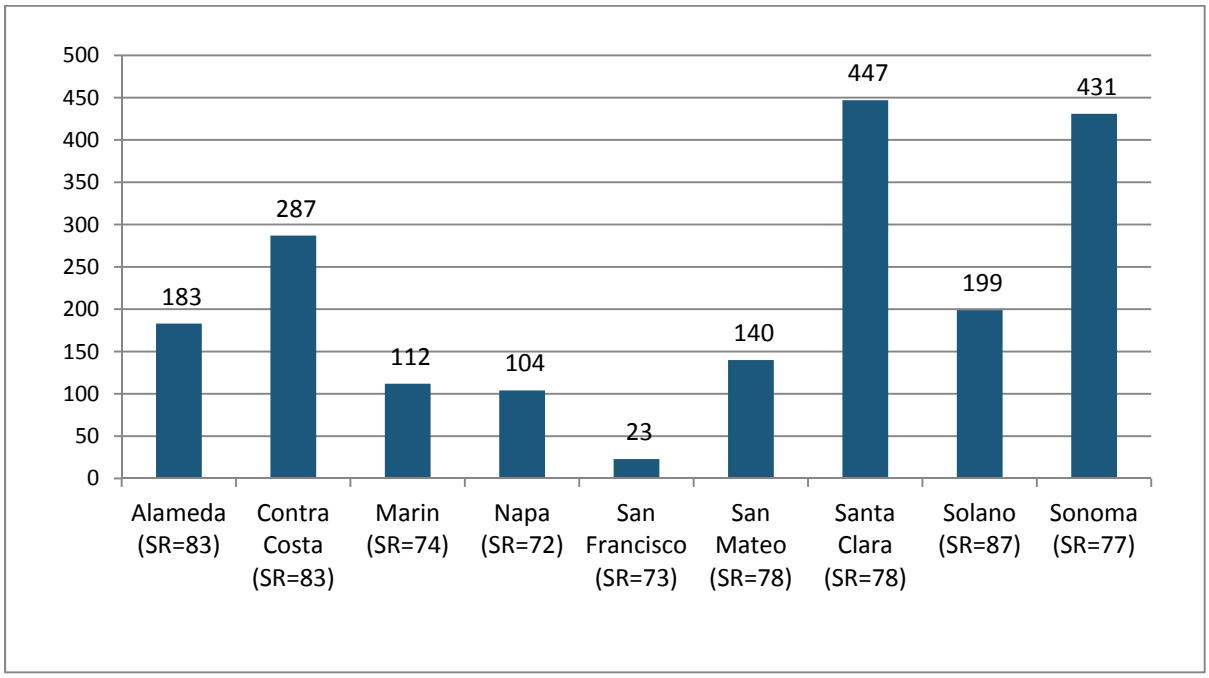


Sources: Caltrans, *Structure Maintenance & Investigations Report*, February 2013, *California Statewide Local Streets and Roads Needs Assessment Final Report*, January 2013.

Peer County Comparison

There are approximately 2,000 bridges maintained by local agencies in the Bay Area. In comparison with the other counties in the Bay Area, Santa Clara County has the most number of bridges within its jurisdiction with 447. Sonoma County has the second most number of local bridges with 438 bridges. Figure ES.3 illustrates the number of local bridges within each county and the average SR scores.

Figure ES.3 Bridge Inventory by County and Average Sufficiency Ratings (SR) Scores



Source: Caltrans, *Structure Maintenance & Investigations Report*, February 2013, California Statewide Local Streets and Roads Needs Assessment Final Report, January 2013.

Freeway and Intersection Traffic Conditions

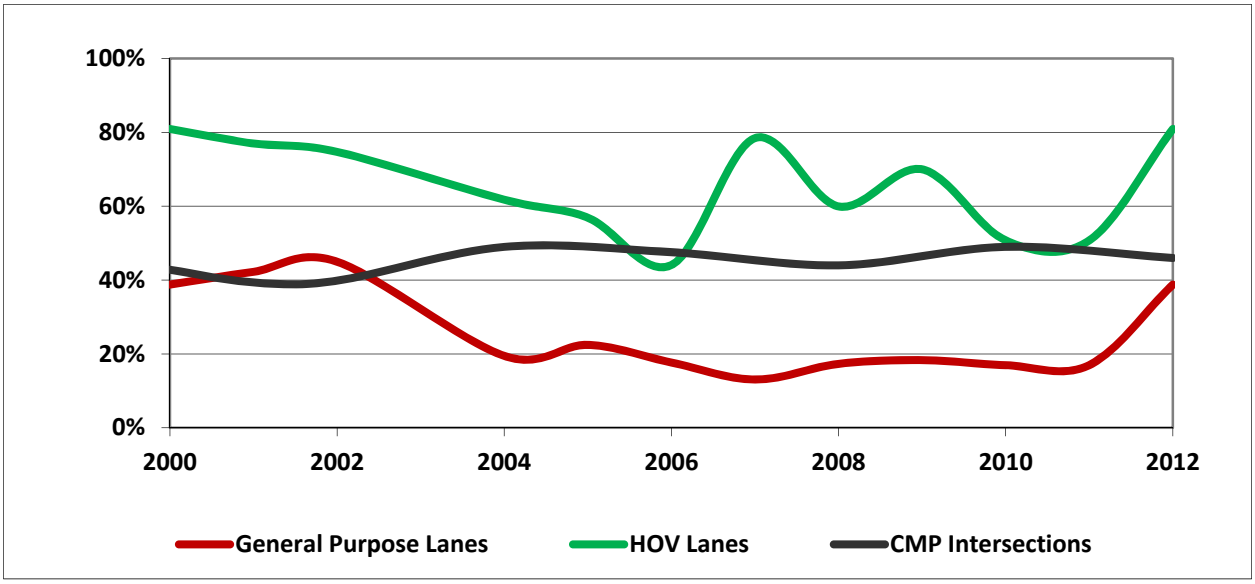
Santa Clara County has been and continues to make investments to its freeway and highway systems by extending carpool or high occupancy vehicle (HOV) lanes, rebuilding outdated interchanges, building express lanes, and installing ramp metering to improve mobility within the county. One way to measure the effects of these improvements is to monitor the traffic conditions on these roadway facilities on a periodic basis.

There are approximately 860 mixed-flow or general purpose lane miles of freeways, 170 High Occupancy Vehicle (HOV) lane miles, and 252 intersections monitored for Congestion Management Program (CMP) purposes in Santa Clara County. Figure ES.4 shows the percentage of traffic moving freely (or essentially at the speed limit) for freeway general purpose and HOV lanes and CMP intersection network throughout the entire day for both the AM and PM peak periods between 2000 to 2012.

From 2000 to 2012, although there has been a downward trend in the percentage of vehicle traffic in the general purpose lanes and HOV lanes, the changes have followed a certain pattern. The percent of vehicles in the general purpose lanes moving freely from about 40% in 2000 to around 20% in 2010, with the percentage hovering around 20% since 2004. For the HOV lanes, the percentage operating at the speed limit has declined from about 80 percent to about 50 percent. The trend line shows that the

percentage dropped to nearly 40 percent by 2006, with the trend reversing between 2006 and 2008 when carpool lane additions such as for SR 87 came on line.

Figure ES.4 Percent of Freeways and Intersections with Traffic Moving Freely



Source: VTA, 2012 Annual Monitoring & Conformance Report, May 2012.

As for the performance of the CMP intersections (dark blue line), the cut-off used to define "free flow" conditions was LOS C, with the highest average delay being 35 seconds. Figure ES.4 shows that the percentage of CMP intersections operating "free flow" in both commute periods being relatively flat, fluctuating between about 40 and 50 percent. Conversely, this means that more than half of the intersections had conditions that were not free flow for an average workday over the period of 2000 to 2010. Between 2010 and 2012, the percentage of intersections operating at "free flow" decreased by 2% indicating that that there was increase in delays and perhaps an increase in economic activity or more people driving.

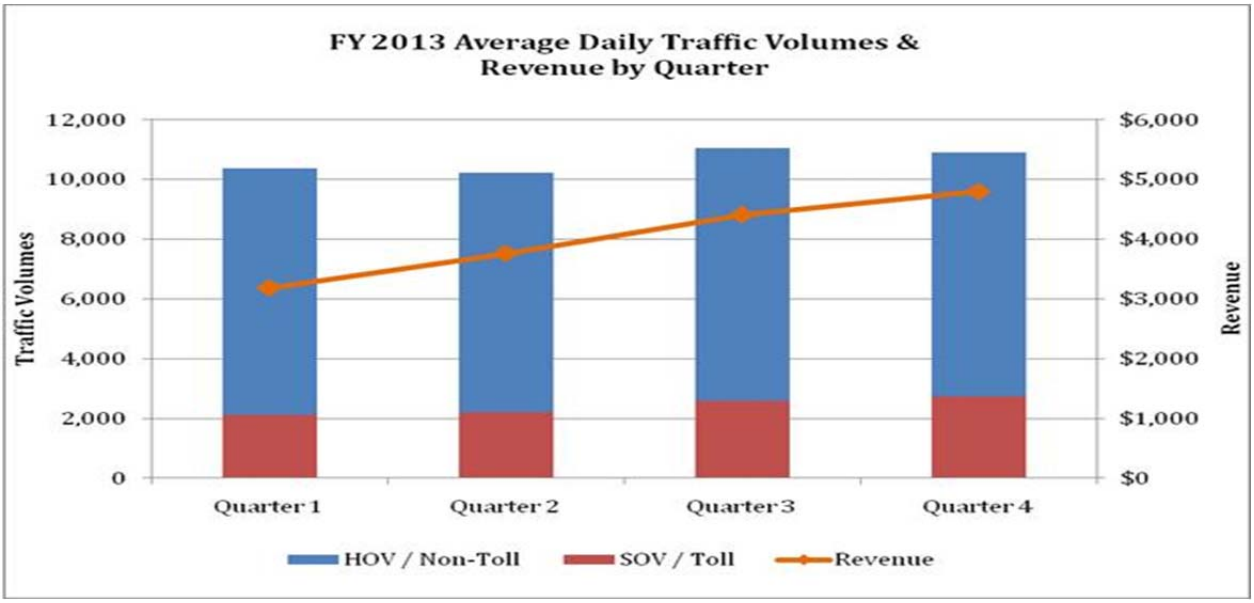
Express Lanes (New)

Express Lanes are a new component to the TSMP and to Santa Clara County's transportation network and infrastructure. The key benefits of express lanes include increased efficiency of the existing freeways by allowing solo drivers access to existing carpool lanes for a fee, provides reliable travel times and reinvests revenues collected from the fees back into to corridor that can be used for operations and maintenance costs, enforcement costs and transit improvements.

The SR 237 Express Lanes I-880 Connector opened for operations in March 2013 and was recognized by the California Transportation Foundation as the Project of the Year in May 2013. Figure ES.6 shows that the average daily trend in traffic volumes and revenues has steadily increased within the first year of operations since the opening of the express lanes. Since the opening of the Express Lanes, the average Single Occupant Vehicles (SOV) usage per day (red bar) increased from approximately 2,000 to 2,750

vehicles and average daily revenues (right column) increased from $3,200 to $ 4,800 during the hours of operations (AM: 5:00 to 10:00 a.m., PM: 3:00 to 7 p.m.). The TMSP will monitor and report on the condition and performance of the express lanes network in future reports as it continues to expand.

Figure ES.5 FY 2013 SR 237 Express Lanes Average Daily Traffic Volumes & Revenue



Source: *VTA SR 237 Express Lanes Annual Draft Report*, September 2013.

Bike Mobility

VTA has a countywide bicycle plan that defines a county bike network composed of both on-street and off-street bikeways and across barrier connections. For the purpose of the TSMP, the percent of completed bicycle projects (in miles) compared with the number of planned projects (in miles) is used to measure the county's progress towards achieving its vision for bike mobility in Santa Clara County. For monitoring purposes, a change of 5% or higher from the previous reporting cycle is considered to be good progress, a change of 1% to 4% is considered to be fair progress, and a change of under 1% is considered to be poor progress. Table ES.5 and ES.6 present the areas measured and the progress made through 2012 on the planned bike improvement identified in the 2008 Countywide Bicycle Plan. Additional measures included in this report. These measures are further discussed in Chapter 3.

Nearly 57% of the 534 miles Cross County Bicycle Network on-street planned miles and 45% of the 813 off-street planned miles in Santa Clara County have been completed to date since tracking of this information from 2009.

Table ES.8 Cross County Bike Network On/Off Street Projects

Cross County Bike Network-On-street	2008	2010	2012
Total length	514	584	584
Completed miles	263	325	330
Planned miles	251	259	254
Percent complete	51%	**56%**	**57%**

Cross County Bike Network-Off-street	2008	2010	2012
Total length	682	813	813
Completed miles	242	361	365
Planned miles	440	452	448
Percent complete	35%	**44%**	**45%**

Source: VTA, *2008 Santa Clara Countywide Bicycle Plan* with supplemental information from VTA Planning Department staff.

Table ES.9 Across Barrier Connection Projects

Across Barrier Connections	2008	2010	2012
Planned/Potential ABC's (CBP 2008)	**115**	115	115
Under Construction	3	1	0
Completed ABCs	0	3	6
Remaining to be completed	115	112	109
Percent complete	0%	**3%**	**5%**

Source: VTA, *2008 Santa Clara Countywide Bicycle Plan* with supplemental information from VTA Planning Department staff.

Across barrier connections are connections that enable bicyclists to conveniently and safely cross freeways, waterways and railroad tracks rather than make circuitous detours to existing roadway crossings. From 2010 to 2012, 3 major ABC projects were completed: US 101/Tully Road overcrossing, San Jose, Permanente Creek Trail Extension Bridge (over US 101) and Stevens Creek Trail Bridge over SR 85 in Mountain View. This represents a modest (2% increase) but significant progress towards expanding the region's bicycle network that includes the planned 115 ABC projects in Santa Clara County.

Transit

VTA provides transit service covering 326 square miles of Santa Clara County with an active fleet of 426 bus vehicles on 71 bus routes and 99 light rail vehicles on three trunk lines. The TSMP covers three aspects of transit performance: 1) physical condition of the vehicles; 2) quality of service provided; 3) annual trips per person. In general, the condition of the transit vehicles in acceptable conditions by federal standards and the quality of transit service provided is fair based on goals set by VTA with minimal change from the previous year (under 2% difference). A summary of the first two measures are provided here.

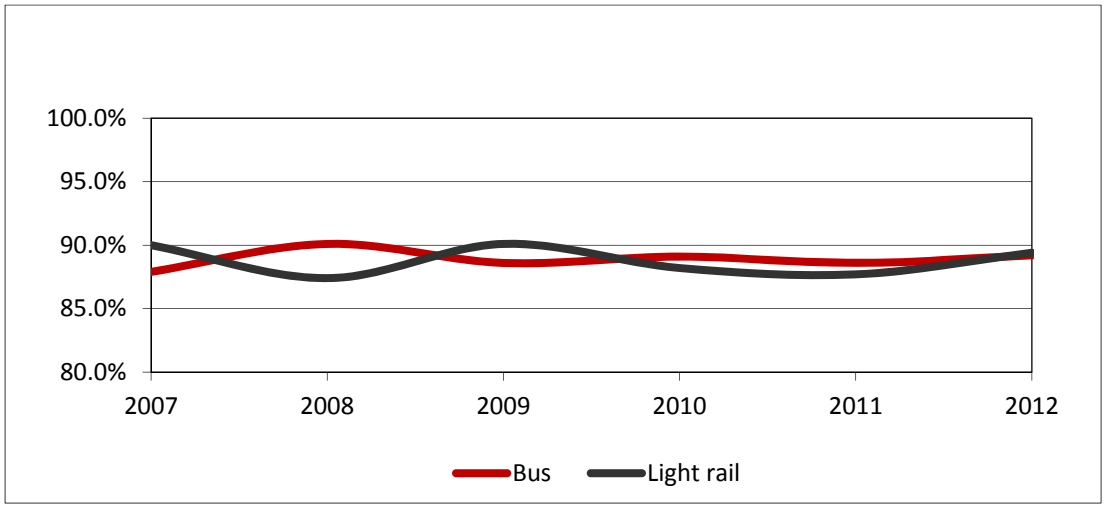
The physical condition of the vehicles is measured by monitoring the average age and the remaining useful service life of the transit fleet. Table ES.10 presents the current vehicle conditions of VTA's transit fleet.

Table ES.10 Condition of Transit Vehicles

Transit Vehicles	Vehicles	Average Age	Minimum Service Life	Percent of Useful Life Remaining
Bus	426	9.4 years	12 Years	21.7%
Light Rail	99	12.0 years	25 Years	51.8%

Figure ES.6 shows the on time performance record between 2005 and 2012. There are many external factors that can affect transit service such as incidents related to auto traffic, roadway repairs or rehabilitation projects, and maintenance related to trackways along the light rail routes. From 2007 to 2012, the average on time performance for both bus and light rail services was 90%. From 2010 to 2010, the on time performance for bus service increased slightly by 0.2% to 89.2% and light rail service declined by 1.2% to 89.4% against an on-time performance goal of 95%.

Figure ES.6 On Time Performance



Source: VTA, *FY 2012 Transit Operations Performance Report*, September 2012.

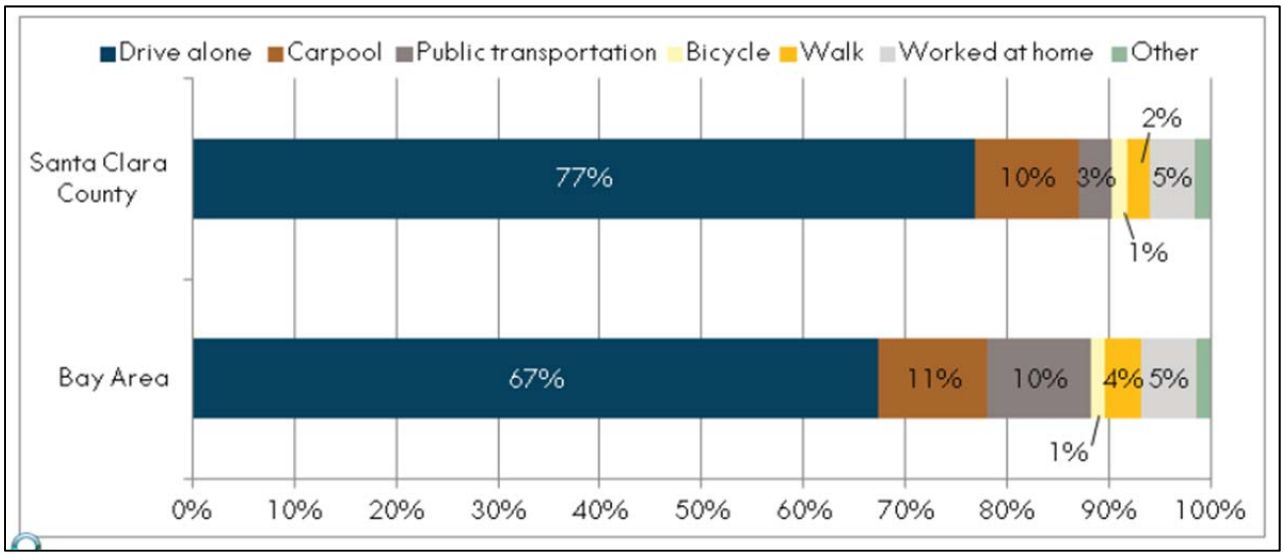
Sustainability

There is a growing public desire to monitor progress towards sustainability. Although there are currently no standard measures for monitoring sustainability related to transportation established by regional public agencies, there is some data that could be used for this purpose.

Motor vehicles are the major source of air pollution for the Bay Area. The TSMP includes two measures related to air quality for monitoring in Santa Clara County: 1) Journey to Work Mode Splits and 2) Air Quality Infractions.

Figure ES.7 shows how residents of Santa Clara County commuted to work by mode in comparison to the rest of Bay Area. Over 75% of those surveyed indicated that they traveled alone to work, compared with Bay Area average of 67%. 10% of the commuters carpooled, 3% took public transit, 1% rode on bicycles, 2% walked to work and 5% worked from home (telecommuted). In general, Santa Clara County residents drive more in single occupant vehicles. This is not surprising considering the County's population, physical size, employment figures and number of registered vehicle owners compared with the eight other counties in the Bay Area as shown in Figure ES.8.

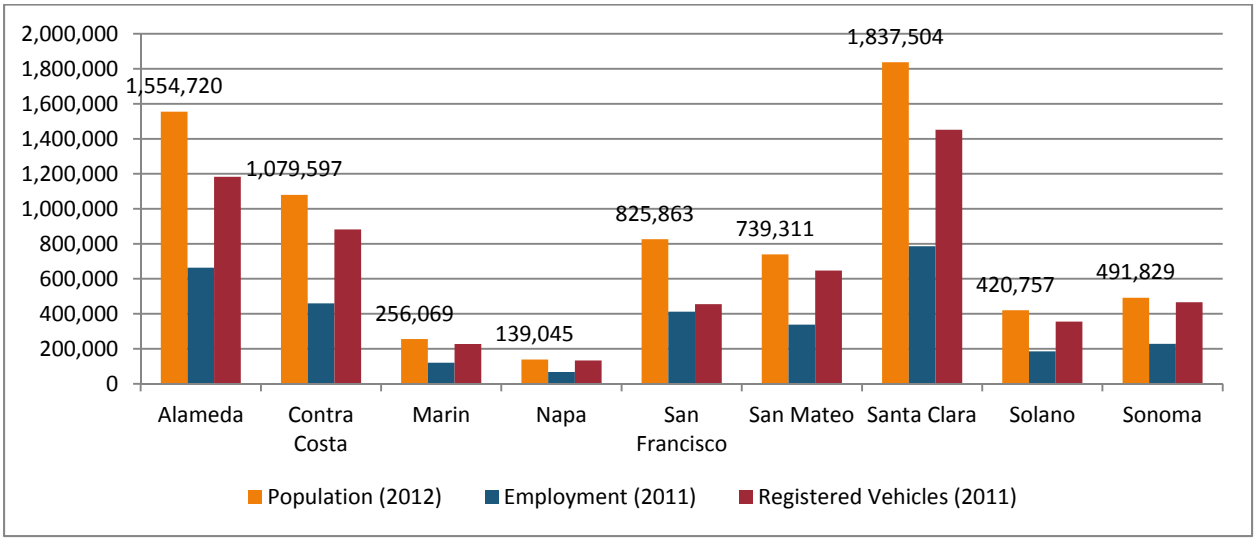
Figure ES.7 Journey to Work Mode Splits (Santa Clara County and Bay Area



Sources: Santa Clara County Public Health Department, *Community Health Existing Conditions Report*, May 2013, p. 5-3. *U.S. Census Bureau, American Community Survey: Americal Community Survey 3-year estimates*, 2006-2008.

Peer County Comparison

Figure ES.8 Comparison of Population, Employment and Registered Vehicles



Sources: California Employment Development Department website 2011 data, California Department of Finance website, 2012 data, California City Finance website, Highway Users Tax Account 2011 data.

Another measure of environmental sustainability is the number of times an air quality monitoring station in the county records contaminant levels that exceed California standards for ozone, carbon monoxide, nitrogen dioxide, and particulate matter 10 (PM 10). Automobiles and trucks are a key source of all of these pollutants.

Table ES.11 summarizes annual air quality infractions in Santa Clara County. The average number of days that exceeded the air quality standards from 2005 to 2010 in a year was 16 days. From 2008 to 2010, the average number of days that exceeded air quality standards remained nearly unchanged at 15 days per year.

Table ES.11 Air Quality Infractions in Santa Clara County

Air Quality Measures	2005	2006	2007	2008	2009	2010	2011	2012
Ozone								
1-hr max	4	10	1	3	5	6	5	3
8-hr max	5	16	4	12	10	9	10	8
Carbon monoxide	0	0	0	0	0	0	0	0
Nitrogen dioxide	0	0	0	0	0	0	0	0
PM10	6	2	3	1	0	na	0	2
Number of recorded air quality infractions in Santa Clara County	**15**	**28**	**8**	**16**	**15**	**15**	**18**	**13**

Sources: Bay Area Air Quality Management District, *2011-2012 Bay Area Pollution Summaries*, June 2011 and June 2012.

NEXT STEPS AND FUTURE CONSIDERATIONS

In addition to tracking of inventory and assessing and monitoring the conditions of transportation assets, the next steps in development of a comprehensive transportation asset management program includes estimating replacement costs and setting goals or targets for maintaining specific condition levels for each of the assets monitored. Setting goals and establishing specific maintenance levels are policy decisions for local and regional councils to discuss and consider as there are fiscal commitments associated with achieving the desired asset conditions.

The development of transportation asset management programs is becoming a common practice among local and state transportation agencies. Transportation agencies such as Seattle Department of Transportation and Portland Bureau of Transportation have recently developed transportation asset management programs and use their programs as a decision making tool for assessing risk and for prioritizing projects based on needs.

1.0 Introduction

1.1 Background

The concept of the developing a countywide transportation system monitoring program stemmed from an earlier effort by Santa Clara Valley Transportation Authority's (VTA's) Technical Advisory Committee (TAC) to study the issue of litter control and landscape maintenance along the freeways in Santa Clara County. This initial effort was followed by a pilot program to monitor and assess in detail the resources needed to adequately control litter and vegetation to acceptable levels.

After reviewing the findings from the Litter Control and Landscape Maintenance Study and Litter Control Pilot Program, the TAC initiated an effort to develop an expanded program that would provide a comprehensive snap shot of the health and performance of Santa Clara County's transportation systems in a single report format. This program, the Transportation System Monitoring Program (TSMP), would essentially serve as a reporting mechanism and asset management tool for Santa Clara County's transportation system infrastructure.

The initial Transportation System Monitoring Report (TSMR) was completed in March 2010 with this first report evaluating specific components of Santa Clara County's existing transportation systems for the 2009 calendar year following guidance provided by VTA's TAC using certain measures. The second report that was approved by the VTA Board of Directors in September 2011 provided information on the 2010 conditions on selected components and made comparisons of Santa Clara County with other Bay Area counties for certain measures where data was available.

This third report (2013 TSMR) provides information on 2011 and 2012 conditions and compares these conditions to those documented in the previous year's report. The information in this report helps to shed light on the areas of the transportation system in Santa Clara County that require immediate or future attention. Each new report has focused on specific transportation infrastructure components and provided new information on transportation system components not covered in previous reports that might be of interest to the residents of Santa Clara County. For example, a new measure that was added to the previous TSMR was the monitoring of litter control and landscape management along freeways. This TSMR focuses on the inventory and conditions of traffic signal systems in Santa Clara County and introduces the monitoring of express lanes.

1.2 Performance Management Framework

Public agencies throughout the U.S. are facing increasing pressure to demonstrate accountability for their investment decisions. In response to these pressures, many transportation agencies are employing performance management programs. The overall goal of these programs is to improve transparency, make the best use of limited resources in terms of achieving agency objectives, and build the case for allocating resources to support transportation investments.

A typical performance management framework includes the following steps:

Selecting Measures

The first step involves selecting measures that can be used throughout the process. These measures should reflect the agency's priorities and goals, and answer performance related questions such as "how are we doing?" The selected measures should also focus on the results that reflect the impact of decisions made, rather than simply measuring the amount of resources being devoted to a particular activity.

Setting Targets

Performance targets are specific values used as benchmarks that an agency would like to achieve. These benchmarks are useful in communicating agency goals and tracking progress towards them.

Using Measures in Decision-Making

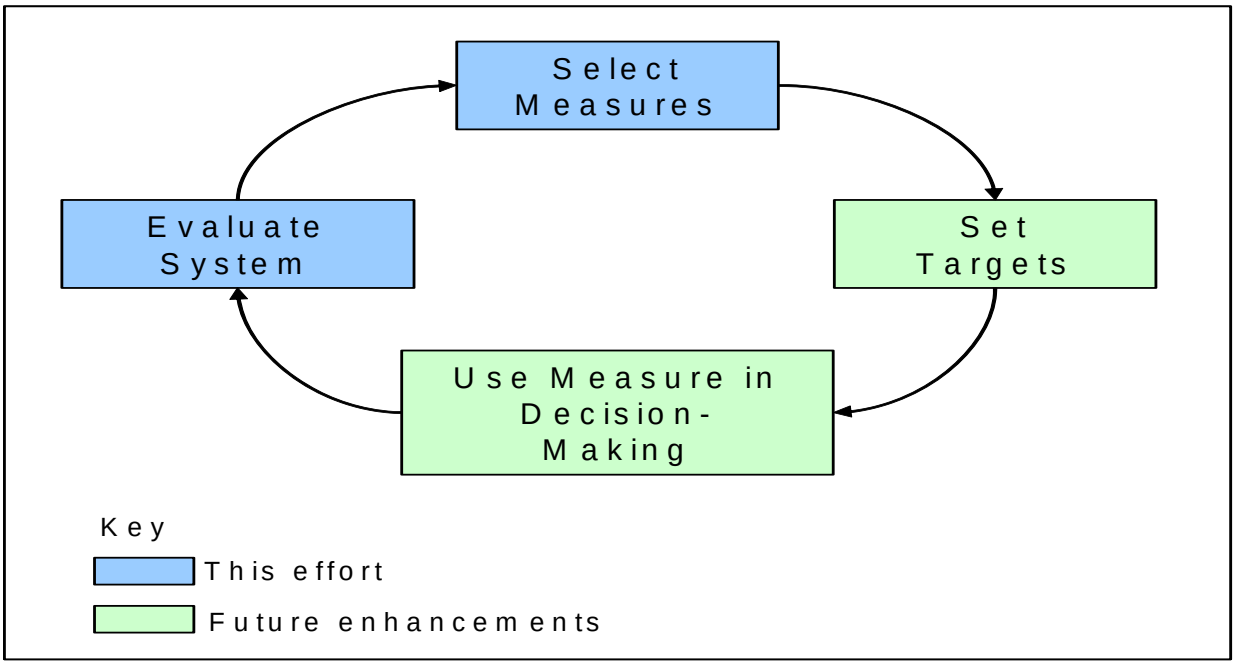
A fundamental part of a successful performance management program is the use of measures that can be evaluated by decision makers to make informed decisions. Measure presentation will further facilitate the evaluation and decision process, much of the data presented will be based on component, location, date, and condition of the asset. For example, performance results can be used to improve decisions about where an agency needs to focus its resources and whether reallocation of funding would be a better option. If the budget is decreased, the expected result can be a decrease in the network performance. Likewise, if the budget is increased, improvements to the network performance can be expected. Non-funding related performance enhancement will be realized through efficiencies in the asset tracking aspects of the program.

Evaluating the System

This step involves communicating performance results on a regular basis. Although measures should be updated periodically to ensure consistency with agency priorities and strategic plans, there are significant benefits associated with maintaining and reporting using a stable set of measures. Internally, this allows for in-depth analysis of near and long term trends. Externally, consistent reporting can make it easier for elected officials and the public to fully appreciate progress that is being made or understand new challenges that arise.

Figure 1.1 illustrates how the initial development of the TMSP fits into the overall performance framework. The scope of this initial effort includes identifying measures to use in the TSMP and conducting an initial analysis of Santa Clara County's transportation systems.

Figure 1.1 Performance Management Framework



1.3 TSMP PURPOSE

The residents of Santa Clara County have made significant investments in its transportation infrastructure. One of the major concerns raised by local agencies is the growing maintenance needs and backlog of deferred maintenance tasks resulting from declining funding resources.

The purpose of developing and implementing a transportation system monitoring program is to provide local jurisdictions, VTA Advisory Committees, and the VTA Board of Directors with current information on the condition and performance of transportation systems in Santa Clara County in a single, publicly accessible report format with the following objectives:

- Enable the county and external stakeholders to better understand the current performance of the county's transportation system and the effectiveness of transportation investments;
- Communicate progress towards stated transportation system goals and objectives;
- Provide additional context for funding and policy decisions;
- Establish a foundation for evaluating the implications of future funding scenarios in terms of their impact on future transportation system performance; and
- Provide a mechanism for benchmarking performance between Santa Clara and other Bay Area counties.
- *Follow the goals of Moving Ahead for Progress in the 21st Century Act (MAP-21), the federal transportation funding program signed into law on July 6, 2012, that emphasizes performance based management of transportation infrastructure assets.*

1.4 REPORT ORGANIZATION

The remainder of this report is organized as follows:

- Chapter 2 summarizes the performance measures included in the 2013 TSMP report;
- Chapter 3 presents a snap shot of the transportation systems in the county using these measures;
- Chapter 4 describes how the data was compiled, processed, and calculated for use in the report; and
- Appendices provide supporting data such as performance measure details, roadside self-assessment surveys and visual assessment scales for litter control and landscape maintenance of the freeways

2.0 Transportation System Measures

Table 2.1 presents the list of components and performance measures that are included in the 2013 TSMP report. This list was developed with input from TAC members and VTA staff during the development of the initial program on key policy issues regarding the performance of the county's transportation systems. One new measure that was added to the 2011 TSMP report was an evaluation of litter control and landscape maintenance of the freeways in Santa Clara County. The 2013 TSMP report includes another new measure that focuses on the inventory and detailed description of traffic signal controllers.

Table 2.1 TSMP System Components and Measures

System Components	Measures
1. Pavement condition	a. Average pavement condition *(based on pavement inspections)*
2. Freeway mobility	b. Percent of freeways with traffic moving freely *(based on level of service)*
3. Express Lanes	c. Utilization of express lanes *(based on traffic volumes and tolls collected)*
4. Bridge condition	d. Percent of bridges in good condition *(based on bridge Sufficiency Rating)*
5. Traffic signals	e. Percent of signals in useful condition *(based on self-assessment survey)*
	f. Average age of traffic signals *(based on local agency self-assessment survey)*
6. Pavement markings	g. Percent of markings in useful condition *(based on self-assessment survey)*
7. Roadway signs	h. Percent of signs in useful condition *(based on self-assessment survey)*
8. Light poles	i. Percent of light poles in useful condition *(based on self-assessment survey*)
9. Curb and gutter	j. Percent of curb and gutter in useful condition *(based on self-assessment survey)*
10. Freeway litter, landscape and graffiti management	k. Percent of roadside with virtually no or some litter (*based on self-assessment survey)*
	L. Condition *(based on visual inspection)*
11. Bicycle mobility	m. Percent of on and off streets cross county bike network completed *(based on number of projects completed from VTA Bicycle Expenditure Program)*
	n. Percent of planned across barrier connections completed *(based on number of projects completed from VTA Bicycle Expenditure and Highway Programs)*
12. Bus and light rail	o. Percent of on-time transit performance *(based on annual transit operations report)*
	p. Percent of planned transit service provided *(based on planned service vs. actual service)*
	q. Transit trips per person *(based on annual boarding riders)*
	r. Remaining years of service life of transit vehicles *(based on age of transit vehicles)*
13. Sustainability	s. Percent of journey to work mode splits *(based on Census surveys)*
	t. Number of days recorded with air quality infractions *(based on air quality standards)*

3.0 2011-2012 System Conditions

This section presents a snap shot of the conditions of the transportation systems in Santa Clara County in 2011 and 2012 where data was available. It provides inventory and performance information for all of the system components listed in Table 2.1. All measures are reported at the county-level. In many cases the underlying data has been compiled by municipalities. Details on how each performance was calculated, including a complete list of data sources, is provided in Appendix A.

3.1 PAVEMENT

There are approximately 9,900 lane miles of local roads maintained by the local agencies in Santa Clara County. Over 50% of the roadways are located within the jurisdictions of the City of San Jose and County of Santa Clara.

Locally Maintained Roadways

The Metropolitan Transportation Commission (MTC), the metropolitan planning organization (MPO) for the Bay Area, collects data from local agencies to determine the average conditions of the region's roadways. MTC and the local jurisdictions use a Pavement Condition Index (PCI) that rates segments of paved roadways on a scale from 0 to 100 points. These points correlate to categories that describe the roadway conditions ranging from a low score of "Failed" to a high score of "Very Good-Excellent." Table 3.1 on the next page describes the rating scale used in the regional pavement conditions analysis.

Figure 3.1, also on the following page, shows the average pavement condition in Santa Clara County from 2004 to 2011. The overall pavement condition for Santa Clara County in 2011 was rated as "Good," which is unchanged compared to 2010. However, the percentage of roadways in "Fair" condition increased by 6%, thus indicating that there will be a growing need to rehabilitate Santa Clara County's local roadways in the near future.

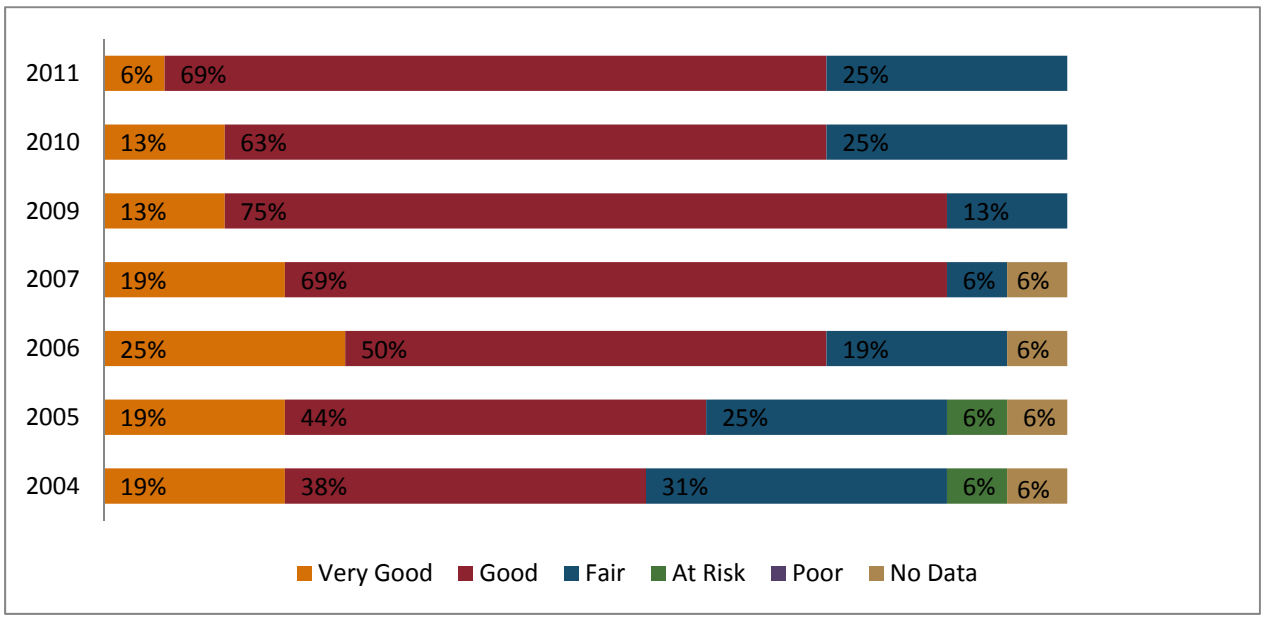
The California Statewide Local Streets and Roads Needs Assessment Final Report, January 2013 estimates a $1.860 billion dollar need to maintain Santa Clara County's 4,161 centerline miles of local roadways over the next 10 years.

Table 3.1 Pavement Condition Index (PCI)

Very Good-Excellent (PCI = 80-100)	Pavements are newly constructed or resurfaced and have few if any signs of distress.
Good (PCI = 70-79)	Pavements require mostly preventive maintenance and have only low levels of distress, such as minor cracks or spalling, which occurs when the top layer of asphalt begins to peel or flake off as a result of water permeation.
Fair (PCI = 60-69)	Pavements at the low end of this range have significant levels of distress and may require a combination of rehabilitation and preventive maintenance to keep them from deteriorating rapidly.
At Risk (PCI = 50-59)	Pavements are deteriorated and require immediate attention including rehabilitative work. Ride quality is significantly inferior to better pavement categories.
Poor (PCI = 25-49)	Pavements have extensive amounts of distress and require major rehabilitation or reconstruction. Pavements in this category affect the speed and flow of traffic significantly.
Failed (PCI = 0-24)	Pavements need reconstruction and are extremely rough and difficult to drive.

Source: MTC, *2011 Pavement Condition Index for Bay Area Jurisdictions,* November 2012.

Figure 3.1 Pavement Conditions on Santa Clara County Roadways



Source: MTC, *2011 Pavement Condition Index for Bay Area Jurisdictions,* November 2012.

Peer County Comparison

There are approximately 42,600 lane miles of local roads in the Bay Area. The majority of these lane miles lie within the counties of Alameda, Contra Costa, and Santa Clara, with Santa Clara County having the most miles or 23% of the Bay Area's roadways.

Table 3.2 below shows a comparison of the local pavement condition by county. In general, the average pavement conditions in the Bay Area remained unchanged from 2007 to 2012. Contra Costa, San Mateo and Santa Clara counties had the best roadway conditions with a rating of "Good" in 2012, compared with the rest of the Bay Area counties. Marin and Napa counties had the worst road conditions with an "At risk" rating.

Table 3.2 Local Pavement Condition by County in the Bay Area (2012)

County	Center Line Miles	Lane Miles	Percent of Total Lane Miles in Bay Area	Average Pavement Condition (2008)	Average Pavement Condition (2010)	Average Pavement Condition (2012)
Alameda	3,534	7,982	19%	66 Fair	67 Fair	**68** **Fair**
Contra Costa	3,346	7,060	16%	72 Good	70 Good	**71** **Good**
Sonoma	2,373	4,960	11%	53 At risk	50 At risk	**50** **Fair**
San Mateo	1,872	3,912	9%	69 Fair	70 Good	**71** **Good**
Solano	1,715	3,623	8%	66 Fair	66 Fair	**67** **Fair**
San Francisco	940	2,134	5%	62 Fair	63 Fair	**65** **Fair**
Santa Clara	4,162	9,381	23%	70 Good	69 Fair	**73** **Good**
Marin	1,021	2,059	5%	61 At risk	61 At risk	**61** **At risk**
Napa	716	1,489	4%	53 At risk	60 At risk	**59** **At risk**
Total	19,679	42,600	100%			
Average Score				64	64	**65**
Median Score				66	66	**67**

Source: MTC, *2011 Pavement Condition Index for Bay Area Jurisdictions,* November 2012; Nichols Consulting Engineering, *California Statewide Local Streets and Roads Needs Assessment*, January 2013.

Note: Scores are based on weighted average Pavement Condition Index by number of lane miles.

State (Caltrans) Maintained Freeways

This is the second year that the TSMP is tracking the pavement conditions of the freeways, so only the 2010 and 2011 conditions are being presented in this report.

Caltrans maintains approximate 239 centerline miles or nearly 1,035 lane miles of roadway in Santa Clara County. Of the 239 centerline miles, 148 miles are spread over eight freeways and the remaining 91 centerline miles are divided among six non-freeway state miles.

Caltrans does not use the exact same Pavement Condition Index (PCI) criteria used by MTC and local agencies in the Bay Area. Instead, Caltrans uses a maintenance level of service evaluation developed specifically to evaluate the state's roadways. The category that Caltrans uses to describe the pavement conditions of its roadways is "Travelway." Within this category, there are 18 maintenance related attributes that Caltrans evaluates as part of its Maintenance Level of Service Report. A few examples of these attributes are evaluation of cracks, potholes, joint separation, slab failure and spalls.

Peer County Comparison

To provide a perspective on the pavement conditions of the freeways in Santa Clara County, a comparison was made to the freeway conditions of all nine counties in the Bay Area. Table 3.3 shows that the conditions of Santa Clara County's freeways in 2011 were rated lower than the rest of the Bay Area's freeways with a score of 67 points compared to the Bay Area average of 73 points out of 100.

Table 3.3 Travelway (Pavement) Conditions of Freeways in Santa Clara County

County	2010 Travelway Conditions	2011 Travelway Conditions	Change
Solano	78	82	(+) 4
Sonoma	74	78	(+) 4
Contra Costa	64	76	(+) 12
Marin	77	75	(-) 2
Napa	71	74	(+) 3
San Mateo	75	71	(+) 4
Alameda	63	70	(+) 7
Santa Clara	**74**	**67**	**(-) 7**
San Francisco	70	65	(-) 5
Bay Area Average Score	**72**	**73**	(+) 1
Bay Area Median Score	**74**	**74**	-
Rank	4th (Tie with Sonoma County)	8th	-

Source: Caltrans, *FY 2010 and FY 2011 Maintenance Level of Service District 4 Reports, 2011 and 2012*.

3.2 ROADSIDE ASSETS

Roadside assets consist of a variety of features such as traffic signals, signs, and street lighting. The conditions of these assets in Santa Clara County were estimated through the use of a self-assessment survey. Table 3.4 presents a summary of the conditions of the roadside assets and the agencies' abilities (local agencies and Caltrans) to maintain them for 2009 to 2011. This information was collected through the use of a self-assessment survey where the local agencies were requested to assess the conditions of their roadway assets and provide an estimate of their staffing ability to maintain these assets. Copies of the responses from the 2011 Roadside Asset survey are included in Appendix B.

For each asset type, the table lists the percent in useful condition. The definition of "useful condition" varies by asset. For example, for traffic signals "useful condition" is defined as "signal equipment that is within the useful lifespan and meets current visibility and safety standards". In the roadside litter category, "useful condition" means "roadside with virtually no or some litter (any litter could be quickly collected by one or two individuals)". Definitions for the other asset categories are described on the survey forms.

Table 3.4 also shows an estimate of the "ability to maintain with existing resources." This item reflects an agency's ability from a staffing resource viewpoint, to properly maintain the assets in its jurisdiction to an acceptable level. The values listed in the table reflect a scale of good/fair/poor as described below:

1 = poor: The roadside assets are maintained on an as needed basis.

2 = fair: There are only enough resources to provide minimum maintenance on the roadside assets. Some maintenance work is being deferred.

3 = good: There are enough resources to routinely maintain the assets.

Table 3.4 Roadside Assets Condition and Resource Availability

Asset	Local Assets[1]						Caltrans Assets					
	Percent in Useful Condition			Ability to Maintain with Existing Resources			Percent in Useful Condition			Ability to Maintain with Existing Resources		
	2009	2010	**2011**	2009	2010	**2011**	2009	2010	**2011**	2009	2010	**2011**
Traffic Signals	73	83	**83**	2.4	2.4	**2.4**	75	75	**70**	3	3	**3**
Pavement Markings	70	67	**68**	1.9	2	**2.2**	60	60	**60**	2	3	**2**
Signs	70	71	**72**	2.1	2.1	**2.1**	80	80	**80**	2	2	**2**
Light Poles	59	75	**66**	1.8	1.8	**1.8**	65	65	**65**	2	2	**2**
Curb and Gutter	84	83	**81**	2.3	1.4	**1.4**	85	75	**75**	na	2	**2**
Roadside Litter	80	67	**69**	1.6	2.1	**2.1**	25	20	**50**	na	2	**2**
Average	72.7	74.3	**73.2**	2.0	2.0	**2.0**	65.0	62.5	**66.7**	2.3	2.3	**2.2**

Source: VTA, *2011 Transportation System Monitoring Program Self Assessment Survey*, May 2012.

[1] These values represent a weighted average for the county. Averages were determined by weighting the results from each jurisdiction by its roadway lane miles.

Table 3.5 summarizes the changes from 2009 to 2011. In general, there were little changes in the roadside asset conditions and abilities of the agencies to maintain them with the exception of the local agency maintained traffic signals. The condition of this asset showed an increase useful life of 10%. This was due to the efforts of City of Los Altos replacing all of their controllers (13). The percent of local agency maintained light poles in useful condition also showed an increase of 16% from 2009. However, this was due to skewing of data where there was incomplete data in 2009 (missing data from 4 of the 15 local agencies).

It should be noted that changes between single consecutive years may show minimal differences. As data is collected more consistently over an extended period of time, the information will become more useful and reliable in identifying trends on the conditions of the monitored transportation system elements.

Table 3.5 Roadside Asset Conditions - Changes from 2009 to 2011

	Local Assets		State (Caltrans) Assets	
Assets	**Percent in Useful Condition**	**Ability to Maintain with Existing Resources**	**Percent in Useful Condition**	**Ability to Maintain with Existing Resources**
	Difference	Difference	Difference	Difference
Traffic Signals	+10%[1]	No change	- 5%	No change
Pavement Markings	- 2%	+0.3%	No change	No change
Signs	+2%[2]	No change	No change	No change
Light Poles	+7%	No change	No change	No change
Curb and Gutter	-3%	-0.9%	- 10%	No change[3]
Roadside Litter	-11%	+0.5%[3]	+25%	No change[3]
Difference of Averages	**+3.0%**	**-0.1%**	**+10%**	**No change**

Notes:
1. City of Los Altos reported replacement all of their signals (13 controllers) in 2010.
2. City of Los Altos also reported that they replaced their roadway signs in 2010-2011.
3. There was no data available for 2009.

Traffic Signal Controller Inventory

Traffic signal controllers are an integral component of the transportation and complete streets network. They are used to assign vehicular, bicycle and pedestrian right-of-way and promote safe, orderly movement of traffic through intersections. These controllers also increase capacity of the intersection and can provide continuous movement of vehicles along a given route. Table 3.6 presents a summary of Santa Clara County's traffic signal systems.

Table 3.6 Traffic Signal Inventory Summary

Jurisdiction	Quantity (Units)	Average Age (Years)	Number of Controller Types (Models)	Number of Intersections with Vehicle Detectors (by Type)	Number of Intersections with Bicycle Detectors
Local	1,818	10	8	1,587	409
Caltrans	160	7	7	NA	NA
Summary	1,978	8 - 14	15	1192 - Loops 199 - Video 52 - GPS 6 - Magnetometers	409

Source: Survey using *MTC's Bay Area Signalized Intersection Systems* spreadsheet template, June 2012.
Notes: The data presented in this summary are based on information provided by the local agencies including some missing information that was not available at the time of the survey.

As shown in Table 3.6, there are nearly 2,000 signalized intersections with controllers in Santa Clara County with an average age between 8 to 14 years old. This information is important in assessing current and future maintenance needs including eventual replacement of the controller units. The National Cooperative Highway Research Program (NCHRP) Report 713 "Estimating Life Expectancies of Highway Assets," 2012 estimates that the average life cycle for traffic signal controllers with proper maintenance is 15-20 years. In addition, the findings show that there are 15 different traffic controller models, nearly 1,600 vehicle detectors and 400 bicycle detectors operating in field today.

Findings from this survey can be used in future discussions such as development of countywide traffic signal coordination that integrates with transit operations, specifically near city and county boundaries, flush plans to move traffic in a systematic manner for special events or emergencies and or a uniform technology standard that allows interoperability between all signal controllers.

3.3 FREEWAY LITTER CONTROL, LANDSCAPE MAINTENANCE AND GRAFFITI

The aesthetics and cleanliness of the freeways were identified by Santa Clara County's local agencies as an important measure to monitor because of the perception by the local communities and effects on the local environment. For the 2013 TSMP, the monitoring of graffiti was added to the report in response to the increased number of vandalism incidents on Santa Clara County's roadways.

Figures 3.2 and 3.3 on the following pages illustrate the freeway system in Santa Clara County and Table 3.6 provides detailed information about each freeway corridor.

Twelve locations were selected for monitoring based on a list of litter hot spots identified in the Litter Control and Maintenance Landscape Study and input from the Systems Operations and Management Working Group (a sub working group of VTA's Technical Advisory Committee) along the freeways in Santa Clara County. These hot spots tend to accumulate litter at a higher rate than other areas, and tend to include areas such as routes to landfill areas, homeless encampment areas, interchanges, and at on/off ramp locations.

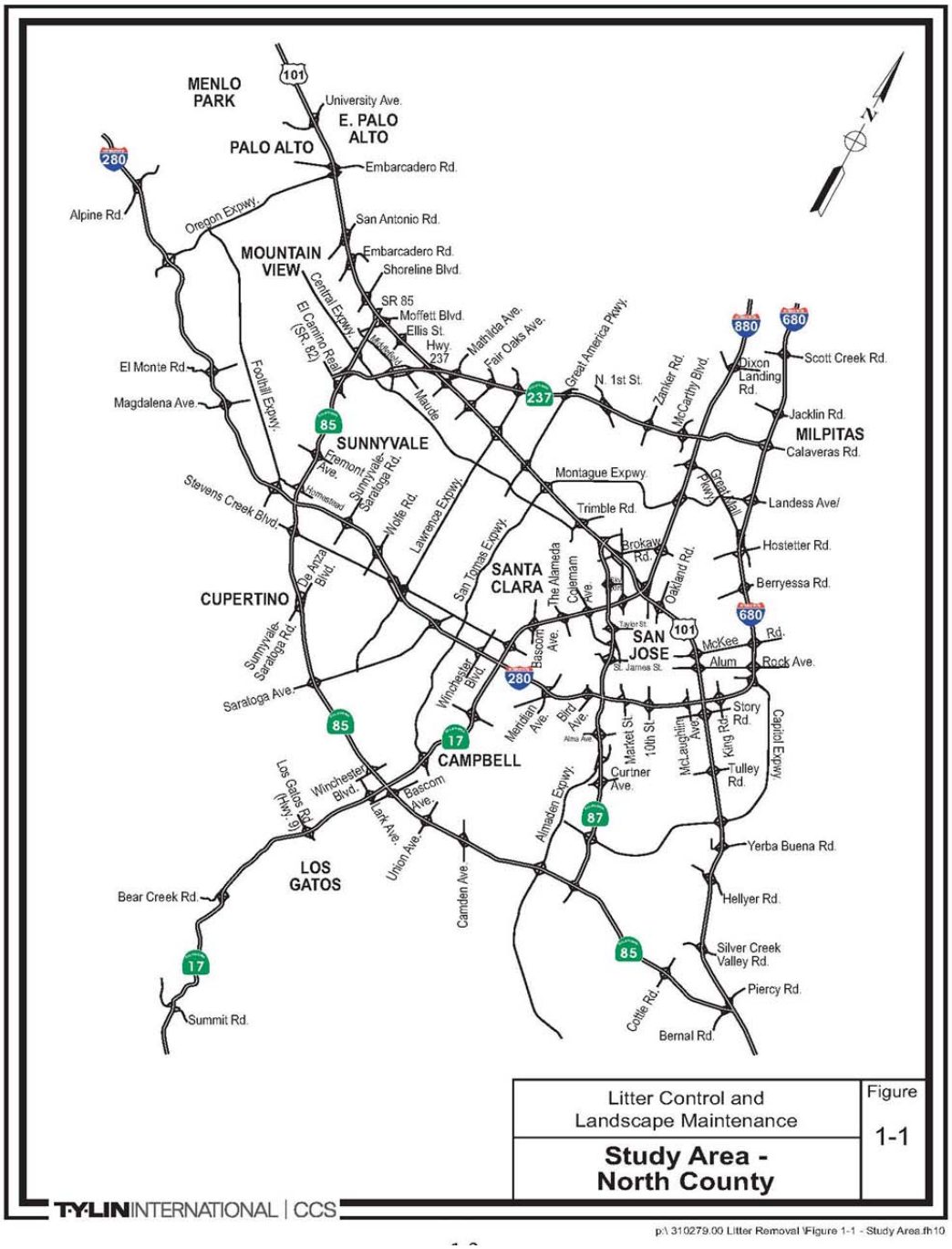
Table 3.7 presents the list of the twelve monitored locations and Figure 3.4 illustrates these locations on Santa Clara County's freeway system. In addition, Figures 3.5 to 3.11 show photos of the conditions observed between 2011- 2012 at the monitored locations and nearby vicinities.

Table 3.7 Freeways in Santa Clara County

Freeway	Centerline Miles	Roadside Miles	Number of Interchanges	Landscaped Acres
17	13.9	27.8	7.0	68.3
85	24.0	48.0	20.0	386.0
87	9.2	18.4	11.0	42.5
101	52.5	105.0	41.0	172.0
237	8.7	17.4	14.0	30.4
280	18.4	36.8	19.0	289.8
680	10.0	20.0	12.0	156.7
880	11.0	22.0	13.0	47.4
Total	**147.7**	**295.4**	**137.0**	**1193.1**

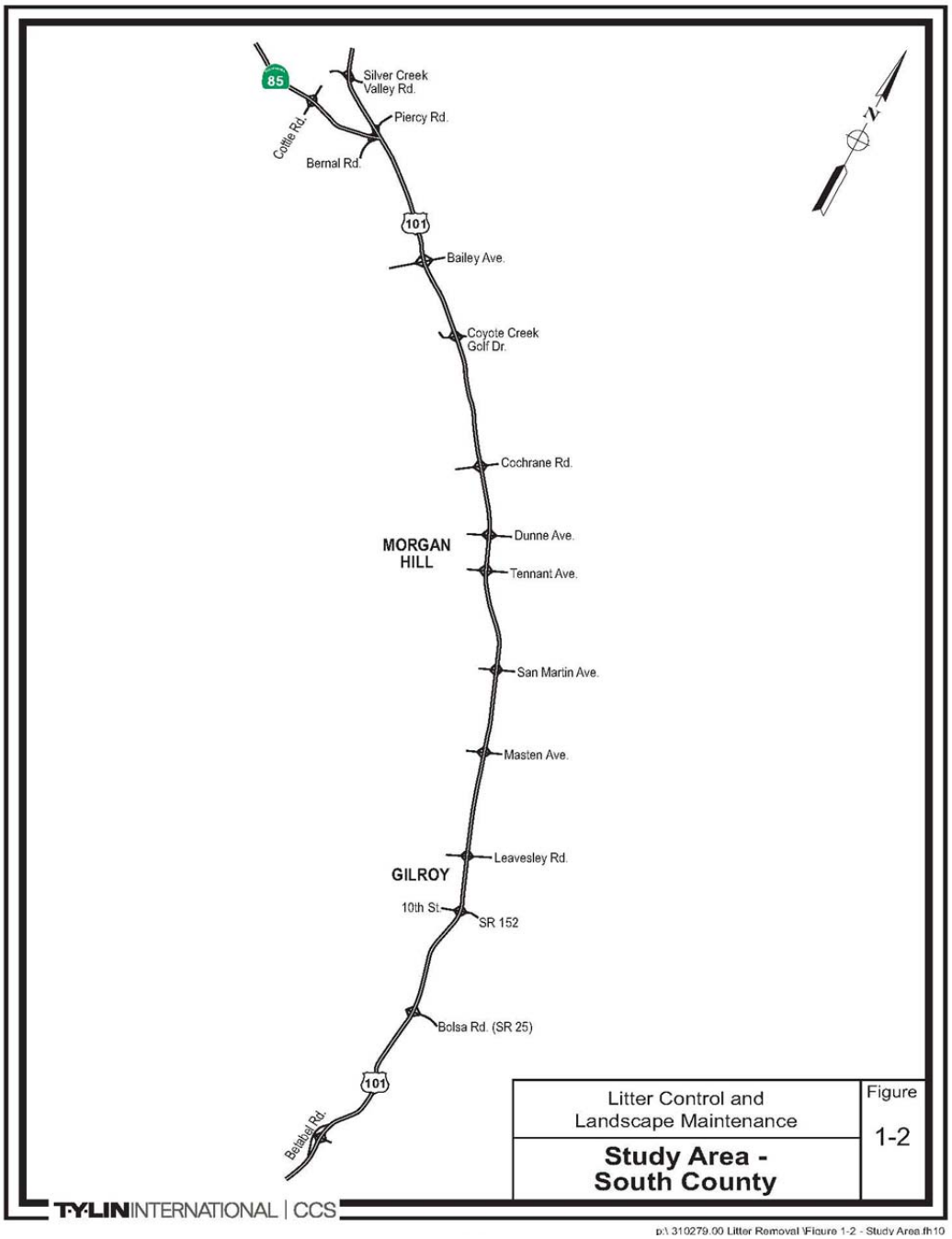
Source: *Litter Control and Landscape Maintenance Study for Freeways in Santa Clara County Final Report,* December 2005, p. 1-4.

Figure 3.2 Santa Clara County North County Area Freeways



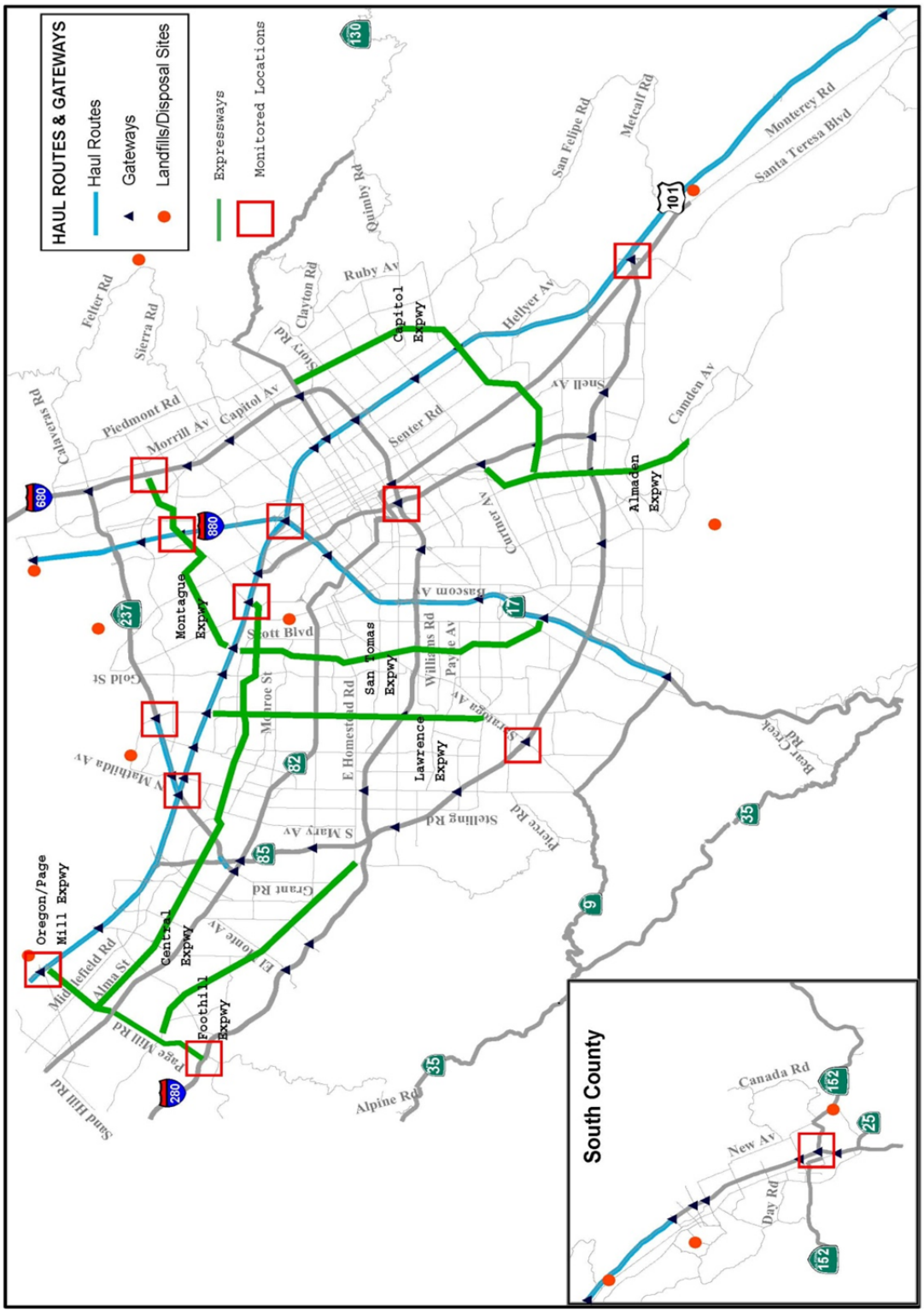
Reprinted from report prepared for VTA by Ty Lin-CCS - *Litter Control and Landscape Maintenance Study for Freeways in Santa Clara County Final Report* December 2005, p. 1-2.

Figure 3.3 Santa Clara County South County Area Roadways



Reprinted from report prepared for VTA by Ty Lin-CCS - *Litter Control and Landscape Maintenance Stud for Freeways in Santa Clara County Final Report,* December 2005*,* p. 1-3.

Figure 3.4 Litter Control and Landscape Maintenance Monitored Locations/ Vicinities



Base map from *Litter Control and Landscape Maintenance Study for Freeways in Santa Clara County Final Report*, December 2005, p. 2-8

Visual Assessment Measure

For this report, the visual assessment scale established in the Litter Control and Landscape Maintenance Study was used to evaluate the litter and landscape conditions at the selected monitoring locations and nearby vicinities. The descriptions of the levels within the litter and landscape scales are provided in Tables 3.7 and 3.8 and the corresponding visual illustrations are in Appendix C.

Table 3.8 Litter Scale

Level	Description
No Litter	Virtually no litter can be observed along the freeway. The observer has to look hard to see any litter, with perhaps a few occasional litter items in a 1/4-mile. Any litter seen could be quickly collected by one individual. The freeway has a generally neat and tidy appearance; nothing grabs the eye as being littered or messy.
Slightly Littered	A small amount of litter is obvious to the observer. The litter along the freeway could be collected by one or two individuals in a short period of time. While the freeway has a small amount of litter, the eye is not continually grabbed by litter items.
Littered	Visible litter can readily be seen along the freeway or ramp, likely requiring an organized effort for removal. This area is "littered" and clearly needs to be addressed.
Extremely Littered	Continuous litter is one of the first things noticed about the freeway. Major illegal dumpsites might be seen, requiring equipment and/or extra manpower for removal. There is a strong impression of a lack of concern about litter on the freeway.

Source: *Litter Control and Landscape Maintenance Stud for Freeways in Santa Clara County Final Report,* December 2005, p. 3-3.

Table 3.9 Landscape Scale

Level	Description
Attractive	Landscaped areas are well maintained with healthy plants. Unlandscaped areas are properly trimmed for safety and sight clearance and no weeds are apparent.
Decent	Landscaped areas have generally healthy plants. Unlandscaped areas may have some weeds that are not excessively high. Trees and brush are appropriately trimmed for safety and sight clearance.
Neglected	Landscaped areas appear neglected with dead/dying plants/trees and/or irrigation problems in evidence. Unlandscaped areas are overgrown with high weeds, trees, or brush and they may be presenting fire or safety hazards.

Source: *Litter Control and Landscape Maintenance Stud for Freeways in Santa Clara County Final Report,* December 2005, p. 3-3.

Freeway Litter and Landscape Conditions

Table 3.9 below shows the corresponding scores to the levels of the visual scales presented in Tables 3.7 and 3.8 on the previous page, and Table 3-10 presents the results of the visual assessment of the monitored locations by VTA staff.

Overall, the cleanliness and neatness of landscaping of the selected monitoring locations along the freeways rated between Slightly Littered – Littered for litter control and Decent - Neglected for landscape maintenance, an average score of 2.3 for litter and 2.4 for landscaping. The most littered and neglected locations were at US 101/Trimble Road-De La Cruz Boulevard, SR 87/Capitol Expressway, and I-680/Montague Expressway in San Jose. The least littered locations with decent landscaping was US 101/SR 152 in Gilroy, I-280/Page Mill Road in Palo Alto, and SR 85/Saratoga Avenue in San Jose. Figures 3.5 to 3.11 show photos of the typical conditions observed in the Fall of 2010 at each of the selected monitored locations and nearby areas.

Table 3.10 Litter Control and Landscape Maintenance Scoring

Litter Control	Score
No Litter	4
Slightly Littered	3
Littered	2
Extremely Littered	1

Landscape Maintenance	Score
Attractive	3
Decent	2
Neglected	1

Table 3.11 Litter Control and Landscape Maintenance Assessment

No.	Route	Monitored Locations	Jurisdiction	Litter 2010	Litter 2011	Landscaping 2010	Landscaping 2011
1	US 101	SR 152 Interchange	Gilroy	3	3	2	2
2	US 101	Story Rd	San Jose	2	3	1	2
3	US 101	Trimble Ave / De La Cruz	San Jose	2	2	1	1
4	US 101	N. Mathilda Ave/SR 237	Sunnyvale	3	3	2	2
5	US 101	Oregon Expwy / Page Mill Rd	Palo Alto	3	3	2	2
6	I-680	Montague Expwy	San Jose	2	2	1	1
7	I-880	Montague Expwy	San Jose	3	3	2	2
8	I-880	US 101 Interchange	San Jose	3	3	2	2
9	I-280	Page Mill Rd	Palo Alto	4	4	1	3
10	SR 237	N. Mathilda Ave	Sunnyvale	3	3	2	2
11	SR 87	SR 87/Capitol Expwy	San Jose	2	3	1	1
12	SR 85	Saratoga Ave	San Jose	3	3	2	2
			Average Score	**2.8**	**2.9**	**1.6**	**1.8**
			Median Score	**3**	**3**	**2**	**2**

Average Litter score of 2.8 **= Between Slightly Littered and Littered,** Average Landscaping score of 2.4 **= Between Decent and Neglected.** Median Litter score of 3.0 **= Littered,** Median Landscaping score of 2.0 **= Decent**

Peer County Comparison

Caltrans also assesses litter control and landscape maintenance levels of its freeways by county using a similar visual assessment measurement as part of its Maintenance Level of Service Report under its Roadside category. Caltrans basically uses a pass/fail scoring system that equates to a numeric value ranging from 0 - 100.

For the purposes of this TSMP report, both visual assessments by VTA and Caltrans are presented here to provide some objectiveness in the reporting. Caltrans reports only at the county level and not by individual freeway segments within a county on attributes related to maintenance of its freeways. Table 3.11 below reports on the litter and landscape conditions assessed by Caltrans and shows a comparison on the same condition with Santa Clara County's peer agencies in the Bay Area.

Santa Clara County scored slightly less than the average of the all the Bay Area counties combined, 63 points compared with the average score of 65 points. However, Santa Clara County is tied for third place with Sonoma County for having clean freeways and maintained landscaping. A copy of Caltrans FY 2011 Maintenance Level of Service District 4 Report Executive Summary Draft Report is provided in Appendix D.

Table 3.12 Litter Control and Landscape Maintenance Assessment

County	Percent of Total Lane Miles in Bay Area	Litter, Landscaping, Graffiti 2010	Litter, Landscaping, Graffiti 2011	Change
Alameda	19%	61	56	(-) 5
Contra Costa	16%	69	72	(+) 3
Marin	5%	62	57	(-) 5
Napa	4%	82	84	(+) 2
San Francisco	5%	56	62	(+) 6
San Mateo	9%	60	67	(+) 7
Santa Clara	**22%**	**63**	**58**	**(-) 5**
Solano	8%	65	79	(+) 14
Sonoma	12%	63	73	(+) 10
Average Score		**65**	**68**	
Median Score		**63**	**67**	
Rank		4th (Tie with Sonoma County)	7th	

Source: Caltrans, *FY 2011 Maintenance Level of Service District 4 Report Executive Summary (Draft),* 2012.

Figure 3.5 Photos of Litter, Landscape and Graffiti Monitored Locations and Nearby Vicinity

1. US 101/SR 152, Gilroy	2. US 101/Story Rd., San Jose

Figure 3.6 Photos of Litter, Landscape and Graffiti Monitored Locations and Nearby Vicinity

3. US 101/Trimble Ave., San Jose	4. US 101/N. Machida Ave., Sunnyvale

Figure 3.7 Photos of Litter, Landscape and Graffiti Monitored Locations and Nearby Vicinity

5. US 101/Oregon Exwy, Palo Alto

6. I-680/Montague Exwy., San Jose

Figure 3.8 Photos of Litter, Landscape and Graffiti Monitored Locations and Nearby Vicinity

7. I-880/Montague Expwy., San Jose	8. I-880/US 101, San Jose

Figure 3.9 Photos of Litter Landscape and Graffiti Monitored Locations and Nearby Vicinity

9. I-280/Page Mill Rd., Palo Alto	10. SR 237/N. Mathilda Ave., Sunnyvale

Figure 3.10 Photos of Litter, Landscape and Graffiti Monitored Locations and Nearby Vicinities

11. SR 87/Capitol Expwy., San Jose	12. SR 85/Saratoga Ave., San Jose

3.4 BRIDGES

Bridges are an important transportation asset as they provide connectivity between communities. There are nearly 490 bridges maintained by the local jurisdictions in Santa Clara County. Table 3.12 below shows the number of bridges by jurisdiction and the average bridge age.

The majority of bridges lie within the jurisdictions of City of San Jose and County of Santa Clara, with each agency maintaining over 150 bridges. The jurisdictions with the oldest bridges lie in Los Altos and Cupertino (over 69 years). The average age of the bridges in Santa Clara County is 47 years.

Table 3.13 Bridge Inventory by Jurisdiction

Local Jurisdictions	Number of Bridges	Average Bridge Age
Campbell	8	46
Cupertino	7	54
Gilroy	11	26
Los Altos	4	72
Los Altos Hills	5	32
Los Gatos	5	49
Milpitas	17	39
Monte Sereno	1	48
Morgan Hill	4	39
Mountain View	13	42
Palo Alto	32	49
San Jose	155	43
Santa Clara	32	46
Saratoga	19	58
Sunnyvale	12	45
County of Santa Clara	160	57
Total	483	47

Source: Caltrans, *Structure Maintenance & Investigations Report*, February 2013.

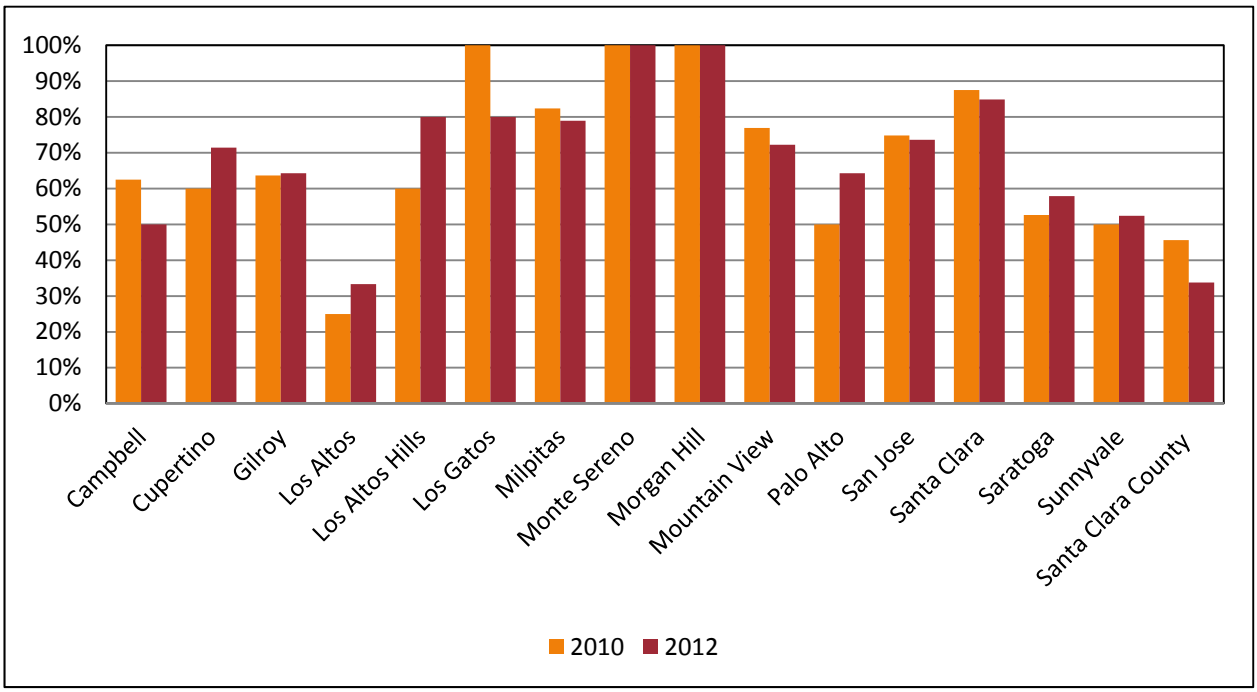
The Federal Highway Administration uses a bridge sufficiency rating system to determine the degree to which bridges in the U.S. are sufficient to remain in service. The rating is based on bridge inspections that are performed every two years. Bridges that have a sufficiency rating less than or equal to 80 qualify for federal bridge rehabilitation funds.

For the purposes of the TSMP, bridges in good condition are defined as bridges with sufficiency rating greater than 80 points. Figure 3.11 below summarizes the condition of bridges in Santa Clara County from 2009 to 2010.

The percentage of local bridges in “Good” condition in 2012 decreased slightly by 2% to 60% compared with 64% of bridges assessed the same condition in 2009. It can be anticipated that as the bridge structures continue to age, work and resources to maintain them to good condition levels will increase in the future.

Figure 3.11 Percent of Bridges in Good Condition by City/Town (SR>80)

Sources: Caltrans, *Structure Maintenance & Investigations Report*, February 2013, *California Statewide Local Streets and Roads Needs Assessment Final Report*, January 2013.



Bridge Sufficiency Rating

A bridge sufficiency rating includes a multitude of factors inspection results of the structural condition of the bridge, traffic volumes, number of lanes, road widths, clearances, and importance for national security and public use, to name just a few.

The point calculation is based on a 0-100 scale and it compares the existing bridge to a new bridge designed to current engineering standards. Bridges are considered structurally deficient if significant load carrying elements are found to be in poor condition due to deterioration or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to point of causing intolerable traffic interruptions. Every bridge constructed goes through a natural deterioration or aging process, although each bridge is unique in the way it ages.

The fact that a bridge is classified under the federal definition as "structurally deficient" does not imply that it is unsafe. A structurally deficient bridge, when left open to traffic, typically requires significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. To remain in service, structurally deficient bridges are often posted with weight limits to restrict the gross weight of vehicles using the bridges to less than the maximum weight typically allowed by statute. To be eligible for federal aid the following is necessary (a local match is required):

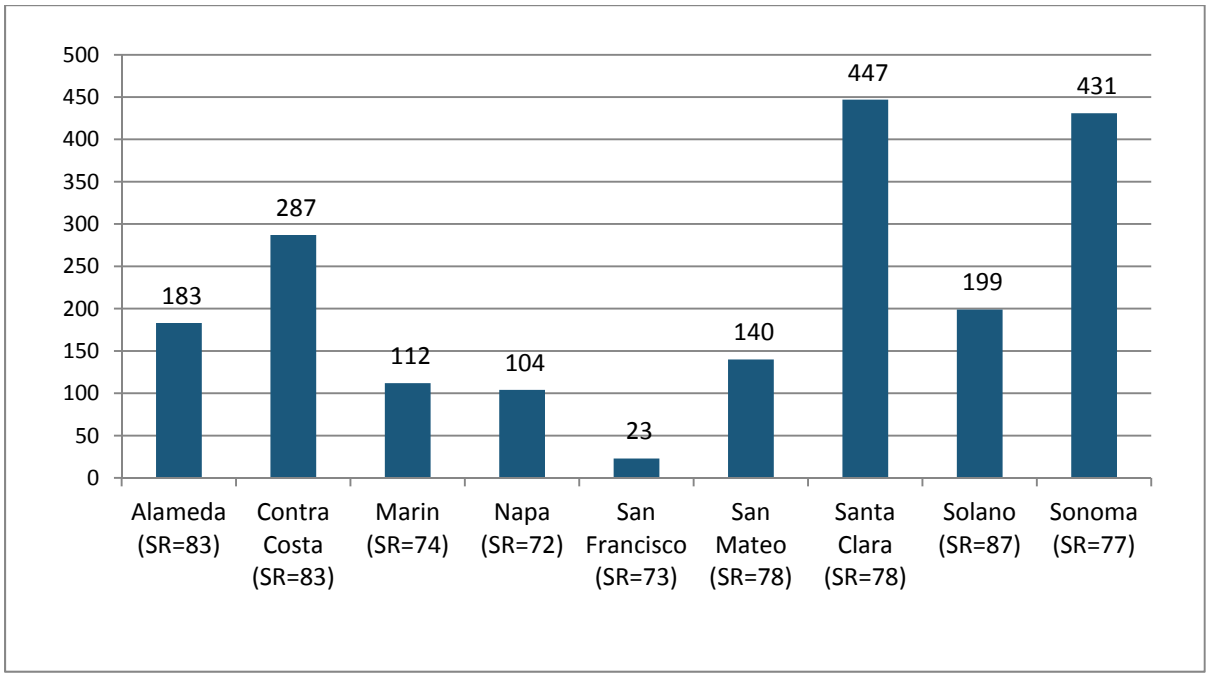
- *Replacement:* bridge must have a sufficiency rating of less than 50 and be either functionally obsolete or structurally deficient.

- *Repair:* bridge must have a sufficiency rating of less than 80 and the jurisdiction is prevented from using any additional federal aid for 10 years.

Peer County Comparison

There are approximately 1,096 bridges maintained by local agencies in the San Francisco Bay Area. In comparison with the other counties in the Bay Area, Santa Clara County has the most number of local bridges with 447 bridges with an average SR of 78. Sonoma County has the second most number of local bridges with 431 bridges with an average SR of 77. Figure 3.12 below illustrates the number of local bridges within each county.

Figure 3.12 Bridge Inventory and Average Sufficiency Rating by County



Source: Caltrans, *Structure Maintenance & Investigations Report*, February 2013, California Statewide Local Streets and Roads Needs Assessment Final Report, January 2013. Note that there is some discrepancy in reporting inventory of transportation assets when referring to multiple data sources.

Figure 3.12 also shows the following: 1) that there are more bridges in Santa Clara County than in any other Bay Area counties, 2) the bridges in Santa Clara County are on average newer than bridges in other counties, and 3) the bridges in Santa Clara County are in slightly better condition than bridges in other counties.

3.5 FREEWAYS, INTERSECTIONS AND EXPRESS LANES

Santa Clara County has been and continues to make investments to its freeway and highway systems such extending carpool or high occupancy vehicle (HOV) lanes, rebuilding outdated interchanges,

building express lanes, and installing ramp metering to improve mobility within the county. One way to measure the effects of these improvements is to monitor the traffic conditions on these roadway facilities on a periodic basis.

VTA, as a congestion management agency for Santa Clara County, routinely monitors the traffic conditions of its freeways annually and its Congestion Management Program (CMP) intersections biannually. VTA has been monitoring its CMP roadway and intersection facilities since 1997, when the CMP for Santa Clara County was established. For the purpose of the TSMP report, the year 2000 is used as the starting base year.

Table 3.15 presents the number of freeway lane miles in Santa Clara County by lane use and number of CMP intersections monitored. The two lane uses are general purpose lanes and HOV lanes. There are approximately 860 mixed-flow or general purpose lane miles of freeways and 170 HOV lane miles in Santa Clara County. As part of the CMP network, VTA also monitors 252 major intersections. These intersections are monitored every two years.

Table 3.14 Freeway and Intersections Inventory

Category	Facilities
Freeway General Purpose Lanes	860 lane miles
Freeway High Occupancy Vehicle (HOV) Lanes	175 lane mile
CMP Intersections	252

Source: VTA, *2012 Annual Monitoring & Conformance Report*, May 2012.

To describe the traffic conditions of the freeways and intersections, a scale from A to F (with A representing free flow moving traffic or minimal delays at signalized intersections and F representing "stop and go" traffic or significant delays at intersections) is used based on the motorist perception. This scale is called Level of Service (LOS).

The standard LOS for Santa Clara County is LOS E, which represents traffic moving at the capacity of the freeways and intersections. Traffic flows on the freeways at LOS E are extremely unstable with little or no usable gaps between vehicles and delays at signalized intersections are approximately 1 to nearly 1 ½ minutes. These conditions typically occur during the AM and PM peak commute hours of the day. The LOS scales for both the freeways and intersections are provided in Tables 3.15 and 3.16

For the purpose of the TSMP, LOS C or better is used as a baseline to measure the traffic conditions on the freeways and at the intersections. The reason for this is that LOS C represents when the traffic conditions begin to deteriorate or become unstable. Also, by monitoring from LOS C instead of LOS E, there is more sensitivity in observing fluctuations or changes in traffic conditions at this level within the LOS scale.

Figure 3.13 illustrates traffic conditions of the freeway general purpose and HOV lanes and CMP intersection network in which traffic moves freely throughout the entire day for both the AM and PM peak periods at LOS C or better from years 2000 to 2012.

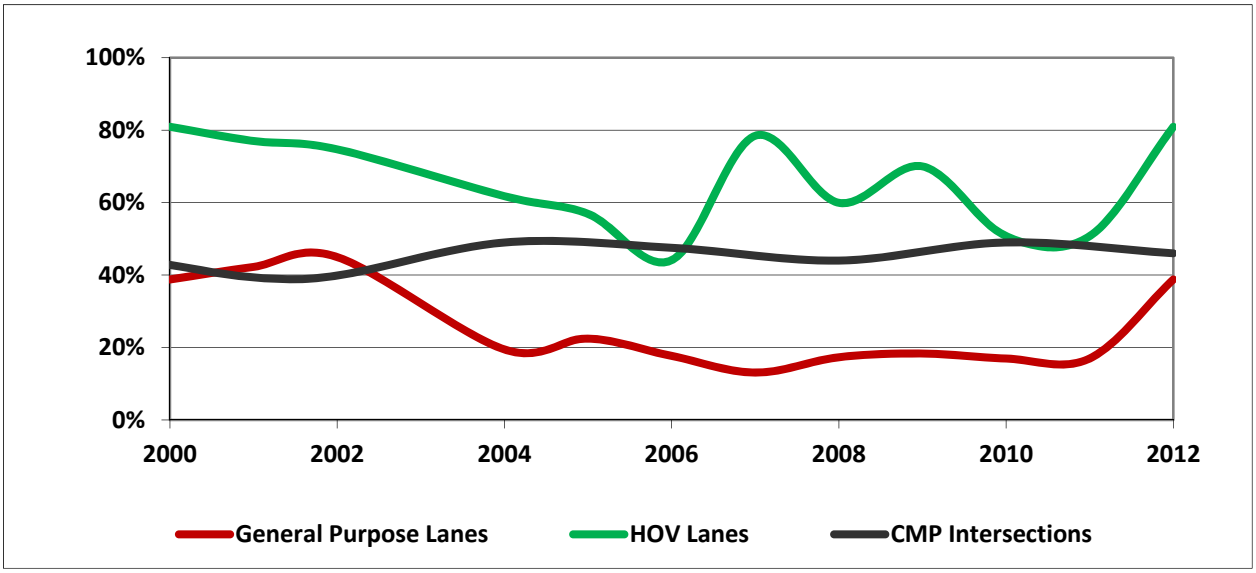
Freeway General Purpose Lanes

Figure 3-13 shows a general trend of percent of traffic moving freely from 2000 to 2012 in the general purpose lanes. Over the last 10 years, there has been a downward trend in the percentage of vehicle

traffic in the general purpose lanes moving at LOS C or better from 39% to 17%. There are many variables that affect traffic conditions. This trend could be the result of an increase of vehicles on the freeway system moving at LOS D or below, operational improvements on the freeway, economic conditions, or a combination of the three scenarios.

As for changes from 2009 to 2010, there was a minimal change of -1% in the traffic conditions in the general purpose lanes moving freely.

Figure 3.13 Percent of Freeways and Intersections with Traffic Moving Freely



Source: VTA, 2012 Annual Monitoring & Conformance Report, May 2012.

As for the performance of the CMP intersections (dark blue line), the cut-off used to define "free flow" conditions was LOS C, with the highest average delay being 35 seconds. Figure 3.13 shows that the percentage of CMP intersections operating "free flow" in both commute periods being relatively flat, fluctuating between about 40 and 50 percent. Conversely, this means that more than half of the intersections had conditions that were not free flow for an average workday over the period of 2000 to 2010. Between 2010 and 2012, the percentage of intersections operating at "free flow" decreased by 2% indicating that that there was increase in delays and perhaps an increase in economic activity or more people driving.

Freeway High Occupancy Vehicle (HOV) Lanes

The operations of HOV lanes in the Bay Area are unique in that drivers, including violators, are free to enter and exit these lanes at any time without restricted access. This type of traffic operations can cause unpredictable traffic conditions on when and where drivers enter and exit the HOV lanes and when and where traffic congestion occurs along the freeway system, especially during the AM and peak commute periods.

From 2010 to 2012, there was an upward trend of 2% in the percentage of vehicles moving at LOS D or better compared to the downward trend between 2000 to 2010, where vehicle traffic in the HOV lanes moving at LOS D or better decreased from 81% to 51%. These changes could be due to the same reasons for the similar situation that occurred with the general purpose lanes in the same period or when the aerial observation photos were taken.

VTA monitors level of service (LOS) on freeways by using aerial photography to collect vehicle density data. Density is measured by counting the number of vehicles along the freeway segments from the aerial photographs. The photo that displays the greatest vehicle density for each freeway segment is considered to represent the peak period and selected for analysis to estimate the traffic condition and LOS. The use of aerial photos is intended to provide a snap shot of typical general traffic conditions so fluctuations in the data may occur from year to year. In theory, data collected over an extended period of time should present a reasonable average condition or trend on traffic conditions.

Table 3.15 CMP Freeway Level of Service Thresholds

Level of Service	Density (passenger cars/mile/lane)	Speed (miles/hour)
A	density $\leq$ 11.0	67.0 $\leq$ speed
B	11.0 < density $\leq$ 18.0	66.5 $\leq$ speed < 67.0
C	18.0 < density $\leq$ 26.0	66.0 $\leq$ speed < 66.5
D	26.0 < density $\leq$ 46.0	46.0 $\leq$ speed < 66.0
E	46.0 < density $\leq$ 58.0	35.0 $\leq$ speed < 46.0
F	58.0 < density	speed < 35.0

Source: VTA, *2010 Annual Monitoring & Conformance Report*, May 2011.

CMP Intersections

The LOS for intersections is based on average seconds of delay or average control delay. From a motorist's perception, this means the length of time it takes for a vehicle to pass through an intersection. Table 3.16 shows the LOS thresholds used for monitoring intersections. For TSMP purposes, LOS C or better is used as the base line for monitoring.

From 2000 to 2010, there was an increase of 6% of intersections operating at LOS C or better from 43% in 2000 to 46%. LOS C for CMP intersections in Santa Clara County is defined as motorists experiencing delays of 20 to 35 seconds. The average percent of CMP intersections operating at LOS C or better for the same time period was approximately 45%. This means that motorists waited an average of 35 seconds or less to pass through an intersection 45% of the time at any one of the 252 CMP intersections.

Table 3.16 CMP Intersection Level of Service Thresholds

LOS	Average Control Delay (seconds per vehicle)	Description
A	Delay ≤ 10 or less	Progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all.
B+	10 < delay ≤ 12	Good progression and/or sort cycle lengths. More vehicles stop than for LOS A, - causing higher average delays.
B	12 < delay ≤ 18	
B-	18 < delay ≤ 20	
C+	20 < delay ≤ 23	Higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
C	23 < delay ≤ 32	
C-	32 < delay ≤ 35	
D+	35 < delay ≤ 39	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progress, long cycle lengths, or high volume to capacity (V/C) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
D	39 < delay ≤ 51	
D-	51 < delay ≤ 55	
E+	55 < delay ≤ 60	This is considered to be the limit of capacity delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.
E	60 < delay ≤ 75	
E-	75 < delay ≤ 80	
F	Delay > 80	This is considered to be unacceptable to most drivers. This condition occurs with over-saturation (when arrival flow rates exceed the capacity of the intersection). Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

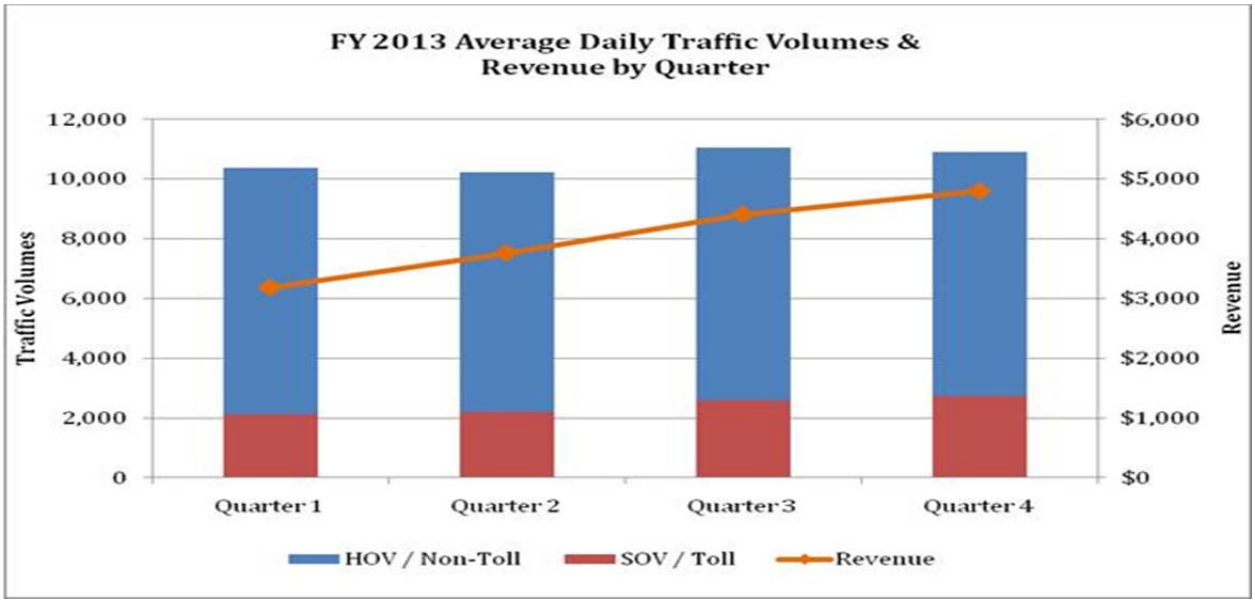
Source: VTA, *2010 Annual Monitoring & Conformance Report*, May 2011.

Express Lanes (New)

Express Lanes are a new component to the TSMP and to Santa Clara County's transportation network and infrastructure. The key benefits of express lanes include increased efficiency of the existing freeways by allowing solo drivers access to existing carpool lanes for a fee, provides reliable travel times and reinvests revenues collected from the fees back into to corridor that can be used for operations and maintenance costs, enforcement costs and transit improvements.

The SR 237 Express Lanes I-880 Connector opened for operations in March 2013 and was recognized by the California Transportation Foundation as the Project of the Year in May 2013. Figure ES.6 shows that the average daily trend in traffic volumes and revenues has steadily increased within the first year of operations since the opening of the express lanes. Since the opening of the Express Lanes, the average Single Occupant Vehicles (SOV) usage per day (red bar) increased from approximately 2,000 to 2,750 vehicles and average daily revenues (right column) increased from $3,200 to $ 4,800 during the hours of operations (AM: 5:00 to 10:00 a.m., PM: 3:00 to 7 p.m.). The TMSP will monitor and report on the condition and performance of the express lanes network in future reports as it continues to expand.

Figure 3.14 FY 2013 SR 237 Express Lanes Average Daily Traffic Volumes & Revenue



Source: *VTA SR 237 Express Lanes Annual Draft Report*, September 2013

3.6 BIKE MOBILITY

The vision for bike mobility in Santa Clara County is "to establish, protect and enhance bicycling as a viable transportation mode and to assure that bicycling is a practical and safe mode of travel, by itself and in combination with other modes."[1] In an effort to achieve this vision, VTA has developed a countywide bicycle plan that defines a county bike network composed of on-street bikeways, the county expressway system and off-street paths.

The Countywide Bicycle Plan identifies a list of projects that fill in the gaps along the planned bike corridors that connect Santa Clara County's 16 jurisdictions and adjacent counties' bicycle plans. The countywide bicycle plan also identifies needed Across Barrier Connections (ABCs) which enable bicyclists to conveniently and safely cross freeways, waterways and railroad tracks rather than make circuitous detours to existing roadway crossings. By significantly shortening the length of the trip, the construction of bridges and/or underpasses for non-motorized users also increases the probability that trips will be conducted by biking or walking.

For the purpose of the TSMP, the monitoring of planned bicycle projects compared with the number of miles and projects completed is used to measure the county's progress towards achieving its vision for bike mobility in Santa Clara County. **Tables 3.16** to **3.19** present the areas measured and the progress made through 2012 on the planned bike improvement identified in the 2008 Countywide Bicycle Plan.

[1] VTA Santa Clara Countywide Bicycle Plan, August 2008.

Tables 3.17 and 3.18 presents the number of planned and completed bicycle on and off street projects by miles. Bike on-street projects are bike projects along roadways shared with autos; and bike off-street projects are bike projects along trails or paths shared with pedestrians. From 2008 to 2012, approximately 67 miles of the on-street projects and 119 miles of off-street projects were completed. This represents a completion of 5% of planned on-street project miles and 10% of planned off-street project miles or a total of 57% and 45% respectively for both plans.

Table 3.17 Cross County Bike On-Street Projects

Cross County Bike Network-On-street	2008	2010	2012
Total length	514	584	584
Completed miles	263	325	330
Planned miles	251	259	254
Percent complete	51%	56%	**57%**

Source: VTA, *Santa Clara Countywide Bicycle Plan*, August 2008 with supplemental information from VTA Planning Department staff.

Table 3.18 Cross County Bike Off-Street Projects

Cross County Bike Network-Off-street	2008	2010	2012
Total length	682	813	813
Completed miles	242	361	365
Planned miles	440	452	448
Percent complete	35%	44%	**45%**

Source: VTA, *Santa Clara Countywide Bicycle Plan*, August 2008 with supplemental information from VTA Planning Department staff.

Table 3.19 Across Barrier Connection

	2008	2010	2012
Total Planned/Potential ABC's (CBP 2008)	115	115	115
Under Construction	3	1	0
Completed ABCs	0	3	6
Remaining to be completed	111	113	109
Percent complete	0%	**3%**	**5%**

Source: VTA, *Santa Clara Countywide Bicycle Plan*, August 2008 with supplemental information from VTA Planning Department staff.

Across barrier connections are connections that enable bicyclists to conveniently and safely cross freeways, waterways and railroad tracks rather than make circuitous detours to existing roadway crossings. From 2010 to 2012, 3 major ABC projects were completed: US 101/Tully Road overcrossing, San Jose, Permanente Creek Trail Extension Bridge (over US 101) and Stevens Creek Trail Bridge over SR 85 in Mountain View. This represents a modest (2% increase) but significant progress towards

expanding the region's bicycle network that includes the planned 115 ABC projects in Santa Clara County.

Table 3.20 Bike Lanes/Shoulders on Roadway Crossings (over/under barriers) Projects

	2008	2010	2012
Total Number of Bike Lane Projects	197	197	197
Under construction	1	1	0
Completed	0	1	2
Remaining to be completed	196	196	194
Percent complete	0%	1%	**1%**

Source: VTA, *Santa Clara Countywide Bicycle Plan*, August 2008.

Bike lanes/shoulders on roadway crossing (over/under barriers) project are project related to widening or restriping of roadways to accommodate bicycles. From 2008 to 2012, only 1 project out of a total of 197 planned projects (1%) were completed.

Table 3.21 Freeway Interchange Ramp Bike Modification Projects

	2008	2010	2012
Total Number of Freeway Ramp Modification Projects revisions (CBP 2008)	80	80	80
Under construction	0	0	0
Completed	0	0	1
Remaining Difficult ramps	80	80	79
Percent complete	0%	**0%**	**1%**

Source: VTA, *Santa Clara Countywide Bicycle Plan*, August 2008.

Freeway interchange ramp bike modification projects are improvements proposed at existing freeway on and off ramps to make crossing for bicyclists easier such as bicycle bypass lanes and curb extension that improve site distance for auto drivers to see bicyclists and reducing the length for bicyclist to cross at on/off ramp entries/exits. These projects are usually within the State right-of-way and require coordination with Caltrans. There are a total of 80 planned projects. To date, one project has been completed, the US 101/Tully Road Interchange Project in San Jose.

3.7 TRANSIT

Transit is another important transportation system component of Santa Clara County's transportation system infrastructure. There are two major transit services provided by VTA in Santa Clara County: bus service and light rail service. VTA also provides paratransit service, a special door-to-door service for individuals with specific needs. For the purpose of the TSMP, only the bus and light rail services are monitored. Table 3.22 below summarizes the transit inventory used to provide this service.

Table 3.22 Transit Inventory

Bus	
Vehicles	450
Routes	69
Coverage area (square miles)	326
Light Rail	
Routes	3
Rail miles	42
Stations	62
Vehicles	100

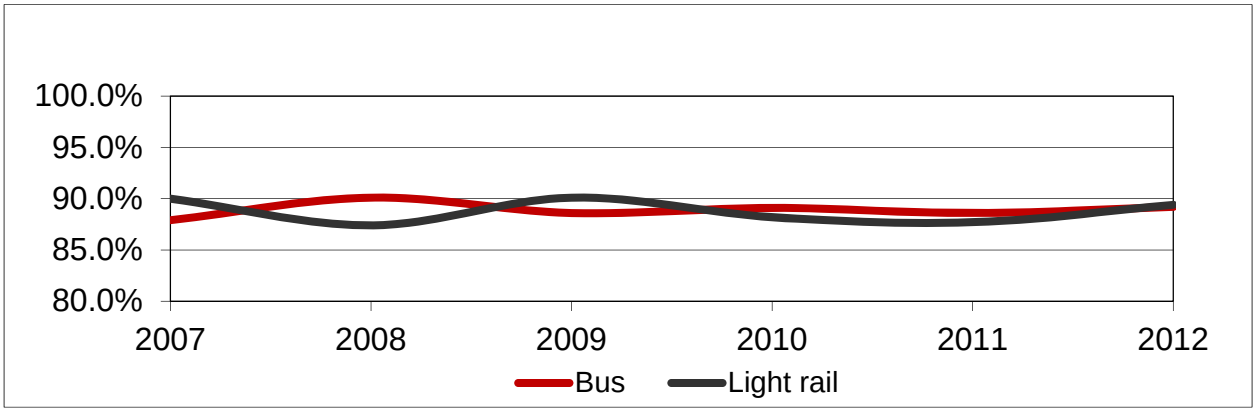
Source: VTA, *Transit Operation Performance Report, FY 2012 Annual Report*, September 2013

The TSMP covers two aspects of transit performance: quality of service provided and annual travel trips per person. These two measures are presented in Figures 3.15 to 3.16 from 2005 to 2012.

Figure 3.15 presents the percentage of on time performance for bus and light rail transit services. This measure tracks the reliability of transit vehicles departing or arriving at a location on time within five minutes of the scheduled time.

There are many external factors that can affect transit service, such as incidents related to auto traffic, roadway repairs or rehabilitation projects, and maintenance related to trackways along the light rail routes. From 2007 to 2012, the average on time performance for both bus and light rail services was 90%. From 2010 to 2012, the on time performance for bus service increased slightly by 0.6% to 89.2% and light rail service increased by 1.2% to 89.4% against a goal of 95%.

Figure 3.15 On Time Performance

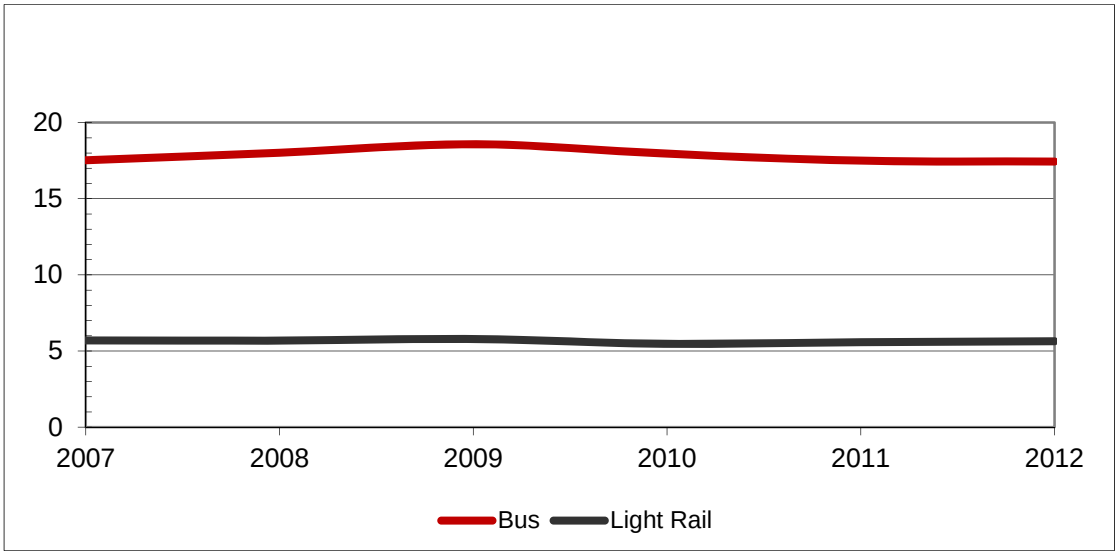


Source: VTA, *Transit Operation Performance Report, FY 2010 Annual Report*, October 2010.

Figure 3.16 presents the annual transit trips per person. This measure tracks the number of people using VTA's bus and light rail services. The number of annual trips per person is calculated by dividing the total number of annual boardings by the population in the county.

From 2005 to 2012, the number of annual transit trips per person has remained consistent between 17.3 to 18.0 for bus trips; however, for light rail, there was a steady increase of 3.3 to 5.6 annual trips per person. From 2009 to 2012, there was a slight decline of an average of 1.2% in transit trips for bus and 0.2% for light rail.

Figure 3.16 Annual Transit Trips per Person



Source: VTA, *Transit Operation Performance Report, FY 2010 Annual Report*, October 2010.

Peer County Comparison

There are 25 transit agencies that serve the Bay Area. To provide some context on the scale of VTA's transit system compared with other transit agencies, a comparison of selected transit agencies in size and operations is provided in Table 3.23.

Table 3.23 Comparison of Transit Agencies

Transit Agency	Primary County(s) Served	Square Miles	Population	Ridership per Capita	Active Transit Fleet (Bus, Ferry, Light Rail...)	Number of Routes
AC Transit	Alameda, Contra Costa	364	1,415,129	43.1	632	109
Golden Gate	Marin, Sonoma	160	815,000	10.3	201	48
Muni	San Francisco	49	824,525	270.0	5,051	74
Sam Trans	San Mateo	446	706,984	20.2	394	54
VTA	**Santa Clara**	**326**	**1,880,876**	**22.8**	**523**	**77**

Source: MTC, *Statistical Summary of Bay Area Transit Operators*, June 2012.

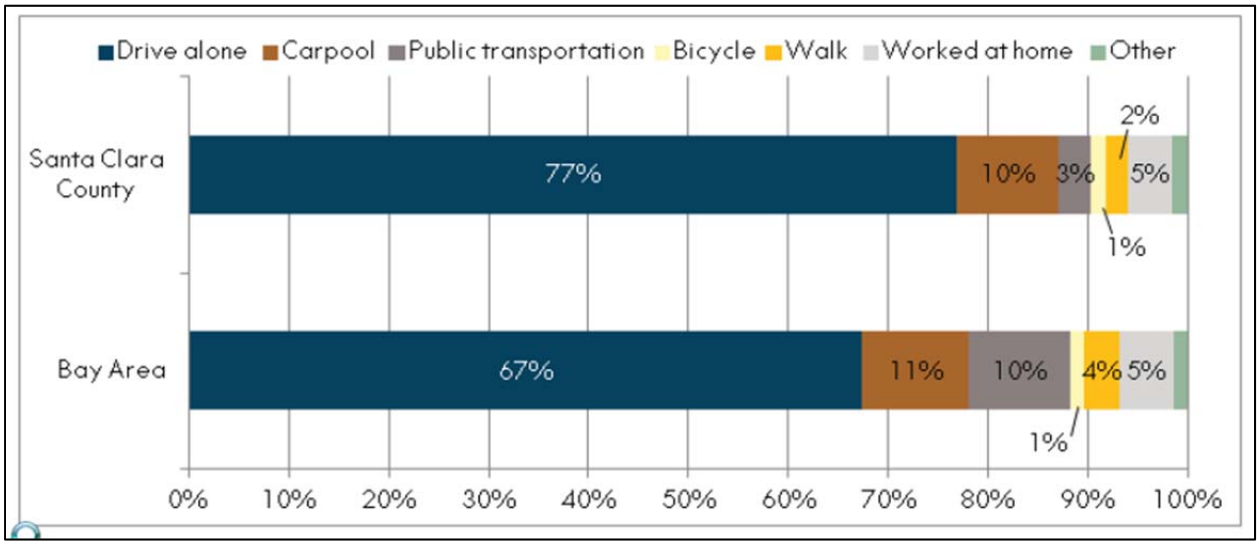
3.8 SUSTAINABILITY

There is a growing public desire to monitor progress towards sustainability. Although there are currently no standard measures for monitoring sustainability related to transportation established by regional public agencies, there is some data that could be used for this purpose.

Motor vehicles are the major source of air pollution for the Bay Area. The TSMP includes two measures related to air quality for monitoring in Santa Clara County: 1) Journey to Work Mode Splits and 2) Air Quality Infractions.

Figure 3.17 shows how residents of Santa Clara County commuted to work by mode in comparison to the rest of Bay Area. Over 75% of those surveyed indicated that they traveled alone to work, compared with Bay Area average of 67%. 10% of the commuters carpooled, 3% took public transit, 1% rode on bicycles, 2% walked to work and 5% worked from home (telecommuted). In general, Santa Clara County residents drive more in single occupant vehicles. This is not surprising considering the County's population, physical size, employment figures and number of registered vehicle owners compared with the eight other counties in the Bay Area as shown in Figure 3.18.

Figure 3.17 Journey to Work Mode Splits (Santa Clara County and Bay Area

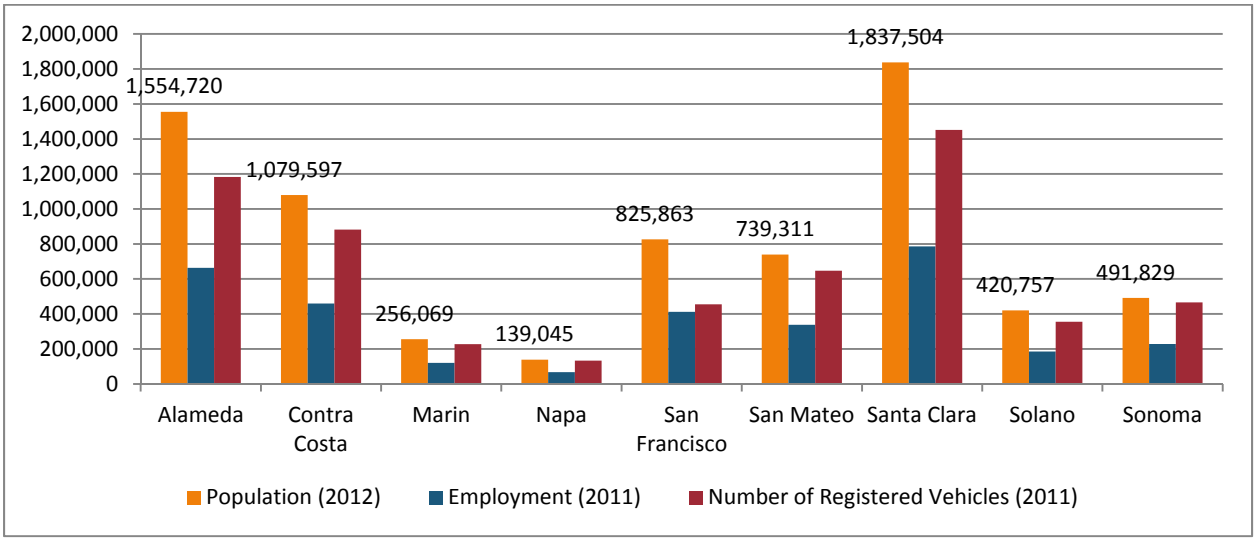


Source: Caltrans, *2008 California Motor Vehicle Stock, Travel and Fuel Forecast*, June 2009.

Note: The 2008 data presented here is based on a forecast from the 2008 California Motor Vehicle Stock, Travel and Fuel Forecast report as an updated report had not been published yet.

Peer County Comparison

Figure 3.18 Comparison of Population, Employment and Registered Vehicles



Sources: California Employment Development Department website 2011 data, California Department of Finance website, 2012 data, California City Finance website, Highway Users Tax Account 2011 data.

Another measure of environmental sustainability is the number of times an air quality monitoring station in the county records contaminant levels that exceed California standards for ozone, carbon monoxide, nitrogen dioxide, and particulate matter 10 (PM 10). Automobiles and trucks are a key source of all of these pollutants. Table 3.24 summarizes annual air quality infractions from 2005 to 2012. From 2009 to 2012, the average number of days per year that exceeded air quality standards was 14 days, a one 1 day improvement versus the average exceeded air quality standards of 15 days per year between 2005 and 2012.

Table 3.24 Air Quality Infractions

Air Quality Measures	2005	2006	2007	2008	2009	2010	2012
Ozone							
1-hr max	4	10	1	3	5	6	3
8-hr max	5	16	4	12	10	9	8
Carbon monoxide	0	0	0	0	0	0	0
Nitrogen dioxide	0	0	0	0	0	0	0
PM10	6	2	3	1	0	na	2
Number of recorded air quality infractions in Santa Clara County	**15**	**28**	**8**	**16**	**15**	**15**	**13**

Sources: Bay Area Air Quality Management District, *2011-2012 Bay Area Pollution Summary*, June 2011 and June 2012.

4.0 Potential Future Measures

4.1 Potential Future Enhancements

The TMSP is a flexible program designed to monitor areas of Santa Clara County's transportation system that is important to the local agencies. The areas monitored do not have to be restricted to the tangible assets of the transportation system. The areas monitored could include non-tangibles such as the progress of transportation planning projects and response times to public inquiries about roadway operational issues. This section describes opportunities for enhancing the TSMP.

Additional Measures

Since the 2011 TSMP Report, the 2013 included a few new additional measures such the average condition of bridges for all counties, average age of traffic signal controllers and performance of Express Lanes. Table 4.1 identifies potential measures that could be considered for future inclusion in the TSMP. In some cases these measures reflect further movement towards the state-of-the-art in performance monitoring. In others, they reflect an aspect of performance that more explicitly addresses the county's core objectives.

Table 4.1 Potential Future Measures

System Component	Potential Future Measures
Freeway mobility	• Travel time reliability (this measure reflects the amount of time travelers have to build into trip to ensure that they arrive at their destination on time)
Signals	• Frequency of traffic signal maintenance • Average age of equipment compared to expected life cycle • Response time to complaints/incidents
Pavement markings	• Condition based on visual inspections • Average age of pavement markings compared to estimated service life
Signs	• Condition based on visual inspections • Average age of signs compared to estimated service life
Light Poles	• Average age of equipment compared to estimated service life
Curb and gutter	• Condition based on visual inspection
Roadside litter management and graffiti	• Visual assessment by freeway corridors and addition of other corridors
Bicycle mobility	• Access to bike network (e.g., percent of population and jobs within a specified distance from a cross county bike facility)
Bus and light rail	• Access to transit service (e.g., percent of population and jobs within a specified distance from transit service)

System Component	Potential Future Measures
Sustainability	• Mode split (percent of trips that occur on transit vs. automobiles vs. bike/pedestrian modes) • Total carbon footprint from vehicles and transit
Transportation Planning Projects/Studies	• Progress of Project Initial Documents (PIDs) studies and other projects
Public inquires	• Tracking number of public inquiries and agency response times related to the roadways

Improve Condition Assessment of Roadside Assets

Table 4.1 illustrates that there is significant opportunity to improve the condition assessment of roadside assets. It recommends "condition based on visual inspection" for a number of assets. The state-of-the-art in this area was originally developed through the National Cooperative Highway Research Program (NCHRP). NCHRP project 14-12 introduced the concept of maintenance quality assurance as "planned and systematic actions needed to provide adequate confidence that highway facilities meet specified requirements. Such requirements are usually defined by the highway agency but are intended to reflect the needs and expectations of the user."[2] The performance assessment approach developed in that NCHRP research effort was based on the concept of maintenance "levels of service," or LOS. This approach could help in:

- Determining the LOS expectations the traveling public supports and is willing to pay for;
- Communicating to the public how agencies are meeting these expectations;
- Determining the additional funding needed to achieve the desired LOS;
- Developing a "priority strategy" to focus on key maintenance activities when funding is less than requested; and
- Achieve a more uniform LOS by identifying locations of excessively high or low maintenance.

Implementing an LOS approach would require the following activities:

- Establish a set of maintenance standards for roadside assets that define an acceptable level of service for each assets;
- Develop a condition survey to use for inspecting roadside assets;
- Conduct annual inspections of roadside assets at a randomly-selected set of locations; and
- Improve the tracking of expenditure levels for roadside assets.

2 M.L. Stivers, K.L. Smith, T.E. Hoerner, and A.R. Romine, Maintenance QA Program Implementation Manual, NCHRP Report 422, National Academy Press, Washington, D.C., 1999.

Develop Approach for Tracking Response Times

Responding to incidents or public inquires is an important function of any public agency. A potential future enhancement to the TSMP is the development of an approach for processing and tracking response times to roadway related incidents. One option for compiling these data is to centralize the handling of interagency incidents and public complaints. For example, all call or emails related to malfunctioning signals or lighting could be forwarded to a single location. The requests could then be recorded in a consistent manner and forwarded to the appropriate agency or municipality. After the request is addressed, it could be closed out. The time between receiving the request and the time in which it is closed out represents the "response time." In addition to enabling the county to compile response data in a consistent manner, this approach would improve overall customer service to the traveling public by providing a single point of contact for all of the riders' transportation-related concerns.

Conduct More Detailed Peer County Review

One of the overall goals of the TSMP is to provide a mechanism for benchmarking Santa Clara County against other Bay Area counties. The 2013 TSMP report includes Peer County Comparisons where data is available for the measures monitored. For example, Table 4.2 shows the distribution of population and jobs in the Bay Area. The table illustrates that 25% of the population and 24% of jobs in the Bay Area are in Santa Clara County.

Table 4.2 Population by County

	Population (2012)	Percent of Population	Jobs (2011)	Percent of Jobs
Alameda	1,554720	21%	663,300	20%
Contra Costa	1,079597	15%	459,300	14%
Marin	256,069	3%	120,000	4%
Napa	139,045	2%	67,800	2%
San Francisco	825,863	11%	412,400	13%
San Mateo	739,311	10%	337,600	10%
Santa Clara	1,837,504	25%	785,600	24%
Solano	420,757	6%	185,500	6%
Sonoma	491,829	7%	228,600	7%

Source: MTC

Table 4.3 shows the number of High Occupancy Vehicle (HOV) lanes and average speed by county. The speeds are shown for two peak periods – one in the AM and one in the PM. The table illustrates that Santa Clary County has by far the most HOV lanes in the region and that the average speeds on these roadways are higher the regional average.

Table 4.3 HOV Lanes by County in the Bay Area – 2011

County	Lane Miles of HOV Lanes	Average Speeds Peak Period
Alameda	72	62
Contra Costa	81	65
Marin	29	47
Napa	-	-
San Francisco	-	-
San Mateo	14	65
Santa Clara	176	63
Solano	17	65
Sonoma	39	63
TOTAL	428	59

Source: Caltrans, *2011 Bay Area HOV Lanes Report*

In conducting similar comparisons in other asset areas, data already collected could be leveraged between agencies if a standard reporting process is established. For example, Caltrans has extensive performance monitoring efforts. However, its reporting is typically done at the district level rather than the county level. In many cases, it may be possible for Caltrans to provide county comparisons of the assets which it maintains.

Appendix A – Performance Measures Details

The following tables provide more details on the measures recommended for use in the TSMP monitoring program. They include the following information for each measure: name, definition, description of what the measure indicates, steps required to calculate it, sources for the underlying data, recommended level of aggregation. All data required for these measures currently exist, as illustrated by the measure results presented throughout this report. Therefore, many steps in the derivation begin with "obtain" the necessary data items. The sources from which these data can be obtained are provided in the "data sources" section of the tables.

Measure	**1. Average pavement condition**
Definition	Very good/good/fair/poor/at risk/poor rating based on 3-year weighted average pavement condition index (PCI). PCI is standard measure of pavement condition used by all jurisdictions in the Bay Area.
Indicates	Indication of pavement condition, the future financial need for maintaining existing pavements, and the effectiveness of previous pavement investments.
Derivation	1. Obtain 3-year average PCI for each jurisdiction 2. Obtain lane miles for each jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county. 3. Define thresholds for very good/good/fair/etc. 4. Assign rating by comparing weighted average to thresholds.
Data sources	MTC state of system report
Aggregation	Report single number for the county.

Measure	**2. Percent of freeways with traffic moving freely**
Definition	Percentage of roadways operating at LOS A, B, or C for the entire day. At LOS A, B, and C, traffic can move relatively freely without significant delay.
Indicates	Indication of congestion levels, future financial needs and effectiveness of previous capital investments.
Derivation	*Freeways and rural highways* 1. Obtain LOS and directional miles by corridor. 2. Sum directional miles with an LOS of A, B, or C in both AM and PM peak periods. 3. Divide #2 by #1. Report as a percent. *Expressway interchanges* 1. Obtain percent in LOS A, B, and C. 2. Sum percents. Report as a percent.
Data sources	CMP database
Aggregation	Report for freeways – mixed, and freeways – HOV Report for expressway interchanges.

Measure	**3. Percent of bridges in good condition**
Definition	Percent of bridges with sufficiency rating (SR) greater than 80. Sufficiency rating is a standard federal measure used to evaluate whether bridges in the U.S. are sufficient to remain in service. Bridges that have a SR less than or equal to 80 qualify for federal bridge rehabilitation funds.
Indicates	Indication of bridge condition, future financial need for maintaining existing bridges and the effectiveness of previous bridge investments.
Derivation	1. Obtain total number of bridges. 2. Obtain total number of bridges with SR > 80. 3. Divide #2 by #1. Report as a percent.
Data sources	Local bridges - http://www.dot.ca.gov/hq/structur/strmaint/local/sr_local.pdf State bridges – Caltrans Pontis database (bridge maintenance management software)
Aggregation	Report single number for the county.

Measure	**4. Percent of signals in useful condition**
Definition	Percent of signal equipment that is within the useful lifespan and meets standards.
Indicates	Indication of signal condition and future financial need for maintaining existing signals.
Derivation	1. Obtain lane miles by jurisdiction. 2. Obtain percent of signals in useful condition by jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county.
Data sources	Self-assessment survey.
Aggregation	Report single number for the county.

Measure	**5. Percent of pavement markings in useful condition**
Definition	Percent of pavement markings that have been repainted or replaced within useful life (typical range is from 1 to 3 years).
Indicates	Indication of marking condition and future financial need for maintaining existing markings.
Derivation	1. Obtain lane miles by jurisdiction. 2. Obtain percent of markings in useful condition by jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county.
Data sources	Self-assessment survey.
Aggregation	Report single number for the county.

Measure	**6. Percent of signs in useful condition**
Definition	Percent of signs that have been replaced within useful life (ranges from 7 to 15 years).
Indicates	Indication of sign condition and future financial need for maintaining existing signs.
Derivation	1. Obtain lane miles by jurisdiction. 2. Obtain percent of signs in useful condition by jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county.
Data sources	Self-assessment survey.
Aggregation	Report single number for the county.

Measure	**7. Percent of light poles in useful condition**
Definition	Percent of light poles that have lighting circuitry (e.g., ballast and writing) that is within its useful like (ranges from 5 to 10 years) and look presentable (no peeling paint or exposed metal).
Indicates	Indication of light pole condition and future financial need for maintaining existing light poles.
Derivation	1. Obtain lane miles by jurisdiction. 2. Obtain percent of light poles in useful condition by jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county.
Data sources	Self-assessment survey.
Aggregation	Report single number for the county.

Measure	**8. Percent of curb and gutter in useful condition**
Definition	Percent of curb and gutter that is even, allowing water to flow down gutter.
Indicates	Indication of curb and gutter condition and future financial need for maintaining existing curb and gutter.
Derivation	1. Obtain lane miles by jurisdiction. 2. Obtain percent of curb and gutter in useful condition by jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county.
Data sources	Self-assessment survey.
Aggregation	Report single number for the county.

Measure	**9. Percent of roadside with virtually no or some litter**
Definition	Same as name.
Indicates	Indication of roadside condition and future financial need for maintaining roadside.
Derivation	1. Obtain lane miles by jurisdiction. 2. Obtain percent of roadside with virtually no or some litter by jurisdiction. 3. Use #1 and #2 to calculate a weighted average for the county.
Data sources	Self-assessment survey.
Aggregation	Report single number for the county.

Measure	**10. Visual assessment of litter control and landscape maintenance on the freeways**
Definition	Assessment on cleanliness and aesthetics of freeways in the county
Indicates	Indication of cleanliness and proper maintenance of landscape along the freeways
Derivation	1. Obtain centerline or lane miles of freeways 2. Use litter and landscape assessment scale identified in Litter and Landscape Maintenance Study for Freeways in Santa Clara County report. 3. Conduct field inspection of freeways and document conditions using photos.
Data sources	Field inspection surveys and photos
Aggregation	Report single number for assessment of litter and one number for landscape maintenance for County.

Measure	**11. Percent of on and off cross county bike network completed**
Definition	Percent length of planned cross county bike corridors that are open to the public.
Indicates	Indication of increased access to bike/pedestrian facilities and improved mode choice.
Derivation	1. Obtain total length of planned bike corridors. 2. Obtain length of existing bike corridors. 3. Divide #2 by #1. Report as a percent.
Data sources	Countywide Bicycle Plan and VTA Planning
Aggregation	Report single number for County.

Measure	**12. Percent of planned across barrier connections completed**
Definition	Percent of planned across barrier connections that are open to the public.
Indicates	Indication of increased access to bike/pedestrian facilities and improved mode choice.
Derivation	1. Obtain number of existing adequate barriers. 2. Obtain number of planned ABCs. 3. Divided by #1 by sum of #1 and #2. Report as a percent.
Data sources	Santa Clara County Wide Bicycle Plan and VTA Planning
Aggregation	Report single number for county.

Measure	**13. Transit on-time performance**
Definition	Percent of time in which transit vehicles arrive at destination within 5 minutes of scheduled time.
Indicates	Indication of service reliability and potential customer satisfaction with transit mode.
Derivation	1. Obtain percent on-time for bus service and light rail service.
Data sources	VTA Short Range Transit Plan
Aggregation	Report for bus and light rail.

Measure	**14. Percent of planned transit service provided**
Definition	Percent of planned bus and light rail service provided.
Indicates	Indication of service reliability.
Derivation	1. Obtain percent of planned service provided for bus and light rail.
Data sources	VTA Short Range Transit Plan
Aggregation	Report for bus and light rail.

Measure	**15. Transit trips per person**
Definition	Number of annual transit boardings per person living in Santa Clara County.
Indicates	Indication of transit usage and customer satisfaction with transit service.
Derivation	1. Obtain number of annual boarding riders. 2. Obtain population. 3. Divide #1 by #2. Report as an integer.
Data sources	Annual boarding - VTA Short Range Transit Plan Population - Santa Clara County Planning Office
Aggregation	Report for bus and light rail.

Measure	**16. Remaining service life of transit vehicles**
Definition	Percent of transit vehicle useful life remaining, where useful life is defined as the age at which a vehicle is eligible for replacement.
Indicates	Surrogate for condition of transit fleet and indication of future financial needs.
Derivation	1. Obtain age of bus and light rail vehicles. 2. Define expected life estimates for buses and light rail vehicles. 3. For each vehicle, calculate percent of useful life remaining, this is equal to 1 - (age/expected life) 4. Calculate average of #3. Report as a percent.
Data sources	VTA Short Range Transit Plan
Aggregation	Report for bus and light rail.

Measure	**17. Vehicle miles traveled per person**
Definition	Average vehicle miles traveled per person living in Santa Clara County.
Indicates	Indication of the extent of vehicle travel in the county and mode choice.
Derivation	1. Obtain vehicle miles traveled (VMT) data. 2. Obtain population. 3. Divide #1 by #2. Report as an integer.
Data sources	VMT - California Motor Vehicle Stock, Travel and Fuel Forecast Population – Santa Clara County Planning Office
Aggregation	Report single value for county.

Measure	**19. Number of recorded air quality infractions**
Definition	Number of times that one of the air quality monitoring stations in the county recorded contaminant levels that exceed California standards for ozone, carbon monoxide, nitrogen dioxide and particulate matter 10. Vehicles are a key source of all of these contaminants.
Indicates	Indication of the impact of transportation system usage on the environment.
Derivation	1. Obtain number of times that the readings at the following stations exceed California standards for 1-hour maximum ozone, 8-hour maximum ozone, carbon monoxide, nitrogen dioxide, and PM10 – Gilroy, Los Gatos, San Jose Central, San Martin and Sunnyvale. 2. Sum values to get a total number of infractions.
Data sources	Bay Area Air Quality Management District's Annual Bay Area Air Quality Summaries
Aggregation	Report single value for county.

Measure	**20. Percent of journey to work mode splits**
Definition	Percentage of travelers using a particular type of transportation such as by way of autos, bicycle, trucks, walking, public transit. This can also include boats and planes.
Indicates	Indication of the mode shift between autos and non-motorized modes and impact of transportation system usage on the environment.
Derivation	1. Obtain estimated percentage of modal split
Data sources	US Census Journey to Work surveys
Aggregation	Report single value for county.

Appendix B – Caltrans FY 2011 Maintenance Level of Service District 4 Report

Appendix C – Roadside Asset Self-Assessment Survey

Roadside Asset Condition Self-Assessment Survey

1. Contact Information

Name: Title:

Phone Number: Email:

2. Self-Assessment Survey

Please fill in blue cells. (Click on blue cells)

Jurisdiction (Choose from pull-down menu)	Choose an item.	
Roadside Assets Condition	**Percent of Assets in Useful Condition [1] (0 - 100%)**	**Level of Accuracy [2] (Accurate - Informed Estimate - Guess)**
1. **Signal Equipment** – Provide percentage of signal equipment that is within the useful lifespan and meets current visibility and safety standards		Choose an item.
2. **Pavement Markings** – Provide percentage of pavement markings that have been repainted or replaced within useful life (ranges from 1 to 3 years)		Choose an item.
3. **Signage** – Provide percentage of signs that have been replaced within useful life (ranges from 7 to 15 years)		Choose an item.
4. **Light Poles & Circuitry** – Provide percentage of light poles that have lighting circuitry (e.g. ballasts and wiring) that is within its useful life (ranges from 5 to 10 years) and look presentable (no peeling paint or exposed metal)		Choose an item.
5. **Curb & Gutter** – Provide percent of curb and gutter that is even, allowing water to flow down gutter		Choose an item.
6. **Roadside Litter Management** – Provide percent of roadside with virtually no or some litter (any litter could be quickly collected by one or two individuals)		Choose an item.

Notes:

1. Percent of Assets in Useful Condition (0-100%) – This data inquiry is designed to ascertain the operating condition and needs of the road side assets. For example, a response of 25% means that 25% of specific type of equipment deployed is working within the equipment's life cycle and the remaining 75% of the equipment is operating beyond its life cycle and may need replacement.

2. Level of Accuracy – This is a request for the respondent to provide a level of accuracy of the data being provided.

- **Accurate** – Data is documented and traceable
- **Informed Estimate** – Based on general knowledge
- **Guess** – Based on limited knowledge

Please fill in blue cells. (Click on blue cells)

Agency Ability to Maintain Roadside Assets [1]	**Ability Level** [2] **(Good – Fair – Poor)**
7. Signal Equipment – Rate ability to maintain and operate signal equipment in working order.	Choose an item.
8. Pavement Markings – Rate ability to maintain pavement markings.	Choose an item.
9. Signage – Rate ability to maintain roadside signs.	Choose an item.
10. Light Poles & Circuitry– Rate ability to maintain light poles.	Choose an item.
11. Curb & Gutter – Rate ability to maintain curbs & gutters.	Choose an item.
12. Roadside Litter Management – Rate ability to maintain roadsides with virtually no or some litter.	Choose an item.

Notes:

1. Agency Ability to Maintain Roadside Assets – This data inquiry is designed to ascertain an agency's ability from a staffing resource viewpoint, to properly maintain the listed roadside assets in its jurisdiction to an acceptable level.

2. Ability Level – This rating refers to the agency's resource level to maintain its current roadside assets.

- Good – There are enough resources to routinely maintain the roadside assets.
- Fair – There is only enough resources to provide minimum maintenance on the roadside assets. Some maintenance work is being deferred.
- Poor – The roadside assets are maintained on an as needed basis.

Appendix D – Litter Control and Landscape Maintenance Visual Assessment Scales for Freeways

This appendix shows the photographs portraying different levels of the litter and landscape scales described in Tables 3.7 and 3.8.

VISUAL STANDARD PHOTOS
No Litter

VISUAL STANDARD PHOTOS
Slightly Littered

VISUAL STANDARD PHOTOS
Littered

VISUAL STANDARD PHOTOS
Extremely Littered

VISUAL STANDARD PHOTOS
Attractive Landscape/Vegetation

VISUAL STANDARD PHOTOS
Decent Landscape/Vegetation

VISUAL STANDARD PHOTOS
Neglected Landscape/Vegetation

Appendix E – Bikeway Projects

This appendix includes a copy of Chapter 3 from VTA's 2008 Santa Clara Countywide Bicycle Plan. Chapter 3 describes bikeways project planning methodology and identifies on and off-street bicycle projects and across barrier connection projects discussed in Section 3.6 Bike Mobility of this report.

Acknowledgments

PARTICIPATING AGENCIES:

City of Campbell
City of Cupertino
City of Gilroy
City of Los Altos
Town of Los Altos Hills
Town of Los Gatos
City of Milpitas
City of Monte Sereno
City of Morgan Hill
City of Palo Alto
City of San Jose
City of Santa Clara
County of Santa Clara
City of Saratoga
City of Sunnyvale
California Department of Transportation (Caltrans District 4)
Santa Clara Valley Transportation Authority

VTA PROJECT STAFF

Eugene Maeda, Sr. Transportation Planner, Project Manager
David Kobayashi, Transportation Planner
Shanthi Chatdradhi, Transportation Engineer
Nicholas Yee, Student Intern
Adam Paranial, Student Intern
Murali Ramanujam, Transportation Engineering Manager
Casey Emoto, Deputy Director, Project Development