QUALITATIVE $PM_{2.5}$ HOT SPOT ANALYSIS

I-580 WESTBOUND HOV LANE WIDENING PROJECT, ALAMEDA COUNTY, CALIFORNIA

EA 04-2908C, 04-2908E
04-ALA-580 PM R8.4-21.6

Prepared for

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Acronyms and Abbreviations

AADT	Annual average daily traffic
BAAQMD	Bay Area Air Quality Management District
CAA	Clean Air Act
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO_2	Carbon dioxide
Department	California Department of Transportation
EMFAC	Emission Factor Model
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOV	High occupancy vehicle
I-580	Interstate 580
LOS	Level of service
μg/m^3	Microgram per cubic meter
mph	Miles per hour
MTC	Metropolitan Transportation Commission
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	Nitrogen oxides
O_3	Ozone
PM	Particulate matter

PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
POAQC	Project of Air Quality Concern
project	Interstate 580 Westbound High Occupancy Vehicle Lane Widening Project
RTP	Regional Transportation Plan
SFBAAB	San Francisco Bay Area Basin
SHOPP	State Highway Operation and Protection Program
SIP	State Implementation Plan
SO_x	Sulfur oxides
TIP	Transportation Improvement Program
USC	United States Code

This project-level hot spot analysis for the Interstate 580 (I-580) Westbound High Occupancy Vehicle (HOV) Lane Widening Project responds to the United States Environmental Protection Agency's (EPA) requirement for a hot spot analysis for particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), as required in the EPA's March 10, 2006, Final Transportation Conformity Rule (71 Federal Register 12468). The effects of localized $PM_{2.5}$ hot spots were evaluated using the EPA and Federal Highway Administration (FHWA) guidance manual, *Transportation Conformity Guidance for Qualitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (FHWA and EPA 2006).

This $PM_{2.5}$ analysis addresses the construction of the proposed project, which is included in the Metropolitan Transportation Commission's (MTC) current Regional Transportation Plan (RTP), the *Transportation 2035 Plan for the San Francisco Bay Area* (MTC 2009, RTP ID No. 230665). The FHWA made the conformity determination for the RTP on May 29, 2009. The project is also included in the 2011 Transportation Improvement Program (TIP), which was adopted by MTC on October 27, 2010 (TIP ID No. ALA-070018).

The project also includes scope from the following projects identified in the 2011 TIP:

- State Highway Operation and Protection Program (SHOPP) improvements for the I-580 corridor within the project limits (TIP MTC-050009, RTP ID No. 230713). $PM_{2.5}$ consultation is not required for this scope of work.
- I-580 Westbound Auxiliary Lane from the Airway Boulevard Interchange to the Fallon Road Interchange, the scope of which was included in the I-580 Westbound HOV Lane Widening Project Initial Study with Mitigated Negative Declaration/Environmental Assessment (IS/EA) and Air Quality Conformity completed in 2009. The auxiliary lane from the Fallon Road Interchange to the Santa Rita Road/Tassajara Road Interchange was previously constructed with the City of Dublin's Fallon Road Interchange Improvement Project, which was completed in summer 2010 (TIP ALA-050011, RTP ID No. 21456).

The California Department of Transportation (Department), in cooperation with the Alameda County Transportation Commission (Alameda CTC), proposes to widen westbound I-580 to provide a westbound HOV lane. The project limits extend from west of the Greenville Road undercrossing (PM R8.4) to just west of the San Ramon Road/Foothill Road overcrossing (PM R21.6), in the cities of Livermore, Pleasanton, and Dublin in Alameda County. The total length of the project is approximately 13.2 miles. Figure 1-1 shows the project location.

An IS/EA for the project was completed in October 2009 (Department 2009). As part of the National Environmental Policy Act (NEPA) process, FHWA issued a project-level conformity determination for the project on June 18, 2009.

Starting on December 14, 2010 – after the IS/EA was approved – Bay Area transportation projects that have federal funding or require federal approvals must obtain FHWA conformity determinations for $PM_{2.5}$. This report has been prepared to support the request for project-level $PM_{2.5}$ conformity determination from FHWA.

2.1 PROJECT OVERVIEW

The proposed project would:

- Reduce westbound peak period congestion and delay by providing a westbound HOV lane for carpool and transit riders. Auxiliary lanes would improve highway operations by taking vehicles' on and off movements out of the mainline through-traffic lanes.
- Encourage use of HOVs and transit by providing carpools and mass transit with a distinct time/speed advantage over single-occupant vehicles. Providing an incentive for carpoolers and transit services would encourage single-occupant vehicle drivers to form carpools and encourage ridership on mass transit. This would subsequently reduce the number of single-occupant vehicles in the mainline through-traffic lanes.
- Support regional air quality attainment goals by reducing the numbers of automobiles in use and idling in traffic with related reductions in vehicle hours traveled (VHT), particularly during the westbound morning peak period when air pollutants accumulate.
- Improve safety for motorists and Department maintenance workers by providing adequate inside and outside shoulders where possible; allowing for refuge areas for disabled vehicles; and improving accessibility for the California Highway Patrol (CHP), other emergency responders, and maintenance vehicles. Standard shoulders would also provide a buffer space between maintenance workers and moving traffic.

2.2 PROJECT DESCRIPTION

The Build Alternative would construct a westbound HOV lane along a 13.2-mile segment of I-580, beginning west of the Greenville Road undercrossing and ending west of the San Ramon Road/Foothill Road overcrossing in eastern Alameda County. Figures 1-2a through 1-2f depict the Build Alternative alignment. In addition to the HOV lane, the following construction activities are included in the Build Alternative:

Figure 1-1. Project Location

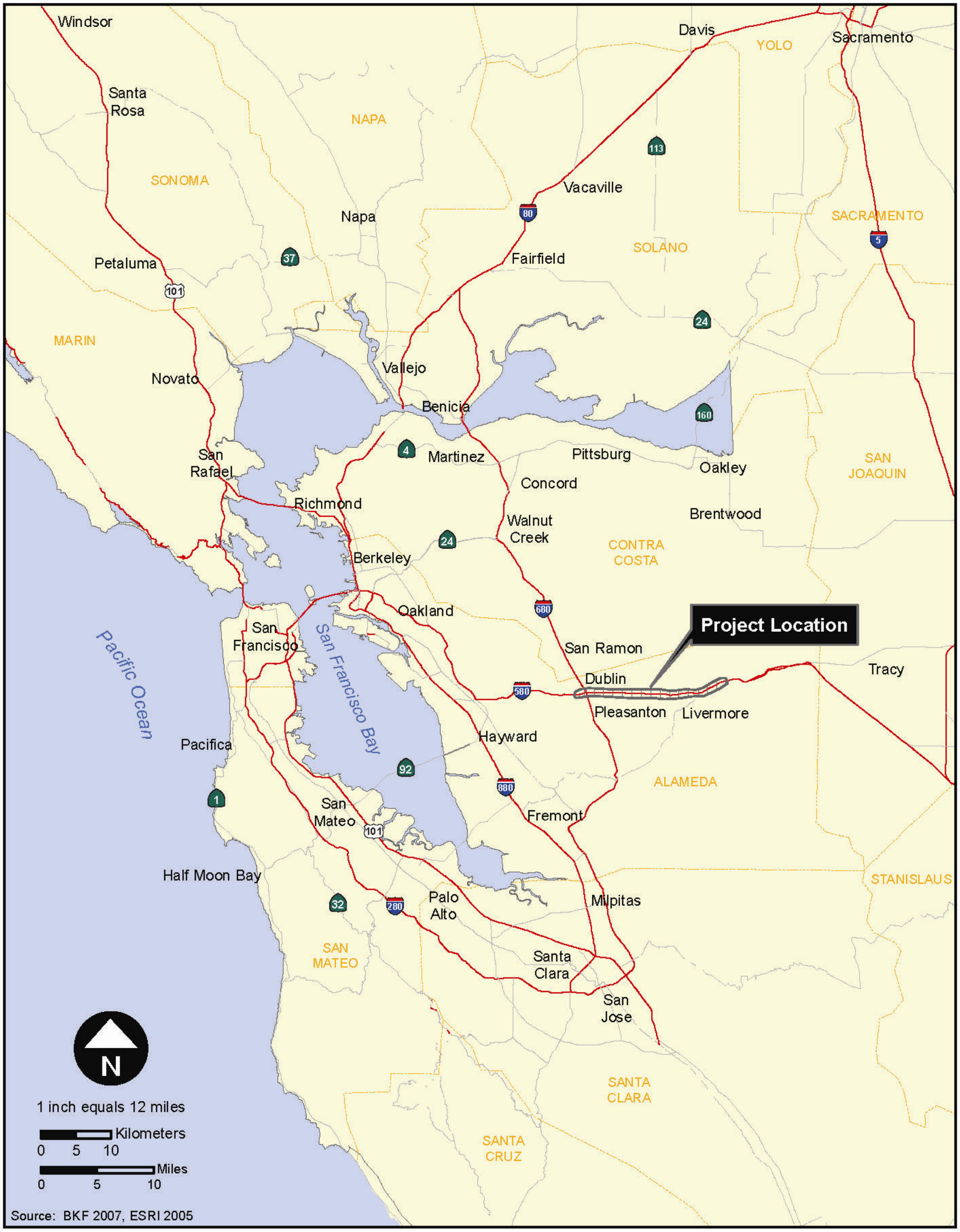


Figure 1-2a. Proposed Project Alignment

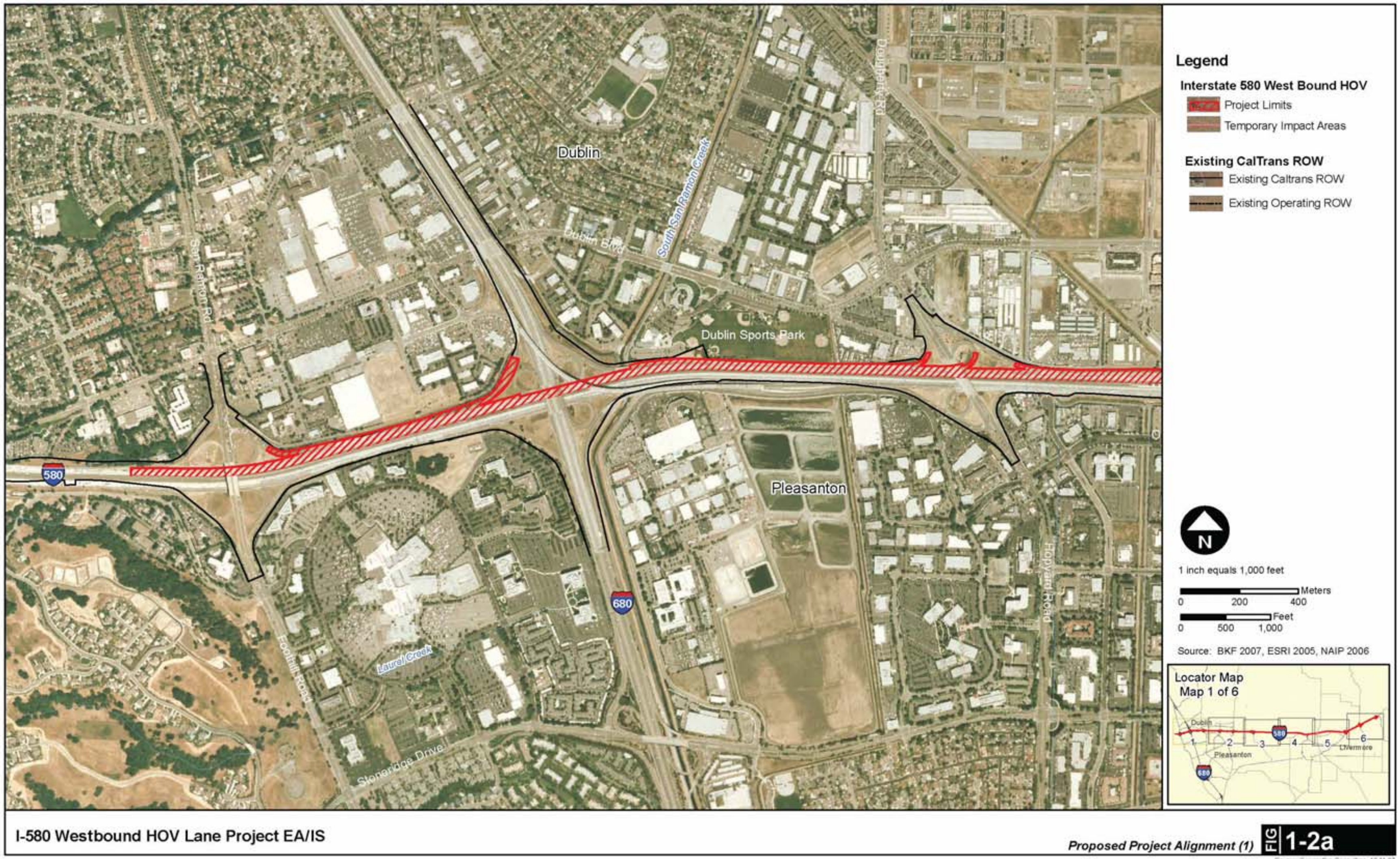


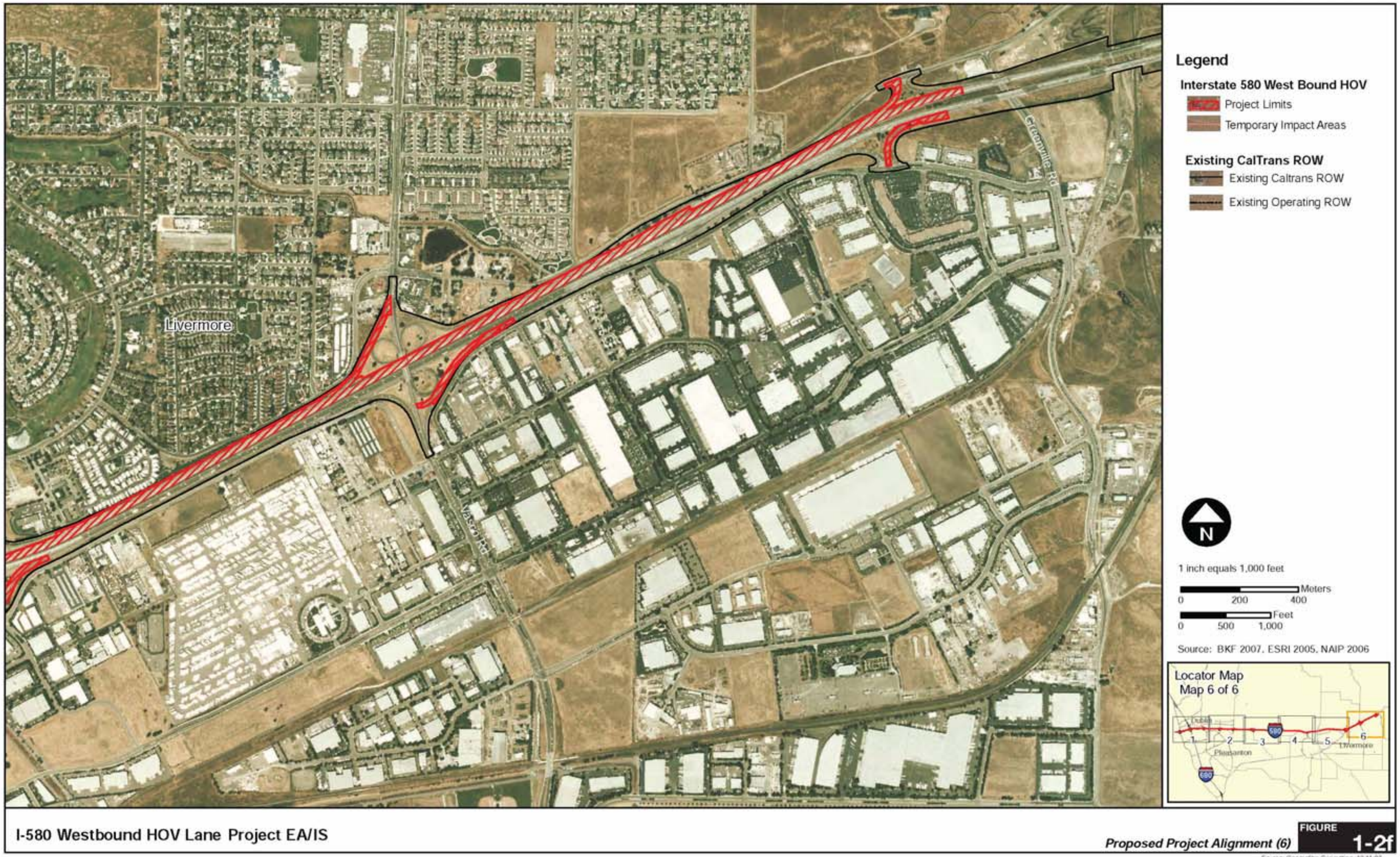
Figure 1-2b. Proposed Project Alignment

Figure 1-2c. Proposed Project Alignment

Figure 1-2d. Proposed Project Alignment

Figure 1-2e. Proposed Project Alignment

Figure 1-2f. Proposed Project Alignment



- Construct westbound auxiliary lanes from Vasco Road to First Street, First Street to North Livermore Avenue, North Livermore Avenue to Isabel Avenue, and Airway Boulevard to Fallon Road (the auxiliary lane between Airway Boulevard and Fallon Road is also identified in the 2011 TIP as a part of TIP ALA-050011 and as RTP ID No. 21456);
- Widen the North Livermore Avenue undercrossing (Bridge No. 33-0153) in both eastbound and westbound directions;
- Widen two existing crossings of the Arroyo Las Positas (Bridge No. 33-0085 and No. 33-0203) in the westbound direction;
- Widen two existing bridge crossings over Tassajara Creek (Bridge No. 33-0015 L and No. 33-0015 R) in the median section in both the eastbound and westbound directions;
- Widen the Dougherty undercrossing (BART transit corridor; Bridge No. 33- 0150L) in the westbound direction;
- Extending the existing box culvert at Arroyo Seco Creek in the westbound direction;
- Construct HOV preferential lanes at the eastbound and westbound on-ramps at Greenville Road, Vasco Road, First Street, and North Livermore Avenue, and the westbound on-ramp at Airway Boulevard;
- Modify the ramp noses at interchange areas to accommodate an auxiliary lane, HOV preferential lane, and shoulder widening;
- Provide standard shoulder widths – a minimum of 10 feet – at all locations on the mainline east of the San Ramon Road/Foothill Road overcrossing to west of the Greenville Road undercrossing except at the following locations:

  – Between San Ramon Road/Foothill Road and Dougherty Road/Hopyard Road interchanges, proposed inside shoulder varies 2 to 10 feet;

  – Through the First Street interchange, proposed inside shoulder varies 5 to 10 feet; and

  – Between the Hacienda Drive interchange and the Tassajara Creek Bridge, proposed inside shoulder width varies 8 to 10 feet.
- Provide an additional 4 feet on the inside shoulder at most locations for CHP enforcement areas; there is not sufficient space within the entire project to provide a 14-foot shoulder at the following locations:

  – From San Ramon Road/Foothill Road to Hacienda Drive interchanges; and

  – From the Las Colinas Road overcrossing to the First Street interchange.
- Rehabilitate existing freeway pavement within the project limits.
- Wherever possible, the Build Alternative would also construct 4 feet of additional pavement width along the standard 10-foot outside shoulder along westbound I-580 in anticipation of a future express lane project. For the future express lane project, it is anticipated that the westbound I-580 travel lanes and outside shoulder would be restriped to provide a 4-foot buffer between the HOV lane and the innermost mixed-flow lane. This would allow for the future conversion of the HOV lane to an express lane. Environmental and project-level conformity analysis for the express lane is not a part of this evaluation.

After the IS/EA for the proposed project was approved in October 2009 under the Department District 4 EA number 290820 (Department 2009), the project was divided into three phases of construction. As a result, the phases were assigned new EA numbers. This Hot Spot Analysis addresses only the activities listed above, which are included in EA numbers 2908C and 2908E.

The widening of bridges over Arroyo Las Positas along eastbound I-580 was also evaluated in the IS/EA. That activity is now included in EA 2908U1, also known as the I-580 Eastbound Auxiliary Lane Project (TIP ALA-070020). A $PM_{2.5}$ conformity evaluation was conducted for that project starting in July 2011, and FHWA issued a conformity determination on November 23, 2011.

As noted in Section 1, project construction will include applicable SHOPP improvements for the I-580 corridor within the project limits (TIP MTC-050009). The SHOPP actions, which consist of pavement resurfacing and/or rehabilitation, emergency relief (23 United States Code 125), and/or widening narrow pavements or reconstructing bridges (no additional travel lanes), are exempt from regional and project-level air quality conformity per 40 Code of Federal Regulations (CFR) 93.126.

3.1 REGULATORY BACKGROUND

Under 1990 Clean Air Act (CAA) 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 MTC and the appropriate federal agencies, such as the FHWA, 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 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 national ambient air quality standards (NAAQS). Conformity requirements were made substantially more rigorous in the 1990 CAA amendments, 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 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 Metropolitan Transportation Commission (MTC) is the designated federal MPO and state regional transportation planning agency for Alameda County. As such, the MTC coordinates the region's major transportation projects and programs, and promotes regionalism in transportation investment decisions.

3.1.1 Statutory Requirements for PM Hot Spot 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 PM_{10} and $PM_{2.5}$ nonattainment and maintenance areas. The final rule requires a hot spot analysis to be performed for a Project of Air Quality Concern (POAQC) or any other project identified by the $PM_{2.5}$ 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 SIP, if one exists. 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 POAQCs 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 (LOS) 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 $PM_{2.5}$ or PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

In March 2006, the FHWA and EPA issued a guidance document entitled *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (FHWA and EPA 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 $PM_{2.5}$ or PM_{10}. The PM_{10} hot spot analysis is not required for project-level conformity because the area is in attainment or unclassified for the national PM_{10} standards.

Hot spot analyses only need to be performed for POAQCs. POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in a $PM_{2.5}$ or PM_{10} SIP as a project of 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 percent 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 (operating 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 buses and/or diesel trucks.

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

- Any new or expanded highway project that primarily serves 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 $PM_{2.5}$ or PM_{10} 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 $PM_{2.5}$ or PM_{10} emissions.

For projects identified as not being POAQCs, qualitative $PM_{2.5}$ (for regions without an approved conformity SIP) hot spot 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 hot spot analysis, since the projects have been found to not be of air quality concern under 40 CFR 93.123(b)(1). The project area is classified as a nonattainment area for the federal $PM_{2.5}$ standard, therefore a determination must be made as to whether it would result in a $PM_{2.5}$ hot spot.

Of the five POAQC types identified above, the project most likely falls into the first category: "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 AADT where 8 percent or more of such AADT is diesel truck traffic." As shown in Table 3-1, the most recent Department traffic counts for I-580 show that the project corridor already exceeds 125,000 total AADT and 8 percent trucks (i.e., 10,000 truck AADT). More than 60 percent of trucks have five or more axles (Table 3-2).

Table 3-1. 2010 Total AADT and Truck AADT

I-580 Segment	Post Mile	Total AADT	Truck AADT	% Trucks
East of Livermore, Greenville Road	R8.265	137,000	11,412	8.33
West of Livermore, Greenville Road	R8.265	138,000	14,352	10.40
East of First Street	10.689	160,000	19,520	12.20
West of First Street	10.689	167,000	7,599	4.55
East of I-680 Junction	20.726	174,000	15,991	9.19
West of I-680 Junction	20.726	177,000	11,983	6.77

Source: Department 2010

Table 3-2. 2010 Percentage of Truck AADT by Axle

I-580 Segment	Post Mile	No. Axles			
		2	3	4	5+
East of Livermore, Greenville Road	R8.265	19.32	5.08	2.64	72.97
West of Livermore, Greenville Road	R8.265	12.90	1.50	1.20	84.40
East of First Street	10.689	18.30	3.10	2.10	76.50
West of First Street	10.689	20.57	6.08	4.23	69.12
East of I-680 Junction	20.726	24.67	8.08	3.32	63.94
West of I-680 Junction	20.726	24.79	6.69	3.95	64.58

Source: Department 2010

Consequently, a qualitative project-level $PM_{2.5}$ hot spot analysis was conducted to assess whether the project would cause or contribute to any new localized $PM_{2.5}$ violations, or increase the frequency or severity of any existing violations, or delay timely attainment of the or $PM_{2.5}$ NAAQS.

3.1.2 Ambient Air Quality Standards

- **24-hour $PM_{2.5}$ Standard:** 35.0 micrograms per cubic meter (μg/m^3)
- **Annual $PM_{2.5}$ Standard:** 15.0 μg/m^3

The Bay Area was designated as a nonattainment area for the federal $PM_{2.5}$ standard on October 8, 2009, with an effective date of December 14, 2009. The Bay Area Air Quality Management District (BAAQMD) must submit a SIP to the EPA by December 14, 2012, demonstrating how the Bay Area will achieve the $PM_{2.5}$ NAAQS by December 14, 2014.

The 24-hour $PM_{2.5}$ 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 $PM_{2.5}$ recorded at the monitoring station. A $PM_{2.5}$ 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 $PM_{2.5}$ 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

A hot spot analysis is defined in 40 CFR 93.101 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 at the 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 in 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 $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (FHWA and EPA 2006) the following two methods for completing a $PM_{2.5}$ 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 $PM_{2.5}$ 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 $PM_{2.5}$ emissions, including tailpipe, brake wear, and tire wear. 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 (CARB) has not made a determination that re-entrained road dust is a significant contributor to ambient $PM_{2.5}$ concentrations in the project region.

Secondary particles formed through $PM_{2.5}$ and PM_{10} 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 $PM_{2.5}$ and PM_{10} are considered as part of the regional emission analysis prepared for the conforming RTP and Federal Transportation Improvement Program (FTIP).

Project construction is anticipated to last approximately 2.0 years. In addition, the project must comply with BAAQMD construction-related fugitive dust control measures, which will ensure that fugitive dust from construction activities is minimized. Consequently, construction-related $PM_{2.5}$ emissions were not included in the hot spot analysis per 40 CFR 93.123(c)(5).

3.2.2 Air Quality Trend Analysis

Local air quality data were obtained from the Livermore monitoring station to characterize existing air quality and predict future conditions in the project area. In addition to monitoring data, this analysis presents project-level $PM_{2.5}$ emissions in the future (2015 and 2035) years to help characterize the project's impact on total $PM_{2.5}$ emissions generated in the project area.

3.2.2.1 Data Considered

The nearest air quality monitoring station is the Livermore station (793 Rincon Avenue, Livermore, CA 94550), which is approximately 0.5 mile south of the project corridor.

3.2.2.2 Climate and Topography

Due to its topographic diversity, the meteorology and climate of the Bay Area is often described in terms of different subregions and their microclimates. The proposed project is located in the Livermore Valley subregion, as defined by the BAAQMD.

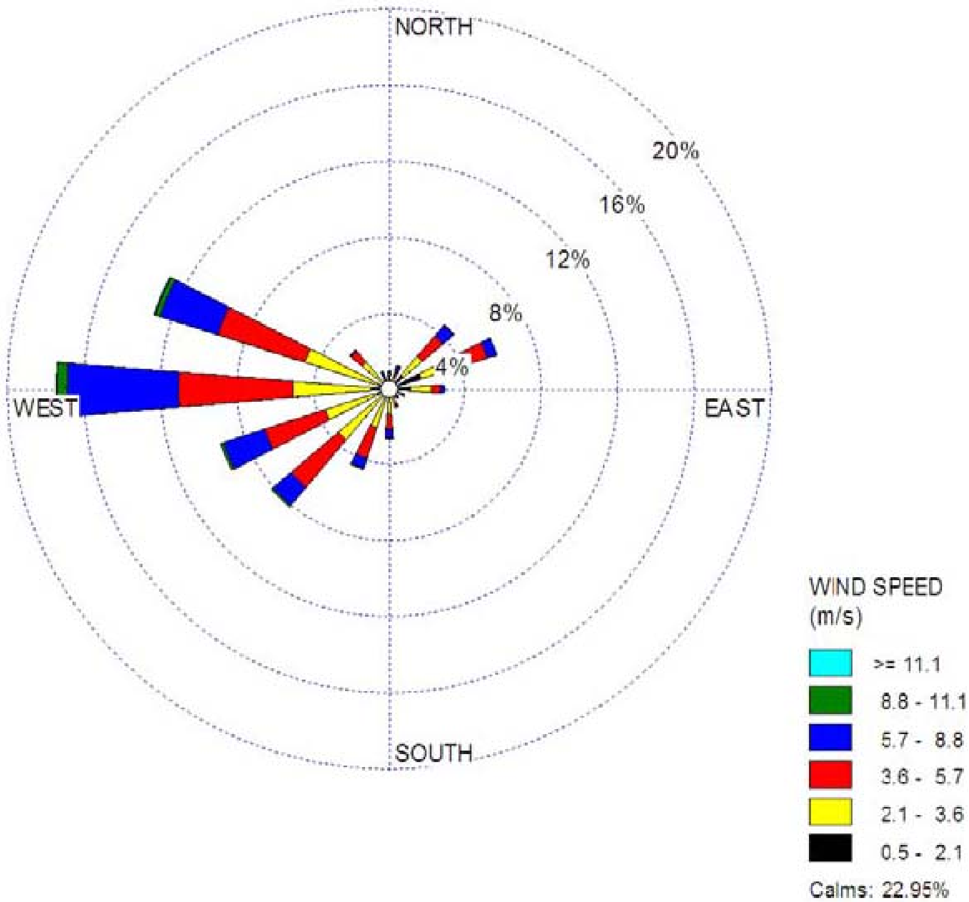
The Livermore Valley is a sheltered inland valley near the eastern border of the San Francisco Bay Area Basin (SFBAAB). The western side of the valley is bordered by 1,000- to 1,500-foot hills with two gaps connecting the valley to the central SFBAAB, the Hayward Pass, and Niles Canyon. The eastern side of the valley also is bordered by 1,000- to 1,500-foot hills with one major passage to the San Joaquin Valley called the Altamont Pass and several secondary passages. To the north lie the Black Hills and Mount Diablo. A northwest-to-southeast channel connects the Diablo Valley to the Livermore Valley. The south side of the Livermore Valley is bordered by mountains approximately 3,000 to 3,500 feet high.

During the summer months, when there is a strong inversion with a low ceiling, air movement is weak and pollutants become trapped and concentrated. Figure 3-1 shows the predominant wind direction in Livermore. Maximum summer temperatures in the Livermore Valley range from the high 80s to low 90s, with extremes in the 100s. Average winter maximum temperatures range from the high 50s to low 60s, while minimum temperatures are from the mid to high 30s, with extremes in the high teens and low 20s.

Air pollution potential is high in the Livermore Valley, especially for photochemical pollutants (such as ozone) in the summer and fall. High temperatures increase the potential for ozone to build up. The valley not only traps locally generated pollutants but can be the receptor of ozone and ozone precursors from San Francisco, Alameda, Contra Costa and Santa Clara counties. On northeasterly wind flow days, most common in the early fall, ozone may be carried west from the San Joaquin Valley to the Livermore Valley.

During the winter, the sheltering effect of the valley, its distance from moderating water bodies, and the presence of a strong high pressure system contribute to the development of strong, surface-based temperature inversions. Pollutants such as carbon monoxide and particulate matter generated by motor vehicles, fireplaces, and agricultural burning can become concentrated. Air pollution problems could intensify because of population growth and increased commuting through the subregion (BAAQMD 2011).

Figure 3-1. Predominant Wind Direction at Livermore Municipal Airport



Source: California Air Resources Board 2011 Livermore Municipal (ID24927, NCDC)

3.2.2.3 Trends in $PM_{2.5}$ Concentrations

Monitored $PM_{2.5}$ concentrations at the Livermore monitoring station for the past four years (2007–2010) are presented in Table 3-3. The data indicates that the 24-hour average $PM_{2.5}$ concentrations have exceeded the NAAQS for 2007–2009 but not 2010. However, the national annual average standard was not exceeded at the monitoring station in any of the past four years. The national 24-hour $PM_{2.5}$ standards estimated day exceedances are displayed in Table 3-3 as well.

Table 3-3. Ambient $PM_{2.5}$ Monitoring Data (µg/m³) at the Livermore Rincon Ave. Monitoring Station (2007–2010)

	Estimated Days Over Standard	Annual Average (µg/m³)		High 24-Hr Average (µg/m³)	
Year	**Nat'l**	**Nat'l**	**State**	**Nat'l**	**State**
2010	0.0	7.6	7.6	34.7	34.7
2009	**4.0**	9.1	9.2	**45.7**	45.7
2008	**2.1**	10.0	10.1	**38.6**	52.7
2007	**9.0**	8.9	8.9	**54.9**	54.9

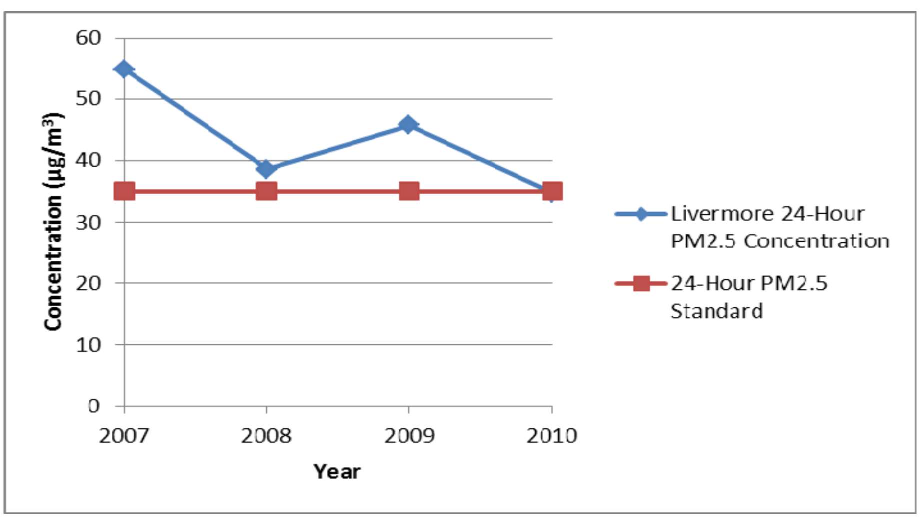
Source: CARB 2012
Notes:
µg/m³ = micrograms per cubic meter
Exceedances of the State or National standard shown in **bold** text.
An exceedance is not necessarily a violation. California standards are not to be exceeded; National standards are not to be exceeded more than once per year.

As required by the applicable transportation conformity regulations for $PM_{2.5}$, 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 $PM_{2.5}$ concentrations. The current annual standard is based on a three-year average of annual mean $PM_{2.5}$ concentrations.

As shown in Figure 3-2, 24-hour average $PM_{2.5}$ concentrations at the Livermore monitoring station show a decreasing trend from 2007 to 2010. These values have remained above the current national standard of 35.0 µg/m³ except for 2010, but below the old standard of 65 µg/m³.

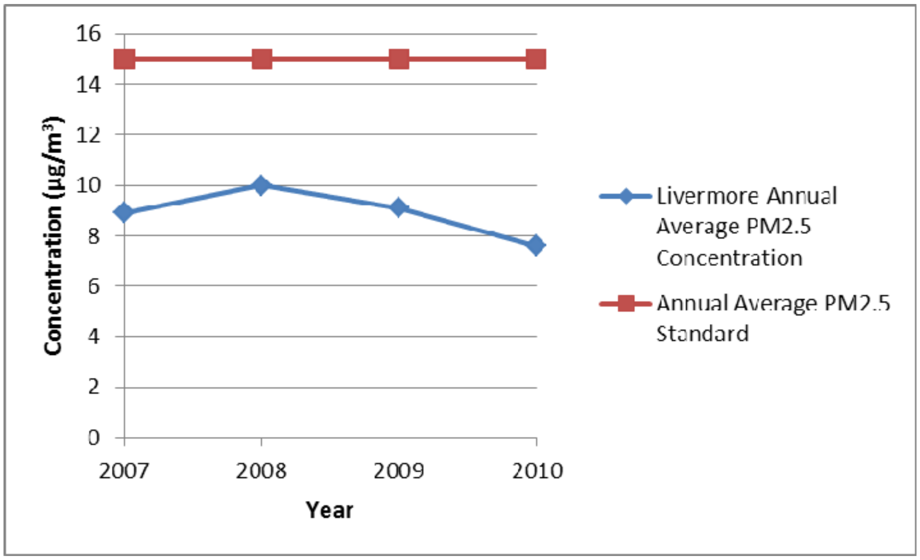
Figure 3-3 indicates that annual average $PM_{2.5}$ concentrations recorded at the Livermore monitoring station peaked in 2008 and decreased through 2010. These values have remained below the current national standard of 15.0 µg/m³.

Figure 3-2. 24-Hour Average $PM_{2.5}$ Concentrations (µg/m³) at the Livermore Rincon Ave. Monitoring Station (2007–2010)



Source: California Air Resources Board 2012

Figure 3-3. Annual Average $PM_{2.5}$ Concentrations ($\mu g/m^3$) at the Livermore Rincon Ave. Monitoring Station (2007–2010)



Source: California Air Resources Board 2012

3.2.2.4 Surrounding Land Uses

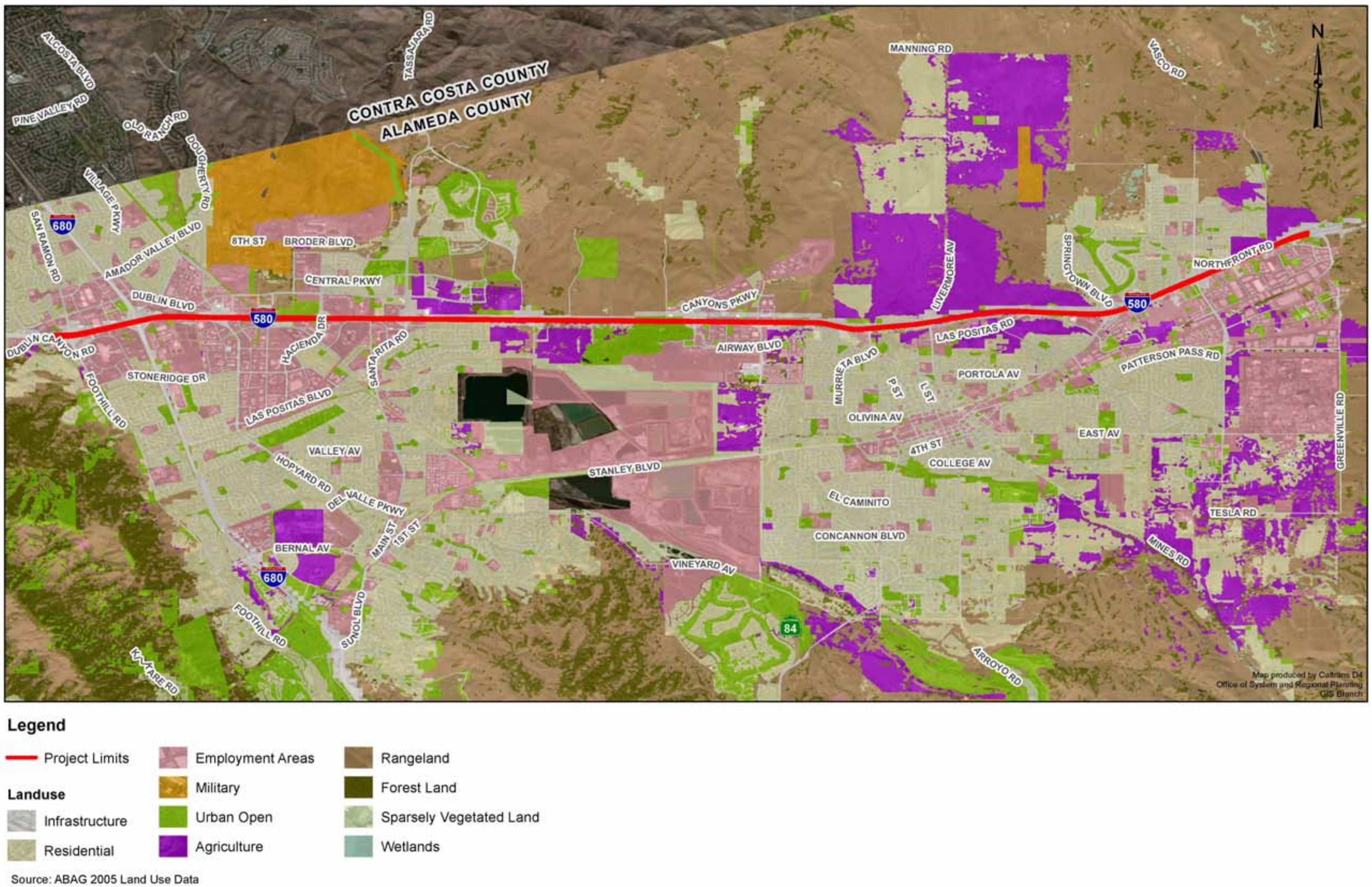
The BAAQMD generally defines a sensitive receptor as a facility or land use that houses or attracts members of the population, such as children, the elderly, and people with illnesses, who are particularly sensitive to the effects of air pollutants.

Various sensitive receptors are located in the vicinity of the project area. Figure 3-4 shows the project area and shows residential neighborhoods that contain sensitive receptor sites. 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 residential developments south and north of I-580 in Dublin, Pleasanton, and Livermore. As stated in Section 2.2, the proposed project would construct auxiliary lanes in four segments of the corridor, provide standard shoulder widths (10 feet minimum) in several locations, and wherever possible add 4 feet of additional pavement along the inside shoulder.

In most locations, the additional pavement would result in a minor shift (5 feet or less) of freeway lanes toward residential receptors to the north. Where the westbound auxiliary lanes would be added – Vasco Road to First Street, First Street to North Livermore Avenue, North Livermore Avenue to Isabel Avenue, and Airway Boulevard to Fallon Road – the lanes would be an average of approximately 17 feet closer to receptors to the north. However, residential developments that are adjacent to the westbound lanes of I-580 are separated from the freeway

Figure 3-4. Land Uses in the Project Area



by other roads (Sunflower Court and Northfront Road between Vasco Road and First Street, Las Colinas Road between First Street and North Livermore Avenue, and Collier Canyon Road between Airway Boulevard and Fallon Road). The exception is a 0.18-mile portion of a mobile home park on Sundance Drive between Vasco Road and First Street, which is not separated from I-580 by a road but a 16-foot-high sound wall. Because of the relatively small distance of the shift, the presence of roads (and a sound wall) that provide a partial buffer zone between I-580 and the residences, and the presence of existing vehicle emissions from the other roads, the project is not expected to decrease air quality in those locations. In addition, the project would help to reduce congestion and improve traffic flow, especially in the period after the opening year. Since motor vehicle emissions tend to decrease with increased speed and reduced congestion, the project would improve air quality in the vicinity of nearby receptors.

3.2.2.5 Future Trends

Emission trend data for the SFBAAB from the 2009 edition of *The California Almanac of Emissions and Air Quality* published by the CARB was used to provide an estimate of potential $PM_{2.5}$ trends in the vicinity of the project area. While the CARB'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 3-4 presents $PM_{2.5}$ emission trends in the SFBAAB for the years 1975 to 2020.

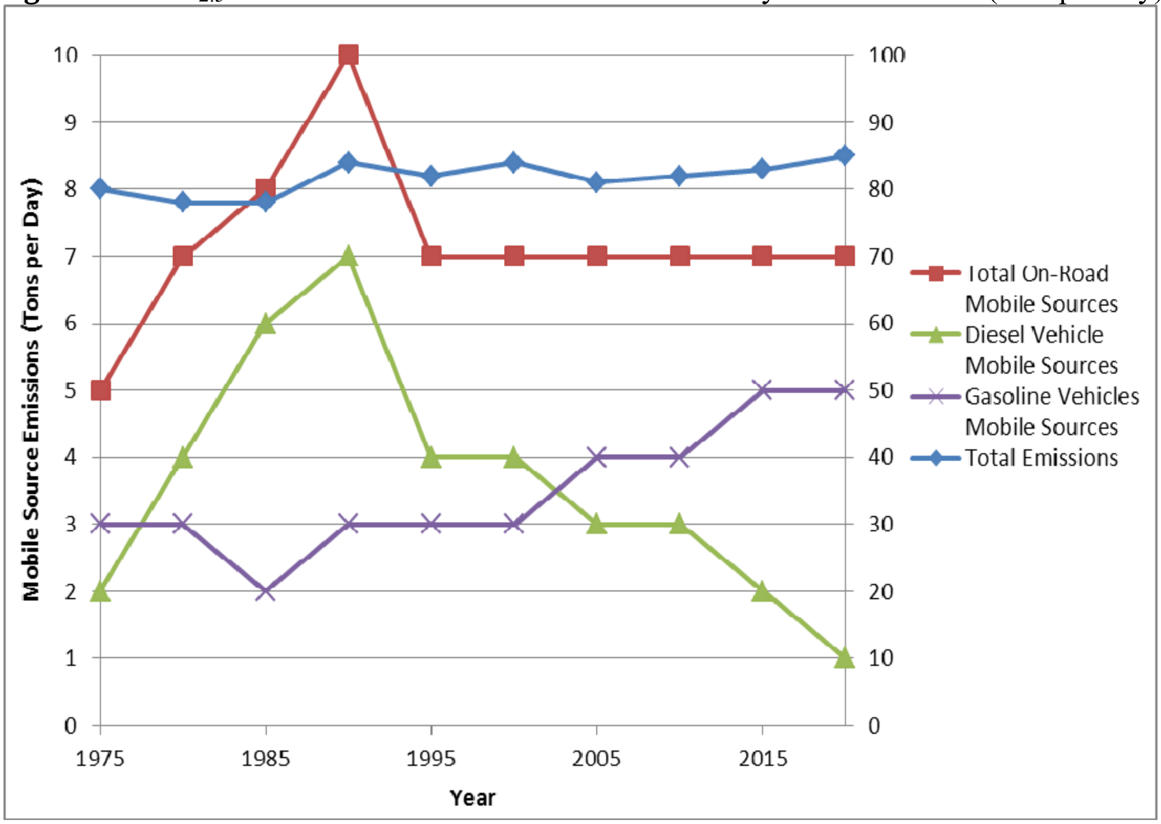
Table 3-4. $PM_{2.5}$ Emission Trends in the San Francisco Bay Area Air Basin, 1975–2020 (tons per day)

Year	Total Emissions	Total On-Road Mobile Sources	Diesel Vehicle Mobile Sources	Gasoline Vehicles Mobile Sources
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 $PM_{2.5}$ from diesel motor vehicles have been decreasing since 1990 due to adoption of more stringent emission standards, even though population and vehicle miles traveled (VMT) have been increasing. Figure 3-5 indicates that total $PM_{2.5}$ emissions have remained relatively constant in the SFBAAB 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 $PM_{2.5}$ are not likely to result from on-road sources but from area-wide sources, such as fugitive dust associated with construction and development projects.

Figure 3-5. $PM_{2.5}$ 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 Transportation and Traffic

Anticipated regional growth in population and employment 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 (Dowling Associates 2008), including daily VMT data for the No Build and Build scenarios.

VMT data included vehicle activity for affected roadways in the immediate project region. The traffic data used for emissions modeling is summarized in Table 3-5. Table 3-5 presents daily VMT distribution and speed for westbound I-580 only; the project would not affect VMT and speeds in the eastbound direction.

Table 3-5. Daily VMT and Worst Case Peak Hour Speeds
(Westbound Direction Only)

Peak Hour Scenario	VMT	Speed (mph)
No Build 2015	124,727	31
No Build 2035	130,175	29
Build 2015	133,618	36
Build 2035	142,838	34

Mainline Average Daily Traffic Volumes and Mainline Truck Volumes

Tables 3-6 and 3-7 present the total AADT volumes as well as truck AADT volumes for the I-580 corridor in the project vicinity used for the emissions analysis. Volumes are presented for westbound I-580 only, as the project would not affect operations in the eastbound direction.

Table 3-6. No Build and Build Total AADT and Truck AADT, 2015
(Westbound Direction Only)

Segments	NO BUILD		BUILD	
	Total AADT	Truck AADT	Total AADT	Truck AADT
San Ramon Rd. – Interstate 680/580 Interchange	106,802	12,816	107,508	12,901
Interstate 680/580 IC – Hopyard Rd./Dougherty Rd.	127,624	15,315	129,250	15,510
Hopyard Road/Dougherty Rd. – Hacienda Dr.	132,958	15,955	134,525	16,143
Hacienda Dr. – Santa Rita Rd./Tassajara Rd.	124,911	14,989	129,434	15,532
Santa Rita Rd./Tassajara Rd. – El Charro Rd./Fallon Rd.	122,389	14,687	127,721	15,327
El Charro Rd./Fallon Rd. – Airway Blvd.	115,770	13,892	122,284	14,674
Airway Blvd. – Isabel Ave.	119,518	14,342	123,709	14,845
Isabel Ave. - Livermore Ave.	130,911	15,709	134,850	16,182
Livermore Ave. – First St.	114,802	13,776	118,461	14,215
First St. – Vasco Rd.	108,429	13,012	110,524	13,263
Vasco Rd. – Greenville Rd.	88,842	10,661	90,154	10,818
East of Greenville Rd.	85,421	10,251	85,468	10,256

Note: Truck AADT was assumed to represent 12 percent of total AADT for 2015 No Build and Build conditions. Analysis of existing and future goods movement conducted as part of the 2007 Central Alameda County Freeway System Operational Analysis projected an 80 percent increase in truck traffic between 2005 and 2030. Similarly, the 2005 Draft California Good Movement Action Plan estimated a 74 percent increase in truck traffic for the same duration. These projections translate into a 2.4 percent annual increase in truck traffic. As shown in Table 3-1, current (2010) truck percentages in the project limits range from 4.55 to 12.20 percent (Department 2010). For a conservative future estimate, the highest three 2010 truck percentages (9.19, 10.40, and 12.20) were averaged, and a 2.4 annual increase was applied to the average to arrive at a 2015 percentage (11.93, rounded to 12).

Table 3-7. No Build and Build Total AADT and Truck AADT, 2035 (Westbound Direction Only)

Segments	NO BUILD		BUILD	
	Total AADT	**Truck AADT**	**Total AADT**	**Truck AADT**
San Ramon Rd. – Interstate 680/580 Interchange	104,782	20,956	106,736	21,347
Interstate 680/580 IC – Hopyard Rd./Dougherty Rd.	128,220	25,644	131,090	26,218
Hopyard Road/Dougherty Rd. – Hacienda Dr.	136,620	27,324	139,568	27,914
Hacienda Dr. – Santa Rita Rd./Tassajara Rd.	131,195	26,239	137,577	27,515
Santa Rita Rd./Tassajara Rd. – El Charro Rd./Fallon Rd.	124,147	24,829	130,744	26,149
El Charro Rd./Fallon Rd. – Airway Blvd.	132,069	26,414	138,332	27,666
Airway Blvd. – Isabel Ave.	132,698	26,540	139,231	27,846
Isabel Ave. - Livermore Ave.	149,978	29,996	155,801	31,160
Livermore Ave. – First St.	135,978	27,196	141,768	28,354
First St. – Vasco Rd.	130,675	26,135	133,538	26,708
Vasco Rd. – Greenville Rd.	110,126	22,025	112,473	22,495
East of Greenville Rd.	92,032	18,406	92,236	18,447

Note: Truck AADT was assumed to represent 20 percent of total AADT for 2035 No Build and Build conditions. Analysis of existing and future goods movement conducted as part of the 2007 Central Alameda County Freeway System Operational Analysis projected an 80 percent increase in truck traffic between 2005 and 2030. Similarly, the 2005 Draft California Good Movement Action Plan estimated a 74 percent increase in truck traffic for the same duration. These projections translate into a 2.4 percent annual increase in truck traffic. As shown in Table 3-1, current (2010) truck percentages in the project limits range from 4.55 to 12.20 percent (Department 2010). For a conservative future estimate, the highest three 2010 truck percentages (9.19, 10.40, and 12.20) were averaged, and a 2.4 annual increase was applied to the average to arrive at a 2035 percentage (19.18, rounded to 20).

Mainline Level of Service

Appendix A presents mainline LOS data for the years 2015 and 2035. In 2015, project implementation would have a negligible impact on peak period operations in the mixed-flow lanes, and the HOV lane would operate at LOS A throughout the corridor. In 2035, mixed-flow lane operations would improve in some segments during a.m. and p.m. peak periods, and the HOV lane would operate at LOS B or C in the a.m. (the peak travel period) and LOS A in the p.m. peak.

Congestion Relief and System-Wide Improvements

The project would provide congestion relief and improve system-wide operations by improving traffic flow and reducing vehicle hours of delay (VHD). Westbound is the peak commute direction on I-580 in the morning; accordingly, the project would result in the most benefits during the a.m. period. In 2035, the project would improve peak-hour travel speeds from approximately 29 mph to 34 mph. VHD during the a.m. peak hour (7:00 a.m. to 8:00 a.m.) would be reduced by 1,250 hours. In addition, travel time savings through the corridor would be an average of approximately 13.2 minutes in the mixed-flow lanes and 31 minutes in the HOV lane.

3.2.3.2 Transportation and Traffic Analysis

Vehicle emission rates were determined using EMFAC2007 and the VMT and speed data presented in Table 3-5. The EMFAC2007 program assumed the SFBAAB Alameda County regional traffic data.

The modeling of vehicle emission rates does not account for future decreases from continuing improvements in engine technology and the retirement of older, higher-emitting vehicles. The emission factors used in the analysis also do not reflect the California Truck and Bus Regulation, which CARB initially approved in 2008 and amended in 2010. The regulation requires fleets that operate in California to reduce diesel truck and bus emissions by retrofitting or replacing existing engines. The amended regulation would require installation of diesel particulate matter retrofits beginning January 1, 2012 and replacement of older (pre-1994) trucks starting January 1, 2015. By January 1, 2023, nearly all vehicles would need to have 2010 model year engines or equivalent (CARB 2011). The new regulations will make the average truck more efficient, reducing emissions in all of the scenarios and decreasing the difference in emissions between the Build and No Build scenarios. As EMFAC2007 uses a much broader range of engine model years for each scenario, the model output tends to overstate emissions for both alternatives.

In addition, the emissions modeling used worst case peak-hour speeds, as average daily speed data were not available. As a result, the calculation method provides a worst-case estimate for total emissions.

Table 3-8 summarizes the modeled daily $PM_{2.5}$ emissions. The differences in emissions between the Build and No Build conditions represent emissions generated directly as a result of implementation of the Build Alternative in the construction interim year (2015) and the design/future year (2035).

Table 3-8. Daily Modeled $PM_{2.5}$ Emissions

	Daily VMT (Westbound Only)	**$PM_{2.5}$ Emission Factor (grams/mile)**	**Pounds/Day $PM_{2.5}$**
Build 2015	1,765,844	0.030	117
No Build 2015	1,720,396	0.033	125
Build 2035	1,966,485	0.024	104
No Build 2035	1,903,705	0.026	109

Overall, the Build Alternative would result in a net decrease in $PM_{2.5}$ emissions over the life of the project, compared with the No Build Alternative. The model output indicates that the Build Alternative would decrease $PM_{2.5}$ emissions by approximately 8 pounds per day in 2015 and by 5 pounds per day in 2035 compared to No Build. Although the conservative methodology used to calculate the emissions overstates the decrease, a decrease in $PM_{2.5}$ will result from project-related improvements in traffic operations and overall system efficiency as well as from the improvements in engine technology, the retirement of higher-emitting vehicles, and the regulatory changes described above.

3.3 CONCLUSION

AADT on I-580 in the project limits exceeds the FHWA and EPA's POAQC threshold of 125,000 and 8 percent trucks (10,000 truck AADT). Implementation of the Build Alternative would not significantly affect diesel truck percentages as the estimated percentage of diesel trucks is the same in the Build and No Build scenarios. As indicated in Table 3-8, $PM_{2.5}$

emissions would decrease in both 2015 and 2035 with the Build Alternative due to travel time savings, decreases in hours of delay, and improvements in average network speed when compared to the No Build Alternative.

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 I-580 Westbound HOV Lane Widening Project meets the CAA conformity requirements and will not further contribute to NAAQS violations or 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 $PM_{2.5}$ air quality standards for the following reasons:

- Based on representative monitoring data, ambient 24-hour average and annual average $PM_{2.5}$ concentrations are declining (see Figures 3-2 and 3-3).

- Based on representative monitoring data, monitored annual average $PM_{2.5}$ concentrations have not exceed the national standard of 15.0 $\mu g/m^3$ in the past four years (2007–2010) (see Table 3-3).

- Based on representative monitoring data, monitored 24-hour average $PM_{2.5}$ concentrations exceeded the federal standard of 35 $\mu g/m^3$ nine times in 2007, twice in 2008, four times in 2009, and zero times in 2010, indicating that 24-hour $PM_{2.5}$ concentrations are likely decreasing.

- Construction of the Build Alternative would increase peak-hour speeds in the project corridor during both the opening and horizon years (see Table 3-5).

- The analysis shows that $PM_{2.5}$ emissions would decrease with the 2015 and 2035 Build conditions when compared to No Build conditions, thereby reducing total $PM_{2.5}$ emissions generated within the project region (see Table 3-8).

- Compared with the No Build Alternative, the Build Alternative would result in a net decrease in $PM_{2.5}$ emissions over the life of the project.

- Implementation of the proposed project would not significantly affect diesel truck percentages between Build and No Build alternatives (assumed 12 percent for 2015 and 20 percent for 2035 for both alternatives).

For these reasons, future or worsened $PM_{2.5}$ violations of any standards are not anticipated. Therefore, the proposed I-580 Westbound HOV Lane Widening Project meets the conformity hot spot requirements in 40 CFR 93.116 and 93.126 for $PM_{2.5}$.

BAAQMD 2011. California Environmental Quality Act Air Quality Guidelines. Bay Area Air Quality Management District. URL: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_May%202011_5_3_11.ashx. May.

CARB. 2010. The California Almanac of Emissions and Air Quality - 2009 Edition. URL: http://www.arb.ca.gov/aqd/almanac/almanac09/almanac2009all.pdf.

CARB. 2011. Truck and Bus Regulation: On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation. California Air Resources Board. URL: http://www.arb.ca.gov/msprog/onrdiesel/onrdiesel.htm. Accessed August 8, 2011.

CARB. 2012. ARB Databases: Aerometric Data Analysis and Management System (ADAM). California Air Resources Board. URL: http://www.arb.ca.gov/adam/index.html. Accessed February 8, 2012.

Department. 2009. I-580 Westbound HOV Lane Project Initial Study with Mitigated Negative Declaration/Environmental Assessment. Alameda County, California. California Department of Transportation. District 4 – ALA -580 (R8.29/R21.43). EA No. 290820. September 2009. Approved October 2009.

Department. 2010. 2010 Annual Average Daily Truck Traffic on the California State Highway System. Compiled by Traffic and Vehicle Data Systems, State of California Business, Transportation and Housing Agency, Department of Transportation. Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration. December 2010, URL: http://traffic-counts.dot.ca.gov/2009all/docs/2009truckpublication.pdf.

Dowling 2008. I-580 Westbound HOV Lane Widening Project Traffic Operations and Traffic Forecasting Report. Final. Prepared for Alameda County Congestion Management Agency by Dowling Associates, Inc. under contract to BKF Engineers, Inc. July 18, 2008.

FHWA and EPA. 2006. 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

Garza, V.J., P. Graney, and D. Sperling. 1997. Transportation Project-Level Carbon Monoxide Protocol. Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-97-21.

MTC. 2009. Transportation 2035 Plan for the San Francisco Bay Area. Regional Transportation Plan (RTP). Metropolitan Transportation Commission. Adopted April 22, 2009. URL: http://www.mtc.ca.gov/planning/2035_plan/.

Appendix A
Mainline Levels of Service

Table A-1. No Build and Build LOS, 2015 (Westbound Direction Only)

Segments	NO BUILD				BUILD[1]			
	AM		PM		AM		PM	
	HOV	Mixed Flow	HOV	Mixed Flow	HOV	Mixed Flow[2]	HOV	Mixed Flow[2]
San Ramon Rd. – Interstate 680/580 Interchange	-	D	-	E	A	D	A	F
Interstate 680/580 Interchange – Hopyard Rd./Dougherty Rd.	-	F	-	E	A	F	A	F
Hopyard Road/Dougherty Rd. – Hacienda Dr.	-	F	-	D	A	F	A	E
Hacienda Dr. – Santa Rita Rd./Tassajara Rd.	-	F	-	D	A	F	A	D
Santa Rita Rd./Tassajara Rd. – El Charro Rd./Fallon Rd.	-	E	-	C	A	F	A	D
El Charro Rd./Fallon Rd. – Airway Blvd.	-	E	-	C	A	F	A	D
Airway Blvd. – Isabel Ave.	-	D	-	C	A	D	A	**C**
Isabel Ave. - Livermore Ave.	-	C	-	C	A	D	A	C
Livermore Ave. – First St.	-	C	-	C	A	D	A	C
First St. – Vasco Rd.	-	C	-	C	A	C	A	C
Vasco Rd. – Greenville Rd.	-	C	-	B	A	C	A	B
East of Greenville Rd.	-	D	-	B	-	D	-	**A**

Source: Dowling 2008

Notes: 2015 LOS determined using Demand Volume/Capacity Ratio for each freeway segment; corridor micro-simulation model not prepared for 2015.

1. The project will construct an HOV lane in the westbound direction only (eastbound HOV lane currently in operation).

2. **Boldfaced** LOS letters indicate improvement in Level of Service compared with the No Build Alternative.

Table A-2. No Build and Build LOS, 2035 (Westbound Direction Only)

Segments	NO BUILD				BUILD[1]			
	AM		PM		AM		PM	
	HOV	Mixed Flow	HOV	Mixed Flow	HOV	Mixed Flow[2]	HOV	Mixed Flow[2]
San Ramon Rd. – Interstate 680/580 Interchange	-	D	-	D	B	**C**	A	E
Interstate 680/580 Interchange – Hopyard Rd./Dougherty Rd.	-	F	-	E	B	**E**	A	**D**
Hopyard Road/Dougherty Rd. – Hacienda Dr.	-	F	-	D	B	F	A	D
Hacienda Dr. – Santa Rita Rd./Tassajara Rd.	-	F	-	C	C	F	A	D
Santa Rita Rd./Tassajara Rd. – El Charro Rd./Fallon Rd.	-	C	-	C	C	D	A	C
El Charro Rd./Fallon Rd. – Airway Blvd.	-	F	-	E	C	F	A	**D**
Airway Blvd. – Isabel Ave.	-	F	-	C	C	F	A	C
Isabel Ave. - Livermore Ave.	-	F	-	C	C	F	A	C
Livermore Ave. – First St.	-	F	-	C	C	F	A	C
First St. – Vasco Rd.	-	F	-	D	C	**C**	A	**B**
Vasco Rd. – Greenville Rd.	-	F	-	B	C	**C**	A	**A**
East of Greenville Rd.	-	F	-	B	-	**E**	-	B

Source: Dowling 2008

Notes: 2035 LOS determined using a micro-simulation model for the corridor.

1. The project will construct an HOV lane in the westbound direction only (eastbound HOV lane currently in operation).

2. **Boldfaced** LOS letters indicate improvement in Level of Service compared with the No Build Alternative.