I-215/Barton Road Interchange Improvement Project

Air Quality Analysis

Cities of Grand Terrace and Colton, San Bernardino County

08-SBD-215 PM 0.58/1.66

EA No. 08-0J0700

PN 0800000282

September 2013

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South of Barton Road to North of Barton Road

Cities of Grand Terrace and Colton, San Bernardino County

08-SBD-215 PM 0.58/1.66

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September 2013

Prepared By: ______________________ Date: September 16, 2013

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Executive Summary

The San Bernardino Associated Governments (SANBAG), in cooperation with the California Department of Transportation (Caltrans or Department), City of Grand Terrace, and City of Colton, proposes to improve the Interstate 215 (I-215)/Barton Road interchange. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County. On Barton Road, the project limits extend from approximately 0.3 mile (mi) west of I-215 to 0.4 mi east of I-215. The project limits on I-215 extend from approximately 0.8 mi south of Barton Road to 0.4 mi north of Barton Road. The purpose of the proposed project is to reconstruct and improve the interchange in order to improve operation, increase capacity, and reduce congestion at the I-215/Barton Road interchange.

This air quality analysis provides a discussion of the proposed project, the physical setting of the project area, and the regulatory framework for air quality. The analysis provides data on existing air quality and evaluates potential air quality impacts associated with the proposed project.

Historical air quality data show that existing carbon monoxide (CO) levels for the project area and the general vicinity do not exceed either the State or federal ambient air quality standards. The proposed project would help to improve traffic flow and reduce congestion on roadway links in the project vicinity. The project is located in an attainment/maintenance area for federal CO standards. Using the Caltrans Transportation Project-Level Carbon Monoxide Protocol, a screening and a CO hot-spot analysis was conducted to determine whether the proposed project would result in any CO hot spots. It was determined that the proposed project would not result in any exceedances of the 1-hour or 8-hour CO standards.

The proposed project is within a nonattainment area for federal $PM_{2.5}$ and PM_{10} (particulate matter less than 2.5 microns and 10 microns, respectively, in size) standards. Therefore, per 40 Code of Federal Regulations (CFR), Part 93, analyses are required for conformity purposes. However, the United States Environmental Protection Agency (EPA) does not require hot-spot analyses, qualitative or quantitative, for projects that are not listed in Section 93.123(b)(1) as an air quality concern. Therefore, a $PM_{2.5}$/PM_{10} hot-spot analysis has been submitted to the Transportation Conformity Working Group (TCWG) for its review.

Compliance with South Coast Air Quality Management District (SCAQMD) Rules and Regulations during construction will reduce construction-related air quality impacts from fugitive dust emissions and construction equipment emissions.

Because the proposed interchange improvement project does not generate new regional vehicular trips, no new regional vehicular emissions would occur. The proposed project may have a beneficial effect in helping to reduce congestion on roadway links in the project vicinity.

The proposed project is required to include an analysis of Mobile Source Air Toxics (MSAT) as part of the National Environmental Policy Act (NEPA) process for highways. It is expected that there would be similar or lower MSAT emissions in the study area under any of the Build Alternatives relative to the No Build Alternative in the design year (2040) due to the improvement in the level of service (LOS) and reduction of the delay at the project intersections.

The project is located in San Bernardino County, which is not among the counties listed as containing serpentine and ultramafic rock. Therefore, the impact from naturally occurring asbestos (NOA) during project construction would be minimal to none.

The project is in the 2012 Regional Transportation Plan (RTP), which was found to be conforming by the Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) on June 4, 2012. The project is also in the 2013 Federal Transportation Improvement Program (FTIP), which was found to be conforming by the FHWA/FTA on December 14, 2012 (Project ID: SBD31850; Model No. S310. Description: *In Grand Terrace at Barton Road Interchange. Reconstruct overcrossing and ramps with partial cloverleaf configuration; northwest of I-215 work includes the addition of northbound aux lane; local street work to include widening of Barton Road, removal of La Cross Avenue between Vivienda Avenue and Barton Road, replacement with new local road, improvements to Barton Road and Michigan Way/Vivienda Avenue intersection and realignment of Commerce Way*). The Build Alternatives are consistent with the scope of design concept of the FTIP. Therefore, the proposed project is in conformance with the State Implementation Plan (SIP).

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Chapter 1 Project Description

1.1 Introduction

The San Bernardino Associated Governments (SANBAG), in cooperation with The California Department of Transportation (Caltrans), City of Grand Terrace, and City of Colton, proposes to improve the Interstate 215 (I-215)/Barton Road interchange. The proposed project is located in the City of Grand Terrace and partially in the City of Colton in San Bernardino County. On Barton Road, the project limits extend from approximately 0.3 mile (mi) west of I-215 to 0.4 mi east of I-215. The project limits on I-215 extend from approximately 0.8 mi south of Barton Road to 0.4 mi north of Barton Road. Figure 1 shows project location and vicinity maps.

I-215 is a major north-south freeway facility that begins at the southern junction of Interstate 15 (I-15) in the City of Murrieta in Riverside County and terminates at the northern junction with I-15, near Devore in San Bernardino County. It is an alternative route of I-15. The portion of I-215 within the project limits currently provides three through lanes in each direction and a paved median.

The existing I-215/Barton Road interchange is a compact diamond interchange with single-lane entrance and exit ramps. Both of the exit ramp approaches expand to two lanes to accommodate turning traffic. The existing northbound ramp intersection and southbound ramp intersection are spaced approximately 350 feet (ft) apart. The existing overcrossing is a single lane in each direction with back-to-back left-turn pockets for the entrance ramps.

Barton Road is an east-west primary arterial in the County of San Bernardino. It extends from La Cadena Drive in the City of Colton to east of San Mateo Street in the City of Redlands. Within the project limits, Barton Road is a two-lane roadway west of I-215. East of I-215, Barton Road is a four-lane facility with turn lanes at various intersections. Within the project limits, there are several intersections:

- Grand Terrace Road (unsignalized T-intersection)
- Southbound ramps and La Crosse Avenue intersection (signalized)
- Northbound ramps intersection (signalized)
- Michigan Avenue intersection (signalized T-intersection)
- Vivienda Avenue intersection (unsignalized T-intersection)

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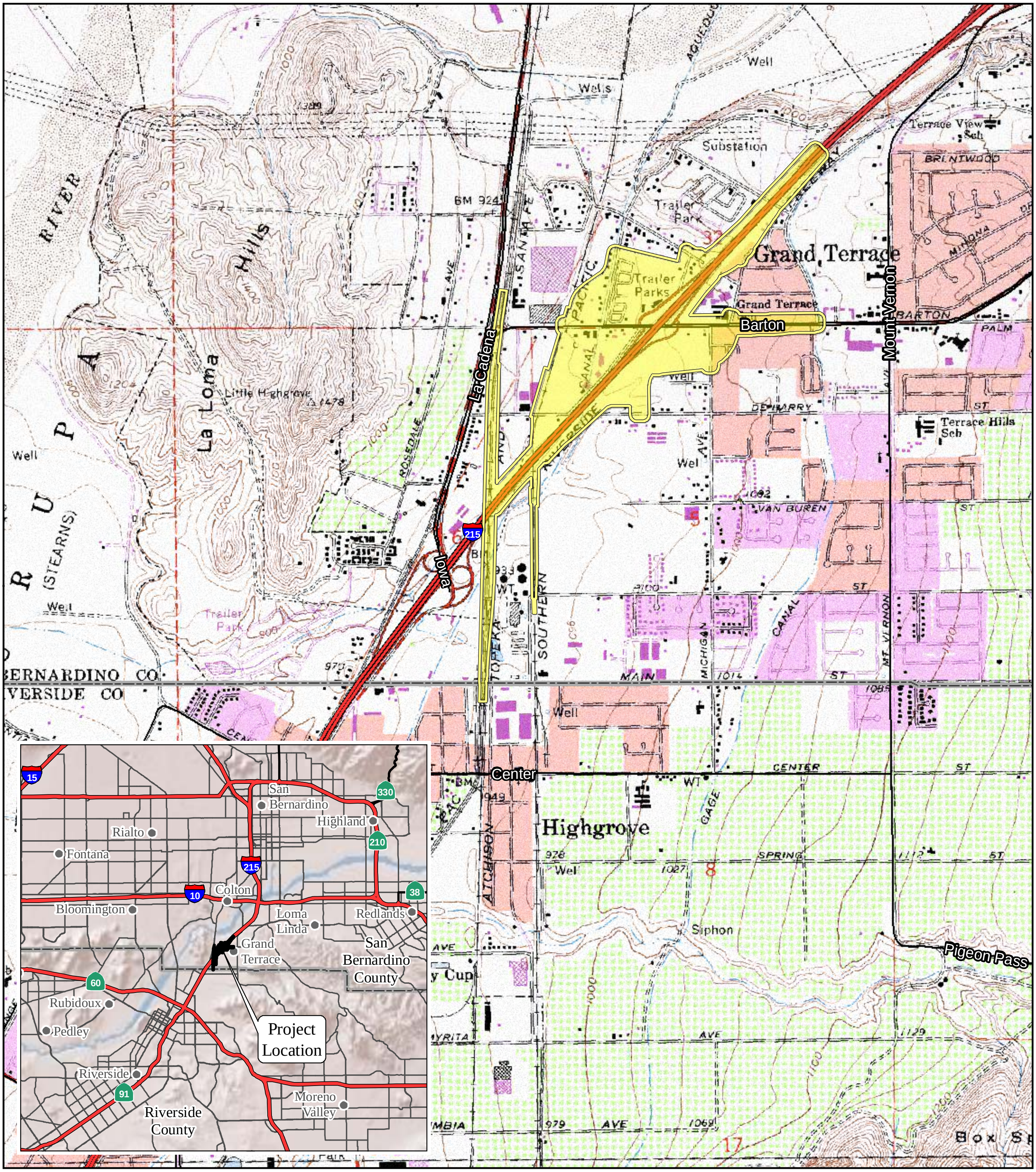

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Project Area

FIGURE 1

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SOURCE: USGS 7.5 min. quad. (San Bernardino South, 1980)

I-215/Barton Road Interchange Improvement Project

Project Location Map

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1.2 Purpose and Need

1.2.1 Purpose

The purpose of the proposed project is to improve the operation, increase the capacity, and reduce the existing and future congestion at the I-215/Barton Road interchange, and improve access to facilities served by the interchange.

1.2.2 Need

Based on traffic projections and the existing and planned land uses in the vicinity, the facility is forecast to degrade to level of service (LOS) F (breakdown condition) by 2040 without improvements.

1.2.2.1 Capacity and Transportation Demand

The study area intersections currently operate at LOS B or C during the a.m. and p.m. peak hours. Without improvements, in 2016, the Barton Road/Grand Terrace Road intersection would operate at LOS F during the a.m. peak hour and LOS E during the p.m. peak hour. Because of the projected demand, without improvements, by 2040 all seven study area intersections would operate at LOS F during both the a.m. and p.m. peak hours, with the exception of Barton Road/La Cadena Drive during the a.m. peak hour, which would operate at LOS C.

The demand for interchange access is also represented in traffic volumes. Traffic projections for 2040 show that the average daily traffic (ADT) volumes on I-215 will increase by more than 200 percent. The 2009 Barton Road interchange ramp volumes are forecast to double by 2040. Additional capacity is needed to accommodate projected traffic volumes and improve LOS.

1.2.2.2 Roadway Deficiencies

The existing I-215 southbound off-ramp at Barton Road is nonstandard per the Highway Design Manual (6th Edition) because it intersects with a local street (La Crosse Avenue) before reaching Barton Road. The southbound off-ramp at Barton Road is a five-legged intersection with a two-way frontage road adjacent to the southbound on-ramp. The existing interchange does not have adequate space for Surface Transportation Assistance Act (STAA) truck-turning movements, a sidewalk on the south side, or bicycle lanes. Therefore, the existing interchange restricts large truck movements and pedestrian and bicyclist access to local streets. Reconstruction of the interchange is needed to improve access to the freeway and local streets.

In the existing condition, the left-turn lane on westbound Barton Road at the I-215 southbound on-ramp does not have sufficient vehicle capacity during the a.m. and p.m. peak hours. This prevents left-turning and through traffic from moving through the interchange. Queue lengths are forecasted to increase substantially by 2040 without interchange improvements. Additional turn-pocket capacity is needed in order to reduce delays at the interchange.

1.2.2.3 Social Demand and Economic Development

The I-215/Barton Road interchange is the primary regional access for the City of Grand Terrace. It also serves the southwestern portion of the City of Colton and provides direct access to the City of Loma Linda. The City of Colton is projected to experience substantial population growth through 2035 according to the Southern California Association of Governments (SCAG) 2012 Adopted Regional Transportation Plan (RTP) Growth Forecasts. The build out of the area in accordance with the City of Grand Terrace General Plan and the Barton Road Specific Plan will result in increased traffic congestion on the freeway and the local street networks leading to the interchange. Reconstruction of the interchange is needed to relieve additional congestion.

1.3 Project Description

The Project Description describes the proposed action and the design alternatives that were developed to meet the identified need through accomplishing the defined purposes while avoiding or minimizing environmental impacts. The alternatives are Alternative 1 (No Build), Alternative 3 (Cloverleaf Interchange), Alternative 6 (Modified Cloverleaf), and Modified Alternative 7 (Modified Cloverleaf/Diamond). The proposed project is located in the City of Grand Terrace, partially in the City of Colton in San Bernardino County, California. Within the limits of the proposed project, I-215 currently provides three lanes in each direction. Barton Road is a two-lane roadway west of I-215 and a four-lane facility with turn lanes at various intersections east of I-215. Barton Road provides four ramps that connect to I-215: southbound on- and off-ramps, and northbound on- and off-ramps.

The purpose of the proposed project is to reconstruct and improve the interchange in order to improve operation, increase capacity, and reduce congestion at the I-215/ Barton Road interchange. The existing interchange has a nonstandard southbound off-ramp, and the existing interchange restricts large truck movements and pedestrian and bicyclist access. Without the interchange improvement, the operation of this facility will deteriorate over time to reach unacceptable LOS in the future.

The project area for the I-215/Barton Road Interchange Improvement Project overlaps the project area with the I-215 Bi-County High-Occupancy Vehicle (HOV) Lane Gap Closure Project at the Burlington Northern Santa Fe (BNSF) Railway two-track underpass (bridge over the freeway) and the Union Pacific Railroad (UPRR) single-track underpass between the Iowa Avenue/La Cadena Drive interchange and the Barton Road interchange. Both projects would require the reconstruction of these two structures. For the I-215/Barton Road Interchange Improvement Project, the reconstruction is needed to accommodate an auxiliary lane that is proposed between the northbound La Cadena entrance ramp and the proposed Barton Road exit ramp. The underpass replacements are required for I-215/Barton Road interchange Alternatives 3, 6, and Modified Alternative 7. For the I-215 Bi-County HOV Lane Gap Closure Project, the reconstruction is necessary due to inadequate horizontal clearance between the existing structure supports and the proposed HOV lane addition. The reconstructed bridges would be raised to provide adequate vertical clearance with the freeway.

Because the I-215 Bi-County HOV Lane Gap Closure Project analyzed the environmental impacts of reconstruction of the two railroad structures, as well as construction of temporary railroad bridges to be utilized during reconstruction of the existing structures (railroad shooflies), and this project is under construction, these impacts are not evaluated as part of this document.

1.4 Project Alternatives

Four alternatives are being analyzed in this document: the No Build Alternative (Alternative 1) and three Build Alternatives (Alternatives 3, 6, and Modified Alternative7).

1.4.1 No Build Alternative

1.4.1.1 Alternative 1 (No Build Alternative)

Under this alternative, no interchange reconstruction would occur. This alternative would not improve operations or reduce congestion at the I-215/Barton Road interchange.

1.4.2 Proposed Build Alternatives

1.4.2.1 Alternative 3 (Cloverleaf Interchange)

Alternative 3 would provide a conventional partial cloverleaf interchange with the northbound on- and off-ramps on the southern side of Barton Road and the southbound on and off-ramps on the northern side. This alternative would widen

Barton Road from one through lane to two through lanes in each direction and add turning lanes onto the southbound and northbound loop on-ramps. The existing overcrossing would be replaced with a new structure with four through lanes and two turn lanes. This alternative also includes the improvements listed below.

- The existing ramps would be removed and a new southbound off-ramp, southbound loop on-ramp, northbound loop on-ramp, and northbound off-ramp would be constructed.
- The southbound off-ramp would make a new connection at Barton Road with one right-turn lane, one shared right-/left-turn lane, and one left-turn lane; La Crosse Avenue north of Barton Road would be removed.
- The southbound loop on-ramp would provide three lanes at Barton Road.
- The northbound off-ramp would accommodate three lanes (two right-turn lanes and one left-turn lane) at the Barton Road intersection.
- The northbound loop on-ramp would provide three lanes at Barton Road.
- A portion of the I-215 Bi-County HOV Lane Gap Closure Project sound barrier in the northwest quadrant would be removed to accommodate the new southbound off-ramp.
- Commerce Way would be reconfigured to intersect with Barton Road at Vivienda Avenue.
- The intersection of Michigan Avenue at Barton Road would be eliminated; Michigan Avenue would form a T-intersection with Commerce Way.
- The segment of Vivienda Avenue west of I-215 would be converted into a cul-de-sac.
- A new two-lane road would be constructed between La Crosse Avenue and Grand Terrace Road adjacent to Vivienda Avenue.
- Grand Terrace Road and the Grand Terrace Road/Barton Road intersection would be realigned.
- Grand Terrace Road would be extended southwest of Barton Road to tie into East De Berry Street.
- Grand Terrace Road at Barton Road would be converted into a cul-de-sac.
- Barton Road would be widened to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Standard sidewalks and a Class II bicycle lane would be provided on both sides of Barton Road within the project limits.
- Bioswales would be constructed in the northwest and southeast quadrants to treat storm water runoff.

- New landscaping would be provided consistent with the I-215 Bi-County Aesthetic Concept.
- Utilities would be relocated or protected in-place during construction.
- Drainage facilities would be modified consistent with other project improvements.
- Traffic signal modifications would be made at Barton Road/Grand Terrace Road/De Berry Street, I-215 northbound ramps/Barton Road, I-215southbound ramps/Barton Road, and Commerce Way/Vivienda Avenue/Barton Road.

The conceptual design for Alternative 3 is shown on Figure 2.

1.4.2.2 Alternative 6 (Modified Cloverleaf)

Alternative 6 proposes a modified cloverleaf interchange with the southbound entrance and exit ramps directly connected to Barton Road; the northbound entrance and exit ramps would be constructed to an extension of Commerce Way, which would be realigned to connect to Barton Road at the location of the existing Vivienda Avenue intersection to the east. Barton Road would be widened to two through lanes in each direction plus one left-turn and one right-turn lane. The existing overcrossing would be replaced with a new structure with four through lanes and three turn lanes. This alternative also includes the improvements listed below.

- The existing ramps would be removed.
- A new southbound loop on-ramp would provide two lanes at Barton Road.
- A new southbound off-ramp would make a new connection at Barton Road with one right-turn lane, one left-turn lane, and one shared right-/left-turn lane; La Crosse Avenue north of Barton Road would be removed; La Crosse south of Barton Road would be reconfigured to a right-in/right-out layout.
- A new northbound off-ramp would tie in to Commerce Way and provide for dual left-turn lanes and a single right-turn lane.
- A bridge would be constructed over the Riverside Canal on the northbound off-ramp to span the canal.
- A new northbound hook on-ramp would be provided in the southeast quadrant. The access to the ramp would be through the proposed extension of the Commerce Way.
- A portion of the I-215 Bi-County HOV Lane Gap Closure Project sound barrier in the northwest quadrant would be removed to accommodate the new southbound off-ramp.

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- Alternative 3
- Temporary Construction Easement
- Proposed Right of Way
- Limits of Construction
- Proposed Retaining Wall
- Proposed Sound Barrier
- I-215 Bi-County HOV Lane Gap Closure Project Sound Barrier
- Grand Terrace Fitness Park
- City Boundary

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FIGURE 2

I-215/Barton Road Interchange Improvement Project

Alternative 3

SOURCE: Microsoft (5/2010); San Bernardino Cnty. (3/08, 9/2013); AECOM (5/2011)

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- A new sound barrier is proposed adjacent to the Terrace Village RV Park and the Grand Terrace Mobile Home Park.
- Commerce Way would be reconfigured to intersect with Barton Road at Vivienda Avenue.
- Commerce Way would be shifted to the east to accommodate the northbound off- and on-ramps.
- Commerce Way would be extended southeast of Barton Road to cross Michigan Avenue in the vicinity of De Berry Street.
- The northbound on-ramp and off-ramp would intersect with the proposed Commerce Way extension.
- The intersection of Michigan Avenue at Barton Road would be eliminated; Michigan Avenue would form a T-intersection with Commerce Way.
- A new two-lane road between La Crosse Avenue and Grand Terrace Road would be constructed adjacent to Vivienda Avenue.
- Barton Road would be widened to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Standard sidewalks and a Class II bicycle lane would be provided on both sides of Barton Road within the project limits.
- Bioswales would be constructed in the northwest and southeast quadrants to treat storm water runoff .
- New landscaping would be provided consistent with the I-215 Bi-County Aesthetic Concept.
- Utilities would be relocated or protected in place during construction.
- Drainage facilities would be modified consistent with other project improvements.
- Traffic signal modifications would be made at Barton Road/Grand Terrace Road, I-215 northbound ramps/Commerce Way, I-215 southbound ramps/Barton Road and Commerce Way/Vivienda Avenue/Barton Road.

The conceptual design for Alternative 6 is shown on Figure 3.

1.4.2.3 Modified Alternative 7 (Modified Cloverleaf/Diamond) (Locally Preferred Alternative)

Modified Alternative 7 would provide a tight diamond configuration for the northbound ramps. The southbound ramps would have a modified cloverleaf configuration with a roundabout at the intersection of the southbound ramps, Barton Road, and La Crosse Avenue. Barton Road would be widened to two through lanes in each direction plus one left-turn and one right-turn lane east of the southbound ramps.

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FIGURE 3

LEGEND

- Alternative 6
- Temporary Construction Easement
- Proposed Right of Way
- Limits of Construction
- Proposed Retaining Wall
- Potential Sound Barrier
- Proposed Sound Barrier
- I-215 Bi-County HOV Lane Gap Closure Project Sound Barrier
- Grand Terrace Fitness Park
- City Boundary

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SOURCE: Microsoft (5/2010); San Bernardino Cnty. (3/08, 9/2013); AECOM (11/2011)

I-215/Barton Road Interchange Improvement Project

Alternative 6

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The existing overcrossing would be replaced with a new structure with four through lanes and one turn lane. This alternative also includes the improvements listed below.

- The new southbound loop on-ramp would provide two lanes at Barton Road in a roundabout configuration.
- The new southbound off-ramp would make a connection at Barton Road and transition into a roundabout which would provide one right-turn lane, and one shared through/left-turn lane; La Crosse Avenue north of Barton Road would be removed.
- The new northbound off-ramp would terminate at Barton Road with one left-turn lane, one shared through/right-turn lane and one dedicated right-turn lane.
- The new northbound on-ramp would have two lanes at the Barton Road intersection.
- A portion of the I-215 Bi-County HOV Lane Gap Closure Project sound barrier in the northwest quadrant would be modified to accommodate the new southbound off-ramp.
- Commerce Way would be reconfigured to intersect with Barton Road at Vivienda Avenue.
- The intersection of Michigan Avenue at Barton Road would be eliminated; Michigan Avenue would form a T-intersection with Commerce Way.
- A new two-lane road between La Crosse Avenue and Grand Terrace Road would be constructed adjacent to Vivienda Avenue.
- Barton Road would be widened to four through lanes approximately between Grand Terrace Road and Vivienda Avenue.
- Standard sidewalks and a Class II bicycle lane would be provided on both sides of Barton Road within the project limits.
- Bioswales would be constructed in the northwest and southeast quadrants to treat storm water runoff.
- New landscaping would be provided consistent with the I-215 Bi-County Aesthetic Concept.
- Utilities would be relocated or protected in place during construction.
- Drainage facilities would be modified consistent with other project improvements. Traffic signal modifications would be made at Barton Road/Grand Terrace Road, I-215 northbound ramps/Barton Road, and Commerce Way/Vivienda Avenue/ Barton Road.

The conceptual design for Modified Alternative 7 is shown on Figure 4.

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LEGEND

- Modified Alternative 7
- Proposed Right of Way
- Temporary Construction Easement
- Limits of Construction
- Proposed Retaining Wall
- Proposed Sound Barrier
- I-215 Bi-County HOV Lane Gap Closure Project Sound Barrier
- Grand Terrace Fitness Park
- City Boundary

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FIGURE 4

I-215/Barton Road Interchange Improvement Project

Modified Alternative 7

SOURCE:Microsoft (5/2010); San Bardino Cnty. (3/2008, 9/2013); AECOM (4/2013)

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1.4.3 Alternatives Considered but Eliminated from Further Discussion

Alternatives 2 and 4 included a new northbound on-ramp that encroached into the playfields and portable buildings at Grand Terrace Elementary School in the northeast quadrant of the interchange. Meetings with the Colton Joint Unified School District Director of Facilities and Planning and a California Department of Education representative determined that the acquisition of school property under these alternatives would require the school to be relocated. This would require that the project cost include the cost of moving the school and environmental clearance of a new site. Further study determined that a suitable site within the school enrollment area was not available.

During reviews of the Build Alternatives that occurred between September 7, 2011, and October 27, 2011, it was discovered that the northbound on-ramp associated with Alternative 5 conflicts with the designed placement of the eastside bridge abutment for the Newport Avenue Overcrossing (OC) Bridge Replacement Project. The Newport OC Bridge project is in final design, and determining potential resolutions to the engineering conflict is expected to cause critical delays to this project by requiring substantial redesign, which in turn would be expected to result in an environmental reevaluation. In addition, Alternative 5 would result in greater environmental impacts than Alternatives 3, 6, and 7, and is the most expensive Build Alternative.

During the development of Alternative 7, the design team and Caltrans worked to resolve issues associated with the intersection configuration, access control on La Crosse Avenue, and intersection control measures. The existing intersection at the I-215 southbound ramps and Barton Road contains a local street, La Crosse Avenue, that forms two legs of the intersection. The existing connection of La Crosse Avenue north of Barton Road would be eliminated with Alternative 7, but the southern leg of La Crosse Avenue would remain active and provide access to the intersection. Because the connection of the southern leg of La Crosse Avenue at this intersection would occur directly opposite the proposed realigned southbound off-ramp, this connection would be nonstandard per the Caltrans Highway Design Manual (HDM) Index 504.8, Access Control.

In September 2011, Caltrans, SANBAG, and Federal Highway Administration (FHWA) staff met to review the issue of access control at La Crosse Avenue. During this meeting it was concluded that right-in/right-out access to La Crosse Avenue would provide an adequate compromise to maintain access while minimizing the nonstandard access control. The decision was contingent upon verifying that traffic would operate at an acceptable LOS with the right-in/right-out access control. The traffic operations were verified, and the right-in/right-out control at La Crosse Avenue was incorporated into the various engineering and environmental studies needed for Project Approval/Environmental Document (PA/ED) approval as Alternative 7.

A few property owners along the southern leg of La Crosse Avenue were concerned about how Alternative 7 would impact the access for their delivery trucks and contacted the City of Colton with questions in early 2012. The City of Colton presented the concept of Alternative 7, and the property owners indicated that the loss of full access to the interchange from La Crosse Avenue would negatively affect their businesses.

In August 2012, Caltrans submitted a draft Modified Access Request (MAR), which evaluated the Locally Preferred Alternative (Alternative 7) to FHWA for review. FHWA staff visited the project site along with several Caltrans project staff members. The private property owners’ concerns were discussed. During their visit, FHWA staff questioned whether a roundabout concept would improve conditions at the southbound ramp intersection, solve the access control issues, and eliminate the controversy regarding the right-in/right-out configuration. The group agreed that a roundabout would reduce the impacts of La Crosse Avenue on the intersection since wrong-way moves would be more difficult and all directions of the intersection’s legs would be served. FHWA informally rejected the MAR pending further study of a roundabout.

The design team prepared a traffic analysis for one and two roundabout scenarios. The analysis determined that a roundabout would be feasible at the I-215 southbound ramps/Barton Road /La Crosse Avenue intersection. A roundabout in this location would provide access control at La Crosse Avenue, maintain access to all four legs of the intersection, and solve the truck turning movement concerns of the surrounding property owners. The traffic analysis also concluded that a roundabout on Barton Road at the I-215 northbound ramps is not feasible due to operational issues and increased right of way (ROW) impacts. In February 2013, the Project Development Team (PDT) decided to proceed with a modification to Alternative 7 that includes a roundabout at the I-215 southbound ramps. This alternative was formally named Modified Alternative 7 and was selected as the Locally Preferred Alternative at the PDT meeting on March 5, 2013.

For the reasons described above, and because Alternatives 3, 6, and Modified Alternative 7 are feasible, the PDT made a decision to withdraw Alternatives 2 and 4 from further consideration on March 18, 2008, to withdraw Alternative 5 from further consideration on January 17, 2012, and to withdraw Alternative 7 from further consideration on March 5, 2013.

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Chapter 2 Environmental Setting

A region's topographic features can affect pollutant levels; therefore, they are used by the California Air Resources Board (ARB) to determine the boundaries of air basins. A local air district has been formed for each air basin; the district is responsible for providing air quality strategies to bring the air basin into compliance with the national ambient air quality standards (NAAQS).

The project site is located in City of Grand Terrace within San Bernardino County, an area within the South Coast Air Basin (Basin) that includes Orange County and the nondesert parts of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the Basin is administered by the South Coast Air Quality Management District (SCAQMD), a regional agency created for the Basin.

2.1 Meteorology

2.1.1 Climate

Climate in the Basin is determined by its terrain and geographical location. The Basin is a coastal plain with connecting broad valleys and low hills. The Pacific Ocean forms the southwestern boundary, and high mountains surround the rest of the Basin. The region lies in the semipermanent high-pressure zone of the eastern Pacific. The resulting climate is mild and tempered by cool ocean breezes. This climatological pattern is rarely interrupted. However, periods of extremely hot weather, winter storms, and Santa Ana wind conditions do occur.

The annual average temperature varies little throughout the Basin, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The climatological station closest to the site monitoring temperature is the San Bernardino Station.[1] The annual average maximum temperature recorded at this station is 79.9°F, and the annual average minimum is 48.2°F. January is typically the coldest month in this area of the Basin.

The majority of annual rainfall in the Basin occurs between November and April. Summer rainfall is minimal and generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern portion of the Basin along

[1] Western Regional Climatic Center. 2010. http://www.wrcc.dri.edu (accessed August 25, 2010).

the coastal side of the mountains. The climatological station closest to the site that monitors precipitation is the San Bernardino Station. Average rainfall measured at this station varied from 3.25 inches in February to 0.71 inch or less between May and October, with an average annual total of 16.12 inches. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

The Basin experiences a persistent temperature inversion (increasing temperature with increasing altitude) as a result of the Pacific high. This inversion limits the vertical dispersion of air contaminants, holding them relatively near the ground. As the sun warms the ground and the lower air layer, the temperature of the lower air layer approaches the temperature of the base of the inversion (upper) layer until the inversion layer finally breaks, allowing vertical mixing with the lower layer. This phenomenon is observed from midafternoon to late afternoon on hot summer days, when the smog appears to clear up suddenly. Winter inversions frequently break by midmorning.

Inversion layers are significant in determining ozone (O_3) formation. O_3 and its precursors will mix and react to produce higher concentrations under an inversion. The inversion will also simultaneously trap and hold directly emitted pollutants such as carbon monoxide (CO). Particulate matter less than 10 microns in size (PM_{10}) is both directly emitted and created indirectly in the atmosphere as a result of chemical reactions. Concentration levels of these pollutants are directly related to inversion layers due to the limitation of mixing space.

Surface or radiation inversions are formed when the ground surface becomes cooler than the air above it during the night. The earth's surface goes through a radiative process on clear nights, when heat energy is transferred from the ground to a cooler night sky. As the earth's surface cools during the evening hours, the air directly above it also cools, while air higher up remains relatively warm. The inversion is destroyed when heat from the sun warms the ground, which in turn heats the lower layers of air; this heating stimulates the ground level air to float up through the inversion layer.

The combination of stagnant wind conditions and low inversions produces the greatest concentration of pollutants. On days of no inversion or high wind speeds, ambient air pollutant concentrations are the lowest. During periods of low inversions and low wind speeds, air pollutants generated in urbanized areas in Los Angeles and Orange Counties are transported predominantly onshore into Riverside and San Bernardino Counties. In the winter, the greatest pollution problems are CO and oxides of nitrogen (NO_X) because of extremely low inversions and air stagnation during the night and early morning hours. In the summer, the longer daylight hours and the brighter sunshine combine to cause a reaction between hydrocarbons and NO_X to form photochemical smog.

2.2 Air Quality Management

Pursuant to the Clean Air Act (CAA), the United States Environmental Protection Agency (EPA) established NAAQS. The NAAQS were established for six major pollutants, termed criteria pollutants. Criteria pollutants are defined as those pollutants for which the federal and State governments have established ambient air quality standards, or criteria, for outdoor concentrations in order to protect public health and welfare. The NAAQS are two-tiered: primary, to protect public health; and secondary, to prevent degradation to the environment (e.g., impairment of visibility, damage to vegetation and property).

The six criteria pollutants are O_3, CO, particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. PM includes particulate matter less than 2.5 microns in size ($PM_{2.5}$) and PM_{10}. The standards for these pollutants are shown in Table 2-1, and the health effects from exposure to the criteria pollutants are described later in this analysis.

2.3 2004 Transportation Conformity Rule

The EPA General Conformity Rule applies only to federal actions that result in emissions of nonattainment or maintenance pollutants, or their precursors, in federally designated nonattainment or maintenance areas. The EPA General Conformity Rule establishes a process to demonstrate that federal actions would be consistent with applicable State Implementation Plans (SIPs) and would not cause or contribute to new violations of the NAAQS, increase the frequency or severity of existing violations of the NAAQS, or delay the timely attainment of the NAAQS. The emissions thresholds that trigger requirements of the General Conformity Rule for federal actions emitting nonattainment or maintenance pollutants, or their precursors, are called *de minimis* levels. The general conformity *de minimis* thresholds are defined in 40 Code of Federal Regulations (CFR) 93.153(b). The Federal General Conformity Rule does not apply to federal actions in areas designated as nonattainment of only the California ambient air quality standards (CAAQS).

Table 2-1 Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	**Method[4]**	**Primary[3,5]**	**Secondary[3,6]**	**Method[7]**
Ozone (O_3)	1-Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	--	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM_{10})	24-Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		--		
Fine Particulate Matter ($PM_{2.5}$)	24-Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15.0 µg/m^3		
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1-Hour	20 ppm (23 mg/m^3)		35 ppm(40 mg/m^3)		
	8-Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)[8]	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)	Gas Phase Chemiluminescence	53 ppb (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1-Hour	0.18 ppm (339 µg/m^3)		100 ppb (188 µg/m^3)	None	
Sulfur Dioxide (SO_2)[9]	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (for certain areas) [9]		Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	24-Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas) [9]	—	
	3-Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1-Hour	0.25 ppm (655 µg/m^3)		75 ppb (196 µg/m^3)	—	
Lead[10,11]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High-Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	
	Rolling 3-Month Average[11]	—		0.15 µg/m^3		
Visibility-Reducing Particles[12]	8-Hour	See footnote 12	Beta Attenuation and Transmittance through Filter Tape	**No Federal Standards**		
Sulfates	24-Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24-Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: California Air Resources Board, June 7, 2012.

The footnotes for this table are provided on the following page.

Footnotes:

1 California standards for ozone; carbon monoxide (except Lake Tahoe); sulfur dioxide (1- and 24-hour); nitrogen dioxide; suspended particulate matter - PM_{10}, $PM_{2.5}$ and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2 National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once per year. The ozone standard is attained when the fourth-highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

3 Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4 Any equivalent procedure which can be shown to the satisfaction of ARB to give equivalent results at or near the level of the air quality standard may be used.

5 National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6 National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7 Reference method as described by the EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the EPA.

8 To attain the 1-hour standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb. Note that the national standards are in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national standards to the California standards, the units can be converted from ppb to ppm. In this case, the national standards of 53 ppb and 100 ppb are identical to 0.053 ppm and 0.100 ppm, respectively.

9 On June 2, 2010, the new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

10 The ARB has identified lead and vinyl chloride as “toxic air contaminants” with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

11 The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standards are approved.

12 In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basins, respectively.

°C = degrees Celsius
ARB = California Air Resources Board
EPA = United States Environmental Protection Agency
mg/m^3 = milligrams per cubic meter
ppb = parts per billion
ppm = parts per million
µg/m^3 = micrograms per cubic meter

The EPA, in conjunction with the United States Department of Transportation (DOT), established the Transportation Conformity Rule on November 30, 1993. The rule implements the CAA conformity provision, which mandates that the federal government not engage, support, or provide financial assistance for licensing or permitting or approve any activity not conforming to an approved CAA implementation plan. As part of the Clean Air Rules of 2004, the EPA published a final rule in the Federal Register on July 1, 2004, to amend the Transportation Conformity Rule to include criteria and procedures for the new 8-hour ozone (O_3) and fine particulate matter ($PM_{2.5}$) NAAQS. The final rule addressed a March 2, 1999, court decision by incorporating the EPA and DOT guidance. On July 20, 2004, the EPA published a technical correction notice to correct two minor errors in the July 1, 2004, notice. To remain consistent with the stricter federal standards, the ARB approved a new 8-hour O_3 standard (0.07 parts per million [ppm], not to be exceeded) for O_3 on April 28, 2005. Additionally, the ARB retained the current 1-hour-average standard for O_3 (0.09 ppm) and the current monitoring method for O_3, which uses the ultraviolet (UV) photometry method.

In April 2003, the EPA was cleared by the White House Office of Management & Budget (OMB) to implement the 8-hour ground-level O_3 standard. ARB provided the EPA with California's recommendations for 8-hour O_3 area designations on July 15, 2003. The recommendations and supporting data were an update to a report submitted to the EPA in July 2000. On December 3, 2003, the EPA published its proposed designations. The EPA's proposal differs from the State's recommendations primarily on the appropriate boundaries for several nonattainment areas. The ARB responded to the EPA's proposal on February 4, 2004. On April 15, 2004, the EPA announced the new nonattainment areas for the 8-hour O_3 standard. The designations and classifications became effective on June 15, 2004. The transportation conformity requirement became effective on June 15, 2005.

The EPA proposed a $PM_{2.5}$ implementation rule in September 2003 and made final designations in December 2004. The $PM_{2.5}$ standard complements existing national and State ambient air quality standards that target the full range of inhalable coarse particulate matter (PM_{10}).

Air quality monitoring stations are located throughout the nation and maintained by the local air districts and State air quality regulating agencies. Data collected at permanent monitoring stations are used by the EPA to identify regions as "attainment," "nonattainment," or "maintenance," depending on whether the regions meet the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of nonattainment, such as marginal, moderate, serious, severe, and extreme, are used to classify each air basin in the State on a pollutant-by-pollutant basis. The classifications are used as a foundation to create air quality management strategies to improve air quality and comply with the NAAQS. Attainment status for each of the criteria pollutants in the Basin is listed in Table 2-2.

Table 2-2 Attainment Status of Criteria Pollutants in the South Coast Air Basin

Pollutant	State	Federal
O_3 (1-hour)	Nonattainment	Revoked June 2005
O_3 (8-hour)	Nonattainment	Extreme Nonattainment[1]
PM_{10}	Nonattainment	Serious Nonattainment[2]
$PM_{2.5}$	Nonattainment	Nonattainment[3]
CO	Attainment	Attainment/Maintenance
NO_2	Nonattainment	Attainment/Maintenance
Lead	Attainment (Except Los Angeles County)	Attainment (Except Los Angeles County)
All others	Attainment/Unclassified	Attainment/Unclassified

Source: California Air Resources Board (ARB), 2013 (http://www.arb.ca.gov/desig/desig.htm).

[1] Effective June 2010, the federal 8-hour O_3 nonattainment status was changed to extreme with an attainment date of 2024.

[2] In October 2006, the EPA, in its final rule revision, eliminated the annual PM_{10} standard.

[3] The $PM_{2.5}$ nonattainment designation is based on the 1997 standard. In 2006, the EPA revised the 24-hour standard. The 2006 $PM_{2.5}$ new standard of 35 $\mu g/m^3$ applies 1 year after the effective date of the new designation (December 2010).

$\mu g/m^3$ = micrograms per cubic meter
CO = carbon monoxide
EPA = United States Environmental Protection Agency
NO_2 = nitrogen dioxide
O_3 = ozone
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
PM_{10} = particulate matter less than 10 microns in diameter
SCAQMD = South Coast Air Quality Management District

2.4 Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and CO are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. The majority of the sensitive receptors within or adjacent to the project area are residential uses; however, Grand Terrace Elementary School is located on Barton Road, adjacent to I-215.

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Chapter 3 Regulatory Framework

3.1 Federal Clean Air Act

The CAA (1977 amendments–42 United States Code [USC] 7401 et seq.) states that the federal government is prohibited from engaging in, supporting, providing financial assistance for, licensing, permitting, or approving any activity that does not conform to an applicable SIP. Federal actions relating to transportation plans, programs, and projects developed, funded, or approved under 23 USC of the Federal Transit Act (40 USC 1601 et seq.) are covered under separate regulations for transportation conformity.

In the 1990 CAA amendments, the EPA included provisions requiring federal agencies to ensure that actions undertaken in nonattainment or attainment-maintenance areas are consistent with applicable SIPs. The process of determining whether or not a federal action is consistent with an applicable SIP is called conformity.

The EPA General Conformity Rule applies only to federal actions that result in emissions of nonattainment or maintenance pollutants, or their precursors, in federally designated nonattainment or maintenance areas. The EPA General Conformity Rule establishes a process to demonstrate that federal actions would be consistent with applicable SIPs and would not cause or contribute to new violations of the NAAQS, increase the frequency or severity of existing violations of the NAAQS, or delay the timely attainment of the NAAQS. The emissions thresholds that trigger requirements of the General Conformity Rule for federal actions emitting nonattainment or maintenance pollutants, or their precursors, are called *de minimis* levels. The general conformity *de minimis* thresholds are defined in 40 CFR 93.153(b). The federal General Conformity Rule does not apply to federal actions in areas designated as nonattainment of only the CAAQS.

3.2 California Clean Air Act

The ARB administers the air quality policy in California. These standards, included with the NAAQS in Table 2-1, are generally more stringent and apply to more pollutants than the NAAQS. In addition to the criteria pollutants, CAAQS have been established for visibility-reducing particulates, hydrogen sulfide, and sulfates. The California Clean Air Act (CCAA), which was approved in 1988, requires that each local air district prepare and maintain an Air Quality Management Plan (AQMP) to achieve compliance with the CAAQS. These AQMPs also serve as the basis for preparation of the SIP for the State of California.

The ARB establishes policy and statewide standards and administers the State's mobile source emissions control program. In addition, the ARB oversees air quality programs established by State statute, such as Assembly Bill (AB) 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987.

3.3 California State Implementation Plan

Federal clean air laws require areas with unhealthy levels of O_3, CO, NO_2, SO_2, and inhalable particulate matter to develop plans, known as SIPs, describing how they will attain NAAQS. The 1990 amendments to the CAA set new deadlines for attainment based on the severity of the pollution problem and launched a comprehensive planning process for attaining the NAAQS. The promulgation of the new national eight-hour O_3 standard and the $PM_{2.5}$ standards in 1997 will result in additional statewide air quality SIPs, which are not single documents, but a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting), district rules, State regulations, and federal controls. Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations, and limits on emissions from consumer products. State law makes the ARB the Lead Agency for all purposes related to the SIP. Local air districts and other agencies, such as the Bureau of Automotive Repair, prepare SIP elements and submit them to the ARB for review and approval. The ARB then forwards SIP revisions to the EPA for approval and publication in the Federal Register. CFR Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items included in the California SIP. Many additional California submittals are pending EPA approval.

3.4 South Coast Air Quality Management District

The SCAQMD and SCAG are responsible for formulating and implementing the AQMP for the Basin. Every 3 years, the SCAQMD prepares a new AQMP, updating the previous plan and having a 20-year horizon. The SCAQMD adopted the 2003 AQMP in August 2003 and forwarded it to the ARB for review and approval. The ARB approved a modified version of the 2003 AQMP and forwarded it to the EPA in October 2003 for review and approval.

The 2003 AQMP updates the attainment demonstration for the federal standards for O_3 and PM_{10}, replaces the 1997 attainment demonstration for the federal CO standard, provides a basis for a maintenance plan for CO for the future, and updates the maintenance plan for the federal NO_2 standard that the Basin has met since 1992.

The 2003 AQMP proposes policies and measures to achieve federal and State standards for healthful air quality in the Basin. This revision to the AQMP also addresses several State and federal planning requirements and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools. This AQMP is consistent with and builds on the approaches taken in the 1997 AQMP and the 1999 Amendments to the O_3 SIP for the Basin for the attainment of the federal O_3 air quality standard. However, this revision points to the urgent need for additional emission reductions (beyond those incorporated in the 1997/1999 Plan) to offset increased emission estimates from mobile sources and meet all federal criteria pollutant standards within the time frames allowed under the CAA.

The SCAQMD adopted the 2007 AQMP on June 1, 2007, which it describes as a regional and multiagency effort (i.e., the SCAQMD Governing Board, ARB, SCAG, and EPA). State and federal planning requirements will include developing control strategies, attainment demonstration, reasonable further progress, and maintenance plans. The 2007 AQMP also incorporates substantial new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools. The 2007 AQMP includes a request to have the Basin’s federal 8-hour O_3 attainment status changed from severe to extreme. This change would extend the attainment deadline from 2021 to 2023. The ARB approved the 2007 AQMP on September 27, 2007, and adopted it as part of the 2007 SIP.

The 2012 AQMP incorporated the latest scientific and technological information and planning assumptions, including the 2012 RTP/Sustainable Communities Strategy (SCS) and updated emission inventory methodologies for various source categories. The 2012 AQMP included the new and changing federal requirements, implementation of new technology measures, and the continued development of economically sound, flexible compliance approaches. The SCAQMD adopted the 2012 AQMP in December 2012 and forwarded it to ARB for review and approval.

SCAG is responsible under the CAA for determining the conformity of projects, plans, and programs with the SCAQMD AQMP. As indicated in the California Environmental Quality Act (CEQA) *Air Quality Handbook*, there are two main indicators of consistency:

- Whether the project would result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP.
- Whether the project would exceed the AQMP's assumptions for 2020 or increments based on the year of project build out and phase.

Chapter 4 Monitored Air Quality

The SCAQMD operates several air quality monitoring stations within the Basin. The San Bernardino Air Quality Monitoring Station, located approximately 5.5 mi northeast of the project site at 24302 4th Street, monitors four of the five criteria pollutants: CO, O_3, NO_2, and PM. The next closest monitoring station with SO_2 data is the Rubidoux Station in Riverside County, which is located approximately 6 mi southwest of the project site at 5888 Mission Boulevard. Air quality trends identified from data collected at both air quality monitoring stations between 2010 and 2012 are listed in Table 4-1.

The following air quality information briefly describes the various types of pollutants monitored within the vicinity of the project study area.

4.1 Carbon Monoxide

CO is formed by the incomplete combustion of fossil fuels, and is emitted almost entirely from automobiles. It is a colorless, odorless gas that can cause dizziness, fatigue, and impairments to central nervous system functions. The entire Basin is in attainment/maintenance for the federal CO standard and attainment for the State CO attainment standard. State and federal standards were not exceeded between 2010 and 2012.

4.2 Ozone

O_3, a colorless gas with a sharp odor, is one of a number of substances called photochemical oxidants (highly reactive secondary pollutants). These oxidants are formed when hydrocarbons, NO_X, and related compounds interact in the presence of ultraviolet sunlight. The Basin is a nonattainment area for both the federal and State ozone standards. The State 1-hour O_3 standard was exceeded 27 to 41 times per year in the last 3 years. The State 8-hour O_3 standard was exceeded 60 to 77 times per year in the last 3 years. The federal 8-hour O_3 standard was exceeded 39 to 54 times per year in the last 3 years.

4.3 Nitrogen Dioxide

NO_2 is a reddish-brown gas with an odor similar to bleach and is a byproduct of fuel combustion, which results from mobile and stationary sources. It has complex daily (diurnal) concentrations that are typically higher at night. The Basin has relatively

Table 4-1 Local Air Quality Levels

Pollutant	Standard	2010	2011	2012
Carbon Monoxide				
Max 1-hr concentration (ppm)		2.1	1.9	3.1
No. days exceeded: State Federal	> 20 ppm/1-hr > 35 ppm/1-hr	0 0	0 0	0 0
Max 8-hr concentration (ppm)		1.73	1.74	1.64
No. days exceeded: State Federal	$\geq$9 ppm/8-hr $\geq$9 ppm/8-hr	0 0	0 0	0 0
Ozone				
Max 1-hr concentration (ppm)		0.129	0.135	0.124
No. days exceeded: State	> 0.09 ppm/1-hr	27	40	41
Max 8-hr concentration (ppm)		0.104	0.121	0.109
No. days exceeded: State Federal[1]	> 0.07 ppm/8-hr > 0.075 ppm/8-hr	60 40	66 39	77 54
Particulates (PM_{10})				
Max 24-hr concentration ($\mu g/m^3$)		61	54	51
No. days exceeded: State Federal	> 50 $\mu g/m^3$ > 150 $\mu g/m^3$	2 0	2 0	1 0
Annual avg. concentration ($\mu g/m^3$)		32.4	31.2	32.0
Exceeds Standard? State	> 20 $\mu g/m^3$	Yes	Yes	Yes
Particulates ($PM_{2.5}$)				
Max 24-hr concentration ($\mu g/m^3$)		39.3	65.0	34.8
No. days exceeded: Federal[2]	> 35 $\mu g/m^3$	2	2	0
Annual avg. concentration ($\mu g/m^3$)		11.1	NA	11.7
Exceeds Standard? State Federal	> 12 $\mu g/m^3$ > 15 $\mu g/m^3$	No No	NA NA	No No
Nitrogen Dioxide				
Max 1-hr concentration (ppm): State	> 0.18 ppm/1-hr	0.069	0.062	0.060
No. days exceeded		0	0	0
Annual avg. concentration: Federal	0.053 ppm annual avg.	0.019	0.017	NA
Exceed federal standard?		No	No	NA
Sulfur Dioxide				
Max 24-hr concentration (ppm)		0.005	0.001	0.001
No. days exceeded: State Federal	0.04 ppm 0.14 ppm	0 0	0 0	0 0
Annual avg. concentration: Federal	0.030 ppm annual avg.	0.001	0.000	0.000
Exceed federal standard?		No	No	No

Source: EPA and ARB 2010 to 2012.
$\mu g/m^3$ = micrograms per cubic meter
NA = Not Available
ARB = California Air Resources Board
EPA = United States Environmental Protection Agency
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ppm = parts per million

low NO_2 concentrations, as very few monitoring stations have exceeded the State standard of 0.25 ppm (1 hour) since 1988. NO_2 is itself a regulated pollutant, but it also reacts with hydrocarbons in the presence of sunlight to form O_3 and other compounds that make up photochemical smog. NO_2 decreases lung function and may reduce resistance to infection. The entire Basin has not exceeded either federal or State standards for NO_2 in the past 3 years with published monitoring data. It is designated as a maintenance area under the federal standards and a nonattainment area under the State standards.

4.4 Sulfur Dioxide

SO_2 is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels. SO_2 irritates the respiratory tract, can injure lung tissue when combined with fine particulate matter ($PM_{2.5}$), and reduces visibility and the level of sunlight. The entire Basin is in attainment with both federal and State SO_2 standards.

4.5 Coarse Particulate Matter

PM_{10} occurs from sources such as road dust, diesel soot, combustion products, construction operations, and dust storms. PM_{10} scatters light and substantially reduces visibility. In addition, these particulates penetrate into lungs and can potentially damage the respiratory tract. The State 24-hour PM_{10} standard was exceeded 1 to 2 times per year in the last 3 years. The federal 24-hour PM_{10} standard was not exceeded in last 3 years. The State annual average was exceeded in each of the past 3 years.

Over 99 percent of inhaled particulate matter is either exhaled or trapped in the upper areas of the respiratory system and expelled. The balance enters the windpipe and lungs, where some particulates cling to protective mucus and are removed. Other mechanisms, such as coughing, also filter out or remove particles. Collectively, these pulmonary clearance mechanisms protect the lungs from the majority of inhalable particles.

Irritating odors are often associated with particulates. Some examples of sources of these types of odors are gasoline and diesel engine exhausts, large-scale coffee roasting, paint spraying, street paving, and trash burning.

4.6 Fine Particulate Matter

$PM_{2.5}$ consists of “fine” particles and is believed to pose the greatest health risks. Because of their small size (approximately one-thirtieth the average width of a human hair), fine particles can lodge deeply into the lungs. Particulate matter impacts primarily affect infants, children, the elderly, and those with preexisting cardiopulmonary disease. Industry groups challenged the new standard in court, and implementation of the standard was blocked.

The 2006 federal 24-hour standard was exceeded 0 to 2 times per year in the last 3 years. The annual average concentrations do not exceed the State or federal standards in the past 3 years.

4.7 Volatile Organic Compounds or Reactive Organic Gases

Hydrocarbon compounds are compounds containing various combinations of hydrogen and carbon atoms that exist in the ambient air. Volatile organic compounds (VOCs) contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor, and some examples include gasoline, alcohol, and solvents used in paints. There are no specific State or federal VOC thresholds, as they are regulated by individual air districts as O_3 precursors. Reactive organic gases (ROGs) are a form of VOCs.

4.8 Lead

Lead is found in old paints and coatings, plumbing, and a variety of other materials. Once in the bloodstream, lead can cause damage to the brain, nervous system, and other body systems. Children are highly susceptible to the effects of lead. With the exception of Los Angeles County, which is in nonattainment for State and federal standards, the entire Basin is in attainment for federal and State lead standards.

Chapter 5 Potential Air Quality Impacts

5.1 Short-Term Impacts

During construction, short-term degradation of air quality may occur due to the release of particulate emissions generated by excavation, grading, hauling, and other activities related to construction. Emissions from construction equipment also are anticipated and would include CO, NO_X, VOCs, directly-emitted particulate matter ($PM_{2.5}$ and PM_{10}), and toxic air contaminants such as diesel exhaust particulate matter.

Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, and paving roadway surfaces. Build Alternatives 3, 6, and Modified Alternative 7 would require approximately 208,000 cubic yards (cy), 157,000 cy, and 175,000 cy of net soil export, respectively. Construction-related effects on air quality from most highway projects would be greatest during the site preparation phase because most engine emissions are associated with the excavation, handling, and transport of soils to and from the site. If not properly controlled, these activities would temporarily generate PM_{10}, $PM_{2.5}$, CO, SO_2, NO_X, and VOCs. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_X, VOCs, and some soot particulate ($PM_{2.5}$ and PM_{10}) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase while those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site.

SO_2 is generated by oxidation during combustion of organic sulfur compounds contained in diesel fuel. Off-road diesel fuel meeting federal standards can contain up to 5,000 ppm of sulfur, whereas on-road diesel is restricted to less than 15 ppm of sulfur. However, under California law and ARB regulations, off-road diesel fuel used in California must meet the same sulfur and other standards as on-road diesel fuel, so SO_2-related issues due to diesel exhaust would be minimal.

The maximum amount of construction-related emissions during a peak construction day are presented in Table 5-1 (model data is provided in Appendix D). The PM_{10} and $PM_{2.5}$ emissions assume a 50 percent control of fugitive dust from watering and associated dust control measures. The emissions presented below are based on the best information available at the time of calculations and specify that the schedule for all improvements is anticipated to take approximately 24 months, beginning in 2014 and ending in 2016. Caltrans Standard Specifications for construction (Section 14-9 [Dust Control] and Section 39-3.06 [Asphalt Concrete Plant Emissions]) will be adhered to in order to reduce emissions generated by construction equipment. Additionally, the SCAQMD has established Rule 403 for reducing fugitive dust emissions. The best available control measures (BACM), as specified in SCAQMD Rule 403, shall be incorporated into the project commitments. With the implementation of standard construction measures (providing 50 percent effectiveness) such as frequent watering (e.g., minimum twice per day) and Measures AQ-1 through AQ-5, fugitive dust and exhaust emissions from construction activities would not result in any adverse air quality impacts with implementation of Build Alternatives 3, 5, 6, or Modified 7.

Table 5-1 Maximum Project Construction Emissions

Project Phases	ROG	CO	NO_X	Total PM_{10}	Total $PM_{2.5}$
Grubbing/Land Clearing (lbs/day)	2.7	14.6	23.9	51.2	11.5
Grading/Excavation (lbs/day)	18.5	88.8	253.5	60	19.3
Drainage/Utilities/Sub-Grade (lbs/day)	12.1	54.5	122.5	56.2	16.1
Paving (lbs/day)	2.9	14.3	22.3	1.5	1.3
Maximum (lbs/day)	18.5	88.8	253.5	60	19.3
Total (tons/construction project)	3.3	15.8	41.4	13	3.9

Source: LSA Associates, Inc., June 2013.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ROG = reactive organic gases

5.1.1 Naturally Occuring Asbestos (NOA)

The project is located in San Bernardino County, which is not among the counties listed as containing serpentine and ultramafic rock. Therefore, the impact from NOA during project construction would be minimal to none.

5.2 Long-term Regional Vehicle Emission Impacts

The purpose of the proposed project is to alleviate substantial traffic congestion and delays during the morning and afternoon peak periods and to accommodate projected future traffic volumes at the I-215/Barton Road interchange. The proposed project would not generate new vehicular traffic trips since it would not construct new homes or businesses. However, there is a possibility that some traffic currently utilizing other routes would be attracted to use the improved facility, thus resulting in increased vehicle miles traveled (VMT). Therefore, the potential impact of the proposed interchange project on regional vehicle emissions was calculated using traffic data for the project region and emission rates from the EMFAC2007 emission model.

A supplemental traffic analysis prepared by Iteris (January 2012) estimated the impact that the proposed project would have on regional VMT and vehicle hours traveled (VHT), as shown in Table 5-2. This VMT and VHT data, along with the EMFAC2007 emission rates, were used to calculate CO, ROGs, NO_X, sulfur oxide (SO_X), PM_{10}, and $PM_{2.5}$ emissions for the Existing and 2040 regional conditions. The results of the modeling are included in Appendix D and summarized in Table 5-3. Tables 5-4 and 5-5 list the increase in regional emissions compared to the Existing and No Build conditions, respectively. As shown in Table 5-5, the proposed project would add less than 11 lbs/day of CO, ROG, NO_X, SO_X, PM_{10} or $PM_{2.5}$ to the region. Therefore, the proposed project would not contribute substantially to regional vehicle emissions.

Table 5-2 Regional Traffic Data

Scenario	VMT	VHT	Average Speed (mph)
Existing (2009)	2,602,749	71,498	36.4
No Build (2040)	3,677,227	103,183	35.6
Alternative 3 (2040)	3,682,867	103,301	35.7
Alternative 6 (2040)	3,683,833	103,239	35.7
Modified Alternative 7[1] (2040)	3,679,674	103,108	35.7

Source: Iteris, January 2012.
[1] The VMT and VHT are the same for Alternative 7 and Modified Alternative 7.
mph = miles per hour
VMT = vehicle miles traveled
VHT = vehicle hours traveled

Table 5-3 Regional Vehicle Emissions (lbs/day)

Pollutant	Existing	2040 No Build	2040 Alt. 3	2040 Alt. 6	2040 Modified Alt. 7
CO	14,993	6,031	6,041	6,042	6,035
ROG	757	292	292	292	292
NO_X	4,573	1,492	1,494	1,494	1,493
SO_X	23	32	32	32	32
PM_{10}	275	332	333	333	333
$PM_{2.5}$	184	203	203	203	203

Source: LSA Associates, Inc., January 2012.
Alt. = Alternative
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
PM_{10} = particulate matter less than 10 microns in size
ROG = reactive organic gases
SO_X = oxides of sulfur

Table 5-4 Increase in Regional Vehicle Emissions over Existing Conditions (lbs/day)

Pollutant	2040 No Build	2040 Alternative 3	2040 Alternative 6	2040 Modified Alternative 7
CO	-8,962	-8,953	-8,951	-8,958
ROG	-466	-465	-465	-465
NO_X	-3,082	-3,079	-3,079	-3,081
SO_X	9	10	10	9
PM_{10}	57	57	58	57
$PM_{2.5}$	19	19	19	19

Source: LSA Associates, Inc., January 2012.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases
SO_X = oxides of sulfur

Table 5-5 Increase in Regional Vehicle Emissions over No Build Conditions (lbs/day)

Pollutant	2040 Alternative 3	2040 Alternative 6	2040 Modified Alternative 7
CO	9	11	4
ROG	0	1	0
NO_X	2	3	1
SO_X	0	0	0
PM_{10}	1	1	0
$PM_{2.5}$	0	0	0

Source: LSA Associates, Inc., January 2012.
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases
SO_X = oxides of sulfur

5.3 Carbon Monoxide Screening Analysis

The methodology required for a CO local analysis is summarized in the Caltrans Transportation Project-Level Carbon Monoxide Protocol (Protocol), Section 3 (Determination of Project Requirements) and Section 4 (Local Analysis). In Section 3, the Protocol provides two conformity requirement decision flowcharts that are designed to assist the project sponsors in evaluating the requirements that apply to specific projects. The flowchart in Figure 1 (Appendix A of this report) of the Protocol applies to new projects and was used in this local analysis conformity decision. Below is a step-by-step explanation of the flow chart. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the project. The flowchart begins with Section 3.1.1:

- **3.1.1. Is this project exempt from all emissions analyses?**
  NO.

  Table 1 of the Protocol is Table 2 of Section 93.126 of 40 CFR. Section 3.1.1 is inquiring if the project is exempt. Such projects appear in Table 1 of the Protocol. The Build Alternatives do not appear in Table 1. Therefore, they are not exempt from all emissions analyses.

- **3.1.2. Is the project exempt from regional emissions analyses?**
  NO.

  Table 2 of the Protocol is Table 3 of Section 93.127. The question is attempting to determine whether the project is listed in Table 2. Although the project is an interchange reconfiguration project, it includes additional through lanes on Barton Road. Therefore, it is not exempt from regional emissions analysis.

- **3.1.3. Is the project locally defined as regionally significant?**
  YES.

  As mentioned above, the project includes additional through lanes on Barton Road. Therefore, the project is potentially regionally significant.

- **3.1.4. Is the project in a federal attainment area?**
  NO.

  The project is located within an attainment/maintenance area for the federal CO standard.

- **3.1.5. Are there a currently conforming Regional Transportation Plan (RTP) and Transportation Improvement Program (TIP)?**
  YES.

  Refer to Appendix B.

- **3.1.6. Is the project included in the regional emissions analysis supporting the currently conforming RTP and TIP?**
  YES.

  The project is included in the SCAG 2012 RTP and the 2013 Federal Transportation Improvement Program (FTIP) (Project ID: SBD31850; Model No. S310. Description: *In Grand Terrace at Barton Road Interchange. Reconstruct overcrossing and ramps with partial cloverleaf configuration; northwest of I-215 work includes the addition of northbound aux lane; local street work to include widening of Barton Road, removal of La Cross Avenue between Vivienda Avenue and Barton Road, replacement with new local road, improvements to Barton Road and Michigan Way/Vivienda Avenue intersection and realignment of Commerce Way*).

- **3.1.7. Has the project design concept and/or scope changed significantly from that in the regional analysis?**
  NO.

  The proposed Build Alternatives are consistent with the project description in the 2012 RTP and 2013 FTIP.

- **3.1.9. Examine local impacts.**

  Section 3.1.9 of the flowchart directs the project evaluation to Section 4 (Local Analysis) of the Protocol. This concludes Figure 1.

Section 4 contains Figure 3 (Local CO Analysis [Appendix A of this report]). This flowchart is used to determine the type of CO analysis required for the Build Alternatives. Below is a step-by-step explanation of the flowchart. Each level cited is followed by a response, which in turn determines the next applicable level of the flowchart for the Build Alternatives. The flowchart begins at level 1:

- **Level 1. Is the project in a CO non-attainment area?**

  NO.

  The project site is located in an area that has demonstrated attainment with the federal CO standard.

- **Level 1 (cont.). Was the area redesignated as "attainment" after the 1990 Clean Air Act?**

  YES.

- **Level 1 (cont.). Has "continued attainment" been verified with the local Air District, if appropriate?**

  YES.

  The South Coast Air Basin (Basin) was designated as attainment/maintenance by the United States Environmental Protection Agency (EPA) on June 11, 2007. (Proceed to Level 7.)

- **Level 7. Does the project worsen air quality?**

  YES.

  Because one of the following conditions (listed in Section 4.7.1 of the CO Protocol) is met, the project would potentially worsen air quality.

a. *The project significantly increases the percentage of vehicles operating in cold start mode. Increasing the number of vehicles operating in cold start mode by as little as 2% should be considered potentially significant.*

The percentage of vehicles operating in cold start mode is the same or lower for the intersection under study compared to those used for the intersection in the attainment plan. It is assumed that all vehicles in the intersection are in a fully warmed-up mode. Therefore, this criterion is not met.

b. *The project significantly increases traffic volumes. Increases in traffic volumes in excess of 5% should be considered potentially significant. Increasing the traffic volume by less than 5% may still be potentially significant if there is also a reduction in average speeds.*

Based on the Traffic Operations Analysis (December 2011), the proposed project would not increase the daily traffic volumes along I-215. However, the proposed project would significantly change the traffic volumes along Barton Road between Michigan Street and Vivienda Avenue. The 2040 traffic volumes with and without the proposed Build Alternatives are shown in Table 5-6. Therefore, this criterion is met.

Table 5-6 2040 Average Daily Traffic Volumes (Total AADT/Truck AADT)

Roadway Link	Alt 1 Traffic Volumes	Alt 3 Traffic Volumes	Alt 6 Traffic Volumes	Modified Alt 7 Traffic Volumes
I-215 between Washington and Barton	332,800 (23,296)	332,800 (23,296)	332,800 (23,296)	332,800 (23,296)
I-215 between Barton and Iowa	306,100 (21,427)	306,100 (21,427)	306,100 (21,427)	306,100 (21,427)
Barton Road west of Grand Terrace	25,750 (1,803)	24,300 (1,701)	24,300 (1,701)	24,300 (1,701)
Barton Road between Grand Terrace and I-215	25,850 (1,810)	26,490 (1,854)	26,490 (1,854)	26,490 (1,854)
Barton Road between I-215 and Michigan	44,350 (3,105)	44,250 (3,098)	34,690 (2,428)	44,250 (3,098)
Barton Road between Michigan and Vivienda	39,250 (2,748)	44,250 (3,098)	34,690 (2,428)	44,250 (3,098)

Source: Iteris, *Traffic Operations Analysis*, December 2011.
AADT = Annual Average Daily Traffic
Alt = Alternative
I-215 = Interstate 215

c. *The project worsens traffic flow. For uninterrupted roadway segments, a reduction in average speeds (within a range of 3 to 50 mph) should be regarded as worsening traffic flow. For intersection segments, a reduction in average speed or an increase in average delay should be considered as worsening traffic flow.*

As shown in Tables 5-7, 5-8, 5-9, and 5-10, the proposed Build Alternatives would reduce the LOS at the intersection of Barton Road and La Cadena Drive in the a.m. peak hour. However, the LOS would remain acceptable. In addition, the LOS at the other intersections within the project area would improve under the Build Alternatives. Therefore, this criterion is not met.

Table 5-7 2040 without Project (Alternative 1) Intersection LOS

Intersection		AM Peak Hour			PM Peak Hour		
		LOS	Delay (sec)	V/C	LOS	Delay (sec)	V/C
1.	Barton Road/La Cadena Drive	C	31.4	0.94	F	169.3	1.51
2.	Barton Road/Grand Terrace Road	F	>500	-	F	>500	-
3.	Barton Road/La Crosse Avenue	F	223.4	-	F	>500	-
4.	Barton Road/I-215 SB Ramps	F	184.8	1.40	F	290.6	1.70
5.	Barton Road/I-215 NB Ramps	F	99.7	1.31	F	251.3	1.66
6.	Barton Road/Michigan Street	F	101.7	1.20	F	135.7	1.32
7.	Barton Road/Vivienda Avenue	F	434.9	-	F	>500	-

Source: Iteris, *Traffic Operations Analysis*, December 2011.
I-215 = Interstate 215 SB = southbound
LOS = level of service sec = seconds
NB = northbound V/C = volume-to-capacity ratio

Table 5-8 2040 Alternative 3 Intersection LOS

	Intersection	AM Peak Hour			PM Peak Hour		
		LOS	Delay (sec)	V/C	LOS	Delay (sec)	V/C
1.	Barton Road/La Cadena Drive	D	35.5	0.97	F	163.7	1.49
2.	Barton Road/Grand Terrace Road	A	6.3	0.60	A	5.5	0.60
3.	Barton Road/La Crosse Avenue	Does Not Exist					
4.	Barton Road/I-215 SB Ramps	B	14.6	0.68	B	12.9	0.61
5.	Barton Road/I-215 NB Ramps	A	9.5	0.71	B	13.7	0.83
6.	Barton Road/Michigan Street	Does Not Exist					
7.	Barton Road/Vivienda Avenue	D	45.7	0.91	D	38.8	0.90

Source: Iteris, *Traffic Operations Analysis*, December 2011.
I-215 = Interstate 215 SB = southbound
LOS = level of service sec = seconds
NB = northbound V/C = volume-to-capacity ratio

Table 5-9 2040 Alternative 6 Intersection LOS

	Intersection	AM Peak Hour			PM Peak Hour		
		LOS	**Delay (sec)**	**V/C**	**LOS**	**Delay (sec)**	**V/C**
1.	Barton Road/La Cadena Drive	D	38.8	0.96	F	165.9	1.49
2.	Barton Road/Grand Terrace Road	A	7.6	0.61	A	7.2	0.58
3.	Barton Road/La Crosse Avenue	Does Not Exist					
4.	Barton Road/I-215 SB Ramps	B	20.0	0.68	B	16.3	0.63
5.	Barton Road/I-215 NB Ramps	C	23.3	0.90	B	19.1	0.83
6.	Barton Road/Michigan Street	Does Not Exist					
7.	Barton Road/Vivienda Avenue	D	50.7	0.93	D	50.0	0.95

Source: Iteris, *Traffic Operations Analysis*, December 2011.
I-215 = Interstate 215 SB = southbound
LOS = level of service sec = seconds
NB = northbound V/C = volume-to-capacity ratio

Table 5-10 2040 Modified Alternative 7 Intersection LOS

	Intersection	AM Peak Hour			PM Peak Hour		
		LOS	**Delay (sec)**	**V/C**	**LOS**	**Delay (sec)**	**V/C**
1.	Barton Road/La Cadena Drive	D	42.3	0.97	F	168.9	1.49
2.	Barton Road/Grand Terrace Road	B	10.2	0.62	A	5.4	0.58
3.	Barton Road/La Crosse Avenue	Does Not Exist					
4.	Barton Road/I-215 SB Ramps	A	7.0	-	B	17.0	-
5.	Barton Road/I-215 NB Ramps	B	14.0	0.70	C	30.5	0.95
6.	Barton Road/Michigan Street	C	26.7	0.69	C	23.3	0.55
7.	Barton Road/Vivienda Avenue	D	51.8	0.90	D	45.2	0.97

Sources: Iteris, *Traffic Operations Analysis*, December 2011;AECOM, *Barton Road Interchange Improvement Project Roundabout Analyses*, January 2013.
I-215 = Interstate 215 SB = southbound
LOS = level of service sec = seconds
NB = northbound V/C = volume-to-capacity ratio

- **Level 7 (cont.). Is the project suspected of resulting in higher CO concentrations than those existing within the region at the time of attainment demonstration?**

  NO.

  CO concentrations at the intersections under study will be lower than those reported for the maximum of the intersections analyzed in the CO attainment plan because all of the following conditions, listed in Section 4.7.2 of the CO Protocol, are satisfied:

  - The receptor locations at the intersections under study are at the same distance or farther from the traveled roadway than the receptor locations used in the intersections in the attainment plan. The attainment plan evaluates the CO concentrations at a distance of 10 feet (ft) from the edge of the roadways. The CO Protocol does not permit the modeling of receptor locations closer than this distance.

- The project intersection traffic volumes and geometries are not substantially different from those included in the attainment plan. Also, the intersections under study have less total traffic and the same number of lanes or fewer than the intersections in the attainment plan.
- The assumed meteorology for the intersections under study is the same as the assumed meteorology for the intersections in the attainment plan. Both use the worst-case scenario meteorology settings in the CALINE4 and/or CAL3QHC models.
- As shown in Table 5-11, traffic lane volumes for all approach and departure segments are lower for the intersections under study than those assumed for the intersections in the attainment plan. The intersections in the attainment plan include Wilshire Boulevard/Veteran Avenue, Sunset Boulevard/Highland Avenue, La Cienega Boulevard/Century Boulevard, and Long Beach Boulevard/Imperial Highway. The intersections under study were selected based on their LOS and the proposed project's contribution to the total traffic volumes.
- The percentages of vehicles operating in cold start mode are the same or lower for the intersections under study compared to those used for the intersections in the attainment plan. It is assumed that all vehicles in the intersections are operating in fully warmed-up mode.
- The percentages of heavy-duty gas trucks in the intersections under study are the same or lower than the percentages used for the intersections in the attainment plan analysis. It is assumed that traffic distribution at the intersections under study does not vary from the EMFAC2007 standards.
- Average delay and queue length for each approach are the same or less for the intersections under study compared to those found in the intersections in the attainment plan. The predicted LOS for the intersections under study range from A to F. The LOS for the intersections in the attainment plan are not listed; however, the traffic counts and intersection geometries correspond to an LOS F for three of the four intersections in the attainment plan.
- The background CO concentrations in the area of the intersections under study are 3.7 ppm for 1 hour and 2.3 ppm for 8 hours, which is lower than the background concentrations for the intersections in the attainment plan. These varied from 5.3 to 13.2 ppm for 1 hour and 3.7 to 9.9 ppm for 8 hours.

Table 5-11 Traffic Volume Comparison

Attainment Plan Maximum Volumes	Intersection 1		Intersection 2		Intersection 3		Intersection 4	
	AM	PM	AM	PM	AM	PM	AM	PM
Existing Traffic Volumes	Wilshire Boulevard/ Veteran Avenue		Sunset Boulevard/ Highland Avenue		La Cienega Boulevard/ Century Boulevard		Long Beach Boulevard/ Imperial Highway	
Intersection Total	8,062	7,719	6,614	7,374	6,635	8,674	4,212	5,514
Turn Maximum	384	780	200	263	700	1,187	176	202

Source: Protocol User Workbook (University of California, Davis 1998).

Build Alternative Maximum Volumes	Intersection 1		Intersection 2		Intersection 3		Intersection 4	
	AM	PM	AM	PM	AM	PM	AM	PM
2040 Conditions Alternative 1	Barton Road/ La Cadena Drive		Barton Road/ Grand Terrace Road		Barton Road/ La Crosse Avenue		Barton Road/ I-215 SB Ramps	
Intersection Total	4,244	6,427	1,947	2,640	1,804	2,654	2,766	3,442
Turn Maximum	620	682	190	52	306	360	907	615
2040 Conditions Alternative 3	Barton Road/ La Cadena Drive		Barton Road/ Grand Terrace Road		Barton Road/ La Crosse Avenue		Barton Road/ I-215 SB Ramps	
Intersection Total	4,244	6,427	1,995	2,733	N/A	N/A	3,356	3,787
Turn Maximum	620	682	186	175	N/A	N/A	907	615
2040 Conditions Alternative 6	Barton Road/ La Cadena Drive		Barton Road/ Grand Terrace Road		Barton Road/ La Crosse Avenue		Barton Road/ I-215 SB Ramps	
Intersection Total	4,244	6,427	1,995	2,733	N/A	N/A	3,059	3,786
Turn Maximum	620	682	186	175	N/A	N/A	907	615
2040 Conditions Modified Alternative 7	Barton Road/ La Cadena Drive		Barton Road/ Grand Terrace Road		Barton Road/ La Crosse Avenue		Barton Road/ I-215 SB Ramps	
Intersection Total	4,244	6,427	1,995	2,733	N/A	N/A	3,059	3,786
Turn Maximum	620	682	186	175	N/A	N/A	907	615
Build Alternative Maximum Volumes	**Intersection 5**		**Intersection 6**		**Intersection 7**			
	AM	**PM**	**AM**	**PM**	**AM**	**PM**		
2040 Conditions Alternative 1	Barton Road/ I-215 NB Ramps		Barton Road/ Michigan Street		Barton Road/ Vivienda Avenue			
Intersection Total	4,087	3,736	4,085	5,057	2,795	3,951		
Turn Maximum	868	901	896	616	165	45		
2040 Conditions Alternative 3	Barton Road/ I-215 NB Ramps		Barton Road/ Michigan Street		Barton Road/ Vivienda Avenue			
Intersection Total	4,076	4,726	N/A	N/A	4,197	5,104		
Turn Maximum	868	901	N/A	N/A	896	616		
2040 Conditions Alternative 6	Barton Road/ I-215 NB Ramps		Barton Road/ Michigan Street		Barton Road/ Vivienda Avenue			
Intersection Total	3,677	3,071	N/A	N/A	4,354	5,172		
Turn Maximum	747	700	N/A	N/A	1,042	958		
2040 Conditions Modified Alternative 7	Barton Road/ I-215 NB Ramps		Commerce Way/ Michigan Street		Barton Road/ Vivienda Avenue			
Intersection Total	4,076	4,726	2,202	2,226	4,197	5,104		
Turn Maximum	868	901	809	660	896	616		

Sources: Iteris, *Traffic Operations Analysis*, December 2011; AECOM, *Barton Road Interchange Improvement Project Roundabout Analyses*, January 2013.
I-215 = Interstate 215
NB = northbound
SB = southbound

The project is not expected to result in any concentrations exceeding the 1-hour or 8-hour CO standards. Therefore, a detailed CALINE4 CO hot-spot analysis is not required.

5.4 $PM_{2.5}$/PM_{10} Hot-Spot Analysis

The proposed project is within a nonattainment area for federal $PM_{2.5}$ and PM_{10} standards. Therefore, per 40 CFR, Part 93, analyses are required for conformity purposes. However, the EPA does not require hot-spot analyses, qualitative or quantitative, for projects that are not listed in Section 93.123(b)(1) as an air quality concern. The project does not qualify as a project of air quality concern (POAQC) because of the following reasons:

i) The proposed project is not a new or expanded highway project. The proposed project is an interchange reconstruction project that does not increase the capacity of I-215. This type of project improves freeway interchange operations by reducing traffic congestion and improving merge operations. Based on the *Traffic Operations Analysis* (December 2011) and the *Barton Road Interchange Improvement Project Roundabout Analyses* (January 2013), the proposed Build Alternatives would increase the capacity of Barton Road through the interchange. However, the traffic volumes along Barton Road would not exceed the 125,000 average daily trips threshold for a POAQC. In addition, the total truck percentages along Barton Road would not exceed the 8 percent threshold, and the total truck average annual daily traffic (AADT) would not exceed the 10,000-vehicle threshold for POAQC. The future traffic volumes along I-215 and Barton Road are shown in Table 5-6.

ii) The proposed project does not affect intersections that are at LOS D, E, or F with a significant number of diesel vehicles. Based on the *Traffic Operations Analysis* (December 2011) and *the Barton Road Interchange Improvement Project Roundabout Analyses* (January 2013), the proposed Build Alternatives would reduce the delay and improve the LOS at intersections within the project vicinity. The LOS conditions in the project vicinity with and without the proposed Build Alternatives are shown in Tables 5-7 through 5-10.

iii) The proposed project does not include the construction of a new bus or rail terminal.

iv) The proposed project does not expand an existing bus or rail terminal.

v) The proposed project is not in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The project-level PM hot-spot analysis was presented to SCAG's Transportation Conformity Working Group (TCWG) for discussion and review on August 25, 2009. Per Department Headquarters policy, all nonexempt projects need to go through review by the TCWG. This project was approved and concurred upon by Interagency Consultation at the TCWG meeting as a project not having adverse impacts on air quality, and it meets the requirements of the CAA and 40 CFR 93.116. On May 28, 2013, the TCWG confirmed that the addition of Modified Alternative 7 would not change the project's determination. Copies of the TCWG findings are included in Appendix C.

Therefore, the proposed Build Alternatives meet the CAA requirements and 40 CFR 93.116 without any explicit hot-spot analysis. The proposed Build Alternatives would not create a new, or worsen an existing, PM_{10} or $PM_{2.5}$ violation.

5.5 Qualitative Project-Level Mobile Source Air Toxics Discussion

In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, nonroad mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS)[1]. In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA)[2]. These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM),

[1] http://www.epa.gov/ncea/iris/index.html.

[2] http://www.epa.gov/ttn/atw/nata1999/.

formaldehyde, naphthalene, and polycyclic organic matter (POM). While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule described above requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if vehicle activity (vehicle-miles travelled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050, as shown in Figure 5. The projected reduction in MSAT emissions would be slightly different in California due to the use of the EMFAC2007 emission model in place of the MOBILE6.2 model.

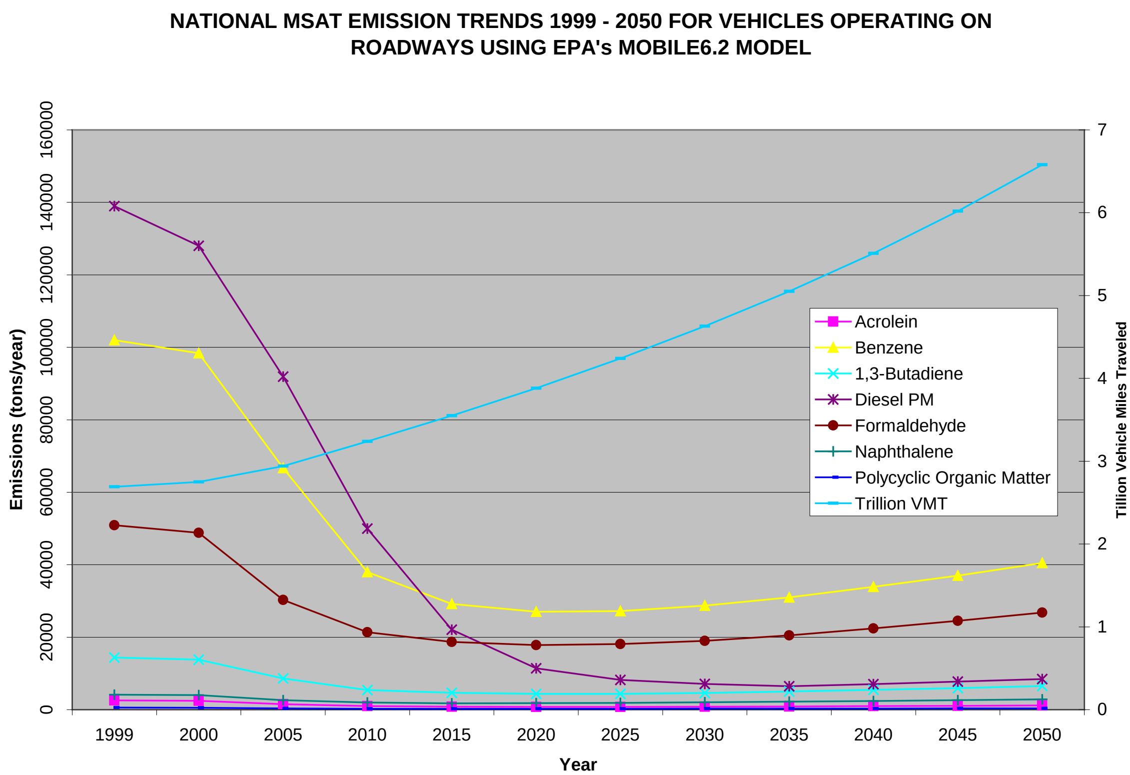

Figure 5 National MSAT Emission Trends

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of the National Environmental Policy Act (NEPA).

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, EPA, Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals. NEPA also requires federal agencies to use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment. NEPA requires, and FHWA is committed to, the examination and avoidance of potential impacts to the natural and human environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, we must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest. The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

In December 2012, the FHWA issued guidance[1] to advise FHWA division offices as to when and how to analyze MSATs in the NEPA process for highways. This document is an update to the guidances released in February 2006 and September 2009. The guidance is described as interim because MSAT science is still evolving. As the science progresses, FHWA will update the guidance. This analysis follows the FHWA guidance.

5.5.1 Information that is Unavailable or Incomplete

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through

1 http://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/aqintguidmem.cfm.

assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. EPA is the lead authority for administering the CAA and its amendments and has specific statutory obligations with respect to hazardous air pollutants and MSAT. EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. EPA maintains IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects".[1] Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations[2] or in the future as vehicle emissions substantially decrease.[3]

The methodologies for forecasting health impacts include: emissions modeling, dispersion modeling, exposure modeling, and final determination of health impacts, with each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 years) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

1 EPA, http://www.epa.gov/iris/.

2 HEI, http://pubs.healtheffects.org/view.php?id=282.

3 HEI, http://pubs.healtheffects.org/view.php?id=306.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways, to determine the portion of time that people are actually exposed at a specific location, and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI[1]. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA[2] and the HEI[3] have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires the EPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld the EPA’s approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to

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1 http://pubs.healtheffects.org/view.php?id=282.

2 http://www.epa.gov/risk/basicinformation.htm#g.

3 http://pubs.healtheffects.org/getfile.php?u=395.

be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

Due to the limitations cited, a discussion such as the example provided in this Appendix (reflecting any local and project-specific circumstances), should be included regarding incomplete or unavailable information in accordance with Council on Environmental Quality regulations [40 CFR 1502.22(b)]. FHWA Headquarters and Resource Center staff members Victoria Martinez ([787] 766-5600, ext. 231), Bruce Bender ([202] 366-2851), and Michael Claggett ([505] 820-2047) are available to provide guidance and technical assistance and support.

5.5.2 Qualitative Project Level MSAT Analysis

For each of the project alternatives, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. The proposed project is an interchange improvement project that increases the capacity of Barton Road. This type of project improves roadway operations by reducing traffic congestion and improving traffic operations. As shown in Tables 5-7 through 5-10, the proposed Build Alternatives would reduce the delay and either improve the LOS or maintain the LOS at the same level as without the project at six out of seven of the study area intersections. In 2040, some Build Alternatives would result in a slight decrease in the a.m. peak-hour LOS at the Barton Road/La Cadena Drive intersection. However, the decrease in LOS from C to D in the a.m. peak hour is considered acceptable from a traffic perspective. In addition, as identified in the *Traffic Operations Analysis*, the City of Colton has included a project to improve this intersection in its Capital Improvement Program.

For all of the future alternatives (no build and build), emissions are projected to be lower than present levels in the design year as a result of the EPA's national control programs, which are projected to reduce MSAT emissions by 72 percent between 1999 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future than they are today.

In summary, under the project Build Alternatives, it is expected that there would be similar or lower MSAT emissions in the study area relative to the No Build Alternative due to the general LOS improvement. On a regional basis, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause regionwide MSAT levels to be substantially lower than they are today.

5.6 Air Quality Management Plan Consistency Analysis

An AQMP describes air pollution control strategies to be taken by counties or regions classified as nonattainment areas. The AQMP's main purpose is to bring the area into compliance with the requirements of federal and State air quality standards. The AQMP uses the assumptions and projections by local planning agencies to determine control strategies for regional compliance status. Therefore, any projects causing a significant impact on air quality would impede the progress of the AQMP. For a project in the Basin to be consistent with the AQMP, the pollutants emitted from the project must not exceed the SCAQMD significance threshold or cause a significant impact on air quality. If feasible mitigation measures can be implemented to reduce the project's impact level from significant to less than significant under CEQA, the project is considered to be consistent with the AQMP.

A consistency analysis determination plays an essential role in local agency project review by linking local planning and unique individual projects to the AQMP in the following ways: it fulfills the CEQA goal of fully informing local agency decision makers of the environmental costs of the project under consideration at a stage early enough to ensure that air quality concerns are fully addressed, and it provides the local agency with ongoing information, assuring local decision makers that they are making real contributions to clean air goals defined in the most current AQMP (adopted in 2003 and updated in 2007). Because the AQMP is based on projections from local General Plans, projects consistent with the local General Plan are considered consistent with the AQMP.

Air quality models are used to demonstrate that the project's emissions will not contribute to the deterioration or impede the progress of air quality goals stated in the AQMP. The air quality models use project-specific data to estimate the quantity of pollutants generated from the implementation of a project. The results for the No Project and the Proposed Project scenarios in the horizon year are compared to the AQMP's air quality projections.

As shown above, the proposed Build Alternatives would not substantially contribute to or cause deterioration of existing air quality; therefore, mitigation measures are not required for the long-term operation of the project. Hence, the proposed Build Alternatives are considered to be consistent with the City of Grand Terrace and the County of San Bernardino General Plans and the SCAG forecast and are therefore consistent with the AQMP.

5.7 Conformity Analysis

Conformity determinations require the analysis of direct and indirect emissions associated with the proposed project and their comparison to the without project condition. If the total of direct and indirect emissions from the project reaches or exceeds the regionally significant thresholds, the Lead Agency must perform a conformity determination to demonstrate the positive conformity of the federal action.

As stated previously, the proposed Build Alternatives are expected to improve traffic flow and reduce delay and congestion. No significant hot spots for CO, $PM_{2.5}$, or PM_{10} would occur as a result of the proposed Build Alternatives.

The project is in the 2012 RTP, which was found to be conforming by the FHWA/ Federal Transit Administration (FTA) on June 5, 2012. The project is also in the 2013 FTIP, which was found to be conforming by the FHWA/FTA on December 14, 2012 (Project ID: SBD31850; Model No. S310. Description*: In Grand Terrace at Barton Road Interchange. Reconstruct overcrossing and ramps with partial cloverleaf configuration; northwest of I-215 work includes the addition of northbound aux lane; local street work to include widening of Barton Road, removal of La Cross Avenue between Vivenda Avenue and Barton Road, replacement with new local road, improvements to Barton Road and Michigan Way/Vivenda Avenue intersection and realignment of Commerce Way*). The Build Alternatives are consistent with the scope of design concept of the FTIP. Therefore, the Build Alternatives are in conformance with the SIP. The project will also comply with all SCAQMD requirements.

5.8 Cumulative Impacts Relating to Air Quality

Cumulative projects include local development as well as general growth within the project area. However, as with most development, the greatest source of emissions is from vehicular traffic that can travel well out of the local area. Therefore, from an air quality standpoint, the cumulative analysis would extend beyond any local projects and, when wind patterns are considered, would cover an even larger area.

Accordingly, the cumulative analysis for a project's air quality analysis must be regional by nature.

Construction and operation of cumulative projects would further degrade the local air quality, as well as the air quality of the Basin. Air quality would be temporarily degraded during construction activities that occur separately or simultaneously.

However, the greatest potential for a cumulative impact on the regional air quality would be the incremental addition of pollutants from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with construction of these projects. Note that the Build Alternatives are transportation improvements and not a direct trip generator.

With respect to operational emissions that may contribute to exceeding State and federal standards, a CO and $PM_{2.5}/PM_{10}$ screening analysis was performed. The results of this analysis illustrate that localized levels would not violate air quality standards and, therefore, do not present an adverse cumulative impact. In addition, due to the Build Alternatives' relatively small scale, the contribution to the Basin air emissions is not cumulatively considerable.

Chapter 6 Minimization Measures

The following measures will be implemented during construction activities.

AQ-1 During clearing, grading, earthmoving, or excavation operations, excessive fugitive dust emissions will be controlled by regular watering or other dust preventive measures using the following procedures, as specified in the South Coast Air Quality Management District (SCAQMD) Rule 403. All material excavated or graded will be sufficiently watered to prevent excessive amounts of dust. Watering will occur at least twice daily with complete coverage, preferably in the late morning and after work is done for the day. All material transported on site or off site will be either sufficiently watered or securely covered to prevent excessive amounts of dust. The area disturbed by clearing, grading, earth moving, or excavation operations will be minimized so as to prevent excessive amounts of dust. These control techniques will be indicated in project specifications. Visible dust beyond the property line emanating from the project will be prevented to the maximum extent feasible.

AQ-2 Project grading plans will show the duration of construction. Ozone precursor emissions from construction equipment vehicles will be controlled by maintaining equipment engines in good condition and in proper tune per manufacturer's specifications.

AQ-3 All trucks that are to haul excavated or graded material on site will comply with State Vehicle Code Section 23114, with special attention to Sections 23114(b)(F), (e)(2), and (e)(4), as amended, regarding the prevention of such material spilling onto public streets and roads.

AQ-4 The contractor will adhere to Caltrans Standard Specifications for Construction (Sections 14.9-02 and 14-9.03).

AQ-5 Should the project geologist determine that asbestos-containing materials (ACMs) are present at the project study area during final inspection prior to construction, the appropriate methods will be implemented to remove ACMs.

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Chapter 7 References

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Institute of Transportation Studies-University of California Davis, *Transportation Project-Level Carbon Monoxide Protocol*, December 1997.

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Western Regional Climatic Center, http://www.wrcc.dri.edu .

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Appendix A CO Protocol

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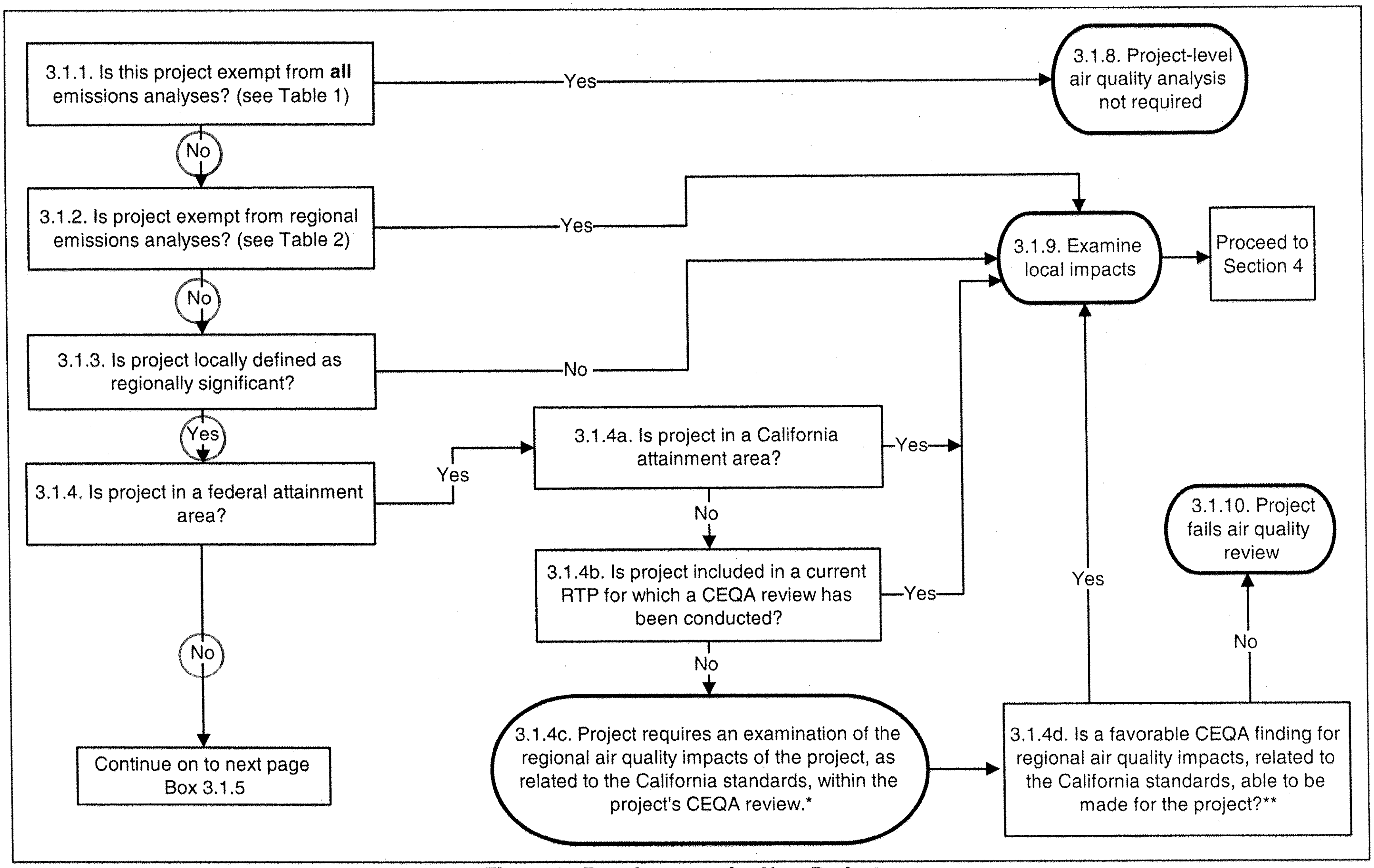


Figure 1. Requirements for New Projects

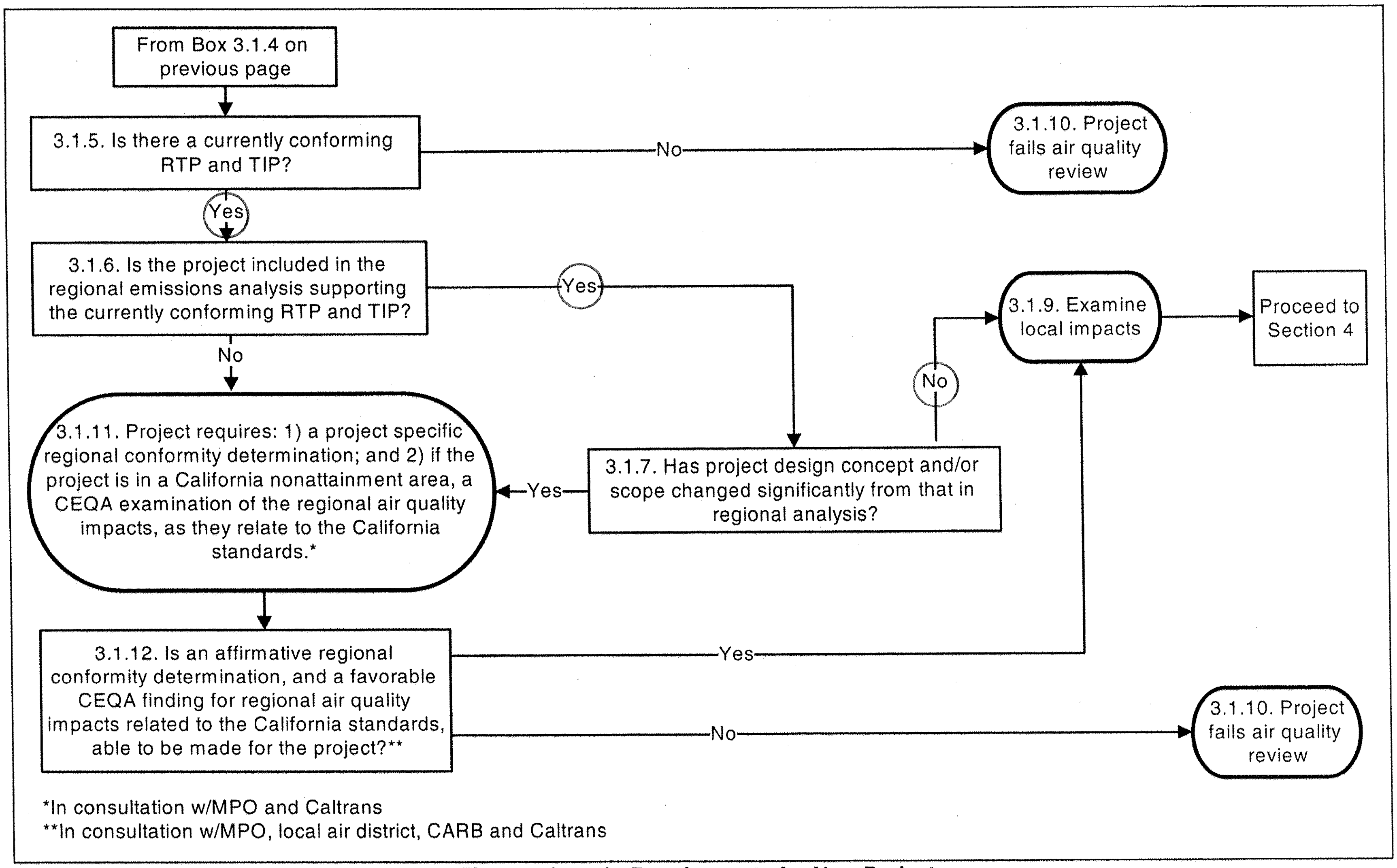


Figure 1 (cont.). Requirements for New Projects

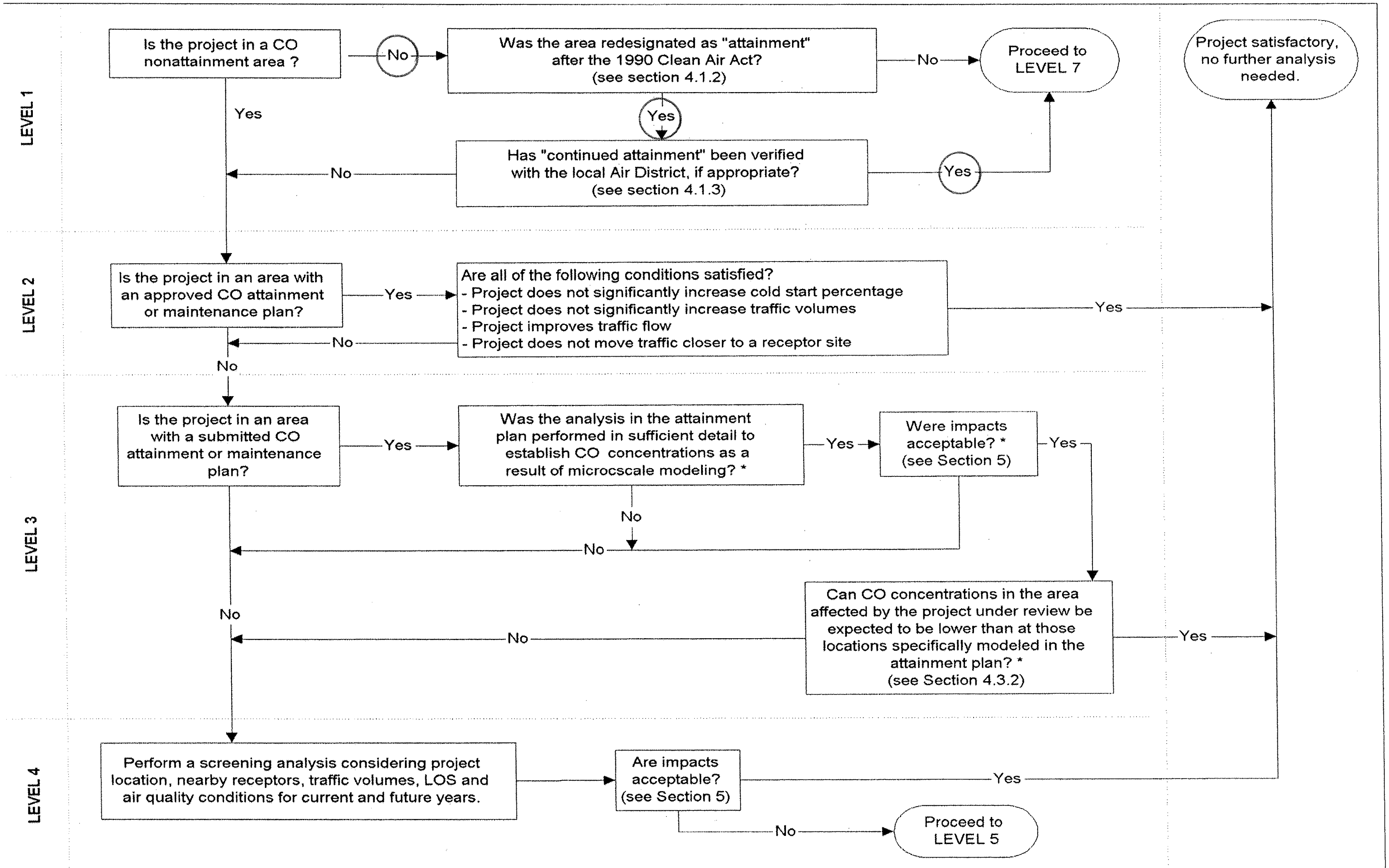
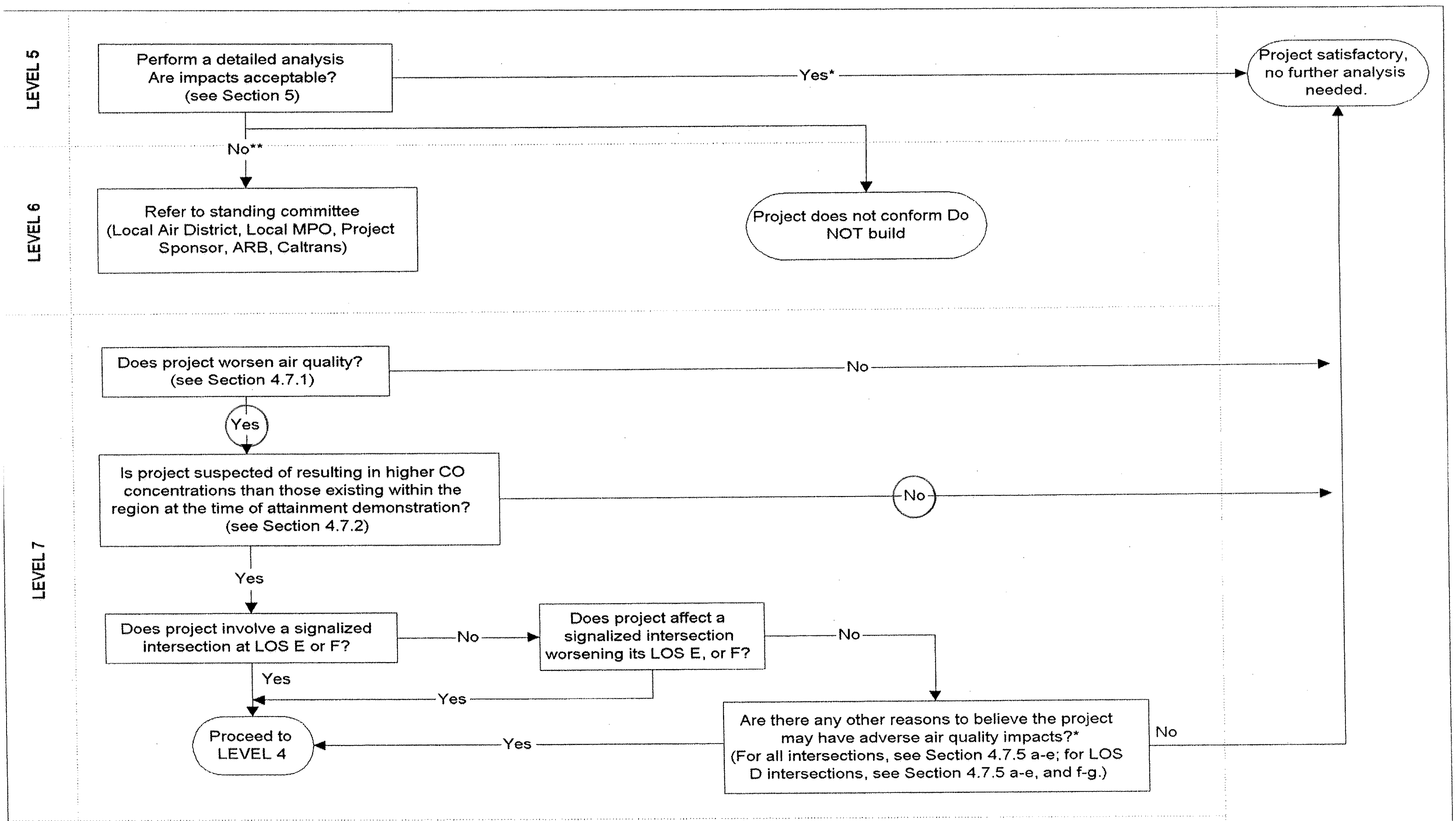


Figure 3. Local CO Analysis



*Consultation with MPO and Local Air District required in addition to normal NEPA/CEQA requirements
**Consultation with MPO, Local Air District, CARB and Caltrans (District & Headquarters) required in addition to normal NEPA/CEQA requirements

Figure 3 (cont.). Local CO Analysis

Appendix B 2012 RTP and 2013 FTIP Project Listings

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County	System	Lead Agency	RTP ID	FTIP ID	Begin PM	End PM	Route Number	Route Name	From	To	Description	Roadway Segment: Route Name	Roadway Segment: Length	Roadway Segment: From	Roadway Segment: To	Roadway Segment: Description	Roadway Segment: Existing Lanes	Roadway Segment: Proposed Lanes	Transit Segment: Route	Additional Details	RTP Baseline	2008	2012	2014	2018	2020	2023	2030	2035
San Bernardino	State Highway	CHINO	4A01384				83	SR-83 (Euclid)	Merril Av	Kimball Av	Widen from 2 to 4 lanes each dir (3.9-2.8)									Existing Configuration: 1 lane each direction						X			
San Bernardino	State Highway	CALTRANS	4M07035				138	SR-138	SR-18	PHELAN RD	PHASE II: WIDEN 2 TO 4 LANES FROM SR-18 TO PHELAN RD (PHASE I PHELAN RD TO I-15 IN RTIP#34011)									WIDEN TO 4 LANES (EA 3401U - PHASE 2) SR-18 TO PHELAN RD. BEG PM (LA 69.3) TO (LA 75.0) & (SBD 0.0) TO (SBD 2.9) SR-18 limit is in LA County							X		
San Bernardino	State Highway	CALTRANS	34011	34011	2.9	15.2	138				NEAR WRIGHTWOOD FROM PHELAN RD TO I-15 WIDEN FROM 2 TO 4 LANES (EA3401U)	RTE. 138	12.3 MILES	I-15	PHELAN RD.	WIDEN FROM 2-4 LANES	2	4							X				
San Bernardino	State Highway	SAN BERNARDINO COUNTY	4A01385				142	SR-142 (Chino Hills Pkwy)	Carbon Canyon Rd	Pipeline Dr	Widen from 2 to 3 lanes each dir (PM 2.0-5.5)															X			
San Bernardino	State Highway	SANBAG	4M07007				210	I-210 @ Baseline			Interchange reconfiguration/new interchange									bridge widening from 4 to 6 lanes and ramp improvements						X			
San Bernardino	State Highway	SANBAG	4M01047				210	I-210 @ Del Rosa			Interchange reconfiguration/new interchange															X			
San Bernardino	State Highway	SANBAG	4M01049				210	I-210 @ Waterman			Interchange reconfiguration/new interchange															X			
San Bernardino	State Highway	CALTRANS	4M01005				210	SR-210	I-215	I-10	Add 1 MF lane and 1 HOV lane each direction and widen UC's (PM 22.0-33.2)															X			
San Bernardino	State Highway	HIGHLAND	4M0801				210	SR-210	VICTORIA AVE	VICTORIA AVE.	CONSTRUCT NEW DIAMOND IC AT VICTORIA AVE WITH 2 LANES EACH RAMP AND MODIFICATIONS TO ARDEN AVE IC																	X	
San Bernardino	State Highway	SANBAG	4M1007	20110110	19.4	20.2	210				CONSTRUCT NEW FULL-SERVICE INTERCHANGE WITH DIAMOND CONFIGURATION AT SR-210 AND PEPPER AVENUE IN THE CITY OF RIALTO. ADD WB AND EB ACCEL AND DECEL LANES AND LOCAL STREET IMPROVEMENTS (CONSTRUCT 4 LANES ON PEPPER AVE FROM HIGHLAND AVE TO 160 FT SOUTH OF SR-210).	SR210	n/a	AT PEPPER AVE.	n/a	ALSO CONSTRUCT 4 LANES - 2 IN EACH DIRECTION FROM PEPPER TO HIGHLAND 160' SOUTH OF SR210	n/a	n/a							X				
San Bernardino	State Highway	HIGHLAND	4M01003	2011154	30	30.75	210				SR 210 AT 5TH ST/GREENSPOT RD; ON AND OFF RAMPS WIDENING; ADD LANES (.45) ORIGINALLY PORTION OF PROJECT 200429 PROJECT ADDS 1 LANE N/B TO EXISTING 2 LANES AND ADDING 2 LANES TO EXISTING TO LANES TO N/B OFF RAMP AND ADDING 1 LANE TO EXISTING 2 LANE S/B OFF RAMP	SR210	ABOUT 0.8 MILES ALL TOTAL	5TH ST	GREENSPOT	WIDEN RAMPS	2	4							X				
San Bernardino	State Highway	SANBAG	4M01005	20111625	26.7	33.2	210				SR210 LANE ADDITION - ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE(S/B). TO I-10 (REDLANDS) INCLUDES AUX. LANES BETWEEN HIGHLAND AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST. S/B ON RAMP	210	6.5 MILES	HIGHLAND AVE	I-10	ADDING 1 LANE IN EACH DIRECTION	4	6								X			
San Bernardino	State Highway	VARIOUS AGENCIES	20620	20620	0	22.8	210				UPLAND TO SAN BERNARDINO FROM LA CO LINE TO RTE 215 - 8 LN FREEWAY INCLUDING 2 HOV LNS (6+2)-210 CORR. W/AUX LNS THRUOUT SEGS. 9-11(SEG.11 INCL CONNECTOR BETWEEN 210 & 215 (MORE)	210	22.8 MILES	LA CO. LINE	RTE. 215	8 LN FREEWAY INCLUDING 2 HOVE LNS (6+2)-210 CORR. W/AUX LNS THRUOUT SEGS. 9-11(SEG.11 INCL CONNECTOR BETWEEN 210 & 215 (MORE)	n/a	8			X		X						
San Bernardino	State Highway	HIGHLAND	4M01003	201153	30	30.75	210				WIDEN 5TH ST FROM CITY CRK TO SR210; RESTRIPE 5TH ST FROM 4-6LNS BTW CHURCH AVE & SR210; RESTRIPE 210 UNDERCROSSING 4-5LNS BTW RAMPS WITH ADD. TURN LN. CONSTRUCT TRUCK ACCL. LN ON SB SR210 ON-RAMP AND FWY MAINLINE INCLUDING WIDENING OF EXISTING FWY BRIDGE	5TH ST	N/A	210 WEST SIDE RAMPS	210 EAST SIDE RAMPS	RESTRIPE TO 5 LANES WITH ADDITIONAL TRUCK TURN LN	4	5							X				
San Bernardino	State Highway	HIGHLAND	4M01003	201153	30	30.75	210				WIDEN 5TH ST FROM CITY CRK TO SR210; RESTRIPE 5TH ST FROM 4-6LNS BTW CHURCH AVE & SR210; RESTRIPE 210 UNDERCROSSING 4-5LNS BTW RAMPS WITH ADD. TURN LN. CONSTRUCT TRUCK ACCL. LN ON SB SR210 ON-RAMP AND FWY MAINLINE INCLUDING WIDENING OF EXISTING FWY BRIDGE	5TH ST	N/A	CHURCH AVE	SR 210	RESTRIPE TO ADD LANES	4	6							X				
San Bernardino	State Highway	HIGHLAND	4M01003	201153	30	30.75	210				WIDEN 5TH ST FROM CITY CRK TO SR210; RESTRIPE 5TH ST FROM 4-6LNS BTW CHURCH AVE & SR210; RESTRIPE 210 UNDERCROSSING 4-5LNS BTW RAMPS WITH ADD. TURN LN. CONSTRUCT TRUCK ACCL. LN ON SB SR210 ON-RAMP AND FWY MAINLINE INCLUDING WIDENING OF EXISTING FWY BRIDGE	SB SR210 ON-RAMP	0.6 MILES	START OF ON-RAMP	375 FT MERGE TO SINGLE ON-RAMP, ON-RAMP CONTINUES TO MERGE WITH MAINLINE	CONSTRUCT TRUCK ACCL. LN ON SB SR210 ON-RAMP, EXTEND EXISTING ON RAMP OVER BRIDGE STRUCTURES SOUTH OF 5TH ST.	1	2							X				
San Bernardino	State Highway	HIGHLAND	4M01003	201153	30	30.75	210				WIDEN 5TH ST FROM CITY CRK TO SR210; RESTRIPE 5TH ST FROM 4-6LNS BTW CHURCH AVE & SR210; RESTRIPE 210 UNDERCROSSING 4-5LNS BTW RAMPS WITH ADD. TURN LN. CONSTRUCT TRUCK ACCL. LN ON SB SR210 ON-RAMP AND FWY MAINLINE INCLUDING WIDENING OF EXISTING FWY BRIDGE	SR 210	ABOUT 0.3 MILES	5TH	5TH	RAMP WIDENING	2	3							X				
San Bernardino	State Highway	CALTRANS	4H01008				215	I-215	SR-210	I-15	Add 1 HOV lane each direction (PM 9.5-18.0)																	X	
San Bernardino	State Highway	CALTRANS	4M01003				215	I-215	SR-30	I-15	Add 1 MF lane each direction (10.0-18.0)																	X	
San Bernardino	State Highway	SANBAG	4M01044				215	I-215 @ Palm			Interchange reconfiguration/new interchange																		X
San Bernardino	State Highway	SANBAG	4M01045				215	I-215 @ Pepper/Linden			Interchange reconfiguration/new interchange																		X
San Bernardino	State Highway	SAN BERNARDINO, CITY OF	SBD59204	SBD59204	11.6	1	215				I-215 AT UNIVERSITY PARKWAY INTERCHANGE - CONSTRUCT SOUTHBOUND UNIVERSITY PARKWAY -INTERCHANGE RECONFIGURATION AND AUX. LANE ON EACH SIDE, NEW RAMP	I-215	n/a	UNIVERSITY	UNIVERSITY	INTERCHANGE RECONFIGURATION	4	4							X				
San Bernardino	State Highway	SANBAG	200614	200614	21.4	5.1	215				I-215 BI-COUNTY HOV LANE GAP CLOSURE PROJECT- ADD 1 HOV LANE IN EACH DIRECTION FROM SPRUCE ST. ON RIV 91 TO ORANGE SHOW RD;(ALSO INCLUDES RTP 4M0803 (STIP 2010 $24881 RCTC and $45089 SANBAG)	n/a	n/a	n/a	n/a	n/a	n/a	n/a			X			X					
San Bernardino	State Highway	VARIOUS AGENCIES	713	713	4.1	10.1	215				I-215 CORRIDOR NORTH - IN SAN BERNARDINO, ON I-215 FROM RTE 10 TO RTE 210 - ADD 2 HOV & 2 MIXED FLOW LNS (1 IN EA. DIR.) AND OPERATIONAL IMP INCLUDING AUX LANES AND BRAIDED RAMP	I-215	n/a	I-10	SR210	WIDEN MIXED FLOW PLUS HOV	3	6			X		X						
San Bernardino	State Highway	SANBAG	SBD31850	SBD31850	0.58	1.66	215				IN GRAND TERRACE AT I-215 BARTON ROAD INTERCHANGE RECONSTRUCT OC AND RAMPS WITH PARTIAL CLOVERLEAF CONFIGURATION NW OF I-215 WORK INCL ADD OF NB AUX LN,LOCAL STREET WORK TO INCL WIDENING OF BARTON RD, REMOVAL OF LA CROSSE AVE. BETWEEN VIVENDA AVE & BARTON RD, REPLACEMENT W/ NEW LOCAL ROAD, IMPROVEMENTS TO THE BARTON RD AND MICHIGAN WAY/VIVENDA AVE INTERSECTION AND REALIGNMENT OF COMMERCE WAY	I-215	1.08	JUST WEST OF DEBERRY STREET	JUST WEST OF NEWPORT ROAD	RECONSTRUCT BARTON RD. I/C WITH MODIFIED PARTIAL CLOVERLEAF CONFG. CONSTRUCT O/C ADD APPROX 1,500' AUX LN AT NB EXIT;CONSTRUCT NEW 1.000' 4 LANE SECTION OF COMMERCE WAY;ADD 2 LANES TO 3200 FT. SECTI	3	3			X				X				
San Bernardino	State Highway	YUCCA VALLEY	4A01386				247	SR-247 (Old Woman Springs Rd)	North of SR-62	Griffith Rd	Widen from 1 to 2 lanes each dir (EA:34430) (PM															X			
San Bernardino	State Highway	VICTORVILLE	4A07141				395	US 395	Aqueduct		Widen US 395 at Aqueduct from 4 to 6 lanes									Exist Config: 2 lanes each direction						X			

2013 Federal Transportation Improvement Program

San Bernardino County
State Highway
Including Amendments 1-3 and 5-8
(In $000`s)

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
20111625	San Bernardino	SCAB		4M01005	CAX63	210	26.7	33.2	S	NON-EXEMPT	0
Description:							PTC	143,939	Agency	SANBAG	

SR210 LANE ADDITION - ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE(S/B). TO I-10 (REDLANDS) INCLUDES AUX. LANES BETWEEN HIGHLAND AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST. S/B ON RAMP

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
STP LOCAL			43,523	43,523						43,523		43,523
SBD CO MEASURE I	11,870	1,500	43,523	56,893	3,561			9,809		43,523		56,893
SURFACE TRANS PROG - RIP			43,523	43,523						43,523		43,523
20111625 Total	11,870	1,500	130,569	143,939	3,561			9,809		130,569		143,939

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
2011154	San Bernardino	SCAB		4M01003	CAX76	210	30	30.75	S	NON-EXEMPT	1
Description:							PTC	6,225	Agency	HIGHLAND	

SR 210 AT 5TH ST/GREENSPOT RD; ON AND OFF RAMPS WIDENING; ADD LANES (.45) ORIGINALLY PORTION OF PROJECT 200429 PROJECT ADDS 1 LANE N/B TO EXISTING 2 LANES AND ADDING 2 LANES TO EXISTING TO LANES TO N/B OFF RAMP AND ADDING 1 LANE TO EXISTING 2 LANE S/B OFF RAMP

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
CITY FUNDS	1,000		5,225	6,225				1,000	5,225			6,225
2011154 Total	1,000		5,225	6,225				1,000	5,225			6,225

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
201153	San Bernardino	SCAB		4M01003	NCR88	210	30	30.75	S	NON-EXEMPT	0
Description:							PTC	5,070	Agency	HIGHLAND	

WIDEN 5TH ST FROM CITY CRK TO SR210; RESTRIPE 5TH ST FROM 4-6LNS BTW CHURCH AVE & SR210; RESTRIPE 210 UNDERCROSSING 4-5LNS BTW RAMPS WITH ADD. TURN LN. CONSTRUCT TRUCK ACCL. LN ON SB SR210 ON-RAMP AND FWY MAINLINE INCLUDING WIDENING OF EXISTING FWY BRIDGE

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
PRIVATE FUNDS	507		4,563	5,070	507			4,563				5,070
201153 Total	507		4,563	5,070	507			4,563				5,070

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
SBD31850	San Bernardino	SCAB		SBD31850	CARH3	215	.58	1.66	S	NON-EXEMPT	8
Description:							PTC	78,794	Agency	VARIOUS AGENCIES	

IN GRAND TERRACE @ I-215 BARTON RD I/C RECONSTRUCT OC & RAMPS W/ PARTIAL CLOVERLEAF CONFIG. NW OF I-215 WORK INCL ADD OF NB AUX LN.LOCAL ST WORK TO INCL WIDENING OF BARTON RD, REMOVAL OF LA CROSSE AVE. BETWN VIVENDA AVE & BARTON RD, REPLACEMT W/ NEW LOCAL RD, IMPROVEMTS TO BARTON RD & MICHIGAN WAY/VIVENDA AVE INTERSECTION & REALIGNMT OF COMMERCE WY (Toll credits used for Demo in FY12/13 for $300

Fund	ENG	R/W	CON	Total	Prior	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	Total
DEMO-SAFETEA-LU		1,500		1,500		1,500						1,500
SECTION 112	1,980			1,980		1,980						1,980
SECTION 115	501			501		501						501
STP LOCAL			10,632	10,632					10,632			10,632
SBD CO MEASURE I	2,183	3,436	18,551	24,170	832	1,351	3,436		18,551			24,170
STIP ADVANCE CON-RIP		17,400	22,611	40,011			17,400		22,611			40,011
SBD31850 Total	4,664	22,336	51,794	78,794	832	5,332	20,836		51,794			78,794

Appendix C TCWG Findings

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TCWG Project-Level
PM Hot Spot Analysis Project Lists

Review of PM Hot Spot Interagency Review Forms

August 2009	Determination
RIV011210	Not a POAQC - Hot Spot analysis not required.
SBD31850	Not a POAQC - Hot Spot analysis not required.
SBD_OC2500	A POAQC - Hot Spot analysis required.
SBD20040826 and SBD200619	

PROGRAMS & PROJECTS
Compass Blueprint
Clean Cities
Environment
Air Quality
Energy
Environmental Impact Reports
Environmental Justice
Intergovernmental Review
Solid & Hazardous Waste Management
Water
Housing
Local Profiles
Overall Work Program
Regional Comprehensive Plan
Federal Transportation Improvement Program
Regional Transportation Plan
State of the Region
Strategic Plan
Transportation
REGIONAL COUNCIL
Districts & Representatives
Executive Officers
Governing Structure
LEGISLATION
California Legislative Matrix
State & Federal Programs
Find Your Representative
DATA SERVICES
Demographics, Trends & Statistics
Emergency Information Network
Goods Movement Database
Integrated Growth Forecast
Mapping & GIS
Transportation Modeling
Scenario Planning Model (SPM)
MEDIA & COMMUNICATIONS
Press Room
Publications & Reports
SCAG-TV Streaming Videos

TCWG Project-Level PM Hot Spot Analysis Project Lists

Review of PM Hot Spot Interagency Review Forms

May 2013	Determination
SBD31850 Memo	Reaffirmed Not a POAQC - Hot Spot Analysis Not Required (EPA concurrence via email before the meeting)
SCAG015	Not a POAQC - Hot Spot Analysis Not Required (EPA concurrence via email before the meeting)
ORA 112622	Not a POAQC - Hot Spot Analysis Not Required (TCWG concurrence via email before the meeting)

Appendix D Construction and Regional Emission Calculations

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I-215/Barton Road Regional Emissions

Scenario	VMT	VHT	Avg Speed
Existing	2,602,749	71,498	36.4031
Alt 1	3,677,227	103,183	35.6379
Alt 3	3,682,867	103,301	35.6518
Alt 6	3,683,833	103,239	35.6826
Mod Alt 7	3,679,674	103,108	35.6876

Existing

Pollutant	Emissions factor (g/mile)	Emissions (lb/day)
CO	2.613	14,993
ROG	0.132	757
NOx	0.797	4,573
SOx	0.004	23
PM10	0.048	275
PM2.5	0.032	184
CO2	413.186	2,370,854

Alt 1	2040		
Pollutant	factor (g/mile)	Emissions (lb/day)	Increase over Existing (lb/day)
CO	0.744	6,031	-8,962
ROG	0.036	292	-466
NOx	0.184	1,492	-3,082
SOx	0.004	32	9
PM10	0.041	332	57
PM2.5	0.025	203	19
CO2	437.050	3,543,060	1,172,206

Alt 3	**2040**		**Project**	**Project**	
	Emissions		**Increase over**	**Increase over**	**SCAQMD**
	factor	**Emissions**	**No Build**	**Existing**	**Thresholds**
Pollutant	**(g/mile)**	**(lb/day)**	**(lb/day)**	**(lb/day)**	**(lbs/day)**
CO	0.744	6,041	9	-8,953	550
ROG	0.036	292	0	-465	55
NOx	0.184	1,494	2	-3,079	55
SOx	0.004	32	0	10	150
PM10	0.041	333	1	57	150
PM2.5	0.025	203	0	19	55
CO2	437.050	3,548,494	5,434	1,177,640	

Alt 6	**2040**			**Project**	
	Emissions		**Project**	**Increase over**	**SCAQMD**
	factor	**Emissions**	**Increase**	**Existing**	**Thresholds**
Pollutant	**(g/mile)**	**(lb/day)**	**(lb/day)**	**(lb/day)**	**(lbs/day)**
CO	0.744	6,042	11	-8,951	550
ROG	0.036	292	1	-465	55
NOx	0.184	1,494	3	-3,079	55
SOx	0.004	32	0	10	150
PM10	0.041	333	1	58	150
PM2.5	0.025	203	0	19	55
CO2	437.050	3,549,425	6,365	1,178,571	

Mod Alt 7	**2040**			**Project**	
	Emissions		**Project**	**Increase over**	**SCAQMD**
	factor	**Emissions**	**Increase**	**Existing**	**Thresholds**
Pollutant	**(g/mile)**	**(lb/day)**	**(lb/day)**	**(lb/day)**	**(lbs/day)**
CO	0.744	6,035	4	-8,958	550
ROG	0.036	292	0	-465	55
NOx	0.184	1,493	1	-3,081	55
SOx	0.004	32	0	9	150
PM10	0.041	333	0	57	150
PM2.5	0.025	203	0	19	55
CO2	437.050	3,545,418	2,358	1,174,564	

Road Construction Emissions Model, Version 7.1.3

Emission Estimates for -> I-215/Barton Road				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	2.7	14.6	23.9	51.2	1.2	50.0	11.5	1.1	10.4	2,685.9
Grading/Excavation	18.5	88.8	253.5	60.0	10.0	50.0	19.3	8.9	10.4	27,848.4
Drainage/Utilities/Sub-Grade	12.1	54.5	122.5	56.2	6.2	50.0	16.1	5.7	10.4	10,965.1
Paving	2.9	14.3	22.3	1.5	1.5	-	1.3	1.3	-	2,522.1
Maximum (pounds/day)	18.5	88.8	253.5	60.0	10.0	50.0	19.3	8.9	10.4	27,848.4
Total (tons/construction project)	3.3	15.8	41.4	13.0	1.8	11.2	3.9	1.6	2.3	4,361.6

Notes: Project Start Year -> 2014
Project Length (months) -> 24
Total Project Area (acres) -> 40
Maximum Area Disturbed/Day (acres) -> 5
Total Soil Imported/Exported (yd^3/day)-> 1000

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.

Emission Estimates for -> I-215/Barton Road				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	1.2	6.6	10.9	23.3	0.5	22.7	5.2	0.5	4.7	1,220.9
Grading/Excavation	8.4	40.4	115.2	27.3	4.6	22.7	8.8	4.0	4.7	12,658.4
Drainage/Utilities/Sub-Grade	5.5	24.8	55.7	25.5	2.8	22.7	7.3	2.6	4.7	4,984.1
Paving	1.3	6.5	10.1	0.7	0.7	-	0.6	0.6	-	1,146.4
Maximum (kilograms/day)	8.4	40.4	115.2	27.3	4.6	22.7	8.8	4.0	4.7	12,658.4
Total (megagrams/construction project)	3.0	14.4	37.6	11.8	1.6	10.2	3.6	1.4	2.1	3,956.1

Notes: Project Start Year -> 2014
Project Length (months) -> 24
Total Project Area (hectares) -> 16
Maximum Area Disturbed/Day (hectares) -> 2
Total Soil Imported/Exported ($meters^3$/day)-> 765

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sume of exhaust and fugitive dust emissions shown in columns K and L.

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Appendix E Greenhouse Gas Emissions

As discussed in Section 2.2, the purpose of the proposed project is to alleviate existing and future traffic congestion at the Interstate 215 (I-215)/Barton Road ramps during peak hours. The proposed project will not generate new vehicular traffic trips since it will not construct new homes or businesses. However, there is a possibility that some traffic currently utilizing other routes would be attracted to use the new facility, thus resulting in slight increases in vehicle miles traveled (VMT). The impact of greenhouse gas (GHG) emissions is a global rather than a local issue. However, due to lack of global models for project-level analyses, the impact of the Build Alternative on GHG emissions was calculated using traffic data for the project region.

The traffic study (Iteris, January 2012) calculated the VMT and vehicle hours traveled (VHT) for all of the vehicle trips within the project region. This traffic data, in conjunction with the EMFAC2007 emission model, was used to calculate the carbon dioxide (CO_2) emissions for the 2040 regional conditions.

The results of the modeling were used to calculate the CO_2 emissions listed in Table E-1. The CO_2 emissions numbers listed in Table E-1 are only useful for a comparison between project alternatives. The numbers are not necessarily an accurate reflection of what the true CO_2 emissions will be because CO_2 emissions are dependent on other factors that are not part of the model, such as the fuel mix (EMFAC model emission rates are only for direct engine-out CO_2 emissions, not full fuel cycle; fuel cycle emission rates can vary dramatically depending on the amount of additives like ethanol and the source of the fuel components), rate of acceleration, and the aerodynamics and efficiency of the vehicles. As shown in Table E-1, the proposed project would result in a small increase (less than 1 percent) in CO_2 emissions within the region when compared to the without project conditions.

Table E-1 Change in Regional CO_2 Emissions

Alternative	Daily CO_2 Emissions (lbs/day)	Increase from Existing (lbs/day)	Increase from No Project (lbs/day)	Percent Increase from No Project
Existing	2,370,854	-	-	
2040 No Build	3,543,060	1,172,206	-	-
2040 Alternative 3	3,548,494	1,177,640	5,434	0.15
2040 Alternative 6	3,549,425	1,178,571	6,365	0.18
2040 Modified Alternative 7	3,545,418	1,174,564	2,358	0.07

Source: LSA Associates, Inc., January 2012.
CO_2 = carbon dioxide
lbs/day = pounds per day

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Appendix F Experience and Preparers

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TUNG-CHEN CHUNG, PH.D.

PRINCIPAL/
DIRECTOR OF ACOUSTICAL AND AIR QUALITY SERVICES

EXPERTISE

Community and Transportation Noise Studies
Room Acoustics Design and Analysis
Interior Noise and Vibration Isolation Studies
Air Quality Studies
Expert Witness Testimony

EDUCATION

University of California, Los Angeles, Ph.D., Mechanical Engineering, 1991.
University of California, Los Angeles, Engineer Degree in Mechanical Engineering, 1985.
University of Mississippi, Oxford, MS, Mechanical Engineering, 1981.
National Tsing-Hua University, Taiwan, BS, Mechanical Engineering, 1978.
University of California, Irvine, Business Development Techniques for High Value Contracts, 1994.
University of California, Irvine, UAM Regional Air Quality Modeling, 1992.
University of Louisville, Kentucky, FHWA Highway Noise Analysis Certificate, 1990.
BBN/San Francisco, Noise Control for Building and Manufacturing Plants Certificate, 1987.

PROFESSIONAL REGISTRATIONS/AFFILIATIONS

Institute of Noise Control Engineering, Board Certified Member
Certified Acoustical Consultant, County of Orange
Certified Acoustical Consultant, County of San Diego
American Physics Society
Acoustical Society of America
S.C. Chinese-American Environmental Protection Association

PROFESSIONAL EXPERIENCE

Director of Acoustical and Air Quality Services, LSA Associates, Inc., Environmental Planning and Traffic Engineering, Irvine, California, 1997–present.

Director of Technical Services, The Planning Center, Planning and Environmental Impact Report Consultants, Newport Beach, California, 1995–1997.

Section Manager, MBA, Environmental and Planning Consultants, Santa Ana/Irvine, California, 1989–1995. Manager for acoustic and air quality analysis.

Acoustical Specialist, County of Orange Environmental Management Agency, 1989.

Smith, Fause & Associates, Inc., Acoustical Consulting, Project Manager, 1986–1989.

PRINCIPAL PROFESSIONAL RESPONSIBILITIES

Dr. Chung performed more than 750 California Environmental Quality Act/National Environmental Policy Act- (CEQA/NEPA) related and stand-alone noise studies for community and transportation noise analyses, including field measurement, modeling, and data analysis. Typical noise analysis includes construction, vehicular traffic, and long-term stationary-source operations. Others include rail, airport, and shooting range noise impact analysis.

Dr. Chung performed more than 550 air quality studies for projects such as transportation facilities, landfills, office buildings, and ocean bay enhancement/sediment management projects.

Dr. Chung completed the design and analysis of architectural room acoustics (interior configuration and absorption required for proper room use) for more than 20 theaters, studios, workshop places, and convention centers.

Dr. Chung performed more than 60 acoustical analyses on building interior sound and vibration isolation for hospitals, apartment complexes, office buildings, performing arts centers, schools, etc., throughout the United States.

PUBLICATIONS/PRESENTATIONS

Noise Standards, Control, and Market Outlook, Chinese American Professional Society Technical Conference, Environmental Forum, September 7, 1996.

Noise Impacts on People and Wildlife and Governmental Regulations. University of Southern California Environmental Engineering Seminar Guest Speaker, January 31, 1994.

Noise and the Environment—Impacts and Regulations, Chinese American Professional Society Annual Conference, Environmental Forum, June 23, 1993.

Defect of the Kolmogorov Power Laws for Turbulence Using the Wiener-Hermite Expansion, PhD dissertation, December 1991.

Defect of the Five-Thirds Law Using the Wiener-Hermite Expansion, *Journal of Statistical Physics*, Volume 55, June 1989.

PROFESSIONAL EXPERIENCE

Freeway/Highway Project Experience

State Route 91 (SR-91) High-Occupancy Vehicle (HOV) Lane Addition, Caltrans District 12, Orange/Los Angeles County, CA. Dr. Chung conducted a noise impact analysis for this project along SR-91 between Interstate 605 (I-605) and State Route 57 (SR-57). Numerous noise measurements and model calibrations were conducted. Soundwalls were identified for sections of the freeway to mitigate anticipated noise level increases associated with the proposed project.

State Route 18 (SR-18)/Big Bear Bridge Improvements, Caltrans District 8, San Bernardino, CA. Dr. Chung conducted a noise impact analysis for the Big Bear Bridge Relocation project. Noise impacts on the cabins adjacent to SR-18, associated with vehicular traffic on the relocated SR-18 were assessed. Mitigation measures were identified to reduce the long-term impacts to less than significant levels.

State Route 15 (SR-15)/Parks Project, Caltrans District 11, San Diego, CA. Dr. Chung conducted air quality and noise impact analyses for the City of San Diego's proposed parks along SR-15. Air pollutant emissions were calculated, and noise levels were projected. Mitigation measures were identified for both air quality and noise impacts.

Interstate 15 (I-15)/Hook Avenue Interchange, City of Victorville, CA. Dr. Chung conducted a noise impact study, including ambient noise monitoring, and vehicular traffic noise analyses, for both freeway traffic and traffic along Hook Avenue. A soundwall was recommended for certain areas along I-15 to mitigate the noise impacts on existing residences. No significant noise impact was found along Hook Avenue.

I-5/Downey Residence Vibration Impact Assessment, Caltrans, Downey, CA. Dr. Chung conducted a vibration impact analysis at a Downey residence whose property line abutted Caltrans right-of-way along I-5. Vibration due to heavy truck passby on I-5 generated measurable ground vibration within the residence. Mitigation measures were identified for the vibration impacts identified.

Orange County Bus System Improvement Project, Orange County Transportation Authority, (OCTA) Orange County, CA. Dr. Chung conducted noise and air quality impact studies for proposed OCTA service changes. Noise and air quality impacts from the proposed changes were examined and potential impacts were identified. Feasible mitigation measures were identified for the proposed project.

Santa Clara County Congestion Management Program Environmental Impact Report (EIR), Santa Clara County Transportation Commission, Santa Clara County, CA. Dr. Chung conducted a noise and air quality impact analysis for this proposed congestion management program. Potential air quality and noise impacts were examined. Feasible mitigation measures were identified.

Newport Arches Bridge Improvement Project, City of Newport Beach, CA. Dr. Chung prepared a noise impact study for a bridge-widening project on Newport Boulevard over Pacific Coast Highway. Vehicular traffic noise was assessed with the SOUND32 noise program, a Caltrans version of the FHWA Highway Traffic Noise Prediction Model. A soundwall was recommended at several locations along Newport Boulevard to mitigate anticipated traffic noise level increases due to travel lanes being moved closer to the existing residences along Newport Boulevard. Mitigation measures were also recommended during the construction phase to minimize the construction noise impacts.

Beverly Boulevard Widening, County of Los Angeles Department of Public Works, Montebello, CA. Dr. Chung conducted noise monitoring and modeling for this proposed widening project. Impacts and feasible mitigation measures were identified for the proposed project.

Fremont Avenue Widening, County of Los Angeles Department of Public Works, Alhambra, CA. Dr. Chung conducted noise monitoring and modeling for this proposed widening project. Impacts and feasible mitigation measures were identified for the proposed project.

Almansor Street Widening, County of Los Angeles Department of Public Works, Alhambra, CA. Dr. Chung conducted noise monitoring and modeling for this proposed widening project. Impacts and feasible mitigation measures were identified for the proposed project.

Trask Avenue Widening, City of Garden Grove, CA. Dr. Chung conducted air quality analysis, noise monitoring, and modeling for this proposed widening project. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified.

Fairview Street Widening, Cities of Santa Ana and Garden Grove, Orange County, CA. Dr. Chung conducted air quality analysis and noise monitoring and modeling for this proposed widening project. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified for the proposed project.

El Camino Real Widening, City of Tustin, CA. The City of Tustin planned to widen a portion of El Camino Real along I-5. Dr. Chung conducted air quality analysis, noise monitoring, and modeling for the proposed widening. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified for the proposed project.

Antonio Parkway, County of Orange, CA. The County of Orange planned to extend Antonio Parkway south of Oso Parkway to the Ortega Highway through the proposed new community of Las Flores. Dr. Chung conducted an air quality analysis and noise monitoring and modeling for the proposed new road. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified for the proposed project.

Tustin Ranch Road and Bridge Improvements, City of Tustin, CA. The City of Tustin planned to widen a portion of Tustin Ranch Road and the bridge over railroad tracks and flood control channel within the City's boundary. Dr. Chung conducted an air quality analysis, noise monitoring, and modeling for the proposed improvements. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified for the proposed project.

Mid-Valley Parkway, Riverside County Transportation Commission, Riverside County, CA. The Riverside County Transportation Commission planned to construct/widen a major highway, Mid-Valley Parkway, through the cities of Palm Springs, Rancho Mirage, Cathedral City, and Palm Desert. Dr. Chung conducted an air quality analysis as well as noise monitoring and modeling for the proposed widening. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified for the proposed project.

Carlsbad Boulevard Widening, City of Carlsbad, CA. Dr. Chung conducted an air quality analysis, noise monitoring, and modeling for this proposed widening/extension project. Impacts and feasible mitigation measures, including soundwalls and building facade upgrades, were identified for the proposed project.

KEITH ANDREW LAY

ASSOCIATE

EXPERTISE

Noise and Air Quality Analysis

EDUCATION

University of Manitoba, B.S., Civil Engineering (Transportation and Environmental Engineering emphasis), 1998.

PROFESSIONAL EXPERIENCE

Associate, LSA Associates, Inc., Irvine, California, February 2003–present.

Assistant Engineer, LSA Associates, Inc., May 2000–February 2003.

Technical Officer, National Research Council of Canada, 1999–2000.

Intern, National Research Council of Canada, 1998–1999.

Technical Officer, Manitoba Government Services, 1997.

PRINCIPAL PROFESSIONAL RESPONSIBILITIES

Mr. Lay is an Associate and Air Quality/Noise Specialist, a part of LSA's environmental technical staff. Mr. Lay is primarily responsible for the preparation of air quality and noise studies. Since joining LSA in 2000, Mr. Lay has conducted air quality and noise studies for a variety of transportation projects, in accordance with procedures specified in the California Department of Transportation (Caltrans) protocols and guidelines. He has specific expertise in the use of both the CALINE4 carbon monoxide dispersion model and the SOUND32 noise model.

RECENT PROJECT EXPERIENCE

Interstate 5 (I-5) High-Occupancy Vehicle (HOV)/Truck Lanes Project, Santa Clarita, CA. Mr. Lay prepared an air quality analysis for the I-5 HOV/Truck Lanes Project. The project segment of I-5 crosses the City of Santa Clarita, the unincorporated community of Castaic, and other parts of unincorporated northern Los Angeles County. The analysis consisted of evaluating two Build Alternatives to extend the HOV lanes on I-5 from the State Route 14 (SR-14) interchange to just south of the Parker Road/I-5 interchange, incorporating truck climbing lanes from the SR-14 interchange to Pico Canyon Road/Lyons Avenue, and constructing and/or extending auxiliary lanes between intersections at six locations.

State Route 60 (SR-60)/Lemon Avenue Interchange Project, Diamond Bar, CA. Mr. Lay prepared air quality analysis for the SR-60/Lemon Avenue Interchange Project in the City of Diamond Bar. The analysis consisted of evaluating three Build Alternatives to construct a new interchange on SR-60 at Lemon Avenue.

I-5 Widening (State Route [SR-91] to Interstate 605 [I-605]) Environmental Impact Report/Environmental Impact Statement (EIR/EIS), Orange County, CA. Mr. Lay assisted in the preparation of the air quality analysis for the I-5 Corridor Improvement Project (SR-91 to I-605). The purpose of this analysis was to evaluate the potential short-term construction and long-term operation impacts associated with widening I-5 from 6 lanes to 10 or 12 lanes.

SR-91 Eastbound Lane Addition Project, Orange and Riverside Counties, CA. LSA worked with the Orange County Transportation Authority (OCTA) and Caltrans to add an additional lane to eastbound SR-91 between State Route 241 (SR-241) and State Route 71 (SR-71).Mr. Lay assisted in updating the air quality analysis and preparing the air quality section of the environmental document.

Cherry Avenue/Interstate 10 (I-10) Interchange, Fontana, CA. Mr. Lay conducted air quality and noise impact analyses as part of the necessary environmental compliance documents for the improvements to the Cherry Avenue/I-10 interchange project. This project is a cooperative study to evaluate alternatives for widening the Cherry Avenue/I-10 overcrossing and modifying the ramp connections.

Citrus Avenue/I-10 Interchange, Fontana, CA. Mr. Lay conducted air quality and noise impact analyses as part of the environmental services for improvements to the Citrus Avenue/I-10 Interchange project in the City of Fontana. Improvements will consist of widening the Citrus Avenue overcrossing to three through lanes in each direction with two left-turn lanes to the I-10 on-ramps.

I-10 Median Widening, Redlands, CA. Mr. Lay assisted in preparing the air quality and noise impact analyses for the I-10 widening project in the City of Redlands. Improvements will consist of widening the freeway from six to eight lanes by adding one mixed-flow lane in the median in each direction.

Interstate 215 (I-215) Widening/Reconstruction Segment 1, San Bernardino, CA. Mr. Lay conducted a noise impact analysis for the proposed highway widening and reconstruction of I-215 in the City of San Bernardino. The purpose of the project is to improve the existing conditions by upgrading I-215 to current design standards by providing increased weaving distances, eliminating the existing “left-on” and “left-off” ramps, and increasing the capacity of I-215 through the use of HOV lanes in both northbound and southbound directions.

Community and Environmental Transportation Acceptability Process (CETAP) Riverside/Orange County Corridor, Riverside, CA. The technical studies were prepared in support of the overall environmental impact analyses for the comparison of alternative routes to be evaluated with the objective of preserving rights-of-way for two major transportation corridors in western Riverside County, California. Mr. Lay assisted in the preparation of the air quality and noise impact analyses.