

# **ATTACHMENT G**

# California Department of Transportation

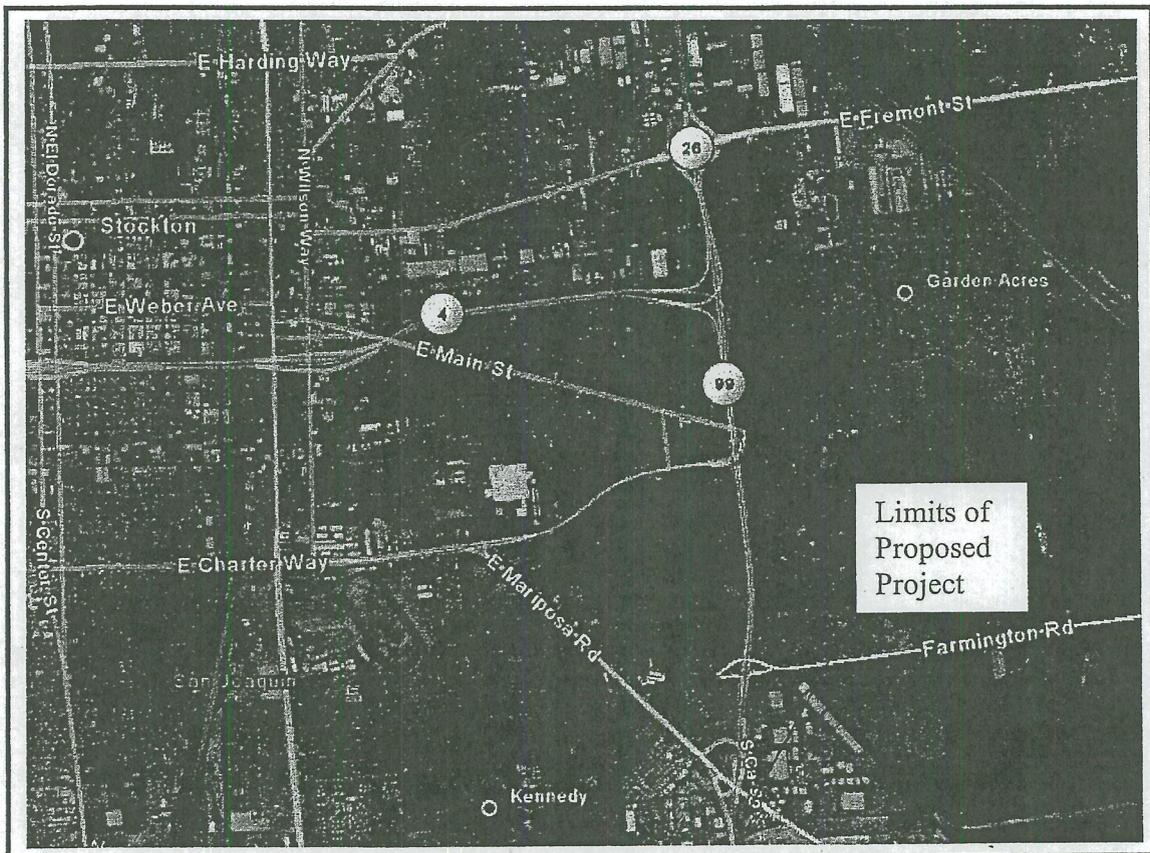
District 10  
OFFICE OF TRAFFIC OPERATIONS  
STOCKTON

STATE ROUTE 99  
In San Joaquin County and in Stockton  
Beginning from 0.4 miles north of Arch Road and ending 0.1 miles south of SR-4 west

## South Stockton Widening Project

### TRAFFIC OPERATIONS ANALYSIS REPORT

EA 3A100\_  
10-SJ-99 PM 15.0/18.6



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DISTRICT 10 OFFICE OF TRAFFIC OPERATIONS

Reviewed by:

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November 1, 2006

# 1. INTRODUCTION

This traffic study is prepared for the South Stockton SR 99 Widening project in San Joaquin County. A traffic operational analysis was performed for the below listed alternatives proposed alternatives of the South Stockton Widening project on SR 99. Please refer to the previously approved Project Study Report/Project Development Study (PSR/PDS) approved on 11/28/2000 for the description of the project including the need and purpose. In order to fulfill the need and purpose of this project the following alternatives are being proposed under Year 2014 and Year 2034 scenarios (see **Appendix for Layouts**):

- Alternative 1 (Interchange at Mariposa Road with Martin Luther King (MLK) JR Blvd/Charter Way ramps closed. SR-4 to be re-aligned through Stagecoach Road.)
- Alternative 2 (Interchange at Mariposa Road and Golden Gate Avenue\* (MLK JR Blvd) and realign SR 4 Farmington Road)
- Alternative 2a (Interchange at Mariposa Road and Golden Gate Avenue\* (MLK JR Blvd) ramp terminal on the west side and realign SR 4 Farmington Road)
- Alternative 3 (Couplet System between Farmington Road and Mariposa Road with MLK JR Blvd/Charter Way ramps closed)
- Alternative 4 (Interchange at Mariposa Road with braided ramps to MLK JR Blvd/ Charter Way)

Also included in the study is a "No build" alternative; however this alternative was not fully analyzed. Level of Service (LOS) analysis was completed for a "No build" alternative and it was determined that there was a need to widen SR 99 as the results of the analysis yielded LOS F for most of this stretch of SR 99 as early as the year 2014. By the year 2034, this entire stretch of SR 99 was experiencing an LOS F. It was concluded by these results that further analysis of the ramps would not be performed since the results indicated that a project would need to be in place to improve the SR 99. In addition, the ramps in this area would need to be upgraded as they do not meet current design standards.

## 1.1 This Report

Since the names of the alternatives have changed over the course of the analysis. In the appendix, some reports still carry previous names for these alternatives. Previous names for Alternatives 1, 2 and 3 are as follows: Alternative 1 (Mariposa Alternative, Cozad Alternative, and 6B Alternative), Alternative 2 (Golden Gate Alternative), and Alternative 3 (Janzen Alternative). For the ease of interpreting and comparing the results and information provided in this report, the names of the alternatives have been updated to the most recent nomenclature used in the latest Project Development Team (PDT) meeting.

## 1.2 Purpose

The purpose of this traffic study report is to document the results of the Design Hour traffic operations analysis for the South Stockton SR 99 Widening project. Traffic Operations analysis for each alternative includes components of the freeway system, ramp terminal intersections and impacted local street intersections. Caltrans District 10 is working cooperatively with the San Joaquin Council of Governments (SJCOG), the City of Stockton, and the San Joaquin County Public Works to advance this project through the approval process. All agencies have provided input during the development of this traffic study. The results contained in this report will serve as the traffic operations section of the Project Approval/Environmental Document (PA/ED).

**Note: (\*)** For Alternative 2 and 2a, rename Golden Gate Ave to MLK JR Blvd.

### 1.3 Study Area

The project study area is within the City of Stockton and San Joaquin County. The study area includes SR 99 between Mariposa Road interchange to SR 4 west connector. For this study, the following interchanges were evaluated:

- Mariposa Road interchange
- Farmington Road interchange
- MLK JR Blvd (Charter Way) interchange

In addition to the mainline and ramp intersection analyses, the following local street and ramp intersections were evaluated for the Year 2014 and Year 2034 with the inclusion of volumes that will be re-routed due to the closure of MLK JR Blvd (Charter Way) under Alternatives 1 and 3 only (see **Figure 1**):

- SR 4/Wilson Way ramp intersections
- SR 4/Filbert Street ramp intersections
- Mariposa Road/Stagecoach Road
- Mariposa Road/East Frontage Road
- Mariposa Road/West Frontage Road
- Mariposa Road/Farmington Road
- Mariposa Road/MLK JR Boulevard (Charter Way)
- Farmington Road/Stagecoach Road
- Farmington Road/Golden Gate Avenue
- Farmington Road/Netherton Avenue
- Golden Gate Avenue/MLK JR Boulevard (Charter Way)
- Main Street/MLK JR Boulevard (Charter Way)
- Filbert Street/Lafayette Street
- Filbert Street/Main Street
- Main Street/Golden Gate Avenue
- Wilson Way/Hazelton Avenue
- Wilson Way/MLK JR Boulevard (Charter Way)

In **Figure 1**, the intersections indicated by a yellow dot are intersections that will experience a significant impact (delay) due to the re-routing of traffic under alternatives 1 & 3 of the South Stockton Widening Project.

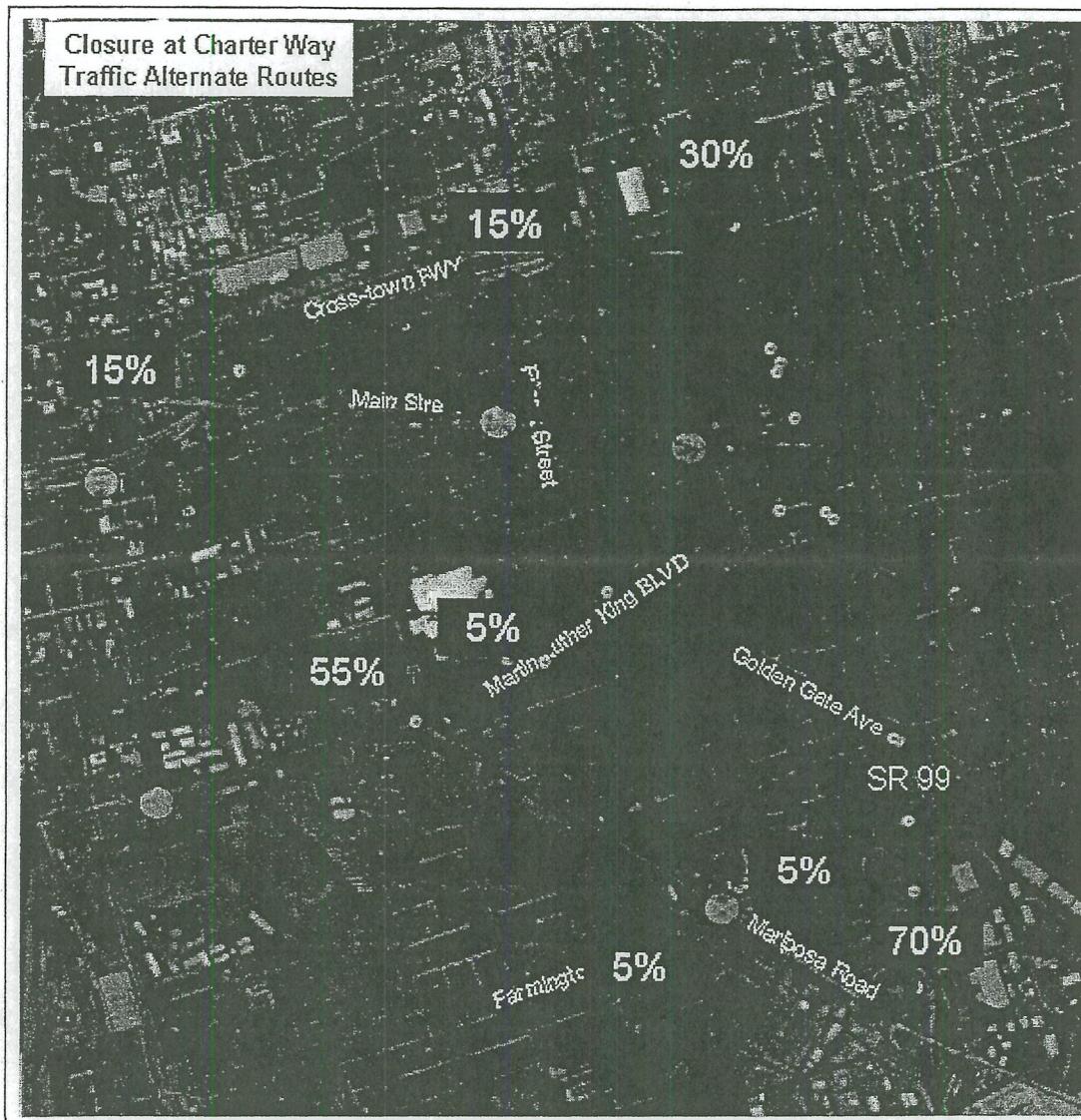


FIGURE 1 – Traffic re-routing pattern, corresponding percentages and impacted intersections under Alternatives 1 & 3

## 2. TRAFFIC ANALYSIS

The traffic data was provided by District 10 Travel Forecasting Branch to perform the analysis for the project design years 2014 and 2034. Traffic data used for the analysis does not include the recently proposed Mariposa Lakes Development located northeast of the Mariposa Road interchange. Depending on the potential impacts the Mariposa Lakes Development may cause, a supplemental traffic analysis may be required.

### 2.1 Analysis Methodology and Key Assumptions

#### Analysis Methodology

All operational analyses were conducted using procedures and methodologies contained in the Highway Capacity Manual (HCM 2000), Transportation Research Board, 2000.

**2.1.1 Freeway mainline segments, ramp junctions (Merge/Diverge)** were analyzed using the Highway Capacity Software (HCS) Version 4.1d. This software is based on Highway Capacity Manual (HCM) 2000 methodology weaving was analyzed using the Leisch Method. Shown on the HCM, the level of service (LOS) for freeway section is based on density (passenger cars/lane/mile). Freeway LOS is a qualitative measure of the traffic flow based on the speed, travel time, delay and freedom to maneuver. There are six levels, ranging from LOS A (i.e. the best operating conditions) to LOS F (i.e. the worst operating conditions). See Table 1. The LOS for freeway ramp junctions is also based on density, as summarized in Table 2.

TABLE 1 FREEWAY MAINLINE LOS CRITERIA		
LOS	Description	Density <sup>1</sup>
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	≤ 11
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	> 11 to 18
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 18 to 26
D	Speeds declined slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	> 26 to 35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	> 35 to 45
F	Represents a breakdown in flow.	*

Notes: (1) Density in passenger cars per mile per lane  
Source: Highway Capacity Manual (Transportation Research Board, 2000)

TABLE 2 FREEWAY RAMP MERGE AND RAMP DIVERGE LOS CRITERIA		
LOS	Description	Density <sup>1</sup>
A	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.	≤ 10
B	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted.	> 10 to 20
C	Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver.	> 20 to 28
D	Speeds declined slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort.	> 28 to 35
E	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing.	> 35 to 43
F	Represents a breakdown in flow.	> 43

Notes: (1) Density in passenger cars per mile per lane  
Source: Highway Capacity Manual (Transportation Research Board, 2000)

2.1.2 Freeway weaving section analysis was performed for “No build” alternative and Alternative 2 only. Analysis of the other alternatives was not necessary since the spacing between ramps exceeds the maximum length (2500 feet) for which weaving analysis is not required.

2.1.3 Signalized and Unsignalized intersections were analyzed using Synchro/SimTraffic, version 6.0. At intersections, LOS is a description of an intersection’s operation, ranging from LOS A (indicating free-flow traffic conditions with little or no delay) to LOS F (representing over saturated conditions where traffic flows exceed design capacity, resulting in long queues and delays). See Table 3.

At side-street stop-controlled intersections, the LOS rating is based on the control delay for each minor movement. Table 4 summarizes the relationships between delay per vehicles and LOS for unsignalized intersections.

TABLE 3 SIGNALIZED INTERSECTION LOS CRITERIA		
LOS	Description	Average Control Delay (secs/vehicle)
A	Operations with very low delay occurring with favorable progression and/or short cycle length.	≤ 10
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10 to 20
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20 to 35
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop and individual cycle failures are noticeable	> 35 to 55
E	Operations with high delay values indicating poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	> 55 to 80
F	Operations with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80

Source: Highway Capacity Manual (Transportation Research Board, 2000)

TABLE 4 UNSIGNALIZED INTERSECTION LOS CRITERIA		
LOS	Description	Total Delay (seconds/vehicle)
A	Little or no conflicting traffic.	≤ 10
B	The approach begins to notice absence of available gaps.	> 10 to 15
C	The approach begins experiencing delay for available gaps.	> 15 to 25
D	The approach experiences queuing due to a reduction in available gaps.	> 25 to 35
E	Extensive queuing due to insufficient gaps.	> 35 to 50
F	Insufficient gaps of suitable size to allow traffic demand to cross safely through a major traffic stream.	> 50

Source: Highway Capacity Manual (Transportation Research Board, 2000)

### 2.1.4 Key Assumptions

- A Peak Hour Factor (PHF) of 0.92 was used for freeway mainline, ramp junctions and roadway intersections.
- A peak hour truck percentage of 13 percent for freeway mainline and a range of 5-15 percent for all local roadways were used.
- A free flow speed of 65 mph was used on the freeway mainline and 45 mph for the ramps and 35 mph for the local roadways.
- The ideal intersection saturation flow rate of 1,900 passenger cars per hour per lane was used for signalized intersections.
- Signalized intersections were analyzed based on the optimum cycle length with the maximum of 120 sec cycle length.

## 2.2 Opening Year (2014) Operations Analysis

### 2.2.1 Freeway Mainline Level of Service Operations

Table 5, provided by Travel Forecasting Branch, summarizes the design hour volumes freeway mainline LOS on SR 99 between MLK JR Blvd (Charter Way) and south of Mariposa Rd. By 2014, which is the opening day for the project, the mainline will be operating at an acceptable LOS; however, many locations will be at LOS D. This indicates that the mainline will be near capacity and will, in a few years, drop to an unacceptable LOS in many locations.

### 2.2.2 Freeway Weaving Level of Service Operations

Under "No build" alternative, the northbound and southbound weaving section on SR 99 between SR 4 west connector and MLK JR Blvd (Charter Way) interchange would operate at LOS E conditions. The combinations of non-standard weaving distance and heavy freeway mainline volumes and on/off ramps merge/diverge volumes result in severe congestion. Similarly, under Alternative 2, the LOS is C for the SR 99 northbound direction (between Mariposa Road off-ramp and Golden Gate Avenue (rename to MLK JR Blvd) on-ramp) and LOS C for the southbound direction (between Golden Gate Avenue (rename to MLK JR Blvd) on-ramp and Mariposa Road off-ramp). The amount of traffic weaving in the northbound direction is minimal; however, the large volumes on the mainline will make it difficult for these vehicles to find a gap and be able to enter. This will only worsen as mainline traffic increases to the year 2034. In the southbound direction, there is a larger weaving volume at the Mariposa Road off-ramp that causes a LOS C. This LOS is acceptable; however, it will begin to deteriorate with increased volumes on the ramp and especially in the mainline. Figure 504.7 (see Appendix) shows the weaving analysis worksheets for the "No build" alternative and Alternative 2.

**Table 5  
Mainline Level of Service and Delay  
Year 2014 and 2034 Conditions - Design Hour**

Count Locations	Existing Conditions		NO BUILD ALTERNATIVE				ALTERNATIVE 1				ALTERNATIVE 2, 2a				ALTERNATIVE 3***			
	2004		2014		2034		2014		2034		2014		2034		2014		2034	
	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS	Pk Hour Count	LOS
<b>MAINLINE</b>																		
S/B SR 99 N/o Arch	3,075	D	3,879	E	6,505	F	4,128	C	7,000	F	3,997	C	6,726	F	4,482	C	7,067	F
N/B SR 99 N/o Arch	3,195	D	3,627	E	6,596	F	3,959	C	6,830	F	4,135	C	7,361	F	4,020	C	7,078	F
S/B SR 99 N/o Mariposa	3,415	D	4,089	F	5,928	F	4,590	D	7,414	F	4,408	C	7,336	F	3,606	C	5,769	F
N/B SR 99 N/o Mariposa	3,575	D	4,033	F	6,858	F	4,095	C	7,032	F	4,542	C	7,963	F	3,116	B	5,866	E
S/B SR 99 N/o Farmington	3,715	E	4,232	F	6,297	F	4,590	D	7,414	F	4,408	C	7,336	F	4,684	D	7,367	F
N/B SR 99 N/o Farmington	3,855	E	4,249	F	6,297	F	4,095	D	7,032	F	4,542	C	7,963	F	4,358	C	7,706	F
S/B SR 99 N/o MLK JR Blvd (Charter Way)	4,300	E	4,875	E	6,256	F	4,590	D	7,414	F	4,671	D	7,724	F	4,684	D	7,773	F
N/B SR 99 N/o MLK JR Blvd (Charter Way)	4,300	E	4,875	E	6,256	F	4,095	C	7,032	F	4,613	C	8,067	F	4,358	C	7,706	F

Note: -Mainline Truck Percentage = 16%

-Design Hourly Volume (DHV) represents 10% of Average Daily Traffic (ADT) See attached Diagrams for further details (in Appendix)

### 2.2.3 Freeway Ramp Junctions Level of Service Operations

Table 6 summarizes the on-ramp merge and off-ramp diverge section LOS for all ramp junctions. Based on the Design Hour results of the Year 2014, the on-ramp merge and off-ramp diverge will operate at acceptable LOS conditions. However, some locations will begin to drop to near unacceptable levels at opening day. See Appendix for calculation worksheets.

To improve the merge LOS, ramp meters should be installed at the on-ramps to control the traffic flow entering the freeway during the peak hours.

Table 6 – On-ramp Merge & Off-ramp Diverge Analysis Summary (For applicable alternatives) 2014									
Alternative	Street/Road	Merge	#Lanes	LOS** 2014	Density* pc/mi/l <sub>n</sub>	Diverge	#Lanes	LOS 2014	Density* pc/mi/l <sub>n</sub>
ALT 1	Mariposa Rd	NB on-ramp loop	1	C	20.9	NB off-ramp	2	C	27.2
		NB on-ramp	1	B	15.2	SB off-ramp	2	D	31.7
		SB on-ramp loop	1	C	20.5				
		SB on-ramp	1	B	15.5				
ALT 2/2a	MLK JR Blvd/Golden Gate Ave	NB on-ramp	1	B	18.6	NB off-ramp	1	D	28.5
		SB on-ramp	1	C	24.8	SB off-ramp	2	D	29.5
	Mariposa Rd	NB on-ramp loop	1	C	24.4	NB off-ramp	1	C	27.1
		NB on-ramp	1	B	17.4	SB off-ramp	1	D	29.8
		SB on-ramp	1	B	14.6				
		SB on-ramp loop	1	B	19.4				
ALT 3	Farmington Rd	NB on-ramp	1	B	18.1	SB off-ramp	2	D	30.4
	Mariposa Rd	SB on-ramp	1	B	18.1	NB off-ramp	1	C	26.8

\*Density = Passenger car per mile per lane (pc/mi/l<sub>n</sub>)

\*\*Merge locations where LOS for on-ramp drops below LOS D will require a Ramp Meter.

### 2.2.4 Intersection Analysis

The intersections were analyzed using Synchro/SimTraffic 6.0. The results were taken from SimTraffic as this was the preferred software due to the synchronization of most of these intersections. The lane configuration for each of the alternatives at the proposed interchanges was determined based on Year 2034 vehicle demands (see Appendix). For other affected intersections, an analysis was performed for Year 2014 without the re-routing of traffic and another analysis was performed with the inclusion of volumes that will be re-routed due to the closure of MLK JR Blvd (Charter Way) under Alternatives 1 and 3 only. Many of these intersections will not be experiencing an increased in traffic with the other alternatives; therefore, an analysis was not necessary. See Pages 16-21 of this report for Design Hour volumes and Table 7 intersections LOS for each of the alternatives.

**Table 7  
Intersection Level of Service and Delay  
Year 2014 Conditions - Design Hour**

		Alternative				
		ALT1 - MPA	ALT2 - GG (MLK JR Blvd)	ALT3 - Couplet	ALT4 Braided ramps	ALT2a - Alt MLK JR/GG
		Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>
1	Mariposa Road / Stagecoach Rd	17.7 sec/ B	16.7 sec/ B	19.7 sec/ C	20.6 sec/ C	See Alt 2 result
2	Mariposa Road / East Frontage Rd	22.4 sec/ C	15.3 sec/ B	14.0 sec/ B	26.7 sec/ C	See Alt 2 result
3	Mariposa Road / SR 99 NB ramp Int	15.9 sec/ B	12.5 sec/ B	11.3 sec/ B	13.7 sec/ B	See Alt 2 result
4	Mariposa Road / SR 99 SB ramp int.	9.1 sec/ A	9.8 sec/ B	10.9 sec/ B	12.4 sec/ B	See Alt 2 result
5	Mariposa Road / West Frontage Rd	15.8 sec/ B	16.8 sec/ B	20.8 sec/ C	17.3 sec/ B	See Alt 2 result
6	Mariposa Road / Farmington Road	70.6 sec/ E	See Alt 4 result	83.3 sec / F	64.5 sec/ E	See Alt 2 result
7	Farmington Road / Golden Gate Ave	n/a <sup>2</sup>	19.6 sec/ C	n/a <sup>2</sup>	n/a <sup>2</sup>	See Alt 2 result
8	Farmington Road / Stagecoach Rd.	26.4 sec/ C	3.9 sec/ A	14.6 sec/ B	39.6 sec/ D	See Alt 2 result
9	Farmington Road / east couplet	n/a <sup>2</sup>	n/a <sup>2</sup>	21.1 sec/ C	n/a <sup>2</sup>	n/a <sup>2</sup>
10	Farmington Road / west couplet	n/a <sup>2</sup>	n/a <sup>2</sup>	21.1 sec/ C	n/a <sup>2</sup>	n/a <sup>2</sup>
11	Farmington Road / Netherton Ave	10.7 sec/ B	11.5 sec/ B	n/a <sup>2</sup>	11.4 sec/ B	See Alt 2 result
12	Golden Gate Ave / SR 99 NB ramp int.	n/a <sup>2</sup>	17.2 sec/ B	n/a <sup>2</sup>	n/a <sup>2</sup>	See Alt 2 result
13	Golden Gate Ave / SR 99 SB ramp int.	n/a <sup>2</sup>	16.4 sec/ B	n/a <sup>2</sup>	n/a <sup>2</sup>	See Alt 2 result
14	Golden Gate Ave / MLK JR Blvd (Charter Way)	14.5 sec/ B	21.5 sec/ C	21.3 sec / C	39.1 sec/ D	See Alt 2 result
15	Golden Gate Ave / SR 99 Single Ramp Int.	n/a <sup>2</sup>	n/a <sup>2</sup>	n/a <sup>2</sup>	n/a <sup>2</sup>	16.1 sec / B See Alt 2 result
16	Main St. /MLK JR Blvd (Charter Way)	20.9 sec / C	See Alt 4 result See Alt 4 result	See Alt 1 result	20.4 sec/ C	See Alt 2 result
17	Filbert St/ SR 4 WB Ramps	10.9 sec/ B	See Alt 4 result	27.1 sec / C	22.0 sec / C	See Alt 2 result
18	Filbert St/ SR 4 EB Ramps	8.2 sec/ A	See Alt 4 result	27.2 sec / C	10.4 sec/ B	See Alt 2 result
19	Filbert St/ Lafayette St	8.6 sec/ A	See Alt 4 result	10.7 sec / B	9.8 sec/ A	See Alt 2 result
20	Filbert St/ Main St	24.7 sec/ C	See Alt 4 result	23.1 sec / C	16.5 sec/ B	See Alt 2 result
21	Main St / Golden Gate Ave	14.8 sec/ B	See Alt 4 result	See Alt 1 result	24.5 sec/ C	See Alt 2 result
22	Wilson Way /SR 4 WB Ramps	41.4 sec/ D	See Alt 4 result	See Alt 1 result	34.2 sec/ C	See Alt 2 result
23	Wilson Way /SR 4 EB Ramps	42.5 sec/ D	See Alt 4 result	See Alt 1 result	32.3 sec/ C	See Alt 2 result
24	Mariposa Rd/ MLK JR Blvd (Charter Way)	45.2 sec/ D	See Alt 4 result	See Alt 1 result	48.3 sec/ D	See Alt 2 result
25	Wilson Way / Hazelton Ave	19.5 sec/ C	See Alt 4 result	See Alt 1 result	14.9 sec/ B	See Alt 2 result
25	Wilson Way / MLK JR Blvd (Charter Way)	45.0 sec/ D	See Alt 4 result	See Alt 1 result	46.6 sec/ D	See Alt 2 result

(1) Average Control delay and corresponding LOS for signalized intersections

(2) n/a - not applicable or not analyzed in this alternative

(3) Includes improvements as part of the South Stockton Widening

Heavy right turn movements will need to be converted to "free right movements" (heavy right turn movements are movements that require two lanes – see attached SimTraffic output files).

Results in **bold** represent intersections that are significantly impacted due to the redistribution of traffic as a result of the South Stockton Widening Project.

## 2.3 Design Year (2034) Operations Analysis

### 2.3.1 Freeway Mainline Level of Service Operations

Table 5 for Year 2034 shows that the projected increase in the mainline volume will exceed the capacity of three (3) northbound and three (3) southbound freeway mainline lanes. Therefore, SR 99 within the study segments is projected to operate at unacceptable LOS F conditions. Mainline SR 99 can be improved under Design Year 2034 by widening of the freeway from six (6) to eight (8) total lanes.

### 2.3.2 Freeway Weaving Level of Service Operations

Under “No build” alternative, the northbound and southbound weaving section on SR 99 between SR 4 west connector and MLK JR Blvd (Charter Way) interchange, both would operate LOS F conditions. The combinations of non-standard weaving distance and heavy freeway mainline volumes and on/off ramps merge/diverge volumes result in severe congestion. Under Alternative 2, the LOS is F for the SR 99 northbound direction (between Mariposa Road off-ramp and Golden Gate Avenue (rename to MLK JR Blvd) on-ramp) and LOS F for the southbound direction (between Golden Gate Avenue (rename to MLK JR Blvd) on-ramp and Mariposa Road off-ramp). In order to bring the LOS to an acceptable level LOS D or better for weaving, an additional lane on SR 99 in each direction would be needed. The volumes on the SR 99 mainline do not allow for sufficient gaps for weaving to occur (see *2.3.1 Freeway Mainline Level of Service Operations* section above). Figure 504.7 (see Appendix) shows the weaving analysis worksheets for the “No build” alternative and Alternative 2.

### 2.3.3 Freeway Ramp Junctions Level of Service Operations

Table 8 summarizes the on-ramp merge and off-ramp diverge section LOS for all ramp junctions. Based on the Design Hour results of the Year 2034, the on-ramp merge and off-ramp diverge will operate at unacceptable LOS F conditions. Providing two-lane off-ramp and ramp metering and HOV bypass would improve the ramp junctions. See Appendix for calculation worksheets.

Table 8 – On-ramp Merge & Off-ramp Diverge Analysis Summary (For applicable alternatives) 2034									
Alternative	Street/Road	Merge	#Lanes	LOS** 2034	Density* pc/mi/ln	Diverge	#Lanes	LOS 2034	Density* pc/mi/ln
ALT 1	Mariposa Rd	NB on-ramp loop	1	F	37.0***	NB off-ramp	2	F	30.2***
		NB on-ramp	1	F	33.7***	SB off-ramp	2	F	37.5***
		SB on-ramp loop	1	F	36.9***				
		SB on-ramp	1	F	33.7***				
ALT 2/2a	Golden Gate Ave	NB on-ramp	1	F	39.0***	NB off-ramp	1	F	41.9
		SB on-ramp	1	F	41.1	SB off-ramp	2	F	29.1***
	Mariposa Rd	NB on-ramp loop	1	F	43.8	NB off-ramp	1	F	41
		NB on-ramp	1	F	38.4	SB off-ramp	1	F	43
		SB on-ramp	1	F	31.8***				
		SB on-ramp loop	1	D	33.7				
ALT 3	Farmington Rd	NB on-ramp	1	F	40.5	SB off-ramp	2	F	31.7***
	Mariposa Rd	SB on-ramp	1	F	35.0***	NB off-ramp	1	F	40.3

Notes:

\*Density = Passenger car per mile per lane (pc/mi/ln)

\*\*Merge locations where LOS drops below LOS D will require a Ramp Meter.

\*\*\*Overcapacity on the mainline causes unstable conditions at the merge and diverge influence area (entrance & exit). This overcapacity results as a LOS F for the entire ramp, even though the ramp delay does not exceed 35 pc/mi/ln (see HCM 2000 Exhibit 25-4).

### 2.3.4 Intersection Analysis

The intersections were analyzed using Synchro/SimTraffic 6.0. The results were taken from SimTraffic as this was the preferred software due to the synchronization of most of these intersections. The lane configuration for each of the alternatives, at the proposed interchanges was determined based on Year 2034 vehicle demands (See Appendix). For other affected intersections, an analysis was performed for Year 2034 without the re-routing of traffic and another analysis was performed with the inclusion of volumes that will be re-routed due to the closure of MLK JR Blvd (Charter Way) under alternatives 1 and 3 only. Many of these intersections will not be experiencing an increased in traffic with the other alternatives; therefore, an analysis was not necessary. See Pages 22-27 of this report for Design Hour volumes and Table 9 intersection LOS for each of the alternatives.

**Table 9  
Intersection Level of Service and Delay  
Year 2034 Conditions - Design Hour**

		Alternative				
		ALT1 - MPA	ALT2 – GG (MLK JR Blvd)	ALT3 - Couplet	ALT4 Braided ramps	ALT 2a - GG (MLK JR Blvd)
		Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>	Delay/LOS <sup>1</sup>
1	Mariposa Road / Stagecoach Rd	26.3 sec/ C	19.6 sec/ C	22.1 sec/ C	28.6 sec/ C	See Alt 2 result
2	Mariposa Road / East Frontage Rd	20.0 sec/ C	18.0 sec/ B	20.9 sec/ C	31.3 sec/ C	See Alt 2 result
3	Mariposa Road / SR 99 NB ramp Int	22.5 sec/ C	9.4 sec/ B	30.1 sec/ C	22.8 sec/ C	See Alt 2 result
4	Mariposa Road / SR 99 SB ramp int.	42.7 sec/ D	25.6 sec/ C	13.1 sec/ B	12.2 sec/ B	See Alt 2 result
5	Mariposa Road / West Frontage Rd	37.1 sec/ D	44.2 sec/ D	24.3 sec/ C	19.0 sec/ B	See Alt 2 result
6	Mariposa Road / Farmington Road	<b>83.8 sec/ F</b>	See Alt 4 result	<b>119.6 sec / F</b>	<b>88.2 sec/ F</b>	See Alt 2 result
7	Farmington Road / Golden Gate Ave	n/a <sup>2</sup>	31.8 sec/ C	n/a <sup>2</sup>	n/a <sup>2</sup>	See Alt 2 result
8	Farmington Road / Stagecoach Rd.	46.9 sec/ D <sup>3</sup>	7.7 sec/ A	14.8 sec/ B	41.9 sec/ D <sup>3</sup>	See Alt 2 result
9	Farmington Road / east couplet	n/a <sup>2</sup>	n/a <sup>2</sup>	21.8 sec/ C	n/a <sup>2</sup>	n/a <sup>2</sup>
10	Farmington Road / west couplet	n/a <sup>2</sup>	n/a <sup>2</sup>	34.8 sec/ C	n/a <sup>2</sup>	n/a <sup>2</sup>
11	Farmington Road / Netherton Ave	12.2 sec/ B	13.5 sec/ B	n/a <sup>2</sup>	12.9 sec/ B	See Alt 2 result
12	Golden Gate Ave / SR 99 NB ramp int.	n/a <sup>2</sup>	34.3 sec/ D	n/a <sup>2</sup>	n/a <sup>2</sup>	See Alt 2 result
13	Golden Gate Ave / SR 99 SB ramp int.	n/a <sup>2</sup>	35.6 sec/ D	n/a <sup>2</sup>	n/a <sup>2</sup>	See Alt 2 result
14	Golden Gate Ave / MLK JR Blvd (Charter Way)	24.1 sec / C	46.3 sec/ D	23.0 sec / C	<b>81.0 sec / F</b>	See Alt 2 result
15	Golden Gate Ave / SR 99 Single Ramp Int.	n/a <sup>2</sup>	n/a <sup>2</sup>	n/a <sup>2</sup>	n/a <sup>2</sup>	37.9 sec / D
16	Main St. /MLK JR Blvd (Charter Way)	22.2 sec / C	See Alt 4 result	See Alt 1 result	21.0 sec / C	See Alt 2 result
16	Filbert St/ SR 4 WB Ramps	28.3 sec / C	See Alt 4 result	23.7 sec / C	26.2 sec / C	See Alt 2 result
17	Filbert St/ SR 4 EB Ramps	48.9 sec / D	See Alt 4 result	50.1 sec / D	47.8 sec / D	See Alt 2 result
18	Filbert St/ Lafayette St	29.5 sec / C	See Alt 4 result	22.6 sec / C	26.7 sec / C	See Alt 2 result
19	Filbert St/ Main St	<b>68.0 sec / E</b>	See Alt 4 result	65.0 sec / E	66.8 sec / E	See Alt 2 result
20	Main St / Golden Gate Ave	42.4 sec / D	See Alt 4 result	See Alt 1 result	27.7 sec / C	See Alt 2 result
21	Wilson Way /SR 4 WB Ramps	<b>145.3 sec/ F</b>	See Alt 4 result	See Alt 1 result	<b>109.1 sec / F</b>	See Alt 2 result
22	Wilson Way /SR 4 EB Ramps	<b>96.7 sec/ F</b>	See Alt 4 result	See Alt 1 result	<b>146.1 sec / F</b>	See Alt 2 result
23	Mariposa Rd/ MLK JR Blvd (Charter Way)	43.5 sec / D	See Alt 4 result	See Alt 1 result	47.9 sec / D	See Alt 2 result
24	Wilson Way / Hazelton Ave	22.4 sec/ C	See Alt 4 result	See Alt 1 result	19.3 sec / B	See Alt 2 result
25	Wilson Way / MLK JR Blvd (Charter Way)	<b>103.7 sec / F</b>	See Alt 4 result	See Alt 1 result	<b>83.8 sec / F</b>	See Alt 2 result

(1) Average Control delay and corresponding LOS for signalized intersections

(2) n/a - not applicable or not analyzed in this alternative

(3) Includes improvements as part of the South Stockton Widening

Heavy right turn movements will need to be converted to "free right movements" (heavy right turn movements are movements that require two lanes – see attached SimTraffic output files)

Results in Bold represent intersections that are significantly impacted due to the redistribution of traffic as a result of the South Stockton Widening Project.

### 2.3.5 Local street impacts all alternatives

Alternatives with the most impacts to the local streets are Alternatives 1 and 3 with MLK JR Blvd (Charter Way) ramps closed. Based on the results of the forecasting data provided by District 10 Travel Forecasting Branch, upon closing MLK JR Blvd (Charter Way) under Alternative 1, there will be a distribution of traffic to three major interchanges. Most of the traffic will be diverted to the SR 99/Mariposa Road interchange, with a 70% diversion. The remaining 30% will be diverted to SR 4/ Filbert Street (15%) and SR 4/Wilson Way (15%). As shown on **Table 7 and Table 9**, there are a few intersections that will have a significant impact; however, the amount of impact will be trivial, except for the following intersections (See **Figure 12**):

- Mariposa Road/Farmington Road
- Filbert Street/Main Street
- Main Street/Golden Gate Avenue\*
- Wilson Way/SR 4 westbound off-ramp,
- Wilson Way/SR 4 eastbound on-ramp
- MLK Blvd JR (Charter Way)/Wilson Way

Alternative 2 and Alternative 2a have the lowest impact to local streets. Although MLK JR (Charter Way) ramps are closed in these alternatives, all of the traffic is assumed to go to Golden Gate Avenue (MLK JR Blvd) interchange. The only intersection to be impacted will be Mariposa Road/Farmington Road intersection due to the closure of the Farmington Road interchange.

Similarly to Alternative 1, Alternative 3 has a significant impact to the following intersections:

- Mariposa Road/Farmington Road
- Filbert Street/Main Street
- Main Street/Golden Gate Avenue\*
- Wilson Way/SR 4 westbound off-ramp
- Wilson Way/SR 4 eastbound on-ramp
- MLK JR Blvd (Charter Way)/Wilson Way

Alternative 4, braided ramps, has a low impact to local streets. Since this alternative keeps MLK JR Blvd (Charter Way) open with braided ramps, there is no re-routing of traffic through SR 4/Wilson Way and SR 4/Filbert Street ramps. The level of impact due to this alternative will be to MLK JR Blvd (Charter Way)/Golden Gate Avenue intersection and Farmington Road/Mariposa Road intersection, due to the closure of SR 99/Farmington Road interchange.

Following are the suggested intersection improvements under Alternative 1 and Alternative 3

- Mariposa Road/Farmington Road: add northbound and southbound left-turn, thru and right-turn lanes, westbound left-turn and eastbound right-turn lanes.
- \*Golden Gate Avenue/Main Street: adjust signal timing and lengthen the left-turn and right-turn lanes.
- Filbert Street/Main Street: adjust signal timing and lengthen the left-turn and right-turn lanes.
- SR 4/Wilson Way westbound off-ramp: adjust signal timing and add westbound left-turn lane.
- SR 4/Wilson Way eastbound on-ramp: adjust signal timing and add northbound right-turn lane.
- MLK JR Blvd (Charter Way)/Wilson Way: adjust signal timing and add eastbound left-turn lane.

\* Keeping a Charter Way (MLK JR Blvd) over crossing to Main Street would eliminate impacts to this intersection as a result of the South Stockton Widening project.

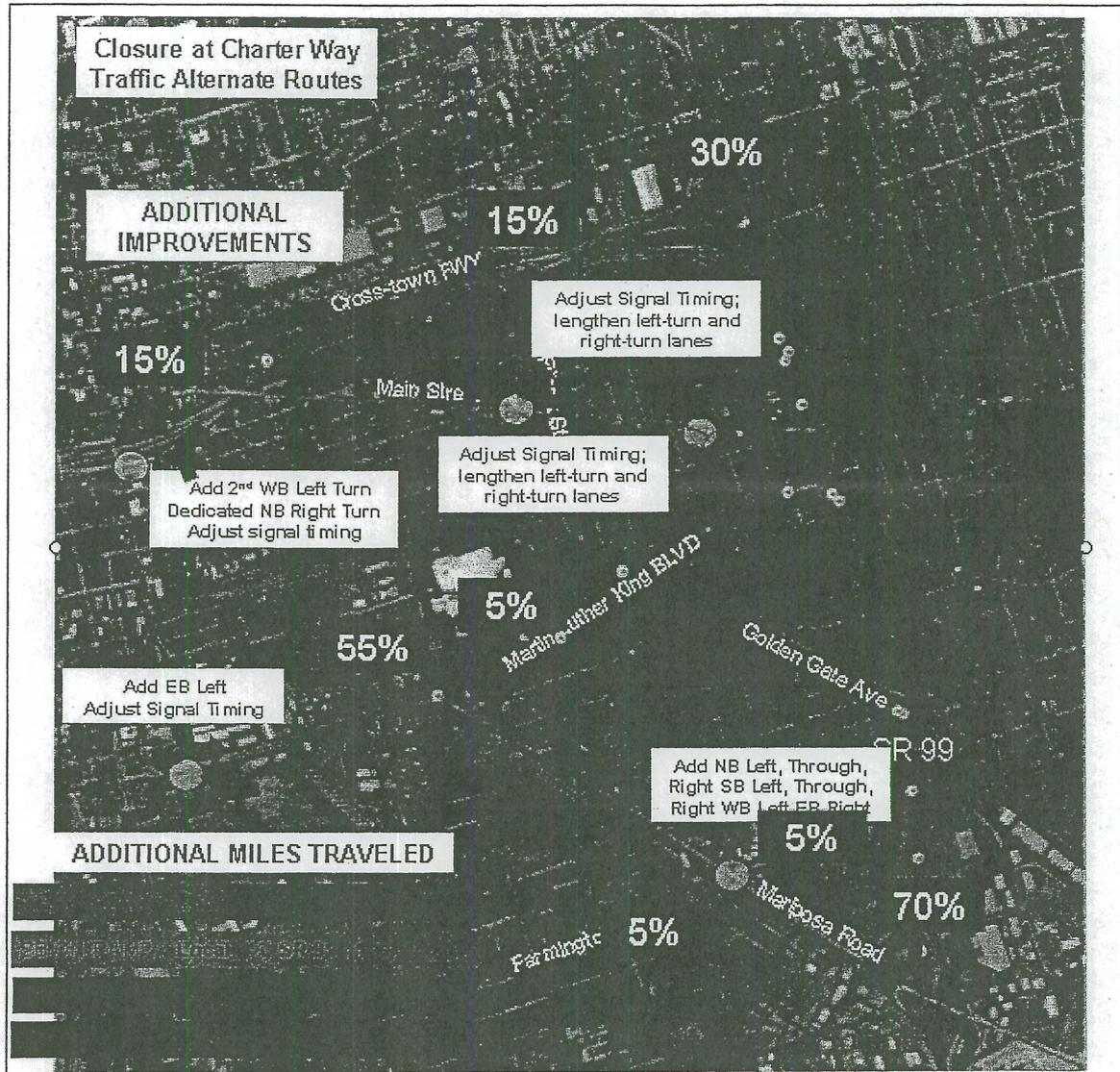


FIGURE 12 – Additional local street improvements as a result of re-routing of traffic for Alt 1 & 3

### 3. CONCLUSION

The Alternative with the overall best operational performance is Alternative 2. This alternative does not require re-routing of traffic to local streets. All traffic using the MLK JR Blvd (Charter Way) interchange will be re-routed to the Golden Gate Avenue (rename to MLK JR Blvd) interchange. Most importantly, this alternative works well with the current approved Duck Creek and Mariposa Lakes Developments because of the realignment of SR 4 Farmington Road to the Golden Gate Avenue (MLK JR Blvd) interchange.

Alternative 2a has the same alignment as Alternative 2, except the northbound and southbound off ramps are connected to one intersection on the west side of the interchange. These ramps will join before connecting to Golden Gate Avenue (rename to MLK JR Blvd), which will allow the traffic to weave into the respective turn lanes. The distance for weaving to occur and provide the necessary storage will significantly affect the placement and/or radius of the northbound off-ramp loop. In addition, the merge point of the two off-ramps could potentially not provide the necessary sight distance due to the difference in superelevation at the ramp convergence point. Eastbound Golden Gate Avenue traffic making left turns to the northbound and southbound on-ramp will need special overhead signs and pavement delineation to avoid any confusion. Also, under this alternative, the overall intersection will require a number of lanes that is atypical of ramp

intersections. This interchange configuration is difficult to expand in the future, since essentially two ramp intersections have already been combined into one.

Alternative 4 (braided ramps) has low impacts to local streets. Since this alternative keeps MLK JR Blvd (Charter Way) open with braided ramps. The primary drawback of this alternative is the proposed isolated Main St northbound off-ramp from the SR 4 connector. This isolated off-ramp would require a longer storage length to prevent traffic queuing back into the SR 4 connector.

Alternative 1 and Alternative 3 do not provide the overall acceptable operations on the freeway, ramps and adjacent roadways. These alternatives will eliminate the MLK JR Blvd (Charter Way) access and traffic will be re-routing to either Mariposa Road interchange or Farmington Road interchange. The proposed configuration necessary for the acceptable operation of this interchange does not leave much room for future expansion.

Based on the above statements, District 10 Traffic Operations Branch Recommends Alternative 2 as the Preferred Build Alternative.