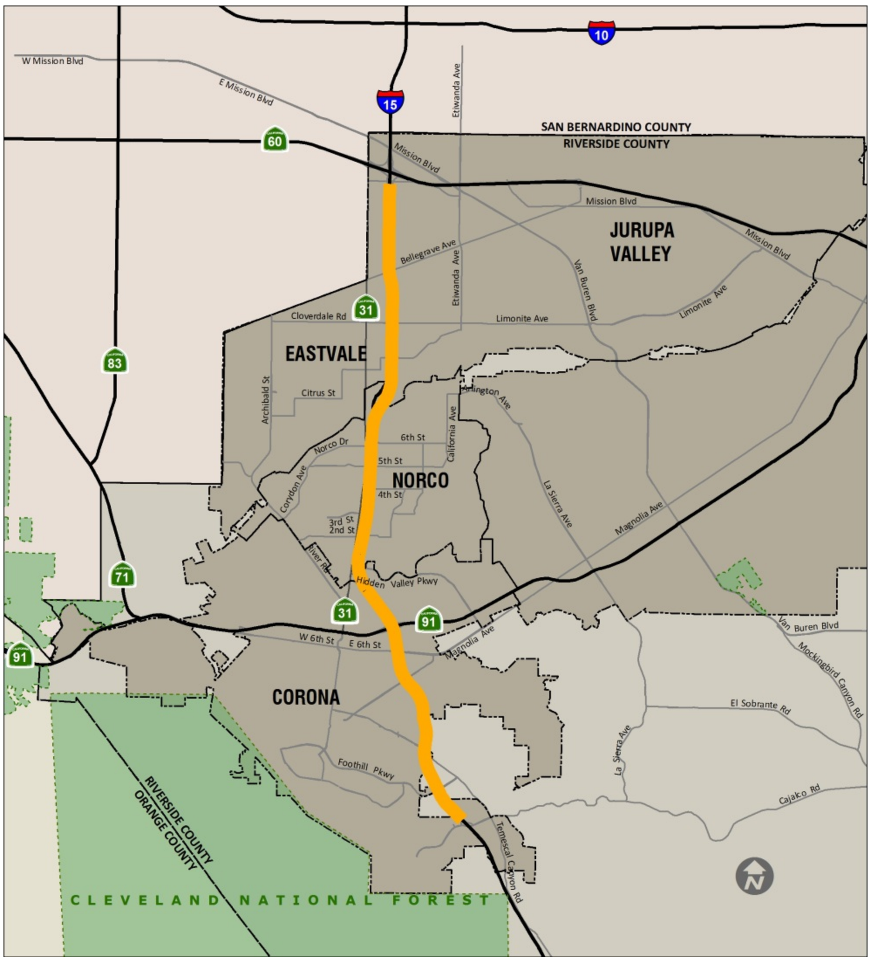
Interstate 15
Corridor Improvement Project
Tolled Express Lane

RIVERSIDE and SAN BERNARDINO COUNTY, CALIFORNIA
DISTRICT 8 – RIV – 15 (RIV-15 PM 34.7 / SBD-15 PM 1.3)
EA 0J0800
PN 0800000283

Quantitative PM2.5 and PM10 Hot-Spot Analysis



Prepared by the
State of California Department of Transportation
in coordination with the Riverside County Transportation Commission

April 2015

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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 15 (I-15) in Riverside County. The project would construct tolled express lanes (TEL) in Riverside County between post miles (PM) 36.8 and 51.4, a distance of about 14.6 miles. This area is referred to as the lane improvement limits. TEL advanced signage is required to be posted at a minimum of two miles prior to the start of the express lanes. The limits for the TEL signage extend from PM 34.7 in Riverside County to PM 1.3 in San Bernardino County; these constitute the overall project limits. The lane improvements within Riverside County, California, would run through the cities of Corona, Norco, Eastvale, Jurupa Valley as well as portions of unincorporated Riverside County. The northern lane improvement limit is just short of the San Bernardino County line. 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. The project, as currently scoped, is included in the 2015 Federal Transportation Improvement Program (FTIP) as Project ID RIV071267.

Build Alternative Description

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. The Build Alternative would be constructed within the existing right of way. Sign improvements would also be made to inform and guide users of the new express lanes. Advanced signage is required to be posted at 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 to PM 1.3 in San Bernardino County. Specifically, 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.
  - 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 with isolated outside widening at Riverside Avenue to maintain lane balance for the SR 60 WB loop connector.

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

Protocol Purpose and Methodology

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 2.5 ($PM_{2.5}$) and particulate matter 10 (PM_{10}) national ambient air quality standards (NAAQS) (75 FR 79370). This modeling protocol details the key data sources, modeling tools, and analytical assumptions used in preparing the project-level quantitative $PM_{2.5}$ and PM_{10} hot-spot analysis for the Interstate 15 (I-15) Express Lanes Project based on the above-referenced Guidance.

The project-level hot-spot analysis will be completed using the above-referenced Guidance. The methodology is briefly summarized below and explained in detail within this section of the Protocol.

- Build Alternative and No Build Alternative emissions rates were calculated using project-specific traffic data and EMFAC2011-PL emissions factors, then modeled using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD).
- Instead of modeling the entire length of the project (16 miles), the worst-case 1-mile segment was modeled that has 1) the highest grams per mile emissions for $PM_{2.5}$ and PM_{10} and 2) and highest background concentration due to the presence of "nearby sources." Since conformity was demonstrated along this worst-case 1-mile segment, then it can be assumed that conformity is met along the entire length of the proposed project. Selection of the worst-case segment was performed according to composite grams per mile emissions that were developed based on project traffic data, EMFAC2011-PL emissions factors, and AP-42 re-entrained road dust calculations for opening year 2020 and Regional Transportation Plan (RTP) horizon year 2035 for the Build Alternative and No Build Alternative.
- Emissions from nearby sources that include 49 warehouse/distribution centers, arterials that provide access to area warehouse/distributions, and the State Route 60 (SR-60) freeway interchange that is located immediately south of the worst-case segment. While the Union Pacific railroad tracks are also located within the immediate project vicinity, these same railroad tracks are located with close proximity to the Mira Loma Van Buren monitoring station that was used to characterized project vicinity $PM_{2.5}$ and PM_{10} background concentrations. As such, railroad activity emissions are already accounted for in the background concentration.

- The surface and profile meteorological data were obtained from the South Coast Air Quality Management District (SCAQMD) for the Fontana meteorological station.
- Area sources were generated to characterize freeway, arterial, and warehouse/distribution center locations. As detailed below, each source was assigned the appropriate release height above ground and initial height of the area source plume.
- Receptor placement included a fine grid of 25 by 25 meters from the I-15 right of way (ROW) to a distance of 100 meters from the ROW, and a 100 by 100 meter grid to a distance of 500 meters from the I-15 freeway ROW.
- Since the Build Alternative design values for $PM_{2.5}$ and PM_{10} were greater than the NAAQS, the No Build Alternative was modeled using the same methodology described above, except that No Build Alternative traffic data was used.

Particulate Matter NAAQS Evaluated

The Riverside County portion of the South Coast Air Basin (Basin) has been designated a federal non-attainment area for $PM_{2.5}$ (24-hour standard and annual standard); and a maintenance area for PM_{10} (24-hour standard). As such, this hot-spot analysis evaluates the project against the following federal standards: 24-hour $PM_{2.5}$, annual $PM_{2.5}$, and 24-hour PM_{10}.

Emissions Inventory

EMFAC2011 was utilized to estimate $PM_{2.5}$ and PM_{10} emissions from exhaust, brake wear, and tire wear. Re-entrained road dust is a significant contributor to regional $PM_{2.5}$ and PM_{10} emissions, and such emissions were estimated using the AP-42 Compilation of Air Pollutant Emission Factors equation with California Air Resources Board (ARB) inputs for silt loading, precipitation, and $PM_{2.5}$ k factor.[1,2]

The Project Level (PL) EMFAC2011 (EMFAC-PL) uses activity data from EMFAC2011-SG module (EMFAC-LDV and EMFAC-HD modules) to calculate emission rates consistent with the default fleet distributions in the region, including running, idling, and start exhaust emissions, and PM tire and brake wear. This project does not meet the following criteria required to complete the detailed approach, therefore, the analysis will utilize the USEPA-approved simplified approach (EMFAC2011-PL):

1. Regional temperature and/or relative humidity profiles differ from EMFAC default; or
2. Vehicle age distributions different from EMFAC defaults; or
3. Project involves vehicle start and idling emissions.

[1] USEPA, AP-42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.2.1, Fugitive Dust Sources, Paved Roads, January 2011. Available: http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf
[2] ARB, Miscellaneous Process Methodology 7.9 Entrained Road Travel, Paved Road Dust (Revised and updated, April 2014). Available: http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9_2014.pdf

Two EMFAC-PL runs, one for year 2020 and one for year 2035, were developed to obtain annual emission rates for the Build Alternative and No-Build Alternative. Since PM emission rates do not vary with temperature and humidity in EMFAC2011- PL, it is not necessary to run multiple EMFAC2011 scenarios to capture seasonal variation in emission rates. Emission rates were developed for truck and non-truck vehicles speeds, ranging from 5 to 70 miles per hour.

This hot-spot analysis considered mainline and ramp links. It is not anticipated that the proposed project would directly or significantly increase volumes on surface streets near I-15. However, five arterials have been identified that facilitate high volumes of truck traffic to access nearby warehouse-distribution centers. As such, these arterials were included in the analysis and modeling: Jurupa Street, East Philadelphia Street, East Mission Boulevard, South Milliken Avenue, and South Wineville Avenue.

Detailed in Attachment A, traffic volumes under the Build Alternative would exceed No Build Alternative volumes along 17 of 79 freeway segments at year 2020 along the I-15 project limits. At year 2035, traffic volumes under the Build Alternative would exceed No Build Alternative volumes along 64 of 79 freeway segments along the I-15 project limits. For a detailed list of traffic links and data see Attachment A.

Detailed traffic data includes traffic volumes, travel speeds, and vehicle speciation for peak and off-peak hours. The traffic data is derived from the regional travel demand forecasting model that is the basis for air quality conformity determinations. The data splits are for four time periods:

- 3-Hour AM Peak Period (6:00 a.m. – 9:00 a.m.)
- 6-Hour High Off-Peak Period (9:00 a.m. – 3:00 p.m.)
- 4-Hour PM Peak Period (3:00 p.m. – 7:00 p.m.)
- 11-Hour Low Off-Peak Period (7:00 p.m. – 6:00 a.m.)

These data were used to estimate emissions for highway and ramp links that are detailed in Attachment A. Each link represents a change in volumes and/or configuration. Link emissions were estimated based on truck and non-truck emission rates, volumes, and travel speeds. Hourly truck percentage averages were calculated using the hourly truck and total traffic hourly volumes for the traffic links. Subsequently, four emission rates associated with each peak and off-peak period were estimated for each link. Emissions from the peak and off-peak period were added up to calculate the total daily emissions.

Traffic data has been provided for the open to traffic year 2020 and the Regional Transportation Plan RTP horizon year 2035. Two factors determine the amount of the project future year emissions: fleet emission rates and traffic volumes. More efficient new engines and better emissions control technologies, combined with retirement of older vehicles, lead to lower grams per mile exhaust emissions rates; while traffic volume growth contribute to increases in overall emissions.

An analysis was conducted using project-specific traffic data, EMFAC-PL emission rates, and the AP-42 re-entrained road dust methodology to determine if more emissions are anticipated in 2020 or 2035. As detailed in Attachment A, Build Alternative and No Build Alternative emissions during year 2035 would exceed year 2020 emissions along all roadway segments. As such, only year 2035 was required to be modeled.

The construction phase would not last more than five years, therefore, no construction emissions were included in this analysis.

Dispersion Modeling

The hot-spot analysis will be completed using AERMOD version 14134, which was published on May 14, 2014. Due to the lengths of the segments and number of sources and receptors involved in the modeling, the Lakes Environmental AERMOD MPI version 14134 was used for this hotspot analysis. The Lakes AERMOD MPI Validation Analysis and Report is included in Attachment C.

Modeling Domain

Due to the 16-mile alignment length, the hotspot analysis focuses on a 1-mile worst case location that is expected to have the highest PM concentrations, and consequently, the most likely area experience a new or worsened PM NAAQS violation. If modeling can show that conformity is demonstrated at this worst-case location, then it can be assumed that conformity is met for the entire project area.

The 1-mile modeling domain is shown in the Study Area figure, attached. This area was selected because of the following reasons:

1. This segment has the highest ADT volumes among all freeway segments. At horizon year 2035 ADT volumes would be 239,110 with truck ADT volumes of 40,833. This second highest ADT segment volumes would be 234,688 with truck ADT volumes of 33,513.
2. This segment has the highest Truck ADT volumes among all freeway segments (40,833). The second highest truck ADT segment volumes would be 33,538, with a corresponding ADT volumes of 198,738.
3. This segment had the highest grams per mile emissions among all freeway segments of 13,680 and 55,879 for $PM_{2.5}$ and PM_{10}, respectively. The second highest grams per mile segment would be 12,223 and 49,730 for $PM_{2.5}$ and PM_{10}, respectively.
4. This segment has the highest number of “nearby sources” among all freeway segments (in addition to the local warehouse/distribution centers, SR-60 and related interchange ramps are included as nearby sources).

Detail data regarding total traffic volumes, truck traffic volumes, and grams per mile emissions rates for each of the 79 freeway segments is provided in Attachment A.

Sources

On-road Emissions. The Lakes Environmental AERMOD geographical interface program was utilized for modeling of the sources and receptors. The area sources were created for each traffic link identified by a change in traffic volumes, speeds, or highway alignment. The attached Study Area figure shows the extent of the modeling analysis. Each line area source parameter was developed as:

- Release Height = % Trucks × 3.4 + % Non-Trucks × 1.3
- Initial Vertical Dimension = % Trucks × 6.8 meters + % Non-Trucks × 2.6 meters
- Initial Vertical Dispersion Coefficient = Initial Vertical Dimension / 2.15

The area sources representing the freeway lanes were extended 0.5 miles on either side of the beginning and end of the selected worst-case segment (shown in Study Area figure) in order to avoid underestimating the concentrations at the start and end locations of the worst-case segment. The urban source group used a surface roughness of 0.240 meters, as discussed below under "Meteorological Data."

Warehouse Emissions. As shown in the Study Area attachment figure, nearby warehouses overlap with the 1,000 meter background capture area around the evaluated roadway segment. Locations of the warehouses were obtained using Google Earth aerial photography. Truck trip generation rates associated the warehouses were calculated using the Institute of Transportation Engineers (9^{th} Edition) High-Cube Warehouse/Distribution Center (152) trip generation factor. The analysis is based on the gross square footage (GSF) of the warehouse and uses a weighted average weekday and weekend truck trip generation factor of 0.5957 per thousand GSF. In addition to running exhaust emissions, truck idle emissions were also considered in this analysis. Consistent with SCAQMD recommendations, 15 minutes of idle time per truck was assumed.

Receptors

A 25 by 25 meter receptor grid was placed from the freeway ROW to a distance of 100 meters; and a 100 by 100 meter grid was placed to a distance 500 meters from the freeway ROW. The receptor grid included a line of receptors at the ROW. Since no areas of restricted public access are present outside of the freeway ROW, no receptors were excluded from this hot-spot analysis.

Meteorological Data

The SCAQMD maintains a network of 27 meteorological monitoring stations located throughout the Basin, and provides data for use in AERMOD dispersion modeling. Two municipal airport meteorological stations are also located within the general project vicinity (Chino Airport and Riverside Municipal Airport); however, data from these stations are not audited for data quality or completeness, and therefore not approved for use for air quality analyses by SCAQMD. The SCAQMD meteorological data files were developed using site specific surface characteristics (i.e., surface albedo, surface roughness, and Bowen ratio) obtained using AERSURFACE. The eight SCAQMD meteorological stations that are located in the general project vicinity are identified below in Table 1, and identified in the Meteorological and Particulate Matter Monitoring Stations figure attachment.

Table 1. Meteorological Station Data

Meteorological Station	Average Wind Speed	Calm Winds	Data Availability	Years	Surface Albedo	Surface Roughness (meters)	Bowen Ratio
Riverside	1.72 m/s	0.02%	99.24%	2008-12	0.19	0.314	1.0
Fontana	2.47 m/s	0.04%	98.70%	2008-12	0.19	0.240	1.0
Upland	1.73 m/s	0.02%	98.49%	2008-12	0.18	0.334	1.0
Lake Elsinore	1.55 m/s	0.02%	99.03%	2008-12	0.20	0.232	1.0
Perris	1.74 m/s	0.21%	98.03%	2007-11	0.20	0.193	1.0
Pomona	1.56 m/s	0.50%	98.51%	2007-12	0.18	0.470	1.0
San Bernardino	1.60 m/s	0.36%	98.75%	2007-12	0.18	0.315	1.0
Redlands	1.51 m/s	0.27%	98.81%	2007-12	0.20	0.331	1.0
Source: SCAQMD, 2015.							

The nearest representative meteorological station should be chosen for dispersion modeling. Usually this is simply the nearest station; however, an interfering terrain feature may dictate the use of an alternate station. With respect to the proposed project, the Fontana station is located nearest to the identified worst-case 1-mile I-15 segment. The Fontana station is located approximately 5.5-miles north-northeast of the worst-case segment location. The next closest station would be the Upland station that is located approximately 7 miles northwest of the worst-case segment location. All other SCAQMD approved stations are located more than 8 miles away from the study area. Since no interfering terrain features are present between the Fontana station and the study area, the Fontana station data is most appropriate for use in this analysis. As with all SCAQMD processed meteorological station data, Miramar Station upper air data was used for this analysis.

Particulate Matter Monitoring Stations

California Air Resource Board (CARB) and SCAQMD maintain a network of air quality monitoring stations located throughout the Basin to characterize the air quality environment in the Basin by measuring and recording ambient air pollutant concentrations. The Basin is divided into 38 source/receptor areas (SRAs). The proposed project corridor extends along 16 miles of I-15, and passes through SRAs 22 (Corona/Norco Area) and 23 (Metropolitan Riverside). SRAs 33 (Southwest San Bernardino Valley) and 34 (Central San Bernardino Valley) are located east and north of the identified worst-case I-15 freeway segment. See the SCAQMD General Forecast Areas and Air Monitoring Areas figure attachment to see the relationship of SCAQMD SRAs to the study area.

The ten SCAQMD ambient air monitoring stations that are located in the general project vicinity are identified in Table 2, and identified in the Meteorological and Particulate Matter Monitoring Stations figure attachment. As shown in the Meteorological and Particulate Matter Monitoring Stations figure attachment, the Mira Loma Van Buren monitoring station is located most proximate to the identified worst-case segment (I-15 north of SR-60), and is located approximately 4 miles southeast from the study area. The Fontana and Upland monitoring stations are located approximately 5.5 miles north-north east and 7 miles northwest of the study area. All other ambient air monitoring stations are located more than 8 miles away from the study area. In addition, the Mira Loma Van Buren station is located within the same SRA (23 – Metropolitan Riverside) as the study area I-15 freeway segment. All other monitoring stations are located outside of SRA 23.

According to the Guidance, each of the following factors must be evaluated when considering monitors for use of their data as representative background concentrations:

Similarity Of Characteristics Between The Monitor Location And Project Area

Although the project study area and the Mira Loma Van Buren monitoring station are both located in dense urban areas, the project study area surrounding land uses are industrial while the Mira Loma Van Buren monitoring station surrounding land uses are residential. While the Mira Loma-10551 Bellegrave monitoring station is located in an area that is more industrial, this site has been inactive since 2011. None of the 10 project vicinity monitoring stations are located in an industrial area of similar density as the project study area. According to the Riverside station wind rose, however, the Mira Loma Van Buren monitoring station is located directly downwind from the project study area. As such, both locations would be heavily influenced by I-15 and SR-60 freeway particulate emissions. Furthermore, the Mira Loma Van Buren station would be influenced more from I-15 and SR-60 freeway particulate emissions than any of the active monitoring stations that are located within the general project vicinity. No interfering terrain features are present between the Mira Loma Van Buren monitoring station and the study area. And finally, the Mira Loma Van Buren monitoring station and the project study area are both located within SCAQMD SRA 23. All other active monitoring stations are located outside of SRA 23.

Distance Of Monitor From The Project Area

At a distance of approximately 4 miles southeast of the study area, the Mira Loma Van Buren monitoring station is the closest active monitoring station to the study area. No interfering terrain features are present between the Mira Loma Van Buren monitoring station and the study area. And finally, as shown on the Meteorological and Particulate Matter Monitoring Stations figure attachment, no monitoring stations are located upwind of the project study area.

Table 2. Project Vicinity Particulate Matter Monitoring Stations

Monitoring Site ID	Monitoring Site Name	Pollutant	Measurement Scale	Sample				Monitor Type
				Duration	Frequency	Collection Method	Analysis Method	
06-071-2002	Fontana – Arrow Highway	PM10	500 M TO 4KM	24 Hour	Every 6th Day	HI-VOL SA/GMW-1200	Gravimetric	SLAMS
		PM2.5	--	24 Hour	Every 3rd Day	Andersen RAAS2.5-300 PM2.5 SEQ w/WINS	Gravimetric	SLAMS
06-065-9001	Lake Elsinore – W Flint St	PM10	--	1 Hour	Every Day	INSTRUMENTAL-R&P SA246B-INLET	TEOM-Gravimetric	SLAMS
		PM2.5	Not Measured					
06-065-0004	Mira Loma – 10551 Bellegrave	PM10	--	24 Hour	Every 6th Day	HI-VOL SA/GMW-1200	Gravimetric	SLAMS
		PM2.5	Not Measured					
06-065-8005	Mira Loma Van Buren	PM10	--	1 Hour	Every Day	INSTRUMENT MET ONE 4 MODELS	Beta Attenuation	SLAMS
		PM2.5	--	24 Hour	Every Day	Andersen RAAS2.5-300 PM2.5 SEQ w/WINS	Gravimetric	SLAMS
06-065-0003	Norco-Norconian	PM10	100 M TO 500 M	24 Hour	Every 6th Day	HI-VOL SA/GMW-1200	Gravimetric	SLAMS
		PM2.5	Not Measured					
06-071-0025	Ontario – 1408 Francis St	PM10	--	24 Hour	Every 6th Day	HI-VOL SA/GMW-1200	Gravimetric	SLAMS
		PM2.5	--	24 Hour	Every 3rd Day	Andersen RAAS2.5-300 PM2.5 SEQ w/WINS	Gravimetric	SLAMS
06-065-6001	Perris	PM10	500 M TO 4KM	24 Hour	Every 6th Day	HI-VOL SA/GMW-1200	Gravimetric	SLAMS
		PM2.5	Not Measured					
06-065-1003	Riverside Magnolia	PM10	4 KM TO 50 KM	1 Hour	Every Day	INSTRMENTL-ANDRSEN-SA246B-INLT	Beta-Attenuation	SLAMS
		PM2.5	--	24 Hour	Every 3rd Day	Andersen RAAS2.5-300 PM2.5 SEQ w/WINS	Gravimetric	SLAMS
06-065-8001	Riverside Rubidoux	PM10	500 M TO 4KM	24 Hour	Every 6th Day	HI-VOL SA/GMW-1200	Gravimetric	SLAMS
		PM2.5	--	24 Hour	Every Day	Andersen RAAS2.5-300 PM2.5 SEQ w/WINS	Gravimetric	SLAMS
06-071-1004	Upland	PM10	--	1 Hour	Every Day	INSTRUMENT MET ONE 4 MODELS	Beta Attenuation	SLAMS
		PM2.5	Not Measured					
Source: USEPA AirData website (http://www.epa.gov/airdata/ad_maps.html); compiled by ICF International, February 2015.								

Wind Patterns Between The Monitor And The Project Area

No interfering terrain features are present between the Mira Loma Van Buren monitoring station and the study area that are likely to affect local wind patterns. As shown on the Meteorological and Particulate Matter Monitoring Stations figure attachment, no monitoring stations are located upwind of the project study area.

After considering each of the 10 project vicinity monitoring stations against the three factors above, it is determined that the Mira Loma Van Buren monitoring station data is most appropriate for use in this analysis.

Determination of Background Concentrations

Using data recorded at the Mira Loma Van Buren monitoring station, $PM_{2.5}$ and PM_{10} background concentrations were developed consistent with the methodology detailed in the Guidance section 8.3.1 using the "single monitor" approach, as this station meets all EPA requirements for (1) similarity 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, as discussed above in the preceding section.

Annual PM2.5

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 Attachment B), 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 micrograms per cubic meter ($\mu g/m^3$).

24-Hour PM2.5

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. 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 Attachment B), 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 $\mu g/m^3$.

24-Hour PM10

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 Attachment B), 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.

Calculation of Design Values for Conformity Determination

Using the Build Alternative and No Build Alternative modeled $PM_{2.5}$ and PM_{10} concentrations and the background concentration values identified above, design values (DV) were calculated for the annual $PM_{2.5}$, 24-hour $PM_{2.5}$ and 24-hour PM_{10} concentrations using the step-by-step calculation procedures detailed in the Guidance, section 9.3. AERMOD modeling outputs are provided in Attachment D.

Annual PM2.5

For annual $PM_{2.5}$, the DV rounds to the nearest 0.1 μg/m^3. The annual $PM_{2.5}$ DVs for the Build Alternative and No Build Alternative are provided below.

Table 3. Annual PM2.5 Design Values (μg/m3)

	Build Alternative	No Build Alternative
Modeled Concentration	6.32	6.31
Background Concentration	14.8	14.8
Total Concentration	21.12	21.11
Design Value	21.1	21.1

24-Hour PM2.5

For 24-hour $PM_{2.5}$, the DV rounds to the nearest 1.0 μg/m^3. The 24-hour $PM_{2.5}$ DVs for the Build Alternative and No Build Alternative are provided below.

Table 4. 24-Hour PM2.5 Design Values (μg/m3)

	Build Alternative	No Build Alternative
Modeled Concentration	16.32	16.29
Background Concentration	36.67	36.67
Total Concentration	52.99	52.96
Design Value	53.0	53.0

24-Hour PM10

For 24-hour PM_{10}, the DV rounds to the nearest 10.0 µg/m^3. The 24-hour PM_{10} DVs for the Build Alternative and No Build Alternative are provided below.

Table 5. 24-Hour PM10 Design Values (µg/m3)

	Build Alternative	**No Build Alternative**
Modeled Concentration	66.61	66.51
Background Concentration	147	147
Total Concentration	213.61	213.51
Design Value	220.0	220.0

Shown above in Table 3 through Table 5, the Build Alternative DV does not exceed the No Build Alternative DV for $PM_{2.5}$ or PM_{10}. As such, project-level $PM_{2.5}$ and PM_{10} conformity is demonstrated.

Reference:

U.S. Environmental Protection Agency. 2013. Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas. November.