Interstate 80/Interstate 680/State Route 12 Interchange Project

Qualitative PM2.5 Hot Spot Analysis

Near the Cities of Fairfield and Suisun City

Solano County, California

04-SOL-80 PM 10.8–17.0; 04-SOL-680 PM 10.0–13.1;
04-SOL-SR 12W PM 1.7–2.8; and 04-SOL-SR 12E PM 1.8–4.8

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STATE OF CALIFORNIA
Department of Transportation

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Chapter 1 Introduction

This project-level particulate matter impact hot spot analysis for the Interstate 80/Interstate 680/State Route 12 Interchange Project responds to the United States Environmental Protection Agency's (EPA) requirement for a hot spot analysis for particulate matter of diameter less than or equal to 2.5 microns (PM2.5), as required in the EPA's March 10, 2006 Final Transportation Conformity Rule (71 FR 12468). The effects of localized PM2.5 hot spots were evaluated using the EPA and FHWA's guidance manual, *Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Federal Highway Administration, and U.S. Environmental Protection Agency 2006).

This PM2.5 and PM10 analysis addresses the construction of the proposed project, including the following components identified in the Metropolitan Transportation Commission's (MTC) Transportation 2035 Plan for the San Francisco Bay Area (Transportation 2035 RTP), which the MTC adopted on April 22, 2009. The FHWA made the conformity determination for the Transportation 2035 RTP on May 29, 2009.

In the adopted 2035 RTP, the proposed project Alternative C, Phase 1 is listed in Appendix 1, page 126 as reference number 230326 (Metropolitan Transportation Commission 2009).

The MTC adopted the 2009 Transportation Improvement Program (2009 TIP) on May 28, 2008, and FHWA/FTA adopted the 2009 TIP Program on November 17, 2008. In the adopted 2009 TIP, Alternative C, Phase 1 is listed as TIP ID SOL070020, RTP ID 22701, and CTIPS ID 20600004066.

The project is currently listed in the Transportation-Air Quality Conformity Analysis for the Transportation 2035 Plan & 2009 Transportation Improvement Program Amendment #09-06 as Reference Number 230326, and will be complete and operational by 2015.

Chapter 2 Project Description

The project to improve the Interstate 80 (I-80)/Interstate 680 (I-680)/State Route 12 (SR 12) interchange and relocate the westbound truck scales facility is located in the vicinity of the city of Fairfield, Solano County, California (see Figure 1-1). The project area covers some 13 miles encompassing all three highways. The project involves improvements on an approximate 4.5-mile-long segment of I-80 between Red Top Road and Abernathy Road, an approximate 3.5-mile-long segment of I-680 between Gold Hill Road and I-80, 2.0-mile-long segment of SR 12 West (SR 12W) between 0.5 mile west of Red Top Road and I-80, and an approximate 2.5-mile-long segment of SR 12 East (SR 12E) between I-80 and Main Street in Suisun City.

2.1 Alternative C, Phase 1

Alternative C, Phase 1 is the fundable first phase of Alternative C which has been identified by the Department as the Agency Preferred Alternative. A fundable first phase was developed to comply with the Departments NEPA regulations and is the project for which a Record of Decision will be issued.

2.1.1 Western Segment

2.1.1.1 Mainline Improvements

Westbound I-80 would be realigned between a point west of Suisun Valley Road to just west of the SR 12W/I-680 interchange by constructing a new six-lane highway alignment north of the existing highway alignment. The realignment would create space in the median for direct HOV connector ramps to be built between I-80 and I-680, as well as future widening of the eastbound lanes. The realigned westbound I-80 would have six lanes, including an HOV lane and an auxiliary lane matching the existing cross section at the existing Suisun Valley Road overcrossing. Immediately west of the Suisun Valley Road overcrossing, a seventh lane would be added, as well as an eighth lane with the on-ramp from Suisun Valley Road. A ninth lane would be added immediately west of the Green Valley Road off-ramp. The four right lanes would exit from I-80 to connect to SR 12W and I-680. There would be a left exit from the HOV lane to an HOV connector to I-680. A wider, single-span bridge would replace the existing bridge over Green Valley Creek. The existing loop on-ramp from northbound I-680 to westbound I-80 would be removed. The connector from northbound I-680 to SR 12W would be constructed to replace this movement. The segment of I-680 north of Red Top Road would be realigned.

2.1.1.2 Freeway-to-Freeway Interchange Improvements

The I-80/I-680/SR 12W interchange would be consolidated in the location of the existing I-80/SR 12W interchange. Both I-680/SR 12W movements would be via direct connectors. The proposed westbound I-80 to southbound I-680 connector would cross over I-80, the eastbound SR 12W connector to eastbound I-80, the UPRR tracks, Fulton Drive, and the realigned Lopes

Road. Access from westbound I-80 to westbound SR 12W would be braided with (cross over) the Green Valley Road on-ramp to westbound I-80. A separate direct connector structure would be built to carry the HOV lanes in both directions between I-680 and I-80 east of the I-80/I-680/SR 12 interchange. Direct connectors between northbound I-680 and westbound I-80 and eastbound I- 80 and southbound I-680 would be constructed similar to those described under Alternative C. Motorist access from northbound I-680 to westbound I-80 would be served by a loop ramp off the I-680 to SR 12W connector. Traffic from eastbound I-80 to southbound I-680 would use a new two-lane ramp.

The direct connection from SR 12W to southbound I-680 would not be built as part of Phase 1; traffic would use Red Top Road from the new SR 12W/Red Top Road interchange to the new I-680/Red Top Road interchange. Motorists traveling eastbound on SR 12W who wish to go to southbound I-680 would exit SR 12W at the proposed SR 12W/Red Top Road interchange and continue along Red Top Road to an on-ramp at the new I-680/Red Top Road interchange.

2.1.1.3 Interchange Improvements

The I-80/Green Valley Road interchange would have a tight diamond configuration westbound and a partial cloverleaf (loop on-ramp) configuration eastbound. The same interchange and overcrossing would provide access to the existing alignment of I-680 (which would be relinquished as a local arterial, as described earlier in this chapter).

The connection from eastbound SR 12W and eastbound I-80 to southbound I-680 would be removed, with traffic expected to use Red Top Road from the new SR 12W/Red Top Road interchange to the new I-680/Red Top Road interchange. A new on-ramp at Green Valley Road would provide access to the new westbound I-80 alignment.

A new interchange would be constructed at I-680/Red Top Road, consisting of an extension of Red Top Road from Lopes Road to an overcrossing over I-680 connecting to on- and off-ramps. Southbound I-680 on- and off-ramps would be located within the existing curve at Lopes Road. Ramsey Road would be realigned to accommodate the northbound on- and off-ramps, but would not be connected to the interchange. There would be a loop on-ramp to northbound I-680. Access between the interchange and Ramsey Road would not be provided.

The I-80/Red Top Road interchange would be partially reconstructed to have a westbound exit loop. Red Top Road would be realigned to connect this interchange on I-80 with a new diamond interchange at SR 12W/Red Top Road.

2.1.1.4 Local Road Improvements

During the initial construction of Phase 1, a bicycle path would be relocated along the western boundary of the business park at the west end of the existing Business Center Drive parking lot, and along the north side of the new connector from westbound I-80 to westbound SR 12W to maintain access between the existing bicycle path along Jameson Canyon Road (SR 12W) and Business Center Drive. This path would be removed when Business Center Drive is extended to the SR 12W/Red Top Road interchange because bicyclists would be able to utilize the extension of Business Center Drive to reach Red Top Road and points west. The existing Green Valley

Road overcrossing at I-80 would be removed, and a new four-lane overcrossing would be constructed on a different alignment.

A new road would be constructed to connect the I-80/Red Top Road interchange with Business Center Drive. Between I-80 and SR 12W, Red Top Road would be realigned to cross over the UPRR tracks and SR 12W approximately 0.25 mile west of the existing SR 12W/Red Top Road intersection. From SR 12W to Business Center Drive, the new road would be an extension of Business Center Drive, originally proposed as part of the overall North Connector project. However, improvements to the interchange at SR 12W would necessitate a slight realignment of the extended road. Therefore, this improvement is included as a component in this proposed project. Construction of the new road would necessitate considerable excavation, and the excavated soils would be used as fill in the construction of embankment associated with the proposed project.

2.1.2 Western Segment

2.1.2.1 Mainline Improvements

A third lane would be added to eastbound SR 12E. This lane would connect (start) at the eastbound SR 12E/Chadbourne Road interchange and would extend east, connecting and ending at the eastbound SR 12E/Webster Street exit.

Chapter 3 PM2.5 Hot Spot Analysis

The following is the PM2.5 hot spot analysis for the Interstate 80/Interstate 680/State Route 12 Interchange Project. In accordance with the final Transportation Conformity Rule, 40 CFR 93.116 and 93.123 (b)(1), this project is defined as a Project of Air Quality Concern (POAQC) and requires a qualitative PM2.5 hot spot analysis.

3.1 Regulatory Background

Under 1990 Clean Air Act Amendments, the U.S. Department of Transportation (DOT) cannot fund, authorize, or approve Federal actions to support programs or projects that are not first found to conform to the State Implementation Plan (SIP) for achieving the goals of the Clean Air Act requirements Conformity with the Clean Air Act takes place on two levels—first, at the regional level and second, at the project level. The proposed project must conform at both levels to be approved.

Regional level conformity in California is concerned with how well the region is meeting the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and particulate matter (PM). California is in attainment for the other criteria pollutants. At the regional level, Regional Transportation Plans (RTPs) are developed that include all of the transportation projects planned for a region over a period of years, usually at least 20. Based on the projects included in the RTP, an air quality model is run to determine whether or not implementation of those projects would conform to emission budgets or other tests showing that attainment requirements of the Clean Air Act are met. If the conformity analysis is successful, the regional planning organization, such as the Metropolitan Transportation Commission (MTC) for Solano County and the appropriate federal agencies, such as the Federal Highway Administration, make the determination that the RTP is in conformity with the State Implementation Plan for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP must be modified until conformity is attained. If the design and scope of the proposed transportation project are the same as described in the RTP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for carbon monoxide (CO) and/or particulate matter. A region is a "nonattainment" area if one or more monitoring stations in the region fail to attain the relevant standard. Areas that were previously designated as nonattainment areas but have recently met the standard are called "maintenance" areas. "Hot spot" analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA purposes. Conformity does include some specific standards for projects that require a hot spot analysis. In general, projects must not cause the CO standard to be violated, and in "nonattainment" areas the project must not cause any increase in the number and severity of violations. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

The concept of transportation conformity was introduced in the CAA 1977 amendments. Transportation conformity requires that no federal dollars be used to fund a transportation project unless it can be clearly demonstrated that the project would not cause or contribute to violations of the NAAQS. Conformity requirements were made substantially more rigorous in the 1990 CAAA, and the transportation conformity regulation that details implementation of the new requirements was issued in November 1993.

DOT and the EPA developed guidance for determining conformity of transportation plans, programs, and projects in November 1993 in the Transportation Conformity Rule (*40 Code of Federal Regulations* [*CFR*] *51* and *40 CFR 93*). The demonstration of conformity to the SIP is the responsibility of the local Metropolitan Planning Organization (MPO), which is also responsible for preparing RTPs and associated demonstration of SIP conformity. Section 93.114 of the Transportation Conformity Rule, states that "there must be a currently conforming regional transportation plan and transportation improvement plan at the time of project approval."

The MTC is the designated federal MPO and state regional transportation planning agency for Solano County. As such, MTC coordinates the region's major transportation projects and programs, and promotes regionalism in transportation investment decisions.

3.1.1 Statutory Requirements for PM Hotspot Analyses

On March 10, 2006, the EPA issued a final transportation conformity rule (40 CFR 51.390 and Part 93) that addresses local air quality impacts in PM10 and PM2.5 nonattainment and maintenance areas. The final rule requires a hot spot analysis to be performed for a POAQC or any other project identified by the PM2.5 SIP as a localized air quality concern. Transportation conformity, under CAA section 176(c) (42 U.S.C. 7506(c)), requires that federally supported highway and transportation project activities conform to the State Implementation Plan (SIP). The rule provides criteria and procedures to ensure that these activities will not create new violations or "worsen" existing violations, or prevent adherence to relevant NAAQS as described in 40 CFR 93.101.

EPA's final rule, 40 CFR 93.123(b)(1) defines a POAQC as:

> (i) New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
>
> (ii) Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
>
> (iii) New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
>
> (iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
>
> (v) Projects in or affecting locations, areas, or categories of sites which are identified in the PM2.5 or PM10 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

In March 2006, the Federal Highway Administration (FHWA) and EPA issued a guidance document entitled *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2006). This guidance details a qualitative step-by-step screening procedure to determine whether project-related particulate emissions have a potential to generate new air quality violations, worsen existing violations, or delay attainment of NAAQS for PM2.5 or PM10. The PM10 hot spot analysis is not required for project-level conformity because the area is in attainment or unclassified for the national PM10 standards.

For the assessment of PM10 hotspots, the final rule is that a hotspot analysis is to be performed only for POAQCs. POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in the PM2.5 or PM10 SIP as a localized air quality concern. The following list provides examples of POAQCs.

- A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) where 8% or more of such AADT is diesel truck traffic.
- New exit ramps and other highway facility improvements to connect a highway or expressway to a major freight, bus, or intermodal terminal.
- Expansion of an existing highway or other facility that affects a congested intersection (operated at LOS D, E, or F) that has a significant increase in the number of diesel trucks.
- Similar highway projects that involve a significant increase in the number of diesel transit busses and/or diesel trucks.

The list below provides examples of projects that are not an air quality concern.

- Any new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel vehicles), including such projects involving congested intersections operating at LOS D, E, or F.
- An intersection channelization project or interchange configuration project that involves either turn lanes or slots or lanes or movements that are physically separated. These kinds of projects improve freeway operations by smoothing traffic flow and vehicle speeds by improving weave and merge operations, which would not be expected to create or worsen PM2.5 or PM10 violations.
- Intersection channelization projects, traffic circles or roundabouts, intersection signalization projects at individual intersections, and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, and do not involve any increases in idling. Thus, they would be expected to have a neutral or positive influence on PM2.5 or PM10 emissions.

For projects identified as not being a POAQC, qualitative PM2.5 and PM10 (for regions without an approved conformity SIP) hotspot analyses are not required. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that CAA and *40 CFR 93.116* requirements were met without a hotspot analysis, since such projects have been found to not be of air quality concern under *40 CFR 93.123(b)(1).* Because this analysis assumes the area is classified as a nonattainment area for the federal PM2.5 standard, a determination must be made as to whether it would result in a PM2.5 hotspot.

Of these five POAQC types identified above, the project most likely falls into the first category of a "new or expanded highway projects that have a significant number of or significant increase in diesel vehicles." As indicated in Table 3-1, traffic volumes along I-80 are anticipated to exceed the EPA and FHWA's POAQC guidelines of 125,000, although truck percentages are expected to remain below the POAQC guidelines of 8% (i.e., 10,000 truck ADT). Consequently, the project is considered to be a POAQC and a qualitative project-level PM2.5 hot spot analysis was conducted to assess whether the project would cause or contribute to any new localized PM2.5 violations, or increase the frequency or severity of any existing violations, or delay timely attainment of the PM10 or PM2.5 national ambient air quality standards (NAAQS).

Table 3-1. Mainline ADT Volume Calculation Assumptions

I-80 ADT Near Cordelia Truck Scales (Worst-Case Traffic Volumes in Project Area)

	WB		EB		Total				
Condition	am Peak Hour	pm Peak Hour	am Peak Hour	pm Peak Hour	am total Peak Hour	pm total Peak Hour	total Peak Hour	Calculated ADT[1]	Calculated Truck ADT[2]
Existing	8,470	6,780	5,650	8,080	14,120	14,860	28,980	144,900	5,057
2015 No Project	10,207	8,164	6,352	8,198	16,559	16,362	32,921	164,605	5,745
2015 Alt C, Phase 1	10,261	8,471	6,324	9,597	16,585	18,068	34,653	173,265	6,047
2035 No Project	11,139	5,310	8,461	6,767	19,600	12,077	31,677	158,385	5,528
2035 Alt C, Phase 1	11,645	8,607	8,879	5,535	20,524	14,142	34,666	173,330	6,049

Notes

[1] Based on guidance provided by Rabinovitz pers. comm.

[2] Assumes 3.49% diesel trucks based on Caltrans 2007 Annual Average Daily Truck Traffic on the California State Highway System data (Attachment D) and methodology from Section B.3.1 of the Caltrans CO Protocol

3.1.2 Ambient Air Quality Standards

- **24-hour Standard:** The old 1997 standard of 65 μg/m^3 was revised in 2006 to 35 μg/m^3
- **Annual Standard:** 15 μg/m^3

The Bay Area was designated as a nonattainment area for the federal PM2.5 standard on October 8, 2009, with an effective date of December 14, 2009. The BAAQMD must submit a SIP to the EPA by December 14, 2012 demonstrating how the Bay Area will achieve the PM2.5 NAAQS by December 14, 2014. (Bay Area Air Quality Management District 2009.)

The 24-hour PM2.5 standard is based on 3-year average of the 98th percentile of 24-hour recorded concentrations; the annual standard is based on 3-year average of the annual arithmetic mean PM2.5 recorded at the monitoring station. A PM2.5 hot-spot analysis must consider both standards, unless it is determined for a given area that meeting the controlling standard would ensure that CAA requirements are met for both standards. The interagency consultation process should be used to discuss how the qualitative PM2.5 hot-spot analysis meets statutory and regulatory requirements for both standards, depending on the factors that are evaluated for a given project

3.2 PM2.5 Hot Spot Analysis

The final Transportation Conformity Rule requires a hot spot analysis to be performed for POAQC, while projects identified as not being a POAQC are not required to undergo a hot spot analysis. As indicated above, data from Table 3-1 indicates that the project is a POAQC and a qualitative PM2.5 hot spot analysis is required.

A hot-spot analysis is defined in Section 93.101 of 40 CFR as an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant air quality standards. A hot-spot analysis assesses the air quality impacts on a project-level – a scale smaller than an entire nonattainment or maintenance area, such as for congested roadway intersections and highways or transit terminals. Such an analysis is a means of demonstrating that a transportation project meets the federal CAA conformity requirements to support state and local air quality goals with respect to achieving the attainment status in a timely manner. When a hot-spot analysis is required, it is included within the project-level conformity determination that is made by FHWA or the Federal Transit Administration (FTA).

3.2.1 Analysis Methodology and Types of Emissions Considered

The EPA and FHWA established in the *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2006) the following two methods for completing a PM2.5 and PM10 hot-spot analysis:

1. Comparison to another location with similar characteristics – (pollutant trend within the air basin)
2. Air quality studies for the proposed project location – (ambient PM trend analysis in the project area)

This analysis uses a combined approach to demonstrate that the proposed project would not result in a new or worsened PM2.5 or PM10 violation. Method 1 was used to establish that the proposed project area will meet the NAAQS. Method 2 was used to demonstrate that implementation of the proposed project would not delay attainment of the NAAQS.

The analysis was based on directly emitted PM2.5 and PM10 emissions, including tailpipe, brake wear, and tire wear.

The hot spot analysis does not consider PM2.5 re-entrained road dust emissions, since there has been no finding of significance made by the EPA or the California Air Resources Board.

Re-entrained dust caused by vehicles traveling over paved and unpaved roads was not included in the qualitative analysis, as the California Air Resources Board has not made a determination that re-entrained road dust is a significant contributor to ambient PM2.5 concentrations in the project region.

Secondary particles formed through PM2.5 and PM10 precursor emissions from a transportation project take several hours to form in the atmosphere, giving emissions time to disperse beyond the immediate project area of concern for localized analyses; therefore, they were not considered in this hot-spot analysis. Secondary emissions of PM2.5 and PM10 are considered as part of the regional emission analysis prepared for the conforming RTP and Federal Transportation Improvement Program (FTIP).

No phase of construction is anticipated to last more than 5 years at any one location. In addition, the project must comply with Bay Area Air Quality Management District (BAAQMD) construction-related fugitive dust control measures, which will ensure that fugitive dust from construction activities are minimized. Consequently, construction-related PM2.5 emissions were not included in the hot spot analysis per 40 CFR 93123(c)(5).

3.2.2 Air Quality Trend Analysis

Local air quality data was obtained from the Berkeley 6th Street and Vallejo Tuolumne Street monitoring stations to characterize existing air quality and predict future conditions in the project area. In addition to monitoring data, this analysis presents project-level PM2.5 emissions in the future (2015 and 2035) years to help characterize the project's impact on total PM2.5 emissions generated in the project area and the impacts of the project and the likelihood of these impacts interacting with the ambient PM2.5 levels to cause hot spots are discussed.

3.2.2.1 Data Considered

The nearest air quality monitoring station is Fairfield station (1010 Chadbourne Road, Fairfield, California, 94585), which is located approximately 2.25 miles east of the I-80 segment analyzed. However, the Fairfield monitoring station only measures for 1-hour and 8-hour ozone and does not monitor for PM2.5. The next closest stations that monitor for PM2.5 are the Vallejo station (304 Tuolumne St, Vallejo CA, 94590), which is over 10 miles southwest of the project location and the Napa station (26552 Jefferson Av, CA, 94558), which is over 10 miles northwest of the project location. The Napa station is not representative of the project area due to differing geographic characteristics and the lack of a major interstate highway in close proximity to the monitoring station. However, given the proximity to I-80, the Vallejo station is considered representative of the project area.

Based on consultation with the Air Monitoring Manager in the BAAQMD's Air Monitoring Division to identify a monitoring location representative of the project site, it was determined that the Berkeley monitoring station (1340 Sixth St., Berkeley CA, 94710) could serve as an adequate proxy monitoring station to characterize PM2.5 concentrations at the project site. While the Berkeley monitoring station is located approximately 25 miles to the southwest, the proximity of the Berkeley monitoring station to I-80 would be similar to the conditions in the project site and the westerly wind direction at Berkeley is similar to the conditions in the project site, sufficient to serve as a surrogate monitoring station for the project area. (Colwell pers. comm.) Given this, the trend analysis in section 3.2.2.3 primarily concerns data from the Berkeley station, but monitoring data from Vallejo are presented for illustrative purposes.

3.2.2.2 Climate and Topography

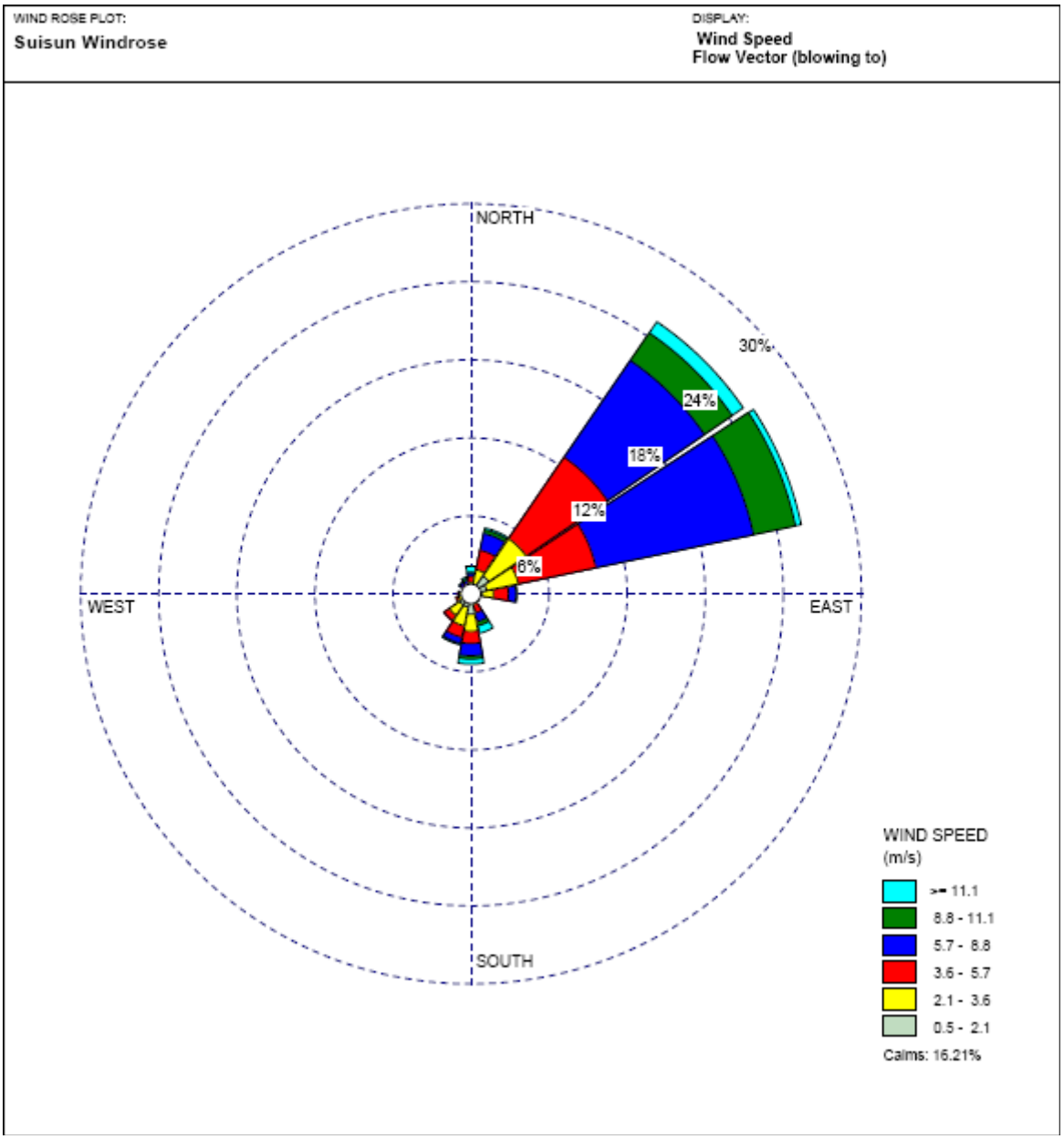
The proposed project lies within the Carquinez Strait region of the San Francisco Bay Area Air Basin (SFBAAB). The Carquinez Strait is the only sea-level gap between the San Francisco Bay and the Central Valley. Within the region, the prevailing winds are from the west, during the summer and fall months, marine air flows eastward through the Carquinez Strait due to high pressure off shore and low pressure in the Central Valley. Figure 3-1indicates the predominant wind direction in the region based on meteorological data from Travis Air Force Base (California Air Resources Board 2009). These west-southwesterly winds usually contain more pollutants from the Sacramento and San Joaquin Valleys in the east than the cleaner marine air from the west. During summer and fall months, this condition can result in elevated pollutant levels as pollutants move through the strait into the central Bay Area from surrounding areas.

The high-pressure periods during the summer and fall months often are accompanied by low wind speeds, shallow mixing depths, higher temperatures, and little or no rainfall. During the summer, mean maximum temperatures reach about 32.2º C (90º F), while mean minimum temperatures in the winter are typically 1.6 º–4.4º C (35 º–40º F). In distant areas like Fairfield, where the region is sheltered from the moderating effects of the strait, temperature extremes are especially pronounced.

Many industrial facilities, such as chemical plants and refineries, are located within the Carquinez Strait region and generate significant air pollutant emissions. However, the high wind speeds in the region often help moderate the pollution potential of this area. Occasionally, short-

term pollution episodes can result from upsets at industrial facilities, while unpleasant odors may occur at any time. The result is that receptors downwind of these facilities could suffer more long-term exposure to air contaminants than individuals elsewhere. Areas of the region that are traversed by major roadways, such as I-80, also may be subject to higher local concentrations of CO and particulate matter, as well as certain toxic air contaminants (TACs), such as benzene.

Figure 3-1. Predominant Wind Direction at Travis Air Force Base



Source: California Air Resources Board 2009

3.2.2.3 Trends in PM2.5 Concentrations

Monitored PM2.5 concentrations at the Berkeley 6th Street monitoring station for the past 3 years (2007-2009) are presented in Table 3-2. The period of 2007-2009 represents the full time period in which the Berkeley monitoring station has been operational; annual PM2.5 data is not available for 2007. This data indicate that the 24-hour average PM2.5 concentrations have exceeded the NAAQS for the past two years. However, the national annual average standard was not exceeded at the monitoring station in any of the past three years. While not indicated in Table 3-2, the Berkeley monitor recorded two days in 2008 in which the national 24-hour PM2.5 standard was exceeded, and one day in 2009. Because the Berkeley station is not a federally recognized monitoring station, the data cannot be used to determine violations of the national PM2.5 standards, or its attainment status. However, based on the Berkeley station is an appropriate proxy station to characterize PM2.5 concentrations and evaluate emission trends in the vicinity of the project area.

Monitored PM2.5 concentrations at the Vallejo Tuolumne Street monitoring station for the past 3 years (2007-2009) are also presented in Table 3-2. This data indicate that the 24-hour average PM2.5 concentrations exceeded the NAAQS for in 2007 and 2008 but not in 2009. However, the national annual average standard was not exceeded at the monitoring station in any of the past three years. While not indicated in Table 3-2, the Vallejo monitor recorded national 24-hour PM2.5 standards exceeded for four days in 2007, seven days in 2008, and five days in 2009. The Vallejo station is a federally recognized monitoring station and is used to determine violations of the national PM2.5 standards. In addition, the Vallejo station is another proxy station to characterize PM2.5 concentrations and evaluate emission trends in the vicinity of the project area.

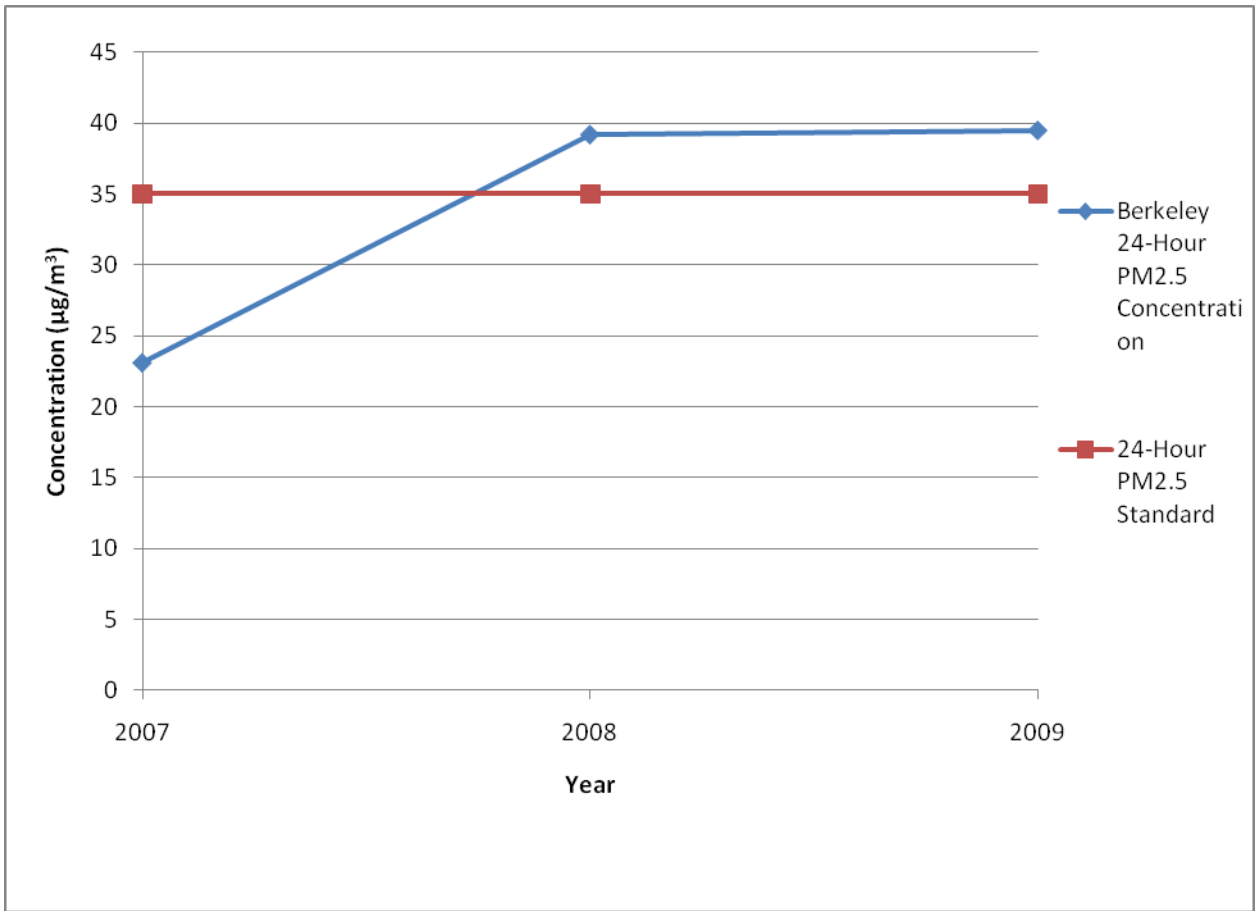
Table 3-2. Ambient PM2.5 Monitoring Data (µg/m3) at the Berkeley 6th Street and Vallejo Tuolumne Street Monitoring Stations (2007-2009)

Metric	2007	2008	2009
Berkeley 6th Street			
24-Hour Standard 98th Percentile	23.1	39.2	39.5
Exceeds the federal 24-hour standard (35 µg/m^3)?	No	Yes	Yes
National annual average	NA	12.9	9.9
Exceeds the federal annual average standard (15 µg/m^3)?	No	No	No
Vallejo Tuolumne Street			
24-Hour Standard 98th Percentile	38.6	36.3	33.5
Exceeds the federal 24-hour standard (35 µg/m^3)?	Yes	Yes	No
National annual average	9.7	9.9	9.9
Exceeds the federal annual average standard (15 µg/m^3)?	No	No	No
Source: California Air Resources Board NA			

As required by the applicable transportation conformity regulations for PM2.5, a trend analysis has been conducted and compared to the current 24-hour and annual average NAAQS. The current 24-hour standard is based on the 3-year average of the 98th percentile of 24-hour average PM2.5 concentrations. The current annual standard is based on a three-year average of annual mean PM2.5 concentrations.

As shown in Figure 3-2, 24-hour average PM2.5 concentrations at the Berkeley 6th Street monitoring station increases between 2007 (23.1 µg/m^3) and 2008(39.2 µg/m^3), and remained relatively constant between 2008 (39.2 µg/m^3) and 2009 (39.5 µg/m^3). These values have remained above the current national standard of 35 µg/m^3, but below the old standard of 65 µg/m^3.

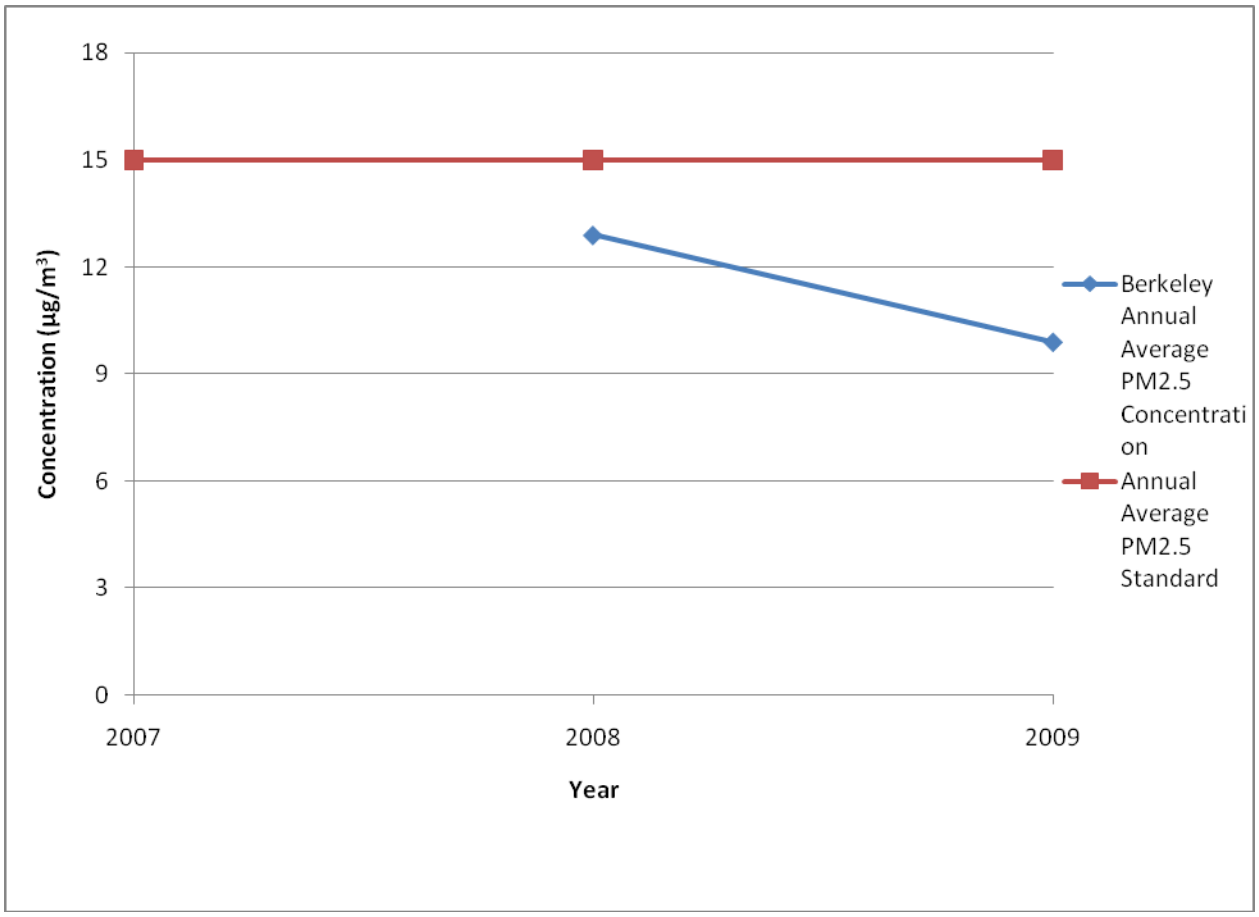
Figure 3-2. 24-Hour Average PM2.5 Concentrations (µg/m^3) at the Berkeley 6th Street Monitoring Station (2007-2009)



Source: California Air Resources Board 2010

Figure 3-3 indicates that Annual average PM2.5 concentrations recorded at the Berkeley 6th Street motioning station decreased from 2008 (12.9 µg/m^3) to 2009 (9.9 µg/m^3). These values have remained below the current national standard of 15.0 µg/m^3.

Figure 3-3. Annual Average PM2.5 Concentrations (µg/m^3) at the Berkeley 6th Street Monitoring Station (2007-2009)



Source: California Air Resources Board 2010

3.2.2.4 Surrounding Land Uses

The Bay Area Air Quality Management District (BAAQMD) generally defines a sensitive receptor as a facility or land use that houses or attracts members of the population, such as children, the elderly, and people with illnesses, who are particularly sensitive to the effects of air pollutants.

Various sensitive receptors are located in the vicinity of the project area are summarized in Figure 3-4 and include: residences, schools, playgrounds, child care facilities, athletic facilities, health care facilities, convalescent centers, or rehabilitation centers. Land use compatibility issues relative to the siting of pollution-emitting sources or the siting of sensitive receptors must be considered. In the case of schools, state law requires that siting decisions consider the potential for toxic or harmful air emissions in the surrounding area. Figure 3-4 does not include the locations of scattered or individual sensitive receptors.

Surrounding land uses include a school and residential developments. As shown in Figure 3-4, sensitive land uses include the high school and residences west of I-680, residences north of I-80 northeast of the SR 12 West connector and north along most of I-80, residences just east of the current I-80/I-680 interchange, and residences north of SR 12 East.

SR 12 East would not be widened northward: therefore these residences would not be closer to the freeway. Also, the build alternative would construct the new interchange further away from the residences that are currently located just east of the I-80/I-680 interchange.

However, the build alternative would construct (realign) the I-680 freeway closer to a high school west of I-680. The realigned I-680 freeway would be located approximately 1000 feet from the northeast corner of the high school property, which is approximately 500 feet closer than the existing alignment at the same location. However, realigning I-680 and constructing the build alternative would help to reduce congestion and improve traffic flow, especially in the opening year. Since motor vehicle emissions tend to be reduced with increased speed and reduced congestion, the project would result in improvements to air quality in the vicinity of these nearby receptors. In addition, given that the prevailing wind direction in the area is from the west-southwest (see Figure 3-1), emissions from I-680 would likely be carried and dispersed the east-northeast of the roadway, and away from the high school.

Figure 3-4. Sensitive Land Uses in the Project Vicinity

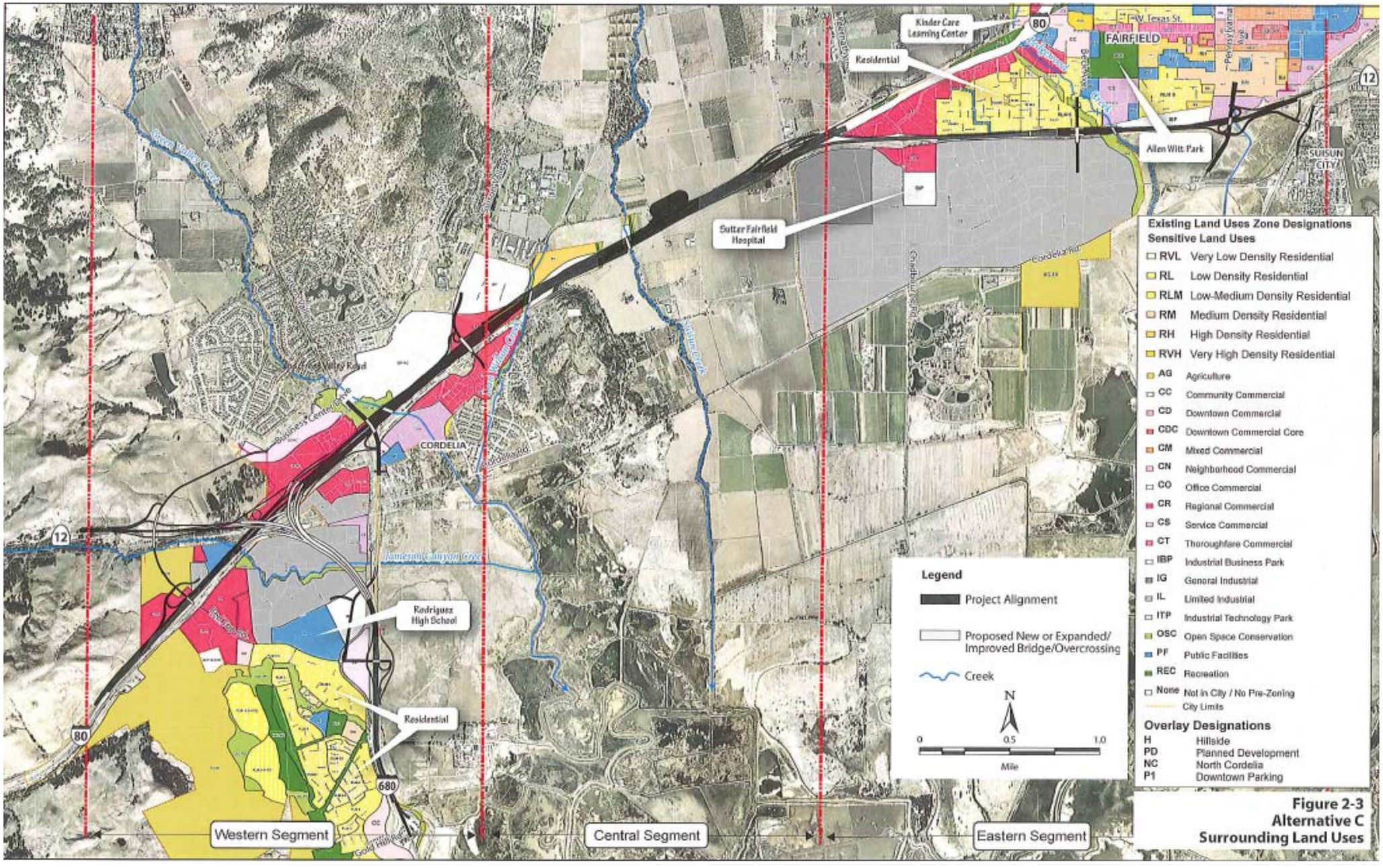
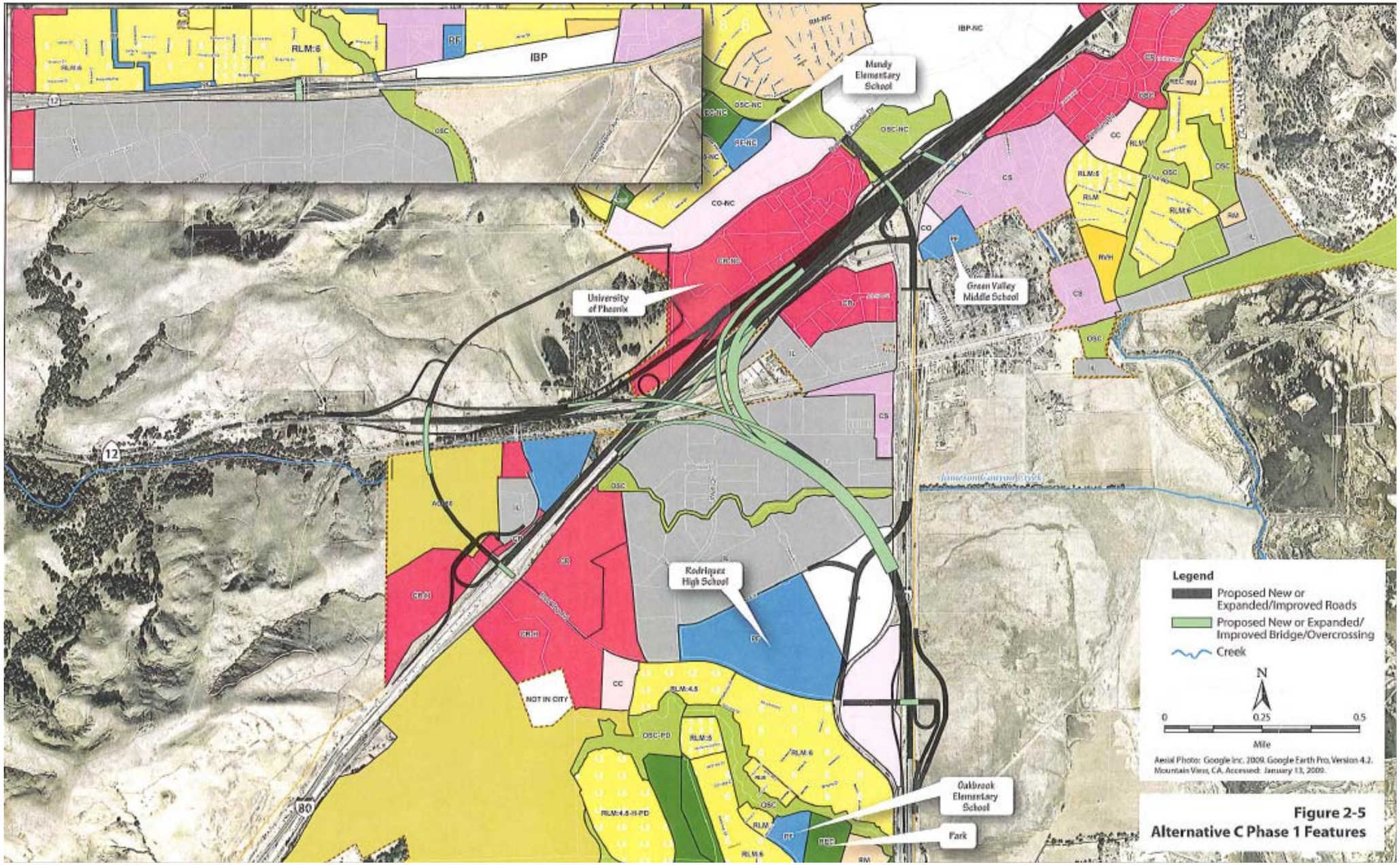


Figure 3-4. Sensitive Land Uses in the Project Vicinity (cont.)



3.2.2.5 Future Trends

Emission trend data for the San Francisco Bay Area Air Basin published in the 2009 edition of *The California Almanac of Emissions and Air Quality* published by the ARB was used to provide an estimate of potential PM2.5 trends in the vicinity of the project area. While the ARB's Almanac does not provide emission trend data on the county level, the regional trend data can be used to provide insight on the general trends of air quality in the region, as implementation of emission standards and control requirements that have an effect on regional pollutant concentrations are likely to result in similar trends at the local level.

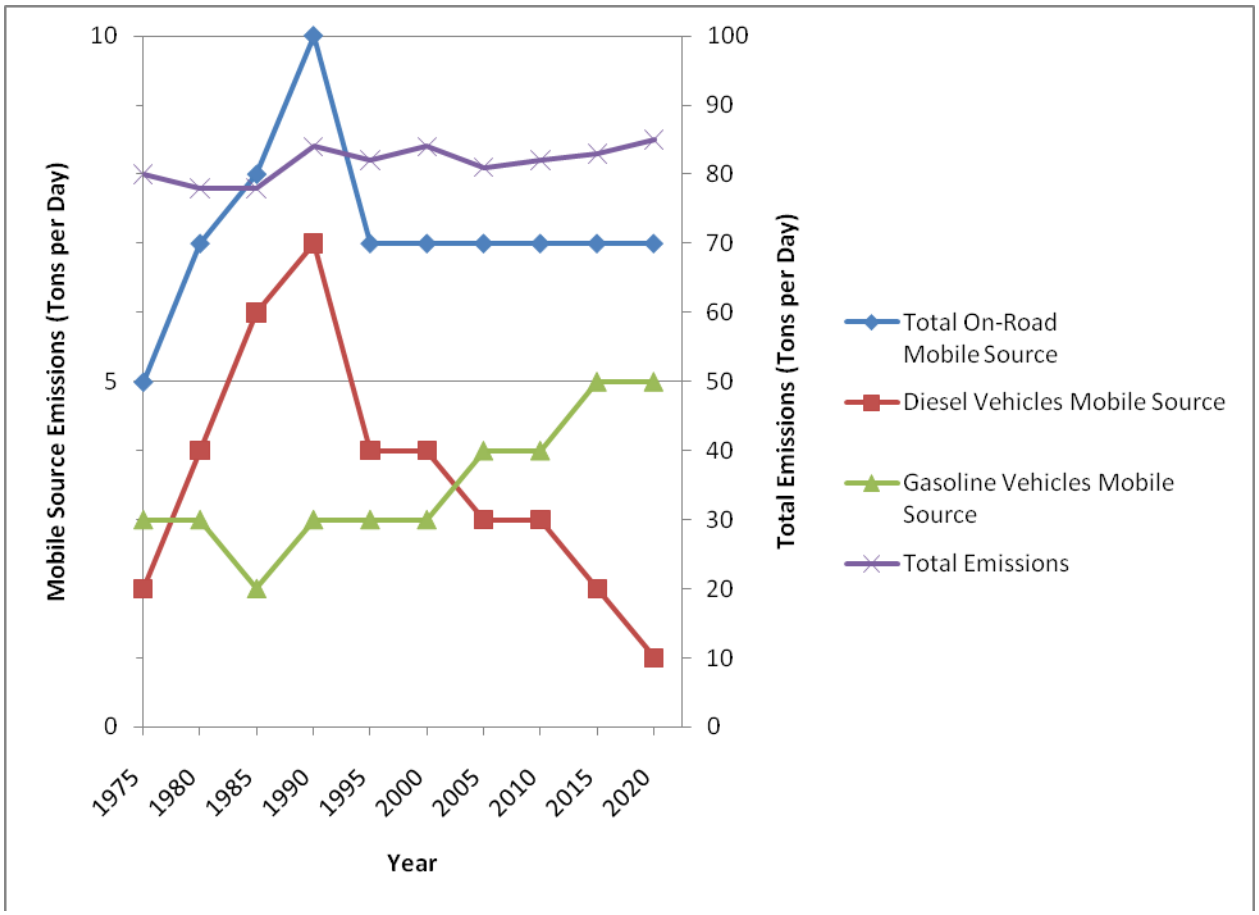
Table 3-3 presents emission trends in the San Francisco Bay Area Air Basin for the years 1975-2020. Total PM2.5 emissions, emissions from on-road gasoline vehicles, on-road diesel vehicles, and total on-road emissions are presented in Table 3-3.

Table 3-3. PM2.5 Emission Trends in the San Francisco Bay Area Air Basin (tons per day)

Year	Total Emissions	Total On-Road Mobile Source	Diesel Vehicles Mobile Source	Gasoline Vehicles Mobile Source
1975	80	5	2	3
1980	78	7	4	3
1985	78	8	6	2
1990	84	10	7	3
1995	82	7	4	3
2000	84	7	4	3
2005	81	7	3	4
2010	82	7	3	4
2015	83	7	2	5
2020	85	7	1	5
Source: California Air Resources Board 2010				

Figure 3-5 presents emissions associated with on-road emissions and indicates that total on-road emissions are expected to remain constant through 2020, with increases in emissions from on-road gasoline vehicles offset by substantial decreases in emissions from on-road diesel vehicles. Emissions of directly emitted PM2.5 from diesel motor vehicles have been decreasing since 1990 even though population and vehicles miles traveled (VMT) are increasing, due to adoption of more stringent emission standards. Figure 3-5 indicates that total PM2.5 emissions have remained relatively constant in the San Francisco Bay Area Air Basin between 1975 and 2005 and are projected to increase slightly through 2020. However, because total on-road emissions are expected to remain constant, the slight increases expected in overall PM2.5 are likely not the result of on-road sources.

Figure 3-5. PM2.5 Emission trends in the San Francisco Bay Area Air Basin (tons per day)



Source: California Air Resources Board 2010

3.2.3 Transportation and Traffic Analysis

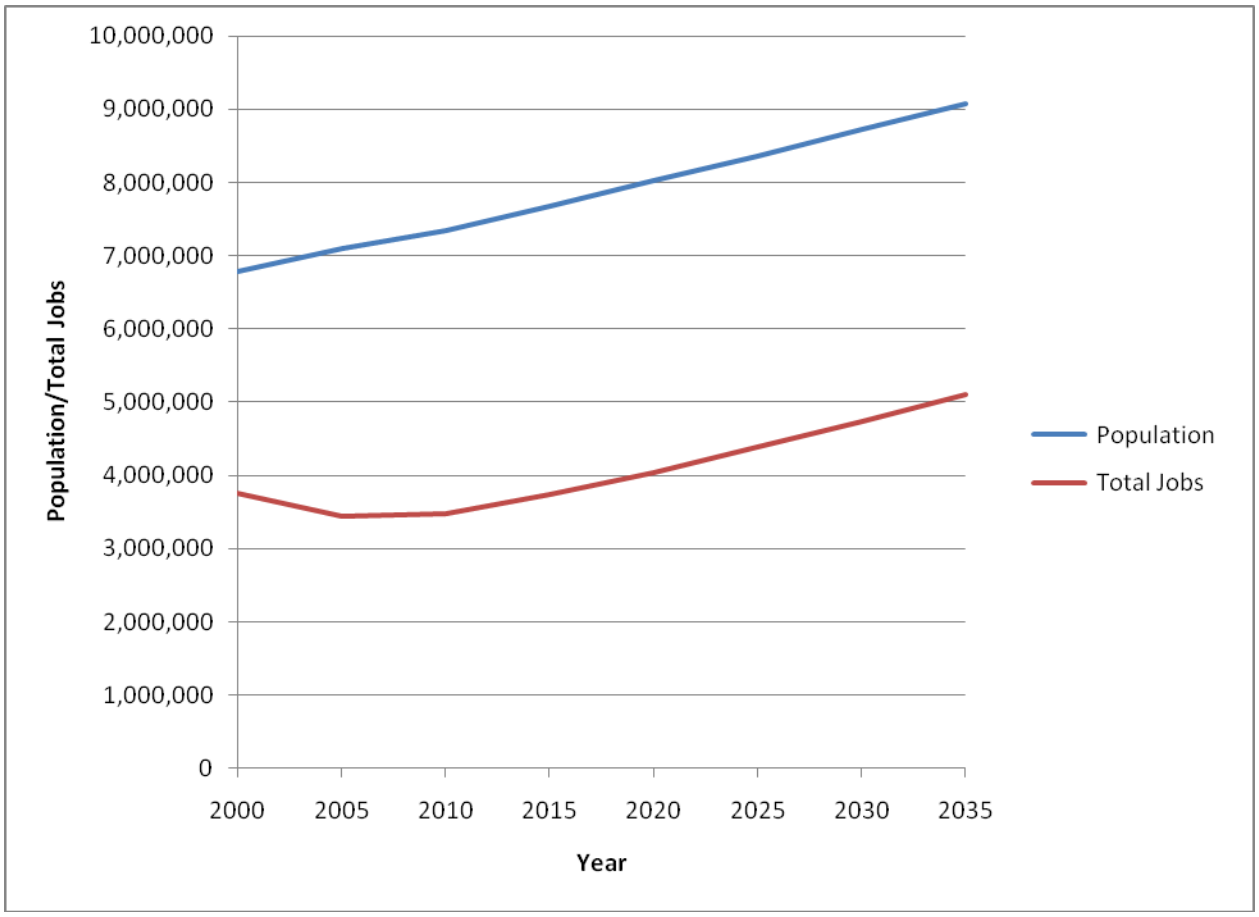
3.2.3.1 Regional Growth

As indicated in Table 3-3 and Figure 3-5, total PM2.5 emissions are projected to increase slightly through 2020, although total on-road emissions are expected to remain constant through 2020. This trend is despite the fact that regional population is anticipated to increase from 6,783,762 in 2000 to 8,018,000 in 2020 and jobs are anticipated to increase from 3,753,460 in 2000 to 4,040,690 in 2020, as indicated in Table 3-4 and Figure 3-6.

Table 3-4. ABAG Regional Population and Housing Projections

	2000	2005	2010	2015	2020	2025	2030	2035
Population	6,783,762	7,096,500	7,341,700	7,677,500	8,018,000	8,364,900	8,719,300	9,073,700
Total Jobs	3,753,460	3,449,740	3,475,840	3,734,590	4,040,690	4,379,900	4,738,730	5,107,390
Source: Association of Bay Area Governments 2009								

Figure 3-6. ABAG Regional Population and Housing Projections



3.2.3.2 Transportation and Traffic

With population and employment growth expected to occur regionally (Table 3-4 and Figure 3-6), it is anticipated that this anticipated growth could result in increased traffic within the project area. Modeled traffic volumes and operating conditions were obtained from the traffic data prepared by the project traffic engineers, Fehr & Peers (Fehr & Peers 2009). Fehr & Peers provided peak hour VMT data and VMT distribution by 5-mph speed bins[1] (5 mph to 75 mph). VMT data included vehicle activity for affected roadways in the immediate project region. Off peak VMT was calculated from peak hour VMT data using a peak hour to daily VMT conversion multiplier of 5, provided by Fehr & Peers (Rabinovitz pers. comm.). The traffic data used for emissions modeling is summarized in Tables 3-5 through 3-7. Table 3-5 presents peak period VMT distribution by speed bin, while Table 3-6 presents non-peak period VMT distribution by speed bin. Table 3-7 presents a comparison of VMT associated with Alternative C, Phase 1 to no project conditions. Table 3-7 indicates that implementation of the build alternative is expected to result in increases in VMT when compared to no-project conditions. While the build

[1] Traffic data are apportioned into separate 5 mph categories between the speeds of 5 to 75 mph. Each 5 mph category is known as a speed bins.

alternative would slightly increase VMT, congested speeds are also increasing, indicating that implementation of the project is causing improved traffic operations and overall system efficiency.

Table 3-5. Criteria Pollutant, MSAT, and CO_2 Modeling Peak Period Traffic Data Inputs

EMFAC Speed Bin Name	VMT Speed Bins Actual	Existing		2015 No Project		2015 Alt C Phase 1		2035 No Project		2035 Alt C Phase1	
		VMT	%	VMT	%	VMT	%	VMT	%	VMT	%
5	0.0–4.99	3,590	0.6	6,215	0.7	3,545	0.4	21,989	2.3	3,976	0.4
10	5.0–9.99	17,038	2.6	16,242	1.7	7,539	0.8	41,087	4.3	17,791	1.7
15	10.0–14.99	11,810	1.8	14,557	1.6	9,132	0.9	48,812	5.1	16,896	1.6
20	15.0–19.99	7,904	1.2	23,837	2.6	7,337	0.8	21,129	2.2	5,964	0.6
25	20.0–24.99	23,955	3.7	30,830	3.3	16,290	1.7	21,760	2.3	18,222	1.8
30	25.0–29.99	33,274	5.1	12,635	1.4	13,777	1.4	15,723	1.7	14,660	1.4
35	30.0–34.99	50,273	7.7	28,900	3.1	36,619	3.8	40,434	4.2	36,444	3.6
40	35.0–39.99	35,486	5.5	34,740	3.7	44,901	4.7	38,276	4.0	24,450	2.4
45	40.0–44.99	28,251	4.3	40,116	4.3	50,507	5.2	35,568	3.7	53,390	5.2
50	45.0–49.99	14,061	2.2	66,066	7.1	33,837	3.5	58,120	6.1	47,359	4.6
55	50.0–54.99	35,562	5.5	58,966	6.3	104,719	10.9	72,410	7.6	142,873	13.9
60	55.0–59.99	30,615	4.7	83,806	9.0	98,014	10.2	176,533	18.5	123,109	12.0
65	60.0–64.99	103,135	15.8	192,765	20.7	209,644	21.7	111,859	11.7	193,862	18.9
70	65.0–69.99	256,001	39.3	316,914	34.1	316,180	32.8	243,730	25.6	316,593	30.8
75	70.0–74.99	0	0.0	3,691	0.4	12,296	1.3	5,176	0.5	10,966	1.1
Total		**650,956**	**100.0**	**930,280**	**100.0**	**964,339**	**100.0**	**952,605**	**100.0**	**1,026,555**	**100.0**

Note: Calculated from Fehr and Peers peak period traffic data (Fehr & Peers 2009).

Table 3-6. Criteria Pollutant, MSAT, and CO_2 Modeling Non-Peak Period Traffic Data Inputs

EMFAC Speed Bin Name	VMT Speed Bins Actual	Existing		2015 No Project		2015 Alt C Phase 1		2035 No Project		2035 Alt C Phase 1	
		VMT	%	VMT	%	VMT	%	VMT	%	VMT	%
5	0.0–4.99	12,564	0.6	21,752	0.7	12,408	0.4	76,963	2.3	13,915	0.4
10	5.0–9.99	59,632	2.6	56,848	1.7	26,387	0.8	143,804	4.3	62,267	1.7
15	10.0–14.99	41,336	1.8	50,949	1.6	31,964	0.9	170,842	5.1	59,136	1.6
20	15.0–19.99	27,665	1.2	83,430	2.6	25,681	0.8	73,951	2.2	20,872	0.6
25	20.0–24.99	83,843	3.7	107,904	3.3	57,015	1.7	76,161	2.3	63,776	1.8
30	25.0–29.99	116,459	5.1	44,223	1.4	48,219	1.4	55,032	1.7	51,311	1.4
35	30.0–34.99	175,957	7.7	101,149	3.1	128,167	3.8	141,517	4.2	127,552	3.6
40	35.0–39.99	124,202	5.5	121,589	3.7	157,152	4.7	133,965	4.0	85,576	2.4
45	40.0–44.99	98,880	4.3	140,406	4.3	176,776	5.2	124,486	3.7	186,866	5.2
50	45.0–49.99	49,213	2.2	231,232	7.1	118,430	3.5	203,419	6.1	165,757	4.6
55	50.0–54.99	124,465	5.5	206,381	6.3	366,517	10.9	253,436	7.6	500,057	13.9
60	55.0–59.99	107,154	4.7	293,322	9.0	343,050	10.2	617,865	18.5	430,881	12.0
65	60.0–64.99	360,974	15.8	674,678	20.7	733,753	21.7	391,505	11.7	678,516	18.9
70	65.0–69.99	896,004	39.3	1,109,200	34.1	1,106,630	32.8	853,054	25.6	1,108,076	30.8
75	70.0–74.99	0	0.0	12,917	0.4	43,036	1.3	18,117	0.5	38,382	1.1
Total		**2,278,348**	**100.0**	**3,255,980**	**100.0**	**3,375,186**	**100.0**	**3,334,118**	**100.0**	**3,592,941**	**100.0**

Note: Calculated from Fehr and Peers peak period traffic data (Fehr & Peers 2009).

Table 3-7. Vehicle Miles Traveled Alternative Comparison

Comparison of VMT by Alternatives	Combined Peak Hour	Non Peak
Comparison of 2015 Build Conditions to 2015 No Project Conditions		
2015 Alt C Scenario 1—2015 No Project	34,059 (3.7 % increase in VMT)	119,206 (3.7 % increase in VMT)
Comparison of 2035 Build Conditions to 2035 No Project Conditions		
2035 Alt C Scenario 1—2035 No Project	73,950 (7.8 % increase in VMT)	258,824 (7.8 % increase in VMT)

Source: Fehr & Peers 2009.

Mainline Average Daily Traffic Volumes

Table 3-1 presents calculated Average Daily Traffic (ADT) volumes for the I-80 corridor in the vicinity of the Cordelia truck scales. This segment was analyzed because it represents a worst-case scenario, as this segment has the greatest traffic volumes of any segment along I-80, I 680, and SR 12in the project area, and projected PM2.5 concentrations and impacts are anticipated to be highest in this area.

The ADT data presented in Table 3-1 was calculated from a.m. and p.m. peak hour volumes along the I-80, as the project traffic study only presented an analysis of mainline peak hour traffic volumes and did not present mainline ADT volumes (Fehr & Peers 2009). Appendix A presents peak hour data for the I-80 segment that were used to calculate ADT volumes.

Based on consultation with the project traffic engineers, Fehr & Peers, ADT volumes were calculated from peak hour volumes presented in Appendix A by summing total a.m. and p.m. peak hour volumes and multiplying the resulting total peak hour volumes by a factor of 5 (Rabinovitz pers. comm.).

MainlineTruck Volumes

An evaluation of truck percentages and truck ADT was not conducted as part of the project traffic study. Consequently, based on guidance from Caltrans staff (Kinoshita pers. comm.), truck percentages were estimated using truck data for the study region published in *Caltrans 2007 Annual Average Daily Truck Traffic on the California State Highway System* (California Department of Transportation 2008) using methodology from Section B.3.1 of the Caltrans *Transportation Project-Level Carbon Monoxide Protocol* (CO Protocol) (Garza et. Al. 1997). Section B.3.1 from Caltrans' CO Protocol presents a methodology to estimate vehicle mix, including heavy duty diesel trucks (HDDT) for use in emissions modeling. Table 3-8 presents the traffic volumes used to estimate truck percentages, while Table 3-9 presents the truck percentage calculations based on methodology from the Caltrans CO Protocol. Based on the calculations presented in Table 3-9, it is anticipated that diesel trucks would represent 3.49% of the total traffic volumes in the area.

Because the build alternative involves improvements to existing freeways and local roadways, it is not anticipated to have an effect on truck volumes and fleet mix in the region, and that the percentage of diesel trucks would remain constant at 3.49% for the no-build and build scenarios, as well as for future years. Consequently, Table 3-1 presents the calculated truck ADT data based anticipated mainline ADT volumes and the calculated truck percentages and indicates that implementation of the build alternatives is expected to result in increases in ADT when compared to no-project conditions.

Table 3-8. Caltrans Truck Percentage Data

Route	Route Suffix	District	County	Postmile Prefix	Postmile	Leg	AADT Total	Total Trucks	Total Truck %	2 Axle Volume	2 Axle Percent	3 Axle Volume	3 Axle Percent	4 Axle Volume	4 Axle Percent	5 Axle Volume	5 Axle Percent	Description
12		4	SOL	R	2.794	B	32500	2340	7.2	719	30.71	214	9.13	118	5.05	1290	55.11	JCT. RTE. 80 WEST
12		4	SOL	L	1.801	A	35500	1807	5.09	460	25.47	150	8.32	36	2	1160	64.22	JCT. RTE. 80 EAST
80		4	SOL	R	11.976	B	120000	6720	5.6	2218	33	551	8.2	222	3.3	3730	55.5	JCT. RTE. 12 WEST
80		4	SOL	R	11.976	A	156000	8112	5.2	2344	28.9	625	7.7	251	3.1	4892	60.3	JCT. RTE. 12 WEST
80		4	SOL		12.839	B	156000	10234	6.56	2576	25.17	677	6.62	788	7.7	6193	60.51	JCT. RTE. 680 SOUTH
80		4	SOL		12.839	A	197000	11308	5.74	2925	25.87	704	6.23	1083	9.58	6596	58.33	JCT. RTE. 680 SOUTH
80		4	SOL		15.815	B	213000	9819	4.61	2905	29.59	633	6.45	468	4.77	5813	59.2	FAIRFIELD, EAST JCT. RTE. 12
680		4	SOL		13.126	B	60000	3126	5.21	1097	35.1	273	8.72	258	8.25	1498	47.93	CORDELIA WYE, JCT. RTE. 80
Total							**970,000**	**53,466**		**15,244**		**3,827**		**3,224**		**31,172**		

Table 3-9. Diesel Truck Calculations

Vehicle Mix Calculation Sheet.

VEHICLE AADT TOTAL	TRUCK AADT TOTAL	TRUCK % TOTAL VEHICLE	TRUCK AADT TOTAL BY AXLE TWO	THREE	FOUR	FIVE+	% TRUCK AADT BY AXLE TWO	THREE	FOUR	FIVE+
970000	53466	5.51%	15244	3827	3224	31172	28.51%	7.16%	6.03%	58.30%

Step 1. Find the mix for the given AADT.

Non-HDT is equal to 100% minus the TRUCK % TOTAL

A. Non-HDT :		0.94488041
b. 2-axle:		0.01571546
c. 3-axle:		0.00394536
d. 4-axle:		0.00332371
e. 5+-axle:		0.03213608
SUM =		1.00000103

STEP 2. Adjust the mix for time of day.

Multiply the percent of each class from step 1 by the non-urban, morning factors from Table B.4 from Caltrans CO Protocol

	Morning factors	
Non-HDT	1.36	1.28503736
2-axle	1.41	0.0221588
3-axle	1.47	0.00579968
4-axle	1.2	0.00398845
5+-axle	0.87	0.02795839
Sum the results		1.34494269

Normalize back to unity by dividing each class by the sum:

Non-HDT	95.55%
2-axle	1.65%
3-axle	0.43%
4-axle	0.30%
5+-axle	2.08%
Sum =	10000.00%

STEP 3. Convert to the vehicle classes used in EMFAC7

Substitute the percentages from STEP 2 g-k into the equations in table B.5 from Caltrans CO Protocol

A. % LDA	76.44%
B. % LDT	13.38%
C. % MDT	4.78%
D. % HDGT	0.96%
E. %HDDT	3.49% <--- Calculated Diesel Trucks
F. % MC	0.96%

Mainline Level of Service

Appendix B presents mainline LOS data for the years 2015 and 2035 and indicates that implementation of project would have a negligible impact on overall a.m. peak hour operations but would dramatically improve system-wide operations in the p.m. peak hour.

Intersection Average Daily Traffic Volumes and Level of Service

Appendix C presents intersection ADT and LOS and indicates that in 20015, overall intersection AADT would decrease at both ramp and non-ramp intersections with project implementation. Intersection volumes would decrease at the majority of intersections, with a 4.5% decrease in overall intersection AADT and the biggest reductions at ramp intersections. LOS and delay would improve further due to signalization. Overall, AADT would generally decrease at other intersections (non-ramp terminals) and LOS and delay would generally remain the same or improve. In 2035, overall intersection AADT would decrease at both ramp and non-ramp intersections with project implementation. Intersection volumes would decrease at just over half of the intersections, with a 4.7% decrease in overall intersection AADT, with the biggest reductions at ramp terminals. LOS and delay would improve slightly at both ramp and non-ramp intersections.

Congestion Relief and System-Wide Improvements

The project would provide congestion relief and improve system-wide operations relief by improving traffic flow and reducing vehicle hours of delay. The project would reduce system-wide travel times and increase overall speeds during both the opening and horizon years (see Table 3-5 and 3-6). For example, opening year average system-wide travel time in the p.m. peak hour would decrease by about four minutes while average speeds would increase by approximately five miles per hour for the build scenario over the no build scenario. Similarly, the horizon year build scenario would result in approximately a six minute savings in travel time and would increase average speeds by approximately nine miles per hour during the p.m. peak hour. System-wide congestion would improve in both the horizon year a.m. and p.m. peak hours as delay would decrease with increased average network speeds over no build conditions. Appendix D provides a summary of travel times and speeds for the different scenario, while Appendix E provides a discussion of congestion relief benefits associated with the project.

3.2.4 Transportation and Traffic Analysis

Vehicle emission rates were determined using the Department's CT-EMFAC model[2]. VMT distribution by speed bin are presented in Table 3-5 and Table 3-6. The CT-EMFAC program assumed the SFBAAB Solano County regional traffic data, operating during the summer months. Vehicle fleet mixes on I-80, I-680, and SR 12 were based on traffic count data collected by the

[2] CT-EMFAC is a California-specific project-level analysis tool for modeling criteria pollutant and carbon dioxide emissions from on-road mobile sources. The model uses the latest version of the California Mobile Source Emission Inventory and Emission Factors model, EMFAC2007. While regulations and emissions controls adopted after 2007 are not reflected in the model emission factors, CT-EMFAC is the latest on-road emissions modeling tool and is used as standard practice in air quality technical analyses.

Department (California Department of Transportation 2008), and MSAT speciation factors were based on CARB factors.

Table 3-10 summarizes the modeled yearly emissions. The differences in emissions between with- and without-project conditions represent emissions generated directly as a result of implementation of the build alternatives. Vehicular emission rates are anticipated to lessen in future years due to continuing improvements in engine technology and the retirement of older, higher-emitting vehicles.

Table 3-10. I-80/I-680/SR 12 Project-Related Emissions (pounds per day)

Scenario	ROG	NO_X	CO	PM10	PM2.5	CO_2[a]
Existing (2004)	2,720	7,671	39,631	191	176	493,410
2015 No Project	1,424	4,386	19,025	206	187	694,836
2015 Alt C Phase 1	1,388	4,522	19,355	202	184	701,297
2035 No Project	814	1,330	8,492	182	169	743,685
2035 Alt C Phase 1	776	1,425	9,077	166	154	749,447
Comparison of Alternatives to Existing						
2015 Alt C Phase 1 - Existing	-1,332	-3,150	-20,276	11	8	207,887
2035 Alt C Phase 1 - Existing	-1,944	-6,247	-30,554	-25	-22	256,037
Comparison of Alternatives to No Project						
2015 Alt C Phase 1 - 2015 No Project	-36	136	330	-4	-3	6,461
2035 Alt C Phase 1 - 2035 No Project	-38	95	585	-16	-15	5,763

Note: Emissions calculations based on CT-EMFAC.
[a] CO_2 presented in metric tons per year.

Emissions associated with implementation of the proposed project were obtained by comparing future with-project emissions to future without-project emissions for both the construction-interim year (2015) and design-future year (2035) scenarios. As indicated in Table 3-10, in 2015 and 2035, PM2.5 emissions would decrease when compared to the No-Build Alternative due to improvements in traffic operations and overall system efficiency.

3.3 Conclusion

Design year ADT on I-80 is expected to exceed the FHWA and EPA's POAQC threshold of 125,000. However truck percentages are not in excess of the FHWA and EPA's POAQC threshold of 8 percent (10,000 diesel truck ADT), as the current diesel truck percentage of approximately 3.49% within the project area equates to truck AADT between 6,047 and 6,049, It should also be noted that implementation of the build alternative would not significantly affect diesel truck volumes and percentages between build and no build alternatives (i.e., effects to truck percentages are below 5% between the no-build and build alternatives). As indicated in Table 3-10, in 2015 and 2035, PM2.5 emissions would decrease when compared to the No-Build Alternative. This is primarily due to travel time savings, decreases in hours of delay, and improvements in average network speed under the build alternative when compared to the no build alternative. Finally, the project would not result in increased congestion at nearby intersections resulting from increased diesel vehicle traffic, as diesel traffic would remain the

same between the no build and build alternatives. Modeling of PM2.5 exhaust emissions indicate that implementation of Alternative C, Phase 1 would result in decreases in daily PM2.5 exhaust emissions over no build conditions in 2015 and 2035.

Transportation conformity is required under CAA section 176(c) (42 U.S.C. 7506(c)) and requires that no federal dollars be used to fund a transportation project unless it can be clearly demonstrated that the project would not cause or contribute to violations of the NAAQS. As required by Final EPA rule published on March 10, 2006, this qualitative assessment demonstrates that the Interstate 80/Interstate 680/State Route 12 Interchange Project meets the CAA conformity requirements and will not conflict with state and local measures to improve regional air quality.

Implementation of the propose project will not result in new violations of the federal PM2.5 air quality standards for the following reasons:

- Based on representative monitoring data, ambient PM2.5 concentrations are remaining relatively constant (24-hour PM2.5 standard) or declining (annual PM2.5 standard) (see Figures 3-2 and 3-3).
- Based on representative monitoring data, monitored annual average PM2.5 concentrations have not exceed the national standard of 15.0 $\mu g/m^3$ in the past three years (2007-2009) (see Table 3-2).
- Based on representative monitoring data, monitored 24-hour average PM2.5 concentrations exceeded the federal standard of 35 $\mu g/m^3$ twice in 2008 and once in 2009, indicating that 24-hour PM2.5 concentrations are likely decreasing.
- Construction of the build alternative would have a negligible impact on overall a.m. peak hour operations but would dramatically improve system-wide operations in the p.m. peak hour.
- In general, construction of the build alternative would result in improved level of service and reduced delay at local intersections.
- Construction of the build alternative would reduce system-wide travel times and increase overall speeds during both the opening and horizon years.
- Project-related PM2.5 emissions are expected to decrease under future build conditions (2015 and 2035) when compared to no build conditions for Alternative C, Phase 1, thereby reducing total PM2.5 emissions generated within the project region (see Table 3-10).
- Maximum truck AADT volume is 6,049, well below the EPA's guidance of 10,000.
- Implementation of the proposed project would not significantly affect diesel truck volumes and percentages between build and no build alternatives (i.e., effects to truck percentages are below 5% between the no-build and build alternatives).

For these reasons, future or worsened PM2.5 violations of any standards are not anticipated. Therefore, the proposed Interstate 80/Interstate 680/State Route 12 Interchange Project meets the conformity hot spot requirements in 40 CFR 93.116 and 93.126 for PM2.5.

Chapter 4 References Cited

4.1 Printed References

Association of Bay Area Governments. 2009. *ABAG Projections 2009: Regional Projections*. Last Revised: 2009. Available at: <http://www.abag.ca.gov/planning/currentfcst/regional.html>. Accessed November 3, 2010.

Bay Area Air Quality Management District. 2009. *Air Quality Plans*. Last Revised: October 4, 2010. Available at: <http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans.aspx>. Accessed November 2, 2010.

Bay Area Air Quality Management District. 1910. *2009 Air Monitoring Network Report*. July 1. Prepared by Technical Services Division.

California Air Resources Board. 2009. Meteorological Files. Last Revised: August 5, 2009. Available at <http://www.arb.ca.gov/toxics/harp/metfiles.htm>. Accessed November 2, 2009.

California Air Resources Board. 2010. ARB Databases: Aerometric Data Analysis and Management System (ADAM). Last Revised: Unavailable. Available at <http://www.arb.ca.gov/adam/topfour/topfour1.php>. Accessed November 3, 2009.

California Air Resources Board. 2010. *The California Almanac of Emissions and Air Quality: 2009 Edition*. Planning and Technical Support Division.

California Department of Transportation. 2008. 2007 Annual Average Daily Truck Traffic on the California State Highway System. State of California, Business, Transportation and Housing Agency. Sacramento, CA, Division of Traffic Operations Office of System Planning Management Traffic Data Branch.

Federal Highway Administration, and U.S. Environmental Protection Agency. 2006. Transportation Conformity Guidance for Qualitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas.

Fehr & Peers. 2009. Draft Traffic Operations Report for the I-80/I-680/SR 12 Interchange Project Report. February 2009. Prepared for Caltrans, Solano Transportation Authority, and Mark Thomas/Nolte JV. Walnut Creek, CA.

Garza, V. J., P. Graney, and D. Sperling. 1997. Transportation Project-Level Carbon Monoxide Protocol. Davis, CA: Institute of Transportation Studies, University of California, Davis.

4.2 Personal Communications

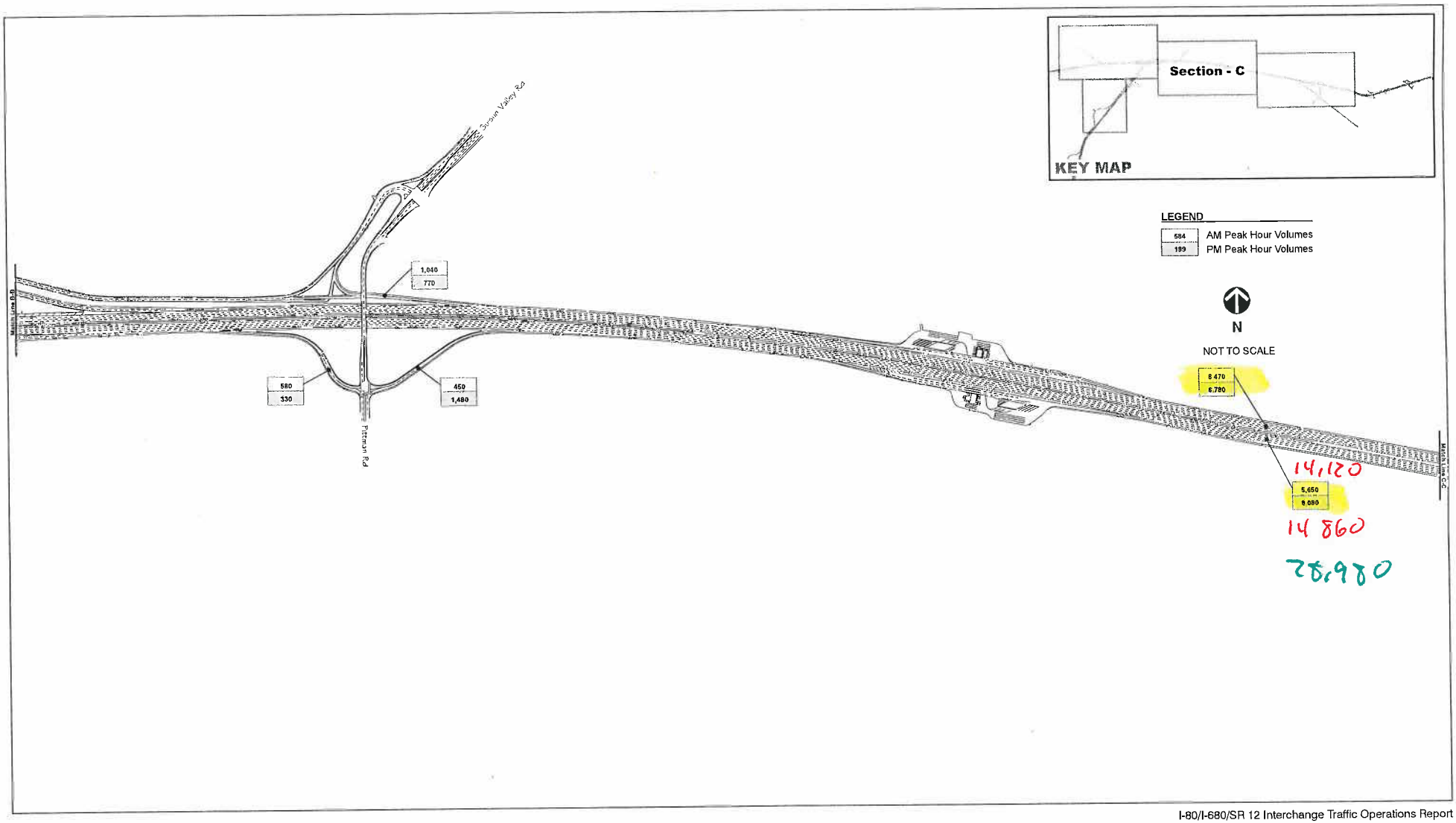
Colwell, Glen. Air Monitoring Manager. Bay Area Air Quality ManagementDistrict. California Department of Transportation, District 4. Oakland, CA. November 3, 2010—telephone conversation.

Kinoshita, Glenn. District Branch Chief-Air/Noise Studies. California Department of Transportation, District 4. Oakland, CA. June 23, 2010—email.

Rabinovitz, Joel. Transportation Engineer. Fehr & Peers. Walnut Creek, CA. January 29, 2009—telephone conversation.

Appendix A

Mainline Peak Hour Volumes used to Calculate Average Daily Traffic



I-80/I-680/SR 12 Interchange Traffic Operations Report

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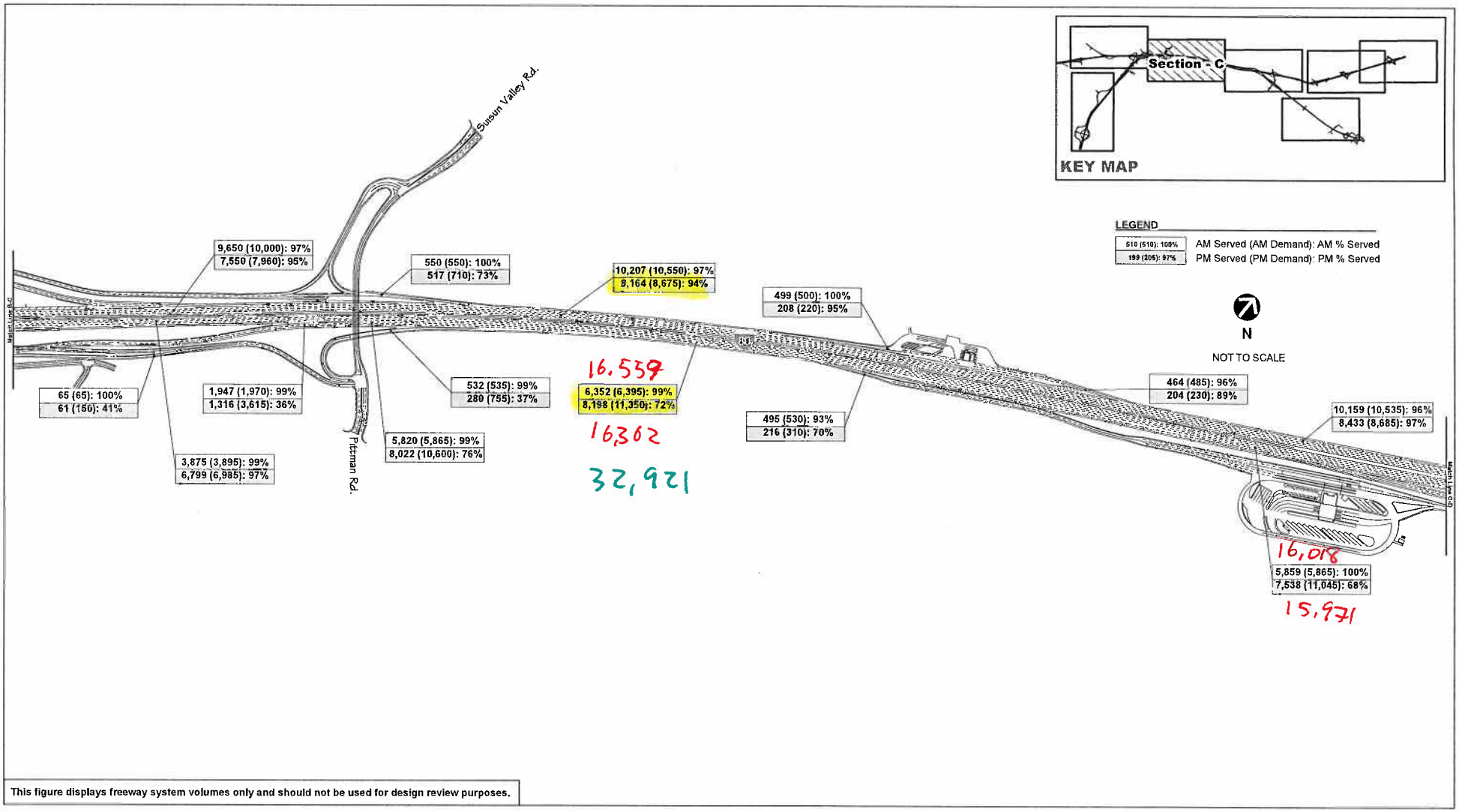
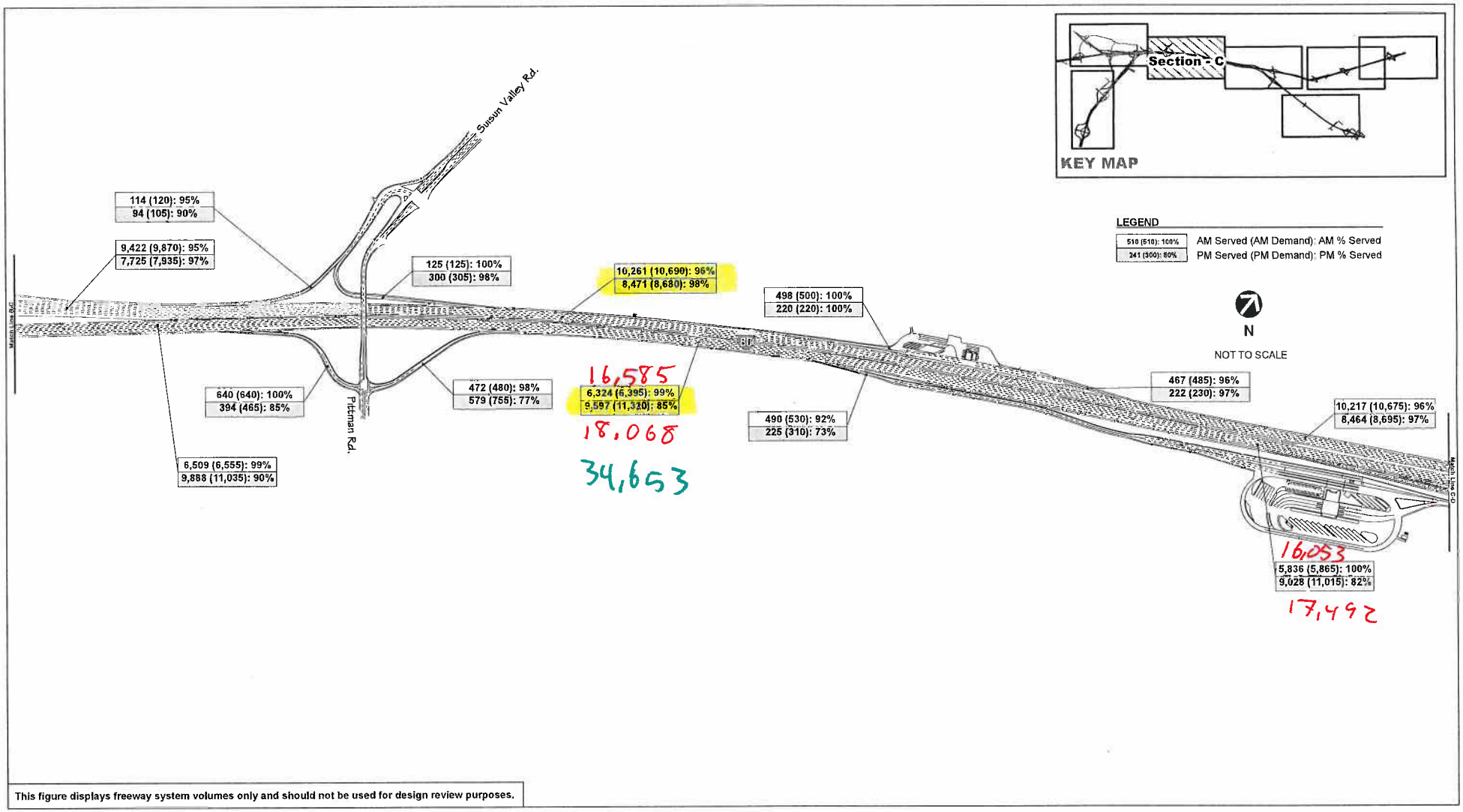
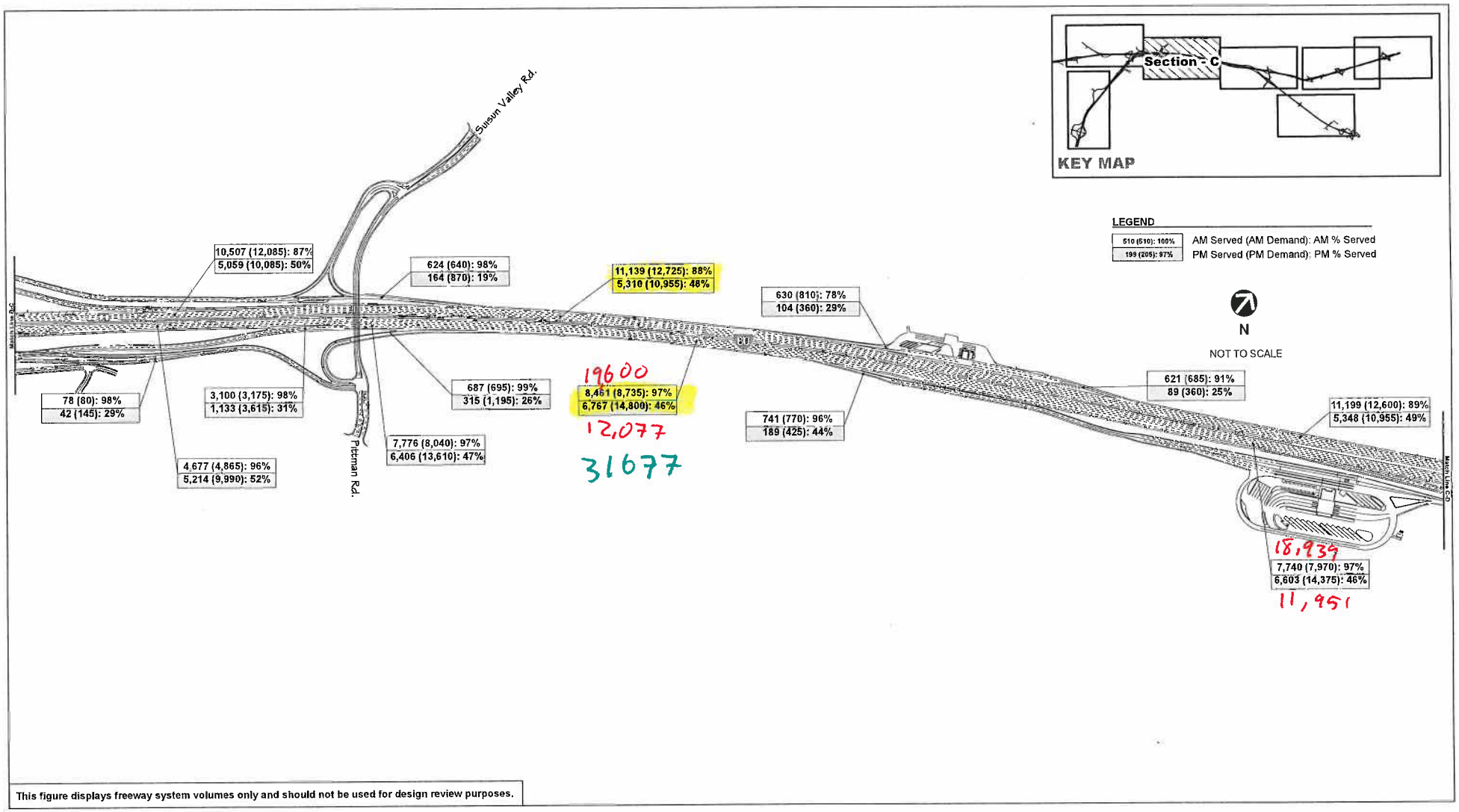
N:\Projects\1021\1808\GIS\MXD\Section C_Exist.mxd

EXISTING CONDITIONS
SECTION - C
FIGURE A3


Section - C
KEY MAP
LEGEND
510 (510): 100%
199 (205): 97%
AM Served (AM Demand): AM % Served
PM Served (PM Demand): PM % Served
N
NOT TO SCALE
Susuin Valley Rd.
Pittman Rd.
Marsh Creek Rd.
9,650 (10,000): 97%
7,550 (7,960): 95%
550 (550): 100%
517 (710): 73%
10,207 (10,550): 97%
8,164 (8,675): 94%
499 (500): 100%
208 (220): 95%
65 (65): 100%
61 (156): 41%
1,947 (1,970): 99%
1,316 (3,615): 36%
532 (535): 99%
280 (755): 37%
16,539
6,352 (6,395): 99%
8,198 (11,350): 72%
16,362
32,921
495 (530): 93%
216 (310): 70%
464 (485): 96%
204 (230): 89%
10,159 (10,535): 96%
8,433 (8,685): 97%
3,875 (3,895): 99%
6,799 (6,985): 97%
5,820 (5,865): 99%
8,022 (10,600): 76%
16,018
5,859 (5,865): 100%
7,538 (11,045): 68%
15,971
This figure displays freeway system volumes only and should not be used for design review purposes.



This figure displays freeway system volumes only and should not be used for design review purposes.



This figure displays freeway system volumes only and should not be used for design review purposes.

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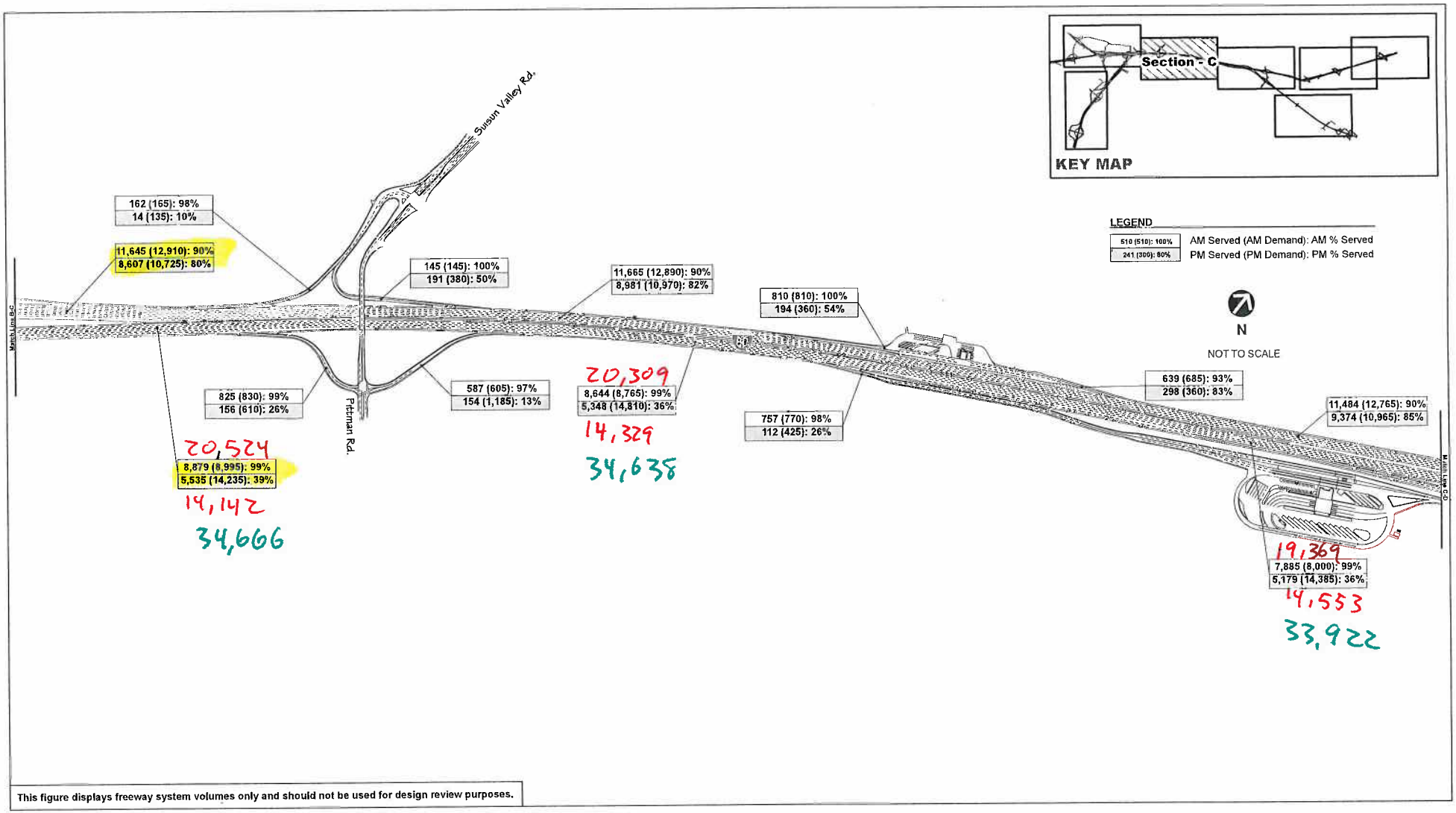
February 2009
1021-1806_2035_NP_SectionC.mxd

YEAR 2035 NO PROJECT
SECTION - C
FIGURE A7



This figure displays freeway system volumes only and should not be used for design review purposes.

YEAR 2035
ALTERNATIVE C PHASE 1 VOLUMES
SECTION - C
FIGURE A56

FEHR & PEERS
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February 2009
1021-1806_2035_AltC_SectionC_mod.mxd

Appendix B

Mainline LOS

TABLE 6-4
2015 ALTERNATIVE C PHASE I AM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C	
		Density[1]	LOS	Density[1]	LOS
Eastbound I-80					
EB I-80, west of Red Top Road	Mainline	17	B	17	B
EB I-80, to Red Top Road	Diverge	14	B	14	B
EB I-80, from Red Top Road	Merge	9	A	N/A [3]	
EB I-80, between Red Top Road and SR 12 West	Mainline	22	C	14	B
EB I-80, between SR 12 West and Green Valley Road / I-680 SB	Weave [2]	17	B	N/A [3]	
EB I-80, from SR 12 West Connector	Merge	N/A [3]		11	B
EB I-80, from NB I-680 Connector	Merge	18	B	19	B
EB I-80, between I-680 and Green Valley Road	Mainline	N/A [3]		18	B
EB I-80, from Green Valley Road	Merge	11	B	N/A [3]	
EB I-80, between Green Valley Road and Pittman Road	Weave [2]	N/A [3]		19	B
EB I-80, between Pittman Road and Truck Scales	Weave [2]	18	B	19	B
EB I-80, to EB SR 12 East Connector	Diverge	11	B	15	B
EB I-80, between SR 12 East and Truck Scales	Mainline	N/A [3]		16	B
EB I-80, between Truck Scales and Abernathy Road	Weave [2]	19	B	17	B
EB I-80, between Abernathy Road and West Texas Street	Weave [2]	16	B	17	B
EB I-80, between Beck Avenue and Travis Boulevard	Weave [2]	15	B	16	B
EB I-80, from Travis Boulevard	Merge	10	B	11	B
EB I-80, between Travis Blvd. and Air Base Prkwy. / Waterman Blvd.	Mainline	14	B	15	B
EB I-80, to Air Base Parkway / Waterman Boulevard	Diverge	12	B	13	B
EB I-80, from Air Base Parkway / Waterman Boulevard	Merge	13	B	14	B
EB I-80, east of Air Base Parkway / Waterman Boulevard	Mainline	18	C	17	B
Westbound I-80					
WB I-80, east of Waterman Boulevard / Air Base Parkway	Mainline	31	D	30	D
WB I-80, to Waterman Boulevard Diagonal	Diverge	24	C	24	C
WB I-80, to Air Base Parkway Loop	Diverge	22	C	22	C
WB I-80, from Air Base Parkway / Waterman Boulevard	Merge	30	D	32	D
WB I-80, between Waterman Blvd. / Air Base Pkwy. and Travis Blvd.	Mainline	34	D	34	D
WB I-80, to Travis Boulevard	Diverge	30	D	33	D
WB I-80, from Travis Boulevard	Merge	24	C	25	C
WB I-80, between Travis Boulevard Loop and Oliver Road	Weave [2]	30	D	30	D
WB I-80, from Oliver Road / West Texas Street	Merge	31	D	33	D
WB I-80, to Abernathy Road	Diverge	34	D	33	D
WB I-80, from Abernathy Road	Merge	23	C	22	C
WB I-80, from SR 12 East	Merge	22	C	24	C
WB I-80, between SR 12 East Connector and Truck Scales	Mainline	33	D	32	D

TABLE 6-4
2015 ALTERNATIVE C PHASE I AM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C	
		Density[1]	LOS	Density[1]	LOS
WB I-80, to Truck Scales	Diverge	18	B	25	C
WB I-80, between Truck Scales and Suisun Valley Road	Weave [2]	37	E	31	D
WB I-80, between Suisun Valley Road and Green Valley Road	Weave [2]	N/A [3]		24	C
WB I-80, to Southbound I-680 Connector	Diverge	24	C	N/A [3]	
WB I-80, from NB I-680	Merge	30	C	N/A [3]	
WB I-80, to SR 12 West/I-680 Connector	Diverge	N/A [3]		16	B
WB I-80, between Green Valley Road and SR 12 West	Weave [2]	26	C	N/A [3]	
WB I-80, between SR 12 West/I-680 Connector and Green Valley Rd	Mainline	N/A [3]		19	C
WB I-80, between SR 12 West and Red Top Road	Mainline	21	C	N/A [3]	
WB I-80, from Green Valley Rd	Merge	N/A [3]		15	B
WB I-80, to Red Top Road	Diverge	23	C	21	C
WB I-80, from Red Top Road	Merge	19	B	23	C
WB I-80, west of Red Top Road	Mainline	14	B	22	C
Northbound I-680					
NB I-680, to Gold Hill Road	Diverge	20	B	20	C
NB I-680, from Gold Hill Road	Merge	19	B	22	C
NB I-680, to Red Top Road	Diverge	N/A [3]		21	C
NB I-680, from Red Top Road	Merge	N/A [3]		19	B
NB I-680, between Gold Hill Road and Central Way	Mainline	20	C	N/A [3]	
NB I-680, to Central Way	Diverge	21	C	N/A [3]	
NB I-680, to SR 12 West	Diverge	N/A [3]		18	B
NB I-680, to Suisun Valley Road	Diverge	17	B	N/A [3]	
NB I-680, off HOV Bypass	Diverge	N/A [3]		16	B
Southbound I-680					
SB I-680, from HOV Bypass	Merge	N/A [3]		19	B
SB I-680, from EB I-80 / Green Valley Road	Merge	28	C	N/A [3]	
SB I-680, between I-80 and Gold Hill Road	Mainline	27	D	N/A [3]	
SB I-680, to Red Top Road	Diverge	N/A [3]		25	C
SB I-680, from Red Top Road	Merge	N/A [3]		26	C
SB I-680, to Gold Hill Road	Diverge	26		C	27
SB I-680, from Gold Hill Road	Merge	27	C	26	C
Eastbound SR 12 West					
EB SR 12 West, west of Red Top Road	Mainline	N/A [3]		10	A
EB SR 12 West, to Red Top Road	Diverge	N/A [3]		10	B
EB SR 12 West, from Red Top Road	Merge	N/A [3]		8	A

TABLE 6-4
2015 ALTERNATIVE C PHASE I AM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C	
		Density[1]	LOS	Density[1]	LOS
Westbound SR 12 West					
WB SR 12 West, from I-680	Merge	N/A [3]		18	B
WB SR 12 West, from Red Top Road	Merge	N/A [3]		22	C
WB SR 12 West, west of Red Top Road	Mainilne	N/A [3]		24	C
Eastbound SR 12 East					
EB SR 12 East, between Truck Scales and Chadbourne Road	Weave [2]	10	A	10	B
EB SR 12 East, from Chadbourne Road	Merge	12	B	12	B
EB SR 12 East, to Webster Street	Diverge	15	B	15	B
EB SR 12 East, between Webster Street and Civic Center Boulevard	Weave [2]	11	B	11	B
EB SR 12 East, from Civic Center Boulevard	Merge	14	B	14	B
Westbound SR 12 East					
WB SR 12 East, to Main Street	Diverge	**68**	**F**	**79**	**F**
WB SR 12 East, between Main Street and Jackson Street	Weave [2]	**74**	**F**	**85**	**F**
WB SR 12 East, from Jackson Street	Merge	**105**	**F**	**111**	**F**
WB SR 12 East, to Abernathy Road	Diverge	26	C	26	C
WB SR 12 East, from Abernathy Road	Merge	21	C	24	C

Notes: [No Shading] = Under Capacity, = Near Capacity, = At/Over Capacity, = 25% Over Capacity, = More than 50% Over Capacity
BOLD = segment operates unacceptably. * = Denotes segment operates at capacity.
1. Density is expressed in vehicles per hour per lane. Speed is expressed in miles per hour and is the speed over all lanes (excluding HOV).
2. Level of service thresholds for weaving sections are different than mainline sections. Refer to Table 1 for thresholds.
3. N/A – This segment is not applicable for this scenario. It is a ramp or freeway segment that isn't present in one scenario, but is in the other.

Source: Fehr & Peers, May 2009.

Attachment C

2015 PM Freeway LOS

TABLE 6-6
2015 ALTERNATIVE C PHASE I PM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C	
		Density[1]	LOS	Density[1]	LOS
Eastbound I-80					
EB I-80, west of Red Top Road	Mainline	25	C	25	C
EB I-80, to Red Top Road	Diverge	20	B	20	B
EB I-80, from Red Top Road	Merge	18	B	N/A [3]	
EB I-80, between Red Top Road and SR 12 West	Mainline	18	C	23	C
EB I-80, between SR 12 West and Green Valley Road / I-680 SB	Weave [2]	29	D	N/A [3]	
EB I-80, from SR 12 West Connector	Merge	N/A [3]		32	D
EB I-80, from NB I-680 Connector	Merge	**100**	**F**	**49**	**F**
EB I-80, between I-680 and Green Valley Road	Mainline	N/A [3]		**47**	**F**
EB I-80, from Green Valley Road	Merge	**50**	**F**	N/A [3]	
EB I-80, between Green Valley Road and Pittman Road	Weave [2]	N/A [3]		**53**	**F**
EB I-80, between Pittman Road and Truck Scales	Weave [2]	**96**	**F**	**64**	**F**
EB I-80, to EB SR 12 East Connector	Diverge	**136**	**F**	**71**	**F**
EB I-80, between SR 12 East and Truck Scales	Mainline	N/A [3]		23	C
EB I-80, between Truck Scales and Abernathy Road	Weave [2]	22	C	26	C
EB I-80, between Abernathy Road and West Texas Street	Weave [2]	21	C	25	C
EB I-80, between Beck Avenue and Travis Boulevard	Weave [2]	21	C	25	C
EB I-80, from Travis Boulevard	Merge	21	C	23	C
EB I-80, between Travis Blvd. and Air Base Prkwy. / Waterman Blvd.	Mainline	24	C	27	D
EB I-80, to Air Base Parkway / Waterman Boulevard	Diverge	20	B	22	C
EB I-80, from Air Base Parkway / Waterman Boulevard	Merge	26	C	27	C
EB I-80, east of Air Base Parkway / Waterman Boulevard	Mainline	28	D	29	D
Westbound I-80					
WB I-80, east of Waterman Boulevard / Air Base Parkway	Mainline	24	C	24	C
WB I-80, to Waterman Boulevard Diagonal	Diverge	21	C	21	C
WB I-80, to Air Base Parkway Loop	Diverge	15	B	15	B
WB I-80, from Air Base Parkway / Waterman Boulevard	Merge	26	C	26	C
WB I-80, between Waterman Blvd. / Air Base Pkwy. and Travis Blvd.	Mainline	26	D	27	D
WB I-80, to Travis Boulevard	Diverge	25	C	26	C
WB I-80, from Travis Boulevard	Merge	20	C	20	C
WB I-80, between Travis Boulevard Loop and Oliver Road	Weave [2]	24	C	24	C
WB I-80, from Oliver Road / West Texas Street	Merge	25	C	25	C
WB I-80, to Abernathy Road	Diverge	26	C	27	C
WB I-80, from Abernathy Road	Merge	19	B	20	B
WB I-80, from SR 12 East	Merge	20	B	18	B
WB I-80, between SR 12 East Connector and Truck Scales	Mainline	27	D	26	D

TABLE 6-6
2015 ALTERNATIVE C PHASE I PM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C	
		Density[1]	LOS	Density[1]	LOS
WB I-80, to Truck Scales	Diverge	34	D	21	C
WB I-80, between Truck Scales and Suisun Valley Road	Weave [2]	40	E	25	C
WB I-80, between Suisun Valley Road and Green Valley Road	Weave [2]	N/A [3]		19	B
WB I-80, to Southbound I-680 Connector	Diverge	19	B	N/A [3]	
WB I-80, from NB I-680	Merge	15	B	N/A [3]	
WB I-80, to SR 12 West/I-680 Connector	Diverge	N/A [3]		14	B
WB I-80, between Green Valley Road and SR 12 West	Weave [2]	19	B	N/A [3]	
WB I-80, between SR 12 West/I-680 Connector and Green Valley Rd	Mainline	N/A [3]		15	B
WB I-80, between SR 12 West and Red Top Road	Mainline	17	B	N/A [3]	
WB I-80, from Green Valley Rd	Merge	N/A [3]		15	B
WB I-80, to Red Top Road	Diverge	18	B	19	B
WB I-80, from Red Top Road	Merge	17	B	22	C
WB I-80, west of Red Top Road	Mainline	23	C	20	C
Northbound I-680					
NB I-680, to Gold Hill Road	Diverge	**98**	**F**	37	E
NB I-680, from Gold Hill Road	Merge	**105**	**F**	39	E
NB I-680, to Red Top Road	Diverge	N/A [3]		35	D
NB I-680, from Red Top Road	Merge	N/A [3]		30	D
NB I-680, between Gold Hill Road and Central Way	Mainline	**115**	**F**	N/A [3]	
NB I-680, to Central Way	Diverge	**124**	**F**	N/A [3]	
NB I-680, to SR 12 West	Diverge	N/A		30	D
NB I-680, to Suisun Valley Road	Diverge	**126**	**F**	N/A	
NB I-680, off HOV Bypass	Diverge	N/A		28	D
Southbound I-680					
SB I-680, from HOV Bypass	Merge	N/A [3]		18	B
SB I-680, from EB I-80 / Green Valley Road	Merge	24	C	N/A [3]	
SB I-680, between I-80 and Gold Hill Road	Mainline	22	C	N/A [3]	
SB I-680, to Red Top Road	Diverge	N/A [3]		23	C
SB I-680, from Red Top Road	Merge	N/A [3]		22	C
SB I-680, to Gold Hill Road	Diverge	22	C	23	C
SB I-680, from Gold Hill Road	Merge	22	C	23	C
Eastbound SR 12 West					
EB SR 12 West, west of Red Top Road	Mainline	N/A [3]		22	C
EB SR 12 West, to Red Top Road	Diverge	N/A [3]		22	C
EB SR 12 West, from Red Top Road	Merge	N/A [3]		14	B

TABLE 6-6
2015 ALTERNATIVE C PHASE I PM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C	
		Density[1]	LOS	Density[1]	LOS
Westbound SR 12 West					
WB SR 12 West, from I-680	Merge	N/A [3]		11	B
WB SR 12 West, from Red Top Road	Merge	N/A [3]		12	B
WB SR 12 West, west of Red Top Road	Mainline	N/A [3]		12	B
Eastbound SR 12 East					
EB SR 12 East, between Truck Scales and Chadbourne Road	Weave [2]	**159**	**F**	**130**	**F**
EB SR 12 East, from Chadbourne Road	Merge	**144**	**F**	**145**	**F**
EB SR 12 East, to Webster Street	Diverge	20	C	27	C
EB SR 12 East, between Webster Street and Civic Center Boulevard	Weave [2]	18	B	22	C
EB SR 12 East, from Civic Center Boulevard	Merge	24	C	28	C
Westbound SR 12 East					
WB SR 12 East, to Main Street	Diverge	19	B	19	B
WB SR 12 East, between Main Street and Jackson Street	Weave [2]	15	B	15	B
WB SR 12 East, from Jackson Street	Merge	**67**	**F**	**83**	**F**
WB SR 12 East, to Abernathy Road	Diverge	19	B	19	B
WB SR 12 East, from Abernathy Road	Merge	18	B	18	B

Notes: [No Shading] = Under Capacity, = Near Capacity, = At/Over Capacity, = 25% Over Capacity, = More than 50% Over Capacity

BOLD = segment operates unacceptably. * = Denotes segment operates at capacity.

1. Density is expressed in vehicles per hour per lane. Speed is expressed in miles per hour and is the speed over all lanes (excluding HOV).
2. Level of service thresholds for weaving sections are different than mainline sections. Refer to Table 1 for thresholds.
3. N/A – This segment is not applicable for this scenario. It is a ramp or freeway segment that isn't present in one scenario, but is in the other.

Source: Fehr & Peers, May 2009.

TABLE 7-4
2035 ALTERNATIVE C PHASE I AM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C Phase I	
		Density[1]	LOS	Density[1]	LOS
Eastbound I-80					
EB I-80, west of Red Top Road	Mainline	N/A [3]		23	C
EB I-80, to Red Top Road	Diverge	**44**	**F**	23	C
EB I-80, from Red Top Road	Merge	12	B	N/A [3]	
EB I-80, between SR 12 West and Green Valley Road / I-680 SB	Weave [2]	22	C	N/A [3]	
EB I-80, from SR 12 West Connector	Merge	N/A [3]		13	B
EB I-80, from NB I-680 Connector	Merge	26	C	27	C
EB I-80, between I-680 and Green Valley Road	Mainline	N/A [3]		24	C
EB I-80, from Green Valley Road	Merge	14	B	N/A [3]	
EB I-80, between Green Valley Road and Pittman Road	Weave [2]	N/A [3]		26	C
EB I-80, between Pittman Road and Truck Scales	Weave [2]	26	C	27	C
EB I-80, to EB SR 12 East Connector	Diverge	13	B	18	B
EB I-80, between SR 12 East and Truck Scales	Mainline	N/A [3]		21	C
EB I-80, between Truck Scales and Abernathy Road	Weave [2]	25	C	24	C
EB I-80, between Abernathy Road and West Texas Street	Weave [2]	21	C	23	C
EB I-80, between Beck Avenue and Travis Boulevard	Weave [2]	21	C	22	C
EB I-80, from Travis Boulevard	Merge	13	B	15	B
EB I-80, between Travis Blvd. and Air Base Pkwy. / Waterman Blvd.	Mainline	20	C	21	C
EB I-80, to Air Base Parkway / Waterman Boulevard	Diverge	16	B	18	B
EB I-80, from Air Base Parkway / Waterman Boulevard	Merge	17	B	19	B
EB I-80, east of Air Base Parkway / Waterman Boulevard	Mainline	23	C	23	C
Westbound I-80					
WB I-80, east of Waterman Boulevard / Air Base Parkway	Mainline	35	D	35	D
WB I-80, to Waterman Boulevard Diagonal	Diverge	30	D	30	D
WB I-80, to Air Base Parkway Loop	Diverge	26	C	26	C
WB I-80, from Air Base Parkway / Waterman Boulevard	Merge	36	E	33	D
WB I-80, between Waterman Blvd. / Air Base Pkwy. and Travis Blvd.	Mainline	38	E	36	E
WB I-80, to Travis Boulevard	Diverge	34	D	31	D
WB I-80, from Travis Boulevard	Merge	38	E	34	D
WB I-80, between Travis Boulevard Loop and Oliver Road	Weave [2]	43	E	39	E
WB I-80, from Oliver Road / West Texas Street	Merge	31	D	30	D
WB I-80, to Abernathy Road	Diverge	33	D	32	D
WB I-80, from Abernathy Road	Merge	35	D	30	D
WB I-80, from SR 12 East	Merge	**46**	**F**	32	D
WB I-80, between SR 12 East Connector and Truck Scales	Mainline	**58**	**F**	38	E

TABLE 7-4
2035 ALTERNATIVE C PHASE I AM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C Phase I	
		Density[1]	LOS	Density[1]	LOS
WB I-80, to Truck Scales	Diverge	31	D	28	D
WB I-80, between Truck Scales and Suisun Valley Road	Weave [2]	**63**	**F**	37	E
WB I-80, between Suisun Valley Road and Green Valley Road	Weave [2]	N/A [3]		29	D
WB I-80, to Southbound I-680 Connector	Diverge	27	C	N/A [3]	
WB I-80, from NB I-680	Merge	**44**	**E***	N/A [3]	
WB I-80, to SR 12 West/I-680 Connector	Diverge	N/A [3]		19	B
WB I-80, between Green Valley Road and SR 12 West	Weave [2]	33	D	N/A [3]	
WB I-80, between SR 12 West/I-680 Connector and Green Valley Rd	Mainline	N/A [3]		21	C
WB I-80, from Green Valley Rd	Merge	N/A [3]		18	B
WB I-80, to Red Top Road	Diverge	25	C	23	C
WB I-80, from Red Top Road	Merge	20	C	26	C
WB I-80, west of Red Top Road	Mainline	N/A		26	C
Northbound I-680					
NB I-680, to Gold Hill Road	Diverge	36	E	40	E
NB I-680, from Gold Hill Road	Merge	36	E	43	E
NB I-680, to Red Top Road	Diverge	N/A [3]		36	E
NB I-680, from Red Top Road	Merge	N/A [3]		31	D
NB I-680, between Gold Hill Road and Central Way	Mainline	36	E	N/A [3]	
NB I-680, to Central Way	Diverge	36	E	N/A [3]	
NB I-680, to SR 12 West	Diverge	N/A [3]		29	D
NB I-680, to Suisun Valley Road	Diverge	27	C	N/A [3]	
NB I-680, off HOV Bypass	Diverge	N/A [3]		26	C
Southbound I-680					
SB I-680, from HOV Bypass	Merge	N/A [3]		22	C
SB I-680, from EB I-80 / Green Valley Road	Merge	32	D	N/A [3]	
SB I-680, between I-80 and Gold Hill Road	Mainline	31	D	N/A [3]	
SB I-680, to Red Top Road	Diverge	N/A [3]		29	D
SB I-680, from Red Top Road	Merge	N/A [3]		34	D
SB I-680, to Gold Hill Road	Diverge	31	D	33	D
SB I-680, from Gold Hill Road	Merge	38	E	36	E
Eastbound SR 12 West					
EB SR 12 West, west of Red Top Road	Mainline	N/A [3]		10	A
EB SR 12 West, to Red Top Road	Diverge	N/A [3]		11	B
EB SR 12 West, from Red Top Road	Merge	N/A [3]		8	A
Westbound SR 12 West					

TABLE 7-4
2035 ALTERNATIVE C PHASE I AM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C Phase I	
		Density[1]	LOS	Density[1]	LOS
WB SR 12 West, from I-680	Merge	N/A [3]		21	C
WB SR 12 West, from Red Top Road	Merge	N/A [3]		27	C
WB SR 12 West, west of Red Top Road	Mainline	N/A [3]		29	D
Eastbound SR 12 East					
EB SR 12 East, between Truck Scales and Chadbourne Road	Weave [2]	13	B	14	B
EB SR 12 East, from Chadbourne Road	Merge	15	B	16	B
EB SR 12 East, to Webster Street	Diverge	20	B	20	B
EB SR 12 East, between Webster Street and Civic Center Boulevard	Weave [2]	15	B	15	B
EB SR 12 East, from Civic Center Boulevard	Merge	18	B	17	B
Westbound SR 12 East					
WB SR 12 East, to Main Street	Diverge	**111**	**F**	**115**	**F**
WB SR 12 East, between Main Street and Jackson Street	Weave [2]	**101**	**F**	**103**	**F**
WB SR 12 East, from Jackson Street	Merge	**115**	**F**	**120**	**F**
WB SR 12 East, to Abernathy Road	Diverge	26	C	26	C
WB SR 12 East, from Abernathy Road	Merge	20	C	23	C

Notes: [No Shading] = Under Capacity, = Near Capacity, = At/Over Capacity, = 25% Over Capacity, = More than 50% Over Capacity

BOLD = segment operates unacceptably. * = Denotes segment operates at capacity.

1. Density is expressed in vehicles per hour per lane. Speed is expressed in miles per hour and is the speed over all lanes (excluding HOV).
2. Level of service thresholds for weaving sections are different than mainline sections. Refer to Table 1 for thresholds.
3. N/A – This segment is not applicable for this scenario. It is a ramp or freeway segment that isn't present in one scenario, but is in the other.

Source: Fehr & Peers, May 2009.

Attachment G

2035 PM Freeway LOS

TABLE 7-6
2035 ALTERNATIVE C PHASE I PM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C Phase I	
		Density[1]	LOS	Density[1]	LOS
Eastbound I-80					
EB I-80, west of Red Top Road	Mainline	N/A [3]		**85**	**F**
EB I-80, to Red Top Road	Diverge	**92**	**F**	**98**	**F**
EB I-80, from Red Top Road	Merge	**90**	**F**	N/A [3]	
EB I-80, between SR 12 West and Green Valley Road / I-680 SB	Weave [2]	**67**	**F**	N/A [3]	
EB I-80, from SR 12 West Connector	Merge	N/A [3]		**144**	**F**
EB I-80, from NB I-680 Connector	Merge	**96**	**F**	**172**	**F**
EB I-80, between I-680 and Green Valley Road	Mainline	N/A [3]		**124**	**F**
EB I-80, from Green Valley Road	Merge	**64**	**F**	N/A [3]	
EB I-80, between Green Valley Road and Pittman Road	Weave [2]	N/A [3]		**135**	**F**
EB I-80, between Pittman Road and Truck Scales	Weave [2]	**103**	**F**	**130**	**F**
EB I-80, to EB SR 12 East Connector	Diverge	**124**	**F**	**140**	**F**
EB I-80, between SR 12 East and Truck Scales	Mainline	N/A [3]		13	B
EB I-80, between Truck Scales and Abernathy Road	Weave [2]	24	C	16	B
EB I-80, between Abernathy Road and West Texas Street	Weave [2]	19	B	18	B
EB I-80, between Beck Avenue and Travis Boulevard	Weave [2]	20	B	18	B
EB I-80, from Travis Boulevard	Merge	19	B	21	C
EB I-80, between Travis Blvd. and Air Base Prkwy. / Waterman Blvd.	Mainline	23	C	23	C
EB I-80, to Air Base Parkway / Waterman Boulevard	Diverge	18	B	19	B
EB I-80, from Air Base Parkway / Waterman Boulevard	Merge	23	C	26	C
EB I-80, east of Air Base Parkway / Waterman Boulevard	Mainline	28	D	25	C
Westbound I-80					
WB I-80, east of Waterman Boulevard / Air Base Parkway	Mainline	**57**	**F**	32	D
WB I-80, to Waterman Boulevard Diagonal	Diverge	**66**	**F**	29	D
WB I-80, to Air Base Parkway Loop	Diverge	**67**	**F**	20	C
WB I-80, from Air Base Parkway / Waterman Boulevard	Merge	**88**	**F**	28	D
WB I-80, between Waterman Blvd. / Air Base Pkwy. and Travis Blvd.	Mainline	**78**	**F**	30	D
WB I-80, to Travis Boulevard	Diverge	**86**	**F**	26	C
WB I-80, from Travis Boulevard	Merge	**93**	**F**	29	D
WB I-80, between Travis Boulevard Loop and Oliver Road	Weave [2]	**89**	**F**	33	D
WB I-80, from Oliver Road / West Texas Street	Merge	**107**	**F**	32	D
WB I-80, to Abernathy Road	Diverge	**103**	**F**	33	D
WB I-80, from Abernathy Road	Merge	**122**	**F**	**38**	**F**
WB I-80, from SR 12 East	Merge	**138**	**F**	**49**	**F**
WB I-80, between SR 12 East Connector and Truck Scales	Mainline	**120**	**F**	**57**	**F**

TABLE 7-6
2035 ALTERNATIVE C PHASE I PM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C Phase I	
		Density[1]	LOS	Density[1]	LOS
WB I-80, to Truck Scales	Diverge	**144**	**F**	**64**	**F**
WB I-80, between Truck Scales and Suisun Valley Road	Weave [2]	**58**	**E***	**70**	**E***
WB I-80, between Suisun Valley Road and Green Valley Road	Weave [2]	N/A [3]		20	B
WB I-80, to Southbound I-680 Connector	Diverge	12	B	N/A [3]	
WB I-80, from NB I-680	Merge	9	A	N/A [3]	
WB I-80, to SR 12 West/I-680 Connector	Diverge	N/A [3]		15	B
WB I-80, between Green Valley Road and SR 12 West	Weave [2]	13	B	N/A [3]	
WB I-80, between SR 12 West/I-680 Connector and Green Valley Rd	Mainline	N/A [3]		15	B
WB I-80, from Green Valley Rd	Merge	N/A [3]		14	B
WB I-80, to Red Top Road	Diverge	**46**	**F**	18	B
WB I-80, from Red Top Road	Merge	8	A	21	C
WB I-80, west of Red Top Road	Mainline	N/A [3]		19	C
Northbound I-680					
NB I-680, to Gold Hill Road	Diverge	**143**	**F**	**138**	**F**
NB I-680, from Gold Hill Road	Merge	**148**	**F**	**141**	**F**
NB I-680, to Red Top Road	Diverge	N/A [3]		**142**	**F**
NB I-680, from Red Top Road	Merge	N/A [3]		**169**	**F**
NB I-680, between Gold Hill Road and Central Way	Mainline	**148**	**F**	N/A [3]	
NB I-680, to Central Way	Diverge	**131**	**F**	N/A [3]	
NB I-680, to SR 12 West	Diverge	N/A [3]		**167**	**F**
NB I-680, to Suisun Valley Road	Diverge	**104**	**F**	N/A [3]	
NB I-680, off HOV Bypass	Diverge	N/A [3]		**157**	**F**
Southbound I-680					
SB I-680, from HOV Bypass	Merge	N/A [3]		19	B
SB I-680, from EB I-80 / Green Valley Road	Merge	15	B	N/A [3]	
SB I-680, between I-80 and Gold Hill Road	Mainline	14	B	N/A [3]	
SB I-680, to Red Top Road	Diverge	N/A [3]		24	C
SB I-680, from Red Top Road	Merge	N/A [3]		24	C
SB I-680, to Gold Hill Road	Diverge	14	B	24	C
SB I-680, from Gold Hill Road	Merge	14	B	23	C
Eastbound SR 12 West					
EB SR 12 West, west of Red Top Road	Mainline	N/A [3]		**163**	**F**
EB SR 12 West, to Red Top Road	Diverge	N/A [3]		**157**	**F**
EB SR 12 West, from Red Top Road	Merge	N/A [3]		**171**	**F**

TABLE 7-6
2035 ALTERNATIVE C PHASE I PM PEAK HOUR
FREEWAY LEVEL OF SERVICE

Segment	Type	No Project		Alternative C Phase I	
		Density[1]	LOS	Density[1]	LOS
Westbound SR 12 West					
WB SR 12 West, from I-680	Merge	N/A [3]		11	B
WB SR 12 West, from Red Top Road	Merge	N/A [3]		12	B
WB SR 12 West, west of Red Top Road	Mainline	N/A [3]		12	B
Eastbound SR 12 East					
EB SR 12 East, between Truck Scales and Chadbourne Road	Weave [2]	**157**	**F**	**163**	**F**
EB SR 12 East, from Chadbourne Road	Merge	**147**	**F**	**154**	**F**
EB SR 12 East, to Webster Street	Diverge	17	B	20	B
EB SR 12 East, between Webster Street and Civic Center Boulevard	Weave [2]	17	B	17	B
EB SR 12 East, from Civic Center Boulevard	Merge	26	C	27	C
Westbound SR 12 East					
WB SR 12 East, to Main Street	Diverge	**158**	**F**	**119**	**F**
WB SR 12 East, between Main Street and Jackson Street	Weave [2]	**134**	**F**	**106**	**F**
WB SR 12 East, from Jackson Street	Merge	**161**	**F**	**131**	**F**
WB SR 12 East, to Abernathy Road	Diverge	**164**	**F**	24	C
WB SR 12 East, from Abernathy Road	Merge	**191**	**F**	**36**	**F**

Notes: [No Shading] = Under Capacity, = Near Capacity, = At/Over Capacity, = 25% Over Capacity, = More than 50% Over Capacity

BOLD = segment operates unacceptably. * = Denotes segment operates at capacity.

1. Density is expressed in vehicles per hour per lane. Speed is expressed in miles per hour and is the speed over all lanes (excluding HOV).
2. Level of service thresholds for weaving sections are different than mainline sections. Refer to Table 1 for thresholds.
3. N/A – This segment is not applicable for this scenario. It is a ramp or freeway segment that isn't present in one scenario, but is in the other.

Source: Fehr & Peers, May 2009.

Appendix C

Intersection Average Daily Traffic Volumes and LOS

2015 Intersection Delay, LOS, and Volumes

RAMP TERMINALS

		2015 No Build							2015 Build Alternative C1							
		AM			PM				AM			PM				
Intersection #	Intersection Name	Delay	LOS	ADT	Delay	LOS	ADT	AADT	Delay	LOS	ADT	Delay	LOS	ADT	AADT	Change vs No Build
1	I-680 NB Ramps & Gold Hill Rd	10	B	1075	20	C	1320	11,975	8	A	590	17	B	875	7,325	-38.8%
3	I-680 SB Ramps & Gold Hill Rd	6	A	1665	6	A	1315	14,900	4	A	1270	3	A	1275	12,725	-14.6%
7	I-80 EB Ramps & Red Top Rd	20	B	1960	12	B	1745	18,525	16	B	1630	16	B	1835	17,325	-6.5%
8	I-80 WB Ramps & Red Top Rd	19	B	1630	14	B	1225	14,275	29	C	1525	39	D	1520	15,225	6.7%
9	Jameson Canyon Rd (SR12 West) & Red Top Rd	28	C	3910	49	D	3785	38,475	10	B	760	9	A	925	8,425	-78.1%
15	I-680 NB Off-Ramp & Central Way	2	A	670	1	A	980	8,250	NA	NA	0	NA	NA	0	0	0.0%
16	I-680 SB Onramp (I-80 EB Off-Ramp) & Lopes Rd	16	B	1710	12	B	1845	17,775	15	B	2245	17	B	1825	20,350	14.5%
17	I-80 (SR 12) WB On-Ramp & Green Valley Rd	4	A	1945	2	A	2080	20,125	19	B	2610	10	B	2340	24,750	23.0%
21	I-80 EB Ramps & Pittman Rd	16	B	1780	>80	F	1970	18,750	21	C	1705	30	C	2070	18,875	0.7%
22	Suisin Valley Rd & Neitzel Rd	5	A	1245	21	C	1420	13,325	2	A	1220	8	A	1425	13,225	-0.8%
24	SR 12 East EB Ramps & Chadbourne Rd	4	A	1100	39	D	2440	17,700	4	A	1115	19	B	2430	17,725	0.1%
25	SR 12 East WB Ramps & Chadbourne Rd	16	B	1610	35	D	2600	21,050	9	A	1385	15	B	2605	19,950	-5.2%
27	I-80 EB Ramps & Abernathy Rd	7	A	1675	61	E	2730	22,025	7	A	1355	17	B	2690	20,225	-8.2%
28	I-80 WB Ramps & Abernathy Rd	18	B	2125	>80	F	2425	22,750	19	B	1815	20	B	2385	21,000	-7.7%
29	I-80 EB Ramps & Magellan Rd	NA	NA	0	NA	NA	0	0	NA	NA	0	NA	NA	0	0	0.0%
30	I-80 EB Off-Ramp & West Texas St	5	A	2130	10	B	2995	25,625	5	A	2110	14	B	2990	25,500	-0.5%
31	I-80 EB On-Ramp - Beck Ave & West Texas St	18	B	2805	>80	F	4365	35,850	17	B	2765	>80	F	4365	35,650	-0.6%
33	I-80 WB On-Ramp - Oliver Rd & Rockville Rd	26	C	2420	31	C	2750	25,850	26	C	2435	31	C	2775	26,050	0.8%
34	I-80 WB Off-Ramp & Oliver Rd	15	B	1655	12	B	1775	17,150	16	B	1710	13	B	1795	17,525	2.2%
38	SR 12 East & Beck Ave	80	F	7035	>80	F	6445	67,400	80	F	5325	80	F	6450	58,875	-12.6%
39	SR 12 East & Pennsylvania Ave	49	D	4780	>80	F	6440	56,100	50	D	4765	80	F	6445	56,050	-0.1%
43	I-80 WB Ramps & Travis Blvd	4	A	2640	6	A	3720	31,800	4	A	2615	7	A	3720	31,675	-0.4%
44	I-80 EB Ramps & Travis Blvd	2	A	2755	6	A	5055	39,050	2	A	2765	6	A	5055	39,100	0.1%
51	I-80 WB On-Ramp - Hilborne Rd & Waterman Blvd	28	C	4010	42	D	5190	46,000	27	C	3970	43	D	5190	45,800	-0.4%
53	I-80 EB Ramps & Air Base Pkwy	11	B	4295	41	B	5090	46,925	10	B	4270	16	B	5090	46,800	-0.3%
99	Red Top Rd & EB SR 12 West Ran	NA	NA	0	NA	NA	0	0	10	B	680	20	B	1180	9,300	0.0%
555	I-680 SB Ramps & Red Top Rd	NA	NA	0	NA	NA	0	0	2	A	615	2	A	970	7,925	0.0%
	Total for all Ramp Terminals							651,650							617,375	
	Change versus Same Year No Build														-5.26%	

NON-RAMP TERMINALS

		2015 No Build							2015 Build Alternative C1							
		AM			PM				AM			PM				
		Delay	LOS	ADT	Delay	LOS	ADT	AADT	Delay	LOS	ADT	Delay	LOS	ADT	AADT	Change vs No Build
2	Ramsey Rd & Gold Hill Rd	11	B	585	14	B	700	6,425	9	A	240	10	A	300	2,700	-58.0%
4	Lopes Rd & Gold Hill Rd	39	D	2225	20	C	1915	20,700	31	C	2095	23	C	2055	20,750	0.2%
5	Lopes Rd & Red Top Rd	18	B	1055	12	B	1065	10,600	11	B	1835	12	B	1935	18,850	77.8%
10	Ramsey Rd & Bridgeport Ave	12	B	600	13	B	645	6,225	9	A	350	10	A	325	3,375	-45.8%
11	Bridgeport Ave & Cordelia Rd	10	B	920	15	C	1130	10,250	10	A	790	14	B	1025	9,075	-11.5%
12	Lopes Rd & Cordelia Rd	80	F	1930	80	F	2180	20,550	41	D	810	21	C	1020	9,150	-55.5%
13	Lopes Rd & Bridgeport Ave	80	F	1545	80	F	1675	16,100	41	D	675	21	C	705	6,900	-57.1%
14	Central Wy & Cordelia Rd	43	E	1200	50	F	1595	13,975	14	B	720	50	F	1145	9,325	-33.3%
18	Green Valley Rd & Business Center Dr	28	C	2670	30	C	3655	31,625	31	C	2490	34	C	3520	30,050	-5.0%
19	Green Valley Rd & Mangels Blvd	21	C	1365	22	C	1610	14,875	21	C	1355	22	C	1610	14,825	-0.3%
20	Pittman Rd & Central Way	22	C	1335	19	B	1515	14,250	24	C	1260	19	B	1600	14,300	0.4%
23	Suisin Valley Rd & Mangels Blvd	20	B	2710	18	B	3375	30,425	21	C	2660	18	B	3435	30,475	0.2%
26	Abernathy Rd & Magellan (Auto Ma	12	B	1705	18	B	2575	21,400	13	B	1450	18	B	2570	20,100	-6.1%
32	Beck Ave & Driveway/Cadenas	21	C	1505	29	C	2730	21,175	21	C	1515	19	B	2735	21,250	0.4%
35	Neitzel Rd & Business Center Dr	8	A	1655	9	A	1775	17,150	NA	NA	0	NA	NA	0	0	0.0%
36	Suisin Valley Rd & Rockville Rd	20	B	1095	10	B	1370	12,325	20	B	1095	10	B	1370	12,325	0.0%
37	Rockville Rd & Abernathy Rd	11	B	1380	12	B	1635	15,075	9	A	1330	10	A	1635	14,825	-1.7%
40	Pennsylvania Ave & Cordelia Rd	11	B	575	50	F	1325	9,500	11	B	540	50	F	1325	9,325	-1.8%
41	Oliver Rd & Travis Blvd	15	B	1670	22	C	2205	19,375	15	B	1695	22	C	2390	20,425	5.4%
42	Holiday Ln & Travis Blvd	18	B	1840	28	C	2840	23,400	18	B	1835	28	C	2845	23,400	0.0%
45	Gateway Shopping Center - 2nd Street & Travis Blvd	18	B	2775	35	D	4845	38,100	18	B	2770	35	D	4845	38,075	-0.1%
46	Pennsylvania Ave & Travis Blvd	30	C	3380	32	C	4545	39,625	30	C	3380	32	C	4545	39,625	0.0%
47	Oliver Rd & Wood Creek Dr	15	B	1355	12	B	1775	15,650	17	B	1370	12	B	1775	15,725	0.5%
48	Oliver Rd & Waterman Blvd	20	C	1755	26	D	1970	18,625	20	C	1710	26	C	1970	18,400	-1.2%
49	Capitola Way & Waterman Blvd	10	B	1560	13	B	1570	15,650	10	B	1565	13	B	1570	15,675	0.2%
50	Barbour Dr & Waterman Blvd	11	B	1835	18	B	2110	19,725	11	B	1850	18	B	2110	19,800	0.4%
54	Health Dr & Air Base Pkwy	32	C	4705	38	D	5230	49,675	32	C	4705	38	D	5230	49,675	0.0%
55	Gateway Shopping Center & Travis Blvd	6	A	2335	8	A	3165	27,500	6	A	2330	8	A	3165	27,475	-0.1%
58	Green Valley Rd & Lopes Rd	NA	NA	0	NA	NA	0	0	14	B	2375	16	B	2365	23,700	0.0%
	Total for all Non-Ramp Terminals							559,950							539,575	
	Change versus Same Year No Build														-3.64%	
	Total Volume For All Intersections							**1,211,600**							**1,156,950**	
	Change versus Same Year No Build														**-4.51%**	

Source: Appendix B, Draft TRAFFIC OPERATIONS REPORT FOR THE I-80/ I-680/SR 12 INTERCHANGE PROJECT REPORT. June 2009
AADT assumed a peak hour multiplier of 5, based on guidance provided by Rabinovitz pers. comm.
Shaded cells are interesections with less traffic volumes for the Build scenario

Attachment H

2035 Intersection LOS, Delay, and Volumes

2035 Intersection Delay, LOS, and Volumes

RAMP TERMINALS

		2035 No Build							2035 Build Alternative C1							
		AM			PM				AM			PM				
Intersection #	Intersection Name	Delay	LOS	AM ADT	Delay	LOS	PM ADT	AADT	Delay	LOS	AM ADT	Delay	LOS	PM ADT	AADT	Change vs No Build
1	I-680 NB Ramps & Gold Hill Rd	20	C	1650	80	F	1790	17,200	10	A	905	80	F	1250	10,775	-37.4%
3	I-680 SB Ramps & Gold Hill Rd	12	B	2285	80	F	2110	21,975	6	A	1685	75	E	1870	17,775	-19.1%
7	I-80 EB Ramps & Red Top Rd	80	F	2480	80	F	3575	30,275	32	C	1990	80	F	2795	23,925	-21.0%
8	I-80 WB Ramps & Red Top Rd	23	C	1985	80	F	2800	23,925	33	C	1815	80	F	2315	20,650	-13.7%
9	Jameson Canyon Rd (SR12 West) & Red Top Rd	80	F	4725	80	F	5740	52,325	14	B	995	80	F	1430	12,125	-76.8%
15	I-680 NB Off-Ramp & Central Way	4	A	880	80	F	1235	10,575	NA	NA	0	NA	NA	0	0	0.0%
16	I-680 SB Onramp (I-80 EB Off-Ramp) & Lopes Rd	51	D	2375	42	D	2680	25,275	22	C	3050	55	D	2630	28,400	12.4%
17	I-80 (SR 12) WB On-Ramp & Green Valley Rd	38	D	2750	39	D	3045	28,975	20	B	3500	20	B	3335	34,175	17.9%
21	I-80 EB Ramps & Pittman Rd	22	C	2210	80	F	2775	24,925	49	D	2135	80	F	2920	25,275	1.4%
22	Suisin Valley Rd & Neitzel Rd	5	A	1570	80	F	1955	17,625	4	A	1565	80	F	1960	17,625	0.0%
24	SR 12 East EB Ramps & Chadbourne Rd	4	A	1305	80	F	3080	21,925	4	A	1320	27	C	3065	21,925	0.0%
25	SR 12 East WB Ramps & Chadbourne Rd	15	B	1935	73	E	3365	26,500	10	B	1675	21	C	3360	25,175	-5.0%
27	I-80 EB Ramps & Abernathy Rd	9	A	2025	77	E	3780	29,025	9	A	1635	19	B	3765	27,000	-7.0%
28	I-80 WB Ramps & Abernathy Rd	21	C	2550	80	F	3325	29,375	20	C	2170	20	C	3315	27,425	-6.6%
29	I-80 EB Ramps & Magellan Rd	NA	NA	0	NA	NA	0	0	NA	NA	0	NA	NA	0	0	0.0%
30	I-80 EB Off-Ramp & West Texas St	7	A	2640	26	C	3775	32,075	7	A	2595	69	E	3975	32,850	2.4%
31	I-80 EB On-Ramp - Beck Ave & West Texas St	22	C	3525	80	F	5415	44,700	20	C	3455	80	F	5415	44,350	-0.8%
33	I-80 WB On-Ramp - Oliver Rd & Rockville Rd	27	C	2890	47	D	3330	31,100	27	C	2885	80	F	3360	31,225	0.4%
34	I-80 WB Off-Ramp & Oliver Rd	18	B	1910	12	B	2165	20,375	20	C	1975	15	B	2200	20,875	2.5%
38	SR 12 East & Beck Ave	80	F	6720	80	F	8655	76,875	80	F	6770	80	F	8655	77,125	0.3%
39	SR 12 East & Pennsylvania Ave	80	F	6215	80	F	8610	74,125	80	F	6215	80	F	8615	74,150	0.0%
43	I-80 WB Ramps & Travis Blvd	5	A	3220	18	B	4235	37,275	5	A	3205	8	A	4230	37,175	-0.3%
44	I-80 EB Ramps & Travis Blvd	3	A	3475	17	B	5885	46,800	3	A	3495	11	B	5880	46,875	0.2%
51	I-80 WB On-Ramp - Hilborne Rd & Waterman Blvd	42	D	4905	80	F	6025	54,650	40	D	4855	62	E	6020	54,375	-0.5%
53	I-80 EB Ramps & Air Base Pkwy	15	B	5320	38	D	6195	57,575	14	B	5285	18	B	6195	57,400	-0.3%
99	Red Top Rd & EB SR 12 West Ramps	NA	NA	0	NA	NA	0	0	9	A	790	80	F	1855	13,225	0.0%
555	I-680 SB Ramps & Red Top Rd	NA	NA	0	NA	NA	0	0	3	A	865	3	A	1115	9,900	0.0%
	Total for all Non-Ramp Terminals							835,450							791,775	
	Change versus Same Year No Build														-5.23%	

NON-RAMP TERMINALS

		2035 No Build							2035 Build Alternative C1							
		AM			PM				AM			PM				
		Delay	LOS	ADT	Delay	LOS	ADT	AADT	Delay	LOS	ADT	Delay	LOS	ADT	AADT	Change vs No Build
2	Ramsey Rd & Gold Hill Rd	17	C	965	15	C	840	9,025	10	B	435	10	B	405	4,200	-53.5%
4	Lopes Rd & Gold Hill Rd	70	E	2930	56	E	3120	30,250	48	D	2700	53	D	2950	28,250	-6.6%
5	Lopes Rd & Red Top Rd	15	B	1410	15	B	1720	15,650	13	B	2460	14	B	2980	27,200	73.8%
10	Ramsey Rd & Bridgeport Ave	19	C	980	15	B	785	8,825	11	B	550	11	B	435	4,925	-44.2%
11	Bridgeport Ave & Cordelia Rd	11	B	1425	21	C	1660	15,425	11	B	1280	18	C	1490	13,850	-10.2%
12	Lopes Rd & Cordelia Rd	80	F	2785	80	F	3245	30,150	80	F	1365	38	D	1515	14,400	-52.2%
13	Lopes Rd & Bridgeport Ave	80	F	2235	80	F	2480	23,575	80	F	1185	38	D	1120	11,525	-51.1%
14	Central Wy & Cordelia Rd	50	F	1735	50	F	2335	20,350	30	D	1200	50	F	1635	14,175	-30.3%
18	Green Valley Rd & Business Center Dr	37	D	3610	65	E	5415	45,125	56	E	3365	71	E	5165	42,650	-5.5%
19	Green Valley Rd & Mangels Blvd	28	C	1930	30	C	2435	21,825	29	C	1925	30	C	2425	21,750	-0.3%
20	Pittman Rd & Central Way	26	C	1660	28	C	2105	18,825	24	C	1555	28	C	2250	19,025	1.1%
23	Suisin Valley Rd & Mangels Blvd	23	C	3515	25	C	4980	42,475	23	C	3425	25	C	5005	42,150	-0.8%
26	Abernathy Rd & Magellan (Auto Mall Pkwy)	16	B	2035	24	C	3460	27,475	18	B	1740	24	C	3450	25,950	-5.6%
32	Beck Ave & Driveway/Cadenassco Dr	25	C	1910	40	D	3400	26,550	25	C	1910	40	D	3400	26,550	0.0%
35	Neitzel Rd & Business Center Dr	9	A	1945	13	B	3150	25,475	NA	NA	0	NA	NA	0	0	0.0%
36	Suisin Valley Rd & Rockville Rd	24	C	1285	13	B	1690	14,875	24	C	1285	13	B	1690	14,875	0.0%
37	Rockville Rd & Abernathy Rd	11	B	1580	21	C	2065	18,225	10	A	1505	21	C	1970	17,375	-4.7%
40	Pennsylvania Ave & Cordelia Rd	21	C	1085	50	F	1800	14,425	19	C	1045	50	F	1795	14,200	-1.6%
41	Oliver Rd & Travis Blvd	17	B	1900	21	C	2775	23,375	16	B	1930	22	C	2780	23,550	0.7%
42	Holiday Ln & Travis Blvd	19	B	2070	35	D	3230	26,500	19	B	2075	35	D	3230	26,525	0.1%
45	Gateway Shopping Center - 2nd Street & Travis Blvd	17	B	3470	52	D	5690	45,800	17	B	3470	52	D	5690	45,800	0.0%
46	Pennsylvania Ave & Travis Blvd	50	D	4620	51	D	5510	50,650	50	D	5230	51	D	5510	53,700	6.0%
47	Oliver Rd & Wood Creek Dr	16	B	1540	13	B	2000	17,700	15	B	1560	13	B	2000	17,800	0.6%
48	Oliver Rd & Waterman Blvd	34	D	2045	42	E	2235	21,400	33	D	2000	42	E	2235	21,175	-1.1%
49	Capitola Way & Waterman Blvd	11	B	1805	15	B	1785	17,950	11	B	1805	15	B	1785	17,950	0.0%
50	Barbour Dr & Waterman Blvd	13	C	2140	26	C	2445	22,925	13	B	2150	26	C	2445	22,975	0.2%
54	Health Dr & Air Base Pkwy	42	D	5790	65	E	6345	60,675	42	D	5790	65	E	6370	60,800	0.2%
55	Gateway Shopping Center & Travis Blvd	6	A	3010	9	A	3670	33,400	6	A	3010	9	A	3670	33,400	0.0%
58	Green Valley Rd & Lopes Rd	NA	NA	0	NA	NA	0	0	18	B	3285	62	E	3315	33,000	0.0%
	Total for all Non-Ramp Terminals							728,900							699,725	
	Change versus Same Year No Build														-4.00%	
	Total Volume For All Intersections							**1,564,350**							**1,491,500**	
	Change versus Same Year No Build														**-4.66%**	

Source: Appendix B, Draft TRAFFIC OPERATIONS REPORT FOR THE I-80/ I-680/SR 12 INTERCHANGE PROJECT REPORT. June 2009
AADT assumed a peak hour multiplier of 5, based on guidance provided by Rabinovitz pers. comm.
Shaded cells are interesections with less traffic volumes for the Build scenario

Appendix D

System-Wide Improvements

Average Network Travel Times and Speeds

AM Peak Hour

Segment	Existing		2015 No Build		2015 Build C1		2035 No Build		2035 Build C1	
	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed
EB 80:All Lanes	7:50	66	8:05	66	8:15	64	8:20	64	8:20	63
EB 80: HOV Lane	NA	NA	7:40	69	7:20	72	7:40	69	7:25	71
EB 80 to EB 12 East	9:10	52	8:35	58	8:45	56	8:55	55	9:00	55
NB 680 to EB 80	9:45	57	9:00	64	9:30	63	9:25	61	9:55	61
NB 680 to EB 12 East	11:05	47	9:35	57	10:05	56	10:05	54	10:35	54
EB 12 West to EB 80	8:00	63	8:05	63	8:25	62	8:20	61	8:35	61
EB 12 West to EB 12 East	9:20	50	8:40	55	9:00	54	9:00	53	9:10	53
WB 80: All Lanes	8:35	61	8:30	63	8:25	64	10:00	54	8:45	62
WB 80: HOV Lane	NA	NA	7:45	69	7:45	70	8:10	66	7:50	69
WB 80 to SB 680	10:05	60	9:40	62	9:55	63	11:15	53	10:25	60
WB 80 to WB 12 West	10:00	51	8:55	59	10:15	62	13:35	39	10:35	60
WB 12 East to EB 80	16:55	16	15:35	33	14:25	34	19:50	26	17:05	28
WB 12 East to SB 680	18:25	17	16:45	35	15:55	36	21:10	27	18:45	30
WB 12 East to WB 12 West	18:20	15	16:00	32	16:15	36	23:25	22	18:55	31
Averages	**11:27**	**46**	**10:12**	**56**	**10:18**	**57**	**12:05**	**50**	**11:06**	**54**

PM Peak Hour

Segment	Existing		2015 No Build		2015 Build C1		2035 No Build		2035 Build C1	
	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed	Travel Time	Speed
EB 80:All Lanes	10:50	47	11:45	45	10:40	50	16:50	31	21:30	25
EB 80: HOV Lane	NA	NA	8:30	62	8:15	64	9:10	58	9:25	56
EB 80 to EB 12 East	12:55	37	41:00	12	35:50	14	49:30	10	60:00	7
NB 680 to EB 80	16:45	24	34:00	17	13:05	49	48:15	12	60:00	8
NB 680 to EB 12 East	18:05	21	60:00	9	37:30	15	60:00	7	60:00	5
EB 12 West to EB 80	12:15	43	11:55	43	11:00	48	22:05	19	60:00	8
EB 12 West to EB 12 East	13:40	34	41:10	12	36:10	13	54:45	10	60:00	4
WB 80: All Lanes	7:55	66	8:30	63	8:10	66	20:10	27	10:05	53
WB 80: HOV Lane	NA	NA	7:35	71	7:30	71	8:40	62	9:10	59
WB 80 to SB 680	9:20	65	9:40	62	9:35	65	21:05	28	11:35	54
WB 80 to WB 12 West	9:10	56	8:50	60	10:00	63	20:20	26	11:55	53
WB 12 East to EB 80	9:40	51	10:55	47	9:55	49	60:00	3	17:00	29
WB 12 East to SB 680	11:05	52	12:05	48	11:20	50	60:00	3	18:25	31
WB 12 East to WB 12 West	10:55	44	11:15	45	11:45	50	60:00	3	18:50	31
Averages	**11:53**	**45**	**19:48**	**43**	**15:46**	**48**	**36:29**	**21**	**30:34**	**30**

Segments that were shown as ">60:00" in the traffic report were rounded off to 60:00 for calculation purposes.

Source: Draft TRAFFIC OPERATIONS REPORT FOR THE I-80/ I-680/SR 12 INTERCHANGE PROJECT REPORT. June 2009

Appendix E

Congestion Relief

System-Wide Measures of Effectiveness

2015 AM Peak Hour Conditions

Alternative C Phase I would have very little effect on mobility. VMT would decrease slightly (approximately 1,000 vehicle-miles or less then 0.5 percent) compared to No Project conditions. Alternative C Phase I would result in a minimal improvement to system-wide operations, compared to No Project conditions, resulting in an increase in VHD of only 3 percent and no change in average network travel speed.

2015 PM Peak Hour Conditions

Alternative C Phase 1 would improve corridor-wide mobility, increasing VMT by 7 percent while decreasing VHD by approximately 39 percent. Average network travel speed would increase by 20 percent (from 36 miles per hour under No Project conditions to approximately 43 miles per hour with Alternative C).

TABLE 6-1
2015 PHASE 1 AM PEAK HOUR
SYSTEM WIDE MEASURES OF EFFECTIVENESS[1]

MOE	Existing	No Project	Alternative B[2] Phase 1	Alternative C[2] Phase 1
Vehicle Miles of Travel (Vehicle Miles / Hour)	316,220	449,870	451,325 (< 1%)	448,800 (< 1%)
Vehicle Hours of Delay (Hours of Delay / Hour)	1,140	1,075	840 (- 22%)	1,105 (+ 3%)
Average Network Travel Speed	46 mph	51.2 mph	52.6 mph (+ 3%)	51.0 mph (< 1%)

1. The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.
2. (%) indicates change relative to the No Project condition

Source: Fehr & Peers, February 2009.

TABLE 6-2
2015 PHASE 1 PM PEAK HOUR
SYSTEM WIDE MEASURES OF EFFECTIVENESS[1]

MOE	Existing	No Project	Alternative B[2] Phase 1	Alternative C[2] Phase 1
Vehicle Miles of Travel (Vehicle Miles / Hour)	334,755	480,410	531,935 (+ 11%)	516,055 (+ 7%)
Vehicle Hours of Delay (Hours of Delay / Hour)	1,885	5,100	2,150 (- 58%)	3,110 (- 39%)
Average Network Travel Speed	33 mph	36.2 mph	47.6 mph (+ 32%)	43.3 mph (+ 20%)

1. The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.
2. (%) indicates change relative to the No Project condition

Source: Fehr & Peers, February 2009.

CONSTRUCTION YEAR 2015 - PEAK HOUR CONDITIONS SYSTEM WIDE MEASURES OF EFFECTIVENESS[1]

MOE	Route	No Project		Alt. C, Phase 1	
		2015 AM Peak Hour	2015 PM Peak Hour	2015 AM Peak Hour	2015 PM Peak Hour
Bottleneck locations		• Bottleneck WB on I-80 between truck scales and Suisun Valley Road. • Bottleneck WB and EB on SR 12 East at the Beck Avenue and Pennsylvania Avenue signalized intersections.	• Major bottleneck EB on SR 12 East at the Beck Avenue and Pennsylvania Avenue signalized intersections; impacts EB I- 80 and NB I-680. • Bottleneck on WB I-80 at Suisun Valley Road	Bottleneck WB and EB on SR 12 East at the Beck Avenue and Pennsylvania Avenue signalized intersections.	Major bottleneck EB on SR 12 East Pennsylvania Avenue signalized intersection; impacts EB I-80 and NB I-680.
Duration of congestion		Congestion would decrease to near existing conditions, lasting approximately 1.5 hours.	Congestion would significantly increase compared to existing conditions, lasting beyond 3 hours	Congestion would decrease to near existing conditions, lasting approximately 1.5 hours.	Congestion would decrease to near existing conditions, lasting approximately 2 hours.
Queue lengths		WB SR 12 East from Beck Avenue to east of Main Street (2+ miles).	EB SR 12 East from Pennsylvania Avenue intersection to NB I-680 (south of Gold Hill Road), 7+ miles, and EB I-80 (Green Valley Road onramp), 4.5 miles.	WB SR 12 East from Beck Avenue to east of Main Street (2+ miles).	EB SR 12 East from Pennsylvania Avenue intersection to NB I-680 connector ramp and EB I- 80 (I-680 merge), 5 miles.
Travel times	WB I-80 to SB I-680	6:40	34:00	9:55	13:05
	WB I-80	8:30	11:45	8:25	10:40
	SR-12 East to WB I-80	15:35	11:55	14:25	11:00
Maximum Individual delay	WB I-80 to SB I-680	25 seconds	26 minutes	40 seconds	5 minutes
	WB I-80	30 seconds	4 minutes	25 seconds	3 minutes
	SR-12 East to WB I-80	7 minutes	4 minutes	6 minutes	3 minutes
Speed	WB I-80 to SB I-680	62 mph	17 mph	62 mph	49 mph
	WB I-80	63 mph	45 mph	60 mph	50 mph
	SR-12 East to WB I-80	35 mph	43 mph	34 mph	48 mph
Flows (volume)	WB I-80 to SB I-680	3,305	2,168	3,378	4,327
	WB I-80	5,466	7,272	5,227	7,937
	SR-12 East to WB I-80	2,202	1,548	2,532	1,334

[1] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

Source: Fehr & Peers 2009

2035 AM Peak Hour Conditions

Alternative C Phase I would improve corridor-wide mobility by increasing VMT approximately 1 percent, while decreasing VHD by 18 percent. Average network travel speeds would increase 6 percent (from 42 mph under No Project conditions to approximately 44 mph).

2035 PM Peak Hour Conditions

Alternative C Phase I would improve corridor-wide mobility by increasing VMT by 16 percent, while decreasing VHD by 16 percent. Average network travel speed would increase 25 percent (from 16 mph to 20 mph).

TABLE 7-1
2035 PHASE 1 AM PEAK HOUR
SYSTEM WIDE MEASURES OF EFFECTIVENESS[1]

MOE	Existing	No Project	Alternative B[2] Phase 1	Alternative C[2] Phase 1
Vehicle Miles of Travel (Vehicle Miles / Hour)	316,220	539,445	564,605 (+ 5%)	546,624 (+ 1%)
Vehicle Hours of Delay (Hours of Delay / Hour)	1,140	3,695	1,845 (- 100%)	3,021 (- 18%)
Average Network Travel Speed	46 mph	41.8 mph	48.9 mph (+ 17%)	44.2 mph (+ 6%)

1. The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.
2. (%) indicates change relative to the No Project condition

Source: Fehr & Peers, February 2009.

TABLE 7-2
2035 PHASE 1 PM PEAK HOUR
SYSTEM WIDE MEASURES OF EFFECTIVENESS[1]

MOE	Existing	No Project	Alternative B[2] Phase 1	Alternative C[2] Phase 1
Vehicle Miles of Travel (Vehicle Miles / Hour)	334,755	413,160	575,815 (+ 39%)	480,410 (+ 16%)
Vehicle Hours of Delay (Hours of Delay / Hour)	1,885	19,065	10,155 (- 47%)	16,095 (- 16%)
Average Network Travel Speed	33 mph	15.9 mph	28.9 mph (+ 82%)	19.8 mph (+ 25%)

1. The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.
2. (%) indicates change relative to the No Project condition

Source: Fehr & Peers, February 2009.

CONSTRUCTION YEAR 2035 - PEAK HOUR CONDITIONS SYSTEM WIDE MEASURES OF EFFECTIVENESS[1]

MOE	Route	No Project		Alt. C, Phase 1	
		2035 AM Peak Hour	2035 PM Peak Hour	2035 AM Peak Hour	2035 PM Peak Hour
Bottleneck locations		• Bottleneck WB on I-80 between truck scales and Suisun Valley Road. • Bottleneck WB and EB on SR 12 East at the Beck Avenue and Pennsylvania Avenue signalized intersections. • Bottleneck WB on SR 12 west at the Red Top Road signalized intersection; impacts I-80 WB.	• Major bottleneck EB on SR 12 East at the Beck Avenue and Pennsylvania Avenue signalized intersections; impacts EB I-80 and NB I-680. • Breakdown of I-80 / Suisun Valley Road and SR 12 East / Chadbourne Road interchanges; impacts WB I-80 and WB SR 12 East.	Bottleneck WB and EB on SR 12 East at the Beck Avenue and Pennsylvania Avenue signalized intersections.	• Major bottleneck EB on SR 12 East Pennsylvania Avenue signalized intersection; impacts EB I-80 and NB I- 680. • Bottleneck on SR 12 East / Chadbourne Road interchanges; impacts WB I-80 and WB SR 12 East.
Duration of congestion		Congestion would significantly increase compared to existing conditions, lasting approximately 3 hours.	Congestion would significantly increase compared to existing conditions, lasting beyond 6 hours	Congestion would significantly increase compared to existing conditions, lasting approximately 2.5 hours	Congestion would significantly increase compared to existing conditions, lasting beyond 5 hours
Queue lengths		• WB I-80 from Suisun Valley Road to SR 12 East (almost 2 miles). • WB SR 12 East from Beck Avenue to east of Main Street (2+ miles). • EB SR 12 East from Pennsylvania Avenue to Beck Avenue (1 mile). • WB SR 12 West from Red Top Road to I- 80 east of I-680 on-ramp (1 mile).	• EB SR 12 East from Pennsylvania Avenue intersection to NB I-680 (south of Gold Hill Road), 7+ miles, EB I-80 (west of Red Top Road), 9+ miles, and EB SR 12 West (west of Red Top Road), 9+ miles. • WB I-80 from Suisun Valley Road back beyond Air Base Parkway (7+ miles).	• WB SR 12 East from Beck Avenue to east of Main Street (2+ miles). • EB SR 12 East from Pennsylvania Avenue to Chadbourne Road (2 miles).	• EB SR 12 East from Pennsylvania Avenue intersection to NB I-680 (south of Gold Hill Road), 7+ miles, EB I-80 (west of Red Top Road), 9+ miles, and EB SR 12 West (west of Red Top Road), 9+ miles • WB I-80 from Suisun Valley Road to Abernathy Road (3 miles).
Travel times	WB I-80 to SB I-680	11:15	48:15	8:45	Greater than 60:00
	WB I-80	10:00	16:50	10:25	21:30
	SR-12 East to WB I-80	19:50	22:05	14:25	Greater than 60:00
Maximum Individual delay	WB I-80 to SB I-680	2 minutes	40 minutes	None	More than 52 minutes
	WB I-80	2 minutes	9 minutes	2 minutes	13 minutes
	SR-12 East to WB I-80	12 minutes	14 minutes	6 minutes	More than 52 minutes
Speed	WB I-80 to SB I-680	53 mph	12 mph	62 mph	8 mph
	WB I-80	54 mph	31 mph	60 mph	25 mph
	SR-12 East to WB I-80	26 mph	19 mph	34 mph	8 mph
Flows (volume)	WB I-80 to SB I-680	3,699	746	3,929	1,549
	WB I-80	6,121	5,411	6,074	6,422
	SR-12 East to WB I-80	2,139	234	2,466	342

[1] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

Source: Fehr & Peers 2009

System Operations and Travel Speeds

2015 AM Peak Hour Travel Times

During the AM peak hour, Alternative C Phase I would result in minimal improvement to travel times in the peak westbound direction, with increases or decreases of less than 30 seconds compared to No Project conditions. It should be noted that one travel time route (WB I-80 to WB SR 12 West) would increase by more than ten percent. This is due to the relocation of Red Top Road 1,500 feet west of the current intersection location, and thus a slightly longer travel path. Travel times from westbound SR 12 East to westbound I-80 and southbound I-680 would decrease slightly by seven and five percent, respectively, because of the improvements to freeway flows in the right two lanes on westbound I-80 west of the SR 12 East connector.

2015 AM Freeway Operations

Construction of Alternative C Phase I would improve AM peak hour operations by adding capacity to westbound I-80, but would not alleviate either the Beck Avenue or Pennsylvania Avenue intersection bottlenecks on westbound SR 12 East. The combination of added capacity on I-80 westbound, and continuation of the bottlenect on westbound SR 12 East, would result in a reduction in congestion on westbound I-80.

Alternative C Phase I would also improve SR 12 West, including replacing the at-grade intersection at Red Top Road with a grade separated interchange approximately 1,500 feet west of the current location. This would reduce congestion and queuing on SR 12 West and reduce the queue spillback to I-80, which would improve operations on westbound I-80 approaching the SR 12 west connector.

All the freeway mainline and weaving sections within the project study area, except for those on westbound SR 12 East, would operate at LOS D conditions or better during the AM peak hour. Locations east of Beck Avenue on westbound SR 12 East would continue to experience LOS F conditions. Only three locations would operate over capacity (LOS F) as a result of the Beck Avenue and Pennsylvania Avenue intersection bottlenecks on westbound SR 12 East.

2015 PM Peak Hour Travel Times

The benefits of constructing Alternative C Phase I during the PM peak hour include travel time savings in the peak eastbound direction ranging from 0 to 60 percent. The travel time savings would result in travel times comparable to, or even better than, existing travel times. Those travel time routes that would be better than existing conditions include those starting on northbound I-680. In the westbound direction, Alternative C Phase I would result in reductions for most travel times; two travel times that would increase slightly are the two that end on westbound SR 12 West. The increased travel time would be due to the relocation of interchanges (the current at-grade intersection at Red Top Road on SR 12 West would be replaced with a grade separated interchange located approximately 1,500 feet west of the existing intersection location), which would result in longer travel distances.

2015 PM Freeway Operations

With construction of Alternative C Phase I, the queuing on westbound I-80 would be eliminated and vehicles would travel at free flow speeds. The bottleneck on eastbound SR 12 East, however, would continue to result in congestion spilling back onto eastbound I-80. The addition of the third lane on eastbound SR 12 East would increase the queuing capacity and throughput on SR 12 East, but would only slightly improve the amount of traffic served at the Beck Avenue and Pennsylvania Avenue intersections. The queue from SR 12 East would continue to spill back to the connector ramp from northbound I-680, which is comparable to the extent of the queue under No Project conditions. This queue would also cause congestion along Abernathy Road and other local streets, as vehicles would not be able to enter I-80 and SR 12 East heading eastbound.

The bottleneck on SR 12 East would constrain the amount of traffic exiting the project on eastbound I-80 and thus the freeway downstream of SR 12 East would operate at LOS D or better, as with No Project conditions. The number of vehicles served would improve slightly with Alternative C Phase I (55 to 70 percent of the demand), as compared to No Project conditions.

With Alternative C Phase I, westbound SR 12 East would continue to experience congestion and queuing as far back as Jackson Street, as with No Project conditions, due to the at-grade intersections. With construction of Alternative C Phase I, two freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations. Those locations are as follows:

- NB I-680, off-ramp to Gold Hill Road
- NB I-680, on-ramp from Gold Hill Road

2035 AM Peak Hour Travel Times

Constructing of Alternative C Phase I during the AM peak hour would result in travel time savings in the peak westbound direction of 5 to 20 percent compared to No Project conditions. In the eastbound direction travel times would be similar to No Project conditions, increasing by 30 seconds or less. The increase in travel time to eastbound SR 12 East is due to an increase in demand served, and therefore more vehicles arriving at the bottleneck, while the increase in travel times to I-80 eastbound is due to the lengthening of some travel time paths due to the location of new interchanges.

2035 AM Freeway Operations

Construction of Alternative C Phase I would improve operations by adding capacity to westbound I-80, but would not alleviate either the Beck Avenue or Pennsylvania Avenue intersection bottlenecks on westbound SR 12 East. The improvements, however, would reduce congestion and queuing on westbound I-80 on several segments, including between the SR 12 East connector and the I-680 and SR 12 West connectors.

Alternative C Phase I would also improve SR 12 West, including replacing the at-grade intersection at Red Top Road/North Connector with a grade separated interchange approximately 1,500 feet west of the current location. This would reduce congestion and queuing on SR 12 West and reduce the queue spillback to I-80, which would improve operations on westbound I-80 approaching the SR 12 west connector.

All the freeway mainline and weaving sections within the project study, except for those on westbound SR 12 East, would operate at LOS E conditions or better during the AM peak hour. Locations east of Pennsylvania Avenue on westbound SR 12 East would continue to experience LOS F conditions. Only three locations would operate over capacity (LOS F) as a result of the Beck Avenue and Pennsylvania Avenue intersection bottlenecks on westbound SR 12 East.

With construction of Alternative C Phase I, eight freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations. Those locations are as follows:

- WB I-80, mainline between Waterman Boulevard/Air Base Parkway and Travis Boulevard
- WB I-80, weave between Travis Boulevard Loop and Oliver Road
- WB I-80, mainline between SR 12 East Connector and Truck Scales
- WB I-80, weave between Truck Scales and Suisun Valley Road
- NB I-680, off-ramp to Gold Hill Road
- NB I-680, on-ramp from Gold Hill Road
- NB I-680, off-ramp to Red Top Road
- SB I-680, on-ramp from Gold Hill Road

2035 PM Peak Hour Travel Times

During the PM peak hour, Alternative C Phase I would result in a worsening of travel times in the peak eastbound direction of up to 200 percent. Some of the increase in the eastbound direction is due to an increase in travel distances because of new ramp locations. However, most of the increase is due to the two lane drops between I-680 and the Suisun Valley Road overcrossing, the short distance between the SR 12 West and I-680 on-ramps, and the heavy demand for the right-most lanes on I-80. In the westbound direction, travel time savings would approach 70 percent compared to No Project conditions.

2035 PM Freeway Operations

With construction of Alternative C Phase I, the length of the queue on westbound I-80 that starts at the weave between the Truck Scales and Suisun Valley Road would significantly reduce from beyond the

project study area east of Air Base Parkway to Abernathy Road. The severity of the congestion on westbound I-80 would also reduce significantly and the volume served would increase from 48 to 82 percent (a 70 percent increase) as compared to the No Project condition. The queue spillback from I-80 to westbound SR 12 East queue would also be reduced significantly.

The bottleneck on eastbound SR 12 East would continue to result in severe congestion spilling back to eastbound I-80. The addition of the third lane on eastbound SR 12 East would increase the queuing capacity of SR 12 East and would slightly increase the amount of traffic served at the Beck Avenue and Pennsylvania Avenue intersections. However, the queue from SR 12 East would still spill as far back as in the No Project case, to beyond the project study area on eastbound I-80, northbound I-680 and eastbound SR 12 West. This queue would also cause congestion t adjacent ramp terminal intersections, as vehicles would not be able to enter I-80 and SR 12 East. Most local streets would also become congested due to queue spillback from the freeway and due to motorists diverting to alternative routes.

The bottlenecks on eastbound SR 12 East would continue to constrain the amount of traffic exiting the project on eastbound I-80 and thus the freeway downstream of SR 12 East would operate at LOS D or better, as with No Project conditions.