I-205 / I-5 Corridor System Management Plan

Prepared for

California Department of Transportation

San Joaquin Council of Governments

Prepared by

DKS Associates

TRANSPORTATION SOLUTIONS

May 20, 2010

FINAL

I-205 and I-5 Corridor System Management Plan

Recommend Approval:

5/27/10

Ken Baxter **Date**

Deputy District Director
Planning and Local Assistance
California Department of Transportation
District 10

Recommend Approval:

5/27/10

Dennis T. Agar **Date**

Deputy District Director
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I approve this Corridor System Management Plan as the overall Policy Statement and Strategic Plan that will guide transportation decisions, investments and system management of the I-205 and I-5 Corridor within San Joaquin County.

6/1/10

Ross A. Chittenden **Date**

District 10 Director
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for

6-25-10

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I-205 / I-5 Corridor System Management Plan

San Joaquin County

Final Report

Prepared for

State of California
Department of Transportation

Prepared by

DKS Associates
TRANSPORTATION SOLUTIONS

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Executive Summary

This report presents the results of the I-205/I-5 Corridor System Management Plan (CSMP) co-developed by Caltrans District 10, the San Joaquin Council of Governments (SJCOG) and the various corridor stakeholders.

Background

The I-205/I-5 CSMP corridor focuses on the freeway segments of I-205 between the Alameda/San Joaquin County line and the I-5 interchange (the entirety of I-205 in San Joaquin County) and I-5 from the I-205 interchange to the SR-12 interchange in San Joaquin County. Because the CSMP must address not only the designated state highway, the CSMP Corridor transportation network includes other state highways, major arterials, intercity and interregional rail, regional transit services, major intermodal facilities, and regional bicycle facilities. The precise limits of the I-205/I-5 CSMP in San Joaquin County area were determined through a collaborative cooperative process between District 10, San Joaquin County Council of Governments, San Joaquin County, the cities of Stockton, Lodi, Lathrop, Manteca, Tracy, and other local and regional agencies along the corridor. The agreed upon roadway analysis network is illustrated in Figure E-1. In addition to the CSMP freeway segments, this network includes portions of I-205 and I-580 in Alameda County, portions of the SR 4 and SR 120 freeway, and major arterials. This extended network was deemed necessary to assess traffic operations in the CSMP corridor.

A CSMP is a transportation planning document that provides for the safe, efficient and effective mobility of people and goods within the most congested transportation corridors. Each CSMP presents an analysis of existing and future traffic conditions and proposes traffic management strategies and capital improvements to maintain and enhance mobility within each corridor. The purpose of a CSMP is to “Preserve the mobility gains of urban corridor capacity improvements over time and to describe how they intend to do so in project nominations” (California Transportation Commission (CTC) Corridor Mobility Improvement Account (CMIA) Program Guidelines, Nov. 8, 2006).

The preparation of this CSMP is a CTC requirement for the use of “Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006” funds, approved by the voters as Proposition 1B on November 7, 2006. The purpose of the CSMP is to reduce congestion within the I-205/I-5 corridor limits, enhance safety, and to preserve the mobility gains of the Proposition 1B investments. Proposition 1B CMIA funds have been allocated for the I-205 Auxiliary Lane project in San Joaquin County. This project is expected to go to construction in the fall of 2010.

The full description of the CMIA project consists of auxiliary lanes and extended acceleration and deceleration lanes, including outside shoulders, at seven locations on I-205 as follows:

- Location 1A - Auxiliary Lane – Eleventh St. to Mountain House Parkway – Westbound (PM 1.9/2.7)

- Location 1B – Auxiliary Lane – Mountain House Parkway to Eleventh St. – Eastbound (PM 2.0/2.6)
- Location 2 – Acceleration Lane – Tracy Blvd. on-ramp – Westbound (PM 6.5/6.8)
- Location 3 – Deceleration Lane – Tracy Blvd. off-ramp – Westbound (PM 7.3/7.5)
- Location 4A – Acceleration Lane – Grant Line Road on-ramp – Eastbound (PM 5.7/5.9)
- Location 4B – Deceleration Lane – Tracy Blvd. off-ramp – Eastbound (PM 6.5/6.8)
- Location 5 – Acceleration Lane – Tracy Blvd. on-ramp – Eastbound (PM 7.3/7.5)

The development and successful implementation of the I-205/I-5 CSMP was dependent upon a collaborative cooperative process between District 10, SJCOG, San Joaquin County, the cities of Stockton, Lodi, Lathrop, Manteca, Tracy, and other local and regional agencies along the corridor. A project development team of key stakeholders was formed to discuss, provide technical assistance, review, and comment on the development of the CSMP.

The CSMP was developed through the following series of milestones:

1. Define Corridor
2. Assemble Corridor Team
3. Develop Preliminary Corridor Performance Assessment
4. Develop Comprehensive Corridor Performance Assessment
5. Identify Causality of Corridor Performance Degradation
6. Develop and Test Improvement Scenarios
7. Develop Corridor System Management Plan
8. Adoption by Regional Transportation Planning Agency and Caltrans, District 10.

This final CSMP report (Milestone 7) is a compilation and summary of the intermediate products which were delivered as part of the technical analysis performed in earlier milestones in support of the CSMP.

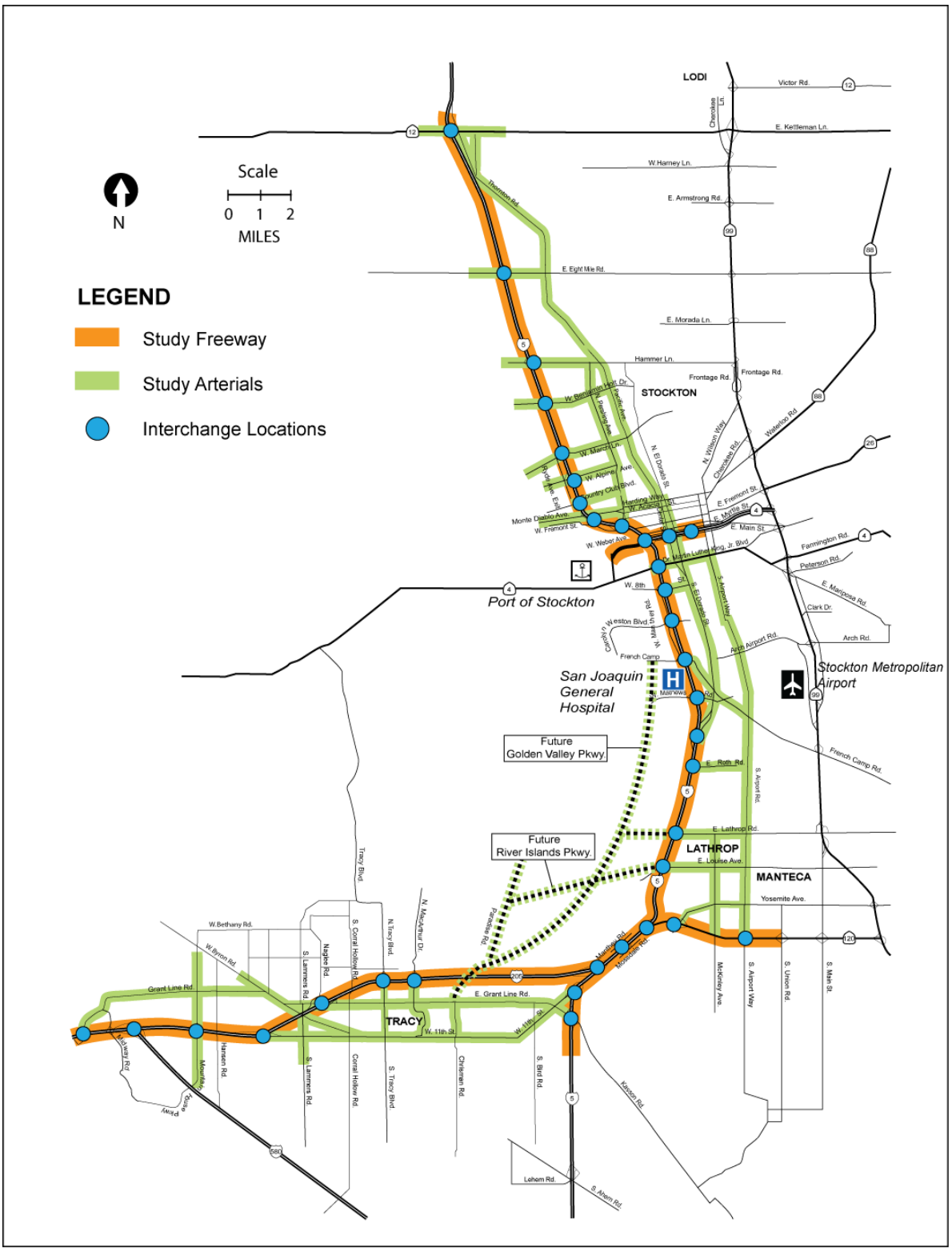

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Figure E-1 Corridor Analysis Network

Summary of Existing Conditions and Trends

I-205 is an important east/west highway in San Joaquin County. It crosses the city of Tracy, and serves as a major interregional connector for moving goods and people between the northern San Joaquin Valley and the San Francisco Bay Area.

In California, I-5 begins at the Southern San Diego city limits at the United States/Mexico international boundary and ends at the California/Oregon State line in Siskiyou County. It is a major north-south interregional freeway of statewide significance; carries a large volume of interstate and interregional traffic; serves major population centers, international border crossings, ports, airports, public transportation facilities, and major travel destinations; and meets national defense requirements. I-5 also serves as a major interregional connector between the San Joaquin Valley communities and the Pacific Coast areas through its links with other interstate and State routes.

Existing travel demand conditions and trends within San Joaquin County are summarized in **Table E-1.** This table illustrates the significant level of growth expected within San Joaquin County over the next 20 years.

Table E-1 SJCOG Daily Vehicle Trip and Traffic Growth Forecasts

Total San Joaquin County									
	SJCOG Forecasts			Growth			% Growth		
Year	Trips	VMT	VHT	Trips	VMT	VHT	Trips	VMT	VHT
2006	2,559,789	13,291,334	295,064	NA	NA	NA	NA	NA	NA
2014	2,806,832	14,674,024	323,172	247,043	1,382,691	28,107	10%	10%	10%
2024	3,346,098	17,891,971	397,231	786,309	4,600,638	102,166	31%	35%	35%
2030	4,045,003	21,633,157	562,010	1,485,214	8,341,823	266,945	58%	63%	90%

Source: SJCOG Travel Demand Model Datasets

Recent years have seen a marked increase in population growth (over 60 percent growth since 1980) in San Joaquin County. Over time, however, a growing imbalance between the number of workers who live in San Joaquin County and the number of jobs actually located there has been created, even though both have grown steadily over the past two decades. One key consequence of this imbalance has been extensive commuting out of the study area in the morning peak hours along I-205 to the Bay Area and along I-5 to Sacramento, with heavy return traffic in the afternoon peak hours.

In the future, this out-commute pattern is expected to continue and even become more pronounced in northern Stockton. Currently I-5's peak direction is southbound in the morning between northern Stockton and downtown Stockton and northbound on I-5 in the evening. According to the SJCOG travel demand model, between 2006 and the year 2014 there is more residential growth in northern Stockton than there is job growth in downtown Stockton. The model also shows large job growth in the Sacramento region by 2014. These changing trends in land use cause shifts in the future traffic patterns with large growth in northbound I-5 traffic commuting from Stockton to Sacramento in the AM and large growth in southbound I-5 traffic

returning from Sacramento back to Stockton in the PM. This pattern is reinforced by severe congestion on I-580 over the Altamont Pass, which makes commuting to Sacramento even more attractive.

During the AM peak period, significant congestion was observed on westbound I-205 as a result of bottlenecks associated with capacity constraints over the Altamont Pass and the I-205/I-580 merge, causing a queue that can extend as far east as the 11th Street on ramp. On I-5, there is a slight southbound delay that also appears in the AM study period at the March Lane on ramp merge. As of the writing of the document the westbound AM queue on I-205 has shorted because a construction project has just recently opened a lengthened merge lane on I-580 that moves the bottleneck further west; therefore, moving the back of the queue to I-580 west of I-205.

With the widening of I-205 to six lanes congestion is no longer observed on I-205 in the PM peak. On I-5 northbound, congestion occurs between the State Route 4 on ramp and the Alpine Avenue on ramp due the lane drop just north of the County Club Boulevard off ramp, and the weave between the State Route 4 on ramp and the Pershing Avenue off ramp.

Based on demands projected for the year 2014, it is expected that congestion will get significantly worse at both of these bottlenecks and that new ones will appear. On westbound I-205, the queue associated with capacity constraints over the Altamont Pass and the I-205/I-580 merge would extend as far east as the 11th Street on ramp. The extent of this queue may be reduced by metering the westbound I-580 connector at the merge to westbound I-205, as is currently planned by Caltrans District 4. However, the impacts of such a meter (i.e. queues on i-580, diversion, air quality) need to be assessed. For 2014, the single lane westbound off ramp at the Tracy Boulevard interchange will have insufficient capacity to accommodate the AM peak period demands. The queue from the Tracy Boulevard intersection will fill the off ramp and spill back onto the westbound I-205 mainline blocking the freeway's through traffic and causing queues that extend almost to I-5. There would also be a similar spillback onto southbound I-5 from the congested Lathrop Road and I-5 southbound off ramp intersection by the year 2014. There would also a queue from the congested weaving section between the I-5 off ramps and the State Route 4 on ramp/Center St off ramp that would create a queue that extends onto northbound I-5 between the State Route 4 off ramp and the Dr. Martin Luther King Jr. Boulevard on ramp.

Based on volumes projected for the year 2014, a number of new bottlenecks are expected to appear in the PM peak period. As with the AM peak period, the single lane westbound off ramp at the Tracy Boulevard interchange will have insufficient capacity to accommodate the year 2014 PM peak period demands. The queue from the ramp terminus intersection will spill back onto the westbound I-205 mainline blocking the freeway's through traffic and causing queues that extend almost to the I-5 ramp. There will also a bottleneck at the 8th Street on ramp that causes a queue that extends onto westbound State Route 4. This is the first merge southbound, after SR-4, where there are only three mainline lanes with no auxiliary lanes.

By 2024 it is expected that congestion will get significantly worse at the I-580 merge bottleneck during AM peak period. The queue on westbound I-205 would extend all the way across I-205, and onto I-5 as far north as French Camp Road. At the Lathrop Road interchange, congestion associated with the northbound off-ramp intersection will spill back onto the northbound I-5 mainline resulting in queues that extend almost to the State Route 120 on ramp. With an increase in traffic commuting north to Sacramento in the AM peak, a bottleneck north of the County Club off ramp is projected with a queue on northbound I-5 that would extend to State Route 4. An unimproved State Route 4 off ramp/Fresno Avenue intersection would have insufficient capacity to accommodate the year 2024 AM peak period demands. The queue from this intersection will fill the westbound SR 4 off ramp, spill back onto the southbound I-5 ramp and onto the southbound I-5 mainline blocking the freeway's through traffic. The resulting queues would extend to the Alpine Avenue off ramp. The existing congestion at the March Lane merge with southbound I-5 would get worse with a queue extending back to Benjamin Holt Drive.

Based on volumes projected for the year 2024 PM peak period, it is expected that congestion will get significantly worse at the 8th Street merge with southbound I-5. The existing congestion at the March Lane merge with southbound I-5 would get worse with a queue extending back to State Route 12.

Recommended Implementation Plan

The recommended implementation plan provides a framework for the phased implementation of the improvements analyzed as part of this CSMP. This recommended plan takes into account several factors including the degree to which the improvements address the operational deficiencies identified as part of the 2014 and 2024 analysis, the relationship between the improvements and future development access, and funding requirements and status. The candidate improvements have been categorized into four implementation timeframes:

- Short-term – improvements to be implemented by 2014 (2010 to 2014);
- Near-term – improvements recommended for implementation by 2017 (2014 to 2017);
- Mid-term – improvements recommended for implementation by 2024 (2017 to 2024); and
- Long-term – improvements recommended for implementation beyond 2024.

Recommended Short-Term (2014) Improvements

The recommended short-term improvements are presented in **Table E-2.** Recognizing the time typically needed to obtain project approval and environmental clearance, design and construct a project, the short-term recommendations are comprised largely of currently programmed projects expected to be completed by 2014. These include the I-205 CMIA Auxiliary, Acceleration and Deceleration Lanes Improvement project, the widening of a segment of I-5 in

north Stockton to accommodate HOV lanes, several interchange improvements, various arterial improvements, and additional Intelligent Transportation System (ITS) infrastructure.

The recommended short-term improvements also include a number of relatively lower-cost, non-RTP projects identified through the operational analysis as being critical to addressing projected 2014 deficiencies. These projects include signal and minor geometric improvements at several interchange and arterial intersections.

It should also be noted that Caltrans District 4 is pursuing plans to implement metering on the westbound I-580 connector at the merge with westbound I-205. The I-580/I-205 junction is located in Alameda County just west of the San Joaquin County line. District 4's Ramp Meter Development Plan calls for metering along the I-580 corridor, including the westbound I-580 connector. It is currently proposed that the connector meter operate between 5:00 and 10:00 AM. The I-580 East CSMP assumed implementation of the ramp metering plan, and further included the short-term recommendation that the connector be improved to increase the capacity at the meter. While details of this improvement were not defined, the cost estimate presented in the I-580 East CSMP suggests widening at the meter to provide an additional lane.

This project is of direct relevance to the I-205/I-5 CSMP because the westbound I-580/I-205 merge is identified as a major bottleneck that results in significant queuing on westbound I-205 during the AM peak. This metering project was examined as a supplemental alternative as part of the 2014 analysis. The results show that metering of the westbound I-580 connector could reduce the congestion and queuing on westbound I-205. However, these benefits of metering the westbound I-580 connector will have to be weighed against the potential congestion and air quality impacts that could be created behind the meter on I-580. These impacts were not measured as part of the supplemental analysis because I-580 is outside the study area. Operations on I-580, between I-205 and SR-132, should be evaluated as part of the planned I-580 ramp metering PSR/PR.

The total cost of the recommended short-term improvements is $350.0 million, excluding costs for the deployment of additional ITS and PeMS equipment along I-205/I-5 and the metering of the I-580 connector. As a package these improvements are expected to significantly reduce congestion within the corridor for 2014. The impacts of these improvements were analyzed using the CORSIM micro-simulation model. This operational analysis suggests that relative to baseline conditions, these improvements will result in a 2,020 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 36 mph along westbound I-205. During the PM peak period, these improvements will result in a 3,359 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 38 mph along westbound I-205. These projects are also expected to improve the safety performance of the corridor.

Recommended Near-Term (2017) Improvements

The recommended near-term improvements are presented in **Table E-3.** Similar to the short-term improvements, a primary consideration for the near-term recommendations was implementation feasibility. Thus, the recommended improvements are comprised largely of

currently planned RTP projects expected to be completed by 2017. These include the widening of I-5 in north Stockton and SR-120 through Manteca, the extension of the SR-4 Crosstown freeway on the west side of I-5, several interchange improvements, various arterial improvements, and additional ITS infrastructure. The recommended near-term improvements also include the implementation of ramp metering along the CSMP corridor.

While this near-term scenario was not analyzed using the I-205/I-5 CSMP CORSIM micro-simulation model, this scenario and the recommended improvements are presented in recognition that several capital projects are progressing toward implementation and that those projects plus system management improvements such as ramp metering are critical to maintaining system performance prior to the implementation of other higher cost and longer-term projects.

The total cost of the recommended near-term improvements is $745.2 million, excluding costs for the deployment of additional ITS equipment along I-205/I-5. Operational analysis using the CORSIM model was not conducted for the near-term (2017) period. However this package of improvements is expected to reduce congestion within the corridor by providing additional capacity at several bottleneck locations, managing the entry of vehicles onto the freeways through ramp metering, and encouraging HOV use. These projects are also expected to improve the safety performance of the corridor.

Recommended Mid-Term (2024) Improvements

The recommended mid-term improvements are presented in **Table E-4.** These improvements are comprised largely of high-cost, freeway capacity projects that will address the major deficiencies projected in the future. These include the widening of I-5 in south Stockton for HOV lanes, I-205 through Tracy for HOV lanes, and westbound I-580 over the Altamont Pass for an HOV/HOT lane. The recommended mid-term improvements also include a number of auxiliary lane improvements, interchange improvements, and construction of the Golden Valley Parkway.

The HOV/HOT improvements on I-580 over the Altamont Pass are outside San Joaquin County (District 10) in Alameda County (District 4), although significant benefits, notably congestion relief on I-205, would be felt within San Joaquin County. The I-580 East CSMP prepared by Caltrans' District 4 recommends the addition of HOT lanes on I-580 over the Altamont Pass as a long-term project to be in place "by 2035". The I-580 East CSMP does not include an intermediate planning horizon between 2015 and 2035, so there is flexibility with respect to the possible timing of this project. The implementation of this project should be coordinated with construction of the HOV lanes on I-205. More specifically, the I-580 HOV/HOT lanes should be built before or concurrently with the I-205 HOV lanes because the alternative analysis indicates that the I-205 HOV lanes may not show significant benefit without the I-580 HOV/HOT lanes.

The total cost of the recommended mid-term improvements is $568.9 million. This cost excludes the estimated $91.3 million for construction of the westbound I-580 HOV/HOT lane over the Altamont Pass. As a package these improvements are expected to significantly reduce congestion within the corridor for 2024 providing additional capacity at several bottleneck

locations and managing the entry of vehicles onto the freeways through ramp metering. By greatly expanding the HOV lane network, the recommended improvements will encourage HOV use and further help to reduce congestion. These projects are also expected to improve the safety performance of the corridor.

The CORSIM micro-simulation model operational analysis suggests that relative to baseline conditions, these improvements will result in a 40,257 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 37 mph along westbound I-205 in the AM peak. During the PM peak period, these improvements will result in a 25,480 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 36 mph along southbound I-5 between State Route 12 and State Route 4.

These recommended mid-term improvements in 2024 would maintain and enhance mobility improvements within the corridor created by the CMIA project in 2014; therefore, they would fulfill the purpose of a CSMP, which is to "Preserve the mobility gains of urban corridor capacity improvements over time."

Recommended Long-Term Improvements

The recommended long-term improvements are presented in **Table E-5.** These improvements are comprised largely of freeway capacity and interchange improvements that the CSMP analysis indicated are not required by year 2024, but that may produce significant benefits in a year 2030 (or later) analysis. Year 2030 traffic forecasts show high peak direction traffic growth on I-580 over the Altamont Pass and I-205 west of MacArthur Drive, low traffic growth on I-205 west of MacArthur Drive, and high off peak direction traffic growth on I-5 (commuting to and from Sacramento).

The total cost of the recommended long-term improvements, excluding the estimated $91.3 million for construction of the eastbound I-580 HOV/HOT lanes over the Altamont Pass, is $438.6 million. Operational analysis using the CORSIM model was not conducted for the long-term (2030) period. However this package of improvements is expected to reduce congestion within the corridor by providing additional capacity at several projected bottleneck locations. The recommended improvements also include projects that will fill gaps in the HOV lane network, thus encouraging HOV use. These projects are also expected to improve the safety performance of the corridor.

Table E-2 Recommended Short-Term (2014) Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
System Management/ITS Improvements[1]		
Deploy programmed ITS elements along I-205 and I-5 per SHOPP list	TBD	Support system management (monitoring, traveler information) activities
Install additional PeMS detector stations along I-205 and I-5	TBD	Support system management (monitoring) activities
Freeway Capacity Improvements		
I-205 CMIA Project • **Auxiliary lanes from Mountain House Pkwy to Eleventh Street** • **Extend acceleration and deceleration lanes from Grant Line Rd to Tracy Blvd**	13.0	Alleviate merge and diverge deficiencies on I-205; improve mainline operations; reduce delay
I-5 HOV lanes - Country Club Blvd to Hammer Lane[2]	75.0	Reduce congestion on I-5; encourage HOV use
Interchange Improvements		
I-5/French Camp Rd - reconstruct interchange + aux	61.2	Improve interchange operation
I-5/ Hammer Ln - reconstruct interchange + aux	50.0	Improve interchange operation
I-5/ Eight Mile Rd - reconstruct interchange	37.0	Improve interchange operation
I-5/ Otto Dr – new interchange + aux	44.0	Increase accessibility; relieve demand at adjacent interchanges
SR-120/ Airport - reconstruct interchange	18.0	Improve interchange operation
SR-120/ McKinley Ave – new interchange + aux	32.1	Improve interchange operation
I-5/Mathews Rd - Signalization	0.6	Improve intersection operations; eliminate ramp spillback onto mainline
I-5/Roth Rd - Signalization	0.6	Improve intersection operations; eliminate ramp spillback onto mainline
I-205/Tracy Blvd – widen westbound off-ramp	0.5	Improve intersection operations; eliminate ramp spillback onto mainline
Arterial Improvements		
Sperry Rd extension (Performance Dr to French Camp Rd)	64.9	Increase accessibility; additional system capacity
Lathrop Rd widening to 4 lanes (I-5 to east of UPRR)	2.8	Improve arterial operations
Louise Ave widening to 4 lanes (5th St to SPRR)	4.5	Improve arterial operations
Airport Way widening to 6 lanes (SR 120 to Lathrop)	18.2	Improve arterial operations
Spot intersection improvements: • Mathews Rd / Manthey Rd • Pershing Ave / March Ln • Pacific Ave / March Ln • Thornton Rd / Hammer • Thornton Rd / Eight Mile Rd	3.1	Improve intersection operations
TOTAL COST (Short-term recommendations)	**350.0**	**Excluding System Management/ITS costs**

Notes: **Bold** = RTP Project

1. Caltrans District 4 is pursuing plans to implement metering on the westbound I-580 connector at the merge with westbound I-205. The I-580 East CSMP assumed implementation of this project, and further recommended that capacity of this meter be increased through an additional lane at the meter. The estimated cost was approximately $500,000. This project is relevant to the I-205/I-5 CSMP because the westbound I-580/I-205 merge is identified as a major bottleneck during the AM peak. Metering of the westbound I-580 connector could reduce the congestion and queuing on westbound I-205. However, these benefits will have to be weighed against the potential congestion and air quality impacts that could be created behind the meter on I-580.

2. Subsequent to preparation of this report, the CTC approved additional funding for the I-5 HOV Lanes widening project that will extend the HOV lane limits from Dr. Martin Luther King Jr. Boulevard to Hammer Lane.

Table E-3 Recommended Near-Term (2017) Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
System Management/ITS Improvements		
Deploy planned ITS elements along I-205 and I-5, including RM infrastructure	TBD	Support system management (monitoring, traveler information) activities
Implement ramp metering (including HOV preferential lanes) at all local interchanges along I-205 and I-5	14.7[1]	Alleviate merge deficiencies; improve mainline operations
Freeway Capacity Improvements		
I-5 HOV lanes (from Hammer Ln to north of Eight Mile Rd) – include auxiliary lanes	275.0	Reduce congestion on I-5; encourage HOV use Alleviate merge deficiencies on I-5
SR-120 Widening to 6 lanes	78.0	Reduce mainline congestion on SR-120
SR-4 Extension	217.6	Improve port access; eliminate queue spillback from local intersection onto I-5 mainline
Interchange Improvements		
I-205/ Lammers Rd – new interchange	63.0	Increase accessibility; relieve demand at adjacent interchanges
I-205/ MacArthur Drive – interchange modification	5.4	Improve interchange operation
I-5/ Gateway Rd – new interchange	63.0	Increase accessibility; relieve demand at adjacent interchanges
I-5/ Louise Ave - reconstruct interchange	33.0	Improve interchange operation
I-5/ Lathrop Rd - reconstruct interchange	33.0	Improve interchange operation
Arterial Improvements		
Lammers Road – realign and widen (I-205 to I-580)	62.8	Improve arterial operations
Eight Mile Rd widening (I-5 to SR 99)	145.1	Improve arterial operations
Airport Way widening (French Camp Rd to Arch Airport Way)	29.6	Improve arterial operations
TOTAL COST (Near-term recommendations)	**745.2**	**Excluding System Management/ITS costs**

Notes:
Bold = RTP Project
1. Cost estimate from *Northern San Joaquin Valley Regional Ramp Metering and HOV Lane Master Plan* (2009)

Table E-4 Recommended Mid-Term (2024) Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
Freeway Capacity Improvements		
I-205 HOV lanes from I-580 to I-5	396.6	Reduce mainline congestion; encourage HOV use
I-5 HOV lanes from Dr. Martin Luther King Jr. Blvd to French Camp Road (southbound transition to Mathews Rd)	42.1	Reduce mainline congestion; encourage HOV use
I-580 Westbound HOV/HOT lane from I-205 to Greenville Road	91.3[1]	Provide additional capacity over Altamont Pass; alleviate congestion at westbound merge and eastbound diverge
I-205 Full auxiliary lanes • between Grant Line Rd and Tracy Blvd • between Tracy Blvd and MacArthur Dr • between MacArthur Dr and Paradise Rd	9.4	Improve operations at merge; reduce mainline congestion
I-5 Full auxiliary lanes • between SR-120 and French Camp • between Downing Ave and 8th St • between Pershing Ave and Monte Diablo Ave	19.7	Improve operations at merge; reduce mainline congestion
Interchange Improvements		
I-5/Mathews Rd Interchange Ramps – Off ramp widening, undercrossing widening and Manthey Rd (frontage road) access limitation	1.6	Improve intersection operations; eliminate ramp spillback onto mainline
I-205 HOV median ramps to I-580	18.0	Provide additional capacity through merge area; alleviate congestion at westbound merge and eastbound diverge; fill gap in HOV/HOT network
Arterial Improvements		
Airport Way widening (Lathrop Rd to French Camp Rd)	22.0	Improve arterial operations
Golden Valley Parkway	59.3	Increase accessibility; provide additional system capacity
Mathews Rd / Manthey Rd – Right-in & right-out only	0.2	Improve intersection operations
TOTAL COST (Mid-term recommendations)	**568.9**[2]	

Notes:
Bold = RTP Project
1. This project is outside San Joaquin County and Caltrans District 10. Cost estimate derived from I-580 East CSMP and reflects one-quarter of total estimated cost for construction of HOT lanes in both directions along various segments of I-580. The cost estimate is reported for information purpose only.
2. The total cost does not include the I-580 Westbound HOV/HOT lane Improvement project.

Table E-5 Recommended Long-Term (2024+) Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
Freeway Capacity Improvements		
I-5 HOV lanes from I-205 to French Camp Road	108.6	Reduce mainline congestion; encourage HOV use
I-5 Mossdale Widening	122.3	Reduce mainline congestion; encourage HOV use
I-5 HOV lanes from Eight Mile Rd to N. Gateway Blvd	25.0	
I-580 Eastbound HOV/HOT lanes from Greenville Road to I-205	91.3[1]	Provide additional capacity over Altamont Pass; alleviate congestion at westbound merge and eastbound diverge
Interchange Improvements		
I-5/ SR 4 (Crosstown) - reconstruct interchange	59.0	
I-5/ Downing Ave - reconstruct interchange	66.0	
I-5/Dr. Martin Luther King Jr. Blvd – reconstruct interchange	21.4	
I-205 HOV median ramps to I-5	36.3	Provide additional capacity through merge area; fill gap in HOV/HOT network
TOTAL COST (Long-term recommendations)	**438.6**[2]	

Notes:
Bold = RTP Project
1. This project is outside San Joaquin County and Caltrans District 10. Cost estimate derived from I-580 East CSMP and reflects one-quarter of total estimated cost for construction of HOT lanes in both directions along various segments of I-580. The cost estimate is reported for information purpose only.
2. The total cost does not include the I-580 Eastbound HOV/HOT lane Improvement project.

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1 Introduction

1.1 The I-205/I-5 Corridor

I-205 is an important east/west highway in San Joaquin County. I-205 begins at Interstate 580 (I-580) in Alameda County and ends at its junction with I-5 in San Joaquin County. In Alameda County, the route is 0.45 miles in length, and in San Joaquin County the route is 13.39 miles in length. It crosses the city of Tracy, and serves as a major interregional connector for moving goods and people between the northern San Joaquin Valley and the San Francisco Bay Area.

In California, I-5 begins at the Southern San Diego city limits at the United States/Mexico international boundary and ends at the California/Oregon State line in Siskiyou County. It is a major north-south interregional freeway of statewide significance; carries a large volume of interstate and interregional traffic; serves major population centers, international border crossings, ports, airports, public transportation facilities, and major travel destinations; and meets national defense requirements. In District 10, I-5 traverses the counties of Merced, Stanislaus, and San Joaquin. I-5 also serves as a major interregional connector between the San Joaquin Valley communities and the Pacific Coast areas through its links with other interstate and State routes.

The CSMP corridor begins on I-205 west of Tracy from the Alameda County/San Joaquin County line to the I-205/I-5 junction in Tracy and continues north on I-5 to the SR-12 junction west of the city of Lodi. The CSMP corridor is approximately 40.34 miles long, 13.39 miles for the I-205 segment and 26.95 miles for the I-5 segment. The CSMP efforts have been coordinated with District 3 and District 4 for consistency across jurisdictional boundaries.

Currently, I-205 carries approximately 123,000 vehicles per day during the peak month. The annual average traffic volume along this part of I-205 ranges from 99,000 to 119,000 daily vehicles. For the I-5, the highest traffic volume segment in within the study limit carries approximately 152,000 vehicles per weekday (south of the SR-120 junction) and the lowest traffic volume segment is approximately 77,000 vehicles per day (at the SR-12 interchange).

1.2 CSMP Purpose and Need

A CSMP is a transportation planning document that provides for the safe, efficient and effective mobility of people and goods within the most congested transportation corridors. Each CSMP presents an analysis of existing and future traffic conditions and proposes traffic management strategies and capital improvements to maintain and enhance mobility within each corridor.

The CSMP transportation network includes, State Highways, major arterials, intercity and regional rail service, regional transit services, and regional bicycle facilities. A team of corridor stakeholder agency staff was assembled to assist in finalizing the corridor definition and provide oversight for ongoing tasks.

The preparation of this CSMP is a CTC requirement for the use of "Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006" funds, approved by the voters as Proposition 1B on November 7, 2006. The purpose of the CSMP is to reduce congestion within the I-205/I-5 corridor limits, enhance safety, and to preserve the mobility gains of the Proposition 1B investments. Proposition 1B CMIA funds have been allocated for the I-205 Auxiliary Lane project in San Joaquin County. This project is expected to go to construction in the fall of 2010.

The full description of the CMIA project consists of auxiliary lanes and extended acceleration and deceleration lanes, including outside shoulders, at seven locations on I-205 as follows:

- Location 1A - Auxiliary Lane – Eleventh St. to Mountain House Parkway – Westbound (PM 1.9/2.7)
- Location 1B – Auxiliary Lane – Mountain House Parkway to Eleventh St. – Eastbound (PM 2.0/2.6)
- Location 2 – Acceleration Lane – Tracy Blvd. on-ramp – Westbound (PM 6.5/6.8)
- Location 3 – Deceleration Lane – Tracy Blvd. off-ramp – Westbound (PM 7.3/7.5)
- Location 4A – Acceleration Lane – Grant Line Road on-ramp – Eastbound (PM 5.7/5.9)
- Location 4B – Deceleration Lane – Tracy Blvd. off-ramp – Eastbound (PM 6.5/6.8)
- Location 5 – Acceleration Lane – Tracy Blvd. on-ramp – Eastbound (PM 7.3/7.5)

1.3 Consistency with Governor's Strategic Plan

The CSMP approach is consistent with the goals and objectives of the Governor's Strategic Growth Plan designed to decrease congestion, improve traveler times, and increase safety, while accommodating future growth. Key elements of the strategy are illustrated in **Figure 1-1.**

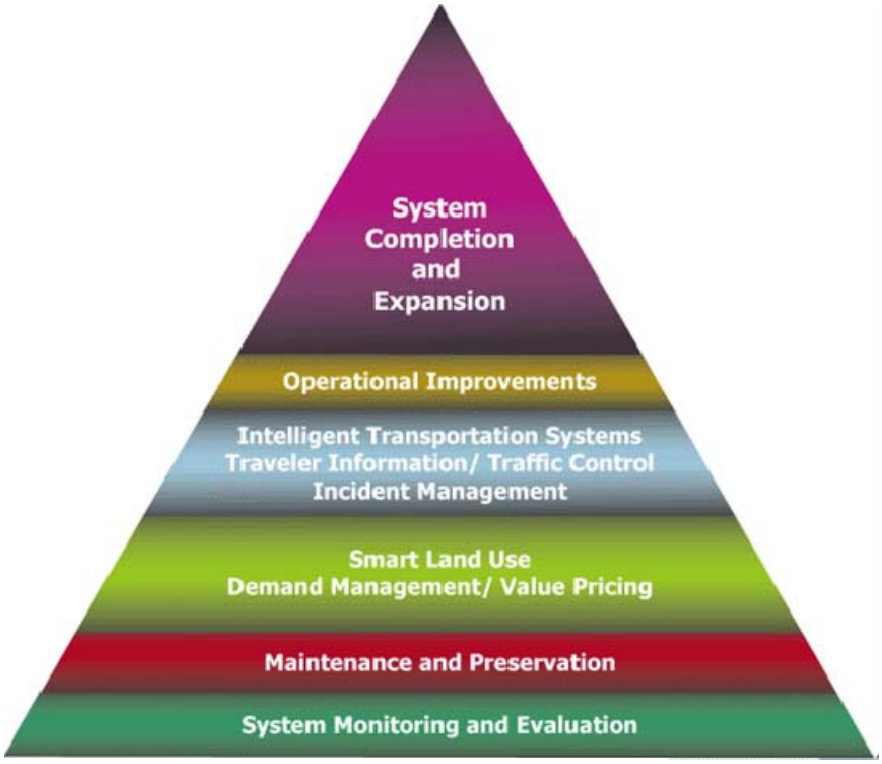

Figure 1-1 System Management Pyramid

At the base of the pyramid, and the foundation of transportation system management, is system monitoring and evaluation. It is essential to understand what is happening on the transportation system so that the best decisions can be made based on reliable data. The next few layers up the pyramid are focused on making the best use of existing resources and reducing the demand for new transportation facilities, particularly for peak hour travel. The top layer of the pyramid is system expansion. This layer assumes that all the underlying components are being addressed and that system capacity expansion investments are necessary.

1.4 Project Participants and Stakeholder Group

The development and successful implementation of the I-205/I-5 CSMP is dependent upon a collaborative cooperative process between District 10, SJCOG, San Joaquin County, the cities of Stockton, Lodi, Lathrop, Manteca, Tracy, and other local and regional agencies along the corridor. A project development team of key stakeholders was formed to discuss, provide technical assistance, review, and comment on the development of the CSMP.

The CSMP development team consists of representatives from Caltrans District 10 Planning, Traffic Operations, Traffic Safety, Maintenance, and Program Project Management. Team members also include representatives from SJCOG, San Joaquin County, cities of Lodi, Stockton, Manteca, Lathrop, Tracy, and the California Highway Patrol (CHP).

A work plan agreement or "charter" was made and entered into by the Department, District 10, and SJCOG to demonstrate a commitment to the CSMP process, to jointly develop a work plan and to coordinate activities related to the requirements for CMIA funding for the I-205 Auxiliary Lane project in San Joaquin County. Refer to the **Appendix A** for the full text of the Charter.

1.5 CSMP Development

Eight milestones have been identified by the CTC and Caltrans in the development of the I-205/I-5 CSMP, namely:

1. Define Corridor
2. Assemble Corridor Team
3. Develop Preliminary Corridor Performance Assessment
4. Develop Comprehensive Corridor Performance Assessment
5. Identify Causality of Corridor Performance Degradation
6. Develop and Test Improvement Scenarios
7. Develop Corridor System Management Plan
8. Adoption by Regional Transportation Planning Agency

Information and results related to the first five milestones form the basis for the material presented in the first three chapters of this document. Similarly, Milestone 6 is covered in Chapters 4 through 8 of this document. For all of these milestones, a number of intermediate working documents were produced and are included as appendices to this report. This report, in turn represents the culmination of Milestone 7.

1.6 Other Regional Planning Efforts

In addition to the I-205/I-5 CSMP there are several regional planning efforts currently underway to improve interregional travel and contribute to improved performance in the I-205/I-5 corridor.

Regional Transportation Plan (RTP) Update

SJCOG is in the process of updating the RTP for San Joaquin County. As the region's comprehensive long-range transportation planning document, the RTP serves as a guide for achieving public policy decisions that will result in balanced investments for a wide range of multi-modal transportation improvements. The RTP plays a critical role in establishing the vision for the region's future transportation system. All transportation investments in the San Joaquin region that include Federal transportation funds must be consistent with the RTP and must be included in the Federal Transportation Improvement Program (FTIP) when ready for funding.

Valley-wide Transit Study

Caltrans recently awarded a partnership planning grant to fund the San Joaquin Valley Express Transit Study with Merced County Association of Governments (MCAG) as lead working with the counties of Kern, Kings, Tulare, Fresno, Madera, Merced, Stanislaus, and San Joaquin. The study will address current and future needs for coordinated bus services throughout the region, resulting in the creation of a more integrated transit network within the San Joaquin Valley and improving the existing transit system. The study will also examine the potential for connectivity with other modes of transportation such as Bay Area Rapid Transit (BART), Altamont Commuter Express (ACE), and Amtrak.

Interregional Transportation Partnership Planning

Caltrans also recently awarded a Partnership Planning grant to fund the Interregional Transportation Partnership Planning program. SJCOG has taken lead on the effort to bring together stakeholders from the Central Valley and the San Francisco Bay Area to explore ways to address complex, interregional growth issues, including interregional transportation, goods movement, and air quality. The program will develop a five-year strategic plan of regional transportation improvement strategies and a memorandum of understanding documenting support from the Central Valley and San Francisco/San Jose Bay Area regions for implementation.

Valley-wide Regional Blueprint Strategies

Building on successful planning studies conducted by several California metropolitan transportation planning agencies over the past four years, Caltrans has recently awarded the third cycle planning grant to MCAG on behalf of the eight San Joaquin Valley regional planning agencies to prepare a “visioning” and growth scenario plan for the San Joaquin Valley. The goal of the San Joaquin Valley Blueprint planning process is to facilitate the development and implementation of a San Joaquin Valley regional vision addressing the growth of San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, Kings and Kern counties, with an emphasis that shows the links between: Land use, agricultural, environment, transportation, and air quality. SJCOG and Caltrans District 10 are actively participating in the Valley-wide Regional Blueprint process.

2 Corridor And Transportation System Characteristics

This chapter provides an overview of the key features and attributes of the I-205/I-5 CSMP corridor. This includes a description of the relevant transportation network infrastructure and services, plus land use and environmental characteristics. A description of current operating conditions and performance is provided in the Chapter 3. The material presented in this chapter is taken largely from the *I-205/I-5 CSMP Comprehensive Corridor Performance Assessment and Causality Report* (see **Appendix B**).

2.1 Corridor Limits

The CSMP corridor focuses on the following two freeway segments:

- **Interstate 205 (I-205) between the Alameda/San Joaquin County line and the I-5 interchange (the entirety of I-205 in San Joaquin County).** West of Tracy, I-205 connects with Interstate 580 (I-580) and continues to the San Francisco/San Jose Area. This roadway segment is 13.39 miles.

- **Interstate 5 (I-5) from the I-205 interchange to the SR-12 interchange in San Joaquin County.** State highway system connections along this segment of I-5 include those with SR-12 in Lodi, State Route 4 (SR-4) in Stockton, and SR-120 in Manteca. This segment of I-5 is approximately 26.95 miles long.

Because the CSMP must address not only the designated state highways, the CSMP Corridor transportation network includes portions of other state highways and freeways, major arterials, intercity and interregional rail, regional transit services, major intermodal facilities, and regional bicycle facilities. In further defining the CSMP corridor, all parallel facilities within one-mile of I-205/I-5 and all modes of transportation serving these corridors were included. Several transit lines run on or parallel the corridor. There are also several park and ride lots located along the corridor. The Port of Stockton, Stockton Metropolitan Airport, and major inter-modal facilities are in close proximity.

The precise limits of the I-205/I-5 CSMP in San Joaquin County area were determined through a collaborative cooperative process between District 10, SJCOG, San Joaquin County, the cities of Stockton, Lodi, Lathrop, Manteca, Tracy, and other local and regional agencies along the corridor. The agreed upon roadway analysis network is illustrated in **Figure 2-1** and further described in the following sections. In addition to the CSMP freeway segments, this network includes portions of I-205 and I-580 in Alameda County, portions of the SR 4 and SR 120 freeway, and major arterials. This extended network was deemed necessary to assess traffic operations in the CSMP corridor.

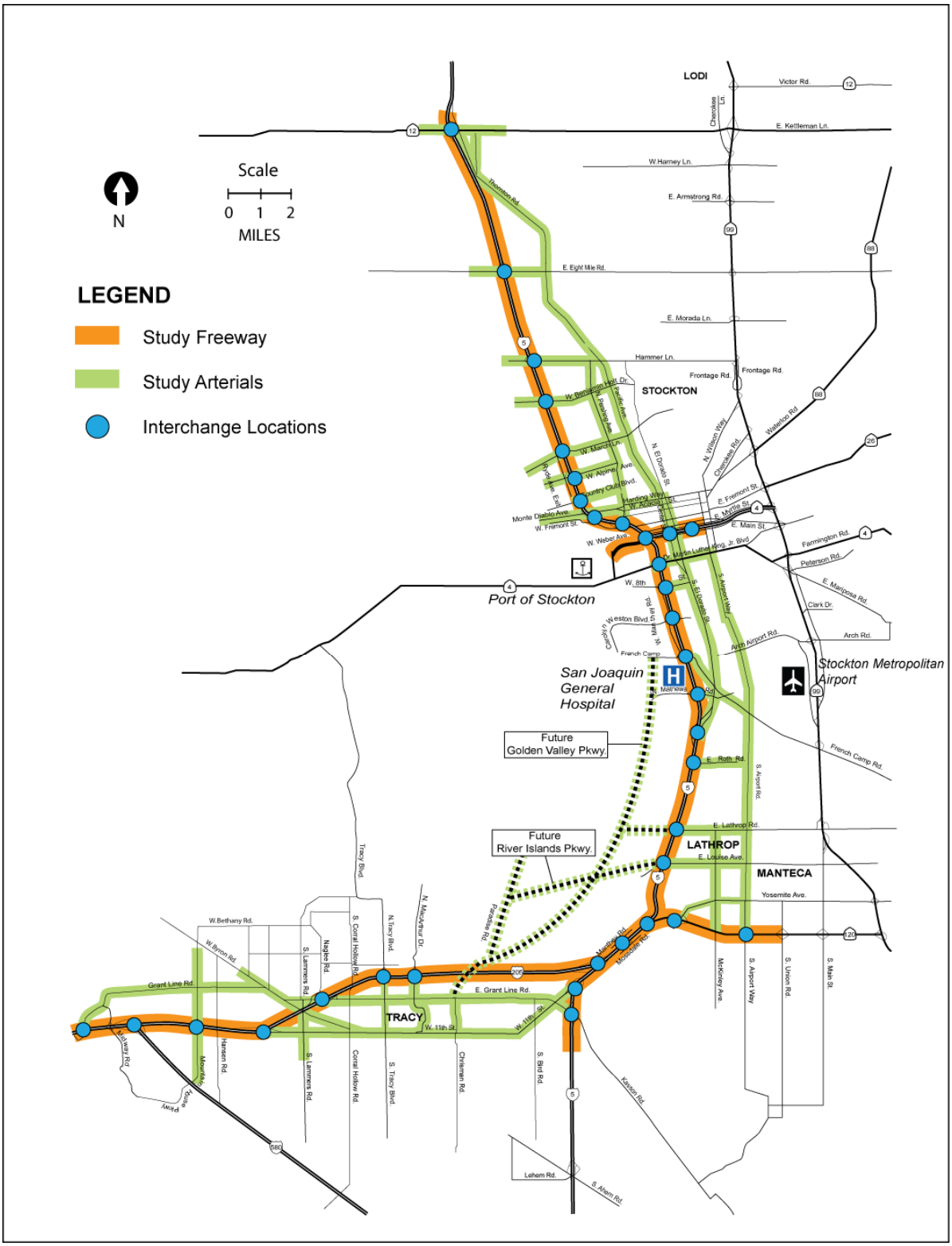

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Figure 2-1 Corridor Analysis Network

2.2 Corridor Route Designation

I-205 is classified as a Principal Arterial-Interstate included in the Eisenhower Interstate System, National Highway System (NHS), California Freeway and Expressway System, National Truck Network for Surface Transportation Assistance Act (STAA) truck routes, and Strategic Highway Network (STRAHNET). The U.S. Department of Defense has identified STRAHNET routes as critical for supporting defense requirements and they are mandatory components of the NHS. I-205 is also designated as an Intermodal Corridor of Economic Significance (ICES) as mandated by the Assembly Bill 1823 Statutes of 1993. An ICES route is a significant transportation artery in the State that connects or provides access to major sea or waterway ports, nationwide railway systems, airports, and interstate and intrastate highway systems that serve as intermodal corridors of economic significance. I-205 is also one of nine gateways of major statewide significance (Central Valley to the Bay Area).

I-5 is also functionally classified as a Principal Arterial-Interstate. It is included in the California Freeway/Expressway System, the National Network for STAA trucks, and the NHS. It is a critical interregional route serving increased traffic demands created by the high population growth rate in the northern San Joaquin Valley.

I-205 and I-5 are designated as Inter-Regional Road System (IRRS) High Emphasis routes. Therefore, they are eligible to be considered for Interregional Improvement Program (IIP) funding which is the State's 25% share of State Transportation Improvement Program (STIP) funds.

The classification and route designations for I-205 and I-5 are summarized in **Table 2-1**.

Table 2-1 I-205 and I-5 CSMP Corridor Classification

Post Mile	Description	Functional Classification	Rural/ Urban/ Urbanized	NHS (Y/N)	FES (Y/N)	STRAH NET (Y/N)	IRRS	NTN (Y/N)	Scenic (Y/N)	Bike Use Allowed (Y/N)
I-205										
00.00/ 01.37	Alameda Co/San Joaquin Co Line to Mountain House	Principal Arterial	Rural	Y	Y	Y	HE/G	Y STAA	N	N
01.37/ 03.37	Mountain House to Eleventh St	Principal Arterial	Urban							
03.37/ 05.20	Eleventh St to Grant Line Rd	Principal Arterial								
05.20/ 07.00	Grant Line Rd to Tracy Blvd	Principal Arterial								
07.00/ 08.13	Tracy Blvd to MacArthur Dr	Principal Arterial								
08.13/ 13.39	MacArthur Dr to Jct. I-5	Principal Arterial	Rural							
I-5										
12.62/ 14.46	I-5/I-205 Jct. to San Joaquin River	Principal Arterial	Rural	Y	Y	Y	HE/G	Y STAA	N	Y
14.46/ 14.83	San Joaquin River to SR-120	Principal Arterial								N
14.83/ 19.58	SR-120 to Roth Rd	Principal Arterial	Urban							
19.58/ 20.95	Roth Rd to French Camp Rd	Principal Arterial								
20.95/ 25.40	French Camp Road to Dr. Martin Luther King Jr. Blvd	Principal Arterial	Urbanized							
25.40/ 27.90	Dr. Martin Luther King Jr. Blvd to Monte Diablo Ave	Principal Arterial								
27.90/ 28.53	Monte Diablo Ave to Country Club Blvd	Principal Arterial								
28.53/ 32.66	Country Club Blvd to Hammer Lane	Principal Arterial								
32.66/ 35.29	Hammer Lane to Eight Mile Rd	Principal Arterial								
35.29/ 36.20	Eight Mile Rd to .9 mi. N of Eight Mile R	Principal Arterial	Rural							
36.20/ 39.57	.9 mi. N of Eight Mile Rd to Jct. SR-12	Principal Arterial								

STRAHNET	Strategic Highway Network	**HE**	High Emphasis
NHS	National Highway System	**STAA**	Surface Transportation Assistance Act
FES	Freeway/ Expressway System	**G**	Gateway
IRRS	Interregional Road System		
NTN	National Truck Network		
Scenic			

2.3 Corridor Function

I-205 is a major east-west freeway of national and statewide significance. It carries a large volume of Interstate and interregional traffic, and connects the Port of Oakland, the East Bay and Livermore Valley with agricultural, and industrial areas in San Joaquin County and the Central Valley. It is a critically important route for the large number of logistical, distribution, and manufacturing facilities located in and adjacent to the corridor which rely on "just in time" delivery of products to Bay Area businesses. This corridor exhibits a heavy directional commute pattern from the Central Valley communities of Stockton, Modesto, and Tracy to the Bay Area employment centers of San Francisco, Oakland and the San Jose area (Silicon Valley). This corridor also serves as a major gateway for goods movement, which accounts for a high percentage of truck traffic, and is also a major recreational route for activities in the Central Valley and the Sierra Nevada. Based on 2006 data, approximately 102,400 vehicles per day, including 12,200 trucks, travel through the I-205 corridor in the Tracy area.

I-5 is a major north-south interregional freeway of statewide significance; carries a large volume of interstate and interregional traffic; serves major population centers, international border crossings, ports, airports, public transportation facilities, and major travel destinations; and meets national defense requirements. In San Joaquin County, I-5 serves as a major interregional connector with I-205 to connect San Joaquin Valley communities and the Pacific Coast areas through links with other Interstate and State Routes. Based on 2006 data, approximately 114,900 vehicles per day, including 28,100 trucks currently travel I-5 through San Joaquin County.

2.4 Roadway Network

The study corridor includes the freeway as well as nearby arterials that could potentially impact the freeway operation. Details of the geometries vary by segment, as discussed below.

2.4.1 Freeway

I-205

I-205 runs approximately thirteen miles in an east-west direction connecting I-580 and I-5. At the initiation of this CSMP effort in 2008, I-205 varied from three lanes in each direction between I-580 and West 11th Street, to two lanes in each direction between West 11th Street and I-5. With the recent completion of a project to add one freeway lane in each direction in spring 2009, I-205 now has three lanes in each direction east of 11th Street. The entire roadway runs on flat terrain with minor grades along the corridor. It should be noted that the description and analysis in this document and the simulation model calibration is based on the geometry and number of lanes along I-205 when field work was conducted in 2008, which is before the third lane in each direction was completed along I-205 east of 11th Street to the I-5 junction.

Major freeway junctions and interchanges along the I-205 corridor are listed below:

- I-580 junction
- I-5 junction
- Eleventh Street interchange
- Grant Line Road Interchange
- Tracy Interchange

Figure 2-2 illustrates the lane configuration along the I-205 study segment. This figure shows the configuration in 2008 when the CSMP effort began and in 2009 after completion of the widening. As the figure shows, I-205 varied between 2 and 3 mainline lanes in 2008, but is now 3 lanes throughout Tracy. Interchanges are spaced every 1 to 3 miles.

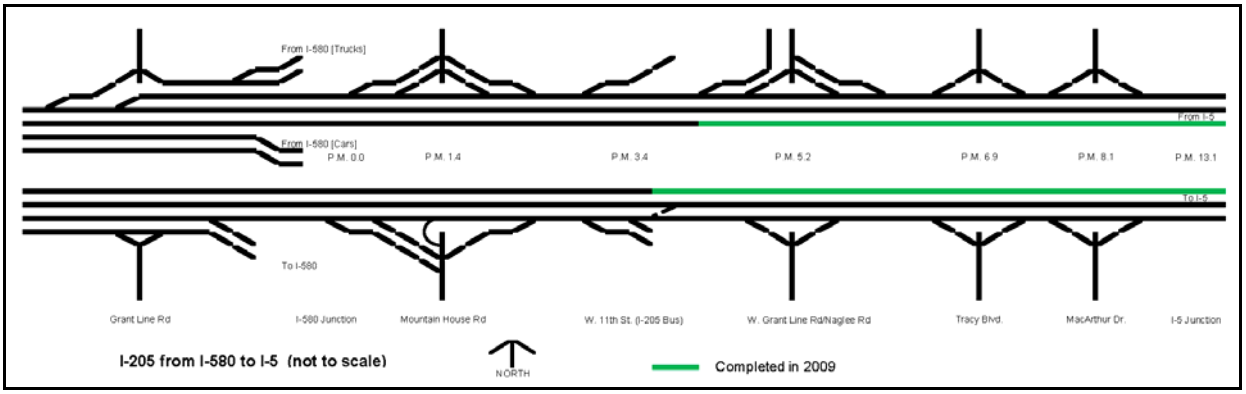


Figure 2-2 Lane Diagram for I-205

I-5

The I-5 segment within the San Joaquin County extends approximately 30 miles from I-205 to SR-12. There are three major freeway junctions along the study segment at I-205, SR-120 and SR-4 (Crosstown Connector). South of the I-205 interchange, the freeway has two lanes in each direction. The freeway has four to five lanes in each direction between I-205 and SR-120. The freeway has three in each direction between I-205 and the Dr. Martin Luther King Jr. Blvd interchange (south of SR-4 Crosstown Connector). There are four lanes between the Dr. Martin Luther King Jr. Blvd interchange and Country Club Boulevard in each direction, with some auxiliary lanes and several sections resulting in five lanes. There are three in each direction between Country Club Boulevard and SR-12. Recently the northbound lane drop at Country Club Boulevard was switched from the left to the right lane.

Lane Diagrams for Interstate 5 are located in **Figure 2-3** through **Figure 2-5.** These diagrams show the corridor and its interchanges from south to north, with the ends of the diagrams extending slightly past the study area. The diagrams show that the entire study corridor features closely spaced interchanges (1 to 3 mile spacing) with several lane drops and shifts that occur in the corridor. In contrast to long sections of I-5 south of the study area which function with wide spacing between interchanges, this area operates in a more urban environment with many interchanges.

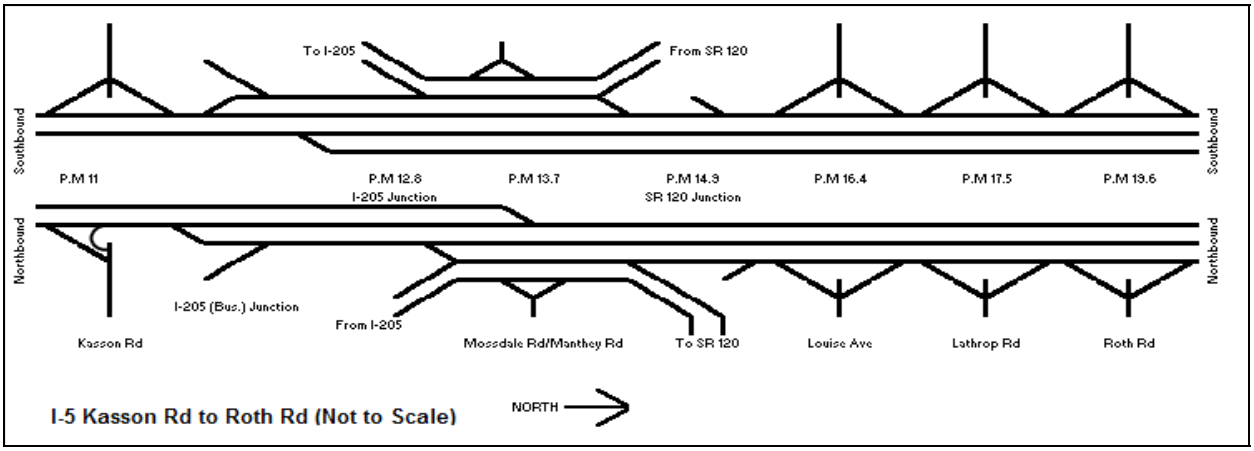


Figure 2-3 Lane Diagram for I-5 (Lathrop Area)

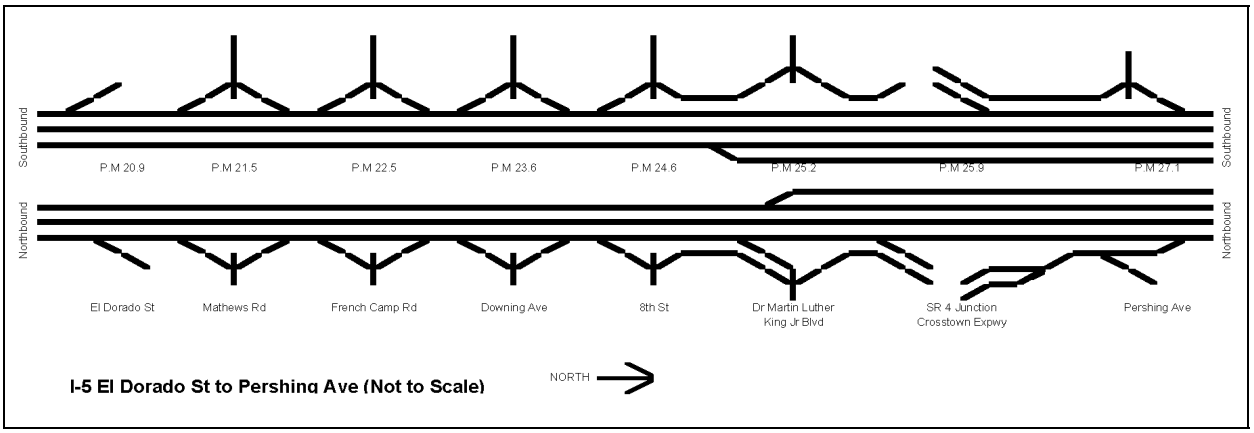


Figure 2-4 Lane Diagram for I-5 (Central Stockton Area)

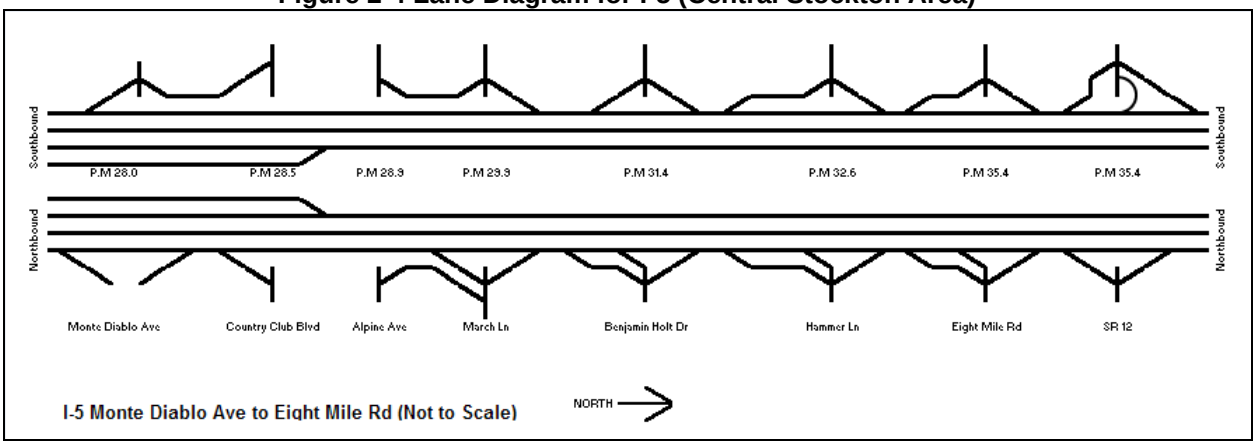


Figure 2-5 Lane Diagram for I-5 (Northern Stockton Area)

Other Freeway Segments Related to the Study Area

Additional sections of freeways are included in the study area. These are included to ensure that operational analysis is responsive. Specific freeways added include:

I-580 between I-205 and the West Grant Line Road interchange in Alameda County (west of study area). This freeway operates with four freeway mixed-flow lanes in each direction at its most restricted point. It includes additional lanes at the merge (westbound) and diverge (eastbound) points where I-205 intersects with the facility, as shown in above.

I-5 between the I-205 interchange and south of the Kasson Road interchange (south of study area). This continuation of I-5 contains three freeway mixed-flow lanes in each direction north of Business I-205 and two freeway mixed-flow lanes in each direction south of Business I-205, as shown in **Figure 2-3** above.

SR-120 between I-5 and east of South Airport Way interchange (east of study area). The entirety of the freeway portion of SR-120 within the San Joaquin County is a seven-mile corridor connecting I-5 and SR 99. It serves as a major connector for commuters from cities in San Joaquin, Stanislaus and Merced Counties to the Bay Area. Currently, this section of SR-120 carries traffic of approximately 77,000 vehicles per day. Between I-5 junction and Airport Way, SR-120 has two lanes in each direction. This facility contains two freeway mixed-flow lanes in each direction. There are existing interchanges at Guthmiller Road and Airport Way. A diagram of SR-120 in the study area is shown in **Figure 2-6.**

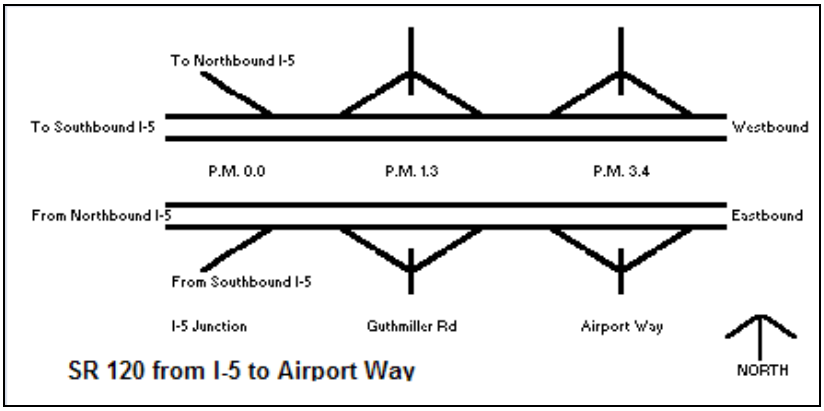


Figure 2-6 Lane Diagram fro SR-120 in Lathrop Area

SR-4 (Crosstown Connector) between I-5 and the Wilson Way interchange (east of the study area). The portion of SR-4 that operates as a freeway segment within the City of Stockton functions is also known as the Crosstown Connector, and it connects I-5 and SR 99. It currently carries traffic of approximately 96,000 vehicles per day. Because of the proximity of the I-5 junction with interchanges at the Center and El Dorado one-way couplet, and at South Stanislaus Street and South Wilson Way, there is a variation in the number of through lanes and auxiliary lanes along the length of this study section. This variation is shown in **Figure 2-7.**

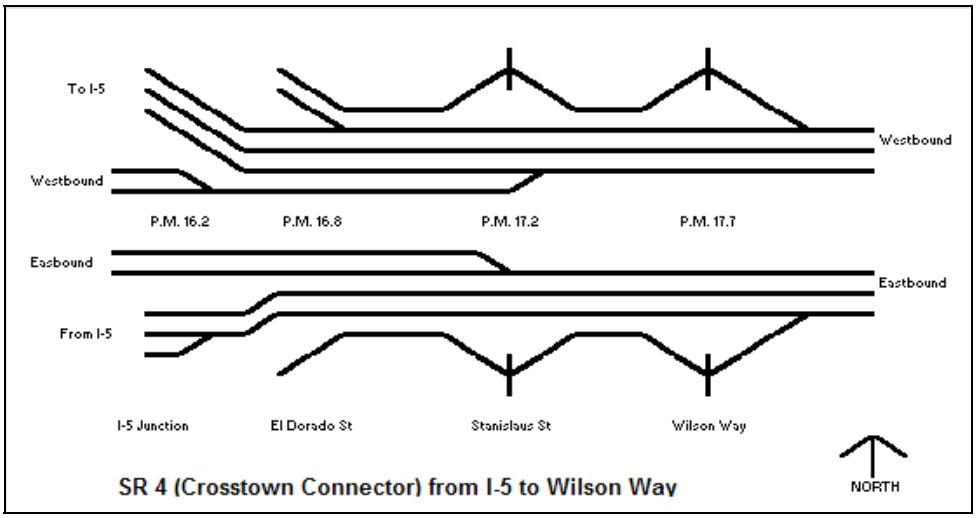


Figure 2-7 Lane Diagrams from SR-4 (Crosstown Connector)

2.4.2 Arterial Facilities

The effective operation of the freeway network depends on nearby arterials that are parallel to the freeway alignment, and/or intersect with the freeway operations at interchanges. These arterials are generally designed to carry more local traffic, but can function as freeway reliever routes (particularly for short-distance trips) if the freeway becomes congested and general speeds deteriorate, or if incidents significantly reduce freeway operations.

The arterials discussed here are listed by city in the study area. The cities include Tracy, Lathrop and Stockton.

Arterials in Tracy (I-205 Segment)

Parallel arterials included in the study area in and around the City of Tracy include 11th Street, and Grant Line Road. Arterials that intersect with I-205 include Mountain House Parkway, Tracy Boulevard and MacArthur Drive. These are shown in **Figure 2-1** earlier in this section.

As a major east-west arterial, 11th Street functions as the east-west street with the highest traffic volumes in Tracy. It serves many residential areas located on either side of the roadway. It extends westward to align with I-205, and crosses to I-5 to the east. Because it connects to the corridor at two locations, it provides a parallel reliever route for I-205 through Tracy, frequently used by peak hour traffic avoiding congestion on I-205. It has been developed as a high speed arterial with four to six through lanes, central median and left turn bays.

West of West Byron Road, West Grant Line Road is a two lane rural arterial that connects to I-580 west of the I-205/I-580 junction. It is used by some traffic to bypass congestion on I-205 between I-580 and West Byron Road.

East of I-205, Grant Line Road runs parallel to I-205 and is an important arterial within Tracy, connecting some of the older developed parts of Tracy. It also provides a parallel reliever route to I-205, running between I-205 in the west and I-5 in the east.

There are several north-south arterials that connect I-205 to West Grant Line Road and 11th Street. These include Mountain House Parkway, Tracy Boulevard and MacArthur Drive. West Byron Road and Paradise Road - South Chrisman Road cross I-205 without interchanges and connect West Grant Line Road to 11th Street. These have similar functions in the Tracy street system, connecting the various activities within the City to each other, as well as to I-205, at one-mile intervals.

Arterials in Lathrop and Southern Stockton (South of SR-4 – Crosstown Connector) (I-5 Segment)

Between SR-120 and SR-4 (Crosstown Connector) there are two key parallel routes that are currently operating to the east of I-5 (South Airport Way and South El Dorado Street). No parallel arterials are currently serving long-distance trips to the west of I-5. Several parallel arterials to the east of the corridor provide routes for local traffic between Manteca, Lathrop and Stockton. These are also shown in **Figure 2-1**, earlier in this section.

South Airport Way provides a continuous route from SR-120 to SR-4, and extends north into the edge of downtown Stockton. It connects to I-5 via Louise Avenue, Lathrop Road, Roth Road, French Camp Road and Dr. Martin Luther King Jr. Blvd.

South El Dorado Street connects Downtown Stockton at SR-4 (Crosstown Connector) to I-5 south of Mathews Road. It is also connected to I-5 via Dr. Martin Luther King Jr. Blvd, W 8th Street, French Camp Road and Mathews Road.

There is no useful parallel route between the SR-120 and I-205 junctions. This is because there is a major river crossing at the San Joaquin River, so that cost of constructing a parallel arterial has been considered prohibitive until recently.

Arterials that intersect with I-5 at interchanges include Louise Avenue, Lathrop Road, Roth Road, El Dorado Street, Mathews Road, French Camp Road, Downing Avenue, 8th Street and Dr. Martin Luther King Jr. Blvd in addition to SR-4 -- Crosstown Connector.

Arterials in Northern Stockton (North of SR-4 – Crosstown Connector) (I-5 Segment)

As with I-5 south of Stockton, there is no long-distance parallel route north of Stockton. The main route parallel to I-5 north of SR-4 (Crosstown Connector) and south of SR-12 is Pacific Avenue and Thornton Road. Between Hammer Lane and Harding Way, Pershing Avenue also provides a parallel route. South of Harding Way, a parallel route is provided by the Center/El Dorado one-way couplet, passing through Downtown Stockton to SR-4 (Crosstown Connector). These are shown in **Figure 2-1,** earlier in this section.

Arterials that intersect with I-5 at interchanges north of SR-4 (Crosstown Connector) include Pershing Avenue / Fremont Street, Mount Diablo Avenue, Country Club Boulevard / Alpine Avenue, March Lane, Benjamin Holt Drive, Hammer Lane, Eight Mile Road and State Route 12.

2.5 Transportation System Management/ITS

Transportation System Management refers to strategies that help maximize the efficiency of the existing roadway system. Many of these strategies involve the application of ITS technologies

and are often referred to as ITS strategies. Examples of System Management strategies include ramp metering, managed lanes, congestion pricing, traveler information, advanced traffic signal systems, freeway/ramp/surface street signal coordination, incident management, and reversible lane control. A number of these strategies have been applied within the I-205/I-5 corridor as discussed below.

2.5.1 ITS Infrastructure

ITS infrastructure refers to a variety of technologies currently used in San Joaquin County for incident notification, traveler information and freeway management. Deployment of ITS technology enhances traveler information services as well as the operational and safety efficiency of the corridor by informing motorists of traffic congestion, inclement weather, such as fog, dust, incident management, emergency response and highway construction and/or closings. This information assists motorists to make informed decisions regarding their travel.

ITS technologies currently deployed within ramp meter signals, dynamic message and warning signs, highway advisory radio (HAR), roadside weather information systems (RWIS), closed circuit television (CCTV) cameras that monitor traffic, and changeable message signs (CMS) that generally display road closure/road condition information. In addition to the cameras, traffic monitoring stations (TMSs) are located at various locations to feed traffic data to the Transportation Management Center (TMC). **Table 2-2** lists the ITS infrastructure or equipment currently in use along I-205 and I-5 within the CSMP corridor limits. These technologies are used in combination as tools to assist traffic monitoring program within the study corridor.

Additional traffic monitoring stations detector units have been installed along I-205 and I-5, and are linked to the University of California (U.C.) Berkeley Performance Monitoring System (PeMS) for use in distribution of data to many users. The PeMS detector units collect on-going data such as volumes and speed. There are currently 45 PeMS stations being installed on I-205, and 24 along I-5 that have been funded through the State Highway Operations and Protection Program (SHOPP). **Table 2-3** lists the currently installed PeMS detector locations.

Table 2-2 Locations of ITS Infrastructure

No.	Route	Postmile	Location	Description
1	I-205	0	I-205 Alameda/San Joaquin County Line	Traffic Monitoring Station (TMS) ID 76
2	I-205	1	I-205 Tracy, Mountain House Parkway	TMS ID 8 [PeMS]
3	I-205	1.17	I-205 Westbound on-ramp from Mountain House Pkwy	Ramp Meter
4	I-205	1.17	I-205 Westbound west of Mountain House Pkwy	TMS [PeMS]
5	I-205	1.3	I-205 Eastbound west of Mountain House Pkwy	TMS [PeMS]
6	I-205	1.62	Eastbound on-ramp from Mountain House Pkwy	Ramp Meter
7	I-205	1.69	EB/WB I-205 west of Mountain House Pkwy	TMS

No.	Route	Postmile	Location	Description
8	I-205	2.38	I-205 Hansen Road	TMS ID 64
9	I-205	2.38	I-205 Hansen Road	WB CMS Station ID60/TMS/CCTV
10	I-205	2.85	I-205 Tracy, 11th Street	TMS ID 334
11	I-205	8.12	EB/WB I-205 at Tracy, MacArthur Dr.	TMS
12	I-205	8.12	Tracy Mac Arthur Drive	TMS ID #121 [PeMS]
13	I-5	12.11	I-5 North of Eleventh St.	CCTV
14	I-5	12.4	I-5 South of RTE 205	Northbound CMS ID #15
15	I-5	12.62	I-5 JCT. RTE 205 West	TMS ID 13
16	I-5	12.62	I-5 JCT. RTE 205 West	CCTV
17	I-5	12.85	I-5 Paradise Cut	RWIS
18	I-5	14.83	I-5 JCT. RTE. 120 East	TMS ID 237 [PeMS]
19	I-5	14.8	I-5 JCT. RTE 120 East	CCTV
20	I-5	15.01	I-5 North of RTE 120	RWIS
21	I-5	15.59	I-5 North of RTE 120	Southbound CMS ID #5
22	I-5	16.46	I-5 South of Louise Avenue	RWIS
23	I-5	17.04	I-5 North of Louise Avenue	Southbound CMS ID #4
24	I-5	18.36	I-5 Lathrop Road	RWIS
25	I-5	18.81	I-5 North of Lathrop Road	Southbound CMS ID #3
26	I-5	19.73	I-5 Roth Road	RWIS
27	I-5	20.22	I-5 North of Roth Road	Southbound CMS ID #2
28	I-5	21.48	Mathews Road	RWIS
29	I-5	21.96	I-5 South of French Camp Road	Southbound CMS ID #1
30	I-5	22.51	I-5 French Camp Turnpike	TMS ID 340
31	I-5	22.85	I-5 North of French Camp Road	Northbound CMS ID #11
32	I-5	23.25	South of French Camp Road	RWIS
33	I-5	25.36	I-5 Stockton, JCT. RTE. 4	TMS ID 223 [PeMS]
34	I-5	25.98	I-5 at Church St. UC	CCTV
35	I-5	26.47	I-5 North of JCT. RTE 4	CCTV
36	I-5	26.97	I-5 Southbound on-ramp from Pershing Ave	TMS ID 101 [PeMS]
37	I-5	28.53	I-5 Country Club Boulevard	TMS ID 55
38	I-5	29.56	I-5 South of March Lane	Southbound CMS ID #10
39	I-5	30	I-5 @ March Lane	CCTV
40	I-5	32.66	I-5 Stockton, Hammer Lane	TMS ID 159
41	I-5	32.66	I-5 Stockton, Hammer Lane	TMS ID 161
42	I-5	35.5	I-5 North of 8 Mile Road	NB EMS supports HAR ID #11
43	I-5	39.57	I-5 JCT. RTE. 12	TMS ID 180
44	I-5	39.57	I-5 JCT. RTE. 12	TMS ID 230
45	I-5	39.9	I-5 Flag City JCT. RTE. 12	HAR ID # 11
46	I-5	41.5	I-5 Turner Road	SB EMS supports HAR ID # 11

Table 2-3 I-205/I-5 CSMP Currently Installed PeMS Detection

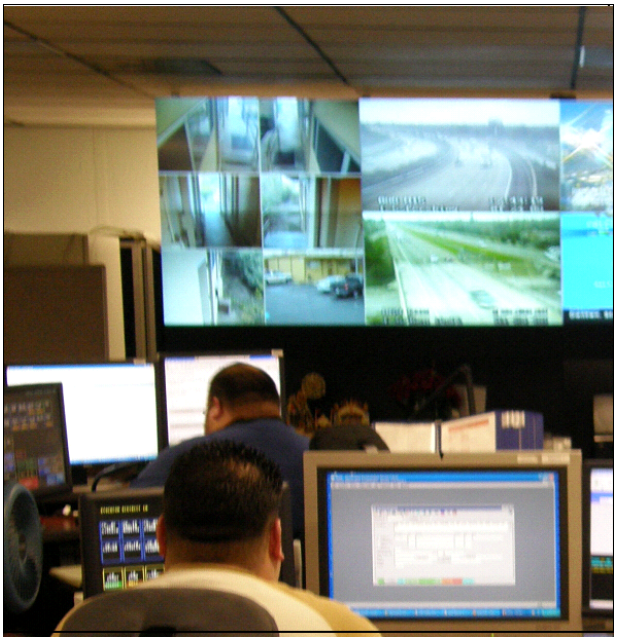
Number	PM	Locations	Number	PM	Location
I-5 North Bound (26 Locations)			**I-205 East Bound (14 Locations)**		
1	16.49	660' North of Louise Ave UC	46	01.30	Mountain House Pkwy Off Ramp
2	17.00	30' North of Lathrop Rd Exit Sign	47	01.45	240' East of Mountain House Parkway
3	18.17	Between Lathrop Rd On ramp and Sharpe Depot Off	48	02.00	30' East of Eleventh St. Advance Sign
4	18.66	Between Lathrop Rd On ramp and Sharpe Depot Off	49	03.50	125' East of Eleventh St. OC
5	19.60	410' South of Sharpe Depot Roth Rd UC	50	05.50	594' West of Grant Line Rd UC
6	20.70	30' North of El Dorado St Exit Sign	51	05.94	317' East of N. Corral hollow Rd UC
7	21.20	30' North of Mathews Rd Exit Sign	52	07.00	176' West of Tracy Blvd UC
8	21.40	Near exist weather station in the median (Cabinet #	53	07.51	200' West of Holly Dr OC
9	22.90	390' South of CMS No. 11	54	08.12	243" West of MacArthur Dr UC
10	23.55	150' North of Eight St. Advance Sign (Post No.	55	09.60	20' East of Paradise Rd OC
11	24.10	Between Downing Ave On ramp and Eight Street Off	56	10.48	10' East of Rancho Rd UC
12	24.64	110' North of Dr. Martin Luther King Jr. Blvd	57	11.40	Between MacArthur Dr On Ramp and
13	25.20	233' North of Fremont Ave Advance Sign (Post#	58	12.00	Between MacArthur Dr On Ramp and
14	25.99	Between East bound SR-4/North bound I-5 Junction and Fresno Ave On ramp.	59	13.3	At the East end of Paradise Cut
			I-205 West Bound (11 Locations)		
15	26.47	Gore area between NB I-5 and Fresno Ave On ramp	60	01.30	Mountain House Pkwy On Ramp
16	27.52	Behind Sound Wall North Monte Diablo UC	61	03.30	30' West of Eleventh St. OC
17	27.93	Behind Sound Wall South of the North End of Sound	62	04.20	Between Grant Line Rd On Ramp and
18	28.38	North of Country Club Blvd Exit Sign	63	05.10	77' East of pole No. 0546D
19	29.87	March Lane Off Ramp	64	05.35	Between Grant Line Rd Off ramp and
20	31.00	South of Fourteen Mile Slough Bridge behind guard	65	06.57	400' East of PM 6.5
21	31.38	Behind Sound Wall 21' North of Sign Bridge	66	07.08	307' East of Tracy Blvd UC Structure
22	31.58	Benjamin Holt Dr On Ramp	67	07.89	800' West From Pole No. 0818A
23	32.47	10' North from the North End of Hammer Ln UC	68	08.30	At MacArthur Dr Off ramp
24	33.49	South of Mosher Slough Bridge Behind Existing	69	09.60	Between I-5 SB /SR-205 WB Junction
25	35.50	In the median area North of Eight Mile Rd UC	70	10.50	15' West of El Rancho Rd UC
26	37.96	By existing TMS station in the median area.			
I-5 South Bound (19 Locations)					
27	21.95	South of CMS No. 1			
28	22.46	300' South of Mathews Rd Advance Sign			
29	23.69	250' South of French Camp Advance Sign			
30	23.96	30' South of Downing Ave Exit Sign			
31	24.63	120' South of Downing Ave Advance Sign			
32	25.40	220' South of Eight St. Advance Sign			
33	26.51	Gore Area between SB I-5/EB SR-4/Fresno Ave			
34	26.51	Gore Area between SB I-5/EB SR-4/Fresno Ave			
35	27.01	On ramp from Fremont Ave, 360' North of PM 27.0			
36	28.14	50' North of Monte Diablo sign Bridge			
37	28.53	10' South of Country Club Blvd UC			
38	30.00	Between March Lane Off and On ramps			
39	30.98	30' South of March Lane Advance Sign			
40	31.47	20' South of Benjamin Holt UC			
41	32.20	112' North of Benjamin Holt Two-Post Advance Sign			
42	32.70	30' South of Benjamin Holt Advance Sign			
43	34.47	90' North of McAuliffe Rd UC			
44	35.51	In the median area North of Eight Mile Rd UC			
45	37.96	By existing TMS station in the median area.			

Within the limits of this CSMP, I-205 and I-5 have extensive detection, but there are some areas along the corridor that need system expansion to fully optimize system Management strategies. **Table 2-4** identifies segments on the CSMP corridor areas with detection spaced more than what is considered acceptable for adequate detection and are identified as areas for further PeMS implementation.

Table 2-4 I-205/1-5 CSMP PeMS Station Gaps

From	To	Location	Distance
Eastbound I-205			
0	0.761	Aqueduct Ser UC to W/O Mountain House Parkway	0.761
1.3	8.51	W/O Mountain House Parkway to Mac Arthur Dr	7.21
8.51	13.39	Mac Arthur Drive to Paradise Cut Bridge	4.88
Westbound I-205			
0	1.176	Aqueduct Ser UC to W/O Mountain House Parkway	1.176
1.176	8.51	W/O Mountain House Parkway to Mac Arthur Dr	7.334
8.51	13.39	Mac Arthur Drive to Paradise Cut Bridge	4.88
Northbound I-5			
R13.334	R16.101	NB 5 Jct Rte EB 205 to Jct 120 East	2.767
R16.101	R22.15	Jct 120 East to French Camp Turnpike	6.049
R22.15	25.002	French Camp Turnpike to S/O Dr. Martin Luther King Jr. Blvd	2.852
26.97	39.57	Pershing Ave to Jct Rte 12	12.6
Southbound I-5			
R23.32	25.002	Downing Ave to Dr. Martin Luther King Jr. Blvd	1.682
26.97	39.57	Pershing Ave to Rte 12	12.6

2.5.2 Transportation Management Centers



Effective System Management or ITS implementation requires coordination of all components. The TMC plays an important role in day-to-day system management, providing coordinated incident responses, as well as integration of various systems. An example of integration would be the coordination of ramp metering and arterial signal management. Traveler information also requires sharing data with public and private partners.

TMCs are used in emergencies, Amber Alerts, to manage the transportation system and provide an Emergency Operations Center function during natural disasters, such as earthquakes. TMCs also serve a security preparedness function; staff can monitor the urban freeway system, quickly activate response strategies (such as changeable message signs), or notify the proper authorities when security risks are identified.

Within San Joaquin County, Caltrans District 10 and the City of Stockton have established TMCs. Several CCTV cameras along the freeways in the Stockton area are shared with City of Stockton and there is a video link between the City's TMC and Caltrans' TMC.

2.5.3 Ramp Metering and HOV Strategies

Rapid growth in the San Joaquin Valley (SJV) has produced significant congestion on the regional routes connecting the population centers in the SJV with job locations in the SJV and in the neighboring Sacramento and San Francisco Bay/San Jose areas. Although commitments have been made for funding of transportation improvements, the funds are not likely to be sufficient to provide the roadway capacity needed to meet the growth forecasts for the next twenty to twenty-five years. San Joaquin County is also part of the eight-county San Joaquin Valley Air Basin, which is in non-attainment for two of the six criteria pollutants specified by the Clean Air Act: ozone and PM_{10}. There is urgent need to ensure that future travel is accommodated in the most efficient manner possible with the least impact on air quality.

In 2006, Caltrans contracted with SJCOG to develop a Ramp Metering and HOV Master Plan for San Joaquin Region, including the counties of San Joaquin, Stanislaus, and Merced. Ramp metering and HOV lanes are effective operational tools for managing congestion on freeways and thereby improving regional and interregional mobility. HOV lanes are common in metropolitan areas and are the basis for innovation with the recent implementation of High Occupancy Toll (HOT) lanes. California implements ramp metering in highly congested corridors during peak traffic hours to improve freeway speeds and safety. However, in San Joaquin County, there is only one operating ramp meter and no HOV lanes.

The purpose of this joint Caltrans/SJCOG effort was to develop a Ramp Metering and HOV Master Plan through system analysis and political consensus in a product that all stakeholders will be able to adopt and implement, in collaboration with state and local partners. The draft Ramp Metering and HOV Master Plan identifies that ramp metering can be effective for mitigating bottleneck impacts and avoiding the breakdown of mainline traffic flow. Ramp metering is needed on westbound and eastbound I-205 when HOV lanes, as fourth lanes, are added in each direction. The plan also identifies the need for ramp metering on north bound I-5 from I-205 to SR-4. The plan also identified the need for HOV lanes on I-5 as fourth lanes are added in each direction. Ramp meters were installed as part of the Mountain House Parkway interchange on I-205 in Tracy. Currently, this is the only location in District 10 with ramp metering. San Joaquin Regional Transit District (SJRTD) has recommended the consideration of HOV transit ramps to accommodate transit when considerations are made for implementing HOV lanes on I-205.

2.5.4 Traffic Control

Another element of System Management/ITS is traffic control. Traffic control includes signal strategies for managing traffic flows on arterials as well as metering on the freeway system. These strategies offer great promise to improve the productivity of the transportation system. There are, however, challenges for the State in utilizing some of these options. Local agencies are often concerned that traffic control devices will cause additional traffic to use local streets as an alternative. This is an area where Caltrans is working with its local partners to reach a solution that will be agreeable to all parties. The I-205/I-5 CSMP Development Team has identified the need for an on-going multi-jurisdictional committee to discuss coordinated transportation demand management practices in San Joaquin County including ramp metering, ITS implementation, traffic signal synchronization, and enhanced transportation demand management.

2.5.5 Incident Management

The standard operating procedure and protocol for incident management of collisions and closures for natural causes on I-205/I-5 is coordinated between the CHP and the Caltrans District 10 Transportation Management Center. Semi-annual team meetings are held with CHP, Caltrans, and San Joaquin County agencies to discuss incident, construction, maintenance, and special event traffic management including permit related issues. Communication with the media is coordinated through the CHP.

Key ITS elements are strategically placed at major decision points and areas with high incident rates where extensive data is gathered through traffic monitoring stations, RWIS, and closed circuit television. Caltrans District 10 communicates road and weather information via the Caltrans Highway Information Network (CHIN), changeable message signs, and HAR. Advanced traveler information systems are available through the telephone and internet via the PeMS, RWIS, and other statewide databases.

2.5.6 Advance Traveler Information Systems

One of the more progressive components of system management and ITS is the Advanced Traveler Information Systems (ATIS). Most commuters get information about traffic conditions

from the media, such as, radio and television stations. ATIS will provide modal-specific, time-of-day demand data that will allow travelers to get the most out of the transportation system. The system would allow travelers to manage their trips in the most efficient manner. Implementing advanced traveler information systems requires a partnership between transportation agencies and the public. However, it is clear that the framework is not yet fully developed and that, at this time, current detection systems are not adequate for real-time, tailored information.

The "511" system is a new three-digit phone number program to access traveler information that is being implemented throughout the country. SJCOG recently made the decision to partner with the Sacramento Area Council of Governments (SACOG) to join the 511 system in the northern Sacramento area region as Phase I of 511 deployment in San Joaquin County. Neighboring transportation planning agencies, Stanislaus Council of Governments (StanCOG) and MCAG have also made the decision to partner with the SACOG 511 region. Deployment of the 511 for San Joaquin County occurred in December of 2008.

SACOG is currently looking at future plans to integrate 511 with a Sacramento Transportation Area Network or STARNET, an information exchange network and operations coordination framework that will be used by the operators of transportation facilities and emergency responders. STARNET will build upon previous ITS investments by using, with little or no modifications, the existing field infrastructure (cameras, changeable message signs, traffic signals, vehicle location systems, etc.) and central systems (freeway management systems, traffic signal systems, transit management systems, computer-aided dispatch systems, etc.) already operated by each agency. As part of the STARNET implementation, interfaces will be developed to these existing systems to enable them to share data and video with each other, provide data and video to the public via the 511 regional travel information system, and provide operations and emergency response personnel with a map-based Regional Transportation Management Display.

2.5.7 Freeway Service Patrol

The Freeway Service Patrol (FSP) is a program run jointly by Caltrans, SJCOG, and the CHP. The program offers free service to motorists provided by privately owned tow trucks that patrol designated routes on congested urban California freeways. This reduces delay for other motorists, maintains the capacity of our highway system and increases safety for motorists by clearing hazards that may cause secondary incidents. FSP services are currently operating along the I-205 corridor. FSP services were expanded to increase hours of operation and the number of trucks during the current construction project on I-205 to widen from four to six lanes.

2.6 Transit Network

2.6.1 Bus Services

San Joaquin Regional Transit District

SJRTD operates various services on different sections of the I-5 and I-205 study corridor. SJRTD operates several coach services along the corridor servicing commuters traveling to the Bay Area and Sacramento. These services not only include some traditional fixed-route

services but also subscription services, so that commuters are guaranteed a bus seat if they subscribe. Each route is tailored to the work destinations in the Bay Area (and related work hours), and has several pick-up points located in the study corridor (including several at the park-and-ride lots listed in **Table 2-7.**

The number of bus trips and estimated daily passenger trips are summarized in **Table 2-5**. The SJRTD In addition to this segment, other local routes provide transportation alternatives between the various activities on the corridor. In conjunction with the City of Stockton (which has provided transit signal priority capabilities along the segment), the SJRTD operates a "bus rapid transit" (BRT) segment on Pacific Avenue from Hammer Lane to the Downtown Transit Center (DTC). The BRT operation will be extended during 2009 south to the airport.

Table 2-5 SJRTD Routes Using I-5 and I-205

Route	Origin - Destination	Corridors/Areas Served in San Joaquin County	Daily Bus Trips	Estimated Weekday Average Daily Passenger Trips
22	North Stockton - Tracy Defense Depot	I-5/Defense Depot	4	105
26	Stockton-Lathrop-Tracy	I-5/Harlan/I-205/Grant Line	25	220
51	Stockton - South Stockton - County Hospital	Parallel roads to I-5	36	300
52	Kaiser-Stockton-County Hospital	Hwy 4/Manthey/I-5	25	315
55	Stockton-Weston Ranch	Dr. Martin Luther King Jr. Blvd /I-5	30	305
90	Stockton -Lathrop - Tracy	I-5/Manthey/I-5/Grant Line	15	160
151	Stockton -Livermore (Lawrence Lab)	I-5/I-205	2	40
152	Stockton -Livermore (Lawrence Lab)	I-5/I-205	2	64
153	Manteca -Livermore (Lawrence Lab)	SR-120/I-5/I-205	2	52
154	Manteca -Livermore (Lawrence Lab)	SR-120/I-5/I-205	2	64
157	Stockton – Manteca – Tracy - Dublin (BART-Hacienda Business Park)	SR-120/I-5/I-205	2	48
160	Stockton - Dublin (BART)	I-5/I-205	2	91
162	Tracy - Sunnyvale (Lockheed)	I-5/I-205	2	66
164	Manteca - Sunnyvale (Lockheed)	I-5/I-205	2	110
166	Stockton - Sunnyvale (Lockheed)	I-5/I-205	2	108
167	Ripon - Livermore (Lawrence Lab)	SR-120/I-5/I-205	2	98
170	Stockton - Manteca - San Jose (Silicon Valley)	SR-120/I-5/I-205	2	96
171	Stockton - Dublin (BART)	I-5/I-205	2	82
172	Stockton - Sunnyvale (Lockheed)	I-5/I-205	2	70
173	Stockton – Manteca - Sunnyvale (Northrop/Grumman)	SR-120/I-5/I-205	2	102
174	Stockton - Palo Alto (Loral)	I-5/I-205	2	82
175	Stockton – Manteca - Santa Clara (Silicon Valley)	SR-120/I-5/I-205	2	62
	TOTAL		**167**	**2,640**

Source: San Joaquin Regional Transit District web site, 2009

Other Bus Transit Providers

In addition to the SJRTD services summarized above, there are other bus lines that use I-5, I-205 or parallel arterials in the study area. These are described in **Table 2-6.** In addition to these routes, other local transit services also operate in Stockton, Tracy, Lodi, Manteca and Escalon.

Table 2-6 Other Bus Routes Operating In The I-205/I-5 CSMP Corridor

Provider	Route Number	From	To	Weekday Service Description	Weekend Service Description
Tracer (Tracy)	Route A	Prime Outlets	West Valley Mall	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
	Route B	City Hall	West Valley Mall	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
	Route C	City Hall	City Hall (Loop Route)	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
GrapeLine (Lodi)	Route 1	Lodi Station	Church/ Lower Sacramento	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
	Route 2	Lodi Station	Central	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
	Route 3	Lodi Station	Ham	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
	Route 4	Lodi Station	Century	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM
	Route 5	Lodi Station	Cherokee	06:00 AM to 07:00 PM	07:45 AM to 03:00 PM

Source: Tracy Tracer and Grapeline web sites, 2009

2.6.2 Passenger Rail Services

In addition to bus transit, passenger rail services provide connections between San Joaquin and points to the north, south and west.

Altamont Commuter Express

The Altamont Commuter Express (ACE) is a parallel commuter rail service operated by the San Joaquin Regional Rail Authority. ACE provides commuter rail service between San Joaquin County and San Jose. Within San Joaquin county, ACE stations are located in Stockton, Lathrop, and Tracy. Over the Altamont Pass, there are additional stations at Vasco Road (Livermore), Pleasanton, Fremont, downtown Santa Clara, and San Jose. The ACE alignment is shown in **Figure 2-8.**

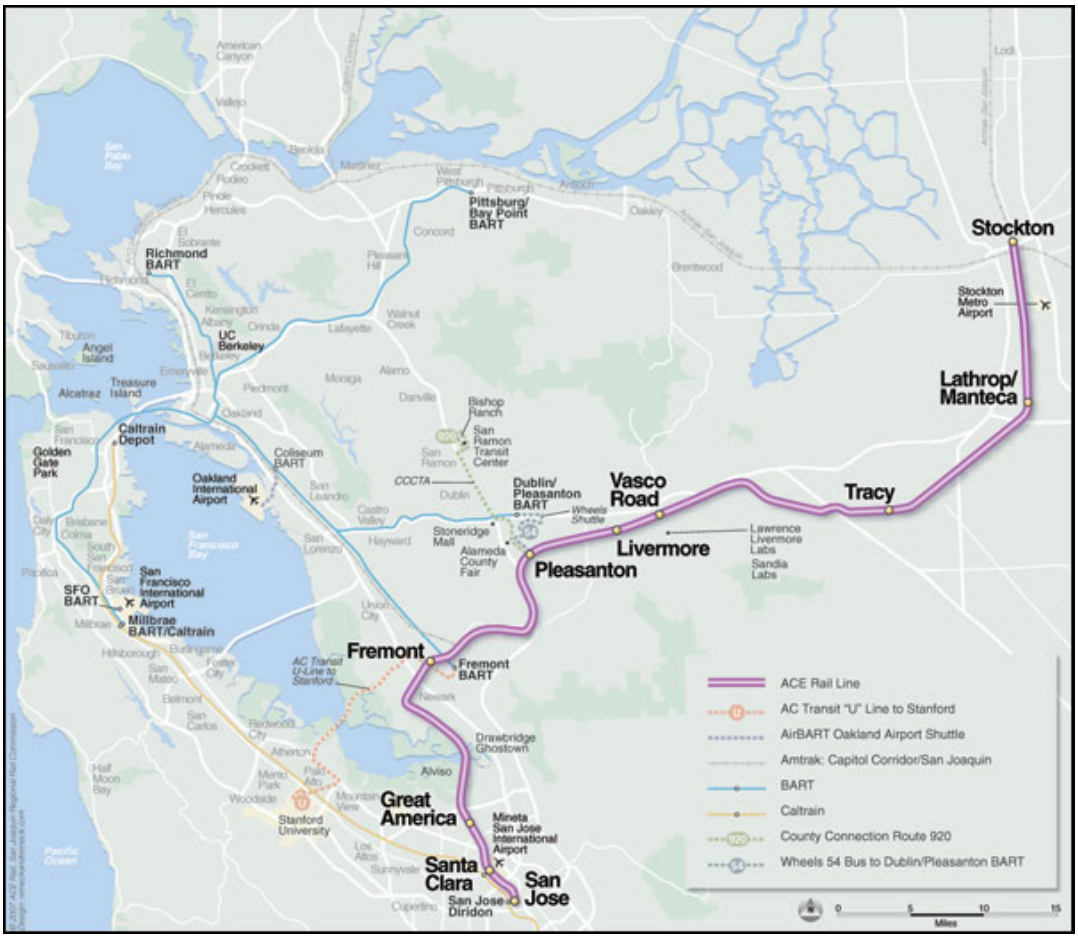


Figure 2-8 Altamont Commuter Express Map
Source: www.acerail.com

The service operates with four trains heading westbound in the AM peak period (leaving Stockton between 4:20 am and 9:30 am) heading toward San Jose, and four trains returning eastbound in the PM peak period (arriving in Stockton between 2:15 pm and 7:45 pm). The service headways are an hour or greater during these operating periods. Total running time from end to end is just over two hours.

As a train service, the capacity is controlled by the number of passenger coaches on the train. The service is ultimately designed to carry eight coaches per train, with up to 137 seats per coach (assuming no seats removed for bicycles). The service carries approximately 3,700 riders a day on the eight trains.

There are large parking lots available for riders. The lot at the Stockton Station is estimated at 90 spaces, with 510 spaces at the Lathrop/Manteca station and 525 spaces at the Tracy station.

Amtrak

Amtrak "San Joaquin" runs between Bakersfield and the San Francisco Bay Area with stops in Fresno, Madera, Stockton, Lodi and Sacramento. Currently, there are four round trips operated daily between the San Francisco Bay area and Bakersfield and two round trips operated between Sacramento and Bakersfield.

High Speed Rail

The California High Speed Rail Authority has developed a plan to build a high-speed rail line generally parallel to SR-99, connecting Los Angeles to San Francisco, and would eventually run from San Diego to and as far north as Sacramento. The plan describes a 800-mile-long high-speed train system capable of speeds of 220 miles per hour. The system as planned would serve the future major metropolitan centers of California.

In December 2007, the California High Speed Rail Authority selected the Pacheco Pass alignment as part of the required environmental studies for the San Francisco Bay Area-Central Valley connection. It would sweep into the Bay Area over the pass between the Los Banos area (Merced County) and Gilroy, head north to San Jose, then up the Peninsula along the Caltrain right-of-way to San Francisco.

An Altamont proposal would have the rail line cross the pass west of Tracy and travel to a new bay crossing near the Dumbarton Bridge, where it would then head north to San Francisco. A separate set of tracks would have taken the train south down the East Bay shoreline to San Jose.

Based on a comprehensive screening evaluation of alignment and station options, the Authority recommended alignments through the Valley that include both the Union Pacific (UP)/Southern Pacific (SP) and Burlington Northern Santa Fe (BNSF) railroad corridors (both running generally parallel to SR-99). This would take some traffic from the freeways in the County, but obviously will not occur until sometime in the future.

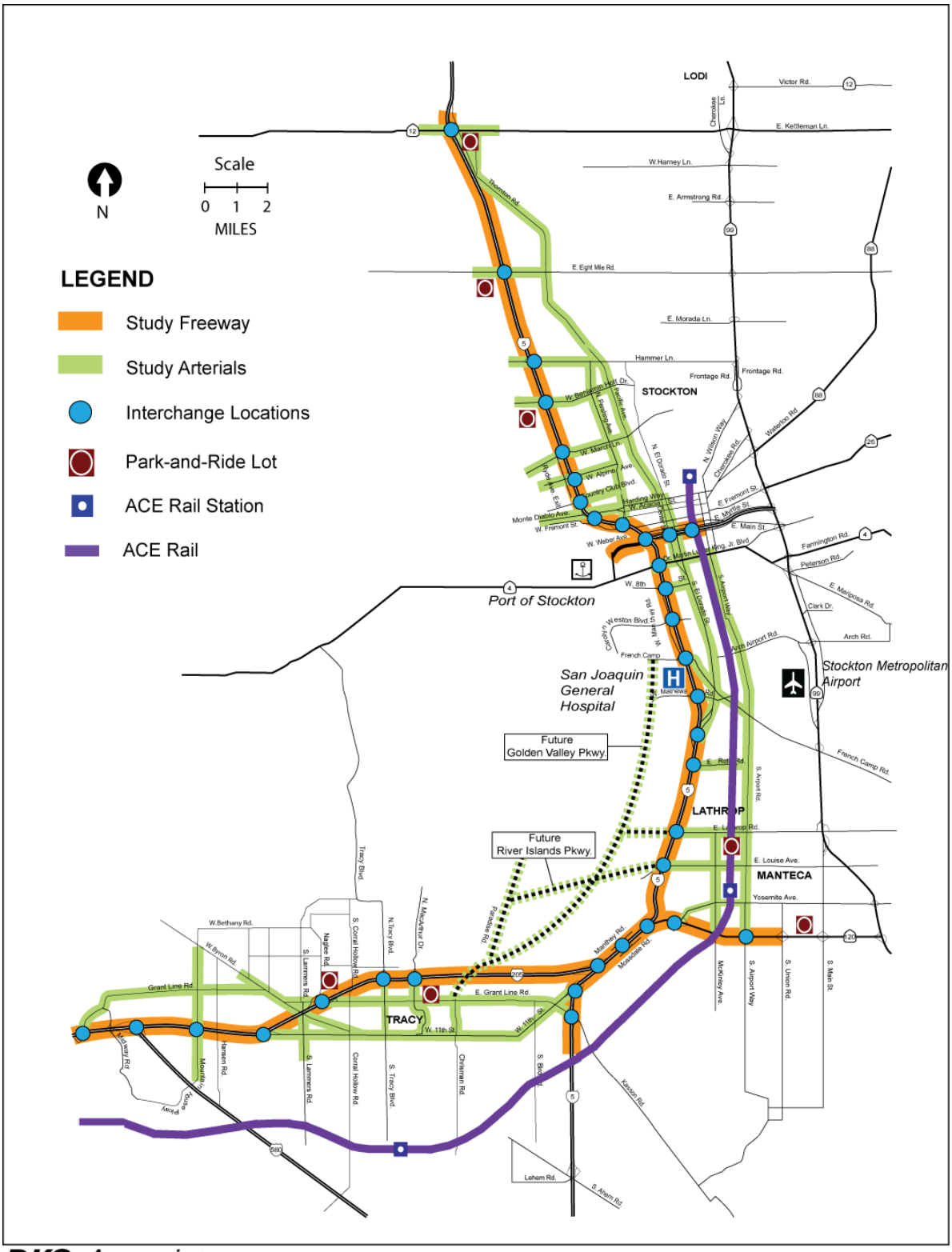
2.6.3 Park-and-Ride Facilities

There are several facilities in place that provide for persons to gather and park cars, providing a place to form carpools (allowing higher per car occupancies) or to use non-auto modes of transportation for a portion of the trip (such as express buses and commuter rail). There are several existing park and ride lots within a mile of the corridor. Their sizes and occupancy are described in **Table 2-7.** It can be seen that the current storage capacity is rather modest and the demand exceeds the capacity at many locations; creating overflow conditions where drivers park vehicles in locations that are not designated parking spaces. These lots provide the opportunity for auto drivers to transfer to express buses or to carpools. The location of these lots is also identified in **Figure 2-9**. Park-and-ride lots are also available at ACE Rail stations, but these lots are primarily designed for rail riders; details on their capacity are discussed in Section 2.6.2.

Table 2-7 Existing General Purpose Park-and-Ride Lots

No.	Park-and-Ride Lots	Jurisdiction	Sponsor	No. of spaces	% of Demand Compared to Spaces in 2007
1	Flag City - I-5/SR-12	Lodi	Caltrans	43	109%
2	Calvary Church - Kelley Drive	Stockton	SJCOG/SJRTD	40	158%
3	Marina Center - I-5/Benjamin Holt Drive	Stockton	SJCOG/SJRTD	35	142%
4	Bethany Church - I-5/Michigan Avenue	Stockton	SJCOG/SJRTD	45	60%
5	Community Center- 5th Street	Lathrop	City/ SJCOG	48	96%
6	Wal-Mart – SR-120/Main Street	Manteca	Developer	50	200%
7	City Park-n-Ride - Naglee Road/I-205	Tracy	City/ SJCOG	180	63%
8	Factory Outlet Center - I-205/MacArthur Drive	Tracy	Developer	45	1%

Source: San Joaquin Council of Governments, 2009



DKS Associates
TRANSPORTATION SOLUTIONS

Figure 2-9 Existing Park-and-Ride Lots
Source: San Joaquin Council of Governments, 2009

2.7 Bike and Pedestrian Facilities

The trip lengths served by the I-205/I-5 freeway corridor greatly exceed the maximum trip length for pedestrian travel and generally exceed typical bike trip lengths. Further, bicycles are not permitted on the I-205 and I-5 study segments. Non-motorized travel is more appropriate for short trips, including access to transit facilities, and may reduce surface street traffic.

However, the connectivity of all modes of transportation including bikeway facilities should be considered when planning and programming improvements along I-205/I-5. For the purposes of the I-205/I-5 CSMP, this discussion of bike and pedestrian facilities focuses on more regional arterial bicycle routes that run parallel to or intersect with the corridor. There are two bike routes in the vicinity of I-205; one on Corral Hollow Road and another on Grant Line Road. There are three bike routes in the vicinity of I-5; on Eight Mile Road from Trinity Parkway to Mokelumne Circle, on Benjamin Holt Drive from Cumberland Place to Alexandria Place, and Weber Avenue from I-5 to Airport Way.

2.8 Goods Movement

The San Joaquin County intermodal system consists of the State and Interstate highway system, the inland Port of Stockton, the Stockton Metropolitan Airport, major railroads and intermodal yards. San Joaquin County is a major Northern California distribution point where the two primary north-south highways, I-5 and SR-99, are joined by the SR-4 (Crosstown Freeway) through downtown Stockton and SR-120 through the City of Manteca. I-205 is a major interregional connector between the northern San Joaquin Valley and the San Francisco Bay Area.

The Caltrans 2001 *Global Gateways Development Program (GGDP) Report* identified I-5, I-205, and SR-120 (from I-5 to SR-99) among the top priority global gateways within California. *The San Joaquin Valley Goods Movement Study*, prepared for Caltrans and the eight San Joaquin Valley counties of (Kern, Fresno, Tulare, Kings, Madera, Merced, Stanislaus and San Joaquin) determined that trucking is the dominant mode for moving freight. The increase in freight movement by trucks on State highways is growing faster than can be accommodated by the existing capacity.

Stockton's deep-water port and airport provide international transport links. The international link can also be made through San Francisco Bay Area air and shipping distribution ports. The location advantage, coupled with shipping/receiving facilities such as the Union Pacific Intermodal Facility, the Stockton Deep Water Port, the Stockton Airport, and the transportation infrastructure has made San Joaquin County an attractive location for warehouses and distribution centers.

Key elements of the goods movement system in San Joaquin County are further discussed below.

Roadway System

I-205 and I-5 are both designated STAA truck routes and are vital to the goods movement network in the San Joaquin Valley. Within the last 10 years, the routes have experienced

dramatic traffic growth and levels of congestion with truck traffic at volumes much higher than the statewide average for the highway system. The corridors are heavily used by trucks for both interregional goods movement to eastern and northern states, and for local farm and commercial truck trips. The 2006 Average Annual Daily Traffic (AADT) on I-205 ranged from 94,300 to 113,000 vehicles with trucks constituting 12 percent of the AADT in some sections. Daily truck volumes ranged from 11,500 to 13,500, with five axle trucks representing approximately 60 percent of the total truck volume. The 2006 AADT on I-5 ranged from 77,000 to 160,000 vehicles with trucks constituting 26.4% of the AADT in some sections. Truck volumes ranged from 15,500 to 42,200, with five axle trucks representing approximately 80% of the total truck volume.

The region is currently experiencing goods movement constraints due to the lack of local STAA routes and available truck parking. These issues are currently being evaluated by the SJV Goods Movement Task Force, and the subcommittee formed to address truck parking issues in the region. Local, regional, and State STAA maps can be located at:

http://www.dot.ca.gov/hq/traffops/trucks/truckmap/index.htm.

Port of Stockton

The Port of Stockton is located on the Stockton Deepwater Ship Channel, 75 nautical miles due east of the Golden Gate Bridge. In the 1930's the Port of Stockton facilities were built and the deep water channel was dredged to accommodate ocean going vessels. The Port is located one mile west of I-5 and SR-4, and in close proximity to other major interconnecting major highway systems.

Union Pacific and Burlington Northern Santa Fe Railroads

Several major railways stretch through large portions of the entire San Joaquin County, including the UP and BNSF Railroad. The UP and BNSF intermodal terminals serve both San Joaquin and Sacramento regions. Stockton serves as a hub for many of these railways and acts as a major distribution center for freight shipped to locations throughout California and the United States.

Airport

In San Joaquin County, the Stockton Metropolitan Airport is the only public access airport in San Joaquin County. The airport currently provides passenger service through Allegiant Air including two flights weekly to Phoenix, Arizona and five flights weekly to Las Vegas, Nevada and Orlando, Florida. The airport is located between two major north-south thoroughfares; I-5, 1.5 miles to the West, and SR-99, which borders the airport to the east. The airport is situated on 1,449 acres of land and has an 8,650-foot long, 150-foot wide primary instrument landing system (ILS) runway, with a take off distance available of 11,037 feet. The Stockton Metropolitan Airport also has a 4,458 foot long, 75 foot wide general aviation runway. Six air carrier gates adjoin the 44,355 square foot terminal building.

Warehousing and Distribution

Stockton has become one of the fastest developing warehousing and distribution centers in California. New warehousing and distribution centers for northern California and for the San Francisco Bay Area are continuing to locate in the southern parts of San Joaquin County and at the Port of Stockton.

The Defense Logistics Agency San Joaquin Depot is made up of distribution facilities at three separate locations: Tracy, Sharpe and Stockton's Rough & Ready Island near the Port of Stockton. The Depot receives, stores, and ships supplies to military customers located mainly in the western United States and the Pacific Theater of operations, and in some cases worldwide.

Trade Corridor

CTC has awarded Proposition 1B CMIA Trade Corridor Improvement Funds (TCIF) to extend the SR-4 Crosstown Freeway in Stockton to improve goods movement and access to and from the Stockton Port. The Port of Stockton was also awarded TCIF funds to deepen the Stockton Ship Channel for improved access to the San Francisco Bay. Both projects are expected to significantly reduce truck related congestion on I- 205/I-5.

2.9 Transportation Demand Management

Transportation demand management (TDM) is designed to reduce vehicle trips during peak hours and is specifically targeted at workforce commuters who generate the majority of peak hour traffic. Strategies include:

a) Rideshare programs
b) Transit usage
c) Flex hours
d) Vanpools
e) Bicycling and walking
f) Telecommuting
g) Mixed land uses (job/housing balance)

These strategies are generally part of land use decisions, the prerogative of local government. For example, TDM programs could be required by local jurisdictions for any large commercial or office project and could be tied to incentives of some sort to encourage the development of such programs.

2.9.1 Rideshare Programs

SJCOG administers a rideshare program known as Commute Connection. This rideshare program includes carpool matching, vanpool matching and assistance, media promotion of ridesharing, distribution of brochures at employment sites and other locations as necessary, program monitoring and recording, public education, and community outreach.

2.9.2 Smart Land Use Funding/Management Practices

Local Tax Measure - Regional Congestion Management System - The 2007 renewal of the local Measure K sales tax that helps to fund transportation projects in San Joaquin County stipulates

that SJCOG will review all environmental documents and/or development applications for residential, commercial, retail, and industrial development in San Joaquin County generating 125 or more peak hour trips. SJCOG will comment on each of these developments as to their impact on the region's congestion management system and recommend the appropriate measures to address the impacts new development will have on the existing transportation system. SJCOG will consider the potential impact on the Regional Congestion Management Plan (RCMP), possible alternative modal infrastructure improvements that should be supported, and possible TDM program participation. The RCMP does include the SHS. All comments on the SHS will be coordinated with Caltrans District 10.

Developer Contributions - The Measure K renewal program has specific language that reinforces the need for new development to provide adequate funding and facilities to mitigate the impact of the development on travel and congestion in the region. The Measure K renewal includes the following requirements:

1. Monitor Vehicle Miles Traveled (VMT) as a key indicator of growth and jobs/housing targets.
2. Adopt programs to strive to limit VMT growth to rate of growth of population.
3. Support and plan for heavy passenger rail and regional bus connections to the Bay Area and Sacramento.
4. Ensure that development contributes a fair share and provides transportation improvements at the time of construction.

These requirements can be used to strengthen the position of the cities, the County, SJCOG, Caltrans and other agencies reviewing Environmental Impact Reports (EIRs) under the California Environmental Quality Act (CEQA) and enhance the potential for getting more participation from developers.

Local Agency Transportation Impact Fees - In San Joaquin County, the City of Stockton and San Joaquin County collect traffic impact fees for the transportation system including the state highway system. The fees are generally charged to new development projects or development expansion projects to offset the cost of needed roadway capacity improvements due to the auto trips generated from the development.

2.10 Area Land Uses and Major Generators

Land uses along the I-205/I-5 Corridor include of a mix of commercial, industrial, residential and agricultural. Recent years have seen a marked increase in residential development in San Joaquin County. The attractiveness of lower land costs and availability has resulted in San Joaquin County becoming a residential choice location for persons who work in either the Bay Area to the west, or the Sacramento area to the north. This has created a growing imbalance between the number of workers who live in San Joaquin County and the number of jobs actually located there, even though both have grown steadily over the past two decades. One key consequence of this imbalance has been extensive commuting out of the study area in the

morning peak hours along I-205 to the Bay Area and along I-5 to Sacramento, with heavy return traffic in the afternoon peak hours. Other major trip generators along the corridor are the industrial areas in Stockton and Lathrop, and the shopping areas to the north and south of I-205 (Tracy Business Center, Tracy Market Place, Wal-Mart, Home Base, West Valley Mall, and Outlet Stores).

The adjacent land uses in the Stockton Area along I-5 vary between residential, commercial, retail and industrial. The portion of the study corridor north of the Downtown Stockton area is primarily residential. Just north of Downtown are two college campuses accessible primarily from March Lane – The University of the Pacific (a private institution with an enrollment of 4,600 – 3,500 as undergraduates – over half of whom live on the Stockton campus); and San Joaquin Delta College (a public institution of 8,000 full-time equivalent students that attend classes at this main campus as well as other campuses throughout the county). March Lane is also a key access route to a regional shopping district located adjacent to San Joaquin Delta College.

The urban edge of Stockton has been shifting northward in the past few decades. For example, the Sanctuary development located west of I-5, south of Spanos Park West, is proposed to have 7,070 dwelling units and 700,000 square feet of combined commercial and industrial development.

In the central Stockton area, the Port of Stockton is located less than one mile west of I-5 in the vicinity of the SR-4 (Crosstown Connector) interchange on the Stockton Deepwater Ship Channel; in the 1930's the Port of Stockton facilities were built and the deep water channel was dredged to accommodate ocean going vessels. The Port of Stockton current expansion project involves redeveloping the 1459-acre Rough and Ready Island (west of the existing port on property once utilized by the U.S. Navy) by upgrading seven wharves; constructing and operating maritime, industrial and commercial facilities; developing an intermodal rail yard; dredging to provide access to 75 percent of the world's large ocean-going vessels; and bridge and road improvements to accommodate increased port operations.

Immediately to the east of I-5 at the same interchange is Downtown Stockton, which serves as an important higher-density activity center and county administrative seat. Just west of Downtown Stockton is a recently-opened arena/events center, an accompanying parking garage, and a ballpark; plans also include a new hotel and marina.

The portion of the I-5 corridor south of SR-4 (Crosstown Connector) has adjacent land uses that take advantage of the freeway location. There is light industry south of SR-4, particularly in the vicinity of the Stockton Metropolitan Airport. A notable major trip generator is the county-owned San Joaquin General Hospital, located just west of I-5 at the Mathews Road interchange. The hospital is currently being renovated and expanded through an extensive master planning effort.

The Lathrop area, further south of Stockton along I-5, is also a fast-growing community. Where once there was mainly agricultural land, now there is a large amount of new housing stock constructed in this area, as well as supporting commercial development. The area is also home to many regional warehouse distribution facilities, which take advantage of the strategic

positioning of this location, which has easy access to the north and south (using I-5), the west (using I-205) and to the east (using SR-120).

Similarly, the Tracy area along I-205 has also experienced significant population and employment growth. Where once there was agricultural land, the City has experienced a rapid population increase as the community nearest to the land-limited Bay Area. The result is that there are many more working residents than there are employment opportunities, and many of these residents take advantage of higher wages available in the Bay Area. As a growing community, Tracy has also seen growth in supporting retail and medical facilities. There is also some distribution facilities located in Tracy, taking advantage of the City's location and access (similar to Lathrop's). Tracy is also the location for the major regional shopping mall located along the I-205 corridor, the West Valley Mall, which contains 875,000 square feet and is located at the Grant Line Road interchange with I-205.

At the western end of the corridor, the planned community of Mountain House is in the initial stages of development. This community is projected to house 45,000 residents when completed, and be incorporated as a new city within the County (when the population is sizeable enough). While primarily residential, the community will have supporting retail, institutional, industrial, office and related activities that will occur within it.

Along the I-205 and I-5 corridor there are numerous land uses that generate high levels of truck activity. There are many large shipping and distribution centers for major retailers and suppliers. There are food processing plants, which package products grown in the area for distribution to locations worldwide.

Consistent with the recent residential growth, several large-scale urban developments have been proposed for the Stockton, Lathrop, Manteca, and Tracy areas.

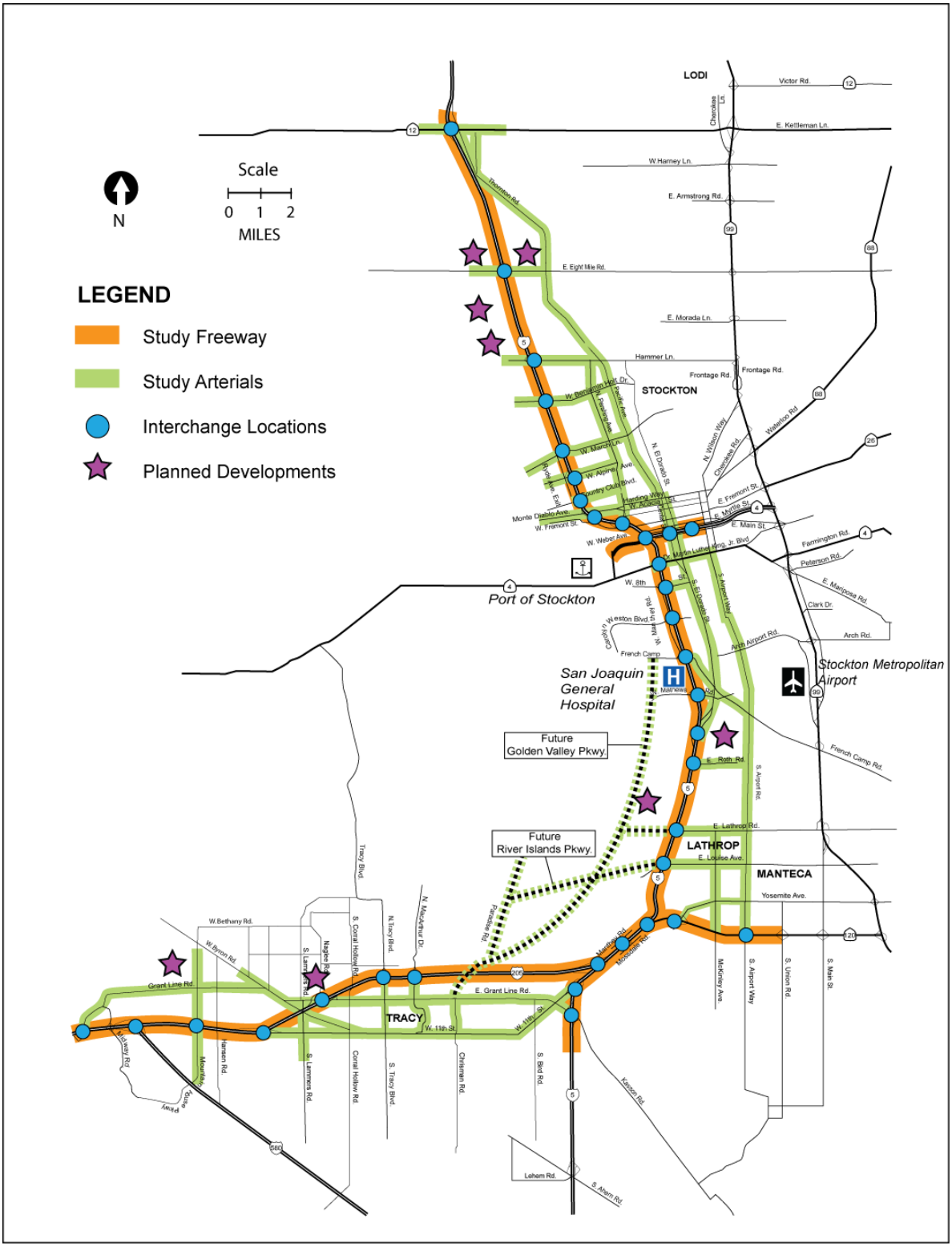
The Mountain House Community Service District is a new community planned on a 4,780-acre site near San Joaquin's border with Alameda County, northwest of the city of Tracy. This project is located just north of I-205, and in close proximity to I-580. Ultimate build out of the community is projected to include a resident population of about 42,000 persons. The Initial Study that was completed on the development indicated that there would be significant transportation impacts on the road system at build out, with traffic increases on I-205, I-580, and I-5 ranging from 10,000 to 23,000 daily vehicles over levels projected without the project in 2010. The recent improvements to the I-205/Mountain House Parkway interchange including the installation of ramp meters on I-205 are a result of the mitigation needed to accommodate the growth in traffic volumes from the development.

In north Stockton, there are several large proposed residential and commercial developments. The Sanctuary development located west of I-5, south of Spanos Park West is proposed to have 7,070 dwelling units and 700,000 floor square feet of combined commercial and industrial development.

Table 2-8 lists the planned developments along the CSMP corridor. These planned developments, along with other major trip generators along the corridor are illustrated in **Figure 2-10.**

Table 2-8 Planned Developments on the I-205/I-5 CSMP Corridor

Development	Location	Acres	Units
Mountain House	North of I-205 and northwest of Tracy Delta College satellite campus is also proposed for location in Mountain House	4800	15000
Tracy Gateway Project	North of I-205 and northwest of Tracy 740,000 sq. ft. of office, 40 acres of retail/lifestyle center, hotel, golf course, health club, among other amenities.		
French Camp	French Camp Road/Roth Road	810	3,500
Tidewater Crossing	French Camp Road	878	2,492
River Run	West of I-5 and Lathrop	2100	10,800
Sanctuary	West of I-5 Between Hammer Lane and Eight Mile Road	2000	7070
Atlas Tract	West of I-5 Between Hammer Lane and Eight Mile Road	800	1654
West Lake	West of I-5 and south of Eight Mile Road	680	2800
Crystal Bay	West of I-5 and south of Eight Mile Road	173	1354
Thompson	West of I-5 and north of Eight Mile Road	645	3800
Spanos Gateway	East and west of I-5 North of Eight Mile Road	2231	7000
North Stockton Village	East of I-5 and north of Eight Mile Road	771	3300



DKS Associates
TRANSPORTATION SOLUTIONS

Figure 2-10 Key Generators and Planned Developments

2.11 Environmental Scan

A scan of potential environmental impacts has been completed along the CSMP corridor. The scan reveals that the I-205 corridor traverses a 100-year flood plain from Tracy Boulevard to I-5. Along the CSMP corridor there is the potential for low to moderate, and moderate to high degrees of impacts to wetlands, a moderate degree of impact to special status species, and low, moderate, and high degrees of impacts to cultural resources. There is a low degree of impact from leaking underground tanks, and a high degree of impact due to possible hazardous waste from lead. Regarding air quality, San Joaquin County is in non-attainment for 1-hour/8-hour ozone, non-attainment for particulate matter, and maintenance for carbon monoxide.

The scan along I-5 reveals that the corridor traverses a 100-year flood plain from I-205 to SR-12. Along the CSMP corridor there is the potential for low, low to moderate, moderate, high to moderate and high degrees of impacts to wetlands. There are low, low to moderate, moderate, moderate to high, and high degrees of impacts to special status species, and low to moderate, moderate, and high degrees of impacts to cultural resources. There are low and moderate degrees of impacts from leaking underground tanks, and a high degree of impact due to possible hazardous waste from lead and aerially deposited lead (ADL) and heavy metals. Regarding air quality, San Joaquin County is in non-attainment for 1-hour/8-hour ozone, non-attainment for particulate matter, and un-classified/attainment for carbon monoxide. See **Table 2-9** for further details on the environmental scan for I-205/I-5.

The National Environmental Policy Act (NEPA) and CEQA and other related federal and state environmental laws and regulations require environmental studies and public participation for all projects for which a public agency has discretionary action. Resources and issues requiring environmental study may include historical structures, protected animals and plants, social and economic impacts, wildlife refuges and public parks, archaeological sites, hazardous waste, paleontological sites, air and water quality, and noise.

Appropriate environmental studies would need to be conducted whenever any of the I-205/I-5 CSMP improvements proposed are implemented, if state or federal funding is involved. Project level analysis may be required, and depending on the funding source, may involve compliance with NEPA and/or CEQA.

Projects that may potentially cause an increase in traffic may require air quality and noise impact studies to determine if effects of increased traffic would cause a significant reduction in air quality and/or substantial increase in noise level. Hazardous waste studies may be indicated if the project area would include gas stations or other business that use or generate potential hazardous waste.

Table 2-9 I-205 and I-5 CSMP Corridor Environmental Scan

Route	Postmile	Description	Flood Plain	Wetlands	Special Status Species	Cultural Resource	Leaking Under-ground Tanks	Possible Hazardous Waste	Air Quality		
									Ozone	Particulate Matter	Carbon Monoxide
I-205	00.00/01.37	ALA /SJ Co Line to Mountain House	N/A	low/mod	moderate	high	low	high lead	1hr/8hr non-attainment	non-attainment	Un-classified/ attainment
	01.37/03.37	Mountain House to Eleventh St		low/mod	moderate	low					
	03.37/05.20	Eleventh St to Grant Line Rd		low/mod	moderate	low					
	05.20/07.00	Grant Line Rd to Tracy Blvd		low/mod	moderate	low					
	07.00/08.13	Tracy Blvd to MacArthur Dr	100 yr	low/mod	moderate	low					
	08.13/13.39	MacArthur Dr to Jct. I-5		mod/high	moderate	moderate					
I-5	12.62/14.46	I-5/I-205 Jct. to SJ River	100 yr	high	high	high	low	high lead	1hr/8hr non-attainment	non-attainment	Un-classified/ attainment
	14.46/14.83	SJ River to SR-120		mod/high	mod/high	high	low	high lead			
	14.83/ 19.58	SR-120 to Roth Rd		low/mod	low/mod	high	moderate	high ADL heavy metals			
	19.58/20.95	Roth Rd to French Camp Rd		low	low	moderate	moderate	high ADL heavy metals			
	20.95/25.40	French Camp Rd to Dr Martin Luther King, Jr. Blvd.		moderate	moderate	moderate	low	high lead			
	25.40/27.90	Dr Martin Luther King, Jr. Blvd. to Monte Diablo Avenue		moderate	low/mod	high					
	27.90/28.53	Monte Diablo Ave to Country Club Blvd		low	low	high					
	28.53/32.66	Country Club Blvd to Hammer Ln		low/mod	low/mod	moderate					
	32.66/35.29	Hammer Ln to Eight Mile Rd		low/mod	low/mod	moderate					
	35.29/36.20	Eight Mile Rd to .90 miles N of Eight Mile Rd		low	low	low/mod					
	36.20/39.57	.90 miles N of Eight Mile Rd to Jct. SR-12		moderate	moderate	moderate					

3 Existing Condition Assessment

Understanding the corridor-wide performance is the foundation for developing a CSMP. This chapter provides an overview of corridor-wide travel conditions and performance based on a variety of existing data and information sources. The material presented is taken largely from the *I-205/I-5 CSMP Comprehensive Corridor Performance Assessment and Causality Report* (see **Appendix B**).

3.1 Corridor Travel Demand Characteristics

3.1.1 Historical Growth and Commute Patterns

Recent years have seen a marked increase in population growth (over 60 percent growth since 1980) in San Joaquin County. As the fastest growing region in the San Joaquin Valley, the population within San Joaquin County is expected to reach 1.7 million people by the year 2050 (SJCOG Regional Expressway Study 2008).

Much of this growth may be attributed to lower land costs and high availability in San Joaquin County making it a residential choice location for persons who work in either the Bay Area to the west, or the Sacramento area to the north. As a result of increased demand for housing, a significant amount of housing stock has been constructed in the County in the past few decades. Jobs are also being relocated to the San Joaquin Valley due to lower cost of doing business, but the Valley continues to remain commuter-oriented, with 77.0% of the workforce driving alone to work based on the 2005 American Community Survey. The average daily commute time in San Joaquin County was almost 30 minutes in 2005. Almost 17% have a commute that is one hour or longer each way (SJCOG RTP 2007).

Over time, a growing imbalance between the number of workers who live in San Joaquin County and the number of jobs actually located there has been created, even though both have grown steadily over the past two decades. One key consequence of this imbalance has been extensive commuting out of the study area in the morning peak hours along I-205 to the Bay Area and along I-5 to Sacramento, with heavy return traffic in the afternoon peak hours.

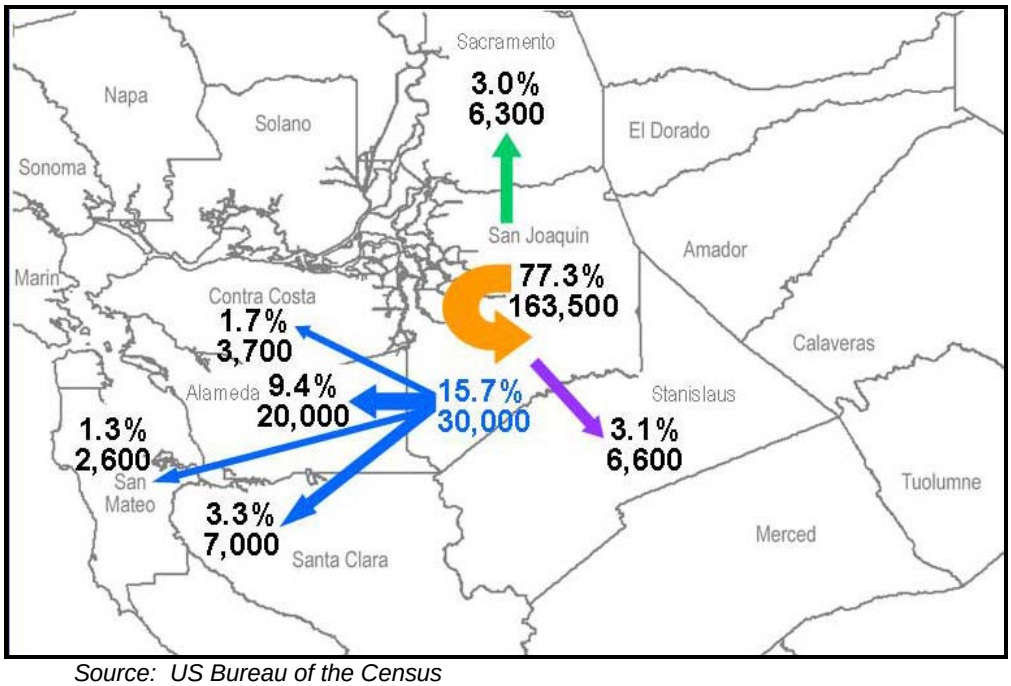
Since 1990, the demands on the corridor have grown significantly, even greater than the population within San Joaquin County. **Table 3-1** summarizes San Joaquin County's population and household growth, as well as general average annual daily traffic volumes in the corridor. Although San Joaquin County population grew by 34 percent between 1990 and 2005, daily volumes along I-5 and I-205 have grown much faster, from 65 to 111 percent in the same time period.

Table 3-1 San Joaquin County and Corridor Historical Growth

Attribute	2005	1990	% Increase Since 1990	2000	% Increase Since 2000	Source
Population	646,259	480,628	34%	563,598	15%	*US Census*
Households	206,346	158,156	30%	181,629	14%	*US Census*
Average Annual Daily Traffic Volumes						
I-205 at San Joaquin County Line	111,000	55,000	102%	83,000	34%	*Caltrans Traffic Count*
I-5 between I-205 and SR-120	160,000	76,000	111%	125,000	28%	*Caltrans Traffic Count*
I-5 between SR-4 and Pershing Avenue	140,000	85,000	65%	107,000	31%	*Caltrans Traffic Count*

Source: US Bureau of the Census, Decennial Census (1990 and 2000) and American Community Survey (2005); Caltrans, Traffic Counts (http:traffic-counts.dot.cao.gov (2000 and 2005) and 1990 Traffic Volumes on California State Highways.

To further explain this condition, commute patterns reported by San Joaquin County residents in the 2000 Census are illustrated in **Figure 3-1.** While most of San Joaquin County residents both live and work in the same county (163,500), a large number (30,000) travel both to and from the west (to Bay Area counties) each day. Another 6,300 travel between San Joaquin County and counties to the north (mainly Sacramento County), while 6,600 travel to and from the south (to Stanislaus and Merced Counties). The I-205/I-5 corridor is used as a primary route of travel for San Joaquin County residents to jobs in other counties.



Source: US Bureau of the Census

Figure 3-1 Commute Patterns for San Joaquin County Residents, 2000

The 2000 decennial census represented the last time that comprehensive county-to-county worker flows were estimates. However, the Census Bureau has provided additional statistics through the American Community Survey program. The data from this program has been compiled in a three-year running average, with the most recent data provided for 2006 to 2008. This data showed that 74.5 percent of working residents of San Joaquin County continue to work in the county, with the remaining 25.5 percent commuting to other metropolitan areas and rural areas. Thus, while the total working residents in the county has grown from 207,000 in 2000 to 269,000 today, the basic out-commuting patterns is roughly consistent with the patterns in the Year 2000, and there continues to be a slight increase in out-commuting from 23.0 percent in 2000 to 25.5 percent today.

3.1.2 Corridor Traffic Volumes

Annual average daily traffic (AADT) volumes at select locations along the I-205 and I-5 corridors are presented in Table 3-1. As indicated, the AADT volumes along the I-205 corridor range from approxiamtely 80,000 in the Tracy area to over 140,000 on I-580 just west of the junction with I-205. On I-5, AADT volumes vary significantly from approxiamtely 150,000 near SR 4 to just under 50,000 north of SR 12.

Table 3-2 Existing (2008) Freeway Annual Average Daily Traffic Volumes

Location	AADT 2008 [1]
I-205 Corridor	
West of I-580 Diverge	140,100
Mountain House Pkwy - 11th St	102,600
Grant Line Rd - Tracy Blvd	82,800
Paradise Rd - I-5	87,500
I-5 Corridor	
I-205 - SR 120	133,000
SR 120 - Louise Ave	97,500
El Dorado St - Mathews Rd	98,500
Dowing Ave - 8th St	115,500
Dr. Martin Luther King Jr Blvd to SR-4	140,000
SR-4 - Pershing Ave	135,000
Monte Diablo Ave - Country Club Blvd	112,000
March Ln - Benjamin Holt Dr	109,500
Otto Dr - Eight Mile Rd	82,400
North Gateway Dr - SR-12	62,200
North of SR-12	48,600

Source: PeMS Database - 2008 Counts

I-205

The eastbound and westbound weekday mainline volume profiles for I-205 are illustrated in **Figure 3-2** and **Figure 3-3** respectively. These profiles were derived from a PeMS detector

station west of Mountain House Parkway and reflect a four month daily sample of Tuesdays, Wednesdays and Thursdays between August and November, 2008. This presented data is before the completion of the third lane through Tracy and points east to I-5.

The commute pattern on I-205 is clearly uni-directional, with San Joaquin residents commuting to jobs in the Bay Area during the AM peak period and returning in the afternoon. The westbound weekday peak traffic volumes occur between 4:00 am and 9:00 am (reaching almost 6,000 vehicles an hour) while the eastbound peak traffic volumes occur between 2:00 pm and 6:00 pm (reaching 5,000 vehicles an hour). Except for days when incidents occur, the traffic volume is reasonably consistent from day to day and the peaks are clearly identifiable on the figures.

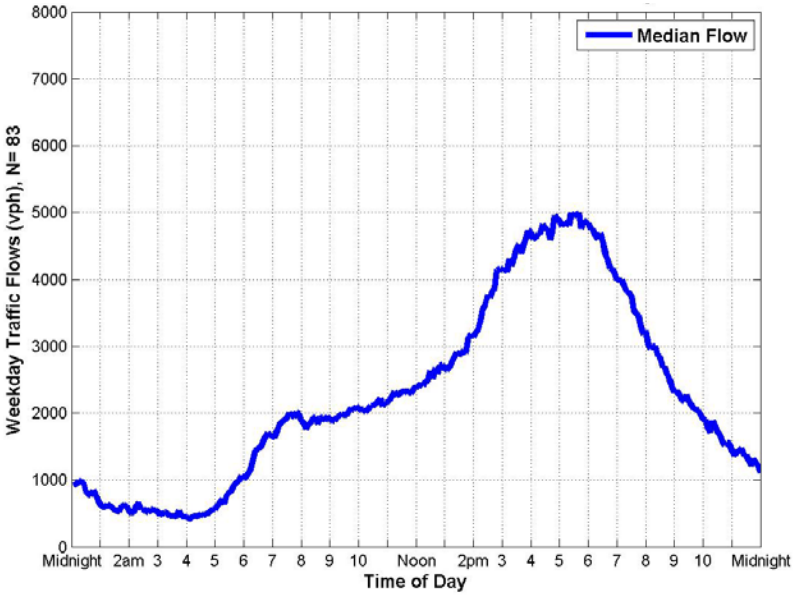


Figure 3-2 I-205 Eastbound, West of Mountain House Parkway

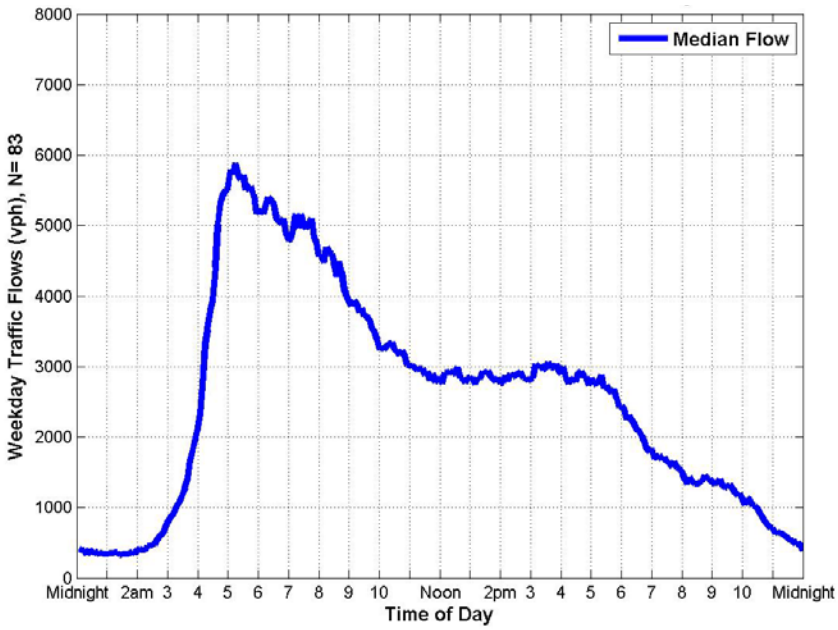


Figure 3-3 I-205 Westbound, West of Mountain House Parkway

I-5

The peaking characteristics on I-5 vary somewhat from those of I-205. Unlike I-205, I-5 carries heavy traffic throughout the day with less-pronounced directional peaking. To illustrate this, traffic volume profiles for five representative locations along I-5 were developed using PeMS data for the same time period used for the I-205 profiles (on Tuesdays, Wednesdays and Thursdays between August and November, 2008).

Figure 3-4 and Figure 3-5 show the volume profiles on I-5 between I-205 and SR-120, the highest traffic volume segment in the corridor. At this location, the peak direction is southbound (towards the Bay Area) in the morning, while it is northbound (away from the Bay Area) in the evening. The peak directional volumes are slightly less than 6,000 vph, similar to that measured on I-205 west of Mountain House Parkway.

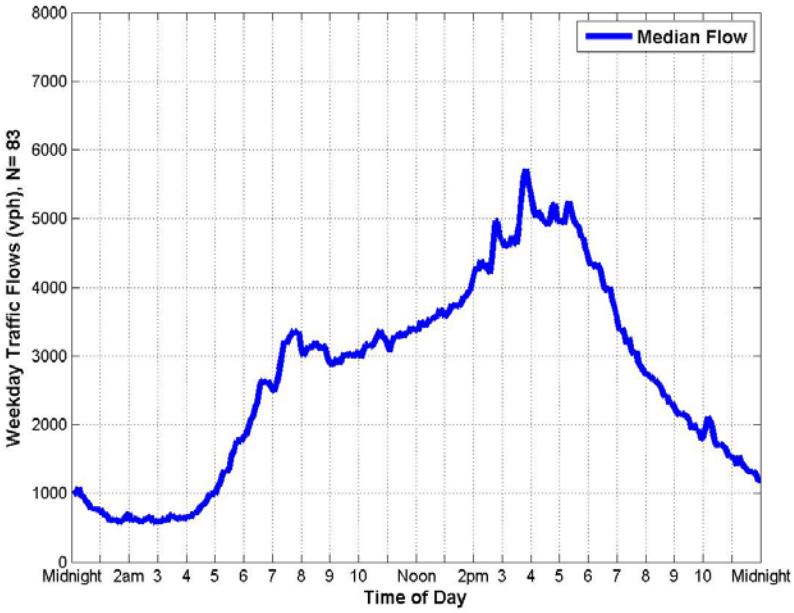


Figure 3-4 I-5 Northbound, between I-205 and SR 120

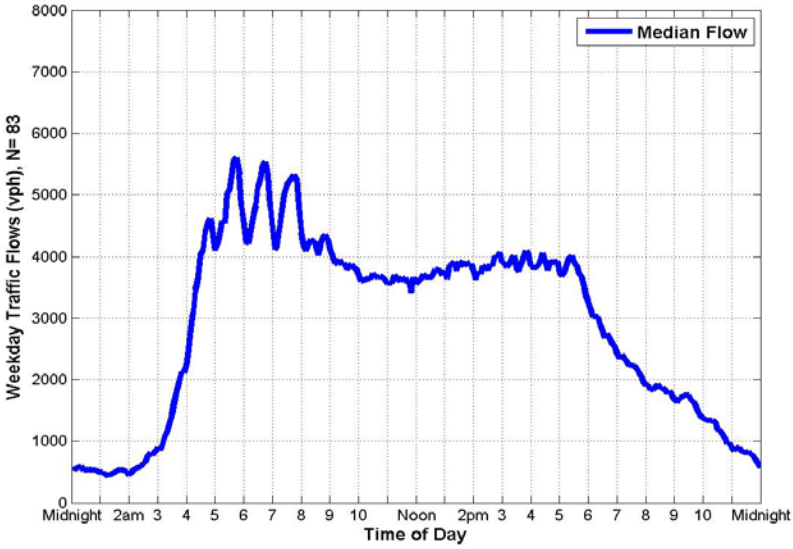


Figure 3-5 I-5 Southbound, between I-205 and SR 120

North of SR-120, the strong peak hour flow dissipates, as the strong Bay Area commute influence is less apparent north of Lathrop. In the northbound direction, there are short peaks between 5:00 am to 8:00 am and 2:00 pm to 5:00 pm. In the southbound direction, there are similar volumes in both the AM and PM peaks, occurring at approximately 5:00 am to 8:00 am and 2:00 pm to 5:30 pm. The variations are shown in **Figure 3-6** and **Figure 3-7.**

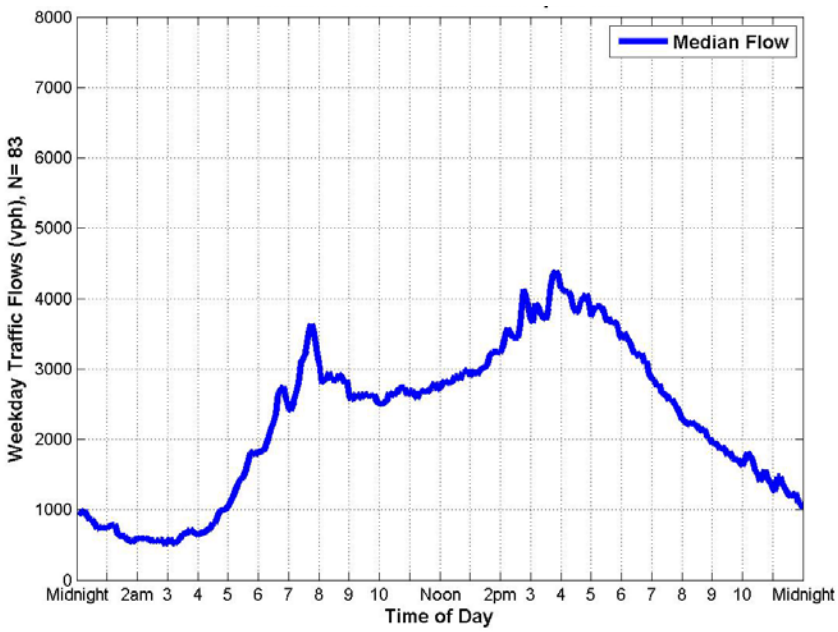


Figure 3-6 I-5 Northbound, South of Lathrop Road

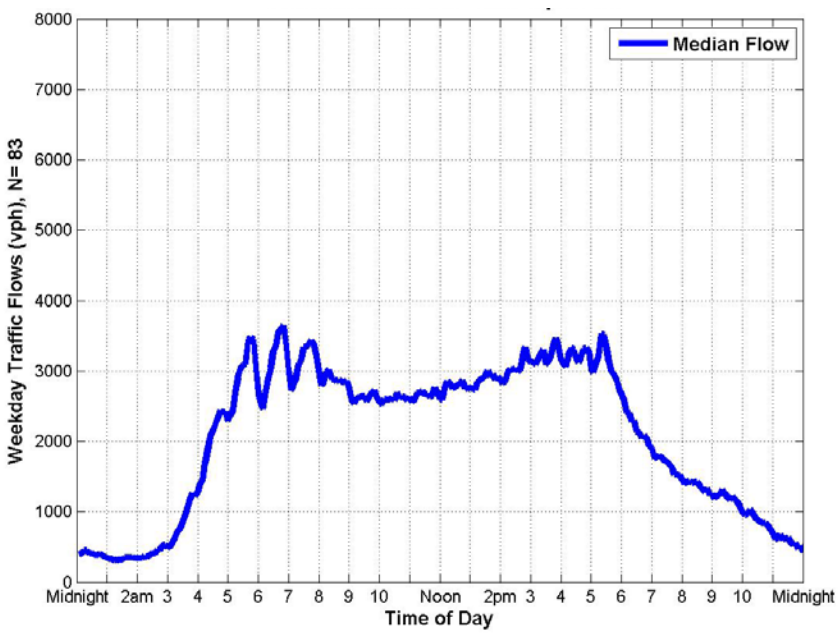


Figure 3-7 Southbound, South of Lathrop Road

In the southern portion of Stockton, the influence of employment near Downtown and the Port create slightly greater peaks on I-5 than is found in sections to the north and south. For example, as shown in **Figure 3-8** and **Figure 3-9**, the peak hour traffic volumes can be as high as 6,000 vehicles at peak hour in one direction.

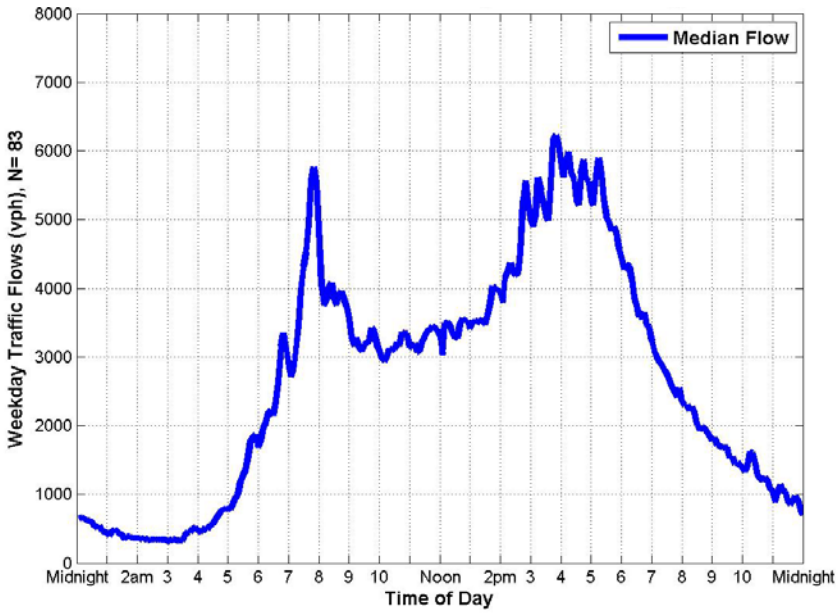


Figure 3-8 I-5 northbound, south of SR 4W (West Dr. Martin Luther King, Jr. Boulevard)

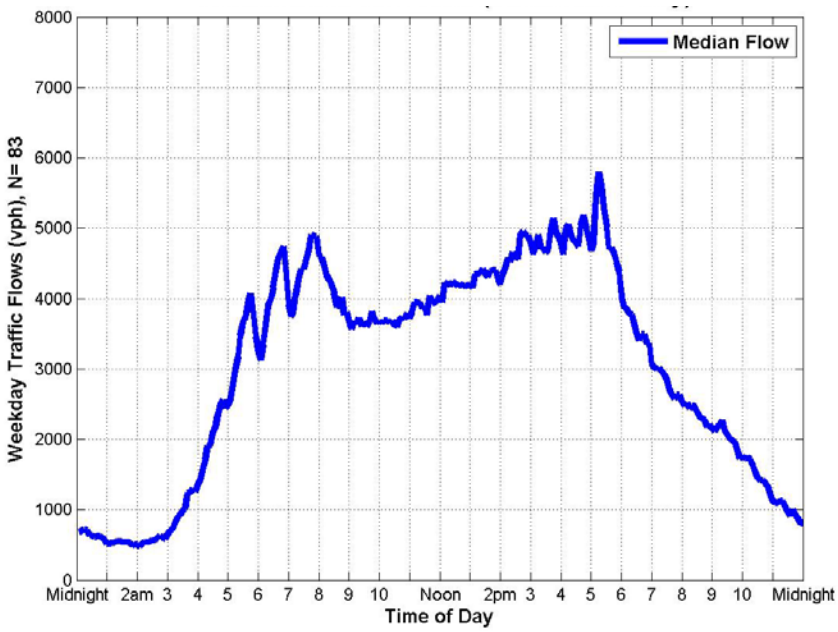


Figure 3-9 I-5 southbound, south of SR 4W (West Dr. Martin Luther King, Jr. Boulevard)

Just north of SR-4 (Crosstown Connector), traffic volumes on I-5 peak southbound during the AM peak period (approximately 6:30 am to 8:30 am) and northbound during the PM peak period (approximately 2:30 pm to 5:30 pm). This occurs because there are many drivers headed to jobs near Downtown Stockton or to activities at the Port. The volumes here can reach as high as 7,000 vehicles in the AM peak hour southbound and the PM peak hour northbound. **Figure 3-10** and **Figure 3-11** show these patterns.

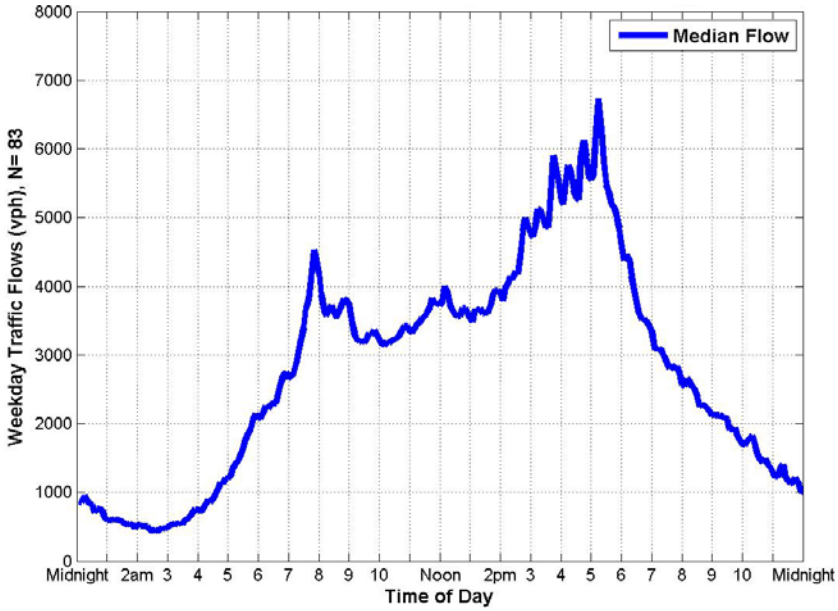


Figure 3-10 I-5 northbound, north of SR 4E (Crosstown Freeway)

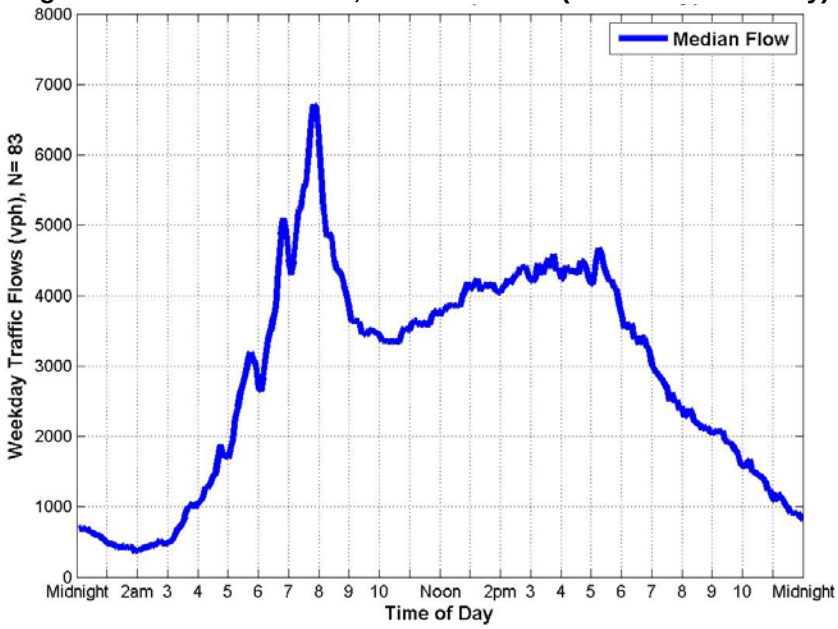


Figure 3-11 I-5 southbound, north of SR 4E (Crosstown Freeway)

At the northern end of the corridor, mainline traffic volumes return to a more steady flow throughout the day. South of the Eight Mile Road interchange at Fourteen Mile Slough, southbound traffic peaks between 7:00 am and 8:00 am. The northbound direction shows an afternoon peak. In both cases, the peak flows can reach as high as 6,000 vehicles per hour in each direction. The midday median volumes are sampled at about 3,000 vehicles per hour in either direction. **Figure 3-12** and **Figure 3-13** illustrate this as a graph.

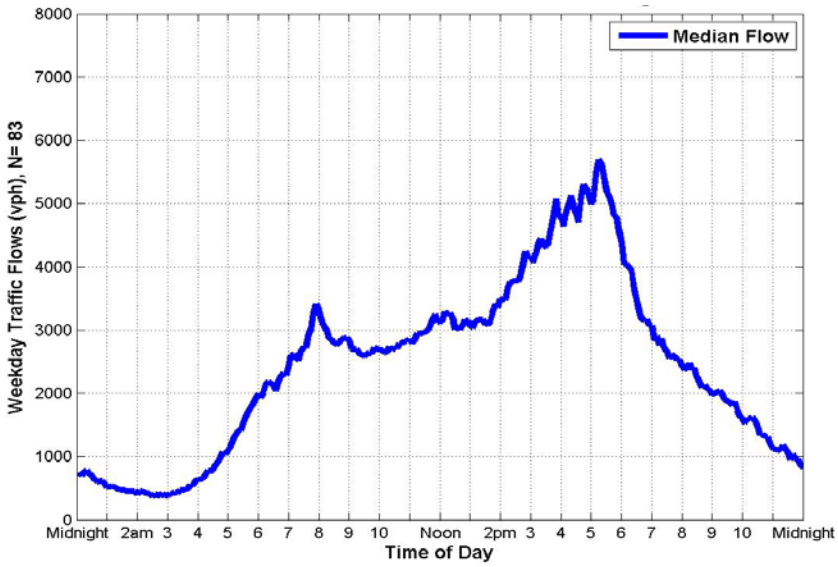


Figure 3-12 I-5 northbound, south of Eight Mile Road

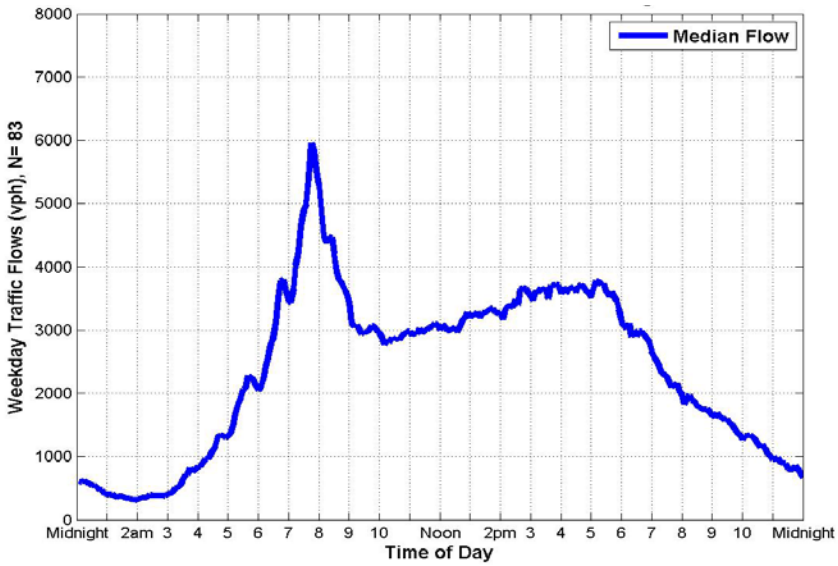


Figure 3-13 I-5 southbound, south of Eight Mile Road

3.1.3 Vehicle Occupancy

Although there are currently no HOV lanes within the study corridor, the number of persons per vehicle is important information to gather because HOV lanes or HOV bypass ramps are potential future operational improvements. The average vehicle occupancy varies between 1.2 and 1.5 occupants per vehicle in the study corridor, with the percentage of vehicles with two or more occupants in the range of 13% to 29%. The average vehicle occupancies and HOV percentages (vehicles with 2 or more occupants) at various locations are shown in **Table 3-3**. It should be noted that ramps often have a higher percent of HOV volumes, especially during the PM peak, because they carry shorter-distance (such as school and shopping) traffic.

Table 3-3 Representative Vehicle Occupancy During AM and PM peaks

		Direction	AM Peak Period		PM Peak Period		
Segment	**Location**	**Direction**	**Average Vehicle Occupancy**	**% HOV** (2 or more persons)	**Average Vehicle Occupancy**	**% HOV** (2 or more persons)	**Source**
I-205	Paradise Rd	Eastbound	-	-	1.4	22%	*San Joaquin HOV Lane and Ramp Metering Study*
		Westbound	1.2	16%	-	-	
	Grant Line Road Ramps	Eastbound	1.1	12%	1.3	23%	*DKS Associates Wiltec, 2008*
		Westbound	1.2	13%	1.4	31%	
	Tracy Boulevard Ramps	Eastbound	1.2	18%	1.3	23%	*DKS Associates Wiltec, 2008*
		Westbound	1.3	26%	1.4	37%	
I-5	French Camp	Northbound	1.2	13%	1.2	19%	*San Joaquin HOV Lane and Ramp Metering Study*
		Southbound	1.3	18%	1.3	19%	
	Monte Diablo/ Country Club	Northbound	1.2	17%	1.3	22%	*Caltrans 2007 HICOMP Report*
		Southbound	1.2	21%	-	-	
	Eight Mile	Northbound	1.4	25%	1.3	24%	*Caltrans 2007 HICOMP Report*
		Southbound	1.3	19%	1.3	21%	
	SR12	Northbound	1.5	29%	1.3	22%	*Caltrans 2007 HICOMP Report*
		Southbound	1.4	24%	1.4	22%	
SR-120	Yosemite Ave	Eastbound	1.3	22%	1.2	21%	*Caltrans 2007 HICOMP Report*
		Westbound	1.3	21%	1.3	24%	
SR-4	Filbert St	Eastbound	1.3	21%	1.3	25%	Caltrans 2007 HICOMP Report

3.1.4 Truck Volumes

The number of heavy trucks that use the facilities varies significantly by season. As an important goods movement corridor, the presence of trucks is high. The trucks are primarily carrying goods to and from the many distribution centers in the study area, as well as other nearby areas. During harvest times, there is also considerable agricultural-related truck traffic as farm goods are transported to processing plants and to markets.

Representative daily truck traffic volumes for the study corridor freeways, taken from the Caltrans *2007 Annual Daily Truck Traffic* report, are summarized in **Table 3-4**. On I-205, truck volumes are shown to vary between 11,000 and 14,000 a day, with trucks representing about 12 percent of the total daily traffic volume. On I-5, trucks comprise approximately about 44,000 vehicles per day (both directions) at the highest volume location on I-5 between I-205 and SR-120. Daily truck volumes drop into the 27,000 to 34,000 range in the Stockton area and continue to drop further north. In the Stockton area, trucks represent approximately 25 percent of the total daily traffic on I-5. The truck volumes on I-5 are likely to increase with the planned expansion of the Port of Stockton.

Table 3-4 Daily Average Truck Volumes and Percentages

Segment	Location	AADT	Truck AADT	Truck %	Year
I-205	East of I-580	112000	13,440	12.0%	2007
	West of West 11th Street	113000	13,560	12.0%	2007
	West of MacArthur Drive	99,000	11,290	11.3%	2007
	West of I-5	101,000	11,540	11.5%	2007
I-5	North of I-205	160,000	44,240	26.4%	2007
	North of SR-120 East	106,000	27,450	25.9%	2007
	North of French Camp Rd	112,000	28,000	25.0%	2007
	North of Dr. Martin Luther King, Jr. Boulevard	131,000	32,100	24.5%	2007
	North of March Lane	118,000	27,140	23.0%	2007
	North of Hammer Lane	95,000	21,470	22.6%	2007
	South of SR-12	77,000	12,620	16.4%	2007
SR-120	East of I-5	61,800	14,170	18.4%	2007
SR-4	East of I-5	95,200	8,450	9.6%	2007

Note:
[1] The truck volumes were not counted continuously or quarterly in that year, therefore volumes for this period were estimated.

Source: Caltrans 2007 Average Annual Daily Truck Traffic On The State Highway System

Additional representative peak hour truck data was available for I-205 through the *I-205 Auxiliary Lane Study*. This data is summarized shown in **Table 3-5**. The peak hour truck volume is in the range of 600 to 1,100 in each direction at Mountain House Parkway and Paradise Road. The variation in the percentage of trucks shows that while truck volumes are relatively constant in each direction, commuter traffic has larger variations in volume on this roadway. This is most evident during the AM peak hour, where trucks represent about 20 percent of the eastbound traffic but only 10 percent of westbound traffic despite the slightly higher truck volume sin the westbound direction.

Table 3-5 I-205 Peak Hour Truck Data

Location	Direction	AM Peak Hour		PM Peak Hour	
		Truck Volumes (per hour)	% Trucks	Truck Volumes (per hour)	% Trucks
Mountain House Parkway	Eastbound	820	19.9%	716	4.9%
	Westbound	927	7.8%	568	7.7%
Paradise Road	Eastbound	919	21.4%	902	9.2%
	Westbound	1046	11.4%	673	8.8%

Source: I-205 Auxiliary Lane Study, 2007

These sources were augmented with additional peak period truck percentage data, collected in 2008. Summarized in **Table 3-6**, the surveys show the importance of I-5 as a major national freight movement facility, with a high percentage of trucks even in the peak hours. The percentage of trucks on I-205 are lower, reflecting the presence of a high number of auto commuters as well as a congested corridor which truck operators often avoid because of the additional labor costs associated with driving in congested traffic.

Table 3-6 Freeway Peak Period Truck Data

Roadway	Location	Direction	AM Peak Period	PM Peak Period
I-5	North of SR-12	Northbound	27%	24%
		Southbound	23%	18%
I-5	South of I-205	Northbound	49%	26%
		Southbound	35%	38%
I-205	East of I-580	Eastbound	20%	6%
		Westbound	9%	8%
I-205	West of I-5	Eastbound	17%	9%
		Westbound	9%	7%
I-580	South of I-205	Northbound	15%	16%
		Southbound	36%	11%

Source: DKS Associates - Wiltec, 2008

3.2 Freeway Performance Measures

This section summarizes corridor-wide performance with respect to four key performance measures: mobility, reliability, safety, productivity, and pavement condition. These measures were derived from a number of data sources, most notably the Performance Measurement System (PeMS) database.

3.2.1 Mobility

The measure of mobility is developed by examining delay as well as travel time. Both of these measures can also be defined in terms of speed.

Delay

For the purposes of this effort, delays in the system are defined as those that are experienced when the speed drops below a free flow speed of 60 miles per hour. This is shown in **Table 3-7**. Delay is reported in vehicle hours of delay. The data used in this analysis is based on a non-holiday Tuesday, Wednesday or Thursday from October 2 to November 20, 2008, provided from PeMS. The highest delayed freeway segment is Eastbound I-205 in the PM peak period. The other significantly delayed freeway segments are Northbound and Southbound I-5 between SR-12 and SR-120 due to significant delay in the midday time period. In this analysis the AM peak period is 5 am to 10 am, the midday period is 10 am to 2 pm and the PM peak period is 2 pm to 7 pm.

During the AM peak period, there are several locations that have demonstrated vehicle hours of delay such as on I-205 westbound and I-5 southbound. Delay is encountered during midday hours as well, especially on I-5. Finally, the PM peak period has delays that occur on I-205 eastbound, and both directions of I-5 between I-205 and SR 10.

Table 3-7 Average Weekday Vehicle Hours of Delay

Freeway	Segment	AM Peak Period (5 – 10 am)	Midday (10 am – 2 pm)	PM Peak Period (2 – 7 pm)	Daily
I-205 Eastbound	I-580 to I-5	43	148	902	1,093
I-205 Westbound	I-580 to I-5	192	69	20	281
I-5 Northbound	SR-12 to SR-4 E	166	187	248	601
I-5 Northbound	SR-4 E to SR-120	97	187	133	417
I-5 Northbound	SR-120 to I-205	13	16	10	39
I-5 Southbound	SR-12 to SR-4 E	168	290	242	700
I-5 Southbound	SR-4 E to SR-120	124	247	150	521
I-5 Southbound	SR-120 to I-205	275	114	38	427

Source: PeMS – October 2 to November20, 2008; Tuesdays through Thursdays

A separate analysis was performed based on speed measured by floating cars. This is shown in **Table 3-8**. These cars drove the corridor during the peak period on a Tuesday, Wednesday or Thursday 16 times in January 2009, and an additional 4 times in April 2009. The peak periods measured were 5 am to 9 am and 3 pm to 6 pm. The delay was experienced when speeds dropped below a free flow speed of 60 miles per hour and delay is reported in vehicle hours of delay. This table shows that majority of the delay is experienced on Westbound I-205 during the AM peak period and on Eastbound I-205 during the PM peak period, with very little sampled delay on I-5 during this time.

Table 3-8 Peak Period Vehicle Hours of Delay

Freeway	AM Peak Period (5 am – 9 am)	PM Peak Period (3 pm – 6 pm)
I-205 Eastbound	1	668
I-205 Westbound	226	13
I-5 Northbound	0	0
I-5 Southbound	20	0

Source: DKS Associate & Wiltec, January and April 2009

Travel Time

Another key performance measure available from existing data is travel time. Travel times provide an indication of the direct user experience on the corridor when traveling between the two end points. The average travel time variations provide an indication of when things are taking more time during the day.

Because the travel patterns and volumes vary through the corridor, it is clear that people often do not drive the entire corridor. Thus, the travel time report is best divided up into segments of the corridor. This section discusses the travel times for I-205 as one segment, then reports three segments of I-5 – from I-205 to SR-120, SR-120 to SR-4 (Crosstown Connector), and SR-4 (Crosstown Connector) to SR-12 – as portions of the same trip.

The data used in this analysis are travel time profiles on a Tuesday, Wednesday or Thursday in September 2008. The experiences reported here are representative of the travel times that have occurred in the corridor. The source is derived from PeMS data.

The increased peak direction travel time on I-205 is notable in the surveys of the corridor. The PeMS-based analysis in **Figure 3-14** shows that the corridor experiences increased westbound travel times during the morning commute of 25 percent (from 8 minutes to 10 minutes) between 5:00 am travel and 6:00 am travel; the travel times during most other times of the day are similar. As shown in **Figure 3-15**, the travel times are greatest in the PM peak commute hours, and can be as high as 15 minutes; most other times of day have travel times within a minute of one other. These are based the 19 detectors active on the corridor.

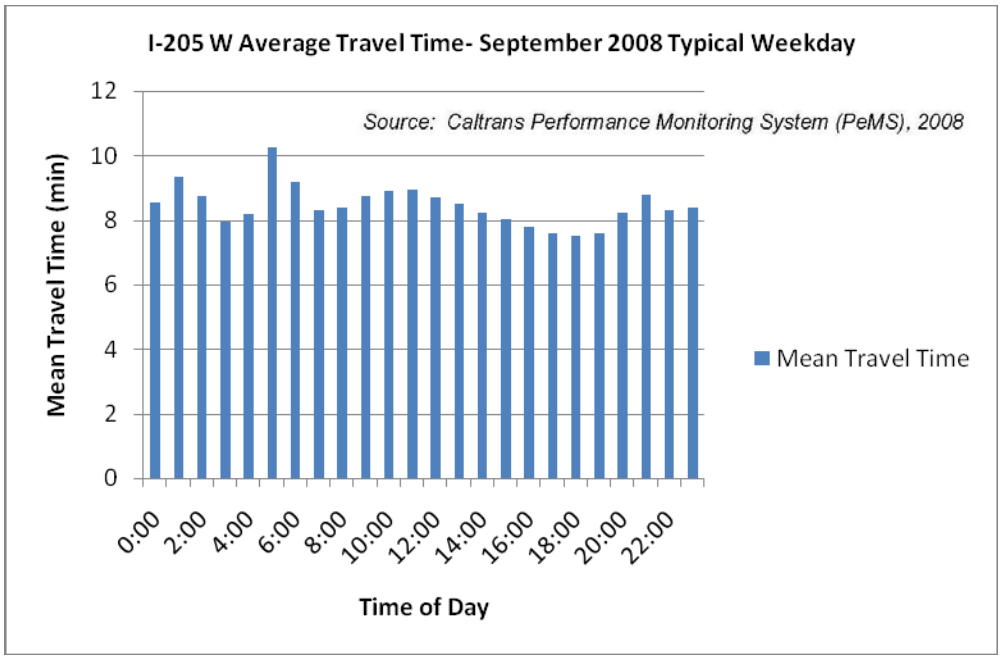


Figure 3-14 Travel Times on I-205 Westbound

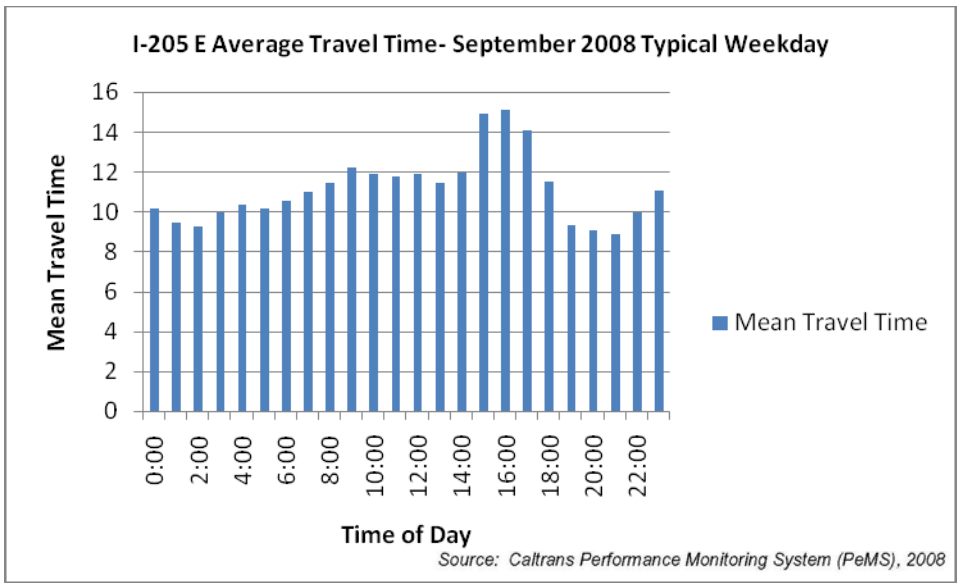


Figure 3-15 Travel Times on I-205 Eastbound

The same trend was verified in floating car survey results taken in the spring of 2009 (before new travel lanes were open). These results, shown in **Figure 3-16**, indicate that westbound travel times are highest between 5:00 am and 7:00 am; and that travel times during most other times of the day are remarkably similar. In the eastbound direction, shown in **Figure 3-17**, the travel times are greatest in the PM peak commute hours between 3:00 pm and 5:00 pm, and can be as high as 20 minutes (an increase of 65 percent).

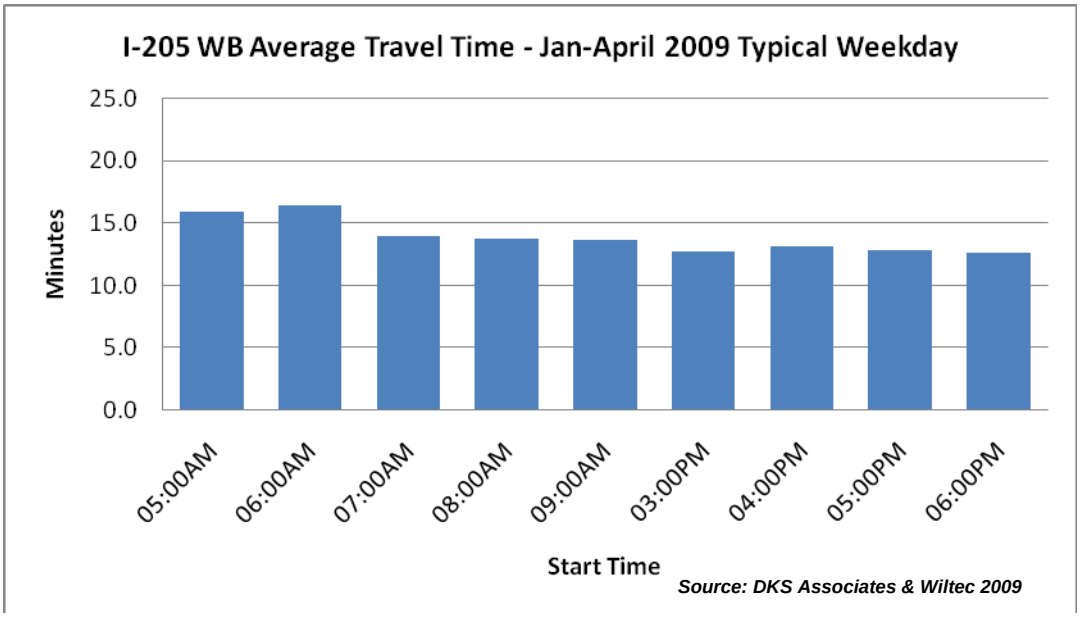


Figure 3-16 Travel Times on I-205 Westbound

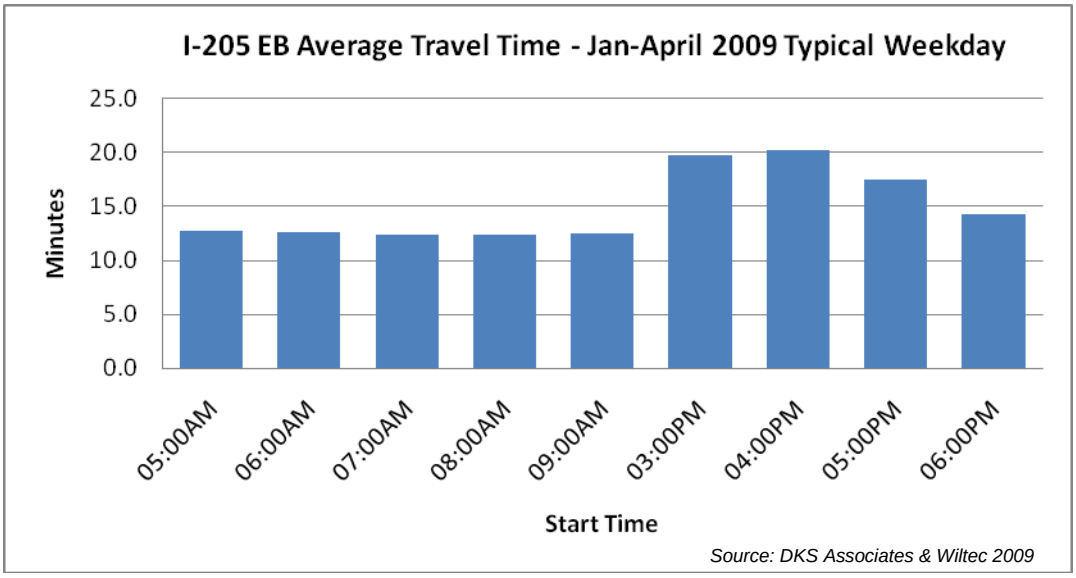


Figure 3-17 Travel Times on I-205 Eastbound

I-5 travel times, demonstrated in the PeMS-based analysis and shown in **Figure 3-18** and **Figure 3-19**, are fairly similar, with the greatest travel times being in the midday hours. Observations suggest that this is due to increased truck traffic. These results suggest that there is little congestion that occurs at specific points on this corridor, but that the increased travel times during midday hours is due to generally heavy traffic volumes on this roadway through the study area. These are based on a total of 67 detectors located throughout in the corridor.

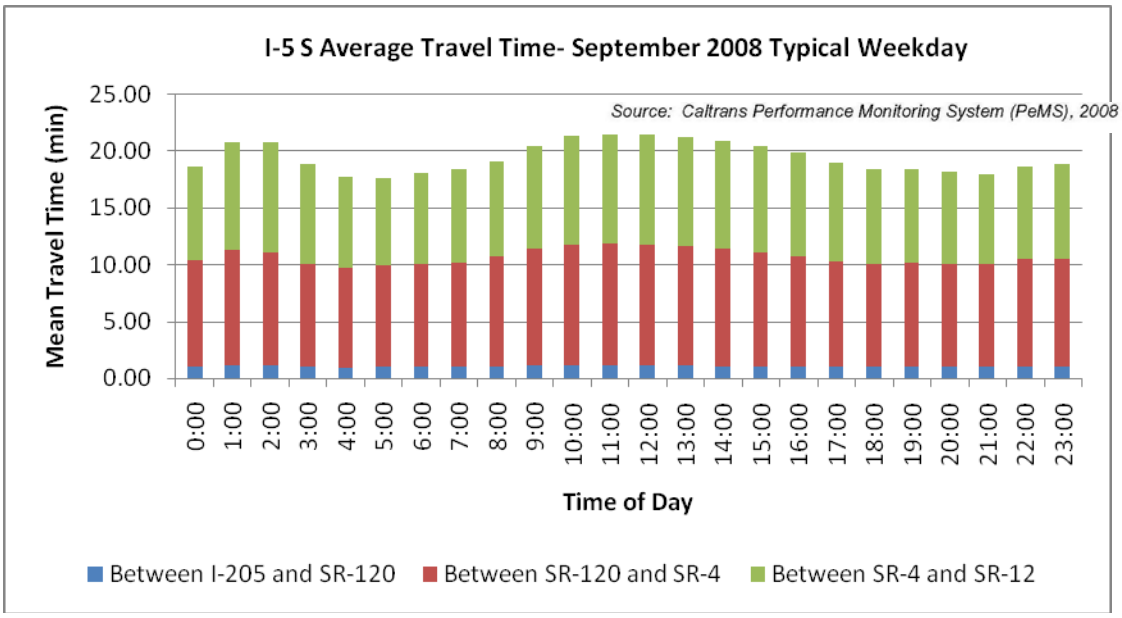


Figure 3-18 Travel Times on I-5 Southbound

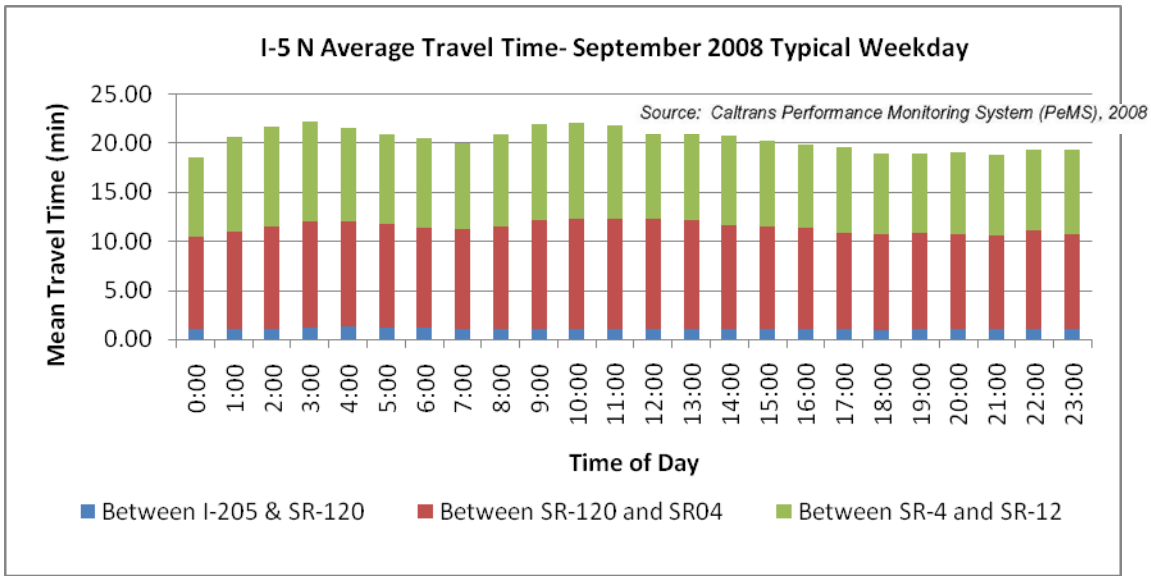


Figure 3-19 Travel Times on I-5 Northbound

The lack of a significant travel time delay was further verified in floating car surveys taken in the spring of 2009. The survey results in **Figure 3-20** and **Figure 3-21** also show that the travel times on I-5 are actually fairly similar.

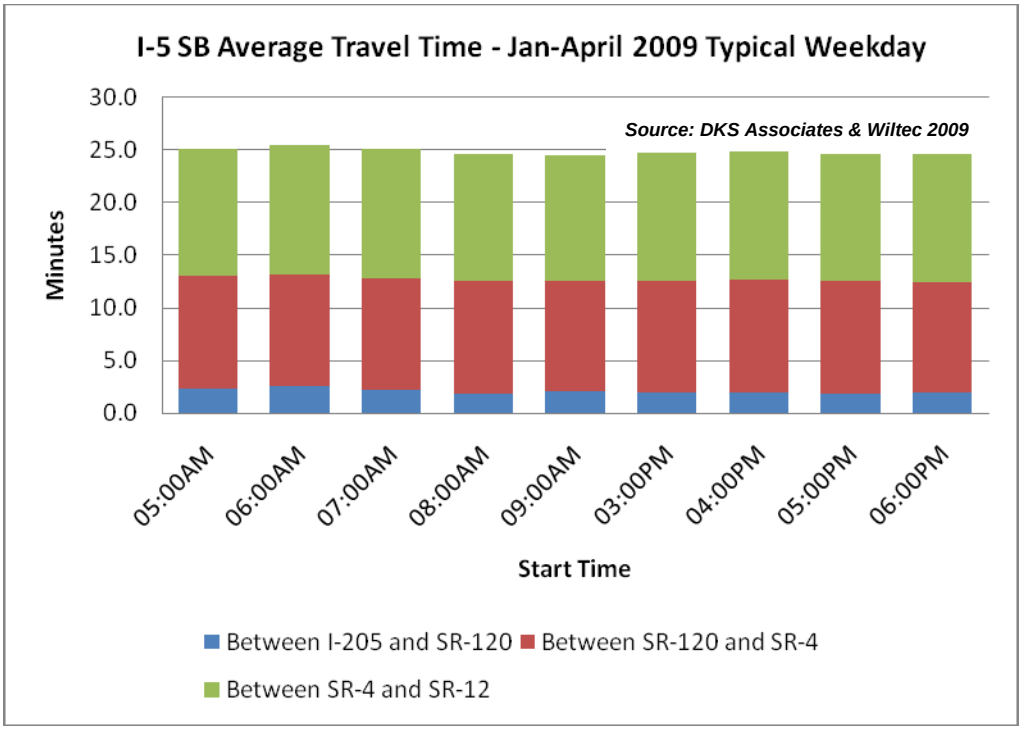


Figure 3-20 Travel Times on I-5 Southbound

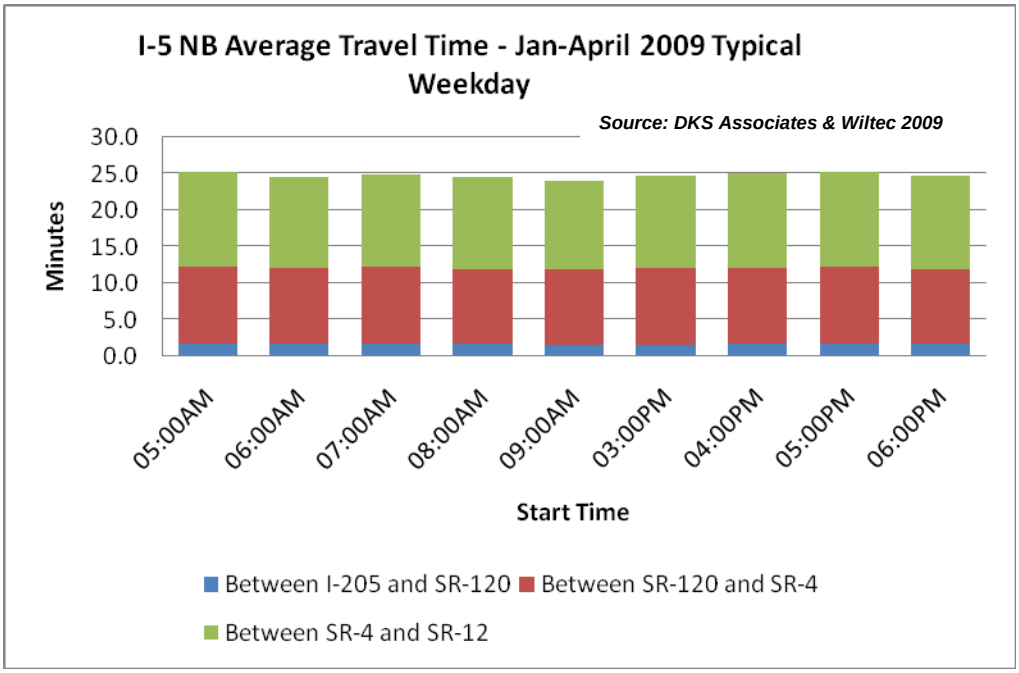


Figure 3-21 Travel Times on I-5 Northbound

3.2.2 Reliability

The reliability of the system is an indication of how predictable the travel times will be for the persons on the facility. A roadway may operate at a reasonable median speed, but individual daily experiences could vary significantly.

Travel Time Variation

A key measure of reliability is the variation in travel times between days. This data can be reliably described using data from PeMS detector stations in the corridor. The stations provide information about the mean and the 95th percentile corridor travel times. These two points provide an indication of what the average and peak travel time conditions are. (This formulation of the buffer index uses a 95th percentile travel time to represent a near-worst case travel time. Whether expressed as a percentage or in minutes, it represents the extra time a traveler should allow to arrive on-time for 95 percent of all trips. A simple analogy is that a commuter or driver who uses a 95 percent reliability indicator would be late only one weekday per month. Source: http://ops.fhwa.dot.gov/publications/tt_reliability/TTR_Report.htm#overview)

When all weekdays are plotted on a graph, the variability in travel time is clearly illustrated. These illustrations follow in the next several figures; in each figure, the blue line represents the mean travel time, while the red line represents the 95th percentile travel time. Areas that show reliable travel times are represented where the two lines are close to one another, while the times with the greatest unreliability are those when the lines are far apart. (The data is derived from a four month daily sample of Tuesdays, Wednesdays and Thursdays between August and November, 2008, derived from PeMS.)

I-205 Travel Time Reliability

The travel times on I-205 can vary significantly from one day to the next. **Figure 3-22** shows this variability in each direction. **Figure 3-22** clearly shows the greatest difference in travel time during the AM peak period commute, and this reliability difference is pronounced between 5:30 am and 7:30 am. **Figure 3-23** shows a significant occurrence of unreliable travel times with variations of over 5 minutes beginning as early as 12:45 pm and continuing until 7:00 pm.

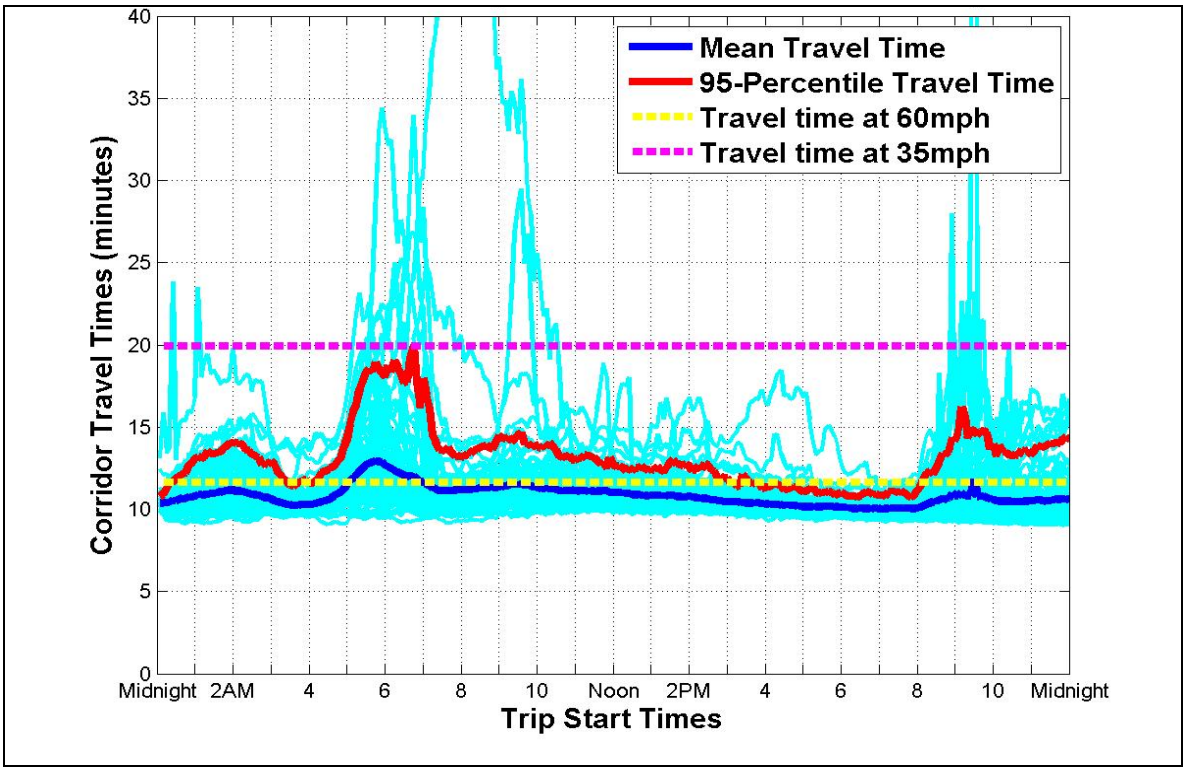


Figure 3-22 I-205 Westbound Travel Time Reliability

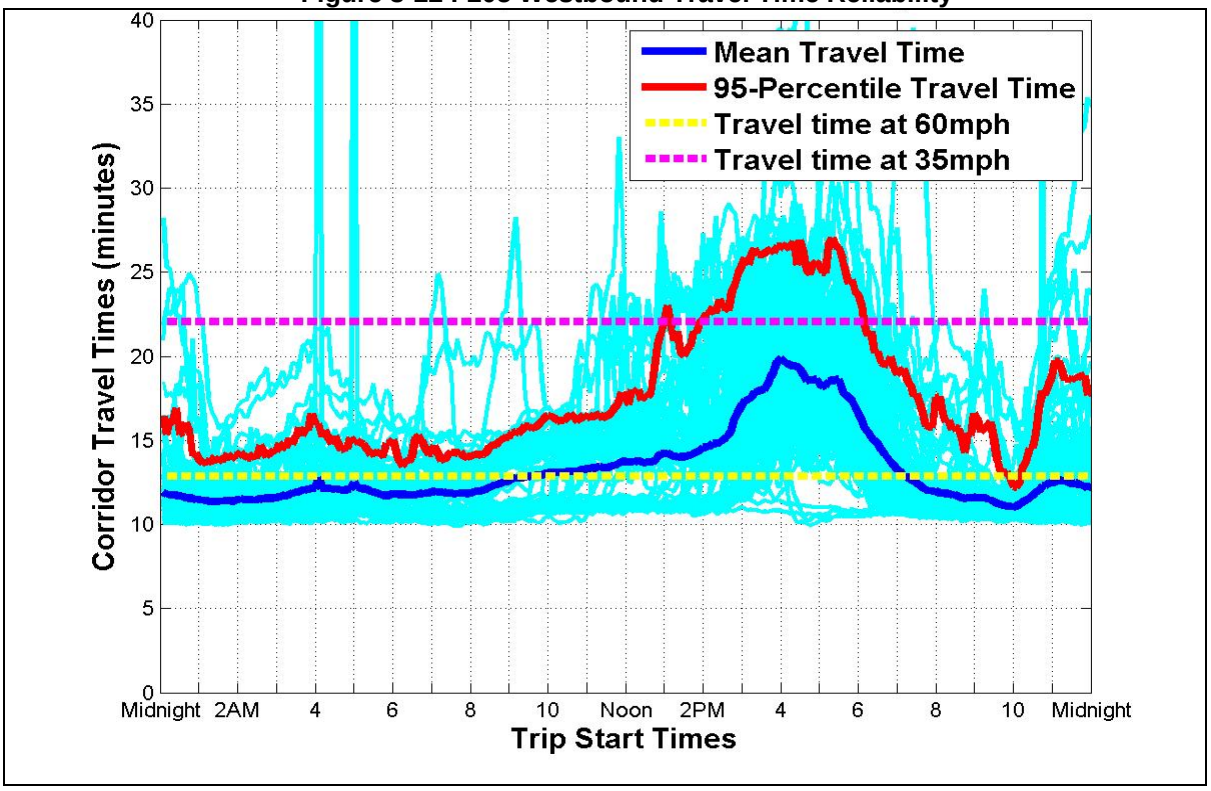
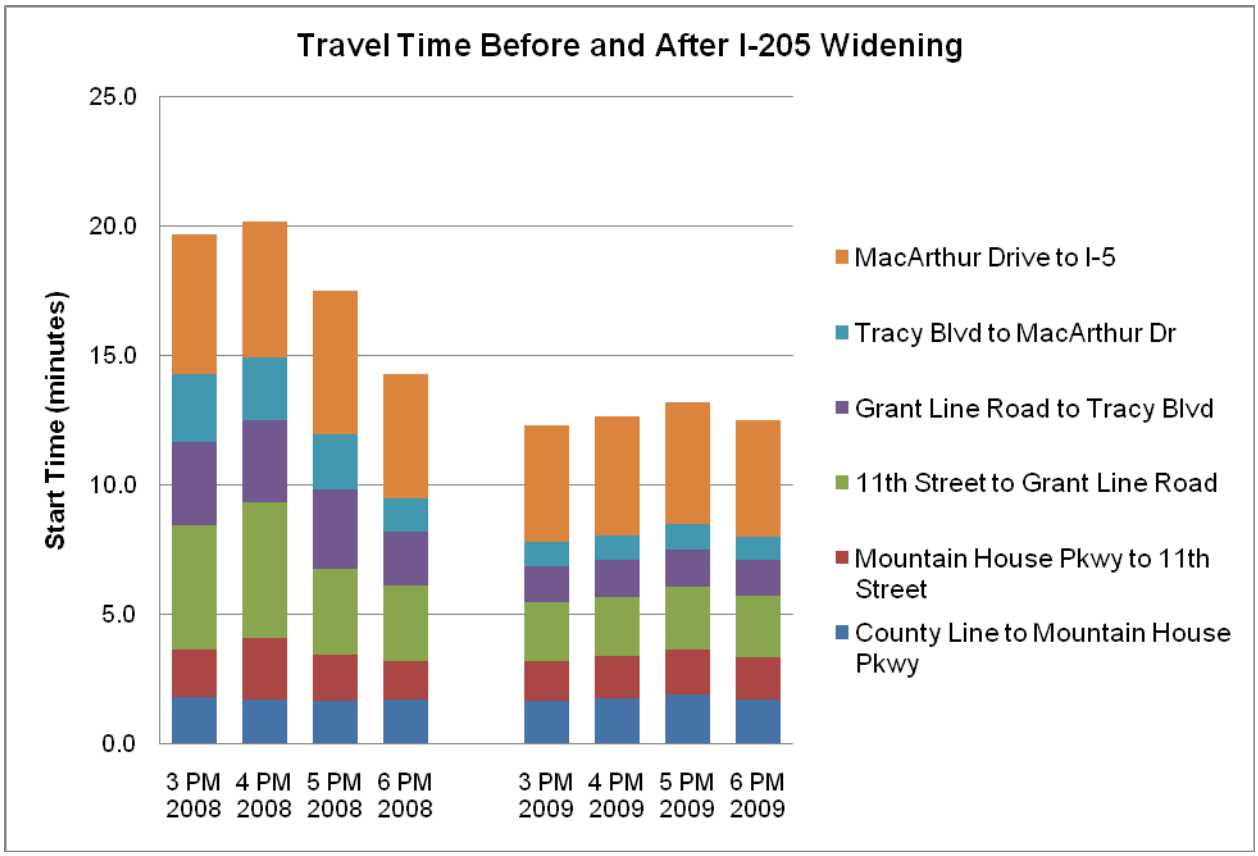


Figure 3-23 I-205 Eastbound Travel Time Reliability

After I-205 Widening Travel Time

Floating cars measured travel times and speeds on I-205 an I-5 to SR-120 in June 2009 after the new third lane was opened in each direction of I-205, 11th Street to I-5, and a new fifth northbound lane was opened on I-5, between I-205 and just north of SR-120. There was also some restriping of the I-5 at the I-205 interchange. The average AM and PM peak period speeds on I-205 and I-5, from I-205 to SR-120, increased up to between 60 mph and 70 mph. The comparison is shown in **Figure 3-24**.



Source: DKS Associates and Wiltec, 2008/2009

Figure 3-24 Comparison of 2008 and 2009 Surveyed Weekday Travel Times for I-205 Eastbound during Weekday PM Peak Period

I-5 Travel Time Reliability

The travel time reliability on I-5 varies depending on the roadway segments being evaluated. The three segments shown in the median travel time graph above are discussed separately here. **Figure 3-25** summarizes these travel time indicators between SR-120 and I-205 southbound; some variability in the AM peak period commute period occurs southbound, with the 95th percentile as high as 8 minutes (or 60 percent higher than the mean travel time of about 5 minutes to traverse this segment). **Figure 3-26** summaries how the northbound variability is not as different between the various sampled days.

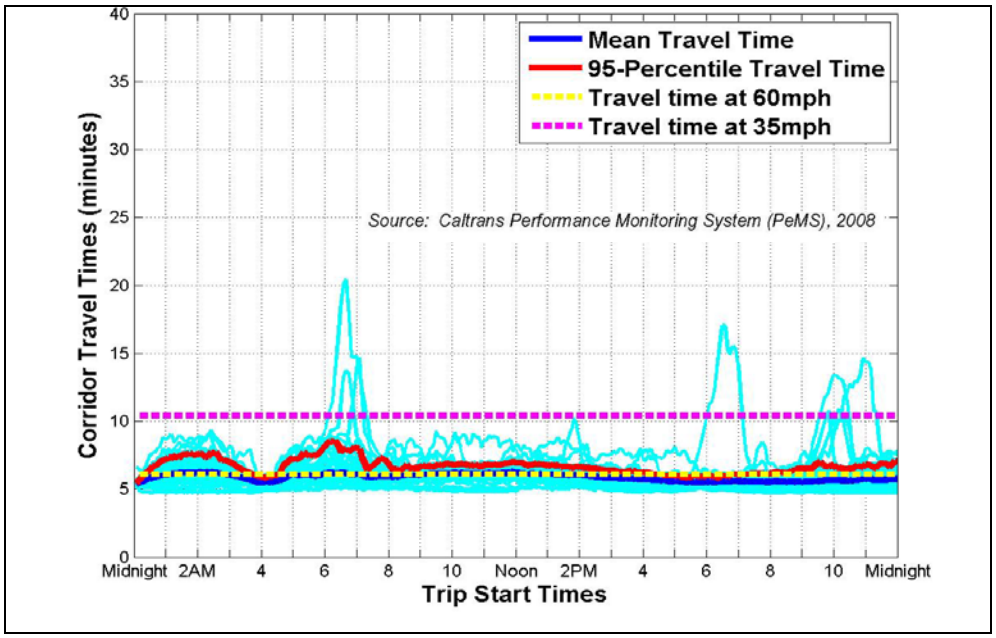


Figure 3-25 I-5 Southbound Average Weekday Travel Times from SR-120 to I-205 (minutes)

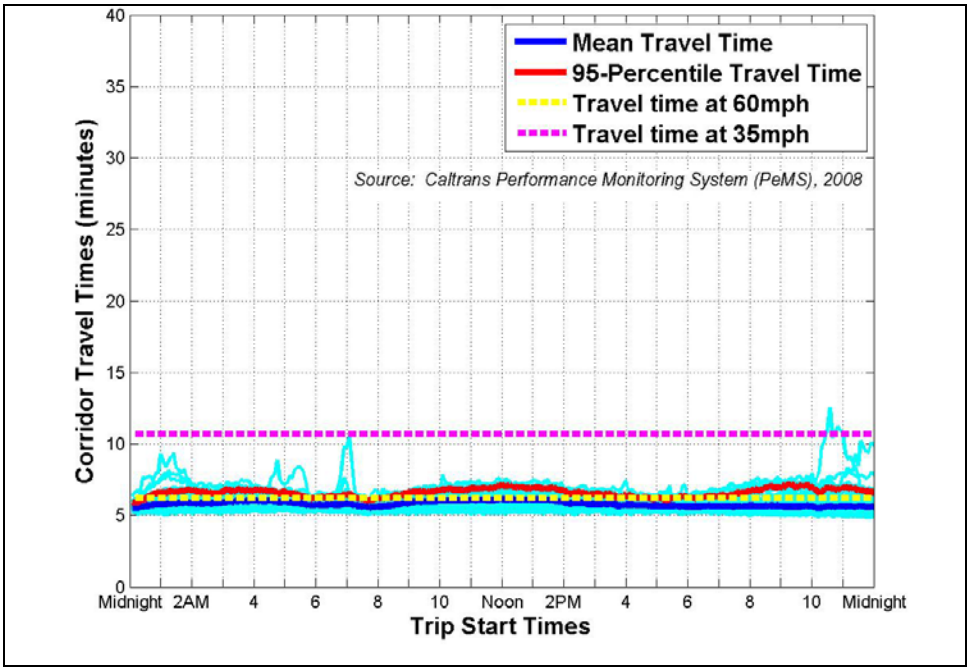


Figure 3-26 I-5 Northbound Average Weekday Travel Times from I-205 to SR-120 (minutes)

The two travel time indicators between SR-120 and SR-4 (Crosstown Connector) in the southbound direction, shown in **Figure 3-27**, shows little variability (about a minute) between the two indicators, suggesting that the travel times are reliable throughout the day in this segment direction. In the northbound direction, the data suggest that there is a bit more variability (about two minutes) as shown in **Figure 3-28**, although the greatest variability appeared during times in the middle of the night, suggesting that road work was occurring.

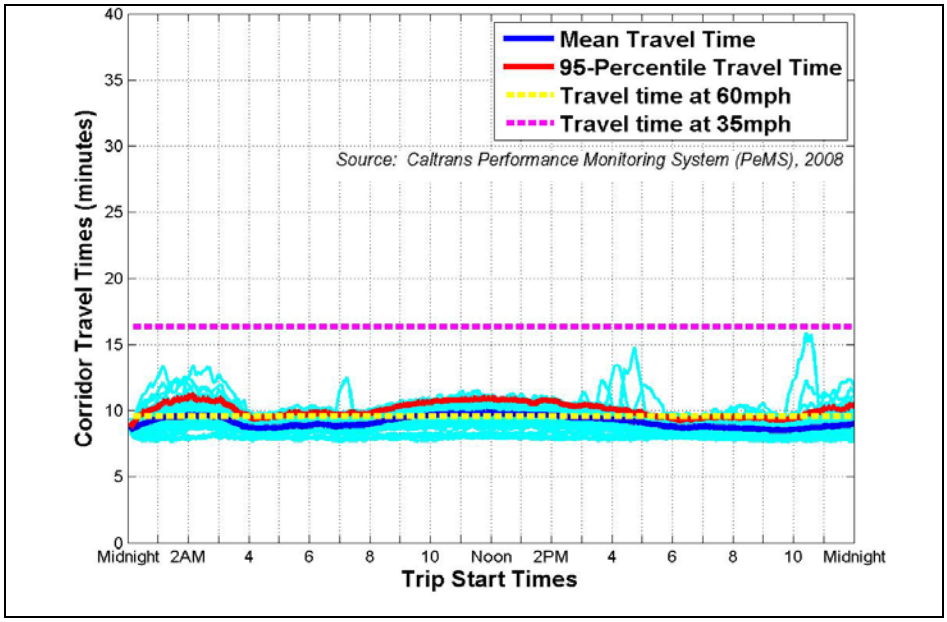


Figure 3-27 I-5 Southbound Average Weekday Travel Times from SR-4 (Crosstown Connector) to SR-120 (minutes)

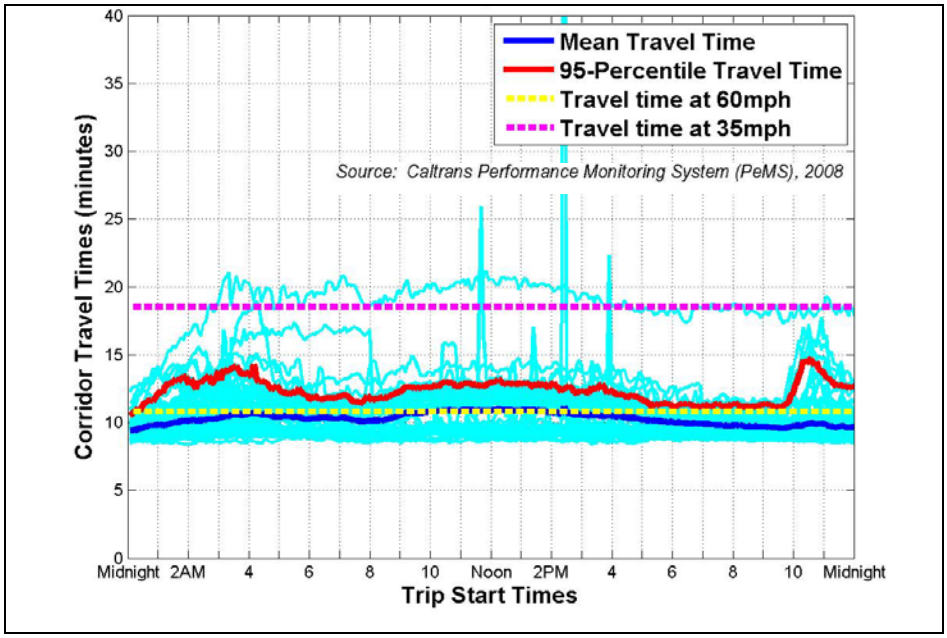


Figure 3-28 I-5 Northbound Average Weekday Travel Times Between SR-120 to SR-4 (Crosstown Connector) (minutes)

The two travel time indicators between SR-4 (Crosstown Connector) and SR-120 in the southbound direction shown in **Figure 3-29** shows some variability (about three minutes) between the two indicators, suggesting that the travel times are somewhat reliable throughout the day in this segment direction (noting the variability in the overnight hours, attributable to road maintenance). In the northbound direction, shown in **Figure 3-30** the data suggest that there is similar variability (about two minutes or about 20 percent longer), again with the greatest variability appeared during times in the middle of the night, attributable to road construction.

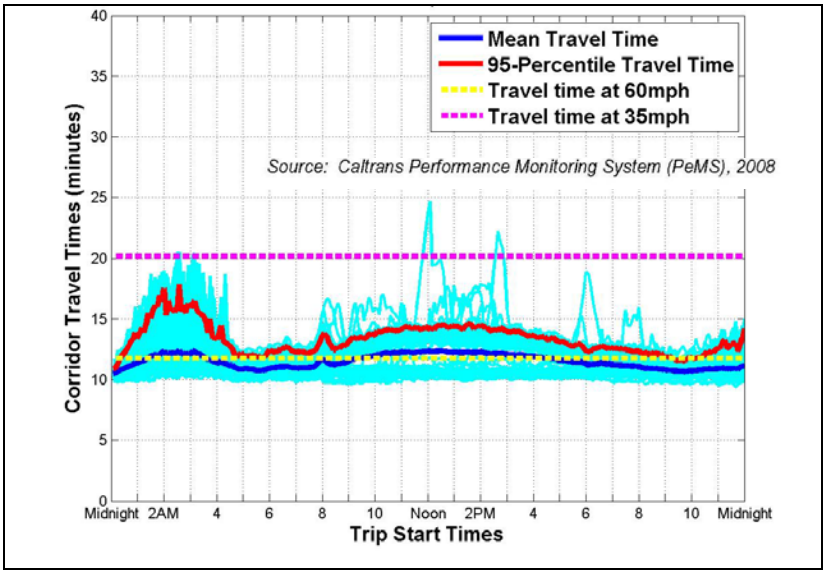


Figure 3-29 I-5 Southbound Average Weekday Travel Times from SR-12 to SR-4 (minutes)

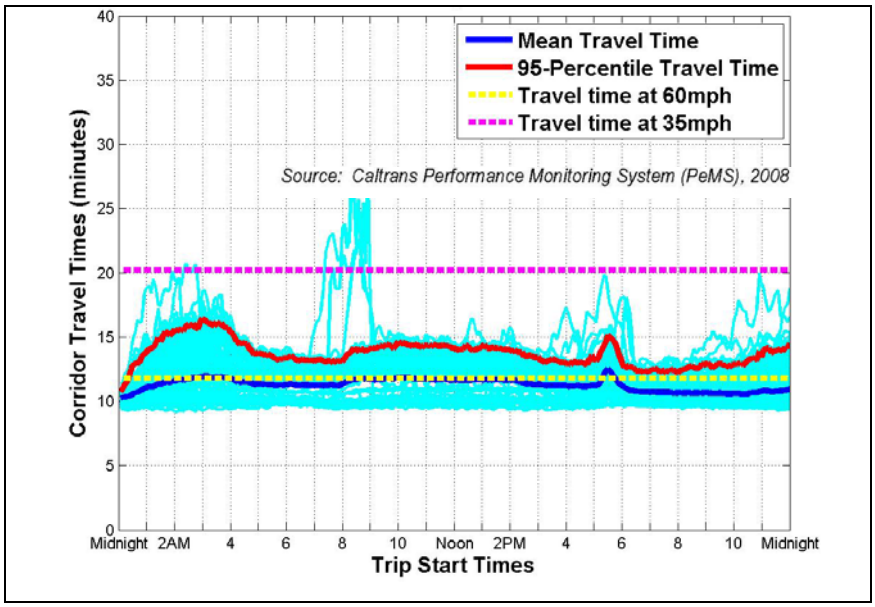


Figure 3-30 I-5 Northbound Average Weekday Travel Times from SR-4 to SR-12 (minutes)

Buffer Index

Another way to summarize travel time data is through the "buffer index". The *buffer index* is a percentage that shows the additional time that would have added to the average travel time to reach the 95th percentile peak travel time. A larger buffer index indicates a large amount of variation in observed travel times, due to recurrent congestion, accidents, other incidents and construction. The average travel times and buffer index are illustrated in **Figure 3-31** through **Figure 3-38.** The presence of roadway maintenance or construction activities on both I-5 and I-205 appear to have contributed significantly to the high buffer index outside the peak hours.

I-205 Buffer Index

The buffer index shown in **Figure 3-31** demonstrates clearly that there is considerable uncertainty to travel time westbound in the AM peak period. The uncertainty is less pronounced in the PM peak period, shown in **Figure 3-32**. The roadway construction in I-205 during the sampling period contributed to uncertainty in travel times in the overnight hours.

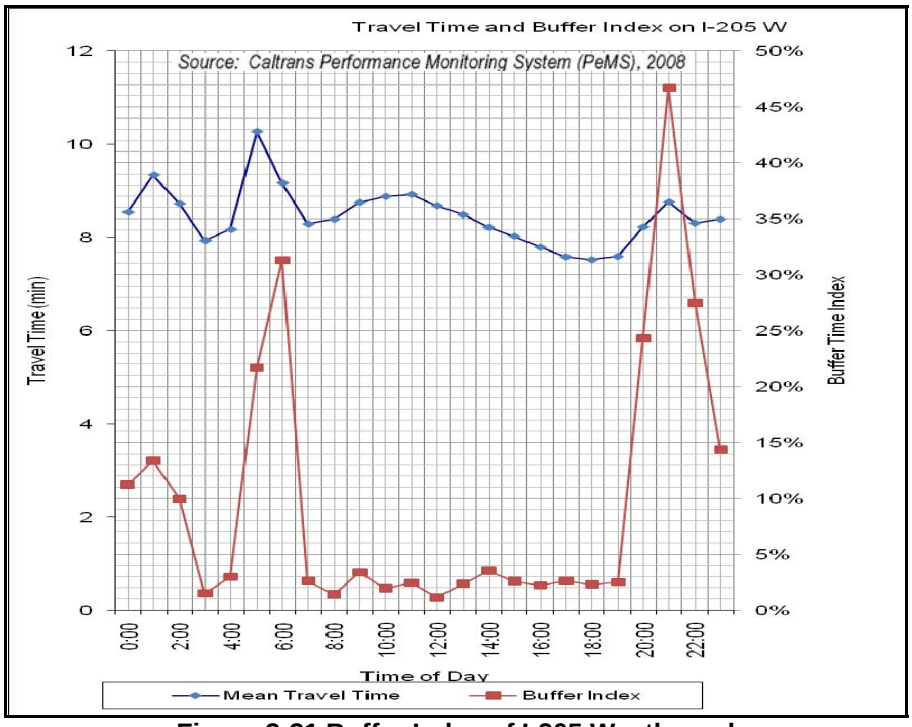


Figure 3-31 Buffer Index of I-205 Westbound

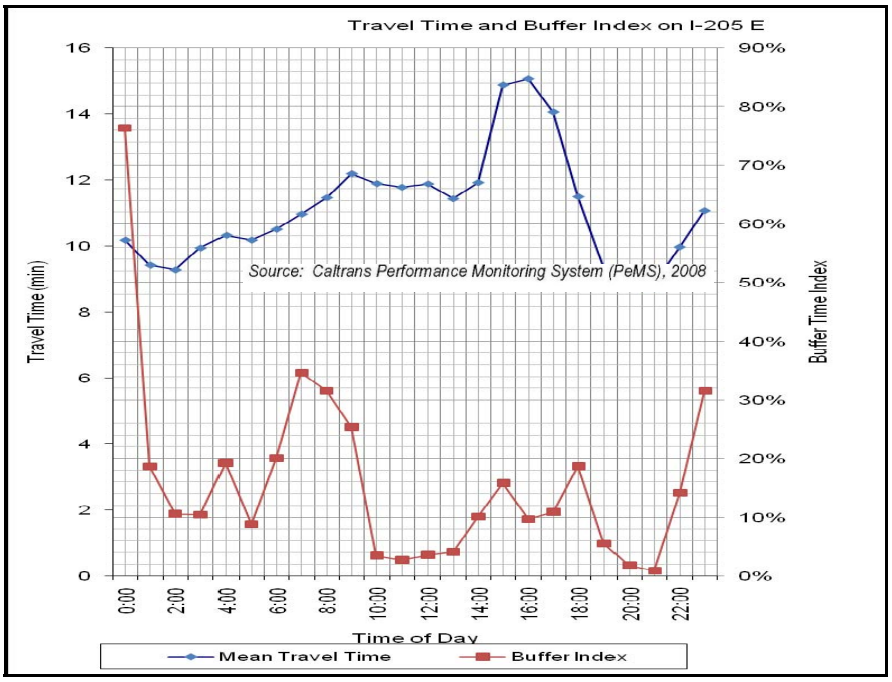


Figure 3-32 Buffer index I-205 Eastbound

I-5 Buffer Index

The I-5 buffer index is demonstrated in three separate segments. The segment shown in Figure 3-33 demonstrates clearly that there is not much greater than a 10 percent variation at any times of the day. The same is true for the northbound direction, shown in Figure 3-34 except for the AM peak commute hours.

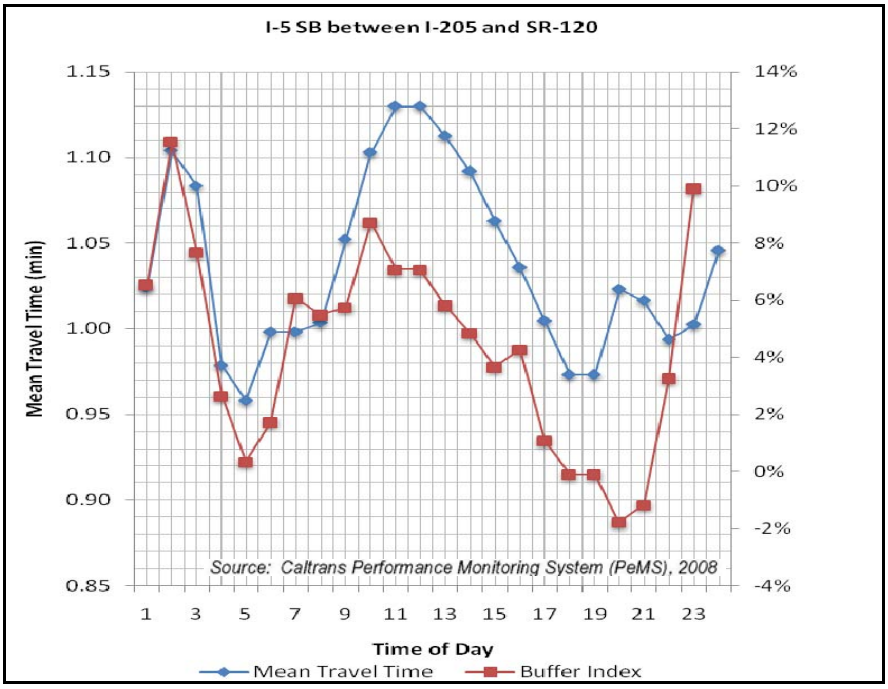


Figure 3-33 Buffer index I-5 Southbound from SR-120 to I-205

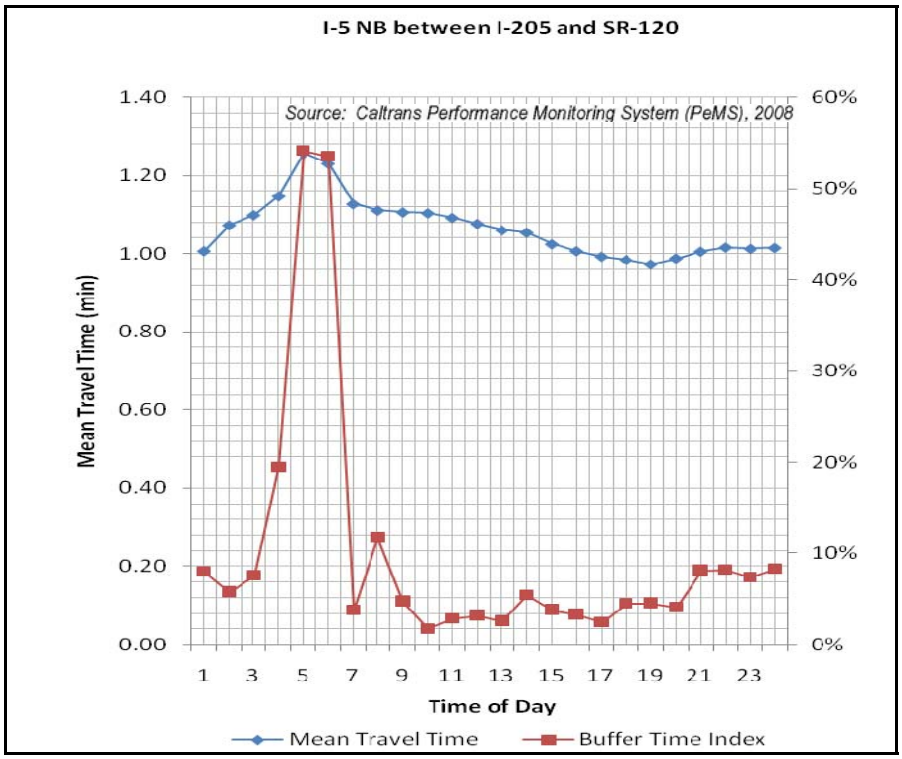


Figure 3-34 Buffer index I-5 Northbound from I-205 to SR-120

The segment between SR-120 and SR-4 (Crosstown Connector), as shown in **Figure 3-35,** again shows little uncertainty in travel time, except for a period at around 11 pm, demonstrating road maintenance disruptions that occurred in the study period southbound. The same pattern is found northbound as shown in Figure 3-36, with the same late evening occurrence because of road maintenance disruptions.

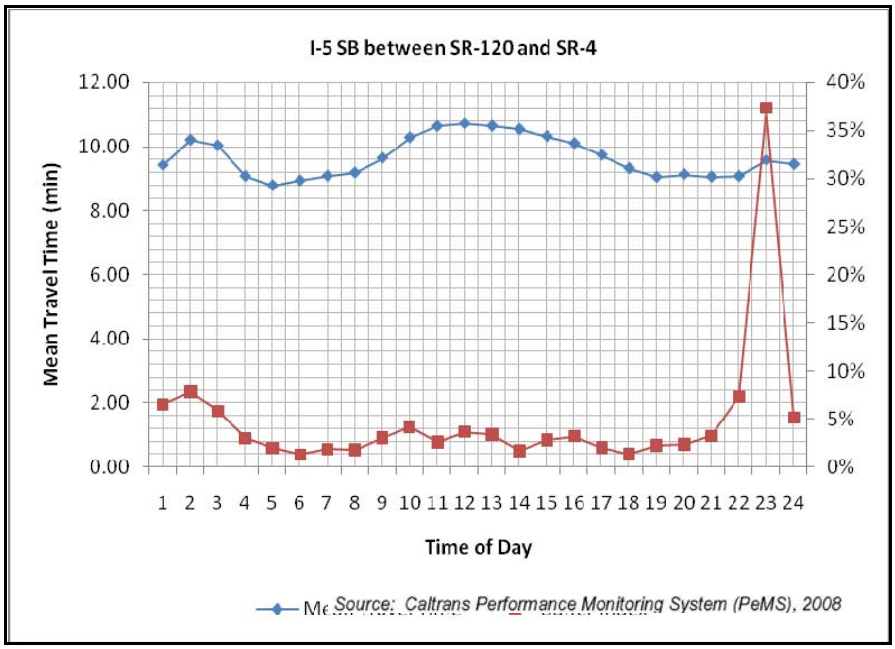


Figure 3-35 Buffer Index I-5 Southbound from SR-4 (Crosstown Connector) to SR-120

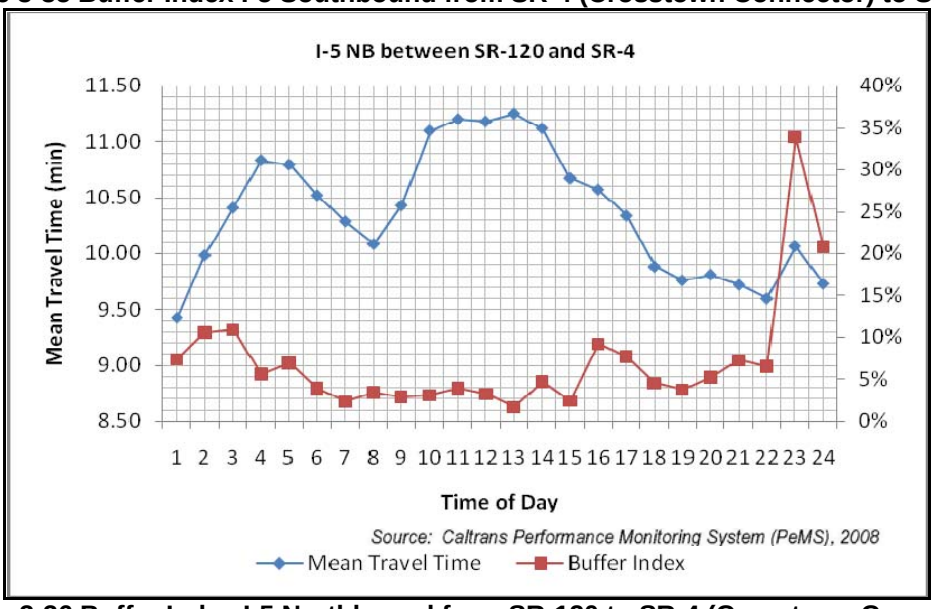


Figure 3-36 Buffer Index I-5 Northbound from SR-120 to SR-4 (Crosstown Connector)

The southbound segment between SR-4 (Crosstown Connector) and SR-12 shows virtually no variation greater than 7 percent in daytime hours, as shown in **Figure 3-37. Figure 3-38** which is the same segment in the northbound direction, shows little uncertainty in travel time, except for a period at around 11 pm, demonstrating road maintenance disruptions that occurred in the study period increases the uncertainty to 23 percent, and a less occurrence in the PM peak commute hours of 15 percent.

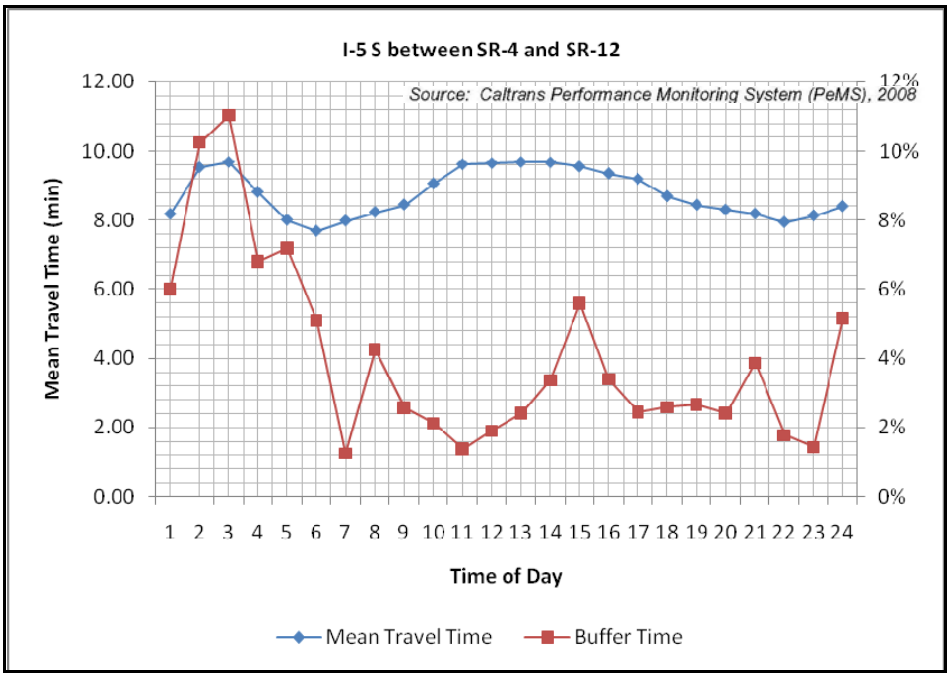


Figure 3-37 Buffer Index I-5 Southbound from SR-12 to SR-4 (Crosstown Connector)

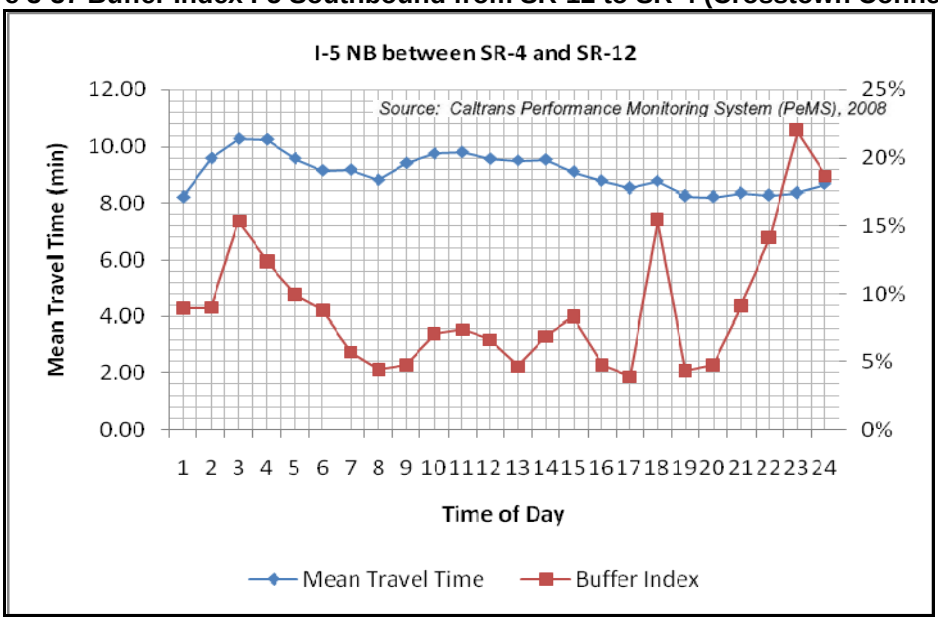


Figure 3-38 Buffer Index I-5 Northbound from SR-4 (Crosstown Connector) to SR-12

3.2.3 Safety

Overall Incident and Accident Information

The adopted performance measures to assess safety are the total number of incidents and the incident rates. These characteristics are computed using the Caltrans Traffic Accident Surveillance and Analysis System (TASAS).

Overall accident rates and numbers of accidents are available from TASAS. These are summarized in **Table 3-9.** For I-5 in both directions and I-205 westbound, the accident rate per

million vehicle miles is at or below the statewide average, listed on the Caltrans web site. The one area with an aggregate higher rate is I-205 eastbound, where the accident rate is 1.7 times the statewide average. The recent opening of the additional lane on I-205 may change the safety performance of the corridor. However, the additional lane has not been open long enough for an appropriate evaluation of its impact.

Table 3-9 Accident Summary by Freeway Segment

Freeway	Direction	Segment	Post Mile	Number of Accidents	Accident Rate (per mile)	Accident Rate (per MVM) [2]	State Average Accident Rate (per MVM) [2]
I-205	Eastbound	Between I-580 and I-5	0.00-12.70	1,030	81.1	1.46	0.87
	Westbound	Between I-5 and I-580	0.00-12.70	614	48.35	0.87	0.87
I-5	Northbound	Between Kasson Rd and SR-12[1]	11.00-42.00	1,106	35.68	0.63	0.83
	Southbound	Between SR-12 and Kasson Rd[1]	11.00-42.00	1,197	38.61	0.68	0.83

[1] In this table, the segment boundaries on I-5 are set by the TASAS reporting system, and do not exactly match the I-5 segment studied here.
[2] MVM – million vehicle-miles
Source: TASAS, August 2004 through July 2007

Spatial Distribution of Incidents

To further understand the safety-related performance characteristics of the corridor, a more detailed breakdown of incidents by location was undertaken. For I-5, the PeMS database was used to generate graphs showing the number of accidents and incidents, aggregated by postmile, over a three-year period. These graphs are presented in **Figure 3-39** and **Figure 3-40.** Important to note that the PeMS database differs from TASAS database, in part because the PeMS dataset includes a combination of reported incidents as well as accidents. As shown in these figures, the number of incidents is greater than the number of accidents. Nonetheless, these graphs do provide insight into the geographic distribution of incidents along the corridor.

In the Southbound direction (**Figure 3-39**), the highest number of incidents on I-5 occur in the areas near the I-205 and SR-120 interchanges (mile post 13) and near SR-4 (Crosstown Connector) (mile post 24); these are due to the high volumes of traffic that are lane changing near these major interchanges. High accidents rates are also shown near Monte Diablo Avenue (mile post 29), which has merging activity from Downtown Stockton and Port of Stockton traffic.

In the northbound direction (**Figure 3-40**) the highest numbers of incidents are shown to occur near the March Lane (mile post 30 area) and Eight Mile Road (mile post 35) interchange areas. Additional areas with higher than average occurrence of incidents are located in and near

Downtown Stockton (PM 24.5 SR-4W to 27.5 Monte Diablo). The incidents that occur in these areas are attributable to lane changes associated with the on-ramps and off-ramps.

In general, planned improvements, such additional capacity, interchange modifications and ramp metering, can improve the safety performance in these areas.

At the time of this study, PeMS data was not available for I-205. Further, the recent opening of the additional lanes on I-205 may have changed the safety performance of the corridor, thus limiting the applicability of historical data.

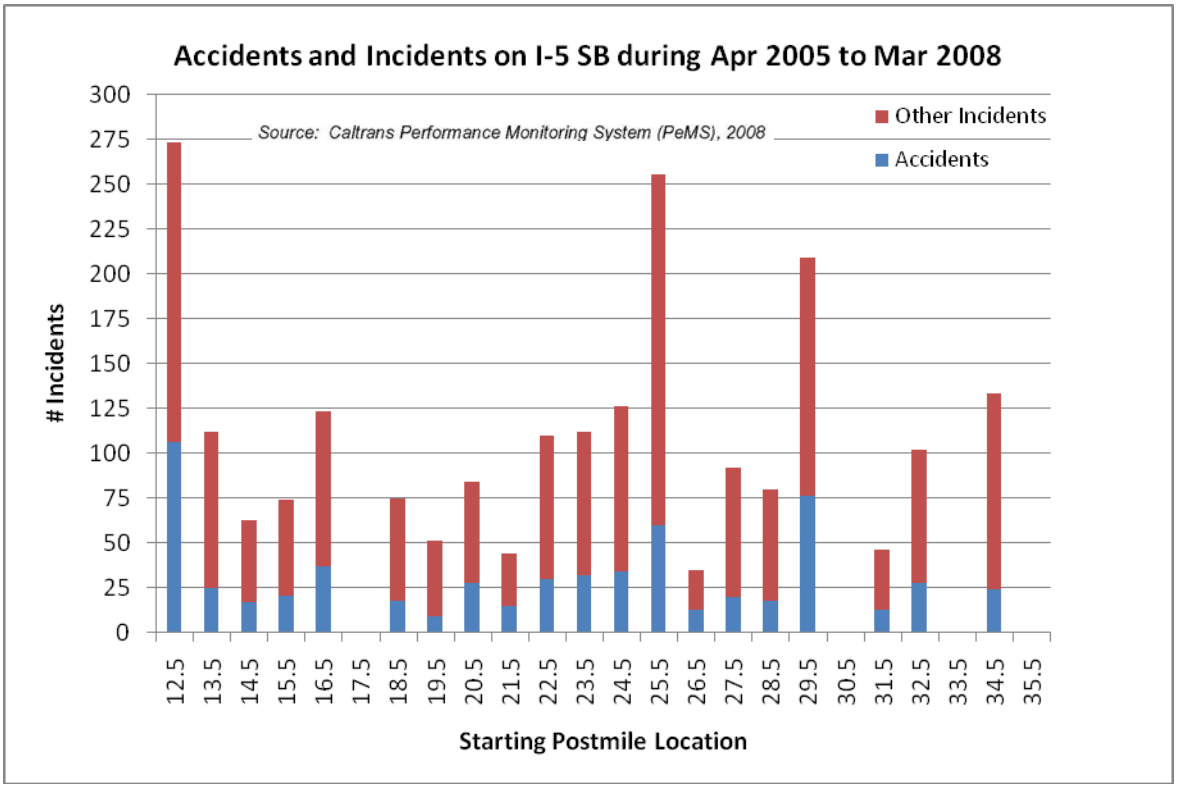


Figure 3-39 Accidents and Incidents on I-5 southbound

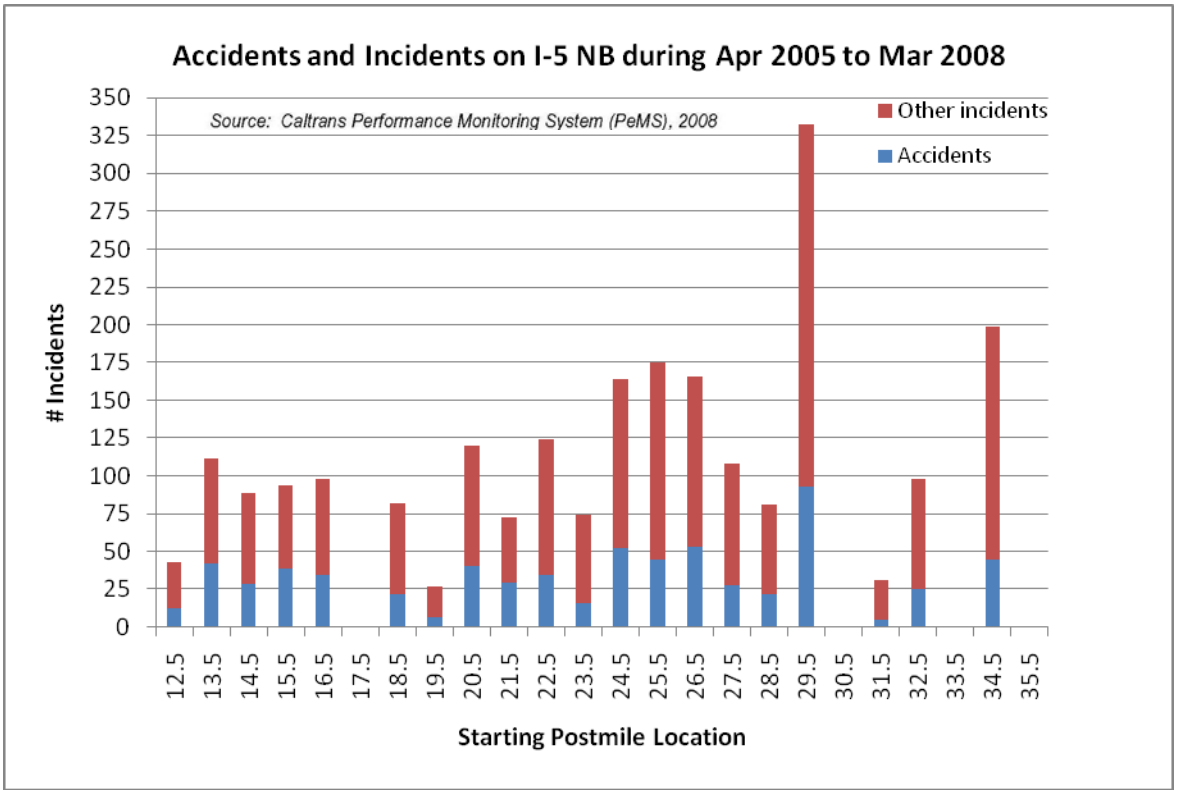


Figure 3-40 Accidents and Incidents on I-5 Northbound

3.2.4 Productivity

Productivity is a system efficiency measured used to analyze the effective capacity of the corridor. The concept is best described as a relationship between volume and capacity.

Clearly, a roadway's productivity is enhanced when more vehicles are on a facility – to a point. As more vehicles are added, travel speeds fall. As the speeds deteriorate, a point is reached where the actual number of cars cannot be carried by the system, and the flow rates begin to drop. This *optimum capacity* reflects the most effective utilization of the roadway at its preferred level.

For freeways, this point is reached at about half of the free-flow speed. This is typically assigned to be 35 miles an hour. Once speeds fall below 35 miles an hour, the flow of traffic volumes that can be carried by the roadway falls. This concept of "lost productivity" is illustrated in **Figure 3-41** by an example from SR-99 in Sacramento County. As traffic flow increases to the capacity limits of a roadway, speeds often decline rapidly at merge/weave locations (e.g., at on-ramps) and throughput drops dramatically. This loss in throughput is the lost productivity of the system.

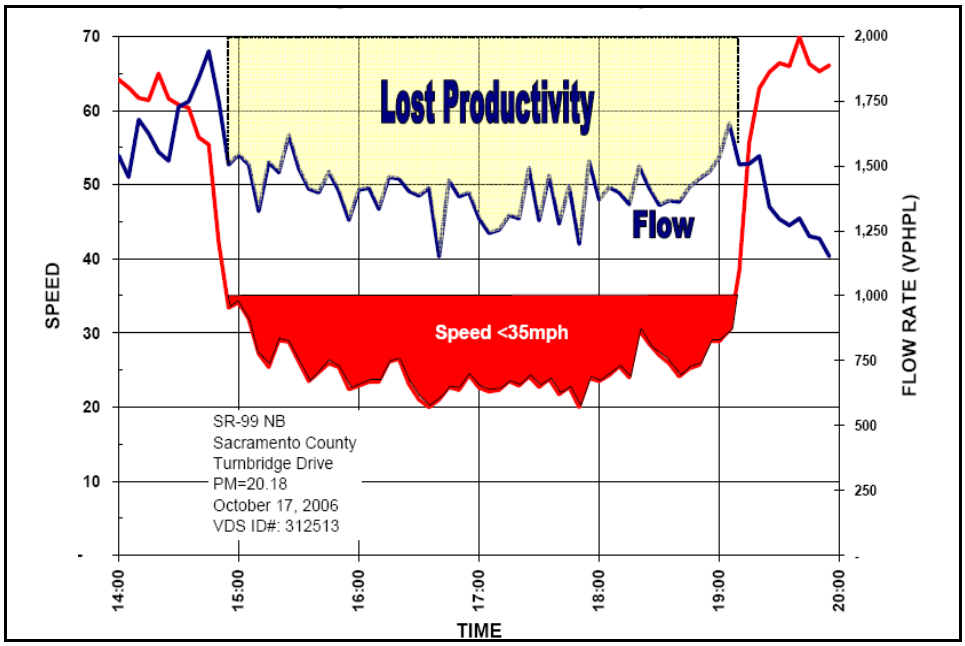


Figure 3-41 Illustration of Lost Productivity

For reporting purposes, this lost productivity was converted into "equivalent lost lane-miles." These lost lane-miles represent a theoretical level of capacity that would have to be added in order to achieve maximum productivity. Equivalent lost lane-miles is computed as follows (for congested locations only):

$$LostLaneMiles = \left(1 - \frac{ObservedLaneThroughput}{2000\ vphpl}\right) \times Lanes \times CongestedDistance$$

Lost lane miles represent a theoretical level of capacity that would have to be added in order to achieve maximum productivity. For examples, losing six lane-miles implies that adding a new lane along a six-mile section of freeway would improve productivity.

The results for the study corridors are summarized in **Table 3-10**. The data used in this analysis is based on PeMS data from a Tuesday, Wednesday or Thursday between September 9 and October 30, 2008. (Fridays were not included in this analysis.) The analysis shows that there is lost productivity to a significant degree on I-205 eastbound and I-5 northbound between SR-4 (Crosstown Connector) and SR-12. The lost lane productivity occurs as a result of afternoon peak hour congestion. It is important to also note that many segments have delay during the midday as well as during the peak commute times, indicating some lost productivity throughout the day.

Table 3-10 Lost Productivity (less than 35 mph)

Freeway	Segment	AM Peak Period (5 – 10 am)	Midday (10 am – 2 pm)	PM Peak Period (2 – 7 pm)	Total (5 am – 7 pm)
I-205 Eastbound	I-580 to I-5*	0.1	0.4	8.6	9.1
I-205 Westbound	I-5 to I-580*	0.8	0.0	0.0	0.8
I-5 Northbound	SR-4 (Crosstown Connector) to SR-12	2.1	1.4	2.3	5.8
I-5 Northbound	SR-120 to SR-4 (Crosstown Connector)	0.5	0.2	0.9	1.6
I-5 Northbound	I-205 to SR-120	0.0	0.0	0.0	0
I-5 Southbound	SR-12 to SR-4 (Crosstown Connector)	0.3	0.6	0.3	1.2
I-5 Southbound	SR-4 (Crosstown Connector) to SR-120	0.0	0.4	0.3	0.7
I-5 Southbound	SR-120 to I-205	0.8	0.2	0.2	1.2

** Lost productivity based on surveys before the additional lanes were provided on this segment.*

Source: Caltrans Performance Monitoring System (PeMS) – September 9 to October 30, 2008; Tuesdays through Thursdays

The addition of travel lanes on I-205 and declining economic activity were factors to remove observed delays of less than 35 mph from I-205.

3.2.5 Corridor Maintenance Conditions and Preservation

Pavement Conditions

The condition of the roadway pavement (or ride quality) on the corridor can influence its traffic performance. Rough or poor pavement conditions can decrease the mobility, reliability, safety and productivity of the corridor, while smooth pavement can have the opposite effect. It is possible for a roadway section to have structural distress without affecting ride quality. Likewise, a roadway section may exhibit poor ride quality, while the pavement remains structurally adequate.

Pavement roughness is generally defined as an expression of irregularities in the pavement surface that adversely affect the ride quality of a vehicle (and thus the user). Roughness is an important pavement characteristic because it affects not only ride quality but also vehicle delay costs, fuel consumption and maintenance costs. The World Bank found road roughness to be a primary factor in the analyses and trade-offs involving road quality vs. user cost (UMTRL 1998).

The International Roughness Index (IRI) is one of the most prevalent measures used to quantify pavement roughness or present pavement serviceability.

The Caltrans Division of Maintenance conducts a Pavement Condition Survey (PCS) annually to identify pavement distress. Based on the most recent survey, the I-205/I-5 corridor exhibits major structural distress needing pavement rehabilitation. The PCS is used to identify needs in the roadway preservation programs (Roadway, Rehabilitation, and Pavement Preservation).

The I-205 corridor was widened from four to six lanes in August of 2009. This project introduced approximately 40 percent more lane miles to the corridor in good condition, and improved approximately 45 of the 50.1 lane miles that had previously been identified for rehabilitation strategies.

Table 3-11 summarizes the pavement conditions along the corridor based on 2008 maintenance pavement condition data. This data indicates that I-5 had 56.3 lane miles identified for rehabilitation strategies. A breakdown of the International Roughness Index (IRI) (IRI) on the corridor from the 2008 PCS data shows the following:

- 24 percent, was considered to have good pavement conditions (IRI < 95)
- 33 percent, was considered to have acceptable pavement conditions (95 < IRI >170)
- 43 percent was considered to have unacceptable pavement conditions (IRI > 170)

.

Table 3-11 Pavement Conditions

Postmile	Location	2008 Maintenance Conditions	
		Pavement Condition	# of Distressed Lane Miles
I-5			
12.62-14.46	I-5 at I-205 Jct. West to San Joaquin River	Minor Structural Problem	0.6
14.46-14.83	San Joaquin River to Jct. SR-120 East	No Structural Problem	0.0
14.83-19.58	SR-120 East to Roth Rd	Minor Structural Problem	7.7
19.58-20.95	Roth Rd to French Camp Rd	Minor Structural Problem	3.0
20.95-25.40	French Camp Rd to .04M north of Dr. Martin Luther King Jr. Blvd	Minor Structural Problem	8.0
25.40-27.90	.04M north of Dr. Martin Luther King Jr. Blvd to Monte Diablo Ave	Major Structural Problem	3.5
27.90-28.53	Monte Diablo Ave to Country Club Blvd	Major Structural Problem	1.7
28.53-32.66	Country Club Blvd to Hammer Lane	Major Structural Problem	13.7
32.66-35.29	Hammer Lane to Eight Mile Rd	Major Structural Problem	7.0
35.29-36.20	Eight Mile Rd. to .90M north of Eight Mile Rd.	Major Structural Problem	4.0
36.2-39.57	.90M north of Eight Mile Rd. to Jct. Rte. 12	Major Structural Problem	7.1
		Total	56.3

Bridge Conditions

The Caltrans Office of Structures Maintenance and Investigations of the Engineering Service Center (OSM&I-ESC) conducts periodic inspections of all State structures. The Structures Replacement and Improvement Needs (STRAIN) report is used to identify needs for the Bridge Preservation Programs (Bridge Replacement/Rehabilitation, Scour Mitigation, Rail Replacement/Upgrade, Seismic Restoration and Widening). Based on the most recent reports, there are currently 11 bridges identified on the STRAIN for I-205 and 4 bridges are identified on the STRAIN for I-5. Refer to

Table 3-12 lists the bridges identified for replacement and or improvement needs on the I-205/I-5 CSMP corridor.

Table 3-12 I-205/I-5 CSMP Corridor Maintenance and Rehabilitation – Bridge Needs

Segment	Description	I-205/I-5 Maintenance Bridge Data	
		Bridge Name	Bridge #/ Location
I-205			
00.00-01.37	Alameda County Line to Mountain House	Aqueduct Service Road UC	(PM 00.01) 29 0299
		Delta-Mendota Canal	(PM 00.15) 29 0037
03.37-05.20	11th Street to Grant Line Rd.	Janney OH	(PM 04.54) 29 0074L&R
05.20-07.00	Grant Line Rd. to Tracy Blvd.	Grant Line Road UC	(PM 05.29) 29 0186R
		Corral Hollow Road UC	(PM 05.94)29 0132L&R
07.00-08.13	Tracy Blvd. to MacArthur Dr.	Tracy Blvd. UC	(PM 07.01) 29 0178L&R
		MacArthur Drive UC	(PM 08.12) 29 0184R
08.13-13.39	MacArthur Dr. to Jct. I-5	El Rancho Road UC	(PM 10.48)29 0214L
		East Banta OH	(PM 11.6) 290179L&R
		Tom Paine Slough	(PM 11.72) 90180L&R
		E205-N5 Connector Ramp	(PM 13.11) 290032G
I-5			
25.40-27.90	.04M north of Dr. Martin Luther King Jr. Blvd to Monte Diablo Ave	Route 5/4 Connector Viaduct	(PM 25.87) 29 0233H
27.90-28.53	Monte Diablo Ave to Country Club Blvd.	Route 5/4 Separation	(PM 26.12) 290232L&R
28.53-32.66	Country Club Blvd to Hammer Lane	Smith Canal	(PM 28.26) 290173L
32.66-35.29	Hammer Lane to Eight Mile Rd	Calaveras River	(PM 29.56) 90174L&R

3.3 Bottleneck Analysis

Understanding the locations of major bottlenecks and their relative degradation to the transportation system's performance in the corridor is crucial to developing an effective CSMP because bottlenecks are often one of the most identifiable causes of recurrent congestion and lost productivity. Using the survey information presented in prior chapters, this chapter identifies the major bottlenecks and quantifies the relative degradation to the degree possible. This provides a more in-depth understanding of the causes of corridor performance degradation that occur at recurrent and non-recurrent bottlenecks.

A "bottleneck" occurs when traffic must slow down to traverse a roadway segment. Typically, bottlenecks occur with a lane merge, a lane drop, weaving or an accident. These points are when the roadway traffic demands approach full saturation of the facility. From the bottleneck point, the traffic delays extend upstream to a point where a slowdown begins. When bottlenecks occur, the begin close to the point of origin, growing in length upstream to the furthest congestion distance, and then reduce in length again until the bottleneck disappears because of a reduced traffic demand. For these freeway corridors, each bottleneck location has been defined as the end of the link at which speed is below 40 miles per hour and rises above 40 miles per hour for the downstream link (as defined in the Caltrans PeMS form: http://pemsforum.dot.ca.gov/?page_id=79).

The system performance data presented previously in this chapter was used to identify bottleneck locations. The primary information sources for recurrent congestion included the PeMS database, 2007 HICOMP report and field observations. Based on this information, four primary congested segments were identified. In some cases, these segments were comprised of multiple bottlenecks.

During the AM peak period, significant congestion was observed on westbound I-205 as a result of bottlenecks associated with capacity constraints over the Altamont Pass and the I-205/I-580 merge, as well as in the vicinity of Mountain House Parkway, East Grant Line Road and MacArthur Drive. On I-5, there is a slight southbound delay that also appears in the AM study period as far north as Hammer Lane due to a bottleneck at the curves in the vicinity of Monte Diablo Avenue.

During the PM peak, congestion occurs on I-5 and I-205 in the same areas as the AM peak but in the opposite direction. On I-205 there is congestion in the eastbound direction throughout the Tracy area from Mountain House Parkway to I-5. On I-5 northbound, congestion occurs north of Downtown Stockton during the PM peak between SR-4 and March Lane.

These congested segments and bottlenecks are further discussed below.

I-205 Westbound in Tracy Area

On I-205, the congestion occurs very early, which is consistent with the PeMS volume and speed data previously presented. Bottlenecks appear in the westbound direction in the vicinity of West Grant Line Road, the I-205/I-580 merge, Mountain House Parkway, East Grant Line Road and MacArthur Drive. This reflects the high demand levels that exceed the capacity of the freeway; with additional delays created as heavy volumes of on-ramp traffic are added into the corridor. At the Grant Line Road and MacArthur Drive on-ramps, this situation is compounded by the presence of heavy trucks slowly accelerating uphill on these ramps -- and then merging with only a short distance -- causing slow-moving mainline traffic to further slow to accommodate the merging vehicles. This congestion occurs quite early in the morning (as early as 4:15 am for the segment closest to I-5), and dissipates by 6:55 am. The recently completed widening of I-205 plus the general reduction in demand associated with the current economic climate have resulted in a decrease in congestion levels along I-205.

I-5 Southbound in Northern Stockton

On I-5 southbound, slowing occurs between 7:30 and 8:45 am as far north as Hammer Lane to a bottleneck at the curves in the vicinity of Monte Diablo Avenue. Lane changing activity that occurs in this vicinity also serves to reduce the flow of traffic at that point. Observations indicate that this bottleneck is mainly due to the large numbers of vehicles using the right lanes to exit at the various Downtown Stockton interchanges. Traffic in those lanes travels at reduced speed, while traffic volume in the left lanes is less that the capacity of those lanes, and flows at a higher speed.

I-205 Eastbound in Tracy Area

On I-205, 2008 and earlier data showed congestion occurring in the eastbound direction throughout the Tracy area from Mountain House Parkway to I-5, appearing as early as 2:15 pm and extending as late as 8:15 pm. The opening of the third eastbound lane on I-205 in 2009 eliminated the primary mainline bottleneck.

However, bottlenecks remain at a number of on-ramp merge points. Slow moving trucks were slowly accelerating uphill at the on-ramps on MacArthur Drive and Grant Line Road, and then merging with only a short distance, which results in mainline congestion and speed reduction. Queues along this segment typically occur between 2:30 pm and 6:30 pm. The primary bottleneck cause is the slow merge of uphill on-ramp traffic from MacArthur Drive without an acceleration lane, at the high-volume section of the freeway. Merging vehicles are thus not able to enter mainline traffic streams effectively, so that mainline vehicles in the rightmost lane must also slow. The merging-related queue extends past Tracy Boulevard and can extend as far back as the 11th Street off-ramp. This bottleneck generally lasts from 2 pm to 6 pm with the maximum queues between 3 pm and 5 pm. The recently completed widening of I-205 plus the general reduction in demand associated with the current economic climate have resulted in a decrease in congestion levels along I-205.

I-5 Northbound in Northern Stockton

On I-5 northbound, a congestion point occurs north of Downtown Stockton, between 4:00 pm and 6:00 pm. This congestion results from the high volumes of local traffic leaving the area merging at the mainline lane drop just north of the Country Club Boulevard off-ramp. It is also resulting from weaving on the Ship Channel bridge structure over the railroad near Downtown Stockton caused by the merging onto I-5 northbound from Westbound SR-4 and the large diverge to the Pershing Street off-ramp, in combination with the heavy traffic volumes and high truck presence on I-5 in that area. In addition, large numbers of trucks in the right lane must merge into the next lane at the point of the lane drop, and this requires slower truck movements during congested times. Queues along this segment typically exist between 3:00 pm and 6:00 pm.

3.4 Non-Recurring Congestion

A second cause of congestion is a presence of incidents which reduce the flow of the freeways. This congestion is “non-recurring” as it only appears when accidents occur.

No specific data non-recurring congestion was available for the I-205/I-5 CSMP corridor. However, the TASAS accident data presented in previously in Section 3.2.3 indicates that there is, on average, one accident in each direction on the study segment of I-5 (approximately 1100 accidents over a three-year period). On I-205, a similar frequency is found in the eastbound direction, while the occurrence of accidents is less frequent in the westbound direction.

3.5 Arterial Roadway Intersection LOS Analysis

Because traffic management strategies can include the use of the adjacent arterial roadways, the performance of these intersections is important to have available. A study of traffic intersection operations at a number of locations in the study area have been made, and reported as Intersection Level of Service.

The Intersection Level of Service was calculated based on existing geometry, signal timing and counts. The calculations cover four peak hours during a weekday on a Tuesday, Wednesday or Thursday. The peak hours were 7 am to 9 am and 4 pm to 6 pm.

The results indicate that five of the study intersections currently operate at LOS F for at least one hour during the AM or PM peak period. These locations, shown on **Figure 3-42,** are:

- Pershing Avenue / Hammer Lane 4 pm to 6 pm
- Pershing Avenue / March Lane 4 pm to 6 pm
- Pacific Avenue / March Lane 4 pm to 5 pm
- Grigsby Place / Benjamin Holt Drive 7 am to 8 am
- Feather River Drive / March Lane 5 pm to 6 pm

LOS results for all study intersections are included in the *Comprehensive Corridor Performance Assessment and Causality Report* (see **Appendix B**).

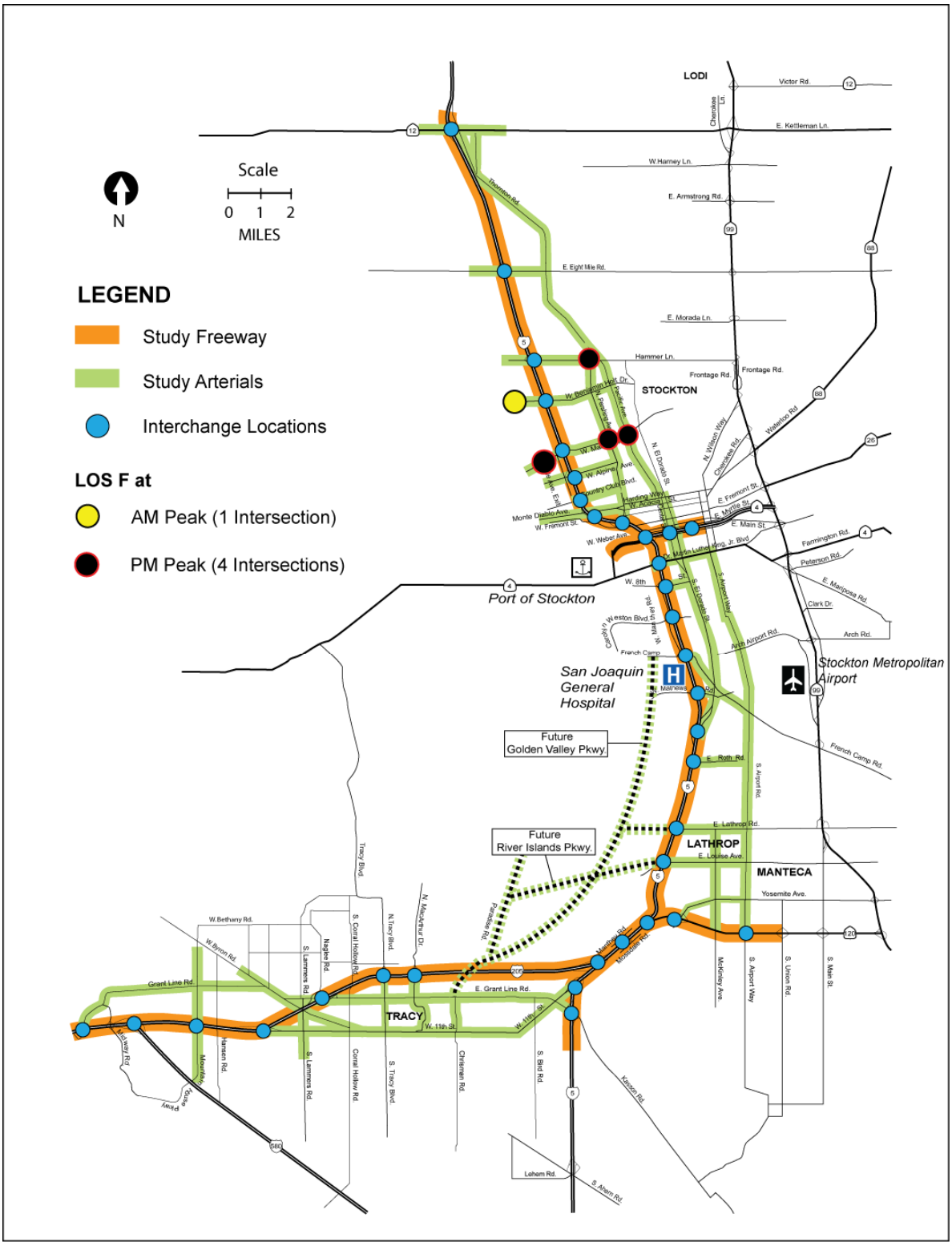


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Figure 3-42 Arterial Intersections Operating at Level of Service F

4 Evaluation Approach

The Evaluation Approach chapter provides an overview of the CSMP forecasting and operational analysis input data sources, assumptions, and methodologies used to conduct the alternatives analysis as part of the I-205/I-5 CSMP.

The following section provides a summary description of the tools and procedures used to develop future year travel demand forecasts in the I-5/205 CSMP study corridor. These travel forecasts were subsequently used as inputs to the operational analysis (i.e. the CORSIM traffic simulation model) for analyzing the CSMP Alternatives under future year conditions. A more complete description of the forecasting methodology with additional information on the input assumptions can be found in the *Final Travel Demand Forecasting Methodology Memorandum* (March 3, 2009) and the *Travel Demand Model Methodology Technical Memorandum* (February 25, 2010) contained in **Appendix C.**

The Operational Analysis section that follows provides an overview micro-simulation traffic modeling process and highlights the key features of the analysis methodologies employed.

4.1 Demand Forecasting

4.1.1 Use of Countywide Travel Demand Model

The growth in travel demand in the study corridor was forecasted using the SJCOG countywide travel demand forecasting model. The SJCOG model was chosen as the demand forecasting tool because the SJCOG model was a calibrated and validated tool designed specifically to forecast growth in auto mode travel for San Joaquin County.

The SJCOG model takes into account varying land use growth rates in different parts of the corridor and County plus the growth in neighboring counties to project travel demand in the County. The SJCOG model also it takes congestion into account when determining destination and route choice. **Table 4-1** summarizes key features of the current SJCOG model.

Table 4-1 Current SJCOG County Travel Demand Model

Area covered	Platform	Forecast Years	Time Periods
San Joaquin County and a northern portion of Stanislaus County	Cube	2006 Base Year 2010 Future Year 2011 Future Year 2013 Future Year 2014 Future Year 2018 Future Year 2020 Future Year 2023 Future Year 2025 Future Year 2030 Future Year	AM Peak Hour; PM Peak Hour; Offpeak; Daily

4.1.2 Forecast Analysis Years

In consultation with the project stakeholders, it was agreed that the following model year datasets would be used in developing the future year forecast demands:

- 2006 Base Model
- 2014 Year Model
- 2024 Year Model

4.1.3 Model Adjustments

Prior to applying the SJGOG countywide model as part of the CSMP effort, adjustments to the model datasets were made as described below.

Network Adjustments

A modeling network input file, containing link and node representation of the County's roadway system, is one of the major inputs to the SJCOG model. Refinements to the network details were made to more accurately replicate the corridor's freeway, interchanges, ramps, and intersections. Further, the network's link (e.g., roadway segment) attributes like number of lanes and capacities were updated to be consistent with the most up-to-date planning documents.

External Trip Adjustments

A "reasonableness" check on the model's forecasted growth against historical and current statewide growth rates showed that some refinements to the model output were warranted for the forecasted growth in traffic at or crossing the San Joaquin County borders. This check of the year 2024 freeway Origin-Destination (OD) demands revealed an excessive amount of growth in demand at the I-580 entry/exit-link (Altamont Pass) on the west edge of the study corridor and an excessive amount of growth in demand at the I-5 entry/exit-link (to/from Sacramento) on the north edge of the study corridor. An algorithm was developed to restrict the year 2014 I-580 western entry/exit-link to 9,000 vehicles per hour, the year 2024 I-580 western entry/exit-link to 12,000 vehicles per hour and restrict the year 2024 I-5 northern entry/exit-link to 5,000 vehicles per hour. The algorithm implements a capacity threshold within the trip tables and then re-assigns the trips to other portions of the network (i.e., to other destinations). The process also shifts a portion of the peak hour trip to other hours within the peak period. This process increases internal trips within the county, increases transit and shared-ride trips, and shifts trips to shoulder hours of the peak hour.

4.2 Operational Analysis

4.2.1 Analysis Tools

To support the operational analysis of the CSMP roadway network, a microscopic simulation model of the roadway system was developed using CORSIM modeling software (version 6). This software was developed for the FHWA and simulates the behavior of individual vehicles.

Synchro 6 was also used for intermediate steps to conduct initial arterial analysis and help generate CORSIM arterial network elements such as lane configurations, turning movement

volumes and intersection signal timing plans. The arterial network input was combined with the freeway network elements to form the entire study network.

4.2.2 Analysis Periods

The following analysis periods were selected and agreed by all the stakeholders as the peak periods experiencing most congested conditions during the AM and PM commuting hours:

- 5-hour AM peak period (5 to 10 AM)
- 5-hour PM peak period (2 to 7 PM)

4.2.3 Simulation Model Network

The CORSIM model network was defined in consultation with the CSMP stakeholders and is illustrated in **Figure 4-1.**

4.2.4 Existing Conditions (2008) Model Development and Calibration

Existing Conditions AM and PM peak period CORSIM models were developed and calibrated to traffic conditions observed during the data collection conducted in year 2008. It is important to note that 2008 models assumed only two lanes per direction in I-205 through Tracy as the widening had not been completed. The calibration process included reasonably matching observed freeway traffic volumes, ramp volumes, freeway speed and bottleneck locations. The results of the calibration effort were documented in the *Simulation Model Calibration Memorandum* (see **Appendix D**).

4.2.5 Base Year (2009) Model Development and Validation

The Base Year models were developed from the Existing Year Models with updated lane configuration reflecting recently completed construction along I-205 and I-5. Within the Base Year, the I-205 section between the Eleventh Street interchange and the I-5 junction was widened to six lanes and the northbound I-5 section between the I-205 junction and the SR 120 junction was widened to five lanes. The northbound I-5 section was restriped with two lanes entering from I-5, three lanes merging from I-205, one lane and a choice lane exiting to SR 120, and four lanes continuing on I-5. The southbound I-5 section was restriped to have two lanes and a choice lane exiting to I-205 and three lanes continuing on I-5.

The models were validated to traffic conditions observed in 2009 after the completion of the I-205 and I-5 widening projects. Details of the base year model validation can be found in the *Baseline 2009 (Post I-205 6 Lane Widening) Simulation Model Validation Memorandum* in **Appendix E**.

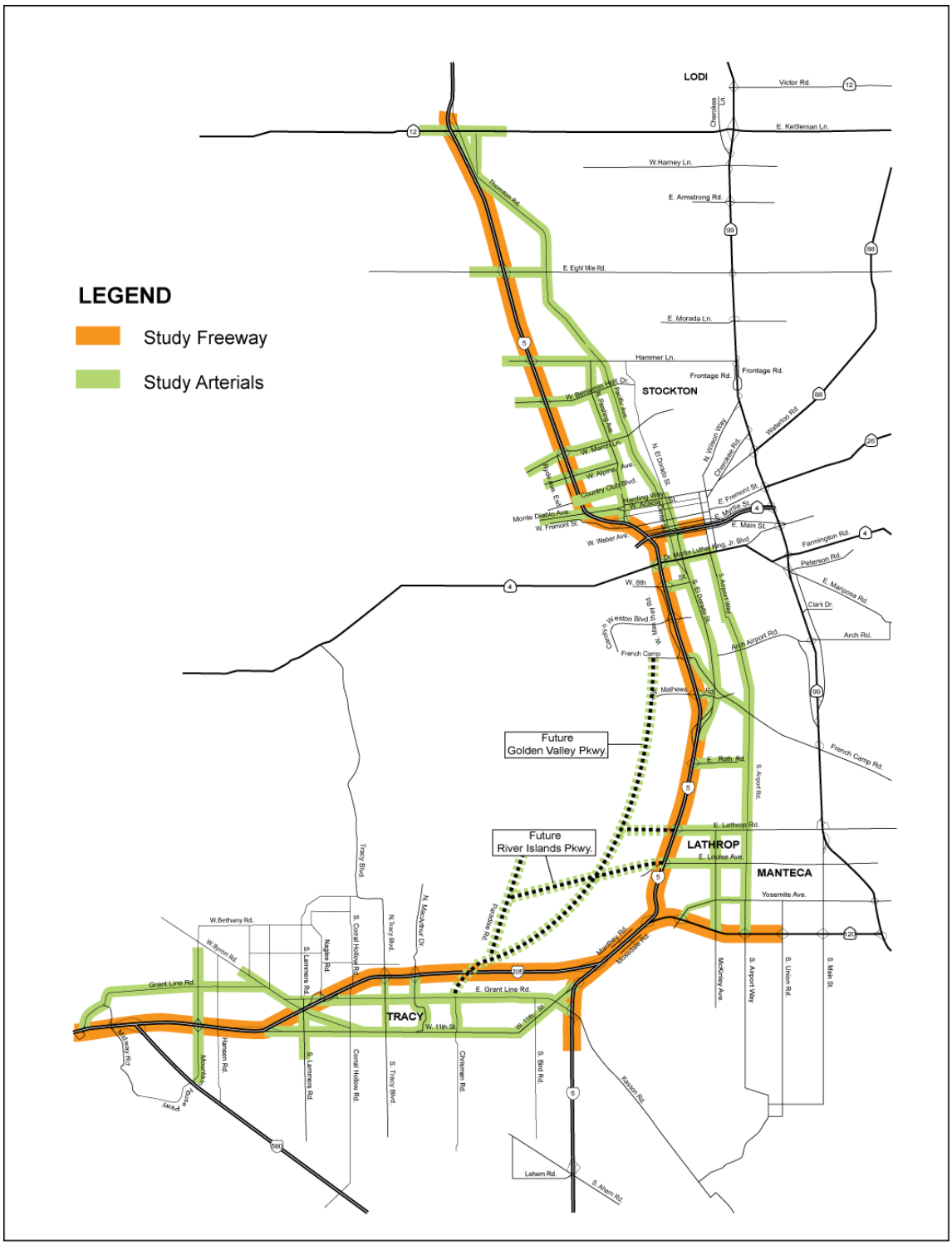

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Figure 4-1 Simulation Model Analysis Network

4.2.6 Alternative Analysis Measures of Effectiveness (MOE's)

Several MOE's were selected to report traffic operations for the year 2014 and 2024, and provide a basis for comparing the benefits and impacts of each of the study alternatives. These measures include:

- **Speed** - Average vehicle speed by hour on the roadway segment.
- **Travel Time** - Average vehicle time traveling between the beginning and the end of the roadway segment by hour.
- **Delay** - Total delay experienced by all vehicles on the roadway segment for the entire time period.
- **Volume Served** - Total traffic volume exiting the end of the roadway segment for the entire time period.
- **Bottlenecks and Queues** - The bottleneck is the location of low capacity that restricts the traffic flow and creates queuing. The traffic queue is a congested stream of traffic that extends upstream of the bottleneck. Queue lengths change over time and are dependent on the levels of flows entering the queue from upstream traffic.

4.3 Development of Future Year Traffic Demand Input for Operational Analysis

The CORSIM model requires numerous demand-related inputs. The travel demand model was used to develop a number of these inputs, including the entry link demands, freeway OD matrices, and intersection turn movement demands. Additional inputs include the HOV percentage and truck percentage. The approach taken in developing these values for the future years is described below.

4.3.1 Link and Intersection Turn Movement Demands

Outputs from the travel demand model were not used directly in the operational analysis. Instead, changes in the forecast demand between the 2006 base model and each horizon year as produced by the travel demand model were added to existing traffic demands. This is known as the difference method and is illustrated in the following equation:

$$\text{Horizon Year peak period demand} = \text{Existing (Observed peak period demand} + \left(\text{Horizon Year peak period model forecast} - \text{2005 peak period model forecast}\right)$$

The difference method was used an intersection level (on the intersection's turning movement traffic volumes) to produce year 2014 and 2024 turning movement splits that were in turn used as inputs to the CORSIM micro-simulation traffic model. This method was also used to estimate demands on entry links into the model and for freeway ramps.

4.3.2 Freeway Origin-Destinations

The difference method was also applied at an OD level to produce year 2014 and 2024 freeway OD matrices. As part of this process, a subarea network of only the freeway and ramp links was extracted for producing the freeway origin and destination peak hour demand matrix from the

model. Changes in the OD matrices between the base and future forecast years were then applied to base year matrix in the CORSIM model.

4.3.3 Shoulder Hour Demand Forecasts

The post-processing method just described was applied to the refined SJCOG travel model outputs to produce an AM Peak Hour set of intersection turning movement traffic volumes and corresponding OD matrix. Likewise, a set of intersection turning movement traffic volumes and matching OD matrix was created for the PM Peak Hour.

The operational analysis for the CSMP I-5/I-205 corridor study is based on a 5-hour AM peak period (5 to 10 AM) and a 5-hour PM peak period (2 to 7 PM). As noted above, the SJCOG countywide travel demand model outputs peak hour demands. Therefore a process was developed to factor peak hour demands into 5-hour peak period demands based on the existing hourly traffic profiles derived from observed traffic counts.

4.3.4 High Occupancy Vehicle Percentage

The HOV percentage for the entire five hour peak period in future years was assumed to be the consistent with existing observed peak hour peak direction HOV percentage. The use of the higher peak hour value for the entire peak period in the future is reflective of the higher demands, congestion levels and peak spreading expected in the future.

4.3.5 Truck Percentage

The proportion of trucks in the vehicle fleet mix was assumed to remain constant in the future. This assumption reflects the fact that while truck volumes are expected to increase in the future, automobile volumes are also expected to increase.

5 Future Baseline Conditions

This chapter provides an overview of future conditions in the I-205/I-5 CSMP corridor. This includes an examination of the trends examine the projected travel demand changes between existing conditions, 2014, 2024 and 2030. Operational trends for the years 2014 and 2024 are also discussed. The trends provide a foundation upon which to identify the need for and compare the performance of various improvement strategies for the corridor.

5.1 Travel Demand Trends

The SJCOG travel model land use inputs for San Joaquin County show that the growth in housing (35%) will far exceed the future growth in jobs (20%) between 2006 and 2024. This will result in more San Joaquin residents commuting out to jobs in the Bay Area and Sacramento regions. **Table 5-1** summarizes the existing and future year land use forecasts for San Joaquin County.

Table 5-1 SJCOG Land Use Development Projections

Total San Joaquin County						
Year	Projections		Growth		% Growth	
	Dwelling Units	Jobs	Dwelling Units	Jobs	Dwelling Units	Jobs
2006	215,165	208,589	NA	NA	NA	NA
2013	238,674	221,680	23,509	13,091	11%	6%
2023	291,320	251,053	76,155	42,464	35%	20%
2030	358,816	288,737	143,651	80,148	67%	38%

Source: SJCOG Travel Demand Model Datasets

Table 5-2 summarizes the San Joaquin County daily vehicle trips, daily vehicle-miles-traveled, and daily vehicle-hours-traveled via auto mode for years 2006, 2014, 2024 and 2030 These travel trends are illustrated in **Figure 5-1**.

Table 5-2 SJCOG Daily Vehicle Trip and VMT Growth Forecasts

Total San Joaquin County									
	SJCOG Forecasts			Growth			% Growth		
Year	Trips	VMT	VHT	Trips	VMT	VHT	Trips	VMT	VHT
2006	2,559,789	13,291,334	295,064	NA	NA	NA	NA	NA	NA
2014	2,806,832	14,674,024	323,172	247,043	1,382,691	28,107	10%	10%	10%
2024	3,346,098	17,891,971	397,231	786,309	4,600,638	102,166	31%	35%	35%
2030	4,045,003	21,633,157	562,010	1,485,214	8,341,823	266,945	58%	63%	90%

Source: SJCOG Travel Demand Model Datasets

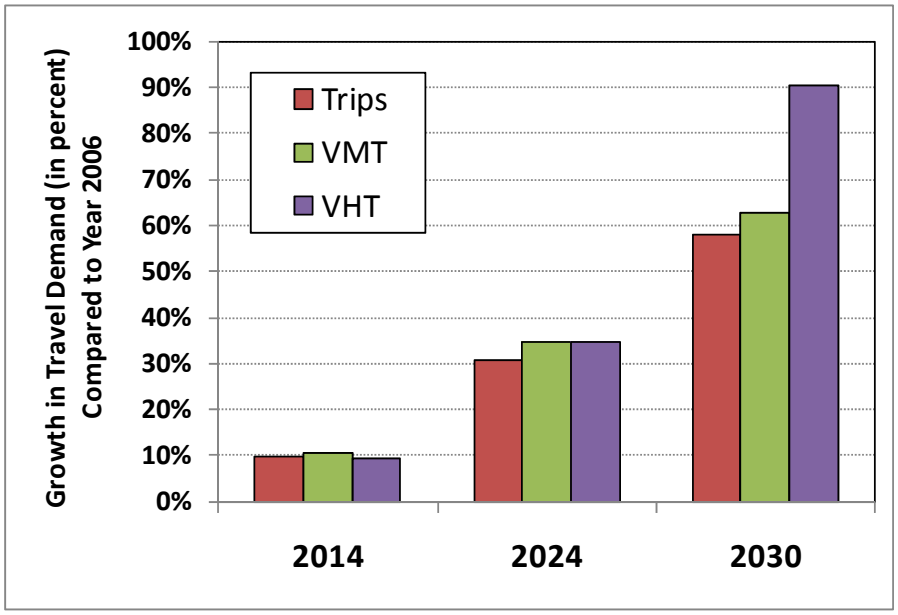

Figure 5-1 Growth in Countywide San Joaquin Auto Mode Travel

In the baseline scenarios, the growth in auto mode travel is expected to outpace the land use growth in San Joaquin County between 2006 and 2030, with vehicle trips increasing by about 58%, VMT growing by about 63% and VHT increasing by about 90%. The finding that VMT is increasing slightly faster than the number of vehicle trips indicates that average auto mode trip length will increase slightly over time. According to the county-wide summary in **Table 5-2**, the average auto mode trip was about 5.2 miles in 2006. This will increase to about 5.35 miles by 2030.

Likewise, the trend of VHT increasing faster than VMT over time indicates that overall travel speeds will decline over time, with time spent in congestion increasing. In 2006, the county wide average auto mode travel speed was about 45.1 mph. This drops to about 38.5 mph in the 2030 base scenario.

In addition to the growth in trip and vehicle travel in San Joaquin, the commute patterns are forecasted to change in northern Stockton by the year 2014. Currently I-5's peak direction is southbound in the morning between northern Stockton and downtown Stockton and northbound on I-5 in the evening. This predominant compute pattern is from residents of northern Stockton residential areas commuting to jobs in downtown Stockton. According to the SJCOG travel demand model's land use inputs, between 2006 and the year 2014 there is more residential growth in northern Stockton than there is job growth in downtown Stockton. The model also shows large job growth in the Sacramento region by 2014. These changing trends in land use cause shifts in the future traffic patterns. The SJCOG model is not forecasting traffic growth in the current peak directions; however, it shows large growth in northbound I-5 traffic commuting

from Stockton to Sacramento in the AM and large growth in southbound I-5 traffic returning from Sacramento back to Stockton in the PM. This pattern is reinforced by severe congestion on I-580 over the Altamont Pass, which makes commuting to Sacramento even more attractive. With these shifts in traffic patterns, the 2014 forecasted I-5 peak period flows are nearly equal in both directions in some places in northern Stockton. Commute patterns on I-205 are expected to stay the same in 2014 with the peak westbound in the AM and eastbound in the PM.

The forecasted growth in annual average daily traffic demands along I-205 and I-5 are summarized in **Table 5-3**. On I-205, daily traffic demands are forecast to increase by 37% to 52% by 2014, and 75% to 102% by 2024, with higher growth projected for the eastern sections of I-205. On I-5, lower levels of daily traffic demand growth are forecast for 2014 (12% to 32%), but similarly high growth is forecast for 2024 (46% to 95%), higher growth rates are projected for the southern and northern ends of I-5 within the study area, with lower growth projected for central I-5 near State Route 4.

Table 5-3 Freeway Annual Average Daily Traffic Volume Growth Forecasts

Corridor	Mainline Daily Traffic Volume			Daily Traffic Growth		Daily Traffic Growth %	
	2008 [1]	2014 [2]	2024 [2]	2014	2024	2014	2024
I-205 Corridor							
West of I-580	140,100	196,600	245,400	56,500	105,300	40%	75%
Mountain House Pkwy - 11th St	102,600	140,200	180,600	37,600	78,000	37%	76%
Grant Line Rd - Tracy Blvd	82,800	124,100	167,400	41,300	84,600	50%	102%
Paradise Rd - I-5	87,500	133,000	162,000	45,500	74,500	52%	85%
I-5 Corridor							
I-205 - SR 120	133,000	163,300	213,900	30,300	80,900	23%	61%
SR 120 - Louise Ave	97,500	124,000	177,000	26,500	79,500	27%	82%
El Dorado St - Mathews Rd	98,500	121,700	182,200	23,200	83,700	23%	85%
Dowing Ave - 8th St	115,500	136,300	195,200	20,800	79,700	18%	69%
Dr. Martin Luther King Jr Blvd to SR-4	140,000	156,600	204,700	16,600	64,700	12%	46%
SR-4 - Pershing Ave	135,000	156,400	202,900	21,400	67,900	16%	50%
Monte Diablo Ave - Country Club Blvd	112,000	132,000	174,700	20,000	62,700	18%	56%
March Ln - Benjamin Holt Dr	109,500	127,800	180,400	18,300	70,900	17%	65%
Otto Dr - Eight Mile Rd	82,400	103,100	157,800	20,700	75,400	25%	92%
North Gateway Dr - SR-12	62,200	82,300	121,300	20,100	59,100	32%	95%
North of SR-12	48,600	63,900	94,500	15,300	45,900	31%	94%

Source: DKS Associates 2010
1) PeMS - 2008 Counts
2) SJCOG Travel Demand Model Forecasts

5.2 Operational Trends

Future 2014 and 2024 baseline operating conditions were determined by modifying the validated 2009 CORSIM model. First, the demand inputs within the CORSIM model were updated to reflect the forecasted future year demands. Second, the CORSIM model network was updated to reflect an assumed set of baseline improvement projects. Additional detail related to future baseline conditions is presented in the *Opening Year 2014 (I-205 Auxiliary Lane Project) Simulation Model Results Memorandum* (see **Appendix F**) and the *Future Year 2024 Simulation Model Alternative Analysis Results Memorandum* (see **Appendix G**)

5.2.1 Future Baseline Improvements

For 2014, the baseline improvements included programmed RTP roadway projects assumed to be completed by the year 2014:

- I-5 Widening for HOV lanes (Country Club Blvd to March Ln)
- I-5/French Camp Road interchange reconstruction
- I-5/Otto Dr interchange new construction
- I-5/Hammer Lane interchange reconstruction
- I-5/Eight Mile Rd interchange reconstruction
- SR 120/Airport Way interchange reconstruction
- SR 120/McKinley Avenue interchange new construction
- Sperry Road extension
- Lathrop Road widening to 4 lanes
- Louise Avenue widening to 4 lanes
- Thornton Road widening to 6 lanes
- Airport Way widening to 6 lanes

The baseline scenario also included a number of intersection signalization and widening improvements as required to accommodate the 2014 traffic volumes and prevent severe congestion from grid-locking the entire study corridor roadway network. These projects included in the Year 2014 were:

- Signalization of the I-5/Mathews Road interchange ramps
- Signalization and widening of the I-5/Mathews Road/Manthey Road intersections
- Signalization of the I-5/Roth Road interchange ramps
- Intersection improvements at Pershing Ave/ March Ln
- Intersection improvements at Pacific/ March Ln
- Intersection improvements at Thornton/ Hammer
- Intersection improvements at Thornton/ Eight Mile Rd

For 2024, baseline improvements included the above plus the I-205 CMIA project and the widening of the westbound I-205/tracy Blvd off-ramp.

5.2.2 Year 2014

The operations analysis revealed six bottleneck locations on the CSMP freeway corridor in the year 2014:

1. Eastbound I-580 over the Altamont Pass (PM) - In 2014 the demand volume on Eastbound I-580 in the PM peak exceeds the capacity of the directional four lane section. The weave on Eastbound I-580 from the Grant Line Road on ramp to the I-205 split is a bottleneck that meters traffic downstream onto Eastbound I-205.

2. Westbound I-580 over the Altamont Pass (AM) - In 2014 the demand volume on Westbound I-580 in the AM peak exceeds the capacity of the directional four lane section. The westbound lane drop on Westbound I-580 west of the Grant Line Road interchange causes a bottleneck and a queue that extends onto Westbound I-205.

3. Westbound I-205 off ramp at Tracy Boulevard (AM and PM) - In 2014 the single lane westbound off ramp at the Tracy Boulevard interchange had insufficient capacity to accommodate the year 2014 AM and PM peak period demands. The queue from the Tracy Boulevard intersection would fill the westbound off ramp and spill back onto the westbound I-205 mainline blocking the freeway's through traffic and cause large queues to form on the westbound I-205.

4. Southbound I-5 off ramp from Lathrop Road (AM) - In 2014 traffic queues from the congested Lathrop Road Southbound I-5 off ramp intersection onto mainline Southbound I-5.

5. Northbound and Southbound I-5 off ramp from Eastbound SR-4 merge (AM) - The weaving section between the I-5 off ramps and the SR4 on ramp/Center Street off ramp is congested. This causes queuing on the NB I-5 to SR-4 off ramp, which extends onto I-5.

6. Southbound I-5 on ramp merge at 8th Street (PM) - By the year 2014 there would be a new bottleneck on Southbound I-5 at the 8th Street on ramp. This is the first merge after SR-4 on ramp where there are only three mainline lanes with no auxiliary lanes. Segments upstream have four lanes and auxiliary lanes.

The northbound I-5 mainline lane drop near Country Club Boulevard does not cause noticeable congestion in the year 2014 scenarios because the traffic entering this stretch of freeway is metered by congestion on State Route 4. The SR-4 to northbound I-5 ramp volumes are restricted (or metered) because queuing on Southbound I-5 at 8th Street extends through the I-5 and State Route 4 interchange onto Westbound SR-4. Thus this I-5 northbound bottleneck is hidden by the SR-4 congestion.

The 2014 baseline bottleneck and queue conditions for the AM and PM peak periods are illustrated in **Figure 5-2** and **Figure 5-3** respectively.

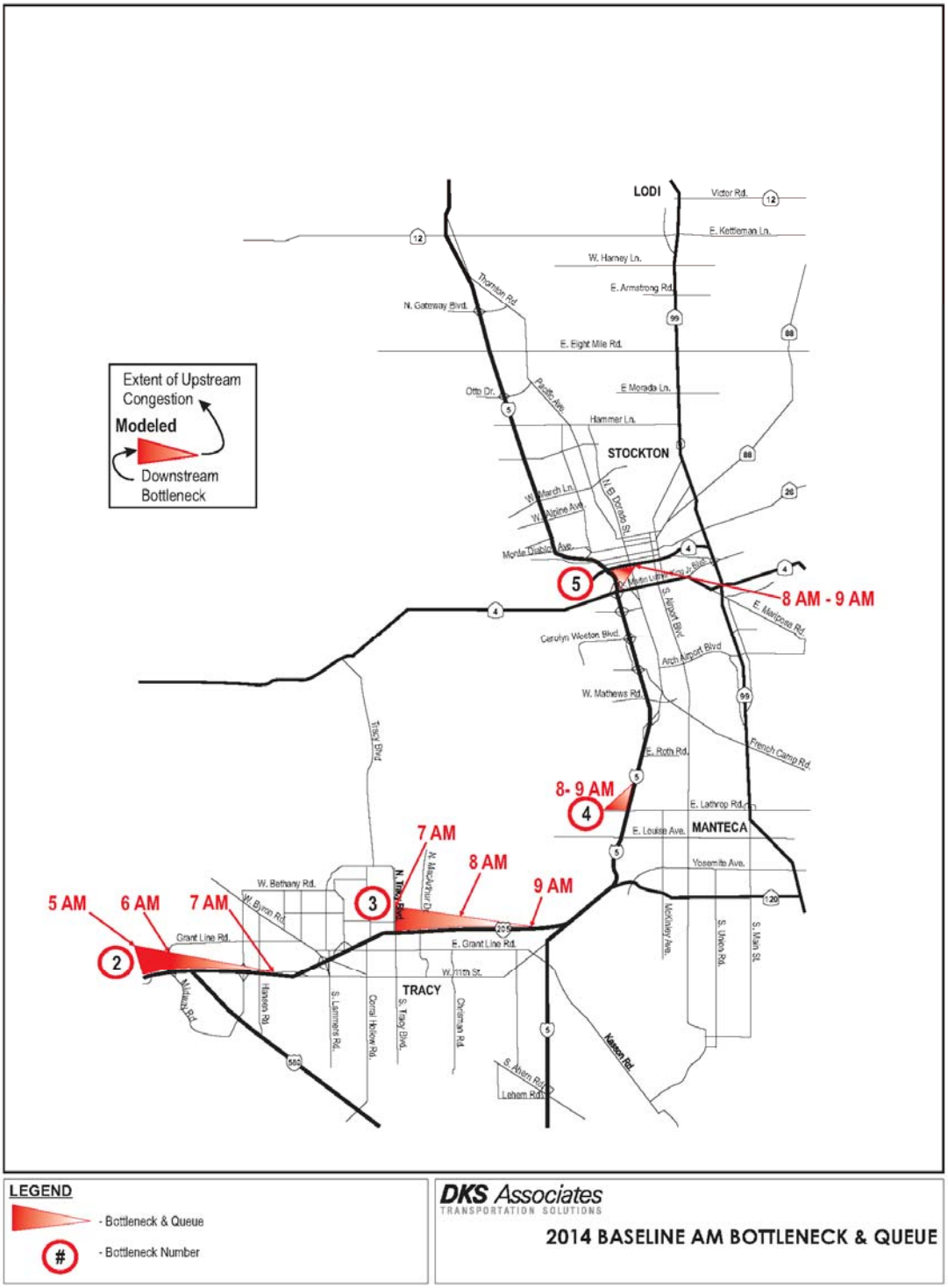

Figure 5-2 Forecasted 2014 Baseline Congestion – AM Peak Period

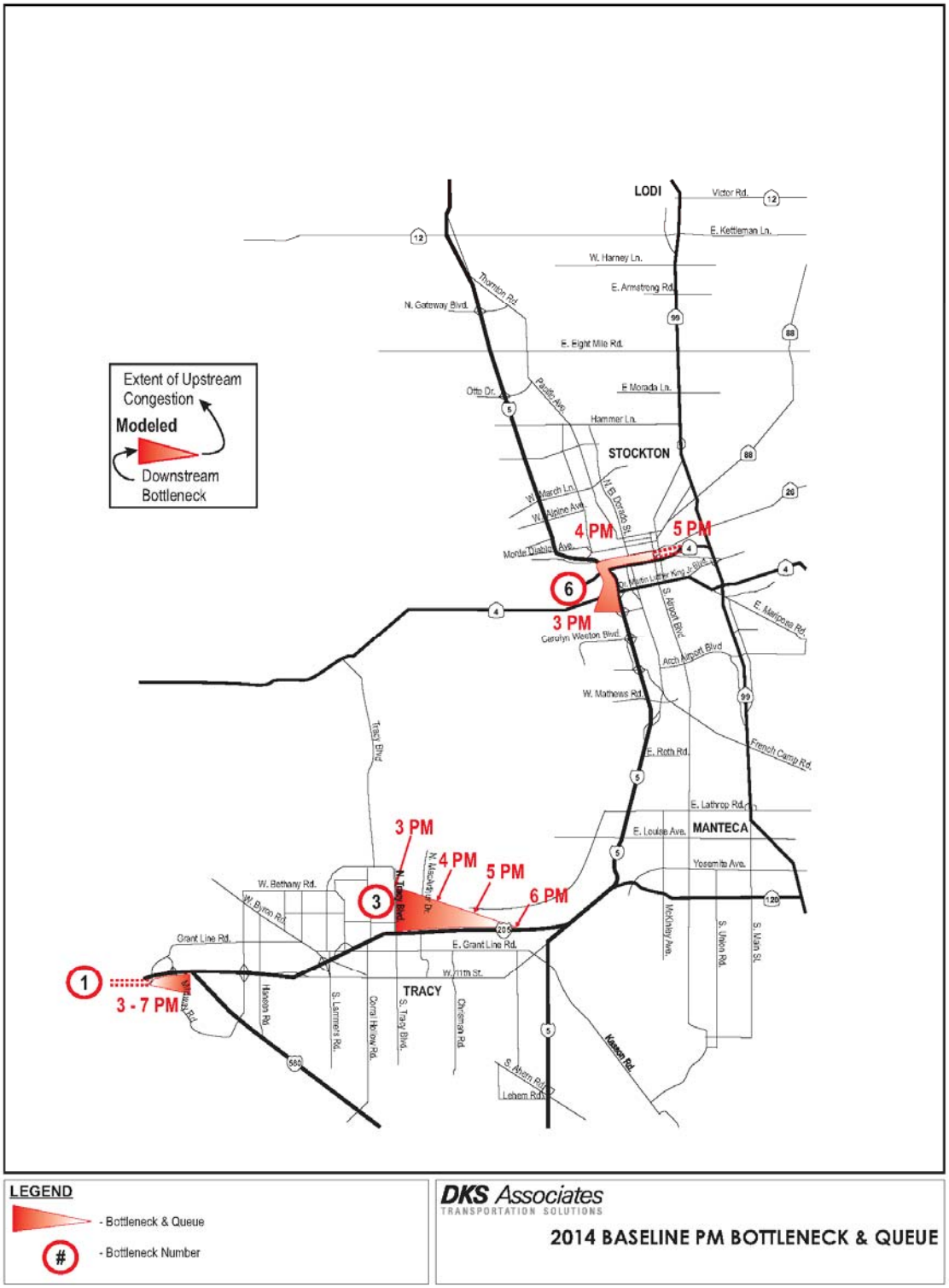

Figure 5-3 Forecasted 2014 Baseline Congestion – PM Peak Period

5.2.3 Year 2024

The baseline analysis for 2024 revealed that four of the 2014 bottlenecks on the freeway would remain:

1. Eastbound I-580 over the Altamont Pass (PM)
2. Westbound I-580 over the Altamont Pass (AM)
3. Southbound I-5 on ramp merge at 8th Street (PM)
4. Northbound I-5 off ramp from Lathrop Road (AM)

The analysis also revealed three new main bottleneck locations on the freeway corridor in the year 2024:

5. Southbound I-5 to SR-4 off ramp (AM) - In 2024 the Fresno Avenue off ramp at the State Route interchange would have insufficient capacity to accommodate the year 2024 AM peak period demands. The queue from the Fresno Avenue intersection would fill the southbound off ramp and spill back onto the southbound I-205 mainline blocking the freeway's through traffic and cause large queues to form.

6. Southbound I-5 on ramp merge at March Lane (AM and PM) - In 2024 the March Lane on ramp to Alpine Avenue off ramp weaving section would have insufficient capacity to accommodate the year 2024 AM and PM peak period demands, even with an auxiliary lane. The PM queue would extend upstream to State Route 12.

7. Northbound I-5 lane drop at Country Club Boulevard (AM) - The existing PM peak period bottleneck on Northbound I-5 at the lane drop at Country Club Boulevard would reappear by 2024 in the AM peak period. The three lane section of I-5 north of Country Club Boulevard has insufficient capacity to accommodate the year 2024 AM peak period demands. The northbound I-5 mainline lane drop near Country Club Boulevard does not cause noticeable congestion in the PM peak period because the traffic entering this stretch of freeway is metered by congestion on State Route 4. The SR-4 to northbound I-5 ramp volumes are restricted (or metered) because queuing on Southbound I-5 at 8th Street extends through the I-5 and State Route 4 interchange onto Westbound SR-4.

The 2024 baseline bottleneck and queue conditions for the AM and PM peak periods are illustrated in **Figure 5-4** and **Figure 5-5** respectively.

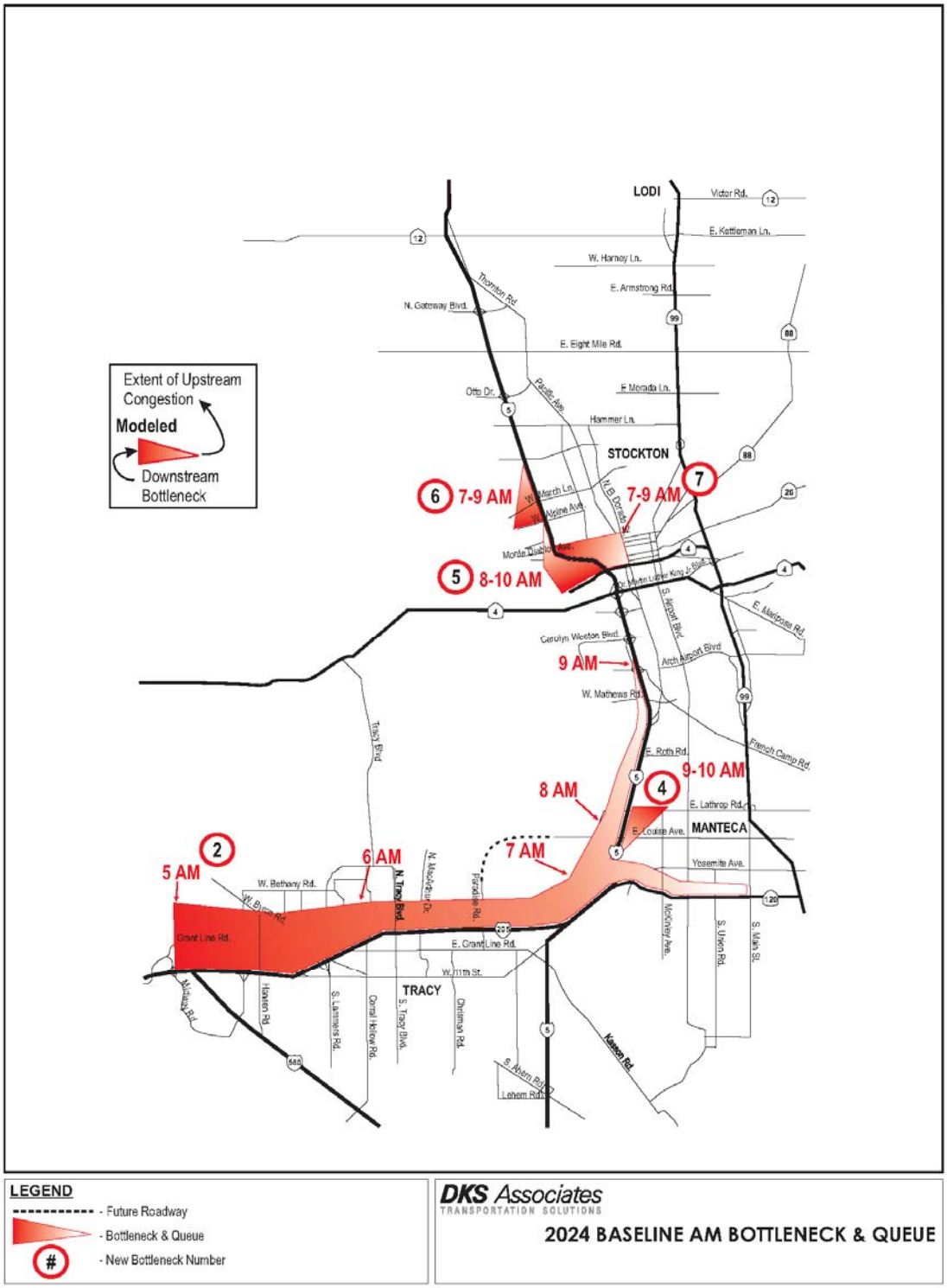

Figure 5-4 Forecasted 2024 Baseline Congestion – AM Peak Period

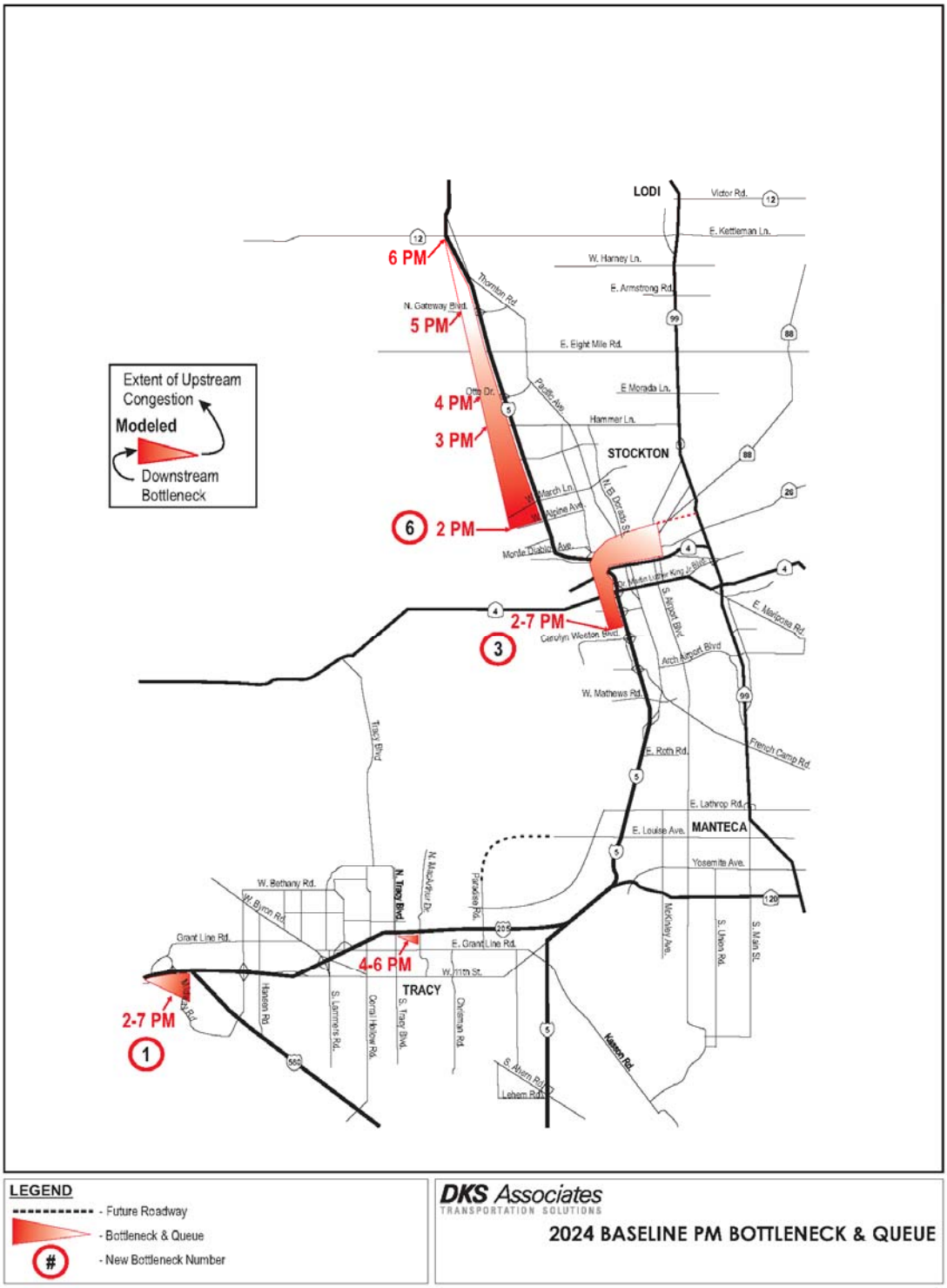

Figure 5-5 Forecasted 2024 Baseline Congestion – PM Peak Period

6 Corridor Improvement Strategies

San Joaquin County has grown significantly in recent years and is projected to experience continued significant growth in the coming decades. Existing traffic demand within the I-205/I-5 corridor already exceeds capacity at several locations during both peak periods. For 2014, peak direction demands along the freeway corridor are forecasted to increase in the range of 30% to 60% on most segments during both the AM and PM peak periods. By 2024, peak direction demands on most segments of I-205/I-5 in the study corridor are forecasted to increase by over 70%. With this level of growth, conditions within the I-205/I-5 corridor are expected to worsen considerably. This will result in not only the increased severity of congestion associated with existing bottlenecks, but also congestion occurring in more areas and in the offpeak direction. Conditions on the arterials in the corridor are also expected to worsen.

The most direct approach for mitigating these impacts, and to improve mobility and travel reliability within the corridor, is to add or expand freeway capacity by adding lanes. While several freeway improvement projects are planned within the county, traffic forecasts indicate that the planned construction of new highway capacity will not keep pace with this growth, and additional capacity-increasing projects are subject to funding and environmental constraints.

As a result, any plan for addressing the transportation needs in the I-205/I-5 corridor must also include strategies that:

- Maximize the efficiency of the existing roadway system.
- Encourage increased use of other modes.
- Reduce the occurrence and impact of incidents.
- Reduce or manage peak period vehicle travel demand.

The types of strategies can be applied in the I-205/I-5 corridor to address existing and forecasted deficiencies include: Roadway Capital Improvements, System Management and ITS Improvements, Transit Improvements, Non-Motorized Mode Improvements, Demand Management Strategies, and Goods Movement Improvements and Policies.

Monitoring and evaluation is the foundation for sound management of the corridor to identify the optimum strategies to improve the transportation corridor. Strategies range from maintenance and preservation to system expansion, but must also include optimization of the existing system by fully incorporating operational strategies into the management plan. Implementation of ITS strategies will complement other improvements, including those improvements that may be implemented by our partner agencies such as transit, light rail, and improvements on the local road system. The goal is that the transportation system, as a whole, including highways, local roads, and alternative means of transportation, operate as one seamless network.

RTP and other planning documents identify numerous programmed and planned strategies and projects intended to address transportation needs in the region and specifically the I-205/I-5 corridor.

This chapter highlights these proposed improvements, beginning with the Corridor concept Plans for both I-205 and I-5. The alternatives analyzed for both 2014 and 2024 are also summarized.

6.1 Corridor Concept Level of Service (LOS) and Concept Facility

Transportation Concept Reports (TCR) are Caltrans' long range (20-year) planning documents for each State Highway Route that identifies existing route conditions and future needs. Each TCR includes a route summary, segment summaries, existing and forecasted travel data, route maps, and a list of planned, programmed, and needed projects for the Highway over the next 20 years. The most important information included within a TCR are Level of Service standards, Concept and Ultimate Facilities, and a list of Programmed, Planned, and Needed Projects.

The Concept LOS for the highway system is basically a report card for evaluating traffic flow with A being best and F being worst. The LOS establishes the minimum standard at which the District expects the highway to function.

The Concept Facility identifies the number of highway lanes and the type of facility needed to manage the traffic expected for the next 20-years. The Ultimate Facility determines the same information as the Concept Facility, but instead for the entire life of the highway. The purpose for this information is to inform Caltrans, local agencies, and developers the expected needs of the highway to ensure development does not encroach upon the required right of way.

I-205 and I-5 are on the IRRS system; therefore, the concept Level of Service LOS for the 20-year planning horizon for the corridor is "C" in rural areas and "D" in urban and developed areas.

I-205

Based on 2006 volumes, as many as 14 lanes will be required on certain segments of I-205 to meet Concept LOS 'C' and 'D' in 2030 . Due to Right-of-Way, environmental, and financial constraints, the Concept Facility for I-205 is 8-lanes.

The Concept Facility includes the consideration of ramp metering and HOV lanes at 8-lanes to manage freeway performance. The 2008 San Joaquin Regional Ramp Metering and HOV Master Plan recommends the implementation of ramp metering and HOV lanes on I-205 in each direction SJCOG is currently developing a HOT lane study that will include the study of I-205 and I-5. Other strategies included in the Concept Facility are expansion of incident management, traveler information, traffic surveillance and detection, advanced traffic signals and operation improvements.

The Ultimate Facility for I-205 is 10-lanes. Both the Concept Facility and Ultimate Facility will be re-evaluated during the next update of the I-205 Transportation Concept Report (TCR) or update of the I-205/I-5 CSMP.

I-5

Based on 2006 volumes, as many as 20 lanes will be required on certain segments of I-5 to meet Concept LOS 'C' and 'D' by 2030. Due to right-of-way, environmental, and financial constraints, the Concept Facility for I-5 is 10 lanes.

The Concept Facility includes the consideration of ramp metering and HOV lanes at 8-lanes to manage freeway performance. The 2008 San Joaquin Regional Ramp Metering and HOV Master Plan recommends the implementation of ramp metering and HOV lanes on I-5 between I-205 and SR-4. SJCOG is currently developing a HOT lane study that will include the study of I-205 and I-5. Other strategies included in the Concept Facility are expansion of incident management, traveler information, traffic surveillance and detection, advanced traffic signals and operation improvements.

The Ultimate Facility for I-5 is the same as the Concept Facility. Both the Concept Facility and Ultimate Facility will be re-evaluated during the next update of the I-5 TCR or update of the I-205/I-5 CSMP.

6.2 Roadway Capital Improvements

Roadway capital improvements represent the most direct approach to addressing operational deficiencies in the CSMP corridor. These can range from fairly low cost improvements like individual intersection improvements on surface roadways, to mid-cost improvements like freeway auxiliary lanes and modified interchange ramps, and up to high cost improvements like adding freeway lanes.

The 2007 Regional Transportation Plan (RTP) identifies a number of planned roadway improvement projects, several of which are currently programmed. This formed the basis for the improvements examined as part of the I-205/I-5. However, through the CSMP development process several additional roadway projects were incorporated into the evaluation process. In some cases these were projects represented major investments

6.2.1 Regional Transportation Plan Improvements

The RTP classifies roadway capital projects into three categories: (1) Mainline Highway, (2) Interchange, (3) and Regional Roadway (Arterial). The RTP projects most relevant to the I-205/I-5 CSMP corridor are shown in **Table 6-1.**

Programmed Mainline Capacity and Interchange Projects

In the I-205 corridor, there is a programmed project that is partially funded with Proposition 1B CMIA funds to construct auxiliary lanes on I-205, a programmed project to construct a new interchange at I-205 and Lammers Road, and the I-205 Tracy corridor tree planting project.

Projects currently programmed along the I-5 corridor include a project to widen I-5 to eight lanes from Country Club Boulevard to Eight Mile Road. The project is currently funded through the Project Approval and Environmental Document phase, and the entire project is anticipated to be funded by 2010. In addition, there are interchange modification projects programmed at Eight Mile Road, Hammer Lane, and French Camp/Sperry Road, and new interchange projects at Otto Drive and North Gateway, north of Eight Mile Road.

Planned Mainline Capacity and Interchange Project List

Planned improvements are those projects without guaranteed funding. Along I-205, the 2007 SJCOG RTP identifies plans to widen the entire corridor from 6 to 8 lanes, modify the interchanges at MacArthur Drive and Grant Line Road, and construct a new interchange at Paradise/Chrisman Road.

Along I-5, the 2007 SJCOG RTP identifies plans to widen I-5 from 9 to 12 lanes from I-205 to SR-120, 6 to 8 lanes from SR-120 in Lathrop to Eight Mile Road in Stockton, 8 to 10 lanes from Roth Road to Otto Drive, 6 to 8 lanes from Eight Mile Road to New Road A, and 4 to 6 lanes from SR-12 west of Lodi to the San Joaquin County/Sacramento County Line. There are also numerous interchange improvements planned for the corridor including improvements to branch connections at I-5 and SR-120 east, and a project to reconstruct the freeway to freeway interchange at SR-4 (Crosstown Freeway).

6.2.2 Non-RTP Improvements

During the CSMP development process, a number of roadway improvements not specifically listed in the RTP were identified and incorporated into the CSMP analysis activities. These included more significant projects such as additional auxiliary lanes and HOV facilities that the CSMP Development Team defined as part of the analysis alternatives. Also included were a number of lower-cost operational and geometric improvements that address local bottlenecks identified during the operational analyses. These non-RTP improvements included:

- I-5 Auxiliary lanes between Pershing Ave and Monte Diablo Ave
- I-5 Auxiliary lanes between 8th Street and Downing Avenue
- I-5 Auxiliary lanes between French Camp Road and State Route 120
- I-205 Auxiliary lanes between Grant Line Rd to Tracy Blvd
- I-205 Auxiliary lanes between Tracy Blvd to MacArthur Dr
- I-205 Auxiliary lanes between MacArthur Dr to Paradise Road
- I-205 to I-580 median HOV/HOT lane direct connector ramps
- I-205 HOV median ramps to I-5
- I-580 HOV lanes from Greenville Road to I-205
- Ramp metering with HOV priority lanes
- Matthews Rd interchange: off-ramp widening
- Mathews Rd/Manthey Rd: 2014 signalize & add left-turn lanes; 2024 right in & right out only
- Pershing/March Lane: add double left-turn lanes in all directions.

- Pacific Ave/March Lane: add westbound right-turn lane
- Thornton Rd/Hammer: add double left turn lanes in both northbound and southbound
- Thornton Rd/ Eight Mile Rd: add double left-turn lane in northbound

The auxiliary lanes between 8th Street and Downing Avenue, and between Roth Road and State Route 120 might be part of RTP interchange improvements.

Table 6-1 RTP Roadway Improvement Projects

Jurisdiction	Facility /Route	Project Description	Project Limits	Cost to Deliver	Open to Traffic	Tier	Funding Category
Freeway Mainline							
Caltrans	I-205	Construct east and westbound auxiliary lanes	Tracy Blvd to Mountain House Parkway	$51,560,000	2013	1	Programmed
Caltrans	I-205	Widen from 6 to 8 lanes (inside/outside)	I-580 to I-5	$396,640,000	2020	1	Planned
Caltrans	I-5	Widen 6 to 8 lanes (inside)	French Camp Road to Dr. Martin Luther King Jr. Boulevard	$42,100,000	2020	1	Planned
Caltrans	I-5	Widen 6 to 8 lanes (inside)	SR 120 to French Camp Road	$108,600,000	2020	1	Planned
Caltrans	I-5	North Stockton Widening - widen 6 to 8 lanes including auxiliary lanes	Country Club Blvd to north of Eight Mile Road	$350,000,000	2017	1	Programmed
Caltrans	I-5 Mossdale	Widen 9 to 12 through lanes	SR-120 to I-205 (P.M. R13.9/R15.6)	$122,300,000	2020	1	Planned
Caltrans	I-5	Widen 6 to 8 lanes (inside)	Eight Mile Road to New Road A	$25,000,000	2016	2	Planned
Caltrans	I-5	Widen 8 to 10 lanes (inside)	Roth Road to Otto Drive	$400,000,000	N/a	2	Planned
Caltrans	SR-120	Widen 4 to 6 lanes (inside)	I-5 to SR99	$78,000,000	2016	1	Planned
Caltrans	SR-4	Extend and re-align from Fresno Ave to east of Daggett Road	Fresno Ave to east of Daggett Road	$217,600,000	2016	1	Planned
Interchange							
Lathrop	I-5 at Lathrop Road	Reconstruct interchange (P.M. 17.3/17.8)	I-5 at Lathrop Road	$33,000,000	2015	1	Planned
Lathrop	I-5 at Louise Avenue	Reconstruct interchange (PM 16.4-16.8)	I-5 at Louise Avenue	$33,000,000	2015	1	Planned
Stockton	I-5 at Downing Ave	Modification of interchange to a higher capacity design (P.M. 23.4-24.4)	I-5 at Downing Ave	$66,000,000	2015	1	Planned
Stockton	I-5 at Eight Mile Road	Modification of interchange (P.M. 34.7/35.9)	I-5 at Eight Mile Road	$37,000,000	2014	1	Programmed
Stockton	I-5 at Charter Way-Martin Luther King Jr. Blvd	I-5/Charter Way - Martin Luther King Jr. interchange improvements	I-5 at Charter Way-Martin Luther King Jr. Blvd	$21,400,000	2015	1	Planned
Stockton	I-5 at French Camp/Arch-Sperry Road (HR 3-193 #2067)	Reconstruct existing French Camp Road interchange, construct auxiliary lanes on I-5, and realign Manthey Road (P.M. 20.8-21.2)	I-5 from PM 22.1/23.6 on French Camp Road from approx 2000 feet west of the IC and approx. 1700 feet east of the IC on Sperry Road. Improvements on nearby streets.	$61,170,000	2012	1	Programmed

Jurisdiction	Facility /Route	Project Description	Project Limits	Cost to Deliver	Open to Traffic	Tier	Funding Category
Stockton	I-5 at Hammer Lane	Interchange Modification and auxiliary lanes (PM 32.6)	I-5 at Hammer Lane	$50,000,000	2014	1	Programmed
Stockton	I-5 at North Gateway (New Road A)	Construction of a new interchange and auxiliary lanes (PM 36.0/36.9)	I-5 at North Gateway (New Road A)	$63,000,000	2015	1	Programmed
Stockton	I-5 at Otto Drive	Construction of a new interchange and auxiliary lanes (PM 33.3/34.2)	I-5 at Otto Drive	$44,024,000	2014	1	Programmed
Stockton	I-5 at Mathews Road	Reconstruct interchange	I-5 at Mathews Road	$35,000,000	N/a	2	Planned
Stockton	I-5 at Roth Road	Reconstruct interchange	I-5 at Roth Road	$35,000,000	N/a	2	Planned
Caltrans	I-5 at SR-12	Loop ramps	I-5 at SR-12	$11,250,000	N/a	2	Programmed
Tracy	I-205 at MacArthur	Improve interchange, enhance circulation, and reduce congestion on I-205 (P.M.R8.1/R8.1)	I-205 at MacArthur	$5,422,000	2015	1	Programmed
Tracy	I-205 at Lammers Rd	Construct interchange (P.M. 2.4/5.3) HR 3-193 #2055 and HR 3-366 #460	I-205 at Lammers Rd	$63,000,000	2015	1	Programmed
Tracy	I-205 at Grant Line Road	Modification of existing interchange	I-205 at Grant Line Road	$27,040,000	2017	1	Planned
Tracy & Lathrop	I-205 at Paradise Road/Chrisman	Construct New Interchange (Goldrush City) (P.M. 13.1/13.1)	I-205 at Paradise Road/Chrisman	$54,015,000	2015	1	Programmed
Manteca	SR-120 at McKinley Avenue	Reconstruct/improve interchange including necessary auxiliary lanes (P.M. 2.2/2.2)	SR-120 at McKinley Avenue	$32,093,000	2012	1	Planned
Manteca	SR-120 at Airport Way	Reconstruct interchange	SR-120 at Airport Way	$18,010,000	2010	1	Planned
Regional Road							
Lathrop	Golden Valley Parkway	Construct parallel facility six lanes (from Lathrop Rd to Brookhurst Blvd) and four lanes (Brookhurst to Paradise)	Along Northwest side of I-5 from Lathrop to Paradise	$59,290,000	2020	1	Planned
Lathrop	Lathrop Rd.	Widen from 2 to 4 lanes	From I-5 to east of UPRR	$2,771,000	2013	1	Planned
Lathrop	Louise Avenue	Widen from 2 to 4 lanes	From 5th St to east of city limits	$2,075,000	2010	1	Planned
Manteca	Airport Way	Widen from 4 to 6 lanes	SR-120 - Lathrop Road (Manteca)	$18,189,000	2013	1	Planned
Manteca	Lathrop Road	Widen from 2 to 4 lanes	From East of UPRR to SR-99	$10,390,000	2030	1	Planned

Jurisdiction	Facility /Route	Project Description	Project Limits	Cost to Deliver	Open to Traffic	Tier	Funding Category
Manteca	Louise Avenue	Widen 2 to 4 lanes	East of UPRR to Manteca SPRR	$2,400,000	2009	1	Programmed
San Joaquin County	Pershing Avenue	Operational Improvements	Meadow Avenue to Thorton Road	$3,800,000	2010	1	Programmed
San Joaquin County	Airport Way	Widen from 2 to 4 lanes	Between (Manteca City Limits) Lathrop Road to French Camp Road	$21,948,000	2022	2	Programmed
Stockton	Airport Way	Widen from 4 to 6 lanes	From Arch Road to French Camp Road	$29,633,000	2015	1	Planned
Stockton	Arch-Sperry Road Extension	Complete the engineering design and acquire the right of way. Relocated a segment of Sperry Road and extend Sperry Road from Performance Drive to French Camp Road. 4 lane extension on an 8 lane roadway project.	Extend Sperry Road approximately one mile from Performance Drive to French Camp Road	$64,937,000	2011	1	Programmed
Stockton	Eight Mile Road Expressway	Widen to 8 through lanes	Between I-5 and Route 99 including reconstruction of intersections, addition of turn and acceleration/deceleration lanes and construction of a raised median	$145,121,000	2015	1	Planned
Stockton	Pacific Avenue	Widen from 6 to 8 lanes including reconstruction of intersections, addition of turn and acceleration lanes and construction/extension of a raised landscaped median	Hammer Lane to March Lane-Between the Calaveras River and Hammer Lane	$51,070,000	2012	1	Planned
Stockton	Thornton Road	Widen 1.5 mile section of roadway from 2 lanes both directions to 6 lanes with a center dual turn lane	From Pershing Avenue to Bear Creek Bridge	$12,506,000	2010	1	Planned
Stockton	Airport Way	Reconstruct intersections, add turn lanes, and install traffic signal improvements	Between Harding Way and Industrial Drive	$7,346,000	2015	2	Planned
Tracy	Grant Line Road	Widen from 2 to 4 lanes	Between Parker Avenue and MacArthur Drive including construction of median and sidewalk	$5,605,000	2009	1	Planned
Tracy	Grant Line Road	Widen from 5 to 6 lanes	From Naglee Road to Lammers Road	$5,583,000	2012	1	Planned
Tracy	Lammers Road	Widen from 2 to 4 lanes	I-205 to I-580	$62,824,000	2017	1	Planned

Jurisdiction	Facility /Route	Project Description	Project Limits	Cost to Deliver	Open to Traffic	Tier	Funding Category
Tracy	Eleventh Street Improvements and MacArthur Dr. Intersection	Installation of traffic signal and/or roundabout improvements at intersections, center median, and an eastbound auxiliary lane at selected areas of Eleventh Street corridor	11th Street at MacArthur Drive	$9,027,000	2018	1	Planned
Tracy	MacArthur Drive	Widen 2 to 4 lanes (Valpico Road to Schulte Road) and extend 4 lane roadway (Mt. Diablo Road to Eleventh Street)	MacArthur Drive from Valpico Road to Schulte Road; MacArthur Drive from Mt. Diablo Road to Eleventh Street	$21,892,000	2012	1	Planned
Tracy	Traffic Signal-Grant Line Road Coordination	Costs associated with connecting thirteen traffic signals along Grant Line Road	Between West City Limits and MacArthur Drive	$150,000	2011	1	Planned
Tracy	Tracy Blvd.	Widen 2 to 4 lanes	I-205 to Eleventh Street	$15,000,000	2020	2	Programmed
Mountain House	Mountain House Parkway	Widen from 2 to 8 lanes	I-205 to Grant Line Road 1.15 miles.	$7,388,000	2025	1	Planned

Source: The Future of Mobility for San Joaquin County, 2007 Regional Transportation Plan, May 2007

6.3 ITS/System Management Improvements

System Management is the implementation of policies, strategies and technologies to improve performance of the existing roadway system. Ramp metering and HOV lanes represent two potential strategies in a comprehensive or integrated approach to managing the region's freeways. Other potential elements include incident management, traveler information, traffic surveillance and detection, advanced traffic signals, and Freeway Service Patrol. The overriding objectives of any system management program are to minimize congestion (and its side effects), improve safety, enhance overall mobility, and provide support to other agencies during emergencies. Often, a combination of strategies is needed to effectively and efficiently achieve these objectives. Many of these strategies involve the deployment of advanced ITS technologies such as closed circuit television to monitor and convey real time travel conditions, traffic detection equipment, and traveler information devices.

The 2007 RTP identified the following areas of emphasis for System Management/ITS within San Joaquin County:

- Expand the City of Stockton's Traffic Management Center
- Expand service hours of the Freeway Service Patrol in the I-205/I-580 corridor
- Expand the Freeway Service Patrol to the I-5 corridor
- Expand the use of automated traveler information systems
- Install ramp-metering on freeway on ramps when interchanges are improved
- Implement the recommendations of the High Occupancy Vehicle Lane Plan
- Coordinating traffic signals
- Intersection signalization

Specific roadway System Management/ITS projects listed in the 2007 RTP are presented in **Table 6-2.**

Caltrans District 10 has also developed an ITS Plan that includes recommendations for additional ITS infrastructure along the I-205/I-5 CSMP corridor. The major challenge to ITS deployment is funding. Within Caltrans, the primary funding avenue is the SHOPP. However, this program has minimal funding for ITS deployment. Caltrans District 10 requests the installation of ITS elements on STIP projects, but more frequently than not, when project costs need to be reduced, ITS elements are the first to go. This is a major challenge to ITS deployment. There needs to be more support from all project partners to promote and fund ITS elements on STIP projects.

Table 6-2 RTP System Management/ITS Improvement Projects

Jurisdiction	Facility /Route	Project Description	Cost to Deliver	Open to Traffic	Tier
Various	Traffic Flow Improvements and System Management	Signal system improvements, operational and intersection improvements to smooth traffic flow, closed circuit TV, freeway service patrols	$5,000,000	2007-2030	1
Stockton		Traffic Control System Upgrades	$29,900,000	2007-2030	1
Stockton	City of Stockton Expansion of ATMS and Central Control System, Phase II	Expand central network, add CCTV cameras, interconnect traffic signals, integration with Caltrans	$9,700,000	2007-2030	2
Stockton	Caltrans Traffic Ops System (TOS) gap closure Project (Region)	Elements that aid in surveillance and management activities to be part of the TOS	$2,000,000	2007-2030	2
Stockton	EVP Deployment	Emergency vehicle pre-emption for city of Stockton, pre-emption signals to allow faster deployment of emergency vehicles	$3,500,000	2007-2030	2
Stockton/ County	Alternate Route Signaling	Installation of 58 static alternate route signs within county for designated detour routes with changeable portable signage	$2,900,000	2007-2030	2
County	Metropolitan Traveler Information System	This project would implement a comprehensive Integrated Travel Information System	$4,000,000	2007-2030	2

Source: The Future of Mobility for San Joaquin County, 2007 Regional Transportation Plan, May 2007.

Table 6-3 identifies the ITS elements that are currently programmed under the SHOPP, and **Table 6-4** identifies the ITS elements that are planned for the corridor but not yet funded. The programmed elements primarily include additional traffic monitoring stations along I-5. The planned elements include several CMS, traffic monitoring station, RWIS and CCTV camera installations, as well as ramp meter infrastructure along both I-205 and I-5.

The I-205/I-5 CSMP Development Team has identified the need for an on-going multi-jurisdictional committee to discuss coordinated transportation system management practices in San Joaquin County including ramp metering, ITS implementation, traffic signal synchronization, and enhanced transportation demand management.

Table 6-3 I-205/I-5 CSMP SHOPP Programmed ITS Elements

No.	EA / RTPMPO ID	Route	Post-mile	Location	Description
1	3A340	I-205	11.1	East of East Banta Overhead	EB CMS/TMS/MVT/CCTV
2	0K330	I-5	12.83	Southbound off-ramp to RTE 205	TMS
3	0K330	I-5	13.31	Northbound on-ramp RT	TMS
4	0K330	I-5	13.65	Southbound I-5	TMS
	0K330	I-5	13.79	Southbound I-5	TMS
6	0K330	I-5	13.99	Northbound off-ramp to Mossdale Rd.	TMS
7	0K330	I-5	14.18	Northbound on-ramp from Mossdale Rd.	TMS
8	0K330	I-5	14.34	Southbound on-ramp from WB RTE 120	TMS
9	0K330	I-5	14.59	Northbound off-ramp to RTE 120	TMS
	0K330	I-5	14.74	Southbound off-ramp to EB RTE 120	TMS
11	0K330	I-5	15.04	Northbound on-ramp from WB RTE 120	TMS
12	0K330	I-5	16.26	Southbound on-ramp from Louise Ave.	TMS
13	0K330	I-5	16.26	Northbound off-ramp to Louise Ave.	TMS
14	0K330	I-5	16.71	Southbound off-ramp to Louise Ave.	TMS
	0K330	I-5	16.74	Northbound on-ramp from Louise Ave.	TMS
16	0K330	I-5	17.28	Southbound on-ramp from Lathrop Rd	TMS
17	0K330	I-5	17.28	Northbound off-ramp to Lathrop Rd.	TMS
18	0K330	I-5	17.77	Southbound off-ramp to Lathrop Rd.	TMS
19	0K330	I-5	17.77	Northbound on-ramp from Lathrop Rd.	TMS
	0K330	I-5	19.39	Southbound on-ramp from Roth Rd.	TMS
21	0K330	I-5	19.39	Northbound off-ramp to Roth Rd.	TMS
22	0K330	I-5	19.81	Southbound off-ramp to Roth Rd.	TMS
23	0K330	I-5	19.81	Northbound on-ramp from Roth Rd.	TMS
24	0K330	I-5	20.5	Southbound on-ramp from El Dorado St.	TMS
	0K330	I-5	20.85	Northbound off-ramp to El Dorado St.	TMS
26	0K330	I-5	21.3	Southbound on-ramp from Mathews Rd.	TMS
27	0K330	I-5	21.3	Northbound off-ramp to Mathews Rd.	TMS
28	0K330	I-5	21.61	Northbound on-ramp from Mathews Rd.	TMS

No.	EA / RTPMPO ID	Route	Post-mile	Location	Description
29	0K330	I-5	21.61	Southbound off-ramp to Mathews Rd.	TMS
	0K330	I-5	22.34	Southbound on-ramp from French Camp	TMS
31	0K330	I-5	22.34	Northbound off-ramp to French Camp	TMS
32	0K330	I-5	22.71	Southbound off-ramp to French Camp	TMS
33	0K330	I-5	23.49	Northbound off-ramp to Downing Ave.	TMS
34	0K330	I-5	23.5	Southbound on-ramp from Downing Ave.	TMS
	0K330	I-5	23.85	Southbound off-ramp to Downing Ave.	TMS
36	0K330	I-5	23.86	Northbound on-ramp from Downing Ave.	TMS
37	0K330	I-5	24.49	Southbound on-ramp from 8th St.	TMS
38	0K330	I-5	24.5	Northbound off-ramp to 8th St.	TMS
39	0K330	I-5	24.82	Northbound on-ramp from 8th St.	TMS
	0K330	I-5	24.82	Southbound off-ramp to 8th St.	TMS
41	0K330	I-5	25.2	NB off-ramp to Dr. Martin Luther King Jr. Boulevard/RTE 4	TMS
42	0K330	I-5	25.2	Southbound I-5 south of Dr. Martin Luther King Jr. Boulevard	TMS
43	0K330	I-5	25.5	Southbound off-ramp LT	TMS
44	0K330	I-5	25.82	Northbound off-ramp to RTE 4	TMS
	0K330	I-5	25.88	Southbound on-ramp LT	TMS
46	0K330	I-5	26.01	Northbound off-ramp to EB RTE 4	TMS
47	0K330	I-5	26.01	Northbound off-ramp to WB RTE 4	TMS
48	0K330	I-5	26.45	Northbound on-ramp from RTE 4	TMS
49	0K330	I-5	26.49	Southbound off-ramp to EB RTE 4	TMS
	0K330	I-5	26.49	Southbound off-ramp to WB RTE 4	TMS
51	0K330	I-5	26.62	Southbound off-ramp LT	TMS
52	0K330	I-5	26.88	Northbound off-ramp to Pershing Ave.	TMS

Table 6-4 I-205/I-5 CSMP Planned ITS Elements

No.	EA / RTPMPO / ID	Route	Post-mile	Location	Description
1	Not Assigned	I-205	0.02	Eastbound I-205	CMS/TMS
2	Not Assigned	I-205	1	I-205 W of Mountain House Parkway	RWIS/HAR/TMS
3	0K710	I-205	2.4	Eastbound I-205 east of Hansen Rd.	CMS/TMS/CCTV
4	Not Assigned	I-205	2.5	I-205 east of Hansen Rd.	RWIS
5	0A0401	I-205	2.92	I-205 east of Hansen Rd.	CCTV
6	Not Assigned	I-205	3	Westbound I-205	CMS/TMS
7	Not Assigned	I-205	3.4	I-205 near W. 11th St.	RWIS
8	Not Assigned	I-205	4	Eastbound I-205	CMS/TMS
9	Not Assigned	I-205	4.5	I-205 west of Byron Rd.	RWIS
10	Not Assigned	I-205	5	Westbound I-205 W of Grant Line Rd.	CMS/TMS/RWIS
11	Not Assigned	I-205	6	EB I-205 E of Corral Hollow Rd	CMS/TMS
12	Not Assigned	I-205	6.5	I-205	RWIS
13	Not Assigned	I-205	7	I-205 near N. Tracy Blvd.	RWIS/TMS
14	Not Assigned	I-205	7.85	EB I-205 west of MacArthur Dr.	CMS/TMS
15	3A340	I-205	8.2	WB I-205 east of MacArthur Dr.	CMS/TMS/MVT/CCTV/RWIS
16	Not Assigned	I-205	9	I-205	RWIS/TMS
17	3A380	I-205	9.7	Eastbound I-205	CMS/TMS
18	Not Assigned	I-205	10	Westbound I-205	CMS/CCTV/TMS
19	3A380	I-205	10.2	I-205	RWIS
20	3A380	I-205	10.65	Westbound I-205	CMS/TMS/CCTV
21	Not Assigned	I-205	11	I-205	RWIS/HAR/TMS
22	Not Assigned	I-205	11.7	Westbound I-205	CMS/TMS
23	3A380	I-205	11.7	Eastbound I-205	CMS/TMS/CCTV
24	3A380	I-205	12.2	I-205	RWIS
25	0A401	I-205	12.6	I-205	CCTV

No.	EA / RTPMPO / ID	Route	Post-mile	Location	Description
26	Not Assigned	I-205	12.7	Westbound I-205	Westbound CMS/TMS
27	3A380	I-5	15.96	Northbound I-5	CMS/TMS/RWIS
28	Not Assigned	I-5	18.36	I-5	RWIS
29	3A400	I-5	25.2	Northbound I-5 south of Dr. Martin Luther King Jr. Boulevard	CMS/TMS/RWIS
30	Not Assigned	I-5	25.2	SB on-ramp from Dr. Martin Luther King Jr. Boulevard	Ramp Meter Infrastructure
31	Not Assigned	I-5	25.5	Northbound on-ramp from Dr. Martin Luther King Jr. Boulevard	Ramp Meter Infrastructure
32	Not Assigned	I-5	26.98	SB on-ramp from Pershing Ave.	Ramp Meter Infrastructure
33	3A400	I-5	26.98	Southbound I-5 Pershing Ave.	CMS/TMS/RWIS/CCTV
34	Not Assigned	I-5	27.22	NB on-ramp from Pershing Ave.	Ramp Meter Infrastructure
35	Not Assigned	I-5	27.812	Southbound on-ramp from Mt. Diablo	Ramp Meter Infrastructure
36	Not Assigned	I-5	28.062	Northbound on-ramp from Mt. Diablo	Ramp Meter Infrastructure
37	Not Assigned	I-5	28.416	SB on-ramp from Country Club	Ramp Meter Infrastructure
38	Not Assigned	I-5	29.179	NB on-ramp from Alpine Ave.	Ramp Meter Infrastructure
39	Not Assigned	I-5	29.882	Southbound on-ramp from March Ln.	Ramp Meter Infrastructure
40	Not Assigned	I-5	30.141	Northbound on-ramp from March Ln.	Ramp Meter Infrastructure
41	Not Assigned	I-5	31.322	SB on-ramp from Ben Holt Dr.	Ramp Meter Infrastructure
42	Not Assigned	I-5	31.599	SB on-ramp from Ben Holt Dr.	Ramp Meter Infrastructure
43	0G470	I-5	32.515	SB on-ramp from Hammer Ln.	Ramp Meter Infrastructure
44	0G470	I-5	32.85	NB on-ramp from Hammer Ln.	Ramp Meter Infrastructure
45	0G470	I-5	34.1	Southbound on-ramp from Otto Dr.	Ramp Meter Infrastructure
46	0G470	I-5	34.5	Northbound off-ramp from Otto Dr.	Ramp Meter Infrastructure
47	0G470	I-5	35.147	SB off-ramp from Eight Mile Rd.	Ramp Meter Infrastructure
48	0G470	I-5	35.513	NB on-ramp from Eight Mile Rd.	Ramp Meter Infrastructure
49	0G470	I-5	36.5	NB on-ramp from Gateway Blvd.	Ramp Meter Infrastructure

6.4 Transit Improvements

There are currently a number of transit services and facilities within the I-205/I-5 CSMP corridor. To accommodate forecasted growth and, ideally, promote even greater transit mode share to help reduce congestion on the roadway network, improvements to the transit system will be necessary. Improvements may include enhancing or expanding the existing services and facilities, implementing new services, and constructing new facilities. Other improvements include supporting strategies such as transit signal priority (TSP) and transit/HOV lanes that facilitate the flow of transit vehicles on the roadway network. A critical component of these improvements will be the provision of parking at transit centers, rail stations and park-and-ride facilities.

There are a number of planned bus and passenger rail improvements that may impact the I-205/I-5 CSMP corridor. These are described in the following sections.

6.4.1 Bus Services

Improvements in service made possible by new capital equipment will be used to lure a greater percentage of "choice riders", especially for intercity and commute trips. RTP expansion plans call for both a new BRT line on the Airport Way corridor, parallel to I-5, and express bus service on the proposed HOV lanes on I-5 and I-205. The San Joaquin Valley Express Transit Study recommended commuter express bus (and train) services between the study area and both the Bay Area and Sacramento.

6.4.2 Passenger Rail Services

ACE

The primary short range goal of ACE is to acquire dedicated rights of way from Stockton to points west of the Altamont Pass, in order to avoid conflicts with freight trains and allowing rail improvements; therefore, allowing increased frequency, improved speed and increased reliably of its service. This will allow it to attract and serve more riders. ACE plans to extend its service to both Sacramento and Modesto in the long term.

ACE has identified, at a minimum, the need for two additional trains to adequately serve the work schedules of Tri-Valley commuters. ACE trains currently operate on tracks owned by UP who have indicated that they will not be allowing any additional passenger trains in their primary routes due to an expected, unprecedented amount of freight growth over the next ten years. This growing rail traffic is having an increasingly negative impact on the ACE service in terms of on-time performance, train speeds, and flexibility in scheduling. SJRRC has identified the need to own and control the rail corridor, for ACE service to realize its full potential to carry large numbers of passengers and significantly contribute to the region's mobility. SJRRC is currently conducting a regional study aimed at improving ACE Rail through the purchase and control of the rail corridor (SJRRC Short Range Transit Plan)

High Speed Rail

The California High Speed Rail Authority has developed a plan to build a high-speed rail line generally parallel to SR-99, connecting Los Angeles to San Francisco, and would eventually run from San Diego to and as far north as Sacramento. The plan describes an 800-mile-long high-speed train system capable of speeds of 220 miles per hour. The system as planned would serve the future major metropolitan centers of California. The proposed high speed Rail network is illustrated in **Figure 6-1.**

In December 2007, the California High Speed Rail Authority selected the Pacheco Pass alignment as part of the required environmental studies for the San Francisco Bay Area-Central Valley connection. It would sweep into the Bay Area over the pass between the Los Banos area (Merced County) and Gilroy, head north to San Jose, then up the Peninsula along the Caltrain right-of-way to San Francisco.

The California High Speed Rail Authority is currently studying two separate rail corridors will impact the I-205/I-5 CSMP study area. The first is the Merced to Sacramento section of the main California High-Speed Train System. The second is the Altamont Corridor Rail Project.

California High-Speed Train System - Merced to Sacramento Section

The Authority proposes to construct, operate and maintain a High Speed Train System, from both Sacramento and San Francisco, via Fresno and Los Angles, to both San Diego and Irvine. The Merced to Sacramento Section would include stations in downtown Sacramento, downtown Stockton, and either downtown Modesto or the Modesto Amtrak Station. The programmatic EIR/EIS for the entire statewide system was completed in 2005 and the notice of preparation and notice of intent on the Merced to Sacramento Section EIR/EIS was released on December 23, 2009. The study will consider the operation of a regional passenger train service running on the High Speed Train System track with its own regional stations, in cooperation with the San Joaquin Regional Rail Commission. This project would provide a new high speed transit alternative on the I-5 corridor.

Altamont Corridor Rail Project

The Authority proposes to upgrade the ACE regional rail service, including a new branch line allowing service between Tracy and Modesto. When the Authority choose the Pacheco Pass for the High Speed Train alignment between the Bay Area and the Central Valley it decided to study the Altamont corridor for a joint-use rail infrastructure project that would pursue a different purpose and need from the high speed train system. This study is being conducted by the California High Speed Rail Authority because passenger trains on this improved corridor may reach speeds of 125 miles per hour. It would facilitate faster and more frequent intercity and commuter service over extended hours of operation on the I-205/I-5 corridor.

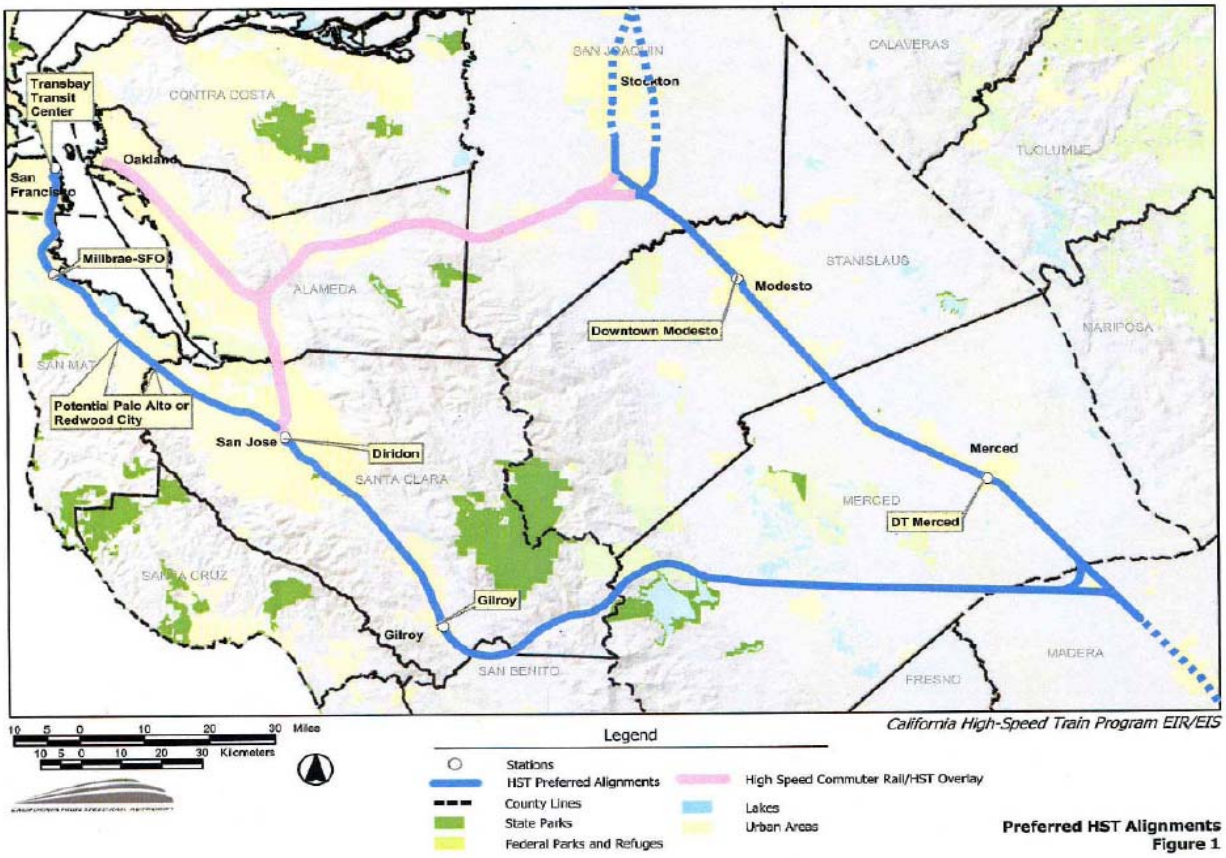

Figure 6-1 High Speed Rail Map

6.5 Non-Motorized Mode Improvements

Non-motorized mode of travel is an alternative to both auto and transit modes. Although bicycles are not permitted on either I-205 or I-5 within the CSMP corridor and the corridor exceeds the maximum trip length for bicycle trips and pedestrian travel, the connectivity of all modes of transportation including bikeway and pedestrian facilities should be considered when planning and programming improvements along I-5 and I-205. Non-motorized travel is appropriate for short trips and may reduce surface street traffic.

The 2007 RTP contains a number of bicycle and pedestrian improvement projects within San Joaquin County. The 2007 City of Stockton Bicycle Master Plan, and the 2005 City of Tracy Master Bike Plan, the 1995 City of Lathrop Bicycle Plan, and the 2002 Unincorporated San Joaquin County Bikeway Plan also identify a number of planned bike facilities along the I-205/I-5 CSMP corridor, as listed in **Table 6-5.**

Table 6-5 RTP Bicycle and Pedestrian Facilities Improvements

Post Mile	Location	From	To	Facility Type
I-205 Corridor				
4.58	Byron Rd.	I-205	Corral Hollow Road	Class III
5.29	Grantline Rd.	Naglee Rd.	Toste Road	Class II
5.93	Corral Hollow Rd.	Lowell	West Valley Mall	Class II
7.00	Tracy Blvd.	I-205	Existing CII Bike Lane (1.91 mi.)	Class III
7.51	Holly Dr.	I-205	Eleventh St.	Class II
I-5 Corridor				
9.60	Paradise Cut	TBD	TBD	Class I
16.47	Louise Ave.	TBD	TBD	Class II
17.51	Lathrop Rd.	TBD	TBD	Class II
19.58	Roth Rd.	TBD	TBD	Class II
32.66	Hammer Lane	Aksland Ave.	To I-5	Class II
32.66	Hammer Lane	I-5	Alexandria Place	Class III
34.30	Otto Dr.	TBD	TBD	Class III
35.29	Eight Mile Rd.	I-5	Jacktone Road	Class III
36.20	I-5 Overcrossing between Gateway Blvd. & Eight Mile Rd	New Road E	New Road B	Class III
36.20	Gateway Blvd.	West of I-5	SR-99	Class III

Sources: 2007 City of Stockton Bicycle Master Plan, and the 2005 City of Tracy Master Bike Plan, the 1995 City of Lathrop Bicycle Plan, and the 2002 Unincorporated San Joaquin County Bikeway Plan.

6.6 Demand Management

TDM is designed to reduce vehicle trips during peak hours and is specifically targeted at work force commuters who generate the majority of peak hour traffic. Strategies include:

a) Rideshare programs
b) Transit usage
c) Flex hours
d) Vanpools
e) Bicycling and walking
f) Telecommuting
g) Mixed land uses (job/housing balance)

Incorporating these strategies would be part of land use decisions, the prerogative of local government. TDM programs could be required by local jurisdictions for any large commercial or office project and could be tied to incentives of some sort to encourage the development of such programs.

Key TDM actions listed in the 2007 RTP include the continued support of the Commute Connection rideshare program, and encouraging local jurisdictions to support land use development patterns that are amenable to transit usage, bicycling and pedestrian facilities.

6.7 Goods Movement Improvements and Policy

The Caltrans 2001 GGDP Report identified I-5, I-205, and SR-120 (from I-5 to SR-99) among the top priority global gateways within California and the San Joaquin Valley Goods Movement Study, prepared for Caltrans and the eight San Joaquin Valley counties of (Kern, Fresno, Tulare, Kings, Madera, Merced, Stanislaus and San Joaquin) determined that trucking is the dominant mode for moving freight. The increase in freight movement by trucks on State highways is growing faster than can be accommodated by the existing capacity.

Because of the importance of efficient freight movement to the economy, the needs of this group must be factored into the solution; moreover, the solution must be consistent with the region's good movements' strategies while still allowing the corridor to meet its congestion and safety goals. Improving the commercial vehicle operators' safety, efficiency, mobility and travel times are the most important goals for this group of users.

The CTC has awarded Proposition 1B CMIA TCIF to extend the SR-4 Crosstown Freeway in Stockton to improve goods movement and access to and from the Stockton Port.

The Port of Stockton was also awarded TCIF funds to deepen the Stockton Ship Channel for improved access to the San Francisco Bay. Both projects are expected to significantly reduce truck related congestion on I-205/I-5.

The extension of State Route 4 freeway from Fresno Avenue to Navy Drive will greatly improve goods movements between the Port of Stockton and I-5. Railroad grade separations from vehicle traffic, including truck traffic, will reduce delay and facilitate goods movement.

6.8 Corridor Rehabilitation and Maintenance Strategy

The current rehabilitation strategy is to maintain and rehabilitate the existing facility with plans to improve various interchanges and widen the roadway where feasible. Projects from the SHOPP are prioritized by the needs of the State Highway. These projects maintain or improve the condition, safety, and operation of the highway, and protect the investment that has been made on the facility. The SHOPP program includes six types of projects that would affect I-205/I-5:

a) Collision Reduction;

b) Roadway Preservation;

c) Bridge Preservation;

d) Roadside Preservation;

e) Mobility Improvements; and

f) Mandates (stormwater requirements and emergency-type projects)

Nominated projects within each category compete for available dollars with other projects on a statewide basis. Safety improvements that meet certain thresholds of cost-benefit criteria are funded first from the SHOPP before other needs are addressed. They do not need to compete.

Maintenance costs, including roadsides, pavement, bridges, guardrail, median barriers, signs, and delineation are increasing making it more difficult to maintain adequate appearance and condition ratings is becoming increasingly difficult. The 10-year SHOPP includes investments in projects in both the rehabilitation and preventive maintenance categories. This investment is expected to provide highway appearance and condition ratings similar to current conditions, which are less than Caltrans performance targets and the desires of the communities served by I-205/I-5.

6.8.1 Programmed SHOPP Projects

I-205 was recently widened to six lanes. There are currently no programmed or planned SHOPP projects identified for I-205. The Proposition 1B funded CMIA project to construct eastbound and westbound auxiliary lanes from Mountain House Parkway to Eleventh Street, acceleration and deceleration lanes at the Tracy Boulevard on- and off-ramps in both directions, and an acceleration lane at the Grant Line Road eastbound on-ramp is expected to go to construction in September 2010.

On I-5 there are three SHOPP projects and one maintenance project programmed. These include a project to treat bridge decks and replace joint seals in various locations, a project to install traffic monitoring stations in various locations, a project to rehab the roadway from Dr. Martin Luther King Jr. Boulevard to Country Club Boulevard, and a pavement rehabilitation project from Hammer Lane to the San Joaquin/Sacramento County line. The programmed SHOPP and maintenance projects for I-5 are listed in **Table 6-6.**

Table 6-6 Programmed SHOPP & Maintenance Project List

Primary Funding Source	RTP Y/N Tier I Tier II	RTP MPO ID EA	Postmile		Location	Description	Total Cost (1, 000)	Begin Const.
I-5								
Maintenance	Y	0T430	0.0	0.0	In San Joaquin County at various locations	Treat bridge decks; replace joint seals	$610	2010
SHOPP	Y	0K330	0.1	47.8	In San Joaquin County on state Routes 5, 132 and 580 at various locations	Install traffic monitoring stations (TMS)	$2,750	2013
SHOPP	Y	0M780	25.3	30.0	Dr. Martin Luther King Jr. Blvd to Country Club Blvd	Roadway rehabilitation	$40,730	2012
SHOPP	Y	0V170	32.6	49.8	Hammer Lane to San Joaquin County/Sacramento County line	Pavement rehabilitation	$40,000	2010

6.8.2 Planned SHOPP Projects

There are currently no planned SHOPP or maintenance projects identified for I-205, and one planned SHOPP project identified for I-5 as listed in **Table 6-7**.

Table 6-7 I-5 Planned SHOPP & Maintenance Project List

Primary Funding Source	RTP Y/N Tier I Tier II	RTP MPO ID	Postmile		Location	Description	Total Cost (1, 000)	Begin Const.
I-5								
SHOPP	TBD	0T820	0.0	0.0	In San Joaquin County along State Routes 4, 5, 12 and 26 at various locations	Install Americans Disability Act (ADA) curbs ramps	TBD R/W $15	TBD

6.8.3 Corridor Preservation Management Practices

Right-of-Way, Preservation of Ultimate Transportation Corridor

Identification of the UTC and subsequent preservation of the ROW will ensure adequate ROW will be preserved to accommodate facility improvement projects beyond 2030. The ultimate corridor concept for I-205 is 8 lanes and I-5 in San Joaquin County is 10 lanes.

The frontage roads along I-5 are fragmented and do not properly serve the corridor for any extended length. It is recommended that local jurisdictions consider the connectivity of existing

and the construction of new frontage roads in future commercial and residential development along I-5. A connected frontage road system will serve as a reliever to the corridor and may serve to preserve future needed right-of-way.

Freeway Agreements and Access Control

The California Freeway and Expressway System has a large financial investment in access control to insure safety and operational integrity of the highways. The Freeway Agreement documents the understanding between Caltrans and the local agency relating to the planned traffic circulation features of the proposed facility. In the event that the freeway is fully constructed, it shows which streets may be closed or connected to the freeway; it shows which streets and roads may be separated from the freeway; it shows the location of frontage roads; and it shows how streets may be relocated, extended or otherwise modified to maintain traffic circulation in relation to the freeway. Agreements are often executed many years before construction is anticipated and they form the basis for future planning, not only by Caltrans but by public and private interests in the community.

The legislative intent for requiring Freeway Agreements is to obtain the local agency's support of local road closures and changes to the local circulation system and to protect property rights and to assure adequate service to the community. Access control is necessary on the freeway or expressway so that current and future traffic safety and operations are not compromised.

7 Future Year Alternative Analysis

The results of the future year alternatives analysis are summarized in the following sections. This analysis utilized the micro-simulation (CORSIM) model and examined two future years, 2014 and 2024. Additional detail related to this analysis is presented in the *Opening Year 2014 (I-205 Auxiliary Lane Project) Simulation Model Results Memorandum* (see **Appendix F**) and the *Future Year 2024 Simulation Model Alternative Analysis Results Memorandum* (see **Appendix G**)

7.1 Analysis Alternatives

In consultation with the CSMP Development Team, sets of alternatives were defined for evaluation under opening year 2014 and future 2024 conditions. For 2014, three primary alternatives were investigated with two supplemental alternatives added to test the effects of the proposed metering of the westbound I-580 connector at the I-205 merge. For 2024, a total of six alternatives were defined. In general, the alternatives were defined to be cumulative in that each alternative includes all of the components in the previous alternative plus new components.

Primary Alternatives for Year 2014

- **Alternative 1: 2014 Base -** This alternative includes all the year 2014 RTP improvement projects with exception of the I-205 CMIA project.
- **Alternative 2A: 2014 with Operational Improvements -** This alternative combines the Base with widening of the Tracy Boulevard off ramps to two lanes.
- **Alternative 3A: 2014 with the I-205 CMIA Project -** This alternative combines Alternative 2A with the CMIA project improvements.

Supplemental Analysis for Year 2014

- **Alternative 2B: 2014 with Operational Improvements plus I-580 metering -** Combines Alternative 2A with metering of the westbound I-580 connector at the I-205 merge.
- **Alternative 3B: 2014 with I-205 CMIA Project plus I-580 metering -** Combines Alternative 3A with metering of the westbound I-580 connector at the I-205 merge.

The metering of the westbound I-580 connector at the westbound I-205 merge has been recommended by Caltrans District 4. This strategy was examined as part of a supplemental analysis for Year 2014 analysis to assess the potential benefit in helping to address the bottleneck at this location just outside the San Joaquin County boundary.

Alternatives for Year 2024

- **Alternative 1: 2024 Base -** The 2024 Base network includes the I-205 CMIA auxiliary, acceleration and deceleration lane project as in the 2014 Alternative 3A plus a

lengthened acceleration and deceleration lanes at Grant Line Road and Tracy Boulevard.

- **Alternative 2: 2024 with Interchange Improvements -** Over the 2024 Base alternative, this alternative includes all the year 2024 RTP improvement projects in the network without the HOV lane freeway widening projects plus ramp metering with HOV preferential lanes at each of the on-ramps.
- **Alternative 3: 2024 Additional Operational Improvements –** Over the 2024 Alternative 2, the Alternative includes additional operational improvements and the non-RTP improvements at selected interchanges.
- **Alternative 4: 2024 Additional Auxiliary Lanes –** Over the 2024 Alternative 3, the Alternative adds the additional auxiliary lanes in between all interchanges, filling in auxiliary lane gaps in the freeway corridors.
- **Alternative 5: 2024 HOV Lane Widening –** Over the 2024 Alternative 4, the Alternative adds a widened lane in each to serve as an HOV lane (8-lanes).
- **Alternative 6: 2024 HOV Direct Connectors –** Over the 2024 Alternative 5, this Alternative implements HOV direct connectors between I-205 and I-5 freeways and between the I-205 and I-580 freeways. The HOV direct connector is a one-lane overpass that connects the I-205 left lane to the I-5 left lane, and a one lane underpass that connects the I-205 left lane to the I-580 left lane.

The improvements included in all alternatives are summarized in **Table 7-1.**

Table 7-1 Summary of I-205/I-5 CSMP Analysis Alternatives

Improvement	Alternative										
	2008	2009	2014			2024					
	Exist	Base Line	1	2	3	1	2	3	4	5	6
			Base	Tracy	CMIA	Base	RTP	Ops	Aux	HOV	DCR
I-205 6-Lane Widening		X	X	X	X	X	X	X	X	X	X
2014 RTP without I-205 CMIA Aux lane			X	X	X	X	X	X	X	X	X
Tracy Off Ramp Widening				X	X	X	X	X	X	X	X
I-205 CMIA Auxiliary, Acceleration and Deceleration Lanes					X	X	X	X	X	X	X
2024 RTP Arterial Widening							X	X	X	X	X
2024 RTP New and Modified Interchange							X	X	X	X	X
Ramp Metering							X	X	X	X	X
Ramp Meter Priority Lanes							X	X	X	X	X
Mathews Road Interchange Modified								X	X	X	X
Auxiliary Lanes I-205 & I-5									X	X	X
HOV Lanes I-205 & I-5										X	X
HOV Direct Connector Ramps I-580 to I-205 and I-205 to I-5											X

7.2 Opening Year 2014 Operational Analysis and Assessment

For the Year 2014, the analysis focused on assessing the expected network performance with committed improvement projects, including the I-205 CMIA project, plus identifying potential lower-cost operational projects to address specific operational deficiencies. The average peak period travel speed and vehicle hours of delay for the three primary 2014 alternatives, broken down by freeway segment, are summarized in **Table 7-4** and **Table 7-5**. The relative impacts and benefits of the alternative improvements to I-205 and I-5 corridors are discussed in the following sections.

Prior to this CSMP study, the impacts of the I-205 CMIA Project improvements were assessed as part of the *Interstate 205 Auxiliary Lanes PA/ED - Traffic Operations Report* prepared in May 2008 for Caltrans District 10 and the San Joaquin Council of Governments. That study analyzed 11 alternative sets of proposed improvements with respect to operations on I-205. Out of that study, Alternative 7A was recommended and its components became the I-205 CMIA project.

Highlights from this prior analysis are included in the discussion below. However, it is important to recognize the differences in the methodologies used for the PA/ED study and the current CSMP effort. The analysis done for the *Interstate 205 Auxiliary Lanes PA/ED - Traffic Operations Report* was performed using FREQ, a macroscopic model, and focused on the I-205 freeway mainline. The adjacent arterial network, including the ramp termini intersections, was not included. This CSMP used CORSIM, a microscopic model that simulates the movement of individual vehicles, and the model network included both freeway and arterial facilities. The demand forecasts also varied between the two efforts. Due to these methodology differences, the detailed results from the two efforts vary somewhat although the general findings are consistent.

Table 7-2 Year 2014 Average Freeway Segment Travel Speed (MPH)

Freeway Segment	Year 2014 Alternative					
	AM Peak Period			PM Peak Period		
	Alt 1	Alt 2	Alt 3	Alt 1	Alt 2	Alt 3
Eastbound/ Northbound						
I-205 Eastbound (I-580 to I-5)	620	62	62	56	58	56
I-5 Northbound (I-205 to SR-120)	65	65	65	59	58	59
I-5 Northbound (SR-120 to SR-4)	61	59	62	61	60	61
I-5 Northbound (SR-4 to SR-12)	63	62	63	61	60	61
Southbound/ Westbound						
I-5 Southbound (SR-12 to SR-4)	60	62	60	61	62	61
I-5 Southbound (SR-4 to SR-120)	61	55	61	43	42	43
I-5 Southbound (SR-120 to I-205)	62	62	62	66	65	66
I-205 Westbound (I-5 to I-580)	36	50	48	35	63	63

Table 7-3 Year 2014 Freeway Segment Vehicle Hours of Delay (Veh Hr)

Freeway Segment	Year 2014 Alternative					
	AM Peak Period			AM Peak Period		
	Alt 1	Alt 1	Alt 1	Alt 1	Alt 1	Alt 1
Eastbound/ Northbound						
I-205 Eastbound (I-580 to I-5)	190	190	180	1110	850	1040
I-5 Northbound (I-205 to SR-120)	25	25	25	120	120	120
I-5 Northbound (SR-120 to SR-4)	370	550	330	500	500	500
I-5 Northbound (SR-4 to SR-12)	300	320	300	510	560	530
Directional Total	*885*	*1085*	*835*	*2240*	*2030*	*2190*
Southbound/ Westbound						
I-5 Southbound (SR-12 to SR-4)	580	350	500	410	400	410
I-5 Southbound (SR-4 to SR-120)	450	970	470	2850	2940	2820
I-5 Southbound (SR-120 to I-205)	70	70	70	30	30	30
I-205 Westbound (I-5 to I-580)	4730	2020	2320	3520	160	140
Directional Total	*5830*	*3410*	*3360*	*6810*	*3530*	*3400*
Network Total	**6715**	**4495**	**4195**	**9050**	**5560**	**5590**

7.2.1 AM Peak Period

Westbound I-205

Alternative 1 shows significant congestion on Westbound I-205 between I-5 and the Tracy Boulevard interchange and between 11th Street on ramp and the I-580 merge under the no project without Tracy Boulevard off ramp widening scenario, characterized by low average speeds and long travel times on Westbound I-205. The congestion on westbound I-205 between I-5 and the Tracy Boulevard interchange would be caused by traffic queuing from the oversaturated westbound single lane off ramp at Tracy Boulevard backing up onto and blocking westbound I-205. The bottleneck on I-580 would cause queuing that extends along westbound I-205 to the Mt House Boulevard off ramp causes congestion on westbound I-205 between 11th Street on ramp and the I-580 merge.

In **Alternative 2,** widening the Tracy Boulevard off ramp to two lanes at the ramp terminal signal improved freeway operations by removing the queue from the oversaturated westbound single lane off ramp at Tracy Boulevard extending to westbound I-205. Widening the westbound Tracy Boulevard off ramp results in an peak increase in speed on the Westbound I-205 corridor of up to 36 mph (a 157% increase). Widening the westbound Tracy Boulevard off ramp results in a travel time reduction on the Westbound I-205 corridor of up to 21 minutes (a 61% reduction). Widening the westbound Tracy Boulevard off ramp results in a decrease in delay on Westbound I-205 corridor by 2,020 vehicle-hours between 5 and 10 AM (a 57% decrease). Widening the Tracy Boulevard off ramp to two lanes at the ramp terminal signal would eliminate the upstream bottleneck allowing more traffic to enter the Westbound I-580 lane drop queue and extend it along I-205.

The I-205 CMIA Project improvements added in **Alternative 3** are expected to provide localized benefits, but were not shown to significantly improve operations along westbound I-205. This is due to the fact that congested conditions in this area are primarily a function of the queue spillback from the bottleneck at the I-205 and I-580 merge. The proposed auxiliary, acceleration and deceleration lane improvements would not relieve the primary bottleneck in the study area.

The traffic operations analysis from the Interstate 205 Auxiliary Lanes PA/ED indicated similar, even more severe, queuing on westbound I-205 during the AM peak period, with the entire segment of I-205 from I-5 to I-580 projected to operate at LOS F. The report showed that in the during the AM peak period that Alternative 7A, the CMIA project, would decrease westbound I-205 travel times by 7 minutes, or 10%, and increase speeds by 1 mile per hour, a 10% increase, as a result of the capacity increases assumed with the proposed auxiliary, acceleration and deceleration lane improvements.

Southbound I-5

Under all alternatives I-5 Southbound between SR-4 and SR-120 is congested in the AM peak and can have an average speed as low as 55 mph and average travel time as high as 14 minutes. Even though all of the scenarios have the same volume and geometry there is a large variation in speed on I-5 Southbound between SR-4 and SR-120 in the AM peak because in oversaturated conditions at both the Mathews Road and Lathrop Road off ramps small random changes in vehicle arrival, vehicle types or diver behavior can cause large changes in delays.

In the AM peak period there is a bottleneck on southbound I-5 at the Mathews Road off ramp, Lathrop Road off ramp and Northbound I-5 at the SR-4 off ramp. The bottleneck on Southbound I-5 at Mathews Road is caused by traffic from the congested closely spaced off ramp and frontage road signals spilling back up to the ramp and onto the mainline lanes. At Lathrop Road traffic queues up from the congested off ramp terminal intersection, filling the off ramp and spilling onto southbound I-5. The freeway queue length extends to Roth Road.

Eastbound I-205

There are no operations issues on Eastbound I-205 under any alternative in the AM peak period. Free flow conditions on eastbound I-205 during the AM peak period were also projected in the *Interstate 205 Auxiliary Lanes PA/ED - Traffic Operations Report*.

Northbound I-5

Under all alternatives, northbound I-5 is projected to be largely uncongested with average speeds near or above 60 mph. Some slowing is projected on I-5 Northbound between SR-120 and SR-4 in the AM peak due to the bottleneck on the SR-4 off ramp. The weaving section between the I-5 off ramps and the SR4 on ramp/Center St off ramp is congested. Small random changes in vehicle arrival, vehicle types or driver behavior can cause large changes in queuing back onto I-5 Northbound. The average hourly speeds for this segment drop as low as 59 mph and travel times as high as 12 minutes. The freeway queue length extends to Dr. Martin Luther King Blvd.

7.2.2 PM Peak Period

Westbound I-205

Alternative 1 would show significant congestion on Westbound I-205 between I-5 and the Tracy Boulevard interchange and between 11th Street on ramp under the no project without Tracy Boulevard off ramp widening scenario, characterized by low average speeds and long travel times on Westbound I-205. The congestion on westbound I-205 between I-5 and the Tracy Boulevard interchange would be caused by traffic queuing from the oversaturated westbound single lane off ramp at Tracy Boulevard backing up onto and blocking westbound I-205.

In **Alternative 2** the widening the Tracy Boulevard off ramp to two lanes at the ramp terminal signal improved freeway operations by removing the queue from the oversaturated westbound single lane off ramp at Tracy Boulevard extending to westbound I-205. Widening the westbound Tracy Boulevard off ramp results in an increase in speed of up to 48 mph (a 301% increase). Widening the westbound Tracy Boulevard off ramp results in a reduction in travel time of up to 38 minutes (a 75% reduction). Widening the westbound Tracy Boulevard off ramp results in a decrease in delay on Westbound I-205 corridor by 3,359 vehicle-hours between 2 and 7 PM (a 96% decrease).

In **Alternative 3,** operating conditions would not change from the free flow conditions projected in Alternative 2. Free flow conditions on westbound I-205 during the PM peak period were also projected in the *Interstate 205 Auxiliary Lanes PA/ED - Traffic Operations Report*.

Southbound I-5

The congested slow speed segments on I-5 southbound between SR-4 and SR-120 in the PM peak, with average hourly speeds as low as 42 mph and travel times as high as 18 minutes. This is caused by the bottleneck at the 8th Street on ramp. This is the first merge southbound, after SR-4, where there are only three mainline lanes with no auxiliary lanes. Segments upstream have four lanes and an auxiliary lane.

Eastbound I-205

There would only be a small amount of delay in the Eastbound I-205 weaving section between the Tracy Boulevard on ramp and the MacArthur Drive off ramp under any alternative. The acceleration lane extension proposed as part of the I-205 CMIA Project improvements in Alternative 3 provides modest benefit to this condition.

Both this CSMP analysis and the Interstate 205 Auxiliary Lanes PA/ED traffic analysis show generally good operations with the I-205 CMIA project improvements, with average speeds over 55 mph. A difference is that the Interstate 205 Auxiliary Lanes PA/ED analysis showed a bottleneck at the Grant Line Road on ramp merge under the no project scenario. The PA/ED analysis shows that as a result of the lengthened merge lane and related assumed capacity increase for that freeway segment, this bottleneck would be eliminated. The Interstate 205 Auxiliary Lanes PA/ED traffic analysis shows that Alternative 7A, the CMIA project, is projected to decrease eastbound I-205 travel times by 3 minutes, or 21%, and increase speeds by 13 mile per hour, a 28% increase during PM peak period.

Northbound I-5

The Northbound I-5 mainline lane drop near Country Club Boulevard does not cause noticeable congestion in the year 2014 scenarios because the traffic entering this stretch of freeway is metered by congestion on State Route 4. The SR-4 to Northbound I-5 ramp volumes are restricted (or metered) because queuing on Southbound I-5 at 8th Street extends through the I-5 and State Route 4 interchange onto Westbound SR-4. Thus this I-5 Northbound bottleneck is hidden by the SR-4 congestion.

7.2.3 Supplemental Analysis

Caltrans District 4 is pursuing plans to implement metering on the westbound I-580 connector at the merge with westbound I-205. District 4's Ramp Meter Development Plan calls for metering along the I-580 corridor, including the westbound I-580 connector. The ramp meter is proposed to operate between 5 AM and 10 AM. The I-580 East CSMP assumed implementation of the ramp metering plan, and further included the short-term recommendation that the connector be improved to increase the capacity at the meter. While details of this improvement were not defined, the cost estimate presented in the I-580 East CSMP suggests widening at the meter to provide an additional lane.

While the I-580/I-205 junction is located in Alameda County just west of the San Joaquin County line, this project is of direct relevance to the I-205/I-5 CSMP because the westbound I-580/I-205 merge is identified as a major bottleneck that results in significant queuing on westbound I-205 during the AM peak. Therefore, supplemental analysis was undertaken to assess the potential impact of this project on operations along I-205.

Alternative 2 and **Alternative 3** were reevaluated in the AM peak period with a meter on the westbound I-580 connector at the merge with westbound I-205. Metering of this connector reduces the flow from I-580 westbound improving conditions at the merge and preventing a queue from extending upstream on I-205. This improves westbound AM traffic flow in the auxiliary lane section to near free flow conditions. Under these test scenarios, the I-205 CMIA Project improvements are projected to increase the speed in the segment between 11th Street and Mountain House Parkway by up to 6 miles per hour, from 52 mph to 58 mph. The benefits of metering the westbound I-580 connector, however, will have to be weighed against the potential congestion and air quality impacts that could be created behind the meter on I-580. These impacts were not measured as part of this supplemental analysis because I-580 was outside the study area. Queuing on I-580, between the ramp meter and SR-132, should be evaluated as part of the planned I-580 ramp metering PSR/PR.

7.2.4 Conclusion

Under Year 2014 conditions, three primary alternatives and two supplemental scenarios were evaluated. The freeway vehicle hours of delay results for the three primary alternatives are shown in **Table 7-4**. Constructing both the Tracy Boulevard ramp widening improvements (not in RTP) and the proposed CMIA Project (in RTP), 2014 Alternative 3, produces freeway delay reductions of approximately 2,500 vehicle-hours in the AM peak period and 3,450 vehicle-hours in the PM peak period.

Table 7-4 I-205/I-5 Freeway Corridor Delay Saving By Alternative

2014 Alternative - Description	Total Delay (vehicle-hours)[1]		Total Delay Savings (vehicle-hours)	
	AM	PM	AM	PM
1. Base - No I-205 CMIA Project	6,708	9,043	--	--
2. No Project With Tracy Off-ramp Ramp Widening	4,493	5,573	2,215	3,470
3. Plus I-205 CMIA Project With Ramp Widening	4,211	5,593	2,497	3,450

Note: 1-Total Delay (vehicle-hours) for the overall I-205 to I-5 freeway (bi-directionally, between I-580 and SR-12) during the AM (between 5AM and 10AM) and PM (between 2PM and 7PM) peak periods.

Source: DKS Associates, 2010

The widening of the westbound off ramp at Tracy Boulevard to provide separate left and right turn lanes (Alternative 2) would produce significant operational benefits including improving AM and PM peak westbound speeds of the entire I-205 corridor by approximately 36 and 48 mph respectively and decreasing AM peak westbound travel times by approximately 21 to 38 minutes respectively.

The addition of the I-205 CMIA Project improvements is projected to produce modest additional benefits. It is concluded from the CSMP analysis that the I-205 CMIA Project improvements would provide the greatest benefit when implemented with the widening of the westbound I-205 off-ramp to Tracy Boulevard and the metering of the westbound I-580 connector at the merge with westbound I-205. The metering of this connector is included in the ramp meter development plan for I-580, and is listed in the I-580 CSMP as a 2015 improvement. These two improvements help address bottlenecks that would otherwise control the flow through the CMIA project area.

It is expected that the CMIA I-205 Project improvements would show a larger benefit with the higher I-205 volumes that would be expected in a post 2014 year when I-580 is metered and or the HOT lanes, or other capacity improvement, on I-580 over the Altamont Pass would be open to traffic. The I-580 CSMP lists HOT lanes on I-580 over the Altamont Pass as a post 2015 improvement.

The previously-conducted Interstate 205 Auxiliary Lanes PA/ED analysis that was based on a different set of assumptions and methodology indicated similar conditions along I-205. That analysis, however, did suggest more significant benefits would be achieved with the CMIA Project under 2014 conditions. The traffic operations analysis from the Interstate 205 Auxiliary Lanes PA/ED indicated that based on the assumed capacity increases the CMIA project would decrease westbound I-205 travel times by 7 minutes, or 10%, during the AM peak period, and decrease eastbound I-205 travel times by 3 minutes, or 21%, during PM peak period.

It is concluded that the planned year 2015 improvements to the I-5/Lathrop Road interchange would offer significant operational benefits if open to traffic by 2015.

It is also concluded that congestion on southbound I-5 and westbound SR-4 will get significantly worse until the planned year 2020 widening of I-5 from Dr. Martin Luther King Jr. Boulevard to French Camp Road to eight lanes, as HOV lanes. Constructing this project ahead of schedule would offer significant operational benefits. The northbound I-5 mainline lane drop near Country Club Boulevard does not cause noticeable congestion in the year 2014 scenarios because the traffic entering this stretch of freeway is metered by congestion on State Route 4. The SR-4 to northbound I-5 ramp volumes are restricted (or metered) because queuing on Southbound I-5 at 8th Street extends through the I-5 and State Route 4 interchange onto Westbound SR-4. Thus this I-5 northbound bottleneck is hidden by the SR-4 congestion. This northbound I-5 bottleneck would be revealed and cause congestion if/when the widening of I-5 to eight lanes from Dr. Martin Luther King Jr. Boulevard to French Camp Road were open to traffic. The North Stockton I-5 widening project eliminates this hidden bottleneck.

The analysis also points to the need to study improvements to the Mathews Road interchange to improve capacity so that off ramp traffic does not back up onto the freeway.

7.3 Year 2024 Operation Analysis and Assessment

The average peak period travel speed and vehicle hours of delay for the 2024 alternatives, broken down by freeway segment, are summarized in **Table 7-5** through **Table 7-8** The relative impacts and benefits of the alternative improvements to I-205 and I-5 corridors are discussed in the following sections.

Table 7-5 Year 2024 Average Freeway Segment Travel Speed (MPH) – AM Peak Period

Freeway Segment	Year 2024 Alternative					
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Eastbound/ Northbound						
I-205 Eastbound (I-580 to I-5)	50	62	62	62	62	62
I-5 Northbound (I-205 to SR-120)	42	64	64	64	65	65
I-5 Northbound (SR-120 to SR-4)	41	42	39	53	60	58
I-5 Northbound (SR-4 to SR-12)	52	50	56	47	57	58
Southbound/ Westbound						
I-5 Southbound (SR-12 to SR-4)	51	53	52	56	63	63
I-5 Southbound (SR-4 to SR-120)	30	24	24	30	37	62
I-5 Southbound (SR-120 to I-205)	26	19	19	22	28	59
I-205 Westbound (I-5 to I-580)	9	15	15	15	13	46

Table 7-6 Year 2024 Average Freeway Segment Travel Speed (MPH) – PM Peak Period

Freeway Segment	Year 2024 Alternative					
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Eastbound/ Northbound						
I-205 Eastbound (I-580 to I-5)	53	23	23	29	56	58
I-5 Northbound (I-205 to SR-120)	59	56	55	53	50	53
I-5 Northbound (SR-120 to SR-4)	60	59	59	60	61	61
I-5 Northbound (SR-4 to SR-12)	60	60	60	47	59	59
Southbound/ Westbound						
I-5 Southbound (SR-12 to SR-4)	24	27	26	26	60	60
I-5 Southbound (SR-4 to SR-120)	36	32	32	42	61	61
I-5 Southbound (SR-120 to I-205)	65	65	65	65	65	65
I-205 Westbound (I-5 to I-580)	63	63	63	63	63	63

Table 7-7 Year 2024 Freeway Vehicle Hours of Delay (Veh Hr) – AM Peak Period

Freeway Segment	Year 2024 Alternative					
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Eastbound/ Northbound						
I-205 Eastbound (I-580 to I-5)	1,872	213	221	198	191	185
I-5 Northbound (I-205 to SR-120)	1,182	43	41	42	32	33
I-5 Northbound (SR-120 to SR-4)	2,215	3,682	5,009	1,473	658	982
I-5 Northbound (SR-4 to SR-12)	1,654	1,957	1,025	2,704	1,024	854
Directional Total	*6,922*	*5,894*	*6,296*	*4,418*	*1,905*	*2,054*
Southbound/ Westbound						
I-5 Southbound (SR-12 to SR-4)	1,588	1,304	1,515	994	280	271
I-5 Southbound (SR-4 to SR-120)	10,838	16,370	16,749	13,306	8,643	458
I-5 Southbound (SR-120 to I-205)	1,778	2,467	2,478	2,239	1,891	131
I-205 Westbound (I-5 to I-580)	24,939	16,221	16,515	17,139	23,012	2,894
Directional Total	*39,143*	*36,362*	*37,256*	*33,677*	*33,826*	*3,753*
Network Total	**46,065**	**42,256**	**43,552**	**38,095**	**35,730**	**5,808**

Table 7-8 Year 2024 Freeway Vehicle Hours of Delay (Veh Hr) – PM Peak Period

Freeway Segment	Year 2024 Alternative					
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Eastbound/ Northbound						
I-205 Eastbound (I-580 to I-5)	1,461	12,441	12,432	9,580	1,335	1,097
I-5 Northbound (I-205 to SR-120)	118	165	169	223	314	241
I-5 Northbound (SR-120 to SR-4)	544	747	778	630	665	633
I-5 Northbound (SR-4 to SR-12)	461	575	584	2,430	862	835
Directional Total	*2,584*	*13,927*	*13,962*	*12,863*	*3,176*	*2,805*
Southbound/ Westbound						
I-5 Southbound (SR-12 to SR-4)	9,733	10,507	10,648	10,638	729	727
I-5 Southbound (SR-4 to SR-120)	3,873	5,277	4,973	3,288	666	690
I-5 Southbound (SR-120 to I-205)	38	36	37	40	45	44
I-205 Westbound (I-5 to I-580)	137	159	160	160	187	160
Directional Total	*13,781*	*15,978*	*15,818*	*14,126*	*1,627*	*1,621*
Network Total	**16,365**	**29,906**	**29,780**	**26,989**	**4,804**	**4,426**

7.3.1 AM Peak Period

Westbound I-205

At the beginning of the AM peak period there is a bottleneck at the I-205 and I-580 merge that creates congestion and a queue on westbound I-205 that extends upstream to I-5 by 7 AM in **Alternative 1** (Base).

During the peak period, adding new interchanges and ramp metering with **Alternative 2** (RTP without HOV lanes) increases average speeds by 6 miles per hour or 67%, decreases total delay by 8,718 hours or 35%, decreases the travel times by 43 minutes, and increases the volume served by 6,010 vehicles or 41% when compared to Alternative 1 (Base). During the peak hour, it helps decrease the travel time by up to 65 minutes. This is because the merge from the new Lammers Road interchange on ramps creates a new bottleneck upstream of the I-580 merge, relieving congestion between Lammers Road and the I-580, but moving the back of the queue further upstream on I-5. While this decreases travel times and delays on I-205 it increases the travel times and delays on I-5 between State Route 4 and I-205.

The improvements to the Mathews Road interchange in **Alternative 3** (Operational Improvements) have no significant effect on I-205 operations in the AM Peak compared to Alternative 2.

There is no significant change to speeds, travel times, delays and volume served with more auxiliary lanes in **Alternative 4** compared to Alternative 3.

Adding westbound HOV lanes to I-205 that end before and do not connect to I-580 in **Alternative 5** does not increase speeds but actually decrease speeds (2 mile per hour during the peak period and up to 5 miles per hour during the peak hour), resulting in an increase in

average travel time by 13.3 minutes (up to 36 minutes during the peak hour). It increases total delays by 5,873 vehicle-hours (a 34% increase) over the five-hour AM peak when compared to Alternative 4. The HOV lanes initially increase speed on the eastern portion of I-205 but the bottleneck at the HOV lane drop just before I-580 causes a long slow queue with significantly slower speeds, increased travel times and increased delays.

Adding direct HOV-to-HOV connectors between I-5, I-205 and I-580 in **Alternative 6** eliminates a bottleneck by closing the HOV lane gap between I-205 and I-580. It helps increase average speed by 33 miles per hour (a 253% increase) during the peak period and decreases travel times by up to 80 minutes (a 81% decrease) during the peak hour. This results in a decrease in total delays by 20,118 vehicle-hours (a 88% decrease), and increases the traffic volumes served by 5,072 vehicles (a 20% gain) during the five-hour AM peak when compared to Alternative 5.

Eastbound I-205

In the AM peak period there are no traffic operations issues and therefore no significant speed differences between alternatives in the eastbound direction.

Southbound I-5 between State Route 12 to State Route 4

In the AM peak period extending State Route 4 to Navy Drive in **Alternative 2** help reduce the impact of queue spillback onto Southbound I-5 from the congested Fresno Avenue interchange. During the peak period, the average segment speed increases by 2 miles per hour (up to 14 mile per hour during the peak hour) and decrease total delays by 284 hours or 18%, and increasing volume served by 1,155 or 5% when compared to Alternative 1.

The improvements to the Mathews Road interchange in **Alternative 3** (Operational Improvements) have no significant effect on southbound I-5 operations in the AM Peak when compared to Alternative 2.

Adding auxiliary lanes in **Alternative 4** increase the average segment speeds by up to 4 miles per hour or 8% during the peak period (up to 27 miles per hour during the peak hour) , decrease travel times by 1 minutes (up to 11 minutes during the peak hour) . This, as a result, decreases total delay by 520 vehicle-hours or 34 %when compared to Alternative 3.

Adding new HOV lanes in **Alternatives 5 and 6** eliminates the bottleneck at the congested March Lane to Alpine Avenue segment and increasing corridor speeds by 7 miles per hour (up to 19 miles per hour during the peak hour), decreasing corridor travel time by 2 minutes(up to 5 minutes during the peak hour). This, as a result, decreases delay by 715 hours or 72% when compared to Alternatives 4.

Southbound I-5– between State Route 4 and State Route 120

At the beginning of the AM peak period there is a bottleneck at I-205 and I-580 that creates congestion and a queue on westbound I-205 that extends upstream to this segment of I-5 by 8 AM in **Alternative 1** (Base).

In the AM peak period, improving interchanges and implementing ramp metering in **Alternative 2** (RTP without HOV lanes) decreases average speed by 6 miles per hour. During the peak hour, however, the improvements result in a decrease in speed as much as 20 miles per hour and an increase in travel time by up to 34 minutes. This results in an increase in delay by 5,532 hours or 51%, and an increase in volume served by 3,864 or 27% when compared to Alternative 1 (Base).

Under this Alternative 2, the merge at the new Lammers Road interchange becomes a new bottleneck. This bottleneck restricts traffic flows entering the downstream I-205/I-580 merge bottleneck. In effect, the bottleneck is shifted from the I-205/I-580 merge to the Lammers Road merge, moving the entire queue upstream. While this decreases travel times and delays on I-205 it increases the travel time and delay on I-5 between State Route 4 and I-205.

Improving the Mathews Road interchange in **Alternative 3** does not provide significant additional benefits under these extremely congested conditions due the bottlenecks on western I-205.

In the less congested early hours of the AM peak period adding auxiliary lanes to I-5 in **Alternative 4** results in an increase in average speed by 6 miles per hour during the peak period (up to 19 miles per hour during the peak hour), and a decrease in average travel time by 13 minutes (up to 38 minutes during the peak hour) when compared to Alternative 2 and 3. This subsequently decreases total delay by 3,443 hours or 20%, and increase period volume served by 1,233 or 7% when compared to Alternative 2 and 3. The addition of auxiliary lanes improves congested flow and reduces queuing in this segment.

Adding the HOV lane in **Alternative 5** shortens the anticipated queue along the I-5 segment. It increases the average speed by 7 miles per hour and decrease travel time by 24 minutes. Especially, in the most congested last hour of the period, adding HOV lanes in **Alternative 5** decreases travel time by up to 61 minutes or 32% when compared to Alternative 4. The Alternative helps decreases total delay by 4,662 hours or 35%, and increases volume served by 1,567 or 8% when compared to Alternative 4.

Alternative 6, adding HOV direct connector ramps, eliminates the bottleneck and provides free flow by closing the HOV lane gap between I-205 and I-580. It increases an average segment speed by 25 miles per hour or 68% and decrease an average travel time by 35 minutes or 74% during the peak period. Within the last hour, it helps increase speed from 6 to 62 miles per hour or 938%, and decreases travel time by up to 114 minutes or 90% when compared to Alternative 5. The Alternative decreases total delay by 8,186 vehicle hours or 95%, and increases volume served by 5,104 hours or 24% when compared to Alternative 5.

Southbound I-5 between State Route 120 and I-205 - Southbound Operations

Early in the AM peak period, there is a bottleneck that forms at the I-205 and I-580 merge that creates congestion and queuing on westbound I-205 that extends upstream onto I-5 before 7 AM and extend to State Route 120 by 8 AM in **Alternative 1** (Base).

Improving interchanges along with the additional auxiliary lanes and HOV lanes to I-5 without direct connector ramps between the HOV lanes on I-5, I-205 and I-580 in **Alternatives 2 through 5** do not provide significant benefits under these extremely congested conditions due the bottlenecks on western I-205 when compared to Alternative 1.

Adding HOV direct connector ramps between the HOV lanes on I-5, I-205 and I-580 in **Alternative 6** (HOV connector ramps) eliminates the bottleneck and provides for free flow traffic condition by closing the HOV lane gap between I-205 and I-580. It increases average speed by 21 miles per hour (to 55 miles per hour during the peak hour) and decreases travel time by 4 minutes (10 minutes during the peak hour). It results in a decrease in total delay by 1,760 vehicle-hours when compared to Alternative 1 through 5. This is because it

Northbound I-5 between I-205 and State Route 120

During the AM peak period there are no traffic operations issues and therefore no significant speed differences between alternatives in the northbound direction.

Northbound I-5 Operation between 120 and State Route 4

Toward the end of the AM peak period, a bottleneck at the Lathrop Road interchange creates extreme congestion and queuing on northbound I-5 in **Alternative 1** (Base). Adding new interchanges in **Alternative 2** (RTP without HOV lanes) reduces queue spillback from the off-ramp to Louis Avenue to the mainline and improves the flow on the I-5 segments toward downstream. However, it reveals a hidden bottleneck at Downing Avenue on-ramp merge area which does not have an auxiliary lane. As a result the Alternative improvements helps increase total volume served by 9,572 vehicles (a 62% increase), but also increase total delays by 1,467 vehicle-hours (a 66% increase) over the five-hour period when compared to Alternative 1 (Base). A significant benefit of the Alternative is more obvious in the last hour of the period. Within this hour, the improvements help increase speed by up to 21 miles per hour or 210% and decrease travel time as much as 47 minutes or 70%. It increases volume served by 4198 vehicles or 360%. There is no significant change to the delay within the hour. The operational improvements to the Mathews Road interchange in **Alternative 3** have no significant effect on Northbound I-5 operations in the AM Peak when compared to Alternative 2. This is because this improvement is in the middle of the queue from Downing Avenue.

Alternative 4 closes auxiliary lane gaps along the I-5 including the segment between Downing Avenue and Eighth Street. This helps increase an average speeds by14 miles per hour or 36% (29 miles per hour during the peak hour), and decrease travel times by 9 minutes or 42% (20 minutes during the peak hour) when compared to Alternative 3. This results in a decrease in total delays decrease by to 2,208 vehicle-hours or a 96%, and an increase in volume served by 918 vehicles or a 3%) over the five-hour peak by closing auxiliary lane gaps in Alternative 4 when compared to Alternative 2. Adding HOV lanes in **Alternative 5** increases an average speeds by 7 miles per hour or 13%(17 miles per hour during the peak hour), and decreases travel times by up to 2 minutes or 15% (5 minutes during the peak hour). This results in a decrease in total delay by 815 vehicle-hours or 55% when compared to Alternative 4. Adding the HOV lanes, however, does not increase the volume served.

Adding a median I-205 HOV lane to I-5 HOV lane direct connector ramp in **Alternative 6** does not significantly increase speeds, decrease travel times, decrease delays or increase volume served during the AM peak when compared to Alternative 5.

I-5 Operation – State Route 4 to State Route 12 - Northbound Operations

In the AM peak period there is a bottleneck at the Country Club Boulevard lane drop that creates congestion and a queue on northbound I-5 in Alternative 1 (Base). Alternatives 2 and 3 do not improve this bottleneck; therefore, they do not provide significant benefits.

In **Alternative 4**, adding auxiliary lanes to I-5 south of State Route 4 relieves an upstream bottleneck increasing flow to the downstream bottleneck in this section at the Country Club Boulevard lane drop. This increase in flow increases congestion in this section. The alternative, therefore, decreases speeds by 9 miles per hours or 16% (up to 30 miles per hour during the peak period) and increases travel time by 4 minutes or 22% (up to 13 minute during the peak hour) when compared to Alternative 3. This results in an increase in total delay by 1,679 hours or 163%. This is because adding auxiliary lanes in the AM peak period adding new HOV lanes in Alternatives 5 and 6 eliminates the bottleneck at the Country Club Boulevard lane drop and increases average speeds by 10 miles per hour or 21 % (up to 27 miles per hour during the peak hour) and decreases average travel time by 4 minutes 22% (up to 13 minutes during the peak hour). This results in a decrease in total delay by 1,679 vehicle-hours or 62% and an increase in volume served by 1,246 or 5% when compared to Alternatives 1 through 4.

7.3.2 PM Peak Period

Eastbound I-205

In the PM peak period the dominate bottleneck is outside the study area on I-580 over the Altamont Pass reducing or metering the flow of eastbound traffic onto I-205. With this reduced flow there is only a small bottleneck at the Tracy Boulevard on ramp merge in Alternative 1.

In the PM peak period adding new interchanges in **Alternative 2** (RTP without HOV lanes) creates a new bottleneck formed at the new southbound Lammers Road to Eastbound I-205 loop on ramp which merges in without an auxiliary lane. The auxiliary lane was assumed to start at the downstream new northbound Lammers Road to Eastbound I-205 slip on ramp and end at the Grant Line Road interchange. There is also a bottleneck in the section between the Tracy Boulevard on ramp and the MacArthur Drive off ramp, which does not have an auxiliary lane. As a result, the Alternative decreases average speed by 30 miles per hour or 57% (up to 42 miles per hour during the peak hour) increases average travel times by 26 minutes or 157% (up to 36 minutes during the peak hour) and thus increases in total delay by 10,978 vehicle-hours (a 752% increase) when compared to Alternative 1 (Base). No significant change in volume served between this Alternative and Alternative 1.

The operational improvements to the Mathews Road interchange in **Alternative 3** have no significant effect on I-205 operations in the PM Peak when compared to Alternative 2.

Closing the auxiliary lane gaps in **Alternative 4** relieves a downstream bottleneck between Tracy Boulevard and MacArthur Drive by closing the auxiliary lane gaps. This results in an

increase in average speed by 6 miles per hour or 26% (up to 9 miles per hour during the peak hour) and a decrease in average travel times by 9 minutes or 21% (up to 12 minutes during the peak hour). This, as a result, decreases total delays by 2,852 vehicle-hours or 23%.There is no significant change in volumes served when compared to Alternative 3. Adding HOV lanes in **Alternative 5** provides additional capacity to the corridor and further relieves the bottleneck at the Lammers Road loop on ramp merge. The Alternative, therefore, increase average speeds by 27 miles per hour or 93% (up to 37 miles per hour during the peak hour) and decreases average travel times by 18 minutes or 55 % (up to 28 minutes during the peak hour). This results in a decrease in total delays by 8,245 vehicle-hours or 86% and an increase in volumes served by increase by 5,531 vehicles when compared to Alternative 4. In **Alternative 6**, adding the direct HOV connection between the eastbound I-205 HOV lanes and the northbound I-5 HOV lanes increases speeds by 2 miles per hour (about a 4% gain) when compared to Alternative 5. The direct HOV connector does not have significant effects on most of the I-205 corridor because the lane drop without the direct HOV connector does not cause a major bottleneck in the year 2024. The single exception to this is that speeds increase by up to 15 miles per hour on the I-205 segment east of the new Paradise Road interchange. The benefits of the new HOV connectors are obscured because the entering flows from I-580 are still metered, albeit at higher rate than before, even with HOV lanes added over the Altamont Pass.

Westbound I-205

In the PM peak period there are no traffic operations issues and therefore no significant speed, travel time, delay or volume served differences between alternatives in the westbound direction.

Northbound I-5between I-205 and State Route 120

In the PM peak period there are no traffic operations issues and therefore no significant speed, travel time, delay or volume served differences between alternatives either direction.

Northbound I-5 between State Route 120 and State Route 4

In the PM peak period there are no traffic operations issues and therefore no significant speed, travel time, delay or volume served differences between alternatives in the northbound direction.

Northbound I-5 between State Route 4 and State Route 12

In the PM peak period Northbound I-5 between State Route 4 and State Route 12 is uncongested in **Alternatives 1 through 3** because of upstream congestion on Northbound I-5 between State Route 120 and State Route 4 metering traffic into this segment.

Adding auxiliary lanes in **Alternatives 4** relieves the upstream bottleneck increasing flows into this segment, causing congestion at the Country Club Boulevard lane drop. When compared to Alternative 3, the Alternative decreases average speeds by 13 miles per hour or 22% (up to 17 miles per hour during the peak hour) and increases average travel times by 4 minutes or 29% (up to 6 minutes during the peak hour). This also increases total delays by 1,846 hours or 316%.

Adding new HOV lanes to Northbound I-5 from Country Club Boulevard to Eight Mile Road in **Alternatives 5 and 6** eliminates the bottleneck at the Country Club Boulevard lane drop and

restores traffic to free flow condition on this corridor segment. The Alternative increases average speeds by 12 miles per hour or 26% (up to 16 miles per hour during the peak hour) and decreases average travel times by up to 5 minutes or 28%. It, therefore, decreases corridor delays by 1,568 vehicle-hours or 65%, and increases vehicles served by 2,099 vehicles when compared to Alternative 4.

Southbound I-5 between State Route 12and State Route 4

In the PM peak period there is a bottleneck at the March Lane on ramp merge, even with an auxiliary lane to Alpine Avenue, that creates congestion and a queue on southbound I-5 in **Alternative 1** (Base).

Improving interchanges and adding auxiliary lanes in **Alternatives 2 through 4** does not provide significant speed, travel time, or delay benefits under these congested conditions when compared to Alternative 1. This is because these alternatives do not make improvements to the bottleneck between March Lane and Alpine Avenue.

Adding HOV lanes in **Alternatives 5 and 6** completely relieves the congestion between March Lane and Alpine Avenue and therefore increases average speeds by 34 miles per hour or 131% (up to 46 miles per hour during the peak hour) when compared to Alternative 4. It also decreases average travel times and total delay by 24 minutes (67%) and 9,909 vehicle-hours (93%) respectively. The Alternative increases volume served by 2,200 vehicles or 8%.

Southbound I-5 between State Route 4 and State Route 120

In the PM peak period there is a bottleneck at the 8th Street on ramp merge, in an auxiliary lane gap, that creates congestion and queues on southbound I-5 in **Alternative 1** (Base). The I-5 Southbound queues caused by the 8th Street merge extend through the I-5 and State Route 4 interchange onto Westbound State Route 4, but do not extend on Southbound I-5 upstream of the State Route 4 interchange. This is because Southbound I-5 enters the queue via four freeway lanes but the heavy on ramp volume from State Route 4 is merging from only one auxiliary lane. The queue on Westbound State Route 4 extends east beyond the study area.

Improving the freeway interchanges in **Alternative 2** reduce congestion upstream on I-5 north of State Route 4 and allows more traffic to enter this segment. This increases volume served increases by 1,398 vehicles or 6% when compared to Alternative 1. However, due to more traffic entering the segment, the Alternative results in a decrease in average speeds by 5 miles per hour or 14% (up to 10 miles per hour during the peak hour) and an increase in average travel times by 4 minutes or 19 % (up to 9 minutes during the peak hour). The segment, therefore, experiences an increase in total delays by 1,403 vehicle-hours or 36%. The operational improvements to the Mathews Road Interchange in **Alternative 3** did not show significant benefits with the traffic metered upstream in the segment between 8th Street and Downing Avenue.

Adding auxiliary lanes to I-5 in **Alternative 4** partially relieves the congestion between 8th Street and Downing Avenue and, therefore, significantly increases average speeds by 9 miles per hour or 27% (up to 16 miles per hour during the peak hour). This, as a result, decreases travel times

by 6 minutes or 25% (by up to 11 minutes during the peak hour) and total delays by 1,685 vehicle-hours or 34%. It also increases volume served by 2,437 or 11% when compared to Alternative 3. Adding HOV lanes in **Alternatives 5 and 6** completely relieve the congestion between 8th Street and Downing Avenue and, therefore, increases average speeds by 18 miles per hour or 43% (up to 22 miles per hour during the peak hour). This, as a result, decreases travel times by 6 minutes or 33% and total delays by 2,622 vehicle-hours or 80%. It also increases volume served by 5,206 vehicles or 23% when compared to Alternative 4.

Southbound I-5 between I-205 and State Route 120

In the PM peak period there are no traffic operations issues and therefore no significant speed, travel time, delay or volume served differences between alternatives either direction.

7.3.3 Conclusion

The construction of the full RTP list of projects to be completed by 2024 plus ramp metering with HOV preference lanes, widening the Tracy Boulevard interchange off ramps, improving the Mathews Road interchange, filling in auxiliary lane gap on I-5 between 8th Avenue and Downing Road, and median I-205 HOV lane to I-580 HOV lane direct connector ramps will almost eliminate congestion on the I-205 and I-5 CSMP corridors in the year 2024. This package of improvements will reduce freeway delays in this corridor by 40,258 vehicle-hours in the AM peak period and 11,939 vehicle-hours in the PM peak period. The majority of the AM peak delay reduction (29,923 vehicle-hours) will be gained only if HOV or HOT lanes are built on I-580 over the Altamont Pass along with the above listed package of improvements.

The total freeway vehicle hours of delay by period for each of the six 2024 alternatives is summarized in **Table 7-9**. Alternative 2 shows more delay than Alternative 1 because the RTP street widening and interchange improvements allow more vehicles to access the freeways, and then add to freeway queues caused by freeway bottlenecks. Alternative 6 shows that constructing all of the RTP projects and several non-RTP projects (HOV or HOT lanes on I-580 over the Altamont Pass, I-580 to I-205 median HOV/HOT lane direct connector ramps, Mathews Road interchange improvements, I-5 auxiliary lanes between 8th Street and Downing Avenue and ramp metering with HOV priority lanes) will reduce delays by 40,258 vehicle-hours in the AM peak period and by 17,161 vehicle-hours in the PM peak period, the greatest delay savings of any of the CSMP alternatives evaluated.

The Year 2024 analysis also concluded that most of the AM delay in the corridor would be eliminated only if HOV or HOT lanes on I-580 over the Altamont Pass were constructed along with I-580 to I-205 median HOV/HOT lane direct connector ramps. This can be seen by comparing the larger AM delay savings in Alternative 6 to the smaller AM delay savings in Alternative 5 (without the HOV direct connector ramps). These delay savings are experienced by the westbound AM traffic going from I-5, along I-205 to I-580. There would be a similar larger savings reported for the PM but the eastbound delays are experienced on I-580 in Livermore, outside of our study area.

Table 7-9 I-205/I-5 Freeway Corridor Delay Saving by Alternative - 2024

2024 Alternative - Description	Total Delay (vehicle-hours)[1]		Total Delay Savings (vehicle-hours)	
	AM	PM	AM	PM
1. Base	46,065	21,569	--	--
2. RTP Improvements Without HOV Lanes	42,256	35,385	3,809	-13,816
3. Additional Operational Improvements	43,552	35,203	2,513	-13,634
4. Additional Auxiliary Lanes	38,095	33,284	7,970	-11,716
5. I-5 / I-205 HOV Lanes	35,730	10,087	10,335	11,482
6. I-580/I-205/I-5 HOV Direct Connector Ramps	5,808	4,408	40,258	17,161

Note: 1-Total Delay (vehicle-hours) for the overall I-205 to I-5 freeway (bi-directionally, between I-580 and SR-12) during the AM (between 5AM and 10AM) and PM (between 2PM and 7PM) peak periods.
Source: DKS Associates, 2010

The Year 2024 analysis also concluded that most of the PM delay in the corridor would be eliminated only if HOV lanes on I-5 south of Dr. Martin Luther King Jr. Boulevard and I-205 HOV lanes direct are constructed. This can be seen by comparing the larger PM delay savings in Alternative 5 to the smaller AM delay savings in Alternative 4 (without the HOV lanes).

8 Recommended Implementation Plan

This chapter presents a recommended plan for the phased implementation of the improvements analyzed as part of this CSMP. This recommended plan takes into account several factors including the degree to which the improvements address the operational deficiencies identified as part of the 2014 and 2024 analysis, the relationship between the improvements and future development access, and funding requirements and status. This last factor recognizes that several of the projects analyzed are already programmed and have committed funding.

The candidate improvements have been categorized into four implementation timeframes:

- Short-term – improvements to be implemented by 2014 (2010 to 2014);
- Near-term – improvements recommended for implementation by 2017 (2014 to 2017);
- Mid-term – improvements recommended for implementation by 2024 (2017 to 2024); and
- Long-term – improvements recommended for implementation beyond 2024.

For each timeframe, the recommended projects are also classified as System Management/ITS Improvements, Freeway Capacity Improvements, Interchange Improvements, and Arterial Improvements. Those projects listed in the 2007 RTP or identified as programmed or planned as part of other planning efforts, are highlighted.

8.1 Recommended Short-Term Improvements

The recommended short-term improvements are presented in Table 8-1. Recognizing the time typically needed to obtain project approval and environmental clearance, design and construct a project, the short-term recommendations are comprised largely of currently programmed projects expected to be completed by 2014. These include the I-205 CMIA project, the widening of a segment of I-5 in north Stockton to accommodate HOV lanes, several interchange improvements, various arterial improvements, and additional ITS infrastructure.

The recommended short-term improvements also include a number of relatively lower-cost, non-RTP projects identified through the operational analysis as being critical to addressing projected 2014 deficiencies. These projects include signal and minor geometric improvements at several interchange and arterial intersections.

In the short-term, it is also recommended that a number of studies be undertaken to help advance proposed near- and mid-term improvements including:

- HOV or HOT lanes on I-580 over the Altamont Pass
- I-5 HOV widening between from Dr. Martin Luther King Jr. Boulevard and French Camp Road
- Mathews Road interchange improvements

It should also be noted that Caltrans District 4 is pursuing plans to implement metering on the westbound I-580 connector at the merge with westbound I-205. The I-580/I-205 junction is located in Alameda County just west of the San Joaquin County line. District 4's Ramp Meter Development Plan calls for metering along the I-580 corridor, including the westbound I-580 connector. The I-580 East CSMP assumed implementation of the ramp metering plan, and further included the short-term recommendation that the connector be improved to increase the capacity at the meter. While details of this improvement were not defined, the cost estimate presented in the I-580 East CSMP suggests widening at the meter to provide an additional lane.

This project is of direct relevance to the I-205/I-5 CSMP because the westbound I-580/I-205 merge is identified as a major bottleneck that results in significant queuing on westbound I-205 during the AM peak. Metering of the westbound I-580 connector can reduce the congestion and queuing on westbound I-205. However, these benefits of metering the westbound I-580 connector will have to be weighed against the potential congestion and air quality impacts that could be created behind the meter on I-580.

The recommended short-term improvements and their expected benefits are further discussed below.

8.1.1 System Management/ITS Improvements

The recommended short-term System Management/ITS improvements include installation of various SHOPP-programmed ITS components along both I-205 and I-5, and the installation of additional PeMS monitoring stations to fill gaps on I-205 and I-5. The ITS and PeMS infrastructure improvements will allow Caltrans to better monitor conditions along the corridor, and to better communicate information to travelers.

As noted above, Caltrans District 4 is pursuing plans to implement metering on the westbound I-580 connector at the merge with westbound I-205, and identified in District 4's Ramp Meter Development Plan. The I-580 East CSMP assumed implementation of the ramp metering plan, and further included the short-term recommendation that the connector be improved to increase the capacity at the meter. This project is of direct relevance to the I-205/I-5 CSMP because the westbound I-580/I-205 merge is identified as a major bottleneck during the AM peak. Metering of the westbound I-580 connector will reduce the congestion and queuing on westbound I-205, and improve operations through Tracy. This project represents a low-cost, intermediate measure for addressing one of the deficiencies over the Altamont Pass until higher-cost, longer-term improvements can be made. However, the benefits of metering the westbound I-580 connector will have to be weighed against the potential congestion and air quality impacts that could be created behind the meter on I-580.

8.1.2 Freeway Capacity Improvements

Two freeway capacity improvement projects are recommended for implementation in the short-term. Both of these projects are currently programmed and are expected to be completed by 2014.

On I-205, the recommended short-term project is the I-205 CMIA-funded project that will provide auxiliary lanes between the Mountain House Pkwy and Eleventh Street interchanges, and

extended acceleration and deceleration lanes for selected ramps at the Tracy Blvd and Grant Line Road interchanges. This project will improve diverge and merge conditions at these interchanges, and reduce the frequency and probability of slowdowns on the mainline that result from traffic exiting and entering the freeway.

The widening of I-5 through north Stockton to accommodate HOV lanes in both directions will help reduce congestion that currently occurs in this segment. This project can also encourage HOV use and support express bus operations in this area.

8.1.3 Interchange Improvements

The recommended short-term interchange improvement projects include a combination of programmed RTP projects and a number of smaller operational projects intended to address deficiencies identified as part of the operational analyses conducted as part of the CSMP effort.

Six RTP interchange improvement projects are recommended for short-term implementation. These include four projects along I-5 and two along SR-120. All of these projects are currently programmed and are expected to be completed by 2014. The reconstruction of the I-5/French Camp Road, I-5/Hammer Lane and I-5/Eight Mile Road interchanges will enhance circulation at the interchanges, and reduce congestion on I-5, the ramps and the surface streets. Construction of the new I-5/Otto Drive interchange will increase accessibility in the area, support future development, and help distribute demand from adjacent interchanges. The two projects along SR-120 offer similar benefits, and will help the flow of traffic between I-5 and SR-120.

Three interchange-related improvements not specifically identified in the RTP are also included in the list of recommended short-term improvements. Each of these are lower-cost operational improvements that address significant problems identified as part of the operational analyses. At the I-5/Mathews Road and I-5/Roth Road interchanges significant congestion is projected in 2014 on the surface streets and ramps under the current stop-controlled operation. Queues from the off-ramps back onto the freeway mainline creating significant delays on I-5 in both directions. In both cases, signalization of the ramp terminus intersections was found to alleviate these conditions.

Similar conditions were projected at the I-205/Tracy Boulevard where the limited capacity of the single-lane off-ramp from westbound I-205 results in queues forming that spill back on the mainline of westbound I-205 during both the AM and PM peak periods. Widening of this off-ramp to provide two lanes at the ramp terminus intersection eliminates this problem.

8.1.4 Arterial improvements

As with the other improvement categories, the recommended set of short-term improvements includes a combination of programmed RTP projects and a number of additional operational projects intended to address deficiencies identified as part of the operational analyses conducted as part of the CSMP effort.

The programmed RTP projects, all expected to be completed by 2014, include those along segments of Sperry Road, Lathrop Road, Louise Avenue and Airport Way. All of these projects

will improve operations along routes that provide access to and from the freeway, or serve as alternative routes to the freeway and help balance traffic demand.

The recommended short-term projects also include improvements at five intersections in the I-205/I-5 corridor that were projected to experience significant degradation in operating conditions in 2014. These bottlenecks generally restrict the ability of surface street traffic to access the freeway, but also can affect freeway off-ramp operations and the ability of traffic to use those surface streets as alternatives to the freeway for short trips. Spot intersection capacity improvements are recommended at these locations. While the direct benefit to freeway operations is expected to be small, the benefits to arterial operations are significant.

8.1.5 Cost and Benefit Summary

The total cost of the recommended short-term improvements is $350 million. As a package these improvements are expected to significantly reduce congestion within the corridor for 2014. The operational analysis using the CORSIM model suggests that relative to baseline conditions, these improvements will result in a 2,020 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 36 mph along westbound I-205. During the PM peak period, these improvements will result in a 3,359 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 38 mph along westbound I-205. These projects are also expected to improve the safety performance of the corridor.

For I-5 all of the recommended improvements were assumed in all alternatives; therefore, the model analysis does not provide any quantitative results. However, qualitative statements can be made. The RTP interchange improvements will improve access and decrease congestion at interchanges. The non-RTP ramp intersection signalizations that were assumed would reduce congestion at interchanges and prevent off ramp queues from extending onto the mainline freeway lanes. In turn, these improvements are expected to provide significant benefit in terms of reduced delay and travel times on the freeway.

The first phase of the North Stockton I-5 Widening Project, between Country Club Blvd and March Lane, was not assumed in the analysis because the full project was identified in the RTP as being completed after 2014. However, this phase is now expected to be in place by 2014. It is expected to reduce congestion on I-5 by eliminating the existing bottleneck in the PM peak period at the northbound I-5 lane drop north of Country Club Boulevard.

8.2 Recommended Near-Term Improvements

The recommended near-term improvements are presented in Table 8-2. Similar to the short-term improvements, a primary consideration for the near-term recommendations was implementation feasibility. Thus, the recommended improvements are comprised largely of currently planned RTP projects expected to be completed by 2017. These include the widening of I-5 in north Stockton and SR-120 through Manteca, the extension of the SR-4 Crosstown freeway to Navy Drive on the west side of I-5, several interchange improvements, various arterial improvements, and additional ITS infrastructure. The recommended near-term improvements also include the implementation of ramp metering along the CSMP corridor.

While this near-term scenario was not analyzed using the I-205/I-5 CSMP micro-simulation model, this scenario and the recommended improvements are presented in recognition that several capital projects are progressing toward implementation and that those projects plus system management improvements such as ramp metering are critical to maintaining system performance prior to the implementation of other higher cost and longer-term projects.

The recommended near-term improvements and their expected benefits are further discussed below.

8.2.1 System Management/ITS Improvements

In the near-term, it is recommended that ramp metering be implemented along I-205 and I-5. Consistent with the recently completed San Joaquin Regional Ramp Metering and HOV Lane Master Plan, meters would be installed on most local interchange on-ramps and HOV preferential lanes would be provided. It is assumed that the necessary ramp metering infrastructure and ramp improvements would be included as part of all programmed and planned interchange projects. For those locations where interchange improvements are not planned for this timeframe, the necessary ramp metering improvements will be needed. The installation of ramp metering infrastructure is indicated in Caltrans District 10 Ramp Meter Development Plan.

The implementation of ramp metering in the near-term is expected to reduce congestion on the freeway especially that associated with the breakdown of traffic flow in the merge areas at the on-ramps. Ramp metering is a highly cost-effective strategy for maintaining the performance of the freeway as demands increase and higher-cost capacity increasing improvements become warranted.

8.2.2 Freeway Capacity Improvements

Three freeway capacity improvement projects are recommended for implementation in the near-term. These projects are currently planned and are expected to be completed by 2017.

The widening of I-5 through north Stockton to accommodate HOV and auxiliary lanes in both directions will help reduce congestion that currently occurs in this segment. This project can also encourage HOV use and support express bus operations in this area.

The extension of the SR 4 Crosstown freeway to Navy Drive on the west side of I-5 will eliminate the projected bottleneck at the SR-4/Fresno Avenue intersection. Congestion associated with this bottleneck is projected to extend back onto the freeway portion of SR-4 and onto southbound I-5. This project will also benefit goods movement by improving access to the Port of Stockton.

The widening of SR-120 through Manteca will help reduce congestion projected for that facility and will help the flow of traffic between I-5 and SR-120.

8.2.3 Interchange Improvements

The recommended near-term interchange improvement projects include both modifications to existing interchanges and construction of new interchanges. All of these projects are included

in the 2007 RTP and are expected to be completed by 2017. These include and two projects along I-205 and three projects along I-5.

The reconstruction of the I-205/MacArthur Drive, I-5/Lathrop Road and I-5/Louise Avenue interchanges will enhance circulation at these locations, and reduce congestion on I-5, the ramps and the surface streets. Importantly, these improvements will help reduce or eliminate the frequency and probability of off-ramps backing up and creating congestion on the mainline. Construction of the new I-205/Lammers Road and I-5/Gateway Road interchanges will increase accessibility in those areas, support future development, and help distribute demand from adjacent interchanges.

8.2.4 Arterial improvements

The recommended near-term arterial improvements include three planned RTP projects: the realignment and widening of Lammers Road, the widening of Eight Mile Road, and the widening of Airport Way. All of these projects will improve operations along routes that provide access to and from the freeway, or serve as alternative routes to the freeway and help balance traffic demand. While the direct benefit to freeway operations is expected to be small, the benefits to arterial operations are significant.

8.2.5 Cost and Benefit Summary

The total cost of the recommended near-term improvements is $745.2 million. Operational analysis using the CORSIM model was not conducted for the near-term (2017) period. However this package of improvements is expected to reduce congestion within the corridor by providing additional capacity at several bottleneck locations, managing the entry of vehicles onto the freeways through ramp metering, and encouraging HOV use. These projects are also expected to improve the safety performance of the corridor.

8.3 Recommended Mid-Term (2024) Improvements

The recommended mid-term improvements are presented in Table 8-3. These improvements are comprised largely of high-cost, freeway capacity projects that will address the major deficiencies projected in the future. These include widening to accommodate HOV or HOT lane on I-5 in south Stockton, I-205 through Tracy and westbound I-580 over the Altamont Pass, plus new auxiliary lanes in various locations along both I-5 and I-205. The recommended mid-term improvements also include interchange improvements and construction of the Golden Valley Parkway.

These improvements and their expected benefits are further discussed below.

8.3.1 System Management/ITS Improvements

The mid-term recommendation for System Management/ITS is to maintain the ITS infrastructure and continue System Management activities.

8.3.2 Freeway Capacity Improvements

The recommended mid-term freeway capacity improvement projects include the planned RTP widening of I-205 to accommodate HOV lanes from I-5 to I-580, plus the construction of auxiliary lanes between several interchanges in the Tracy area. These projects will help

accommodate future demand in the corridor, relieve freeway congestion, and encourage HOV use.

During the AM peak, these improvements will act to feed traffic to the bottlenecks associated with the I-205/I-580 merge and the Altamont Pass. By 2024, demands at the merge will greatly exceed what can be managed through the metering of the westbound I-580 connector. The 2024 baseline analysis suggests that queues on I-250 will extend back onto southbound I-5. Thus, the recommended mid-term improvements also include the construction of a westbound HOV/HOT lane on I-580 from I-205 to Greenville Rd where it will connect with a currently proposed HOT lane. Because the current I-580/I-205 junction is configured to have the I-580 mixed-use lanes merge onto the left side of I-205, a new connector from the westbound HOV lanes on I-205 to the HOV/HOT lane on I-580 (or reconfiguration of this junction) would also be required to alleviate the bottleneck at this location. These improvements will eliminate the bottlenecks at the merge and the Pass, and significantly reduce delays along I-205.

The eastbound and westbound I-580 HOV/HOT lanes (and indirectly the connection to the HOV lanes on I-205) are identified as a long-term improvement in the I-580 East CSMP. The I-580 East CSMP breaks down the recommended improvements into only two categories (short-term and long-term) with the short-term improvements defined as those needed to maintain corridor mobility levels through the year 2015, with long-term referring to improvements beyond that. As such, there appears to be no conflict between the I-205/I-5 CSMP mid-term recommendation and the I-580 east CSMP long-term recommendation. Implementation of I-580 HOV/HOT lanes should be coordinated with construction of the HOV lanes on I-205. More specifically, the westbound I-580 HOV/HOT lanes should be built before or concurrently with the I-205 HOV lanes because the alternative analysis indicates that the I-205 HOV lanes will not show significant benefit without the I-580 HOV/HOT lanes.

On I-5 the recommended widening of I-5 from Dr. Martin Luther King Jr. Boulevard to French Camp Road to accommodate HOV, plus various auxiliary lane widening projects will help relieve congestion at several projected bottlenecks locations and reduce delays on I-5. The HOV lane project can also encourage HOV use and support express bus operations in this area.

8.3.3 Interchange Improvements

As noted above, improvements at the I-205/I-580 junction that allow for a direct connection between the westbound I-205 HOV lane and the I-580 HOV/HOT lane are critical to eliminating the bottleneck at this location.

Improvements at the I-5/Mathews Road interchange are also recommended. By 2024, significant congestion is projected at this interchange with queues from the off-ramps backing onto the freeway mainline creating significant delays on I-5 in both directions. Proposed improvements include widening of the off-ramps and the undercrossing, plus modification of access to and from Manthey Road. These improvements will enhance circulation, and reduce congestion on I-5, the ramps and the surface streets. Importantly, these improvements will help reduce or eliminate the frequency and probability of off-ramps backing up and creating congestion on the mainline.

8.3.4 Arterial improvements

The major recommended mid-term arterial improvement is the construction of the Golden Valley Parkway. This improvement will not only improve access to the affected area, but also provide additional capacity in the corridor and help relieve demands on I-5 and I-205.

Access modifications at the Mathews Road/Manthey Road intersection are also recommended to help improve operations in the vicinity of the I-5/Mathews Rd interchange.

8.3.5 Cost and Benefit Summary

The total cost of the recommended mid-term improvements, excluding the estimated $91.3 million for construction of the westbound I-580 HOV/HOT lanes over the Altamont Pass, is $568.9 million. As a package these improvements are expected to significantly reduce congestion within the corridor for 2024 providing additional capacity at several bottleneck locations and managing the entry of vehicles onto the freeways through ramp metering. By greatly expanding the HOV lane network, the recommended improvements will encourage HOV use and further help to reduce congestion. These projects are also expected to improve the safety performance of the corridor.

The operational analysis suggests that relative to baseline conditions, these improvements will result in a 40,257 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 37 mph along westbound I-205 in the AM peak. During the PM peak period, these improvements will result in a 25,480 hour reduction in freeway vehicle delay and increase average peak hour freeway speeds by 36 mph along southbound I-5 between State Route 12 and State Route 4.

8.4 Recommended Long-Term Improvements

The recommended long-term improvements are presented in Table 8-4. These improvements are comprised largely of freeway capacity and interchange improvements that the CSMP analysis indicated are not required by year 2024, but that may produce significant benefits in a year 2030 (or later) analysis. Year 2030 traffic forecasts show high peak direction traffic growth on I-580 over the Altamont Pass and I-205 west of MacArthur Drive, low traffic growth on I-205 west of MacArthur Drive, and high off peak direction traffic growth on I-5 (commuting to and from Sacramento). The projects that could be postponed are:

- I-5 HOV lanes between French Camp Road and I-205
- I-5 HOV lanes between Eight Mile Road to North Gateway Boulevard
- I-5 Mossdale widening
- I-5 HOV lane to I-205 HOV lane direct connector ramps
- I-5/SR-4 interchange improvement
- I-5/Dr. Martin Luther King Jr. Boulevard interchange improvement
- I-5/Downing Avenue interchange improvement
- I-580 Eastbound HOT lane over the Altamont Pass

The HOV/HOT lane improvements on I-580 over the Altamont Pass are largely outside San Joaquin County (District 10) in Alameda County (District 4), although significant benefits, notably congestion relief on I-205, would be felt within San Joaquin County. The I-580 East CSMP prepared by Caltrans' District 4 recommends the addition of HOT lanes on I-580 over the Altamont Pass as a long-term year project to be in place "by 2035". The implementation of this project should be coordinated with construction of the HOV lanes on I-205. In this case, the eastbound I-580 HOV/HOT lanes should be built concurrently with or after the I-205 HOV lanes to ensure that the downstream capacity is available to accept the additional traffic that would flow over the Altamont Pass.

8.4.1 Cost and Benefit Summary

The total cost of the recommended long-term improvements, excluding the costs for construction of the eastbound I-580 HOV/HOT lanes over the Altamont Pass, is $438.6 million. Operational analysis using the CORSIM model was not conducted for the long-term (2030) period. However this package of improvements is expected to reduce congestion within the corridor by providing additional capacity at several projected bottleneck locations. The recommended improvements also include projects that will fill gaps in the HOV lane network, thus encouraging HOV use. These projects are also expected to improve the safety performance of the corridor.

Table 8-1 Recommended Short-Term Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
System Management/ITS Improvements[1]		
Deploy programmed ITS elements along I-205 and I-5 per SHOPP list	TBD	Support system management (monitoring, traveler information) activities
Install additional PeMS detector stations along I-205 and I-5	TBD	Support system management (monitoring) activities
Freeway Capacity Improvements		
I-205 CMIA Project • **Auxiliary lanes from Mountain House Pkwy to Eleventh Street** • **Extend acceleration and deceleration lanes from Grant Line Rd to Tracy Blvd**	13.0	Alleviate merge and diverge deficiencies on I-205; improve mainline operations; reduce delay
I-5 HOV lanes - Country Club Blvd to Hammer Lane[2]	75.0	Reduce congestion on I-5; encourage HOV use
Interchange Improvements		
I-5/French Camp Rd - reconstruct interchange + aux	61.2	Improve interchange operation
I-5/ Hammer Ln - reconstruct interchange + aux	50.0	Improve interchange operation
I-5/ Eight Mile Rd - reconstruct interchange	37.0	Improve interchange operation
I-5/ Otto Dr – new interchange + aux	44.0	Increase accessibility; relieve demand at adjacent interchanges
SR-120/ Airport - reconstruct interchange	18.0	Improve interchange operation
SR-120/ McKinley Ave – new interchange + aux	32.1	Improve interchange operation
I-5/Mathews Rd - Signalization	0.6	Improve intersection operations; eliminate ramp spillback onto mainline
I-5 Roth Rd - Signalization	0.6	Improve intersection operations; eliminate ramp spillback onto mainline
I-205Tracy Ave – widen westbound off-ramp	0.5	Improve intersection operations; eliminate ramp spillback onto mainline
Arterial Improvements		
Sperry Rd extension (Performance Dr to French Camp Rd)	64.9	Increase accessibility; additional system capacity
Lathrop Rd widening to 4 lanes (I-5 to east of UPRR)	2.8	Improve arterial operations
Louise Ave widening to 4 lanes (5th St to SPRR)	4.5	Improve arterial operations
Airport Way widening to 6 lanes (SR 120 to Lathrop)	18.2	Improve arterial operations
Spot intersection improvements: • Mathews Rd / Manthey Rd • Pershing Ave / March Ln • Pacific Ave / March Ln • Thornton Rd / Hammer • Thornton Rd / Eight Mile Rd	3.1	Improve intersection operations
TOTAL COST (Short-term recommendations)	**350.0**	**Excluding System Management/ITS costs**

Notes: **Bold** = RTP Project

1. Caltrans District 4 is pursuing plans to implement metering on the westbound I-580 connector at the merge with westbound I-205. The I-580 East CSMP assumed implementation of this project, and further recommended that capacity of this meter be increased through an additional lane at the meter. The estimated cost was approximately $500,000. This project is relevant to the I-205/I-5 CSMP because the westbound I-580/I-205 merge is identified as a major bottleneck during the AM peak. Metering of the westbound I-580 connector could reduce the congestion and queuing on westbound I-205. However, these benefits will have to be weighed against the potential congestion and air quality impacts that could be created behind the meter on I-580.

2. Subsequent to preparation of this report, the CTC approved additional funding for the I-5 HOV Lanes widening project that will extend the HOV lane limits from Dr. Martin Luther King Jr. Boulevard to Hammer Lane at a total cost of $105 million.

Table 8-2 Recommended Near-term Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
System Management/ITS Improvements		
Deploy planned ITS elements along I-205 and I-5, including RM infrastructure	TBD	Support system management (monitoring, traveler information) activities
Implement ramp metering (including HOV preferential lanes) at all local interchanges along I-205 and I-5	14.7[1]	Alleviate merge deficiencies; improve mainline operations
Freeway Capacity Improvements		
I-5 HOV lanes (from Hammer Ln to north of Eight Mile Rd) – include auxiliary lanes	275.0	Reduce congestion on I-5; encourage HOV use Alleviate merge deficiencies on I-5
SR-120 Widening to 6 lanes	78.0	Reduce mainline congestion on SR-120
SR-4 Extension	217.6	Improve port access; eliminate queue spillback from local intersection onto I-5 mainline
Interchange Improvements		
I-205/ Lammers Rd – new interchange	63.0	Increase accessibility; relieve demand at adjacent interchanges
I-205/ MacArthur Drive – interchange modification	5.4	Improve interchange operation
I-5/ Gateway Rd – new interchange	63.0	Increase accessibility; relieve demand at adjacent interchanges
I-5/ Louise Ave - reconstruct interchange	33.0	Improve interchange operation
I-5/ Lathrop Rd - reconstruct interchange	33.0	Improve interchange operation
Arterial Improvements		
Lammers Road – realign and widen (I-205 to I-580)	62.8	Improve arterial operations
Eight Mile Rd widening (I-5 to SR 99)	145.1	Improve arterial operations
Airport Way widening (French Camp Rd to Arch Airport Way)	29.6	Improve arterial operations
TOTAL COST (Near-term recommendations)	**745.2**	**Excluding System Management/ITS costs**

Notes:
Bold = RTP Project
1. Cost estimate from *Northern San Joaquin Valley Regional Ramp Metering and HOV Lane Master Plan* (2009)

Table 8-3 Recommended Mid-Term Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
Freeway Capacity Improvements		
I-205 HOV lanes from I-580 to I-5	396.6	Reduce mainline congestion; encourage HOV use
I-5 HOV lanes from Dr. Martin Luther King Jr. Boulevard French Camp Road (southbound transition to Mathews Rd)	42.1	Reduce mainline congestion; encourage HOV use
I-580 Westbound HOV/HOT lane from I-205 to Greenville Road	91.3[1]	Provide additional capacity over Altamont Pass; alleviate congestion at westbound merge and eastbound diverge
I-205 Full auxiliary lanes • between Grant Line Rd and Tracy Blvd • between Tracy Blvd and MacArthur Drive • between MacArthur Dr and Paradise Rd	9.4	Improve operations at merge; reduce mainline congestion
I-5 Full auxiliary lanes • between SR-120 and French Camp • between Downing Ave and 8th St • between Pershing Ave and Monte Diablo Ave	19.7	Improve operations at merge; reduce mainline congestion
Interchange Improvements		
I-5/Mathews Rd Interchange Ramps – Off ramp widening, undercrossing widening and Manthey Rd (frontage road) access limitation	1.6	Improve intersection operations; eliminate ramp spillback onto mainline
I-205 HOV median ramps to I-580	18.0	Provide additional capacity through merge area; alleviate congestion at westbound merge and eastbound diverge; fill gap in HOV/HOT network
Arterial Improvements		
Airport Way widening (Lathrop Rd to French Camp Rd)	22.0	Improve arterial operations
Golden Valley Parkway	59.3	Increase accessibility; provide additional system capacity
Mathews Rd / Manthey Rd – Right-in & right-out only	0.2	Improve intersection operations
TOTAL COST (Mid-term recommendations)	**568.9[2]**	

Notes:
Bold = RTP Project
1. This project is outside San Joaquin County and Caltrans District 10. Cost estimate derived from I-580 East CSMP and reflects one-quarter of total estimated cost for construction of HOT lanes in both directions along various segments of I-580. The cost estimate is reported for information purpose only.
2. The total cost does not include the I-580 Westbound HOV/HOT lane Improvement project.

Table 8-4 Recommended Long-Term Improvements

Improvement Project	Estimated Cost (million $)	Expected Impact/Benefit
Freeway Capacity Improvements		
I-5 HOV lanes from I-205 to French Camp Road	108.6	Reduce mainline congestion; encourage HOV use
I-5 Mossdale Widening	122.3	Reduce mainline congestion; encourage HOV use
I-5 HOV lanes from Eight Mile Rd to N. Gateway Blvd	25.0	
I-580 Eastbound HOV/HOT lane from Greenville Road to I-205	91.3[1]	Provide additional capacity over Altamont Pass; alleviate congestion at westbound merge and eastbound diverge
Interchange Improvements		
I-5/ SR 4 (Crosstown) - reconstruct interchange	59.0	
I-5/ Downing Ave - reconstruct interchange	66.0	
I-5/Dr. Martin Luther King Jr. Boulevard – reconstruct interchange	21.4	
I-205 HOV median ramps to I-5	36.3	Provide additional capacity through merge area; fill gap in HOV/HOT network
TOTAL COST (Long-term recommendations)	**438.6[2]**	

Notes:
Bold = RTP Project
1. This project is outside San Joaquin County and Caltrans District 10. Cost estimate derived from I-580 East CSMP and reflects one-quarter of total estimated cost for construction of HOT lanes in both directions along various segments of I-580. The cost estimate is reported for information purpose only.
2. The total cost does not include the I-580 Eastbound HOV/HOT lane Improvement project.