

Marin County CMP Transportation System Performance Monitoring Report - 2007

**Prepared for
The Transportation Authority of Marin
January 2007**

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Part II (Additional Work)

Part I

2007 Marin County CMP Transportation System Performance Monitoring Study

(Required Work)

1. Introduction

Background

PHA Transportation Consultants conducted a transportation system monitoring study and drafted this report on it for the Transportation Authority of Marin (TAM) in December 2006. The purpose of the report is to evaluate the current Marin County transportation system performance so that unacceptable conditions can be identified and remedial actions can be developed to mitigate the unacceptable conditions. This system performance monitoring report is conducted biannually as required by TAM, the designated Marin County Congestion Management Agency.

This monitoring report evaluated eight performance measures established in the Marin County Congestion Management Program. These performance measures are:

- Roadway Level of Service (PM Peak Hour LOS)
- Aggregate Peak Hour Travel Time
- Person Throughput
- Vehicle Mile Traveled in Congested Conditions
- Job Housing Balance
- Transit Frequency/Headway
- Transit Coordination
- Pedestrian & Bicycle Investment

It is important to note that of the above performance measures, only the “Roadway Level-of-Service” performance measure has an established minimum standard and requires mitigation if a roadway segment is found to be performing below the minimum standard as set forth in Marin County Congestion Management Program. However, there is an exception if the roadway segment condition was grandfathered-in as an “existing condition” prior to the inception of the CMP program. For other performance measures, no minimum standards had been set forth in the Congestion Management Program and the monitoring report focuses only on discussions of current cycle year activities without performance evaluation and ratings.

This monitoring report is organized in two parts. Part 1 consists of nine sections. Section 1 is the introduction. Sections 2 through 9 are discussions of monitoring results of each of the above performance measures.

Part 2 consists of additional work requested by TAM that is not required as part of this biannual monitoring report, but was requested by TAM in order to provide a more comprehensive analysis of the County’s transportation system. The additional work consists of a.m. peak hour roadway segment LOS analyses, weekend vehicle traffic counts, bicycle counts, and pedestrian counts on selected roadway segments, intersection LOS analysis, and freeway weaving analysis of freeway segments.

2. Roadway Level Of Service

Marin County CMP Study Roadway Segments

The Marin County Congestion Management Program has designated a network of roadways that are considered critical for regional traffic circulation. This roadway network includes freeways, highways, and urban arterial streets that provide regional access. Table 1 and Figure 1 show a brief description of the designated CMP roadway network monitoring locations in terms of segment length, limits, and minimum Level-of-Service (LOS) standards. Monitoring is required for p.m. peak period only as traffic volume generally is higher in the afternoon commute hours. A deficiency plan must be developed if a roadway segment is found to be operating below the minimum LOS standard (LOS D for urban and rural arterials, and LOS E for freeway and expressway), unless it had been grandfathered-in before the inception of the CMP in 1991.

Table 1 Marin County CMP Monitoring Study Roadway Segments Marin County CMP Transportation System Performance Monitoring Study -2007						
	Segment	From	To	Length	Min. LOS Standard	GF
1	State Route 1	SFD	Pt. Reyes	2.1	D	N
2	US 101	Atherton	Sonoma County Line	2.3	E	Y
3	Novato Bl	San Marin	Eucalyptus	0.4	D	N
4	S. Novato Bl.	Sunset Pkwy	US 101	1.5	D	N
5	SR 37	US 101	Atherton	2.5	E	N
6	Bel Marin Keys Bl.	US 101	Commercial	0.3	D	Y
7	US 101	Freitas Pkwy	Lucas Valley	0.9	E	Y
8	US 101	Mission	N. San Pedro	1.7	E	Y
9	SFD Bl	San Anselmo	Red Hill	1.1	D	Y
10	Red Hill	SFD	Hillsdale	0.4	D	N
11	US 101	I-580	Mission	1.1	E	Y
12	SFD Bl	College	Wolfe Grade	0.6	D	Y
13	US 101	SFD	I-580	1.3	E	Y
14	I-580	Bellam	S FD	1.4	E	Y
15	I-580	SFD	R-S Bridge	0.6	E	N
16	E. SFD Bl	US 101	E. Larkspur Landing	0.5	D	Y
17	US 101	SR 131	Paradise	1.8	E	Y
18	SR 131	Redwood Frontage	Strawberry	0.5	D	N
19	SR 1	Northern	Alamonte	0.9	D	Y
20	Bridgeway Bl	Gate 5	Gate 6	0.2	D	N
21	US 101	North of GG	Spencer	2.0	E	N
22	SFD Bl	Butterfield	Willow	0.3	D	Y
23	SFD Bl	College	Toussin	0.3	D	Y
24	Novato Bl	Grant	Diablo	0.7	D	N

Source: Transportation Authority of Marin, 2005 Marin County CMP Monitoring Report.
 Min. LOS Standard: Minimum roadway LOS standards adopted in the Marin County Congestion Program.
 GF: Grand-fathered

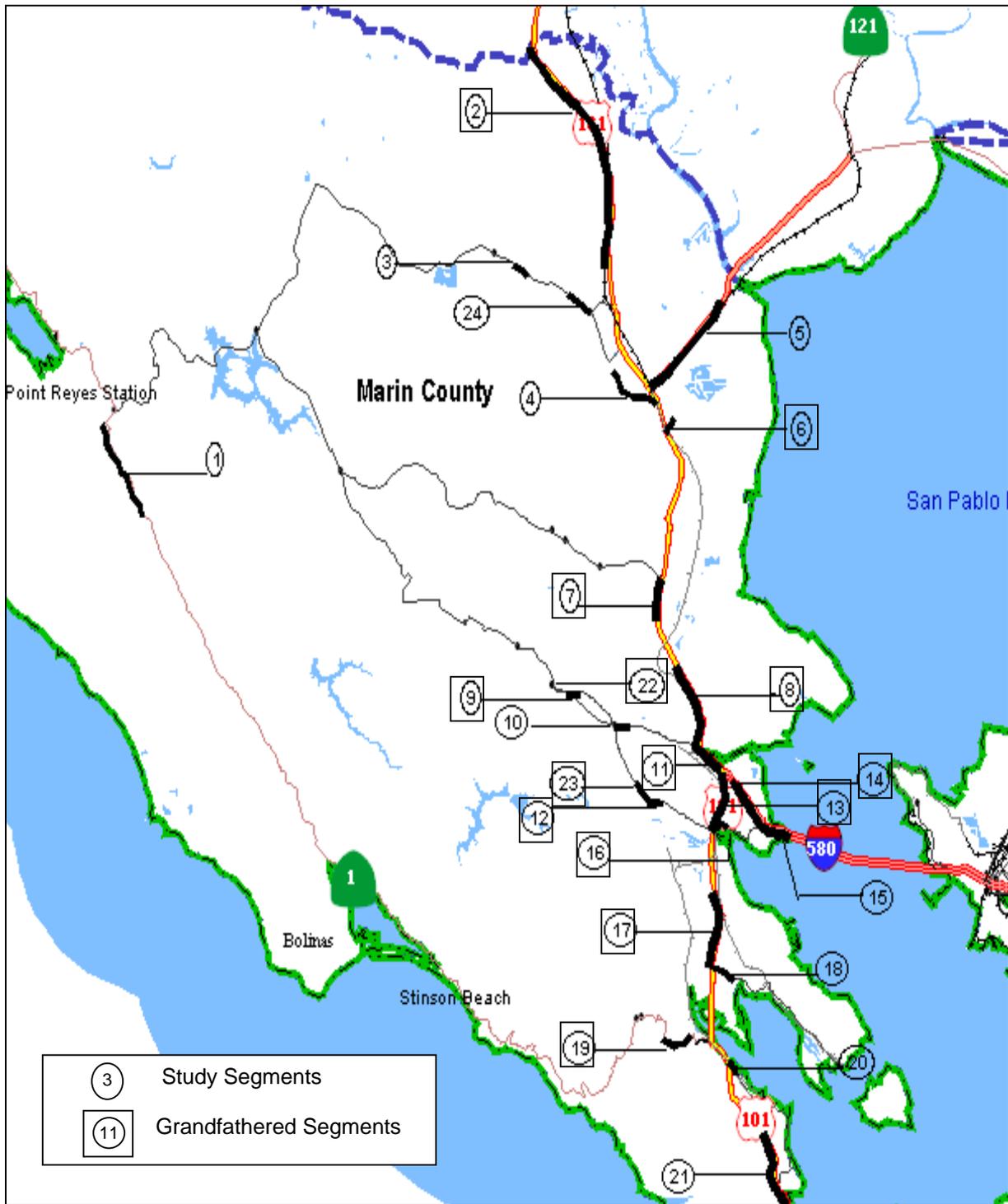


Figure 1 Marin County CMP Monitoring Study Roadway Segment Map
Marin County CMP Transportation System Performance Monitoring Study -2007

Evaluation Methodology and Criteria

In the past, roadway segment LOS was determined using the volume-to-capacity (V/C ratio) method, where peak hour vehicle traffic volume counted at a point along a roadway segment is divided by the hourly lane capacity for the segment. The resulting V/C ratio was then translated into one of the six LOS categories (LOS A –F) based on LOS levels adopted in the 1991 Marin County Congestion Management Plan. This method calculates the V/C ratio based on traffic volumes (counts) collected in the field and a pre-determined set of roadway capacities. Unfortunately, under congested traffic conditions, traffic speed would generally become slow and as a result, a much smaller traffic volume would be recorded. As a result, dividing a much smaller traffic volume by a pre-determined set of roadway capacities would yield a lower V/C ratio and a better than expected LOS. Further, traffic counts collected at one single point along a long segment of roadway often are not reflective of traffic conditions for the entire length of the roadway segment.

This year, a “floating car” method was used to record the running time it takes to travel along the study segment. In the floating car method, a surveyor repeatedly drives through the study segment, traveling at the same speed as other cars on the road, staying within the speed limit, to gauge actual running time in traffic. The running time was converted into speed to determine roadway segment LOS based on a set of pre-determined speed criteria. This method is a better measurement of roadway segment LOS as it takes into consideration intersection delays, signal delays, acceleration, deceleration, and all other delays due to traffic congestion and backups along the segment. A more detailed description of these methods is discussed in the Highway Capacity Manual 1985 and 2000. For this monitoring study, a total of three floating car runs were conducted in both directions of each study roadway segment to determine the average speed for the subsequent LOS ranking. Table 2 shows the roadway segment LOS criteria for both urban streets and freeway segments.

Table 2 Roadway Segment LOS Criteria				
Marin County CMP Transportation System Performance Monitoring Study -2007				
LOS	Basic Freeway Segment Travel Speed (mph)	Major Arterial Segment Travel Speed (mph)	Basic* Freeway (V/C)	Major* Arterial (V/C)
A	>60	>25	0.35	0.60
B	57 - 60	20 -25	0.54	0.70
C	54 - 56	13 - 19	0.77	0.80
D	47 - 53	10 - 13	0.93	0.90
E	30 - 46	7 - 9	1.00	1.00
F	<30	<7	>1.00	>1.00

Source:
 1985 Highway Capacity Manual Special Report 209, 2000 Highway Capacity Manual
 *LOS criteria used in previous monitoring study (2005). Traffic volumes were collected at one point along the roadway segment, then divided by a predetermined roadway capacity to arrive at a V/C ratio.

Roadway Segment LOS Analysis Results

Table 3 summarizes current cycle year roadway segment LOS. Figure 2 and 3 illustrate current year LOS results against the minimum LOS standards graphically. As shown, a total of five (5) roadway segments (four freeway/highway segments and one arterial segment) performed below the minimum acceptable standards as established in the Marin County CMP.

Required Mitigation

As discussed earlier, deficiency plans are required for roadway segments with a LOS ranking below the established minimum standards (D for arterial streets and E for freeway and expressway). Table 4 shows study segments currently performing below the minimum standards and recommended actions.

It is important to note that of the six roadway segments that performed below the established standards, five had been grandfathered and as such no deficiency plans or other actions are required. For roadway segment 15, I-580 (between Sir Francis Drake Boulevard and Richmond-San Rafael Bridge), no deficiency plan or other action is recommended because the LOS F is likely the result of bridge reconstruction work that took place in October and November in 2006 while traffic data were being collected for the monitoring study. The roadway segment LOS is expected to return to acceptable conditions once the bridge reconstruction work is complete.

Historic Trend

Table 5 shows study roadway segment LOS over time. As shown, some roadway segment LOS varies over time. This could be the result of several factors such as traffic fluctuations, diversions, construction activities, roadway widening, or other transportation system management (TSM) projects such as vanpool, carpool, and increased use of public transit. For example, while traffic data were being collected for this monitoring report in October and November 2006, there was construction activity on the Richmond-San Rafael bridge which may have contributed to the LOS F ranking for roadway segment 15 (I-580 between Sir Francis Drake Boulevard and the bridge). Construction activities are now complete and the traffic LOS is expected to improve.

In 2007, a new set of LOS analysis methodology and evaluation criteria is used, resulting in more variations in roadway segment LOS. The new methodology, which evaluates traffic conditions based on travel time and speed along the entire length of the study segment, is a better measurement of traffic LOS since it reflects roadway conditions for the entire segment rather than a single point where traffic data were being collected.

Table 3 Study Roadway Segment Monitoring Results (PM LOS)
Marin County CMP Transportation System Performance Monitoring Study -2007

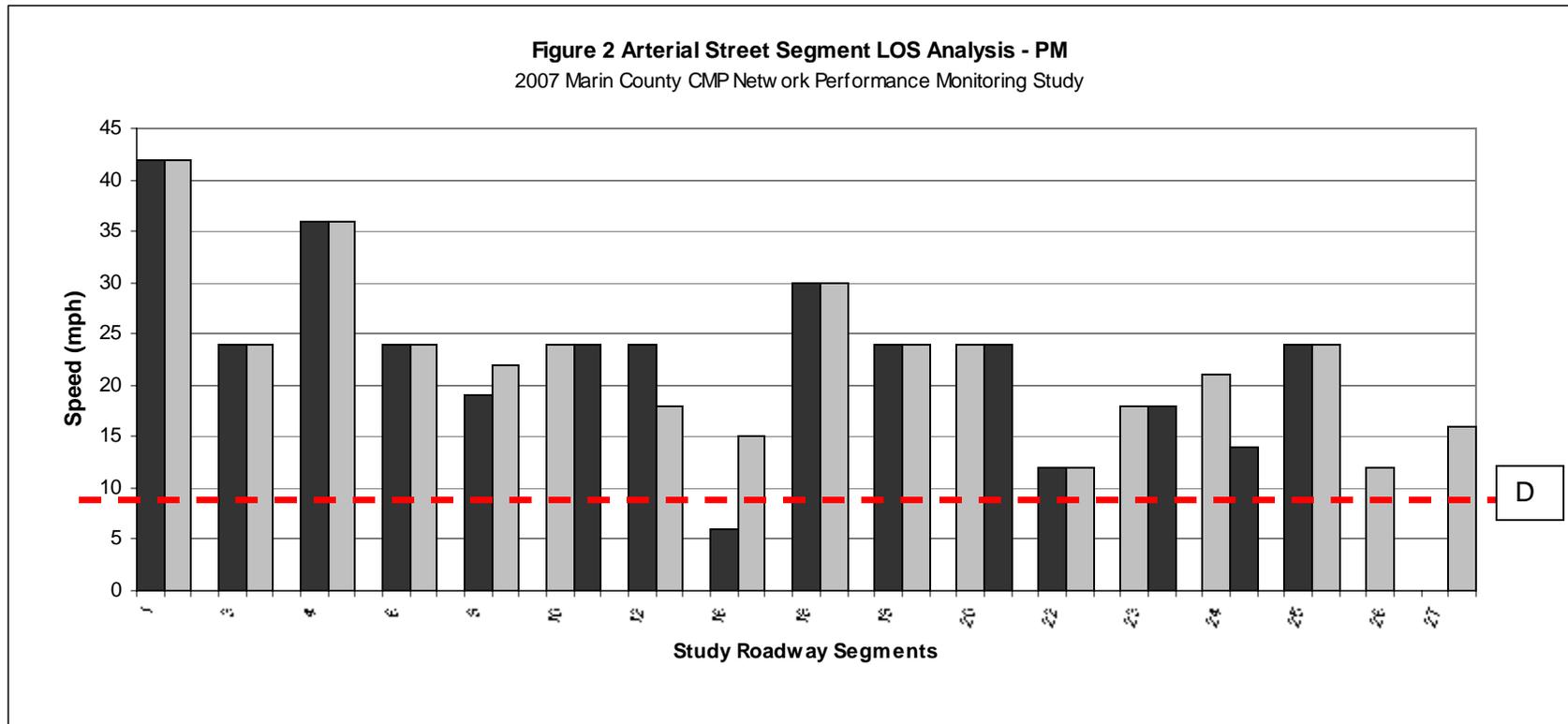
Segment	Mi.	Dir.	1st Run			2nd Run			3rd Run			Avg.	Speed mph	LOS	Minimum Standard	Grand-fathered
			Beg.	End	Lap	Beg.	End	Lap	Beg.	End	Lap					
1 State Route 1(SFD-Pt: Reyes)	2.1	NB	4:48	4:52	0:04	4:55	4:58	0:03	5:13	5:16	0:03	3.0	42.0	A	D	N
		SB	4:52	4:55	0:03	4:59	5:03	0:03	5:17	5:21	0:04	3.0	42.0	A	D	N
2 US 101 (Atherton-Sonoma County)	5.4	NB	4:41	4:48	0:07	5:01	5:09	0:08	5:21	5:30	0:09	8.0	40.0	E	E	Y
		SB	4:56	5:01	0:05	5:16	5:21	0:05	5:38	5:43	0:05	5.0	64.0	A	E	Y
3 Novato Bl. (San Marin-Eucalyptus)	0.4	NB	4:44	4:45	0:01	5:05	5:06	0:01	5:32	5:33	0:01	1.0	24.0	B	D	N
		SB	4:45	4:46	0:01	5:08	5:09	0:01	5:33	5:34	0:01	1.0	24.0	B	D	N
4 S: Novato Bl. (Sunset Pkwy-US 101)	1.2	NB	4:33	4:35	0:02	4:55	4:57	0:02	5:21	5:23	0:02	2.0	36.0	A	D	N
		SB	4:53	4:55	0:02	5:19	5:21	0:02	5:35	5:37	0:02	2.0	36.0	A	D	N
5 SR 37 (US 101- Atherton)	2.6	EB	4:11	4:14	0:03	4:22	4:25	0:03	4:31	4:34	0:03	3.0	52.0	A	E	N
		WB	4:14	4:18	0:04	4:25	4:29	0:04	4:34	4:37	0:03	3.0	52.0	A	E	N
6 Bel Marin Keys (US 101-Commercial)	0.2	EB	4:15	4:15	0:00	4:23	4:24	0:01	4:28	4:29	0:01	0.5	24.0	B	D	Y
		WB	4:19	4:19	0:00	4:21	4:22	0:01	4:26	4:27	0:01	0.5	24.0	B	D	Y
7 US 101 (Freitas Pkwy-Lucas Valley) (NB HOV Lane)	1.0	NB	4:15	4:17	0:02	4:38	4:39	0:01	5:03	5:04	0:01	1.0	60.0	A	E	Y
		SB	4:18	4:19	0:01	4:41	4:42	0:01	5:05	5:07	0:02	1.0	60.0	A	E	Y
		NB	4:11	4:13	0:02	4:19	4:20	0:01	4:27	4:28	0:01	1.0	60.0	A	E	Y
8 US 101 (Mission-N. San Pedro)	1.6	NB	4:12	4:14	0:02	4:34	4:37	0:03	4:59	5:02	0:03	2.0	48.0	C	E	Y
		SB	4:20	4:22	0:02	4:43	4:46	0:03	5:08	5:10	0:02	2.0	48.0	C	E	Y
9 SFD Bl. (San Anselmo-Red Hill)	1.1	EB	5:38	5:41	0:03	4:11	4:15	0:04	4:24	4:28	0:04	3.5	19.0	C	D	Y
		WB	4:18	4:21	0:03	4:04	4:08	0:04	4:18	4:20	0:02	3.0	22.0	B	D	Y
10 Red Hill (SFD-Hillsdale)	0.4	EB	5:38	5:40	0:02	5:15	5:16	0:01	5:39	5:40	0:01	1.0	24.0	B	D	N
		WB	4:15	4:17	0:02	5:14	5:15	0:01	5:37	5:39	0:02	1.0	24.0	B	D	N
11 US 101 (I-580-Mission)	1.1	NB	4:07	4:12	0:05	4:29	4:34	0:05	4:54	4:59	0:05	5.0	13.0	F	E	Y
		SB	4:22	4:25	0:03	4:46	4:48	0:02	5:10	5:12	0:02	2.0	33.0	E	E	Y
12 SFD Bl. (College-Wolfe Grade)	0.6	EB	5:58	6:00	0:02	6:07	6:08	0:01	6:11	6:13	0:02	1.5	24.0	B	D	Y
		WB	5:50	5:51	0:01	6:00	6:03	0:03	6:05	6:07	0:02	2.0	18.0	C	D	Y
13 US 101 (SFD-I-580)	1.3	NB	5:24	5:30	0:06	5:45	5:52	0:07	4:42	4:46	0:04	5.0	15.6	F	E	Y
		SB	5:12	5:13	0:01	5:35	5:37	0:02	4:50	4:52	0:02	1.5	52.0	A	E	Y

Source: PHA Transportation Consultations. Surveys were conducted by floating cars in October and November 2006. Travel times are in minutes.

Table 3 Study Roadway Segment Monitoring Results (PM LOS) - Continue
 Marin County CMP Transportation System Performance Monitoring Study -2007

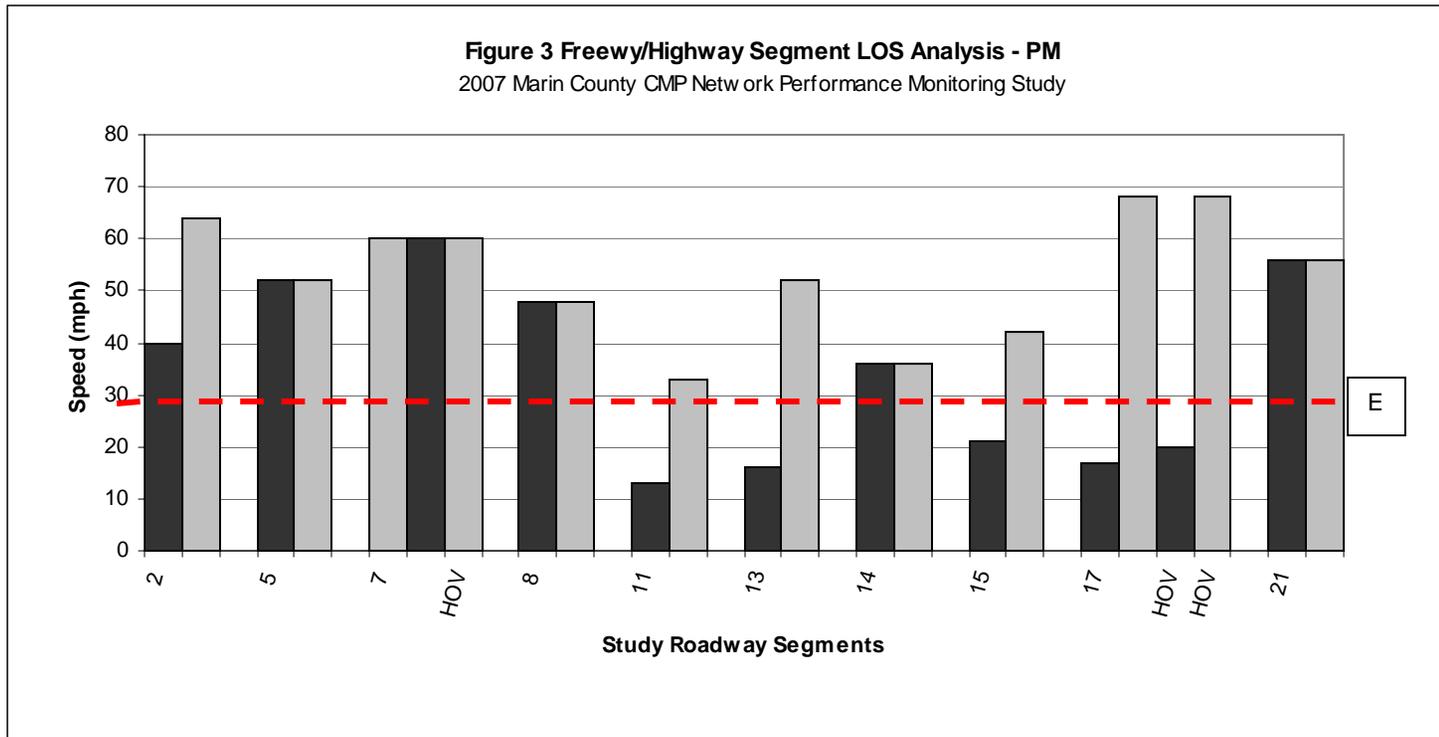
Segment	Mi.	Dir.	1st Run			2nd Run			3rd Run			Avg.	Speed mph	LOS	Minimum Standard	Grandfathered
			Beg.	End	Lap	Beg.	End	Lap	Beg.	End	Lap					
14 I-580 (Bellam-SFD)	1.2	EB	5:17	5:19	0:02	4:17	4:20	0:03	4:20	4:21	0:01	2.0	36.0	E	E	Y
		WB	4:04	4:07	0:03	4:15	4:17	0:02	4:22	4:24	0:02	2.0	36.0	E	E	Y
15 I-580 (SFD-R-S Bridge)	0.7	EB	5:49	5:53	0:04	4:24	4:26	0:02	4:26	4:27	0:01	2.0	21.0	F	E	N
		WB	4:03	4:04	0:01	4:14	4:15	0:01	4:21	4:22	0:01	1.0	42.0	D	E	N
16 E: SFD Bl. (US 101-E. Lkspr Lndng)	0.5	EB	5:13	5:21	0:08	5:37	5:43	0:06	4:38	4:39	0:01	5.0	6.0	F	D	Y
		WB	5:21	5:24	0:03	5:43	5:45	0:02	4:32	4:33	0:01	2.0	15.0	C	D	Y
17 US 101 (SR 131-Paradise) (NB HOV Lane)	1.7	NB	5:00	5:07	0:07	5:28	5:34	0:06	5:48	5:55	0:07	6.0	17.0	F	E	Y
		SB	4:43	4:44	0:01	5:08	5:10	0:02	5:34	5:36	0:02	1.5	68.0	A	E	Y
		NB	4:47	4:53	0:06	5:07	5:12	0:05	5:27	5:31	0:04	5.0	20.0	F	E	Y
		SB	4:39	4:40	0:01	4:59	5:00	0:01	5:20	5:22	0:02	1.5	68.0	A	E	Y
18 SR 131(Redwd Frtage-Strawberry)	0.5	EB	5:19	5:20	0:01	5:24	5:25	0:01	5:30	5:31	0:01	1.0	30.0	A	D	N
		WB	5:20	5:21	0:01	5:25	5:26	0:01	5:31	5:33	0:02	1.0	30.0	A	D	N
19 SR 1(Northern-Alamonte)	0.8	EB	4:29	4:32	0:03	4:37	4:39	0:02	4:47	4:49	0:02	2.0	24.0	B	D	Y
		WB	4:32	4:34	0:02	4:39	4:41	0:02	4:49	4:51	0:02	2.0	24.0	B	D	Y
20 Bridgeway Bl. (Gate 5-Gate 6)	0.2	NB	6:07	6:08	0:01	6:09	6:10	0:01	6:11	6:12	0:01	0.5	24.0	B	D	N
		SB	6:06	6:07	0:01	6:08	6:09	0:01	6:10	6:11	0:01	0.5	24.0	B	D	N
21 US 101(North of GG-Spencer)	1.4	NB	4:51	4:52	0:01	5:16	5:18	0:02	5:43	5:44	0:01	1.5	56.0	A	E	N
		SB	4:49	4:50	0:01	5:14	5:16	0:02	5:41	5:43	0:02	1.5	56.0	A	E	N
22 SFD Bl. (Butterfield-Willow)	0.2	EB	5:30	5:31	0:01	4:10	4:11	0:01	4:23	4:24	0:01	1.0	12.0	D	D	Y
		WB	4:21	4:22	0:01	4:08	4:09	0:01	4:20	4:21	0:01	1.0	12.0	D	D	Y
23 SFD Bl. (College-Toussin)	0.3	EB	4:08	4:09	0:01	5:57	5:58	0:01	6:04	6:05	0:01	1.0	18.0	C	D	Y
		WB	5:51	5:52	0:01	6:03	6:04	0:01	6:05	6:07	0:02	1.0	18.0	C	D	Y
24 Novato Bl. (Grant-Diablo)	0.7	NB	4:39	4:41	0:02	5:00	5:02	0:02	5:27	5:29	0:02	2.0	21.0	B	D	N
		SB	4:48	4:50	0:02	5:11	5:15	0:04	5:36	5:39	0:03	3.0	14.0	C	D	N

Source: PHA Transportation Consultations. Surveys were conducted by floating cars in October and November 2006. Travel times are in minutes.



Commute Direction
 Non-commute Direction

Marin County CMP has established LOS D as the minimum acceptable standard for arterial streets. During the PM peak period, commute directions are travel directions leaving San Francisco and US 101.



Commute Direction
 Non-commute Direction

Marin County CMP has established LOS E as the minimum acceptable standard freeway/highway segments. During the PM peak period, commute directions are travel directions leaving San Francisco and US 101.

Table 4 Sub-standard Roadway Segment and Recommended Actions
 Marin County CMP Transportation System Performance Monitoring Study -2007

	Study Segments	LOS	Actions
11	US 101 (I-580 – Mission)	F	This segment is grand-fathered, an improvement to widen the roadway segment with an HOV lane in both directions is under construction and would be completed in December 2008.
13	US 101 (SFD- I-580)	F	This segment is grand-fathered, an improvement to widen the roadway segment with an HOV lane in both directions is under construction and would be completed in 2008.
15	I-580 (SFD - R-S Bridge)	F	While this segment is currently operate at LOS F, which was likely the result of bridge construction work that took place in October and November while this monitoring study was being conducted. Segment LOS is expected to improve back to LOS E or better once construction is complete. No action is recommended at this time.
16	E. SFD (US 101 – E. Larkspur Landing)	F	This segment had been grand-fathered, TAM is preparing an improvement plan for US 101Greenbrae corridor to address this condition.
17	US 101 (SR 131 – Paradise)	F	This segment is grand-fathered, no deficiency plan needed.

Source: Transportation Authority of Marin, 2005 CMP Monitoring Report. PHA Transportation Consultants 2007 survey.

Table 5 Historic Trend of Roadway Segment LOS
Marin County CMP Transportation System Performance Monitoring Study -2007

#	Segment	1997	1999	2001	2003	2005	2007	GF
1	State Route 1(SFD-Pt. Reyes)	A	A	A	A	A	A	N
2	US 101 (Atherton- Sonoma County Line)	F	F	E	F	D	E	Y
3	Novato Bl. (San Marin- Eucalyptus) *	A	A	A	A	A	B	N
4	S. Novato Bl. (Sunset Pkwy- US 101) *	A	A	A	A	A	A	N
5	SR 37 (US 101- Atherton)	C	C	C	C	C	A	N
6	Bel Marin Keys Bl. (US 101-Commercial)	E	F	E	C	C	B	Y
7	US 101 (Freitas Pkwy- Lucas Valley) *	D	D	D	C	E	A	Y
8	US 101 (Mission- N. San Pedro)	F	F	D	F	F	C	Y
9	SFD Bl (San Anselmo- Red Hill)	F	E	F	E	E	C	Y
10	Red Hill (SFD- Hillsdale)	D	D	D	D	C	B	N
11	US 101(I-580- Mission)	F	F	D	F	F	F	Y
12	SFD Bl. (College- Wolfe Grade)	B	C	C	C	B	C	Y
13	US 101(SFD- I-580) *	D	D	F	F	F	F	Y
14	I-580 (Bellam- S FD)	B	A	B	B	F	E	Y
15	I-580 (SFD- R-S Bridge)	C	C	F	E	C	F	N
16	E. SFD Bl. (US 101- E. Larkspur Landing)	E	F	F	F	C	F	Y
17	US 101 (SR 131- Paradise) *	C	D	D	C	F	F	Y
18	SR 131 (Redwood Frontage- Strawberry)	C	C	C	C	C	A	N
19	SR 1 (Northern- Alamonte)	D	D	D	C	F	B	Y
20	Bridgeway Bl. (Gate 5- Gate 6) *	B	C	B	C	B	B	N
21	US 101(North of GG- Spencer) *	D	D	D	C	C	A	N
22	SFD Bl. (Butterfield- Willow) *	F	F	F	F	F	D	Y
23	SFD Bl. (College- Toussin)	F	F	E	F	F	C	Y
24	Novato Bl. (Grant- Diablo) *	E	F	D	C	E	C	N

Source:
Transportation Authority of Marin, 2005 CMP Monitoring Report.
CMP 2007 Monitoring Report – PHA Transportation Consultants.
* Indicate changes in roadway segment limits between current 2007 and prior years.
Bold face indicates 2006 unacceptable LOS.

3. Aggregate Peak Hour Travel Time

The objective of this performance measure is to identify the amount of time it takes to travel through major corridors in Marin County during the commute hours. The Marin County CMP has designated four key commute corridors for travel time analysis. Travel time analyses were conducted for single-occupant vehicles, high-occupancy vehicles (HOV), and public transit buses for comparison. Table 6 shows the travel time results by mode. It should be emphasized that the Marin County CMP has not established goals or minimum standards for this performance measure and the travel time data are for informational purposes only.

Table 6 Corridor Peak Hour Travel Time Monitoring Results Marin County CMP Transportation System Performance Monitoring Study -2007								
Study Corridor			2005			2007		
			Auto	HOV	Bus	Auto	HOV	Bus
US 101 (San Rafael Transit Center- Sonoma County Line)	AM	NB SB	11 28	N/A 22	33 48	18 30	18 29	45(A) 66(A)
	PM	NB SB	15 11	12 N/A	38 38	25 19	26 N/A	51(A) 52(A)
US 101 (San Rafael Transit Center- GG Bridge)	AM	NB SB	10 13	N/A 12	34 30	13 13	N/A 13	40(B) 31(B)
	PM	NB SB	33 11	15 N/A	50 30	19 12	17 N/A	47 (B) 35 (B)
Sir Francis Drake Boulevard (Butterfield – US 101)	AM	NWB SEB	5 8	N/A N/A	23 N/A	12 17	N/A N/A	N/A 31(C)
	PM	NWB SEB	16 8	N/A N/A	N/A 23	14 12	N/A N/A	26(C) N/A
Red Hill Avenue (SFD – San Rafael Transit Center)	AM	NWB SEB	10 17	N/A N/A	13 13	7 7	N/A N/A	17(D) N/A
	PM	NWB SEB	6 14	N/A N/A	13 13	7 7	N/A N/A	19(D) N/A

Source:
 2005 travel times – Wilbur Smith Associates, 2007 travel times – PHA
 Travel time runs were conducted three times in each direction during the commute periods. Transit travel times were estimated based on bus schedules.
 (A) Estimated based on commute bus Route 70 & 80 between San Rafael Transit Center – Petaluma Depot
 (B) Estimated based on commute bus route 70 & 80 from San Rafael Transit Center and Golden Gate Bridge Toll Plaza. (C) Estimated based on commute bus Route 24 between Bank and US 101/Lucky Drive Bus Pad. (D) Estimated based on commute bus Route 24 between San Rafael Transit Center and SFD/Butterfield intersection

4. Person Throughput

The objective of this performance measure is to identify the number of people moving over a given roadway facility during the commute peak hour. The Marin County CMP has designated six roadway segments for evaluation. Table 7 shows a comparison of person throughput for the current and previous cycle year for the designated corridors in the PM peak hour.

Table 7 Person Throughput Monitoring Results - (PM Peak Hour)
 Marin County CMP Transportation System Performance Monitoring Study -2007

	2005				2007			
	Transit Person	Auto Person	Van Pool Person	Total Person	Transit Person	Auto Person	Van Pool Person	Total Person
US 101- NB (I-580 – Central San Rafael)	2,205	11,127	0	13,332	880	6,758	350	7,988
US 101 - NB (SR 131 – Paradise Dr.)	4,680	11,631	110	16,421	1100	6,762	250	8,112
US 101 - NB (North of Atherton)	1,080	4,026	11	5,117	520	3,846	250	4,616
Sir Francis Drake Boulevard - NWB (East of Wolf Grade)	0	3,497	0	3,497	190	2,381	10	2,581
Sir Francis Drake Boulevard - NWB (North of Red Hill Road)	1,620	3,986	0	5,606	646	2,165	20	2,831
Red Hill Avenue - NWB (East of SDF Boulevard)	315	3,460	0	3,775	190	1,736	10	1,936

Source: PHA 2006 traffic survey, Golden Gate Transit District Ridership Data 2006, and 511.org 2006 vanpool data.
 The above analysis is for the commute direction only, i.e. leaving San Francisco and/or US 101.
 Transit person for Sir Francis Drake and Red Hill Ave. were estimated on actual bus count in the field times an estimated load of 38 person/bus.
 Transit person for US 101 was estimated based on the scheduled bus passed the study segment obtained from times an estimated load of 40 person/bus.
 Vanpool data are provided by 511.org vanpool division.

5. Vehicle Miles Traveled On Congested Highway

The objective of this performance measure is to identify the number of vehicles that travel on congested roadways now and 25 years from now. This helps in developing long-range transportation planning, land use planning, and other public policies that would affect travel patterns in the Marin County. This projection is obtained from the Marin County Traffic Model forecasts for 2030 for the Marin County Area. Congested roadway is defined as roadway segments with a ranking of LOS "F" and V/C >1.

Table 8 Vehicle Miles Traveled on Congested Roadway Monitoring Results Marin County CMP Transportation System Performance Monitoring Study -2007			
	2005	2030	% Changes
Total PM Peak Vehicle Miles Traveled	593,974	802,961	35.18%
Total PM Peak Vehicle Miles Traveled in Congested Conditions	56,712	222,710	292.70%
Percent Vehicle Miles Traveled in Congested Conditions	10%	28%	180.00%
Source: Marin County Traffic Model – TAM 2006			

As shown, in Table 8, vehicle miles traveled by 2030 will increase by 35.18%, and the total number of vehicle miles traveled on congested roadways will increase by 292.70%. The Marin County CMP has not established goals, objectives, or minimum standards for this performance measure. This information is provided to assist in long-range transportation and land use planning.

6. Jobs/Housing Balance

Commute traffic is a major load on the regional transportation system as workers must travel from their homes in one community to work in another community. A balance between jobs and housing within a community or area generally means there is the potential for workers to find jobs within their own communities, meaning shorter commutes. This would in turn reduce the need to travel (or travel long distance) and subsequently reduce traffic congestion on the regional transportation system.

This performance measure evaluates the current and projected balance between jobs and housing in the Bay Area including Marin County. A jobs/employed residents ratio of 1 would be a perfect balance as it means all employed residents could potentially work in the same community where they live. A jobs/employed residents ratio >1, such as San Francisco County, means the community has more jobs than employed residents and must import workers from other counties. The higher the ratio is above 1, the more workers a community must import. As such, in the Bay Area, the morning commute traffic flow gravitates toward San Francisco from the suburban towns and cities while in the afternoon the pattern reverses.

For Marin County, the jobs/employed residents ratios are 0.86, 0.89, and 0.97 respectively for 2000, 2015, and 2030. This ratio is improving but many Marin County workers still must travel to other counties to work and must rely on the area's regional transportation system. Table 9 shows the jobs and housing balance in Bay Area counties, jobs/employed residents ratios and workers that live in one county and work in another county.

The Marin County CMP has not established goals or standards for this measure.

Table 9. Bay Area Job/Housing Balance Monitoring Results					
Marin County CMP Transportation System Performance Monitoring Study –2007					
Employed Residents	2000	2015	% Change	2030	% Change
Alameda	709,557	833,300	17.44%	1,032,100	23.86%
Contra Costa	461,992	541,800	17.27%	667,800	23.26%
Marin*	131,959	144,200	9.28%	179,100	24.20%
Napa	59,886	75,520	26.11%	93,700	24.07%
San Francisco	437,553	453,400	3.62%	558,700	23.22%
San Mateo	369,725	375,500	1.56%	464,600	23.73%
Santa Clara	863,432	874,300	1.26%	1,086,300	24.25%
Solano	182,964	226,500	23.79%	269,800	19.12%
Sonoma	235,069	280,800	19.45%	346,700	23.47%
Total Jobs					
Alameda	750,160	884,970	17.97%	1,088,870	23.04%
Contra Costa	371,310	439,020	18.24%	543,860	23.88%
Marin*	134,180	148,490	10.66%	173,580	16.90%
Napa	66,360	82,930	24.97%	91,920	10.84%
San Francisco	642,500	673,870	4.88%	829,090	23.03%
San Mateo	386,590	400,000	3.47%	507,090	26.77%
Santa Clara	1,044,130	1,077,050	3.15%	1,339,970	24.41%
Solano	136,740	175,900	28.64%	217,910	23.88%
Sonoma	221,490	265,020	19.65%	328,310	23.88%
Jobs/Residents Ratio					
Alameda	1.06	1.06	0.45%	1.06	-0.66%
Contra Costa	0.80	0.81	0.82%	0.81	0.51%
Marin*	1.02	1.03	1.27%	0.97	-5.88%
Napa	1.11	1.10	-0.90%	0.98	-10.67%
San Francisco	1.47	1.49	1.22%	1.48	-0.15%
San Mateo	1.05	1.07	1.88%	1.09	2.46%
Santa Clara	1.21	1.23	1.87%	1.23	0.13%
Solano	0.75	0.78	3.91%	0.81	4.00%
Sonoma	0.94	0.94	0.17%	0.95	0.33%
Import(Export) Workers					
Alameda	40603	51670		56770	
Contra Costa	-90682	-102780		-123940	
Marin*	2221	4290		-5520	
Napa	6474	7410		-1780	
San Francisco	204947	220470		270390	
San Mateo	16865	24500		42490	
Santa Clara	180698	202750		253670	
Solano	-46224	-50600		-51890	
Sonoma	-13579	-15780		-18390	
Source: Marin County Traffic Model, TAM					

7. Transit Headway

This performance measure evaluates transit bus headway (frequency) along major commute corridors during the commute hours. A reduction in headway generally means increased bus service and ridership, and will help alleviate traffic congestions on regional commute corridor. Table 10 compares transit headway along major travel corridors during commute hours. The Marin CMP has not established goals or minimum standard for this performance measure.

Table 10 Transit Headway Monitoring Results			
Marin County CMP Transportation System Performance Monitoring Study –2007			
Golden Gate Transit Basic Service			
Route		2004	2006
10	Tiburon – Sausalito	30	22-31
26	San Francisco - San Anselmo (Via San Rafael)	30	11-15
40	San Rafael – Richmond	20	23-30
70	Novato – San Francisco (Included in Route 80)	30	61-65
80	Santa Rosa – San Francisco	30	61-65
Golden Gate Transit Commute Service			
2	Marin City/Sausalito – San Francisco	10	15-20
4	Mill Valley – San Francisco	15	5-15
8	Tiburon/Belvedere – San Francisco	25	30-46
18	Kenfield (College of Marin) – San Francisco	15	14-29
24	Inverness/Fairfax – San Francisco	10	7-30
26	Sleepy Hollow/San Anselmo – San Francisco	25	15-33
38	Terra Linda – San Francisco	15	21-32
44	Lucas Valley – San Francisco	25	29-58
54	San Marin/Novato – San Francisco	10	15
56	San Marin/Novato – San Francisco	10	15-33
71	Santa Rosa – San Rafael	30	60-75
75	Santa Rosa – San Rafael	30	27-42
97	San Rafael – San Francisco (Via Larkspur Ferry Terminal)		1/day
Golden Gate Transit Local Service			
21	Kenfield – Mill Valley	30	N/A
22	San Rafael – Sausalito	60	8-31
23	Fairfax – Marin Civic Center	30	30
29	San Rafael- San Anselmo	30	N/A
35	San Rafael – Canal Area	30	4-30
Source: Golden Gate Transit District All headway/intervals are in minutes.			

8. Transit Coordination

The purpose of this performance measure is to ensure that all public transit services in Marin and neighboring counties are well coordinated to provide convenient and connected services. A well connected and convenient public transportation system would lead to increased ridership, reducing traffic congestion on the regional arterial and freeway system. Table 11 shows the major objectives and targets for the Marin County public transit services and whether targets are being accomplished. The Marin County CMP has not established minimum standards for this measure and no remedial action is required when targets are not met.

Table 11 Transit Coordination Monitoring Results Marin County CMP Transportation System Performance Monitoring Study –2007		
Objective	Target	Monitoring Results(2005-06)
Convenient transfer within Marin County	Continue operation of existing transfer locations and establish additional locations and facilities.	All seven local and regional bus hubs in Marin County are in operation. No new facility was being considered in 2005 and 2006
Convenient regional transit connection	Continue coordination of regional service and fares with those of other local transit operators in Marin, San Francisco, and Sonoma Counties, and work toward joint fare agreement and service coordination with other public transit operators in the Bay Area	All local and regional transfers among local shuttles, Golden Gate Transit, and West Marin Stagecoach are accepted in Marin County through Marin County Transit District (MCTD) coordination.
Level of coordination with other modes	Continue to work with ride sharing agencies to increase the number of vanpool and carpools to jobs in Marin and San Francisco, as well as to facilitate bicycle and pedestrian access to transit routes.	MTCD had suggested a number of capitol projects to improve pedestrian and bicycle access to transit. This includes a project to convert current two-capacity bicycle racks on transit vehicles to three capacity racks and a project to install more bicycle racks at high use bus stops.
Discount fares for senior and youth	Continue to provide discounted transit fare for seniors 65 and older and students 6-18.	MCTD has a 50% discount for youth and seniors age 65+. In 2005 and 06 MTCD operated a free-ticket program for students from low-income families to travel to and from school. This was later replace by a six-month pass program.
Deficiency plan participation	Work with local operators, local jurisdictions and Bay Area Air Quality Management District to implement transit improvements as potential deficiency plan actions.	MTCD has not been involved in deficiency plans but will participate if invited.
Regional and local bus hubs: San Rafael Transit Center, Marin City Hub, Novato, San Anselmo, Strawberry, Marin civic Center, Tiburon Ferry Terminal, Sausalito Ferry Terminal, Larkspur and Ignacio bus pad.		

9. Pedestrian and Bicycle Investment

The purpose of this measure is to ensure that pedestrian and bicycle travel is accommodated in new transportation improvement projects. The Marin County CMP has not established targets and/or minimum standards for this measure and no remedial action is required. Table 12 summarizes pedestrian and bicycle related projects for the past two years in the County and local jurisdictions.

Table 12 Pedestrian and Bike Projects Monitoring Results (2005-06) Marin County CMP Transportation System Performance Monitoring Study –2007	
Jurisdictions	Monitoring Results
Belvedere	Installed pedestrian sidewalks between city hall and community Road. Installed pedestrian sidewalk at 500 block of San Rafael Ave to improve pedestrian access. Developed plans for 10 handicapped ramp access at various locations throughout the city.
Corte Madera	Completed Class 1 bike lane on San Clemente Street. Completed sidewalk project on Corte Madera Ave.
Fairfax	Work on Center Boulevard project, both with pedestrian and bicycle components, work on a Safe Route to School project, and installed pedestrian crosswalks on SFD Boulevard.
Larkspur	Applied and received funding for SFD Boulevard Bike and Pedestrian Multi-use Bridge Project. Applied for funding for Magnolia Avenue Class I bike lane and pedestrian path extension project.
Mill Valley	Reconfigured pedestrian median on Camino Alto at Miller Avenue to improve pedestrian visibility. Installed pedestrian barricade at Miller Avenue near Camino Alto to improve safety. Added thermoplastic striping at various pedestrian cross-walks to increase visibility.
Novato	Installed Class II bike lane on Diablo Road between Novato Boulevard Center Street, Ignacio Boulevard between Laurel Wood and Creeksside, Red wood Road between Lamont and Olive. Upgraded pedestrian bridges at Simmons Lane and Novato Creek. Added bike racks on sections of Grand Avenue.
Ross	Applied for a TDA grant for a pedestrian path on SFD between Laurel Grove and kentfield. Participated in the Marin County Master Bike Plan Update.
San Rafael	Developed plans and obtained funding for a citywide signage program for Class III bike lane. Applied for two Sate Route to School Grant for traffic calming projects to improve pedestrian access.
Sausalito	Installed Class 1 bike lane connector on Bridgeway Boulevard between Johnson and Mono Ave.
San Anselmo	Applied for Safe Route to School Grant for sidewalk improvement on Ross Ave. between Jones Street and Sunnyside Ave.
Tiburon	Completed a Class II bike lane on Trestle Glen Boulevard. Participated in the Marin County Master Bike Plan Update.
Marin County	Implemented Adult Crossing Guard Program to improve students safety at major routes to school throughout the county. Prepare and coordinate Countywide Master Bike Plan Update in conjunction with towns and cities with county jurisdictions.
PHA Transportation Consultants, collected from officials with local jurisdictions via telephone calls.	

Part II

2007 Marin County CMP Transportation System Performance Monitoring Study

(Additional Work)

1. Introduction

This part of the report consists of additional work requested by TAM as part of the 2007 Marin County CMP Network Performance Monitoring Study. This work is not mandated by the Marin County CMP, but is informational only. This additional work consists of a.m. peak hour roadway segment LOS analyses, vehicle and vehicle occupancy counts, weekend vehicle counts, bicycle counts, and pedestrian counts on selected roadway segments. The additional work also included intersection LOS analysis for two intersections, Novato Boulevard/Diablo Avenue, Sir Francis Drake Boulevard/College Avenue, and freeway weaving analysis of the I-580/US 101 merge in San Rafael.

For roadway segment LOS study, the same 24 study segments plus three additional segments were evaluated for the a.m. peak hour. Table 13 shows the results of the analysis.

For vehicle and vehicle occupancy counts, a total of 12 roadway segments were selected for the study. Table 14 summarizes vehicle and occupancy counts for the study roadway segments for the a.m. peak hour, Table 15 summarizes results for the p.m. peak hour.

The weekend midday vehicle, bicycle, and pedestrian counts included a total of 27 roadway segments and Table 16 summarizes study results.

Table 17 summarizes the results of peak hour intersection LOS analysis and merging/weaving analysis.

Table 13 Study Roadway Segment Monitoring Results (AM LOS)
 Marin County CMP Transportation System Performance Monitoring Study -2007

Study Segments	Mi Dir:	1st Run			2nd Run			3rd Run			Avg.	Speed mph	LOS
		Beg.	End	Lap	Beg.	End	Lap	Beg.	End	Lap			
1 State Route 1 (SFD - Pt: Reyes)	NB	7:59	8:02	0:03	8:06	8:10	0:04	8:14	8:18	0:04	3.0	42.0	A
	SB	8:02	8:06	0:04	8:10	8:13	0:03	8:18	8:22	0:04	3.0	42.0	A
2 US 101 (Atherton - Sonoma County Line)	NB	7:11	7:16	0:05	8:10	8:16	0:06	8:26	8:33	0:07	6.0	54.0	B
	SB	7:24	7:30	0:06	8:20	8:26	0:06	8:40	8:45	0:05	5.0	64.8	A
3 Novato Bl. (San Marin – Eucalyptus)	NB	8:13	8:14	0:01	8:22	8:23	0:01	8:33	8:34	0:01	1.0	24.0	B
	SB	8:14	8:16	0:02	8:23	8:24	0:01	8:35	8:36	0:01	1.0	24.0	B
4 S. Novato Bl. (Sunset Pkwy - Hwy 101)	NB	8:51	8:53	0:02	8:01	8:03	0:02	8:37	8:40	0:03	2.0	36.0	A
	SB	7:01	7:03	0:02	8:27	8:30	0:03	8:46	8:48	0:02	2.0	36.0	A
5 SR 37 (Hwy 101 – Atherton)	EB	7:03	7:06	0:03	7:42	7:45	0:03	7:52	7:55	0:03	3.0	52.0	A
	WB	7:39	7:42	0:03	7:45	7:49	0:04	7:55	7:58	0:03	3.0	52.0	A
6 Bel Marin Keys (US 101 – Commercial)	EB	7:43	7:44	0:01	7:47	7:47	0:00	7:52	7:52	0:00	0.5	24.0	B
	WB	7:44	7:45	0:01	7:49	7:49	0:00	7:54	7:54	0:00	0.5	24.0	B
7 Hwy 101 (Freitas Pkwy - Lucas Valley) (NB HOV Lane)	NB	7:33	7:34	0:01	7:59	8:00	0:01	8:26	8:27	0:01	1.0	60.0	A
	SB	7:36	7:41	0:05	8:01	8:07	0:06	8:30	8:35	0:05	5.0	12.0	F
	NB	7:08	7:09	0:01	7:17	7:19	0:02	7:27	7:28	0:01	1.0	60.0	A
8 US101 (Mission - N. San Pedro)	NB	7:31	7:32	0:01	7:56	7:58	0:02	8:23	8:25	0:02	1.0	64.0	A
	SB	7:45	7:48	0:03	8:12	8:15	0:03	8:38	8:41	0:03	3.0	32.0	E
9 SFD Bl. (San Anselmo - Red Hill)	EB	8:51	9:00	0:09	8:01	8:06	0:05	8:24	8:34	0:10	8.0	9.0	D
	WB	7:29	7:32	0:03	7:55	7:59	0:04	8:19	8:22	0:03	3.0	22.0	B
10 Red Hill (SFD – Hillsdale)	EB	9:00	9:01	0:01	8:15	8:18	0:03	8:06	8:07	0:01	1.0	24.0	B
	WB	7:26	7:27	0:01	7:54	7:55	0:01	8:18	8:19	0:01	1.0	24.0	B
11 US 101 (I-580 – Mission)	NB	7:29	7:31	0:02	7:54	7:56	0:02	8:21	8:23	0:02	2.0	33.0	E
	SB	7:48	7:51	0:03	8:10	8:13	0:03	8:41	8:44	0:03	3.0	24.0	F
12 SFD Bl. (College - Wolfe Grade)	EB	8:22	8:25	0:03	8:33	8:34	0:01	8:45	8:46	0:01	1.5	24.0	B
	WB	8:14	8:16	0:02	8:25	8:27	0:02	8:34	8:37	0:03	2.0	18.0	C
13 US 101 (SFD - I-580)	NB	7:42	7:44	0:02	8:15	8:17	0:02	8:42	8:43	0:01	1.5	52.0	A
	SB	7:22	7:24	0:02	7:54	7:56	0:02	8:21	8:22	0:01	1.5	52.0	A

Continued on next page.

Table 13 Study Roadway Segment Monitoring Results (AM LOS)
 Marin County CMP Transportation System Performance Monitoring Study -2007– Continued from previous page

Study Segments	Mi Dir.		1st Run			2nd Run			3rd Run			Avg.	Speed mph	LOS
			Beg.	End	Lap	Beg.	End	Lap	Beg.	End	Lap			
14 I-580 (Bellam – SFD)	1.2	EB	7:13	7:15	0:02	7:22	7:25	0:03	7:27	7:30	0:03	2.0	36.0	E
		WB	7:19	7:21	0:02	7:10	7:13	0:03	7:18	7:21	0:03	2.0	36.0	E
15 I-580 (SFD - R-S Bridge)	0.7	EB	7:15	7:16	0:01	7:25	7:26	0:01	7:33	7:34	0:01	1.0	42.0	D
		WB	7:09	7:10	0:01	7:16	7:18	0:02	7:26	7:27	0:01	1.0	42.0	D
16 E. SFD BI (Hwy 101 - E. Larkspur Landing)	0.5	EB	7:41	7:42	0:01	7:47	7:48	0:01	7:54	7:55	0:01	1.0	30.0	A
		WB	7:18	7:19	0:01	7:37	7:38	0:01	7:42	7:44	0:02	1.0	28.0	A
17 US 101 (SR 131 – Paradise) (HOV Lane)	1.7	NB	7:39	7:41	0:02	8:12	8:14	0:02	8:39	8:41	0:02	2.0	51.0	A
		SB	7:25	7:27	0:02	7:57	7:59	0:02	8:24	8:26	0:02	2.0	51.0	A
		NB	7:54	7:56	0:02	8:02	8:03	0:01	8:10	8:12	0:02	1.5	68.0	A
		SB	7:49	7:50	0:01	7:56	7:58	0:02	8:03	8:06	0:03	2.0	51.0	A
18 SR 131 (Redwood Frontage Rd. – Strawberry)	0.5	EB	7:48	7:50	0:02	7:57	7:59	0:02	8:03	8:04	0:01	1.0	30.0	A
		WB	7:50	7:52	0:02	7:56	7:57	0:01	8:02	8:03	0:01	1.0	30.0	A
19 SR 1 (Northern – Alamonte)	0.8	EB	7:24	7:26	0:02	7:32	7:34	0:02	7:40	7:42	0:02	2.0	24.0	B
		WB	7:22	7:24	0:02	7:30	7:32	0:02	7:37	7:40	0:03	2.0	34.0	B
20 Bridgeway BI. (Gate 5 - Gate 6)	0.2	NB	8:55	8:56	0:01	8:58	8:59	0:01	9:01	9:01	0:00	0.5	24.0	B
		SB	8:54	8:55	0:01	8:57	8:58	0:01	9:00	9:01	0:01	0.5	24.0	B
21 US 101 (North of GG – Spencer)	1.4	NB	7:34	7:35	0:01	8:06	8:08	0:02	8:33	8:35	0:02	1.5	56.0	A
		SB	7:31	7:34	0:03	8:04	8:06	0:02	8:31	8:33	0:02	2.0	42.0	D
22 SFD BI. (Butterfield – Willow)	0.2	EB	8:50	8:51	0:01	8:46	8:48	0:02	8:50	8:51	0:01	1.0	12.0	D
		WB	7:32	7:33	0:01	8:45	8:46	0:01	8:48	8:50	0:02	1.0	12.0	D
23 SFD BI. (College – Toussin)	0.3	EB	8:20	8:22	0:02	8:32	8:33	0:01	8:41	8:42	0:01	1.0	18.0	C
		WB	8:16	8:17	0:01	8:27	8:28	0:01	8:37	8:38	0:01	1.0	18.0	C
24 Novato BI. (Grant –Diablo)	0.7	NB	8:08	8:09	0:01	8:18	8:19	0:01	8:29	8:31	0:02	1.5	28.0	A
		SB	8:19	8:22	0:03	8:24	8:26	0:02	8:26	8:28	0:02	2.5	17.0	C
25 SR1 (US 101 - Tennessee Valley)	0.4	EB	7:27	7:28	0:01	7:35	7:36	0:01	7:43	7:44	0:01	1.0	24.0	B
		WB	7:20	7:21	0:01	7:28	7:30	0:02	7:36	7:37	0:01	1.0	24.0	B
26 Second St. (US 101 – Marquard)	0.8	EB	9:02	9:05	0:03	8:08	8:13	0:05	8:37	8:42	0:05	4.0	12.0	D
			N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.			
27 Third St. (US 101 – Marquard)	0.8	WB	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.			
			7:23	7:26	0:03	7:21	7:25	0:04	8:13	8:16	0:03	3.0	16.0	C

Source: PHA Transportation Consultants –Surveys were conducted between 7-9 am on Tuesday, Wednesdays, and Thursdays in October/ November 2006.

Table 14 Vehicle Occupancy Analysis (AM –Peak Hour)
Marin County CMP Transportation System Performance Monitoring Study –2007

Study Segments	From North				From East				From West				Total Vehicle	Total Person	Occupancy Rate
	1	2	3	4+ ^A	1	2	3	4	1	2	3	4			
2 US 101 (Atherton-Sonoma County)	2,160	453	159	71 ^B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,843	3,827	1.35
5 SR 37 (US 101-Atherton)	N/A	N/A	N/A	N/A	1,738	147	10	5	N/A	N/A	N/A	N/A	1,900	2,082	1.10
7 US 101 (Freitas Pkwy-Lucas Valley)	3,847	1,603	24	24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5,498	7,221	1.31
8 US 101 (Mission- N. San Pedro)	3,685	1,122	31	36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4,874	6,166	1.27
11 US 101 (I-580-Mission)	5,541	643	39	73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6,296	7,236	1.15
13 US 101 (SFD-I-580)	4,172	494	27	125	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4,818	5,741	1.19
14 I-580 (Bellam-SFD)	N/A	N/A	N/A	N/A	1,202	226	53	18	N/A	N/A	N/A	N/A	1,499	1,885	1.26
15 I-580 (SFD-San Rafael/Richmond Bridge)	N/A	N/A	N/A	N/A	2,550	487	74	32	N/A	N/A	N/A	N/A	3,143	3,874	1.23
17 US 101 (SR 131-Paradise)	3,830	754	17	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4,614	5,441	1.18
18 SR 131 (Redwood Frontage Rd.-Strawberry)	N/A	N/A	N/A	N/A	1,241	283	23	12	N/A	N/A	N/A	N/A	1,559	1,924	1.23
19 SR 1 (Northern-Alamonte)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	687	196	5	N/A	888	1,094	1.23
21 US 101 (North of GG Bridge-Spencer)	4,484	683	89	94	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5,350	7,766	1.45
															Avg. 1.26

Source: PHA Transportation Consultants – October, November 2006. Surveys were conducted between 7-9 am. Peak hour represents four consecutive 15-minute with the highest volumes between 7-9 am.

A: Number of occupants in vehicle.

B: Number of vehicles

N/A: Not applicable.

Table 15 Vehicle Occupancy Analysis (PM –Peak Hour)
Marin County CMP Transportation System Performance Monitoring Study –2007

Study Segments	From East				From South				From West				Total Vehicle	Total Person	Occupancy Rate
	1	2	3	4	1	2	3	4+ ^A	1	2	3	4			
2 US 101 (Atherton-Sonoma County)	N/A	N/A	N/A	N/A	2,194	472	140	72 ^B	N/A	N/A	N/A	N/A	2,878	3,846	1.34
5 SR 37 (US 101-Atherton)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,950	181	10	5	2,146	2,362	1.10
7 US 101 (Freitas Pkwy-Lucas Valley)	N/A	N/A	N/A	N/A	3,881	1,262	341	23	N/A	N/A	N/A	N/A	5,507	7,520	1.37
8 US 101 (Mission- N. San Pedro)	N/A	N/A	N/A	N/A	6,071	939	57	48	N/A	N/A	N/A	N/A	7,115	8,312	1.17
11 US 101 (I-580-Mission)	N/A	N/A	N/A	N/A	5,181	587	23	70	N/A	N/A	N/A	N/A	5,861	6,704	1.14
13 US 101 (SFD-I-580)	N/A	N/A	N/A	N/A	5,312	1,398	36	58	N/A	N/A	N/A	N/A	6,804	8,448	1.24
14 I-580 (Bellam-SFD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,820	247	14	2	2,083	2,364	1.13
15 I-580 (SFD-San Rafael/Richmond Bridge)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,954	247	65	31	3,297	3,767	1.14
17 US 101 (SR 131-Paradise)	N/A	N/A	N/A	N/A	3,624	1,430	50	32	N/A	N/A	N/A	N/A	5,136	6,762	1.32
18 SR 131 (Redwood Frontage Rd.-Strawberry)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,364	159	55	18	1,596	1,919	1.20
19 SR 1 (Northern-Alamonte)	757	108	8	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	874	1,001	1.15
21 US 101 (North of GG Bridge-Spencer)	N/A	N/A	N/A	N/A	3,821	493	17	29	N/A	N/A	N/A	N/A	4,360	4,974	1.14
Avg. 1.23															

Source: PHA Transportation Consultants – October, November 2006. Surveys were conducted between 4-6 pm. Peak hour represents the four consecutive 15-minute with the highest volumes between 4-6 pm.

A: Number of occupants in vehicle.

B: Number of vehicles

N/A: Not Applicable.

Table 16 Vehicle/Bicycle/Pedestrian Volumes (Saturday Midday Peak Hour)

Marin County CMP Transportation System Performance Monitoring Study –2007

Study Segments	From North			From East			From South			From West			Total	Total	Total
	Bike	Veh	Ped	Bike	Veh	Ped	Bike	Veh	Ped	Bike	Veh	Ped	Bike	Veh	Ped
1 SR 101 (SFD-Pt. Reyes)	7	172	0	0	0	0	2	169	0	0	0	0	9	341	0
2 US 101 (Atherton-Sonoma County)	0	2,551	0	0	0	0	0	3,027	0	0	0	0	0	5,578	0
3 N. Novato BI. (San Marin-Eucalytus)	5	292	3	0	0	0	8	332	0	0	0	0	13	624	3
4 S. Novato BI. (Sunset-US 101)	1	321	1	0	0	0	4	355	2	0	0	0	5	676	3
5 SR 37 (US 101-Atherton)	0	0	0	0	1,163	0	0	0	0	0	1,530	0	0	2,693	0
6 Bel Marin Keys BI. (US 101-Commercial)	0	0	0	0	432	3	0	0	0	2	353	2	2	785	5
7 US 101 (Freitas Pkwy-Lucas Valley)	0	4,239	0	0	0	0	0	4,509	0	0	0	0	0	8,748	0
8 US 101 (Mission- N. San Pedro)	0	5,676	0	0	0	0	0	5,301	0	0	0	0	0	10,977	0
9 SFD BI. (San Anselmo-Red Hill)	0	0	0	8	1,480	19	0	0	0	6	1,444	16	14	2,924	35
10 Red Hill BI. (SFD-Hillsdale)	0	0	0	12	1,544	10	0	0	0	9	1,867	2	21	3,411	12
11 US 101 (I-580-Mission)	0	5,097	0	0	0	0	0	6,319	0	0	0	0	0	11,416	0
12 SFD BI. (College-Wolf Grade)	0	0	0	1	1,113	3	0	0	0	7	1,168	4	8	2,281	7
13 US 101 (SFD-I-580)	0	5,102	0	0	0	0	0	5,301	0	0	0	0	0	10,403	0
14 I-580 (Bellam-SFD)	0	0	0	0	1,411	0	0	0	0	0	1,336	0	0	2,747	0
15 I-580 (SFD-San Rafael/Richmond Bridge)	0	0	0	0	2,324	0	0	0	0	0	2,366	0	0	4,690	0
16 SFD BI. (US 101-E. Larkspur Circle)	0	0	0	1	1,113	8	0	0	0	3	1,056	2	4	2,169	10
17 US 101 (SR 131-Paradise)	0	5,331	0	0	0	0	0	5,441	0	0	0	0	0	10,772	0
18 SR 131 (Redwood Frontage Rd.-Strawberry)	0	0	0	49	1,291	0	0	0	0	37	1,304	2	86	2,595	2
19 SR 1 (Northern-Alamonte)	0	0	0	3	826	6	0	0	0	8	764	24	11	1,590	30
20 Bridgeway BI. (Gate 5-Gate 6)	122	971	5	0	0	0	92	960	6	0	0	0	214	1,931	11
21 US 101 (North of GG Bridge-Spencer)	0	3,998	0	0	0	0	0	4,082	0	0	0	0	0	8,080	0
22 SFD BI. (Butterfield-Willow)	0	0	0	4	1,047	18	0	0	0	6	828	21	10	1,875	39
23 SFD BI. (College-Toussin)	0	0	0	1	908	1	0	0	0	10	954	4	11	1,862	5
24 N. Novato BI. (Grant-Diablo)	2	793	3	0	0	0	6	708	10	0	0	0	8	1,501	13
25 SR 1 (US 101-Tennessee Valley)	0	0	0	8	1,532	53	0	0	0	29	1,134	0	37	2,666	53
26 Second St. (US 101-Marquard)	0	0	0	0	0	0	0	0	0	5	2,515	19	5	2,515	19
27 Third St. (US 101-Marquard)	0	0	0	0	0	0	13	1,754	59	0	0	0	13	1,754	59

Source: PHA Transportation consultants – October, November 2006. Surveys were conducted on Saturdays between 12 noon-2 pm. Peak hour represents the four consecutive 15-minute with the highest volumes between 12-2 pm.

Table 17 Intersection LOS/Freeway Merge Analysis
Marin County CMP Transportation System Performance Monitoring Study –2007

Study Locations		From North			From East			From South			From West			V/C	Delay	LOS
		R	T	L	R	T	L	R	T	L	R	T	L			
A1 N. Novato Bl/Diablo Ave.	a.m.	23	474	331	262	291	252	213	304	20	45	222	17	0.68	27.4	C
	p.m.	29	485	466	630	354	403	345	528	55	31	356	38	0.96	52.4	D
A2 SFD/College Ave.	a.m.	0	0	0	0	598	606	397	0	132	262	772	0	0.74	17.8	B
	p.m.	0	0	0	0	859	438	375	0	234	227	797	0	0.68	14.4	B
A3 US 101/ I-580 (Merge analyses)	a.m.	0	0	0	0	3349	0	0	3305	0	0	0	0	N/A*	N/A*	F
	p.m.	0	0	0	0	3378	0	0	9123	0	0	0	0	N/A*	N/A*	F

Source: PHA Transportation consultants – October, November 2006 on Tuesday, Wednesday, and Thursdays 7-9 am and 4-6 pm.

Peak hour represents the four consecutive 15-minute with the highest volumes between 12-2 pm.

For location A1, Novato Boulevard is considered north-south, and Diablo Avenue is considered east-west.

For location A2, College Avenue is north-south, and SFD is east-west.

For location A3, US 101 is north-south, and I-580 is east-west.

* Weaving analyses were not conducted for the US 101/I-580 merge because the distance between the merge and the US 101 off-ramp to Central San Rafael is more than 3,600 feet, which exceeded the maximum spacing criteria 2,500 feet between the merge and the diverge. As such merge analyses were used instead to evaluate the location. Merge area LOS is determined by vehicle density/mi//lane but not V/C or delay.