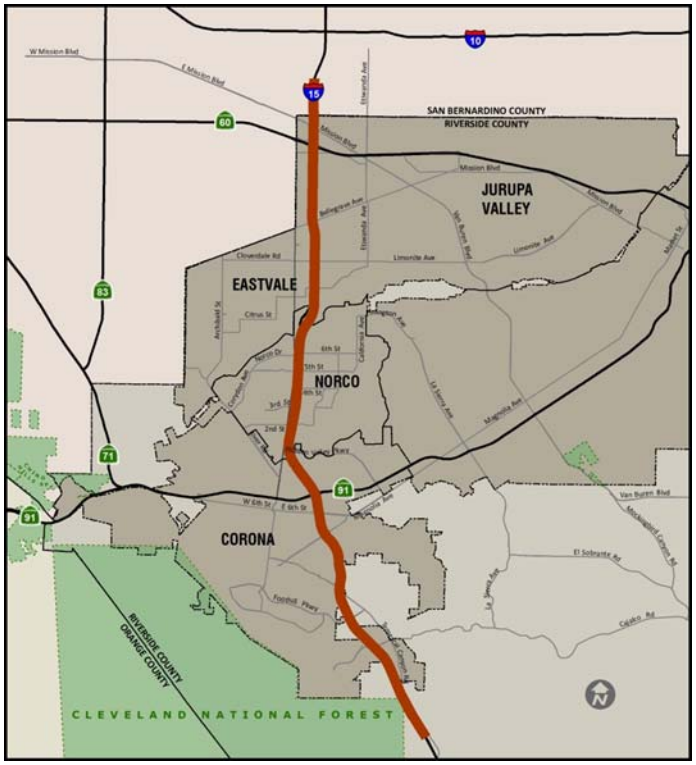
Quantitative $PM_{2.5}$ and PM_{10} Hot-Spot Analysis

INTERSTATE 15 EXPRESS LANES PROJECT



RIVERSIDE and SAN BERNARDINO COUNTIES, CALIFORNIA
DISTRICT 8 – RIV – 15 (RIV-15 PM 34.7/SBD-15 PM 1.3)

EA 0J0800 / PN 0800000283
RTP/FTIP ID: RIV071267

Prepared by

State of California Department of Transportation, District 8
in coordination with the Riverside County Transportation Commission

June 2014

Table of Contents

PAGE

Tables

Figures

Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
AADT	Annual Average Daily Traffic
CAA	Clean Air Act
California CAA	California Clean Air Act
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CFR	Code of Federal Regulations
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
FR	Federal Register
FTIP	Federal Transportation Improvement Program
Guidance	Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas
HOV	high-occupancy vehicle
I-15	Interstate 15
IAC	Interagency Consultation
LOS	Level-of-Service
NAAQS	National Ambient Air Quality Standards
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
POAQC	Project of Air Quality Concern
RCTC	Riverside County Transportation Commission
RTP	Regional Transportation Plan
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
TEL	Tolled Express Lane
VMT	vehicle miles travelled

Introduction

In November 2013, the United States Environmental Protection Agency (EPA) released the final *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas* (Guidance) for quantifying the local air quality impacts of transportation projects and comparing them to the particulate matter (PM) national ambient air quality standards (NAAQS) (75 FR 79370). EPA originally released the quantitative guidance in December 2010, which has now been revised in November 2013 to reflect California's latest approved emissions model, EMFAC2011, and EPA's 2012 PM NAAQS final rule. The Guidance requires a hot-spot analysis to be completed for a project of air quality concern (POAQC). The final rule in 40 CFR 93.123(b)(1) defines a POAQC as the following:

(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 LOS 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 and PM10 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The project under study in this Quantitative Hot-Spot analysis (Analysis) proposes to construct a tolled express lane (TEL) in Riverside County between post mile (PM) 36.8 and PM 51.4, a distance of approximately 14.6 miles. Based traffic forecast that would occur under the Build Condition when compared to the No-Build Condition, this project is considered to be a POAQC as described in 40 CFR 93.123(b)(1)(i); and require this Analysis. This Analysis has been prepared according to the procedures and methodology provided in the Guidance.

Project Description and Location

The Riverside County Transportation Commission (RCTC) and the California Department of Transportation (Caltrans), District 8, propose to develop an express lane network to meet existing and future travel demand, enhance mobility, and afford greater user flexibility on Interstate (I) 15 in Riverside County. This project would construct a tolled express lane (TEL) in Riverside County between post mile (PM) 36.8 and PM 51.4, a distance of approximately 14.6 miles. This area is referred to as the lane improvement limits. TEL advanced signage is required to be posted a minimum of two miles prior to the start of the express lanes. The limits for TEL signage would extend from PM 34.7 in Riverside County to PM 1.3 in San Bernardino County; this constitutes the overall project limits.

The lane improvements within Riverside County, California, would run through the cities of Corona, Norco, Eastvale, and Jurupa Valley as well as portions of unincorporated Riverside County (see Figure 1, Regional Location Map, and Figure 2, Project Vicinity Map). All proposed improvements would be constructed within the existing Caltrans right of way, with the majority of the improvements occurring within the existing I-15 median.

BUILD ALTERNATIVE

The Build Alternative includes construction of one or two express lanes in each direction on I-15 in Riverside County between PM 36.8 and PM 51.4, within the existing right of way. Sign modifications and the installation of new signs would also be included to support the new express lanes. Advanced signage is required to be posted a minimum of two miles prior to the start of the express lanes. The project limits for the signage extend from PM 34.7 in Riverside County to PM 1.3 in San Bernardino County.

The Build Alternative would:

- Provide one tolled express lane in each direction from Cajalco Road to Hidden Valley Parkway, a distance of 7.1 miles.
    - From Cajalco Road to Ontario Avenue, the new lanes would be constructed in the unpaved median.
    - From Ontario Avenue to Magnolia Avenue, the new lanes would be created by restriping the existing paved median.
    - From Magnolia Avenue to East 6th Street (Corona) the new lanes would be developed by widening to the outside and restriping. Because the SR-91 project will construct some express lane improvements along I-15 before I-15 project construction, once the I-15 project is completed, there would be two tolled express lanes in each direction on I-15 extending from Ontario Avenue to East 6th Street.

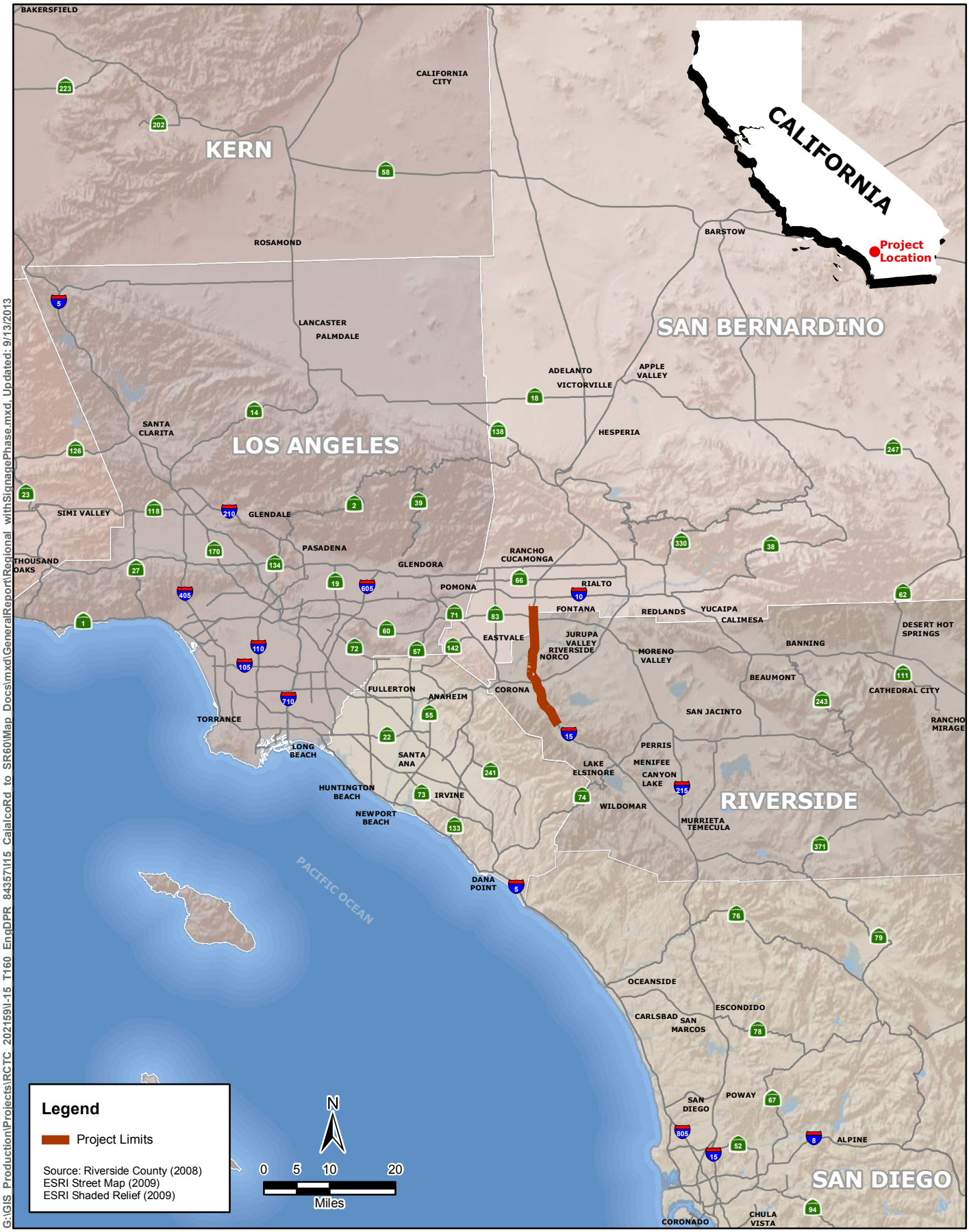


Figure 1
Project Vicinity
I-15 TEL Project

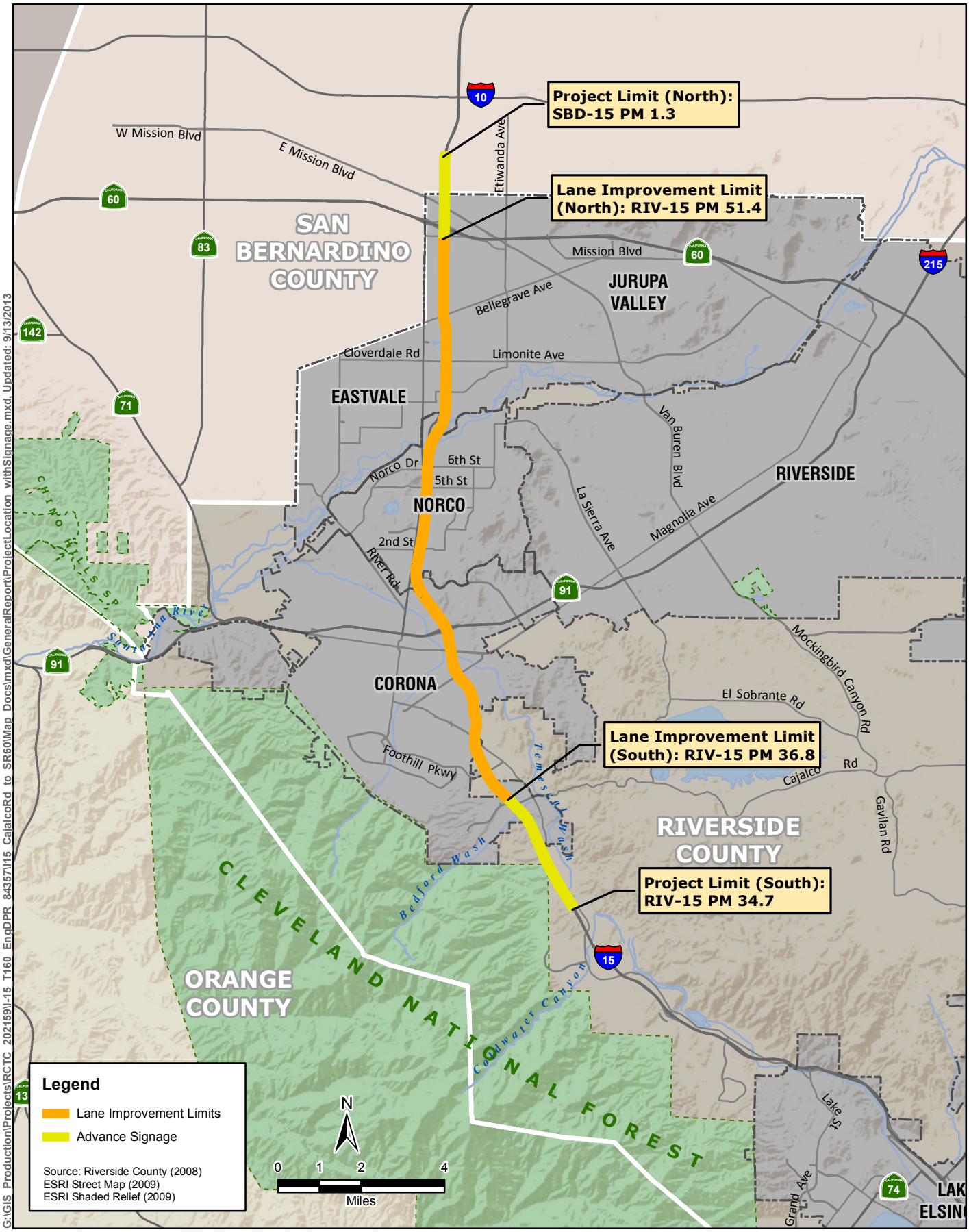


Figure 2
Project Location
I-15 TEL Project

- From East 6th Street to Hidden Valley Parkway (Norco), the median would be paved to create one new express lane in each direction.

- Provide two tolled express lanes in each direction from Hidden Valley Parkway northbound and Second Street southbound (Norco) to Cantu Galleano Ranch Road (Eastvale/Jurupa Valley) by paving the existing unpaved median.

- Construct one tolled express lane in each direction from Cantu Galleano Ranch Road (Eastvale/Jurupa Valley) to SR-60 by paving the unpaved median.

The Build Alternative would not add any new connections or ramps.

Additional Project Features

In addition to the features described above, the Build Alternative includes additional project components such as retaining walls, sound walls, stormwater runoff treatment devices, and bridge widening to accommodate the new tolled express lanes.

Proposed Ingress and Egress Locations

Limited express lane access points are identified at key access points along the express lane facility. Areas where vehicles are permitted to enter the TEL lanes are termed "ingress" locations. L ocations where vehicles may leave the TEL lanes are referred to as "egress" locations. Access into the TEL would be restricted outside of these designated locations.

I-15 Southbound – Ingress Locations

- At East-South SR-60 Connector On-Ramp.
- Immediately before Cantu-Galleano Ranch Road Off-Ramp.
- At Hidden Valley Parkway On-Ramp.

I-15 Southbound – Egress Locations

- Between 6th Street On-Ramp and 2nd Street Off-Ramp.
- Between Magnolia Avenue On-Ramp and Ontario Avenue Off-Ramp.
- Between El Cerrito Off-Ramp and El Cerrito On-Ramp.

I-15 Northbound – Ingress Locations

- Between El Cerrito Off-Ramp and El Cerrito On-Ramp.
- Between Ontario Avenue On-Ramp and Magnolia Avenue Off-Ramp.
- Between Hidden Valley Parkway Off-Ramp and 2nd Street On-Ramp.

I-15 Northbound – Egress Locations

- Between Hidden Valley Parkway Off-Ramp and 2nd Street On-Ramp.
- At Cantu-Galleano Ranch Loop On-Ramp.
- Before North□West SR-60 Connector Off-Ramp.

NO-BUILD ALTERNATIVE

The No-Build Alternative is the condition that would result if the proposed project did not move forward. This alternative includes the construction of limited improvements on I-15 associated with the approved SR-91 Corridor Improvement Project (CIP) project. In addition, this alternative does not preclude the construction of other future improvements or general maintenance to improve the operation of the facility or incorporate safety enhancements. Describing and analyzing a No-Build Alternative helps decision-makers and the public compare the impacts of approving the proposed project with the consequences of not approving the proposed project.

PM2.5 and PM10 Hot Spot Analysis

The project is located within the Riverside County portion of the South Coast Air Basin (SCAB or Basin), which is designated as nonattainment for the federal 24-hour PM_{10} and $PM_{2.5}$ standards. A quantitative hot-spot analysis for $PM_{2.5}$ and PM_{10} is therefore deemed necessary to satisfactorily meet project-level conformity requirements in accordance with EPA's final rule and the Guidance.

A hot-spot analysis is defined in the 40CFR93.101 as an estimation of likely future localized pollutant concentrations and a comparison of those concentrations to the relevant air quality standards. A project-level hot-spot analysis assesses the air quality impacts on a scale smaller than an entire nonattainment or maintenance area, such as a congested freeway corridor. Such an analysis is a means of demonstrating that a transportation project would meet Clean Air Act (CAA) conformity requirements to support state and local air quality goals with respect to potential localized air quality impacts.

CAA Section 176(c)(1)(B) is the statutory criterion that must be met by all projects in nonattainment and maintenance areas that are subject to transportation conformity. Section 176(c)(1)(B) states that federally supported transportation projects must not "cause or contribute to any new violation of any standard in any area; increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area." As aforementioned, this Analysis has been prepared according to the procedures and methodology provided in the Guidance and utilizes dispersion modeling.

According to the Guidance, a hot-spot analysis must include the entire transportation project. As such, the entire project length was modeled.

TYPES OF EMISSIONS CONSIDERED

In accordance with the Guidance, this Analysis considers the following PM_{10} and $PM_{2.5}$ emissions: (1) direct exhaist, (2) brake wear and tire wear, and (3) re-entrained road dust. Precursors of PM_{10} and $PM_{2.5}$ and secondary particles are not considered in this project-level Analysis.[1] According to the project schedules, construction duration will not exceed 5 years (2017 – 2019). As such, short-term construction-period emissions are considered temporary as defined in 40 CFR 93.123(c)(5); and are not included in this Analysis. This project will comply with the South Coast Air Quality Management District (SCAQMD) Rule 403 (Fugitive Dust). Rule 403 is intended to reduce the amount of particulate matter in the ambient air resulting from anthropogenic fugitive dust sources by requiring projects to prevent, reduce, or mitigate fugitive dust emissions. All construction activity sources of fugitive dust are required to implement the best available control measures indicated in Rule 403, provided in Appendix A. In addition, the project is required to comply with all state, federal, and/or local rules and regulations developed as a result of implementing control and mitigation measures proposed as part of the State Implimentation Plan (SIP).

[1] Precurser emissions are considered as part of the regional emission analysis prepared for the conforming RTP and FTIP

EMISSIONS AND DISPERSION MODELS USED

The Guidance requires use of the latest emissions model in hot-spot analyses. This Analysis has been prepared based on the latest EPA-approved emissions model for use in California, EMFAC2011. As recommended by the Guidance, this Analysis applied the simplified approach using the Project-Level Assessment tool, EMFAC2011-PL, to generate emission rates for traffic volumes forecasted within the Riverside County portion of the SCAB for years of 2020 (Opening Year) and 2040 (Horizon Year).

The Guidance recommends that hot-spot analyses be developed consistent with the EPA's current recommended model under Appendix W to 40 CFR Part 51. The American Meteorological Society/EPA Regulatory Model (AERMOD) is the EPA's recommended near-field dispersion model. The latest version of AERMOD (version 14134) was used in this Analysis, using the BEE-LINE Software BEEST version 10.13 software graphical user interface to facilitate modeling inputs.

NATIONAL AMBIENT AIR QUALITY STANDARDS

The CAA and transportation conformity regulations require that conformity be met for all transportation-related NAAQS for which an area has been designated nonattainment or maintenance. Therefore, a project-level conformity determination must address all applicable NAAQS for a given pollutant.[2]

Accordingly, results from a quantitative hot-spot analysis will need to be compared to all relevant PM_{10} and $PM_{2.5}$ NAAQS in effect. For this proposed project, this includes the following:

- PM_{10}
  - 150 micrograms per cubic meter ($\mu g/m^3$) 24-hour standard

- $PM_{2.5}$
  - 35 $\mu g/m^3$ 24-hour standard
  - 12.0 $\mu g/m^3$ annual standard

METEOROLOGY AND CLIMATE

The project site is located within the Riverside County portion of the SCAB, which is an approximately 6,745-square-mile area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The SCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties in addition to the San Gorgonio Pass area in Riverside County. The terrain and geographical location determine the distinctive climate of the SCAB, which is a coastal plain with connecting broad valleys and low hills.

[2] See EPA's March 2006 final rule (71 FR 12468-12511).

AERMOD-ready meteorological data for Riverside (UTM 461.64; 3762.10; 250 m elevation) for years 2008 through 2012, inclusive, was provided by the SCAQMD.[3] This data represents the most recent 5-year data set that meets the EPA's requirement for 90% completeness by quarter for wind direction, wind speed, and temperature. The meteorological data was processed with AERMET Version 14134, using upper air data data from the San Diego Miramar Naval Air Station. The threshold wind speed used was 0.5 meters per second, as recommended by EPA. A wind rose depicting the Riverside station meteorological data set is provided in Figure 3.

BACKGROUND CONCENTRATION

The nearest air quality monitoring station in the vicinity of the project area is the Norco-Norconian monitoring station, which is located approximately 0.75-mile west of I-15. While this station monitors PM_{10}, it does not monitor $PM_{2.5}$. The nearest $PM_{2.5}$ monitoring station is the Mira Loma Van Buren station that is located approximately 3.3 miles east of I-15. The Norco-Norconian and Mira Loma Van Buren stations are identified in Figure 4.

PM_{10} and $PM_{2.5}$ background concentrations were developed consistent with the methodology detailed in the Guidance using the "single monitor" approach, as the Norco-Norconian and Mira Loma Van Buren stations discussed above and depicted in Figure 4 meet all EPA requirements for (1) simularily of characteristics between monitor location and project area, (2) distance of monitor from project area, and (3) wind patterns between the monitor and project area.[4]

24-Hour PM_{10}

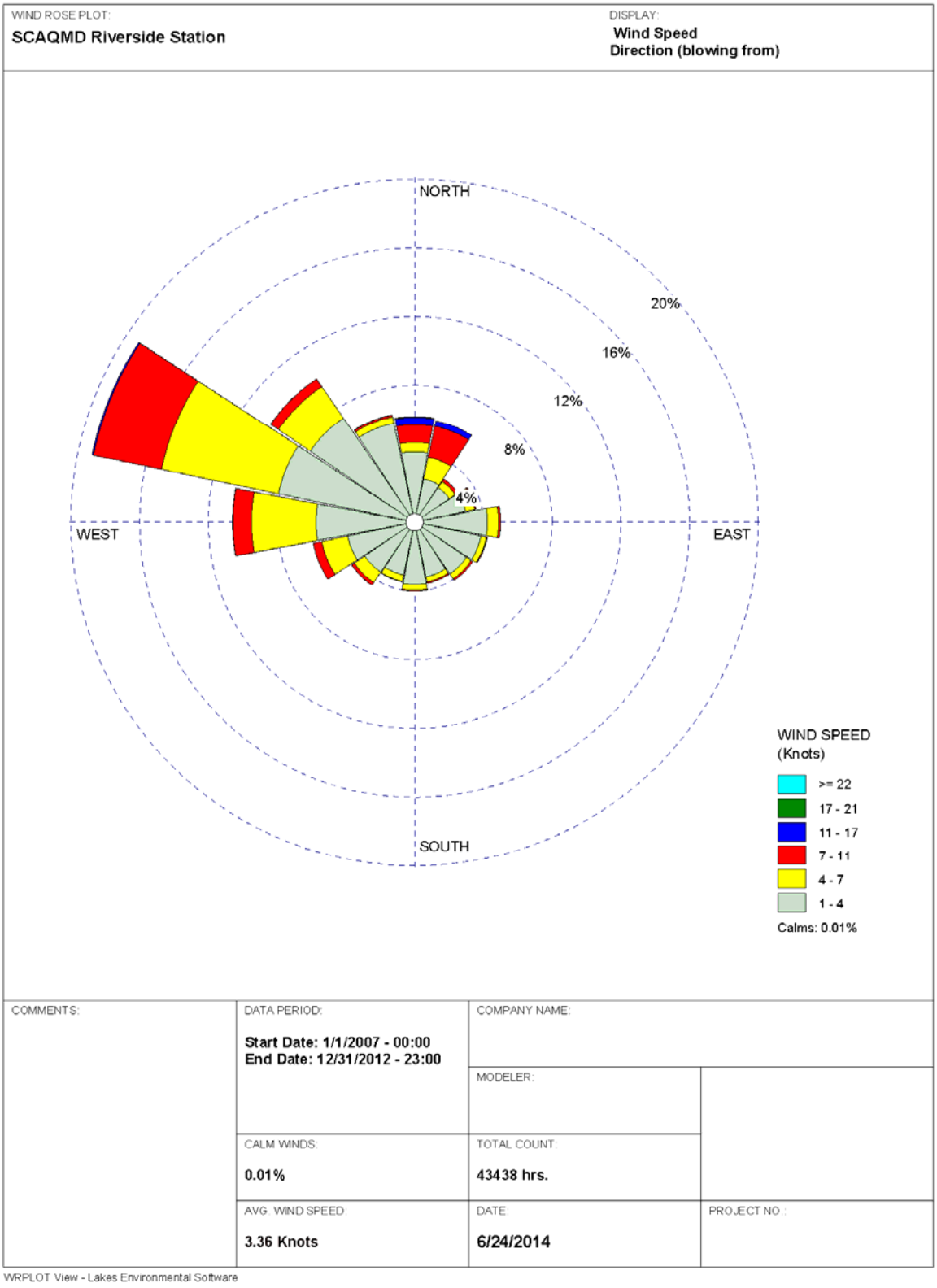
For 24-hour PM_{10}, the appropriate background concentration is simply the highest recorded 24-hour concentration from the previous 3-year period that meets all applicable EPA monitoring requirements, such as data completeness. Per the EPA Monitor Value Reports (see Appendix), which represent the best and most recent information available to EPA from state agencies, the highest 24-hour PM_{10} concentration recorded at either monitoring station during the 2011 – 2013 period was ***147 µg/m^3***.

24-Hour $PM_{2.5}$

For 24-hour $PM_{2.5}$, the Guidance provides two analysis options, or tiers, to determine the appropriate background concentration. This analysis uses the tier one approach, which is conservative, but less intensive to develop.[5] Under the tier one approach, the background concentration is developed by averaging the measured 98th percentile 24-hour concentrations from the previous 3-year period that meets all applicable EPA monitoring requirements, such as data completeness. Per the EPA Monitor Value Reports (see Appendix), which represent the best and most recent information available to EPA from state agencies, the average 98th percentile 24-hour $PM_{2.5}$ concentration recorded at the Mira Loma Van Buren station during the 2011 – 2013 period was ***36.67 µg/m^3***.

[3] Available: http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/data-for-aermod
[4] See Guidance, page 119.
[5] *Ibid*, page 134.

Figure 3: Riverside Station Wind Rose



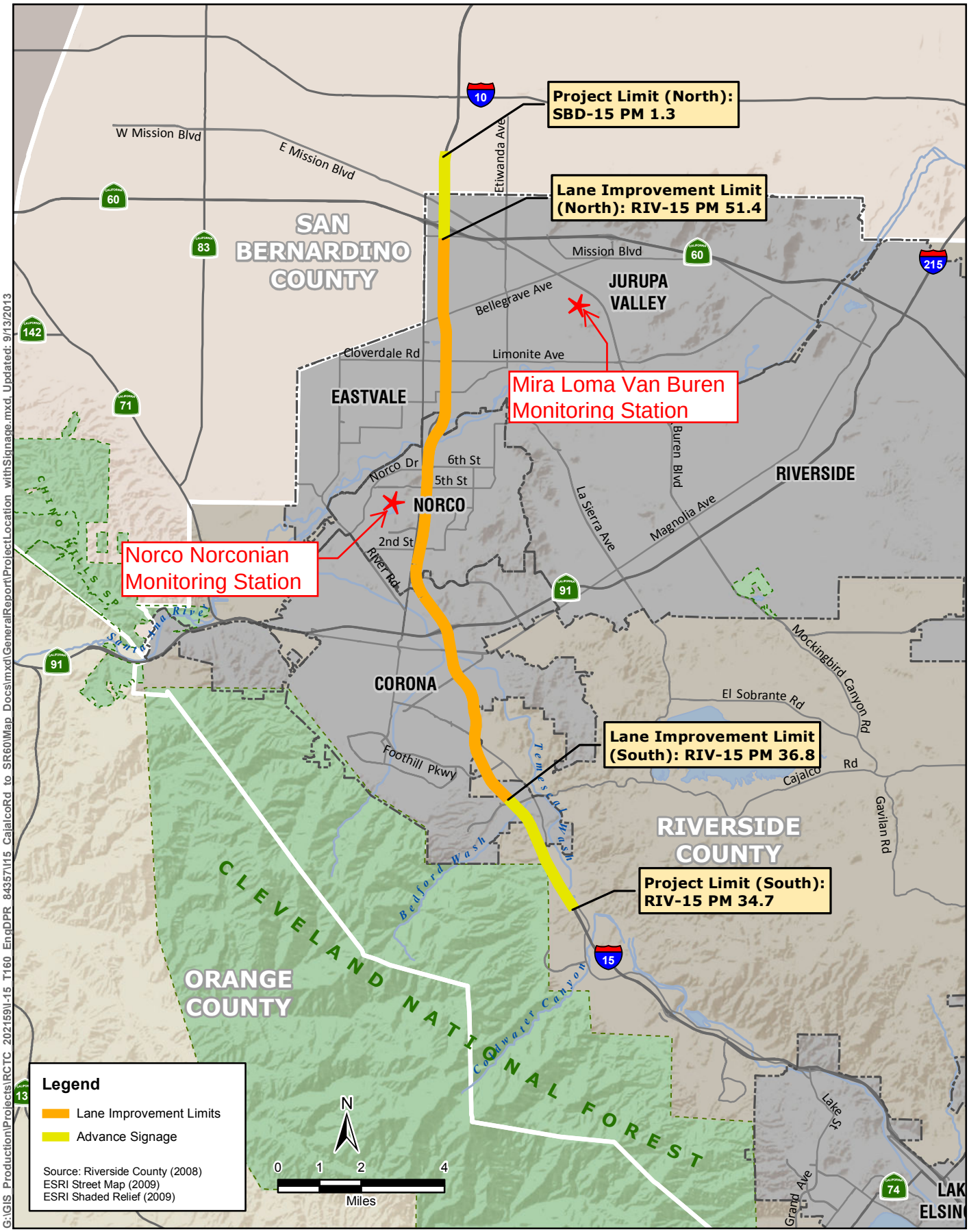


Figure 3
PM Monitoring Station Locations
I-15 TEL Project

Annual $PM_{2.5}$

For annual $PM_{2.5}$, the background concentration is developed by averaging the annual concentrations from the previous 3-year period that meets all applicable EPA monitoring requirements, such as data completeness. Per the EPA Monitor Value Reports (see Appendix), which represent the best and most recent information available to EPA from state agencies, the average annual $PM_{2.5}$ concentration recorded at the Mira Loma Van Buren station during the 2011 – 2013 period was ***14.8 µg/m^3***.

ANALYSIS YEARS AND TRAFFIC DATA

According to the Guidance, if Build Alternative PM_{10} and $PM_{2.5}$ concentrations are less than the applicable NAAQS, then no additional analysis is required to demonstrate project-level conformity. If Build Alternative PM_{10} and/or $PM_{2.5}$ concentrations exceed an applicable NAAQS, then Build Alternative concentrations must be compared to, and not excced, No-Build Alternative concentrations in order to demonstrate project-level conformity. Build Alternative concentrations are determined by adding applicable modeled concentrations to the applicable background concentrations.

As discussed above, background concentrations have been developed for the 24-hour PM_{10}, 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ averaging periods. "Modeled" concentrations are developed using: 1) Build Alternative-specific emissions factors that take into account evaluation year, fleet mix and travel speeds; and 2) Build Alternative-specific forecast traffic volumes for years during which peak emissions from the project are expected to occur (i.e., the period with highest traffic volumes). In other words, modeled concentrations reflect the period having the most potential for NAAQS violations to occur, taking into account the cumulative impacts of project concentrations and background concentrations.

This Analysis considers the Build Alternative forcast of traffic volumes anticipated to occur during the project opening year 2020 and horizon year 2040 using the latest available planning assumptions consistent with 40 CFR 93.110 and 40 CFR 93.123 requirements. The traffic data used in this Analysis was estimated by Iteris (provided in Appendix) under the direction of RCTC and in conjunction with Caltrans District 8 using a travel demand model that was consistent with the SCAG regional model at the time the analysis began.

Build Alternative forecasts for 2020 and 2040 were used to develop 24-hour distributions for each roadway link, that were then used to develop emissions rates using the EMFAC 2011 and re-entrained road dust emissions factors described above. A summary of forecast traffic data used in the Analysis is provided in the Appendix.

DATA INPUTS AND RECEPTORS

The AERMOD model uses traffic data, emission factors, meteorological data, and topographical data to estimate ground-level concentrations of PM_{10} and $PM_{2.5}$ at receptor locations. AERMOD requires specific information for each traffic link and emission factors from each link for each

hour of the day. As mentioned above, the forecast traffic data was used to develop 24-hour traffic volumes for each roadway link. The forecast traffic data was then applied to appropriate emission factors to estimate emissions rates for each of the links along the proposed alignment within the project area. Emissions for tire and brake wear as well as re-entrained road dust were calculated and coded on the links according to their forecast travel activities. A summary of emissions (in pounds/hour) for links calculated based on the emission factors and forecast travel activity data is provided in the Appendix.

Receptors were placed in order to estimate the highest concentrations of PM_{10} and $PM_{2.5}$ to determine possible violations of the NAAQS. For this proposed project, a line of receptors was placed at the right-of-way (ROW) line for conformity analysis using 10 meter spacing. A 25-meter grid was placed from the ROW fenceline to 100 meters. And finally, a 50-meter grid was placed from 100 meters from ROW (end of 25-meter receptor grid) to 250 meters. Location and spacing of receptor placement was determined according to the Guidance.

CALCULATION OF DESIGN VALUES AND DETERMINATION OF CONFORMITY

To be included once dispersion modeling is completed.