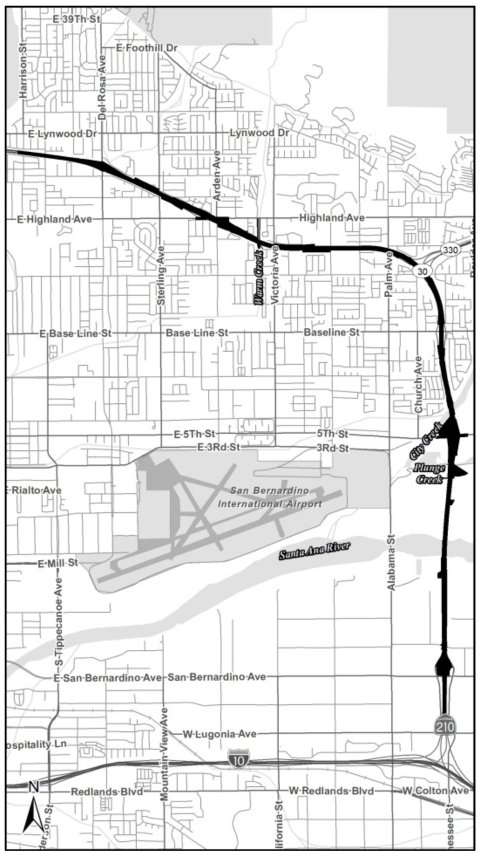
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

CITIES OF HIGHLAND, SAN BERNARDINO, AND REDLANDS, SAN BERNARDINO COUNTY, CALIFORNIA
DISTRICT 8–SBD–210 (PM R25.0/R33.2)
EA 0C700/PN 0812000164

Air Quality Report



Prepared by the
State of California Department of Transportation
in coordination with the San Bernardino Associated Governments

January 2015

Caltrans

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Tables and Figures

Acronyms and Abbreviations

°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AADT	annual average daily traffic
AAQS	ambient air quality standard
AB	Assembly Bill
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
ATCMs	Airborne Toxic Control Measures
Basin	South Coast Air Basin
BMP	best management practice
CAA	Clean Air Act
CAAA 1990	1990 amendments to the Clean Air Act
CAAQS	California Ambient Air Quality Standards
California CAA	California Clean Air Act
Caltrans	California Department of Transportation
CARB Land Use Handbook	*Air Quality and Land Use Handbook: A Community Health Perspective*
CARB	California Air Resources Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
Clean Air Plan	air quality attainment plan
CO Protocol	Transportation Project-Level Carbon Monoxide Protocol
CO	carbon monoxide
CO_2	carbon dioxide
CO-CAT	Coastal Ocean Climate Action Team
DEOG	diesel Exhaust Organic Gases
DOT	U.S. Department of Transportation
DP-30	Caltrans Director's Policy 30
DPM	diesel particulate matter
EMFAC	EMission FACtors
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESAs	Environmentally Sensitive Areas
FHWA	Federal Highway Administration
FR	Federal Register
FTIP	Federal Transportation Improvement Program
GHG	greenhouse gas
H_2S	Hydrogen Sulfide
HAP	hazardous air pollutants
HFC	Hydrofluorocarbons
HFC-23	Fluoroform
HFC-134a	1, 1, 1, 2-tetrafluoroethane
HFC-152a	Difluoroethane
HOV	High Occupancy Vehicle
I-10	Interstate 10
IAC	Interagency Consultation
IGR	Intergovernmental Review

IPCC	Intergovernmental Panel on Climate Change
ITS	Intelligent Transportation System
LED	light-emitting diode
LOS	Level of Service
MOVES	motor Vehicle Emission Simulator
$\mu g/m^3$	micrograms per cubic meter
mpg	miles per gallon
mph	miles per hour
MPO	metropolitan planning agency
MSAT	mobile-source air toxics
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NO	nitric oxide
NO_2	nitrogen dioxide
NOA	Naturally Occurring Asbestos
NOAA	National Oceanic and Atmospheric Administration
NO_X	nitrogen oxide
N_20	nitrous oxide
O_3	Ozone
OPR	Governor's Office of Planning and Research
OSTP	Office of Science and Technology Policy
Pb	Lead
PFC	Perfluorocarbons
PM	particulate matter
PM	post miles
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POAQC	Projects of Air Quality Concern
POM	polycyclic organic matter
ppb	parts per billion
ppm	parts per million
PQM	Polycyclic organic matter
R	Route
Resources Agency	California Natural Resources Agency
ROG	reactive organic gas
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
SANBAG	San Bernardino Association of Governments
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SF_6	sulfur hexafluoride
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_X	sulfur oxides
SR	State Route
TACs	Toxic Air Contaminants

TCMs	Transportation Control Measures
TCWG	Transportation Conformity Working Group
TIP	transportation improvement program
U.S. EPA	U.S. Environmental Protection Agency
VMT	vehicle miles traveled
VOC	volatile organic compounds
VRP	Visibility Reducing Particles

Executive Summary

The San Bernardino Associated Governments (SANBAG), in cooperation with the California Department of Transportation (Caltrans) District 8 and the City of Highland, proposes to widen State Route 210 (SR-210) from Sterling Avenue to San Bernardino Avenue in the cities of Highland, San Bernardino, and Redlands, in San Bernardino County, California (herein referred to as the "proposed project"). The widening would occur between post miles (PM) Route (R) 26.3 and R32.4, for a distance of 6.1 miles. The total length of the proposed project limits is approximately 8.2 miles, from PM R25.0 to R33.2, which includes transition striping and signage. This segment of SR-210 currently has two mixed flow lanes in each direction, with three mixed flow lanes in each direction existing to the west and four mixed flow lanes in each direction existing to the east. The reduction in lanes within this segment of the freeway restricts capacity and creates poor operating conditions. All work would occur within the existing Caltrans right-of-way and temporary construction easements.

The proposed project is included in Southern California Association of Government (SCAG) 2012 Regional Transportation Plan (RTP) Amendment 1, which was adopted by SCAG on June 12, 2013 and approved by the Federal Highway Administration (FHWA) on July 15, 2013. The proposed project is also included in the 2015 Federal Transportation Improvement Program (FTIP) adopted by SCAG on September 11, 2014 and approved by FHWA on December 15, 2014. Both the SCAG 2012 RTP Amendment 1 and SCAG 2015 FTIP include the proposed project as project numbers 4M01005 and 20111625, respectively. As such, the proposed project's operational-period emissions (which include the ozone [O_3] precursors reactive organic gases [ROG] and oxides of nitrogen [NO_X]) meet the regional transportation conformity requirements imposed by the U.S. Environmental Protection Agency (EPA) and the South Coast Air Quality Management District (SCAQMD). Therefore, the proposed project must undergo a project-level air quality analysis but not a regional conformity-level air quality analysis.

The project site is located in an area with relatively poor air quality because of its location downwind from urbanized southern California coastal areas and because meteorological conditions in the project area contribute to air quality problems. The pollutants of primary concern are O_3 and inhalable particulates (particulate matter 2.5 microns or less in diameter [$PM_{2.5}$] and particulate matter 10 microns or less in diameter [PM_{10}]). Potential air quality impacts from project construction and operation were evaluated. During construction, the proposed project would be subject to SCAQMD Rule 403 (Fugitive Dust), which requires that best available fugitive dust control measures be incorporated into construction practices.

With respect to long-term project operations, Caltrans' carbon monoxide (CO) protocol screening procedure demonstrated that the proposed project would not cause or contribute to violations of the state or federal CO ambient air quality standards (AAQS). The project-level $PM_{2.5}$ and PM_{10} hot-spot analysis, conducted using the November 2013 EPA guidance (*Transportation Conformity Guidance for Quantitative Hot-Spot Analysis in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas*), demonstrated that this project would not be considered a Project of Air Quality Concern (POAQC) that requires a quantitative $PM_{2.5}$ and PM_{10} hot spot analysis. The project's interagency consultation documentation is provided in Appendix D.

Project-related mobile-source air toxic (MSAT) emissions, evaluated using the December 2012 FHWA/EPA guidance publication (*Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents)*, were found to pose a less-than-significant health risk under CEQA and a not adverse health risk under NEPA. Climate change and greenhouse gas (GHG) emissions were evaluated consistent with the *Climate Action Program at Caltrans* policy.

This air quality evaluation is the basis for the determination that the proposed project would not result in adverse air quality impacts.

Chapter 1 Introduction

This technical report has been prepared to assess the air quality effects of a proposal by the San Bernardino Associated Governments (SANBAG), in cooperation with the California Department of Transportation (Caltrans) District 8 and the City of Highland, to widen State Route 210 (SR-210) from Sterling Avenue San Bernardino Avenue in the cities of Highland, San Bernardino, and Redlands, in San Bernardino County, California. Please refer to Chapter 2, "Project Description," for a detailed description of the proposed project.

For the proposed project Caltrans is the California Environmental Quality Act (CEQA) lead agency and the National Environmental Policy Act (NEPA) lead agency, under authority delegated by Federal Highway Administration (FHWA).

This report evaluates the effects of the proposed project on air quality resources according to the measures of effectiveness and traffic volumes under the baseline/existing year 2012 condition, project opening year 2020 condition, and project design year 2040 condition.

1.1 Scope and Content of the Report

This report describes the environmental and regulatory setting, the transportation conformity conclusions and potential effects of the project, and the measures to minimize the potential effects of the proposed project. This report is organized as described below.

- Chapter 1, "Introduction," introduces the report and describes its purpose, scope, and content. It also provides a summary of the key findings of the air quality analysis.
- Chapter 2, "Project Description," describes the location, purpose and need, project characteristics and alternatives, phasing, schedule, and required permits and approvals associated with the proposed project.
- Chapter 3, "Affected Environment, Environmental Consequences, and Minimization Measures," describes the physical and regulatory setting, discloses the potential effects of the proposed project, identifies minimization measures to avoid or minimize adverse effects, and provides a summary of federal conformity determinations associated with the proposed project.
- Chapter 4, "Climate Change (CEQA)," provides an analysis of potential climate change effects according to CEQA requirements and identifies minimization measures.
- Chapter 5, "References Cited," lists the printed references and personal communications used in writing this report.

1.2 Summary and Conclusions

This section summarizes the key findings of the air quality and climate change analyses presented in Chapter 3, "Affected Environment, Environmental Consequences, and Minimization Measures," and Chapter 4, "Climate Change (CEQA)."

1.2.1 Transportation Conformity

For the proposed project to be approved, it must meet federal transportation conformity requirements. It also must meet regional and project-level conformity requirements.

1.2.1.1 Regional Transportation Conformity

To be determined as regionally conforming, a project must be listed and accounted for in the modeling associated with the Regional Transportation Plan (RTP) and the Federal Transportation Improvement Program (FTIP). In accordance with Section 93.114 of the U.S. Environmental Protection Agency (EPA) transportation conformity regulations, the proposed project is included in both the Southern California Association of Governments (SCAG) 2012 RTP Amendment #1 under project number 4M01005, and the SCAG 2015 FTIP under project number 20111625.

Within the SCAG 2012 RTP and SCAG 2015 FTIP documents, the proposed project is described as follows: "SR210 LANE ADDITION-ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE TO SAN BERNARDINO AVE (REDLANDS) INCLUDES AUX LANES BETWEEN BASE LINE AND 5^{TH} STS AND AN ACCELERATION LANE AT 5^{TH} ST E/B ON RAMP AND DECELERATION LANE AT HIGHLAND AVE E/B OFF RAMP (under ¼ miles in length)."

The 2012 RTP Amendment 1 and 2015 FTIP were adopted by SCAG on June 12, 2013 and September 11, 2014, respectively, and approved by FHWA on July 15, 2013 and December 15, 2014.

Because both the currently conforming SCAG 2012 RTP Amendment 1 and SCAG 2015 FTIP model lists include the proposed project (2012 RTP Amendment 1 project number 4M01005 and 2015 FTIP Amendment project number 20111625), its regional conformity requirements have been satisfied. Please refer to Appendix A for conformity documentation related to the SCAG 2012 RTP Amendment 1 and SCAG 2015 FTIP.

1.2.1.2 Project-level Transportation Conformity

Project-level carbon monoxide (CO) and particulate matter (PM) emissions were evaluated to determine if the proposed project has the potential to contribute to localized exceedances of the National Ambient Air Quality Standards (NAAQS) or California Ambient Air Quality Standards (CAAQS) for CO, PM less than or equal to 10 microns in diameter (PM_{10}), or PM less than or equal to 2.5 microns in diameter ($PM_{2.5}$). It was determined that project implementation would not result in higher CO concentrations than those existing within the region at the time of attainment demonstration, according to Caltrans' *Transportation Project-level Carbon Monoxide Protocol* (Garza et al. 1997). Furthermore, no violations of the CAAQS or NAAQS for CO are anticipated to occur with implementation of the proposed project.

In accordance with the *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2010), it was determined that the proposed project would not be considered a Project of Air Quality Concern (POAQC). As such, a quantitative $PM_{2.5}$ and PM_{10} hot-spot evaluation is not required. The SCAG Transportation Conformity Working Group (TCWG) agreed with this determination on November 5, 2014. Documentation is provided in Appendix D.

1.2.2 Mobile-Source Air Toxics

An analysis of potential mobile-source air toxic (MSAT) effects was performed in accordance with FHWA's *Interim Guidance Update on Mobile-source Air Toxic Analysis in NEPA Documents* (2012). The traffic impact analysis conducted for the project suggests that under the proposed project, some localized redistribution of surface arterial traffic volumes would likely occur as a result of the new freeway interchange. Nonetheless, impact analysis concluded that project-related MSAT emissions would not pose an adverse risk at any sensitive receptor location.

1.2.3 Criteria Pollutants

1.2.3.1 Construction

According to federal transportation conformity requirements, construction projects lasting less than five years are considered temporary. Therefore, they are not considered part of the transportation conformity determination analysis.

Construction-period criteria pollutant emissions were estimated using the Roadway Construction Emissions Model, Version 7.1.2. A summary of emissions estimates is provided in Table 3-6. Implementation of the exhaust and fugitive dust emission control measures identified in Section 3.3, "Minimization Measures," would avoid and/or minimize any impacts related to air quality.

1.2.3.2 Operation

Exhaust emissions of criteria pollutants were modeled using EMFAC2011 emissions factors; and re-entrained road dust emissions were calculated in accordance with the emission factor equation found in EPA's *Compilation of Air Pollutant Emission Factors,* AP-42, Section 13.2.1 (U.S. Environmental Protection Agency 2011) and the California Air Resources Board's (CARB's) methodology to determine county-specific emissions inventories found in *Entrained Paved Road Dust, Paved Road Travel,* Section 7.9 (California Air Resources Board 1997).

CEQA

CEQA requires proposed project emissions at the opening year to be compared with existing conditions (2012). When compared with existing conditions, the Build Alternative would result in decreases of reactive organic gas (ROG), CO, and nitrogen oxide (NO_X) emissions at Opening Year 2020 when compared with existing conditions. Because vehicle miles traveled (VMT) would increase by Year 2020 when compared with existing 2012 conditions, these emissions reductions would be attributable to a cleaner emitting vehicle fleet due to the retirement of older, higher emitting vehicles. Although PM_{10}, $PM_{2.5}$, and carbon dioxide (CO_2) emissions are anticipated to increase along the SR-210 project limits, these emissions would likely be off-set elsewhere due to traffic redistribution effects that were not accounted for in the proposed project's traffic impact study, due to its project-specific scope.

NEPA

NEPA requires that proposed project emissions be compared with no-build conditions for the opening year and the horizon year. At Opening Year 2020 and Horizon Year 2040, all mobile-source criteria pollutant and CO_2 emissions are predicted to increase slightly under the Build Alternative when compared to No-Build Alternative. However, these emissions would likely be off-set elsewhere due to traffic redistribution effects that were not accounted for in the project's traffic impact study, due to its project-specific scope.

Chapter 2 Project Description

2.1 Introduction

Caltrans, in coordination with SANBAG and the City of Highland, proposes to widen SR-210 from Sterling Avenue to San Bernardino Avenue in the cities of Highland, San Bernardino and Redlands and the County of San Bernardino, California. The widening would occur between PM R26.3 and R32.4, for a distance of 6.1 miles. The total length of the proposed project limits is approximately 8.2 miles, from PM R25.0 to R33.2, which includes transition striping and signage. This segment of SR-210 currently has two mixed flow lanes in each direction with three mixed flow lanes in each direction existing to the west and four mixed flow lanes in each direction existing to the east. The reduction in lanes within this segment of the freeway restricts capacity and creates poor operating conditions. All work would occur within the existing Caltrans right-of-way and temporary construction easements. Figures 2-1 and 2-2 show the regional vicinity map and the project location map, respectively.

The proposed project is included in the SCAG 2012 RTP Amendment 1 (which was adopted by SCAG on June 12, 2013, and approved by FHWA on July 15, 2013) and the SCAG 2015 FTIP adopted by SCAG on June 12, 2013 and approved by FHWA on December 15, 2014. Both the SCAG 2012 RTP Amendment 1 and SCAG 2015 FTIP include the proposed project as 2012 RTP project number 4M01005 and 2015 FTIP Project Number 20111625. The proposed project is being funded with San Bernardino Sales Tax Measure I funds.

2.2 Purpose and Need

Currently, SR-210 consists of a six-lane facility (three lanes in each direction) to the west of Highland Avenue. To the east of Highland Avenue the facility is four lanes (two in each direction) to approximately San Bernardino Avenue, where the existing freeway widens to four lanes in each direction at the terminus of SR-210 at Interstate 10 (I-10). This results in a lane imbalance condition and bottleneck within the corridor. In addition, capacity and operating conditions on SR-210 between Highland Avenue and San Bernardino Avenue are projected to operate at Level of Service (LOS)[1] F during the AM and PM peak hours by the year 2040 (see Tables 2-1 and 2-2). Freeway congestion has potential negative impacts such as increased air pollution, longer commuter and emergency vehicle delays, increased energy consumption, extended commute periods, increased driver frustration, and reduced safety, as well as adverse impacts on the regional and local economy.

[1] The ability of a highway to accommodate traffic is typically measured in terms of Level of Service (LOS). Traffic flow is classified by LOS, ranging from LOS A (free-flow traffic with low volumes and high speeds) to LOS F (traffic volume exceeds design capacity, with forced-flow and substantial delays).

Table 2-1. Existing (2012) and Horizon Year (2040)
SR-210 Eastbound Mainline and Ramp Operation Level of Service (LOS)

Freeway Mainline Segment / Ramp Connection	AM Peak Hour LOS		PM Peak Hour LOS	
	Existing 2012	Future Year 2040 No-Build	Existing 2012	Future Year 2040 No-Build
SR-210 between Sterling Avenue and Highland Avenue-Arden Avenue	B	D	C	D
SR-210 Highland Avenue Off-ramp	N/A*	N/A*	N/A*	N/A*
SR-210 Arden Avenue On-ramp	C	**F**	C	**F**
SR-210 between Highland Avenue-Arden Avenue and SR-330	C	**F**	C	**F**
SR-210 / SR-330 Connector	B	D	C	D
SR-210 between SR-330 and Base Line	B	D	B	C
SR-210 Base Line On-ramp	D	**F**	D	**E**
SR-210 between Base Line and 5th Street-Greenspot Road	D	**F**	D	**E**
SR-210 5th Street Off-ramp	D	**F**	C	**E**
SR-210 5th Street On-ramp	**E**	**F**	D	**F**
SR-210 between 5th Street-Greenspot Road and San Bernardino Avenue	**E**	**F**	D	**F**
SR-210 San Bernardino Avenue Off-ramp	D	D	C	D
SR-210 San Bernardino Avenue On-ramp	B	C	B	C
SR-210 between San Bernardino Avenue and I-10	B	C	B	C

Shaded cells indicate LOS E or F.
"Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
"5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
*Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
Ramp junction analysis is not applicable for ramp connections in weave segments.
Source: URS 2013

Table 2-2. Existing (2012) and Horizon Year (2040)
SR-210 Westbound Mainline and Ramp Operation Level of Service (LOS)

Freeway Mainline Segment / Ramp Connection	AM Peak Hour LOS		PM Peak Hour LOS	
	Existing 2012	Future Year 2040 No-Build	Existing 2012	Future Year 2040 No-Build
SR-210 between I-10 and San Bernardino Avenue Off-ramp	B	C	C	D
SR-210 San Bernardino Off-ramp	C	C	C	D
SR-210 San Bernardino Avenue On-ramp	C	**F**	D	**F**
SR-210 between San Bernardino Avenue and 5th Street - Greenspot Road	D	**F**	D	**F**
SR-210 Greenspot Road Off-ramp	D	**F**	E	**F**
SR-210 Greenspot Road On-ramp	C	D	C	D
SR-210 between Greenspot Road and Base Line	C	**E**	C	**E**
SR-210 Base Line Off-ramp	C	D	C	D
SR-210 between Base Line and SR-330	B	D	B	D
SR-210 / SR-330 Connector	D	**F**	C	**E**
SR-210 between SR-330 and Highland Avenue	D	**F**	C	**E**
SR-210 Highland Avenue Off-ramp	D	**F**	D	**F**

Shaded cells indicate LOS E or F.
Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
"5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
*Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
Ramp junction analysis is not applicable for ramp connections in weave segments.
Source: URS 2013

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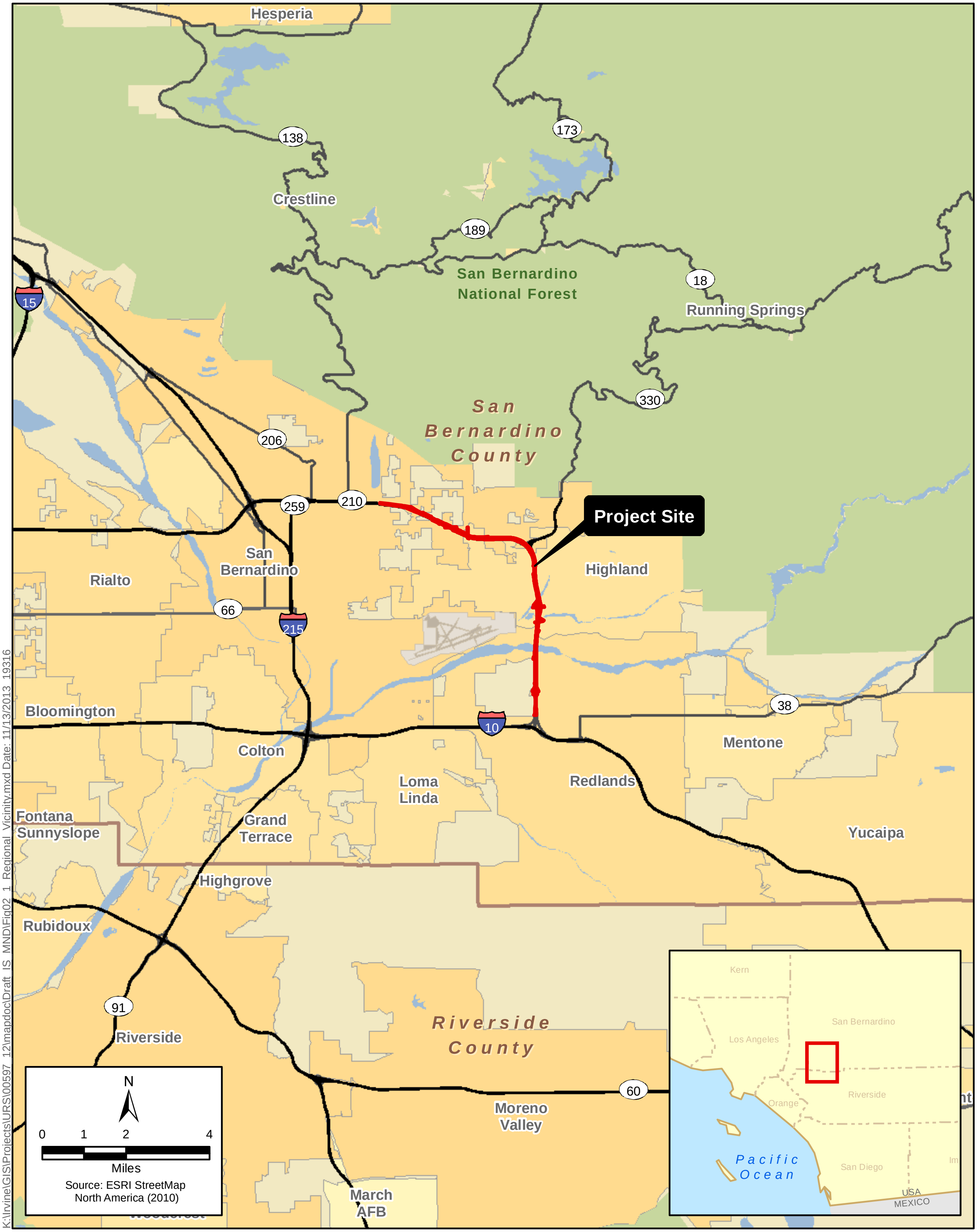

Figure 2-1
Regional Vicinity Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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Figure 2-2
Project Location Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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The purpose of the proposed project is as follows:

- Provide continuity with the number of mixed flow lanes west and east of this freeway segment along SR-210 between Highland Avenue and San Bernardino Avenue.
- Increase the efficiency of this segment of SR-210 by minimizing weaving conflicts at the termini of the third mixed flow lane east and west of this freeway segment.
- Reduce congestion and improve operational efficiency along SR-210 within the project limits.

2.2.1 Existing Conditions

SR-210 begins in San Bernardino County as an extension of SR-210 from Los Angeles County. SR-210 traverses portions of Caltrans District 7 in Los Angeles County and Caltrans District 8 in San Bernardino County. The total route length is 42.8 miles with 8.6 miles in Caltrans District 7 and 34.2 miles in Caltrans District 8. SR-210 in Caltrans District 8 begins at the Los Angeles and San Bernardino County line at 16th Street in the City of Upland. Moving easterly, it traverses the cities of Upland, Rancho Cucamonga, Fontana, Rialto, San Bernardino, Highland, and Redlands. In general, existing lanes along SR-210 are 12 feet wide, and the inside and outside shoulders are generally five feet wide. From Highland Avenue to approximately 5th Street, the median is generally 78 feet wide. From 5th Street to San Bernardino Avenue the existing median narrows to 23 feet wide in the eastbound direction and 27 feet wide in the westbound direction. SR-210 is included in the National Highway System and the California Freeway and Expressway System. It is not included in the Department of Defense “26,000 Mile Priority Network” or in the Strategic Highway Corridor Network. There are four service interchanges within the proposed project limits—Highland Avenue, Base Line, 5th Street/Greenspot Road, and San Bernardino Avenue—and one freeway-to-freeway interchange at SR-330. There are undercrossings at Victoria Avenue, Access Road, and Pioneer Avenue. There are existing water crossing bridges at Sand Creek, City Creek, Plunge Creek, and the Santa Ana River.

2.3 Project Description

This section describes the proposed action and the design alternative that was developed by a multi-disciplinary team to achieve the project purpose and need while avoiding or minimizing environmental impacts. For the proposed project, one Build Alternative and a No-Build Alternative are being considered.

The proposed project would widen SR-210 from Sterling Avenue to San Bernardino Avenue in the cities of Highland, San Bernardino and Redlands and the County of San Bernardino, California. The widening would occur between post miles R26.3 and R32.4, for a distance of 6.1 miles. The total length of the proposed project limits is approximately 8.2 miles, from PM R25.0 to R33.2, which includes transition striping and signage. Within the limits of the proposed project, SR-210 is a four-lane divided freeway with two 12-foot lanes, flanked by 10-foot left shoulders and 10-foot right shoulders. The purpose of the proposed project is to reduce congestion and improve operational efficiency by providing lane continuity with the existing segments of freeway to the west and east of the project limits.

2.3.1 Build Alternative

The proposed Build Alternative would widen SR-210 from four mixed flow lanes (two lanes in each direction) to six mixed flow lanes (three lanes in each direction) from approximately Sterling Avenue to San Bernardino Avenue by adding a mixed flow lane in each direction within the existing median. Figure 2-3 provides an overview of the Build Alternative project limits and references more detailed illustrations that are provided in Appendix I. Figure 2-4 provides illustrations of typical cross sections.

The proposed Build Alternative includes the following design features and elements.

- The existing segment of SR-210 from Sterling Avenue to San Bernardino Avenue would be widened from four mixed flow lanes (two lanes in each direction) to six mixed flow lanes (three lanes in each direction) with the addition of one mixed flow lane in each direction. The third lane would be added within the existing SR-210 median. Each of the six resulting mainline lanes would be 12 feet in width. Both directions (eastbound and westbound) would have 10-foot-wide left and right shoulders.
- An auxiliary lane would be created in each direction between the Base Line and 5th Street interchanges.
- A deceleration lane would be constructed on eastbound SR-210 from Sterling Avenue undercrossing to the proposed two-lane exit at Highland Avenue. Proposed permanent striping would start from Del Rosa Avenue in the eastbound direction.
- A new acceleration lane would be added at the 5th Street eastbound on-ramp.
- The existing SR-210 median would be re-graded and generally remain unpaved.
- The following existing bridges would be widened to accommodate the new mixed flow lanes: Highland Avenue/Arden Avenue, Sand Creek, Victoria Avenue, 5th Street/Greenspot Road, City Creek, Plunge Creek, Access Road, Santa Ana River, and Pioneer Avenue.
- The proposed project would not require the acquisition of new permanent right-of-way. Temporary Construction Easements (TCE) would likely be needed during the construction period for construction of sound walls and construction access.
- Scour and pier protection would be installed at the drainages as needed to protect bridge foundations.
- Drainage system improvements would be constructed to carry runoff away from the traveled lanes and into traditional drainage courses.
- Stormwater treatment best management practice (BMP) features would be included at select locations where identified benefits outweigh impacts. To the fullest extent possible, roadside swales and bio-filtration strips would be used to convey both stormwater quantity flows and peak flows.

- A new fiber optic backbone system would be constructed within the existing median with branch connections linking the backbone system to existing traffic management system elements along the corridor, including wireless vehicle detection stations, ramp metering systems, and a changeable message sign.
- Ramp metering systems would be installed on the existing on-ramps at the 5th Street/Greenspot Road interchange.
- An existing weigh-in-motion system located approximately one-half mile north of San Bernardino Avenue would be reconstructed to accommodate the additional lanes on the freeway.
- Utilities would be relocated, as needed, to accommodate the widened facility.Retaining walls would be constructed as needed by changes in elevation that cannot be accommodated by regrading.
- An existing sound wall between Base Line and 5th Street in the eastbound direction will be reconstructed to accommodate the proposed auxiliary lane. Additional sound walls would be constructed where noise abatement is required and where they are considered feasible and reasonable.

The ultimate corridor for SR-210 within the project limits is an eight-lane freeway facility (six mixed flow lanes and two high occupancy vehicle lanes). Improving the facility to six mixed flow lanes would be compatible with the Route Concept Fact Sheet planning and would not preclude future improvements or make these future improvements more costly to implement.

2.3.2 No-Build Alternative

Under the No -Build Alternative no additional lanes would be constructed along SR-210 between Sterling Avenue and San Bernardino Avenue. This alternative, however, does not preclude the construction of future improvements.

The No-Build Alternative provides a baseline for comparing impacts with the Build Alternative. It is used to compare the relative impacts and benefits of the proposed project improvements, but would not meet the identified purpose and need.

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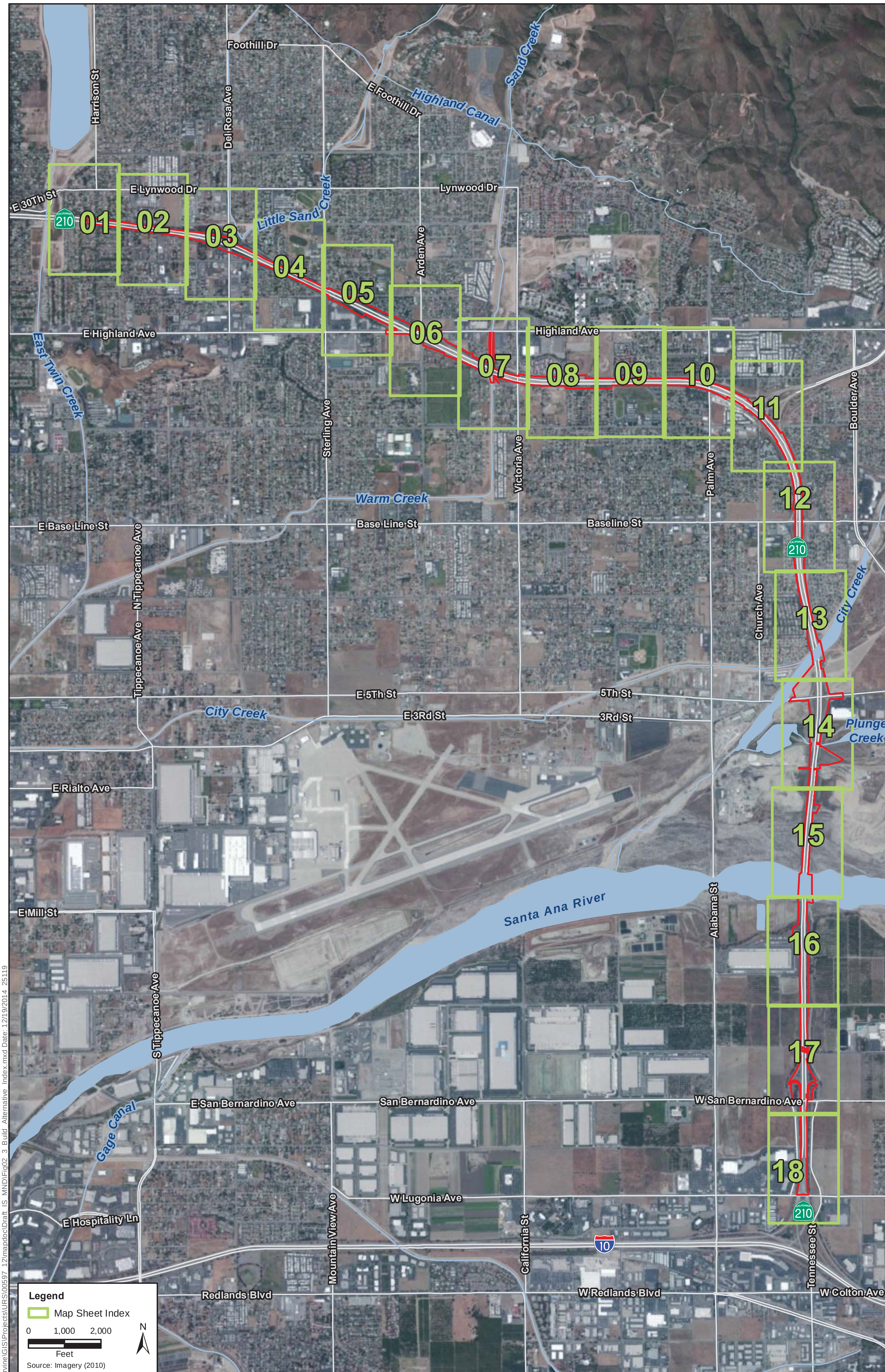

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Figure 2-3
Build Alternative - Index Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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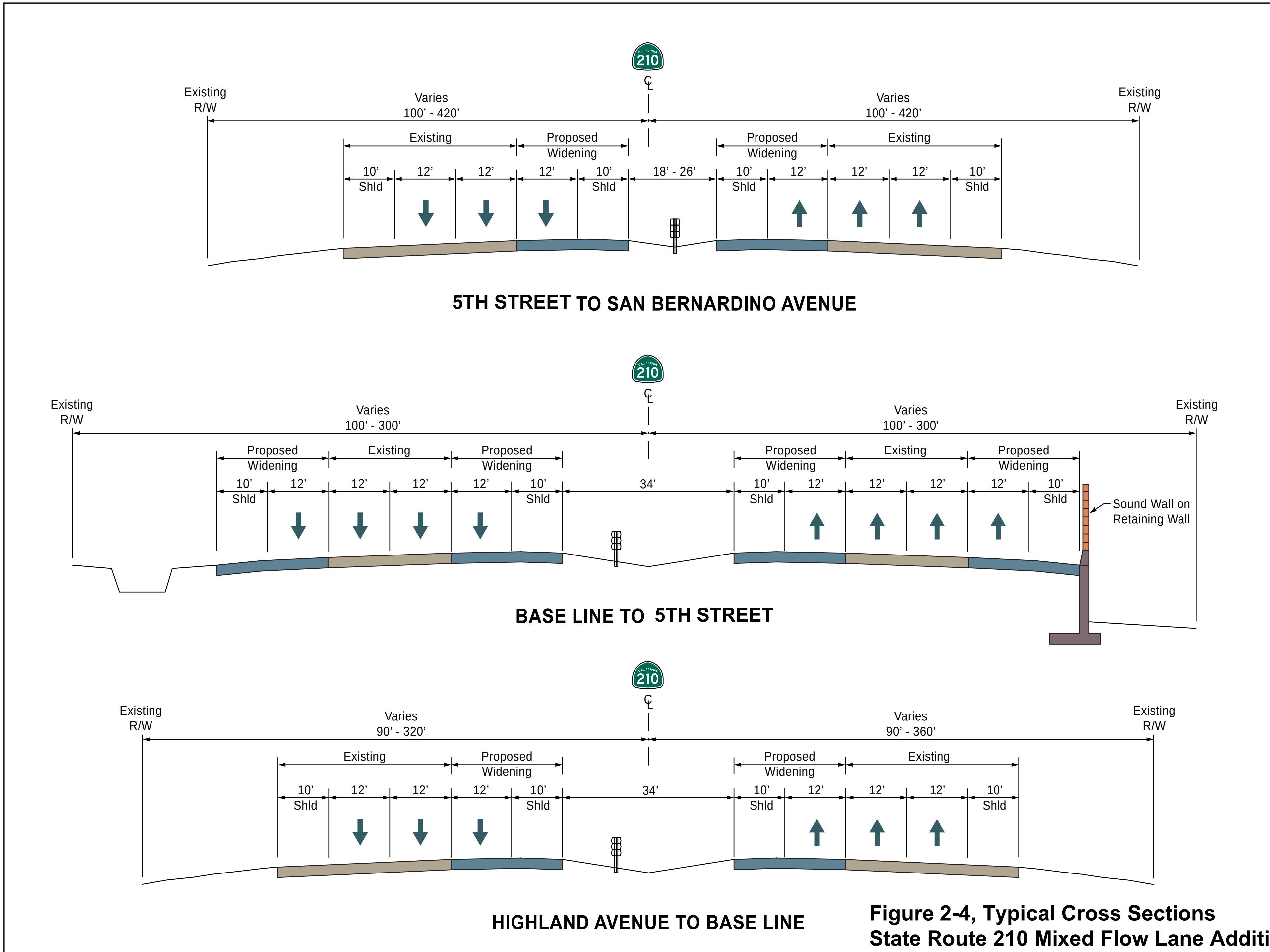

Figure 2-4, Typical Cross Sections State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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Chapter 3 Affected Environment, Environmental Consequences, and Minimization Measures

This chapter describes the affected environment (existing conditions and regulatory setting) for air quality as it relates to the proposed project, the potential environmental consequences with respect to local and regional air quality, and minimization measures to reduce potential effects, where applicable.

3.1 Affected Environment

3.1.1 Regulatory Setting

The proposed project is located in the San Bernardino County portion of the South Coast Air Basin (SCAB or Basin) that is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SCAQMD administers air quality regulations developed at the federal, state, and local levels. These regulations are described below.

3.1.1.1 Federal Air Quality Standards

The federal Clean Air Act (CAA), enacted in 1963 and amended several times thereafter (including the 1990 amendments, known as the Clean Air Act Amendments of 1990 [CAAA 1990], which are the current governing regulations for air quality), establishes the framework for modern air pollution control. In addition, EPA established the NAAQS for criteria pollutants (see Table 3-1), which include CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), PM_{10}, $PM_{2.5}$, and lead (Pb). "Primary" standards have been set to protect public health. For some pollutants, "secondary" standards have been set to protect crops or other protection of materials, as well as avoidance of nuisance conditions.

3.1.1.2 Federal Conformity Requirements

The concept of *transportation conformity* was introduced in the 1977 federal CAA, which includes a provision to ensure that transportation investments conform to the State Implementation Plan (SIP) for meeting the NAAQS; however, the conformity requirements were made substantially more rigorous with the CAAA 1990. Under CAAA 1990, the U.S. Department of Transportation (DOT) cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to an EPA-approved SIP for achieving NAAQS goals. CAAA 1990 requires states to address in the SIP how federal standards will be achieved for areas designated as nonattainment areas for the NAAQS. DOT and EPA developed the transportation conformity regulation, which details requirements for determining conformity of transportation plans, programs, and projects (Code of Federal Regulations [CFR], title 40, sections 51 and 93).

Table 3-1. State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State[1] Standard	Federal[1] Standard	Principal[11] Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
Ozone (O_3)[2]	1 hour 8 hours	0.09 ppm 0.070 ppm	--[3] 0.075 ppm (4th highest in 3 years)	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic volatile organic compounds (VOC) may also contribute.	Low-altitude ozone is almost entirely formed from ROG or VOC and NO_X in the presence of sunlight and heat. Common precursor emitters include motor vehicles and other internal combustion engines, solvent evaporation, boilers, furnaces, and industrial processes.	Federal: Non-attainment State: Non-attainment
Carbon Monoxide (CO)	1 hour 8 hours 8 hours (Lake Tahoe)	20 ppm 9.0 ppm[4] 6 ppm	35 ppm 9 ppm --	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical ozone. Colorless, odorless.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.	Federal: Attainment/ Maintenance State: Attainment
Respirable Particulate Matter (PM_{10})[2]	24 hours Annual	50 µg/m^3 20 µg/m^3	150 µg/m^3 -- [2] (expected number of days above standard ≤1)	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air	Dust- and fume-producing industrial and agricultural operations; combustion smoke and vehicle exhaust; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust;	Federal: Non-attainment State: Non-attainment

Pollutant	Averaging Time	State[1] Standard	Federal[1] Standard	Principal[11] Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
				contaminants. Many toxic and other aerosol and solid compounds are part of PM_{10}.	natural sources.	
Fine Particulate Matter ($PM_{2.5}$)[2]	24 hours Annual 24 hours (conformity process[5]) Secondary Standard (annual; also for conformity process[5])	-- 12 μg/m³ -- --	35 μg/m³ 12 μg/m³ 65 μg/m³ 15 μg/m³ (98th percentile over 3 years)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter is in the $PM_{2.5}$ size range. Many toxic and other aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical and photochemical reactions involving other pollutants including NO_X, sulfur oxides (SO_X), ammonia, and ROG.	Federal: Non-attainment State: Non-attainment
Nitrogen Dioxide (NO_2)	1 hour Annual	0.18 ppm 0.030 ppm	0.100 ppm[6] (98th percentile over 3 years) 0.053 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain and nitrate contamination of stormwater. Part of the "NO_X" group of ozone precursors.	Motor vehicles and other mobile or portable engines, especially diesel; refineries; industrial operations.	Federal: Attainment/ Maintenance State: Non-attainment
Sulfur Dioxide (SO_2)	1 hour 3 hours 24 hours	0.25 ppm -- 0.04 ppm	0.075 ppm[7] (99th percentile over 3 years) 0.5 ppm[8] 0.14 ppm	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, and steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources such as active volcanoes. Limited contribution possible from	Federal: Attainment State: Attainment

Pollutant	Averaging Time	State[1] Standard	Federal[1] Standard	Principal[11] Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
					heavy-duty diesel vehicles if ultra-low sulfur fuel not used.	
Lead (Pb)[9]	Monthly Rolling 3-month average	1.5 μg/m^3 --	-- 0.15 μg/m^3 [10]	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant.	Lead-based industrial processes such as battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from older gasoline use may exist in soils along major roads.	Federal: Attainment State: Attainment
Sulfate	24 hours	25 μg/m^3	--	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources such as volcanic areas, salt-covered dry lakes, and large sulfide rock areas.	Federal: n/a State: Attainment
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm	--	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea. Strong odor.	Industrial processes such as refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources such as volcanic areas and hot springs.	Federal: n/a State: Unclassified
Visibility Reducing Particles (VRP)	8 hours	Visibility of 10 miles or more (Tahoe: 30 miles) at relative humidity less than 70%	--	Reduces visibility. Produces haze. Note: not directly related to the Regional Haze program under the federal CAA, which is oriented primarily toward visibility issues in National Parks and other	See particulate matter above. May be related more to aerosols than to solid particles.	Federal: n/a State: Unclassified

Pollutant	Averaging Time	State[1] Standard	Federal[1] Standard	Principal[11] Health and Atmospheric Effects	Typical Sources	Project Area Attainment Status
				"Class I" areas. However, some issues and measurement methods are similar.		
Vinyl Chloride[9]	24 hours	0.01 ppm	--	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes	Federal: n/a State: Unclassified

Adapted from California Air Resources Board (2012).

Notes: ppm = parts per million; μg/m^3 = micrograms per cubic meter; ppb=parts per billion (thousand million); n/a = not applicable

[1] State standards are "not to exceed" or "not to be equaled or exceeded" unless stated otherwise. Federal standards are "not to exceed more than once a year" or as described above.

[2] Annual PM_{10} NAAQS revoked October 2006; was 50 μg/m^3. The 24-hour $PM_{2.5}$ NAAQS were tightened in October 2006; was 65 μg/m^3. Annual $PM_{2.5}$ NAAQS were tightened from 15 μg/m^3 to 12 μg/m^3 in December 2012, and the secondary annual standard was set at 15 μg/m^3.

[3] Prior to June 2005, the 1-hour ozone NAAQS was 0.12 ppm. Emission budgets for 1-hour ozone are still in use in some areas where 8-hour ozone emission budgets have not been developed, such as the San Francisco Bay area.

[4] Rounding to an integer value is not allowed for the state 8-hour CO standard. A violation occurs at or above 9.05 ppm.

[5] The 65 μg/m^3 $PM_{2.5}$ (24-hour) NAAQS was not revoked when the 35 μg/m^3 NAAQS was promulgated in 2006. The 15 μg/m^3 annual $PM_{2.5}$ standard was not revoked when the 12 μg/m^3 standard was promulgated in 2012. The 0.08 ppm 1997 ozone standard is revoked FOR CONFORMITY PURPOSES ONLY when area designations for the 2008 0.75 ppm standard become effective for conformity use (July 20, 2013). Conformity requirements apply for all NAAQS, including revoked NAAQS, until emission budgets for newer NAAQS are found adequate, SIP amendments for the newer NAAQS are approved with a emission budget, EPA specifically revokes conformity requirements for an older standard, or the area becomes attainment/unclassified. SIP-approved emission budgets remain in force indefinitely unless explicitly replaced or eliminated by a subsequent approved SIP amendment. During the "Interim" period prior to availability of emission budgets, conformity tests may include some combination of build vs. no build, build vs. baseline, or compliance with prior emission budgets for the same pollutant.

[6] Final 1-hour NO_2 NAAQS published in the *Federal Register* on February 9, 2010, effective March 9, 2010. Initial area designation for California (2012) was attainment/unclassifiable throughout. Project-level hot-spot analysis requirements do not currently exist. Near-road monitoring starting in 2013 may cause redesignation to nonattainment in some areas after 2016.

[7] EPA finalized a 1-hour SO_2 standard of 75 ppb in June 2010. Nonattainment areas have not yet been designated as of September 2012.

[8] Secondary standard, set to protect public welfare rather than health. Conformity and environmental analysis address both primary and secondary NAAQS.

[9] CARB has identified vinyl chloride and the particulate matter fraction of diesel exhaust as toxic air contaminants. Diesel exhaust particulate matter is part of PM_{10} and, in larger proportion, $PM_{2.5}$. Both CARB and EPA have identified lead and various organic compounds that are precursors to ozone and $PM_{2.5}$ as toxic air contaminants. There are no exposure criteria for adverse health effects due to toxic air contaminants, and control requirements may apply at ambient concentrations below any criteria levels specified above for these pollutants or the general categories of pollutants to which they belong.

[10] Lead NAAQS are not considered in the transportation conformity analysis.

[11] More detailed information regarding principal health effects is provided in Appendix H.

Failing to submit a SIP that addresses nonattainment or to secure approval could lead to denial of federal funding and permits (in cases where a state-submitted SIP fails to demonstrate achievement of the federal standards, EPA prepares a federal implementation plan).

In addition to the SIP, Section 93.114 of the EPA transportation conformity regulations requires a currently conforming RTP and transportation improvement program (TIP) to be in place at the time of project approval. The RTP and TIP are comprehensive listings of all transportation projects planned for a region over a period of years, usually about 20, that will receive federal funds or be subject to a federally required action, such as a review for effects on air quality. The TIP also lists non-federal, regionally significant projects for information and air quality modeling purposes. The RTP and TIP include projects whose emissions are within the budget planned in the SIP, with the goal of attaining the NAAQS.

Using the projects included in the RTP, an air quality model is run to determine whether the implementation of those projects would conform to emission budgets or other tests showing that federal CAA attainment requirements would be met. If the conformity analysis is successful, regional planning organizations and the appropriate federal agencies, such as FHWA, make the determination that the RTP is in conformity with the SIP for achieving the goals of the NAAQS. Otherwise, the projects in the RTP must be modified until conformity is attained.

If the design and scope of the proposed transportation project are the same as the design and scope described in the RTP, the proposed project is deemed to be a project that meets the regional conformity requirements for purposes of project-level analysis. Conformity with the NAAQS goals of the federal CAA is determined at both the regional and project level. The proposed project must conform at both the regional and project level to be approved.

Typically, a regional transportation conformity determination is made by evaluating whether a project is included in a conforming RTP and/or TIP. Any project listed in an RTP and/or TIP must demonstrate conformity with the SIP because the SIP demonstrates how federal standards will be achieved for the region. The design and scope of the proposed project being evaluated must match the design and scope of the project listed in the RTP and/or TIP. Regional-level conformity in California is concerned with how well the region is meeting the standards set for CO, NO_2, ozone, and particulate matter. Project-level conformity determinations for CO, PM_{10}, and $PM_{2.5}$ are made to verify that a project would not exacerbate an existing NAAQS violation or create a new exceedance and trigger the requirement for a hot-spot analysis.

Conformity at the project level requires hot-spot analysis if a region is designated a nonattainment or maintenance area for CO and/or particulate matter. Hot-spot analysis is essentially the same, for technical purposes, as a CO or particulate matter analysis performed for NEPA purposes. In general, projects must not cause the CO standard to be violated, and in nonattainment regions, the project must not cause any increase in the number and severity of violations. If known CO or particulate matter violations are located in the project vicinity, the project must include measures to reduce or eliminate the existing violations as well.

In California, the federal EPA has delegated authority to prepare SIPs to CARB, which in turn has delegated that authority to individual air districts and planning entities. SCAG is the designated metropolitan planning agency (MPO) and state Regional Transportation Planning Agency for San Bernardino County. As such, SCAG coordinates the region's major transportation projects and programs and develops the RTP and FTIP. Previous transportation improvement programs were called Regional Transportation Improvement Programs (RTIPs). The FTIP sets forth SCAG's investment priorities for transit and transit-related improvements, highways and roadways, and other surface transportation improvements in the South Coast region. The FTIP is in accord with EPA's Transportation Conformity Rule as it pertains to attainment of air quality standards in the South Coast area.

3.1.1.3 Mobile Source Air Toxics

The federal CAA has identified 188 pollutants as being air toxics, which are also known as hazardous air pollutants (HAP). From this list, EPA identified a group of 93 compounds as MSATs in its latest rule, *Control of Emissions of Hazardous Air Pollutants from Mobile Sources* (*Federal Register* [FR], volume 72, No. 37, page 8430) on February 26, 2007. In addition, EPA identified seven priority MSATs: acrolein, benzene, 1,3-butidiene, diesel particulate matter/diesel exhaust organic gases, formaldehyde, naphthalene, and polycyclic organic matter (POM). To address emissions of MSATs, EPA has issued a number of regulations that will dramatically decrease MSATs through cleaner fuels and cleaner engines.

The area of air toxics analysis is a new and emerging issue and is an area of continuing research. Although much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques available for assessing project-specific health impacts from MSATs are limited. Given the emerging state of the science and of project-level analysis techniques, there are no established criteria for determining when MSAT emissions should be considered a significant issue in the NEPA context. FHWA is preparing guidance as to how mobile-source health risks should factor into project-level decision-making under NEPA. In addition, EPA has not established regulatory concentration targets for the priority MSAT pollutants appropriate for use in the project development process. In light of the recent development regarding MSATs, FHWA has issued interim guidance for the assessment of MSATs in NEPA documents (*Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA, December 2012)* (Federal Highway Administration 2012).

3.1.1.4 State Air Quality Standards

Responsibility for achieving the CAAQS, which for certain pollutants and averaging periods are more stringent than federal standards, is placed on CARB and local air pollution control districts (see Table 3-1). State standards are to be achieved through district-level air quality management plans that are incorporated into the SIP. Traditionally, CARB has established state air quality standards, maintained oversight authority in air quality planning, developed programs for reducing emissions from motor vehicles, developed air emissions inventories, collected air quality and meteorological data, and approved SIPs developed by the individual air districts.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality–related sections of environmental documents required under CEQA.

The California Clean Air Act (California CAA) of 1988 substantially added to the authority and responsibilities of air districts. The California CAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures.

The California CAA focuses on attainment of the state ambient air quality standards and requires designation of attainment and nonattainment areas with respect to these standards. The California CAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan (Clean Air Plan) if the district violates state air quality standards for ozone, CO, SO_2, or NO_2. These plans are specifically designed to attain state standards and must be designed to achieve an annual five percent reduction in district-wide emissions of each nonattainment pollutant or its precursors. No locally prepared attainment plans are required for areas that violate the state PM_{10} standards; CARB is responsible for developing plans and projects that achieve compliance with the state PM_{10} standards.

The California CAA requires the state air quality standards to be met as expeditiously as practicable but, unlike the federal CAA, does not set precise attainment deadlines. Instead, it establishes increasingly stringent requirements for areas that will require more time to achieve the standards.

The California CAA emphasizes the control of *indirect* and *area-wide sources* of air pollutant emissions. The California CAA gives local air pollution control districts explicit authority to regulate indirect sources of air pollution and establish Transportation Control Measures (TCMs). The California CAA does not define the terms *indirect [sources]* and *area-wide sources*. However, Section 110 of the federal CAA defines an indirect source as

> …a facility, building, structure, installation, real property, road, or highway that attracts, or may attract, mobile sources of pollution. Such terms include parking lots, parking garages, and other facilities subject to any measure for management of parking supply….

TCMs are defined in the California CAA as "any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions."

3.1.1.5 Local and Regional Implementation of Federal Requirements

The air quality management agencies of direct importance in San Bernardino County include EPA, CARB, and SCAQMD. EPA has established federal standards for which CARB and SCAQMD have primary implementation responsibility. CARB and SCAQMD also are responsible for ensuring that state standards are met. SCAQMD is responsible for implementing strategies for air quality improvement and recommending mitigation measures for new growth and development. At the local level, air quality is managed through land use and development planning practices, which are implemented in the county through the general planning process. SCAQMD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws.

The SCAB is classified as a serious nonattainment area for PM_{10} and a nonattainment area for $PM_{2.5}$ (see Table 3-1). SCAQMD Rule 403 (Fugitive Dust) is intended to reduce the amount of particulate matter in the ambient air resulting from anthropogenic fugitive dust sources by requiring projects to prevent, reduce, or mitigate fugitive dust emissions. All construction activity sources of fugitive dust are required to implement the best available control measures indicated in Rule 403 and summarized in Table 3-2.

SCAG develops the FTIP in consultation with local air management districts. The FTIP includes projects that strive to meet the goals and objectives of the NAAQS. The FTIP is also in accord with EPA's Transportation Conformity Rule as it pertains to air quality standards in the Basin.

Because both the currently conforming SCAG 2012 RTP Amendment #1 and SCAG 2013 FTIP Amendment #4 model lists include the proposed project (2012 RTP Amendment #1 project number 4M01005 and 2012 FTIP Amendment #4 Project Number 20111625), the proposed project's regional conformity requirements have been satisfied.[1] Please refer to Appendix A for conformity documentation related to the SCAG 2012 RTP Amendment #1 and SCAG 2013 FTIP Amendment #4[2]. The proposed project must undergo a project-level but not a regional conformity-level air quality analysis.

3.1.2 Physical Setting

Ambient air quality is affected by climatological conditions, topography, and the types and amounts of pollutants emitted. The following discussion describes relevant characteristics of the SCAB and offers an overview of conditions affecting ambient air concentrations of pollutants in the Basin.

3.1.2.1 Climate and Topography

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

[1] RTP/FTIP amendment is currently in progress, which once completed, will make project consistent.

[2] SANBAG has submitted an amendment request to SCAG to update the post mile limits in the FTIP to reflect the current post miles for the project, which would incorporate the limits of construction striping and signage improvements associated with the project.

Table 3-2. South Coast Air Quality Management District's Best Available Control Measures

Source Category	Control Measure	Guidance
Backfilling	01-1 Stabilize backfill material when not actively handling; and 01-2 Stabilize backfill material during handling; and 01-3 Stabilize soil at completion of activity.	✓ Mix backfill soil with water prior to moving ✓ Dedicate water truck or high-capacity hose to backfilling equipment ✓ Empty loader bucket slowly so that no dust plumes are generated ✓ Minimize drop height from loader bucket
Clearing and grubbing	02-1 Maintain stability of soil through pre-watering of site prior to clearing and grubbing; and 02-2 Stabilize soil during clearing and grubbing activities; and 02-3 Stabilize soil immediately after clearing and grubbing activities.	✓ Maintain live perennial vegetation where possible ✓ Apply water in sufficient quantity to prevent generation of dust plumes
Clearing forms	03-1 Use water spray to clear forms; or 03-2 Use sweeping and water spray to clear forms; or 03-3 Use vacuum system to clear forms.	✓ Use of high-pressure air to clear forms may cause exceedance of rule requirements
Crushing	04-1 Stabilize surface soils prior to operation of support equipment; and 04-2 Stabilize material after crushing.	✓ Follow permit conditions for crushing equipment ✓ Pre-water material prior to loading into crusher ✓ Monitor crusher emissions opacity ✓ Apply water to crushed material to prevent dust plumes
Cut and fill	05-1 Pre-water soils prior to cut-and-fill activities; and 05-2 Stabilize soil during and after cut-and-fill activities.	✓ For large sites, pre-water with sprinklers or water trucks and allow time for penetration ✓ Use water trucks/pulls to water soils to depth of cut prior to subsequent cuts
Demolition – mechanical/manual	06-1 Stabilize wind erodible surfaces to reduce dust; and 06-2 Stabilize surface soil where support equipment and vehicles will operate; and 06-3 Stabilize loose soil and demolition debris; and 06-4 Comply with SCAQMD Rule 1403.	✓ Apply water in sufficient quantities to prevent the generation of visible dust plumes
Disturbed soil	07-1 Stabilize disturbed soil throughout the construction site; and 07-2 Stabilize disturbed soil between structures	✓ Limit vehicular traffic and disturbances on soils where possible ✓ If interior block walls are planned, install as early as possible ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes
Earthmoving activities	08-1 Pre-apply water to depth of proposed cuts; and 08-2 Re-apply water as necessary to maintain soils in a damp condition and to ensure that visible emissions do not exceed 100 feet in any direction; and 08-3 Stabilize soils once earthmoving activities are complete.	✓ Grade each project phase separately, timed to coincide with construction phase ✓ Upwind fencing can prevent material movement on site ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes

Source Category	Control Measure	Guidance
Importing/ exporting of bulk materials	09-1 Stabilize material while loading to reduce fugitive dust emissions; and 09-2 Maintain at least 6 inches of freeboard on haul vehicles; and 09-3 Stabilize material while transporting to reduce fugitive dust emissions; and 09-4 Stabilize material while unloading to reduce fugitive dust emissions; and 09-5 Comply with California Vehicle Code (CVC) Section 23114.	✓ Use tarps or other suitable enclosures on haul trucks ✓ Check seals on belly dump trucks regularly and remove any trapped rocks to prevent spillage ✓ Comply with track-out prevention/mitigation requirements ✓ Provide water while loading and unloading to reduce visible dust plumes
Landscaping	10-1 Stabilize soils, materials, slopes.	✓ Apply water to materials to stabilize ✓ Maintain materials in a crusted condition ✓ Maintain effective cover over materials ✓ Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slopes ✓ Hydroseed prior to rainy season
Road shoulder Maintenance	11-1 Apply water to unpaved shoulders prior to clearing; and 11-2 Apply chemical dust suppressants and/or washed gravel to maintain a stabilized surface after completing road shoulder maintenance.	✓ Install curbing and/or paving ✓ Shoulders can reduce recurring maintenance costs ✓ Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder maintenance costs
Screening	12-1 Pre-water material prior to screening; and 12-2 Limit fugitive dust emissions to opacity and plume length standards; and 12-3 Stabilize material immediately after screening.	✓ Dedicate water truck or high-capacity hose to screening operation ✓ Drop material through the screen slowly and minimize drop height ✓ Install wind barrier with a porosity of no more than 50% upwind of screen to the height of the drop point
Staging areas	13-1 Stabilize staging areas during use; and 13-2 Stabilize staging area soils at project completion.	✓ Limit size of staging area ✓ Limit vehicle speeds to 15 miles per hour ✓ Limit number and size of staging area entrances/exists
Stockpiles/ bulk material handling	14-1 Stabilize stockpiled materials; and 14-2 Stockpiles within 100 yards of off-site occupied buildings must not be greater than 8 feet in height or must have a road bladed to the top to allow water truck access or must have an operational water irrigation system that is capable of complete stockpile coverage.	✓ Add or remove material from the downwind portion of the storage pile ✓ Maintain storage piles to avoid steep sides or faces
Traffic areas for construction activities	15-1 Stabilize all off-road traffic and parking areas; and 15-2 Stabilize all haul routes; and 15-3 Direct construction traffic over established haul routes.	✓ Apply gravel/paving to all haul routes as soon as possible to all future roadway areas ✓ Barriers can be used to ensure vehicles are used only on established parking areas/haul routes

Source Category	Control Measure	Guidance
Trenching	16-1 Stabilize surface soils where trencher or excavator and support equipment will operate; and 16-2 Stabilize soils at the completion of trenching activities.	✓ Pre-watering of soils prior to trenching is an effective preventive measure. For deep trenching activities, pre-trench to 18 inches, soak soils via the pre-trench, and resuming trenching ✓ Washing mud and soils from equipment at the conclusion of trenching activities can prevent crusting and drying of soil on equipment
Truck loading	17-1 Pre-water material prior to loading; and 17-2 Ensure that freeboard exceeds 6 inches (CVC 23114)	✓ Empty loader bucket so no visible dust plumes are created ✓ Ensure that the loader bucket is close to the truck to minimize drop height while loading
Turf overseeding	18-1 Apply sufficient water immediately prior to conducting turf vacuuming activities to meet opacity and plume length standards; and 18-2 Cover haul vehicles prior to exiting the site.	✓ Haul waste material immediately off-site
Unpaved roads/parking lots	19-1 Stabilize soils to meet the applicable performance standards; and 19-2 Limit vehicular travel to established unpaved roads (haul routes) and unpaved parking lots.	✓ Restricting vehicular access to established unpaved travel paths and parking lots can reduce stabilization requirements
Vacant land	20-1 In instances where vacant lots are 0.10 acre or larger and have a cumulative area of 500 square feet or more that are driven over and/or used by motor vehicles and/or off-road vehicles, prevent motor vehicle and/or off-road vehicle trespassing, parking, and/or access by installing barriers, curbs, fences, gates, posts, signs, shrubs, trees or other effective control measures.	
Source: South Coast Air Quality Management District 2005a.		

The greatest air pollution effects occur throughout the SCAB from June through September. This condition is generally attributed to the large amount of pollutant emissions, light winds, and shallow vertical atmospheric mixing. This frequently reduces pollutant dispersion, thus causing elevated air pollution levels. Pollutant concentrations in the SCAB vary with location, season, and time of day. Ozone concentrations, for example, tend to be lower along the coast, higher in the near inland valleys, and lower in the far inland areas of the SCAB and adjacent desert.

The average project area summer (August) high and low temperatures are 96 degrees Fahrenheit (°F) and 62°F, respectively. The average project area winter (December) high and low temperatures are 67°F and 40°F, respectively. Annual average rainfall for the project area is 13.36 inches (Weather Channel 2012).

Wind patterns in the project vicinity (San Bernardino) display a unidirectional flow, with winds arising primarily from the southwest at an average speed of 1.44 meters per second. Calm wind conditions are present 4.21 percent of the time (South Coast Air Quality Management District 2011).

3.1.2.2 Description of Relevant Air Pollutants

The following is a general description of the pollutants for which there are standards (criteria pollutants) and ambient measurements. A description of toxic air contaminants (TACs) and naturally occurring asbestos (NOA), for which there are no standards, is also included. Ozone, and its precursors, ROG and NO_X; sulfates; visibility reducing particles; NO_2; and PM_{10} and $PM_{2.5}$ are considered to be regional pollutants because they or their precursors affect air quality on a regional scale. NO_2 reacts photochemically with ROGs to form ozone, while PM_{10} and $PM_{2.5}$ can form from the chemical reaction of atmospheric chemicals, including NO_X, sulfates, nitrates, and ammonia. These processes can occur at some distance downwind of the source of pollutants. Pollutants such as CO, SO_2, lead, and particulate matter are considered to be local pollutants because they tend to disperse rapidly with distance from the source. Although PM_{10} and $PM_{2.5}$ are considered to be regional pollutants, they can also be localized pollutants because direct emissions of particulate matter from automobile exhaust can accumulate in the air locally near the emission source. Table 3-1 provides references for the state and federal standards and the SCAB's attainment status for the pollutants. While summaries of health effects are provided under the general discussion of each pollutant below, more detailed discussions of health effects are provided in Appendix H.

Ozone

Ozone is a respiratory irritant that increases susceptibility to respiratory infections. It is also an oxidant that can cause substantial damage to vegetation and other materials.

Ozone is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors (ROG and NO_X) react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem.

State and federal standards for ozone have been set for one- and eight-hour averaging times. The state one-hour ozone standard is 0.09 part per million (ppm), not to be exceeded. EPA revoked the one-hour ozone standard on June 15, 2005. The federal eight-hour standard of 0.075 ppm went into effect on January 30, 2006. The California one-hour standard remains in effect. In addition, the state eight-hour standard is 0.070 ppm, not to be exceeded.

The SCAB is designated as an extreme nonattainment area for the state one-hour ozone standard and a nonattainment area for the state eight-hour ozone standard. For the federal eight-hour ozone standard, the SCAB is designated as an extreme nonattainment area.

Carbon Monoxide

CO is a public health concern because it combines readily with hemoglobin and reduces the amount of oxygen transported in the bloodstream. CO can cause health problems such as fatigue, headache, confusion, dizziness, and even death.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

State and federal CO standards have been set for one- and eight-hour averaging times. The state one-hour standard is 20 ppm, not to be exceeded, whereas the federal one-hour standard is 35 ppm, not to be exceeded more than one day per year. The state eight-hour standard is 9.0 ppm, while the federal standard is 9 ppm. This means that a monitored eight-hour CO concentration from 9.1 to 9.4 ppm violates the state but not the federal standard.

The SCAB is designated as an attainment area for the state one- and eight-hour CO standards and an attainment/maintenance area for both the federal one- and eight-hour CO standards.

Inhalable Particulate Matter

Particulates can damage human health and retard plant growth. Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulates also reduce visibility and corrode materials.

PM_{10} sources in Los Angeles County comprise both rural and urban sources, including agricultural burning, tilling of agricultural fields, industrial emissions, dust suspended by vehicle traffic, and secondary aerosols formed by reactions in the atmosphere.

The federal and state ambient air quality standard for particulate matter applies to two classes of particulates: $PM_{2.5}$ and PM_{10}. The state PM_{10} standards are 50 micrograms per cubic meter ($\mu g/m^3$) as a 24-hour average and 20 $\mu g/m^3$ as an annual arithmetic mean. The federal PM_{10} standard is 150 $\mu g/m^3$ as a 24-hour average. For $PM_{2.5}$, the state has adopted a standard of 12 $\mu g/m^3$ for the annual arithmetic mean. The federal $PM_{2.5}$ standards are 35 $\mu g/m^3$ for the 24-hour average and 15.0 $\mu g/m^3$ for the annual arithmetic mean.

The SCAB is designated as a nonattainment area for both the state 24-hour and arithmetic mean PM_{10} standards and a serious nonattainment area for the federal 24-hour PM_{10} standard. In addition, the SCAB is designated as a nonattainment area for the state annual arithmetic mean

$PM_{2.5}$ standard and a nonattainment area for both the federal 24-hour and annual arithmetic $PM_{2.5}$ standards.

Nitrogen Dioxide

NO_X is part of a family of highly reactive gases—the primary precursors to the formation of ground-level ozone—that react in the atmosphere to form acid rain. NO_X, a mixture of nitric oxide (NO) and NO_2, is produced from natural sources, motor vehicles, and other fuel combustion processes. NO, which is colorless and odorless, is oxidized in the atmosphere to form NO_2. NO_2 is an odorous, brown, acidic, highly corrosive gas that can affect human health and the environment. NO_X is a critical component of photochemical smog. NO_2 produces the yellowish-brown color of the smog. EPA has set a NAAQS for NO_2 but not for NO.

NO_X can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are still unclear, but continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidences of acute respiratory illness in children. Health effects associated with NO_X are increased incidences of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation along with pulmonary dysfunction. NO_X can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to the production of particulate nitrates. Airborne NO_X can impair visibility.

NO_X, a major component of acid deposition in California, may affect both terrestrial and aquatic ecosystems. NO_X in the air is a potentially significant contributor to a number of environmental effects, such as acid rain and eutrophication in coastal waters. Eutrophication occurs when a body of water suffers an increase in nutrients that reduces the amount of oxygen in the water, producing an environment that is destructive to fish and other animal life.

The state NO_2 standards are 0.18 ppm as a one-hour average and 0.030 ppm as an annual arithmetic mean. The federal NO_2 standards are 0.100 ppm as a one-hour average and 0.053 ppm as an annual arithmetic mean.

The SCAB is designated as a nonattainment area for both the state one-hour and annual arithmetic mean NO_2 standards and an attainment/unclassified area for the federal one-hour and annual arithmetic mean NO_2 standard.

Sulfur Oxide

SO_X is a family of colorless, pungent gases, including SO_2, that form primarily through the combustion of sulfur-containing fossil fuels (mainly coal and oil), metal smelting, and other industrial processes. SO_X can react to form sulfates, which significantly reduce visibility. SO_X is a precursor to particulate matter formation, which is considered to be in nonattainment status in the project area.

The major health concerns associated with exposure to high concentrations of SO_X include effects related to breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. Major subgroups of the population that are most sensitive to SO_X include individuals with cardiovascular disease or chronic lung disease (such as bronchitis or emphysema) as well as children and the elderly. SO_X emissions can also damage tree foliage and agricultural crops. Together, SO_X and NO_X are the major precursors to acid rain, which is associated with the acidification of lakes and streams and accelerated corrosion of buildings and monuments.

There are state and federal ambient air quality standards for SO_2 but not for SO_X. The state standards are 0.25 ppm as a one-hour average and 0.04 ppm as a 24-hour average. The federal standard is 0.075 ppm as a one-hour average.

The SCAB is designated as an attainment area for both the one- and 24-hour state SO_2 standards and an attainment/unclassified area for the federal one-hour standard.

Lead

Lead is a natural constituent of air, water, and the biosphere. Lead is neither created nor destroyed in the environment, so it essentially persists forever. Automobiles were once a major source of airborne lead because, prior to being phased out, lead was used as a gasoline additive to increase the octane rating. However, in recent years, ambient concentrations of lead have dropped dramatically.

Short-term exposure to high levels of lead can cause vomiting, diarrhea, convulsions, coma, or even death. However, even small amounts of lead can be harmful, especially to infants, young children, and pregnant women. Symptoms of long-term exposure to lower levels of lead may be less noticeable but still serious. Anemia is common, and damage to the nervous system may cause impaired mental function. Other symptoms are appetite loss, abdominal pain, constipation, fatigue, sleeplessness, irritability, and headache. Continued excessive exposure, as in an industrial setting, can affect the kidneys.

Lead exposure is most serious for young children because they absorb lead more easily than adults and are more susceptible to its harmful effects. Even low-level exposure may harm the intellectual development, behavior, size, and hearing of infants. During pregnancy, and especially in the last trimester, lead can cross the placenta and affect the fetus. Female workers exposed to high lead levels have more miscarriages and stillbirths.

The state lead standard is 1.5 $\mu g/m^3$ over a 30-day average; the federal lead standards are 1.5 $\mu g/m^3$ averaged over a calendar quarter and 0.15 $\mu g/m^3$ as a rolling three-month average.

The Los Angeles County portion of the SCAB is designated as a nonattainment area for the state 30-day average lead standard and a nonattainment area for the federal rolling three-month average lead standard. All other areas of the SCAB, including the project area, are designated attainment with respect to lead.

Hydrogen Sulfide

Hydrogen Sulfide (H_2S) is a colorless, flammable, and poisonous gas which is a respiratory irritant. It can cause headaches, nausea, and can result in neurological damage and premature death. It is produced from industrial processes such as refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. It can also come from natural sources such as volcanic areas and hot springs. The state air quality standard for hydrogen sulfide is 0.03 ppm as a one-hour average. At this level individuals may experience headaches and nausea.

Visibility Reducing Particles

Visibility-reducing particles (VRP) consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt.

Vinyl Chloride

The sources for vinyl chloride emissions from industrial process and manufacturing of plastic products, hazardous waste sites, and landfills. Vinyl chloride can cause neurological effects, liver damage, and cancer. It is also considered a toxic air contaminant. The state standard is 0.01 ppm as a 24-hour average.

Mobile-source Air Toxics/Toxic Air Contaminants

TACs are pollutants that may result in an increase in mortality or serious illness, or pose a present or potential hazard to human health. Health effects of TACs include cancer, birth defects, neurological damage, damage to the body's natural defense system, and diseases that lead to death. In 1998, following a ten-year scientific assessment process, CARB identified particulate matter from diesel-fueled engines as a TAC. Compared with other air toxics CARB has identified and controlled, diesel particulate matter (DPM) emissions are estimated to be responsible for about 70 percent of the total ambient air toxics risk (California Air Resources Board 2000).

The EPA in its latest final rule (2007) on the control of HAPs from mobile sources (72 FR 8430), requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOVES2010b model, even if vehicle activity (i.e., VMT) increases by 102 percent, as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emission rate for the priority MSATs is projected for the same time period (Federal Highway Administration 2012).

Naturally Occurring Asbestos

NOA is a fibrous material found in certain types of rock formations. It is the result of natural geologic processes and is commonly found near earthquake faults in California. Some rock types known to produce asbestos fibers are varieties of chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite.

Asbestos is harmless when it is left undisturbed under the soil, but if it becomes airborne, it can cause serious health problems. Human disturbance or natural weathering can break down asbestos into microscopic fibers that are easily inhaled. Inhalation of asbestos fibers can cause lung cancer, mesothelioma (a rare form of cancer found in the lining of internal organs), and asbestosis (a progressive, non-cancer disease of the lungs involving a buildup of scar tissue, which inhibits breathing) (U.S. Environmental Protection Agency 2008a, 2008b).

Both EPA and CARB have issued guidance for reducing exposure to NOA. EPA's suggested measures include leaving NOA material undisturbed, covering or capping NOA material, limiting dust-generating activities, or excavating and disposing of NOA material

(U.S. Environmental Protection Agency 2008c). CARB has adopted Airborne Toxic Control Measures (ATCMs), which are required for road construction and maintenance projects, unless the project is found to be exempt. These ATCMs include stabilizing unpaved surfaces subject to vehicle traffic, reducing vehicle speeds, wetting or chemically stabilizing storage piles, and eliminating track-out material from equipment (California Air Resources Board 2008a).

Although NOA is common in certain counties of California, it is not likely to be found in San Bernardino County (California Department of Conservation 2000).

3.1.2.3 Existing Air Quality Conditions

Existing air quality conditions in the project area can be characterized in terms of the ambient air quality standards that the federal and state governments have established for various pollutants (see Table 3-1) and the monitoring data collected in the region. Monitoring data concentrations are typically expressed in terms of ppm or $\mu g/m^3$. The nearest air quality monitoring station in the vicinity of the project area is the San Bernardino-4th Street monitoring station, which is approximately one mile west of the westernmost extent of the project area and is identified on Figure 3-1. The San Bernardino-4th Street station monitors for ozone, CO, PM_{10}, and $PM_{2.5}$.

Air quality monitoring data from the San Bernardino-4th Street monitoring station is summarized in Table 3-3. These data represent air quality monitoring results for the last three years (2011–2013) from which complete data are available.

Table 3-3. Ambient Air Quality Monitoring Data Measured at the San Bernardino-4th Street Monitoring Station

Pollutant Standards	2011	2012	2013
1-Hour Ozone			
Maximum 1-hour concentration (ppm)	0.135	0.124	0.139
Number of days standard exceeded[1]			
CAAQS 1-hour (> 0.09 ppm)	40	41	22
8-Hour Ozone			
National maximum 8-hour concentration (ppm)	0.121	0.109	0.112
National second-highest 8-hour concentration (ppm)	0.104	0.102	0.103
State maximum 8-hour concentration (ppm)	0.121	0.109	0.113
State second-highest 8-hour concentration (ppm)	0.105	0.103	0.104
Number of days standard exceeded[1]			
NAAQS 8-hour (> 0.075 ppm)	39	54	36
CAAQS 8-hour (> 0.070 ppm)	66	77	53
Nitrogen Dioxide (NO2)			
National maximum 1-hour concentration (ppb)	61.9	67.0	72.1
National second-highest 1-hour concentration (ppb)	60.2	66.7	63.4
State maximum 1-hour concentration (ppb)	61	67	72
State second-highest 1-hour concentration (ppb)	60	66	63
Number of days standard exceeded[1]			
NAAQS 1-hour (≥ 100 ppb)	0	0	0
CAAQS 1-hour (≥ 180 ppb)	0	0	0

Pollutant Standards	2011	2012	2013
Carbon Monoxide (CO)			
National[2] maximum 8-hour concentration (ppm)	1.74	1.64	--
National[2] second-highest 8-hour concentration (ppm)	1.48	1.37	--
California[3] maximum 8-hour concentration (ppm)	1.74	1.64	--
California[3] second-highest 8-hour concentration (ppm)	1.48	1.55	--
Maximum 1-hour concentration (ppm)	2.90	2.73	--
Second-highest 1-hour concentration (ppm)	2.47	2.58	--
Number of days standard exceeded[1]			
NAAQS 8-hour (≥ 9 ppm)	0	0	--
CAAQS 8-hour (≥ 9.0 ppm)	0	0	--
NAAQS 1-hour (≥ 35 ppm)	0	0	--
CAAQS 1-hour (≥ 20 ppm)	0	0	--
Particulate Matter (PM10)[4]			
National[2] maximum 24-hour concentration ($\mu g/m^3$)	128.4	68.1	177.3
National[2] second-highest 24-hour concentration ($\mu g/m^3$)	100.1	63.9	66.8
State[3] maximum 24-hour concentration ($\mu g/m^3$)	54.0	51.0	64.5
State[3] second-highest 24-hour concentration ($\mu g/m^3$)	54.0	49.0	58.9
State annual average concentration ($\mu g/m^3$)[5]	30.1	--	30.1
Number of days standard exceeded[1]			
NAAQS 24-hour (> 150 $\mu g/m^3$)[6]	0	0	1
CAAQS 24-hour (> 50 $\mu g/m^3$)[6]	12	--	12
Particulate Matter (PM2.5)			
National[2] maximum 24-hour concentration ($\mu g/m^3$)	65.0	34.8	55.3
National[2] second-highest 24-hour concentration ($\mu g/m^3$)	45.7	33.5	34.6
National annual designation value ($\mu g/m^3$)	65.0	34.8	55.3
National annual average concentration ($\mu g/m^3$)	45.7	33.5	34.6
State annual designation value ($\mu g/m^3$)	--	--	--
State annual average concentration ($\mu g/m^3$)[5]	--	--	--
Number of days standard exceeded[1]			
NAAQS 24-hour (> 35 $\mu g/m^3$)	2	0	3

Sources: California Air Resources Board 2015.

Notes: CAAQS = California Ambient Air Quality Standards.
NAAQS = National Ambient Air Quality Standards.
— = insufficient data available to determine the value.

[1] An exceedance is not necessarily a violation.

[2] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

[3] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, state statistics are based on California-approved samplers.

[4] Measurements usually are collected every 6 days.

[5] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[6] Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored.

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Figure 3-1
San Bernardino-4th Street Monitoring Station Location
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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As shown in Table 3-3, the San Bernardino-4th Street monitoring station has experienced multiple violations of the state one-hour ozone standard, federal and state eight-hour ozone standards, state PM_{10} standards, and federal and state $PM_{2.5}$ standards multiple times during each of the previous three years.

Attainment Status

EPA has classified the SCAB as an extreme nonattainment area for the federal eight-hour ozone standard. For both the one-hour and eight-hour federal CO standard, EPA has classified the SCAB as an attainment/maintenance area. EPA has classified the SCAB as a serious nonattainment area for the federal PM_{10} standard and as a nonattainment area for the federal $PM_{2.5}$ standard. CARB has classified the SCAB as an extreme nonattainment area for the state one-hour ozone standard and as a nonattainment area for the state eight-hour ozone standard. For the state CO standard, CARB has classified the SCAB as an attainment area. CARB has classified the SCAB as a nonattainment area for the state PM_{10} and $PM_{2.5}$ standards. The SCAB's attainment status for each of these pollutants relative to the NAAQS and CAAQS is summarized in Table 3-1.

3.1.2.4 Sensitive Receptors

Caltrans defines *sensitive receptors* (aka *sensitive land uses*) as schools, medical centers and similar health care facilities, child care facilities, parks, and playgrounds (California Department of Transportation 2008). The area immediately surrounding the project site consists of residential uses, schools, recreation, medical (convalescent) centers, and churches. Analyses performed by CARB indicate that providing a separation of 1,000 feet from high-traffic areas would substantially reduce the exposure to air contaminant concentrations and a decrease in asthma symptoms in children (California Air Resources Board 2005). The closest sensitive receptors are located approximately 50 feet from the existing freeway mainline. Sensitive receptors located within 1,000 feet of the proposed project alignment are shown in Figure 3-2.

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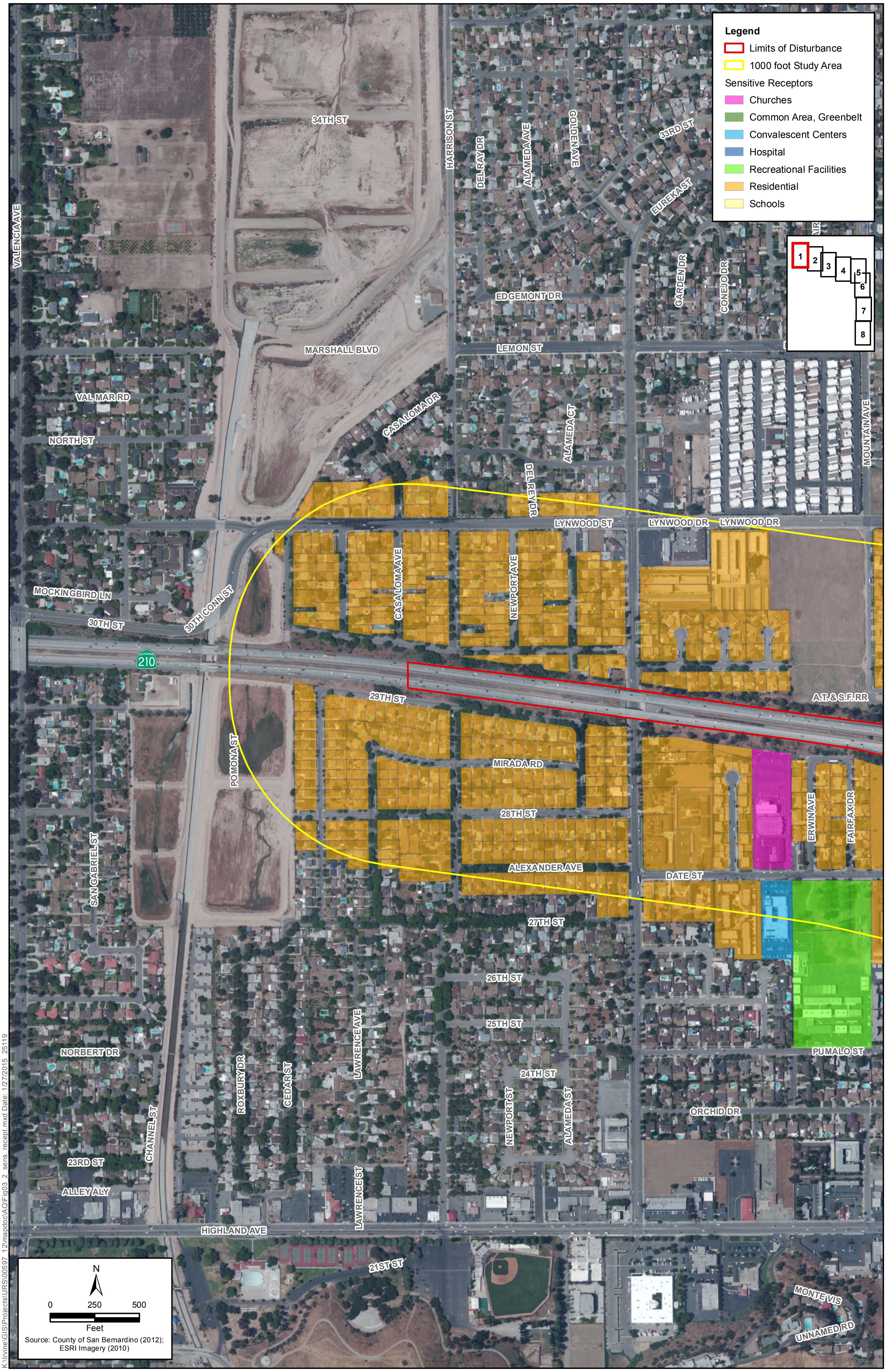

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Figure 3-2 Sheet 1
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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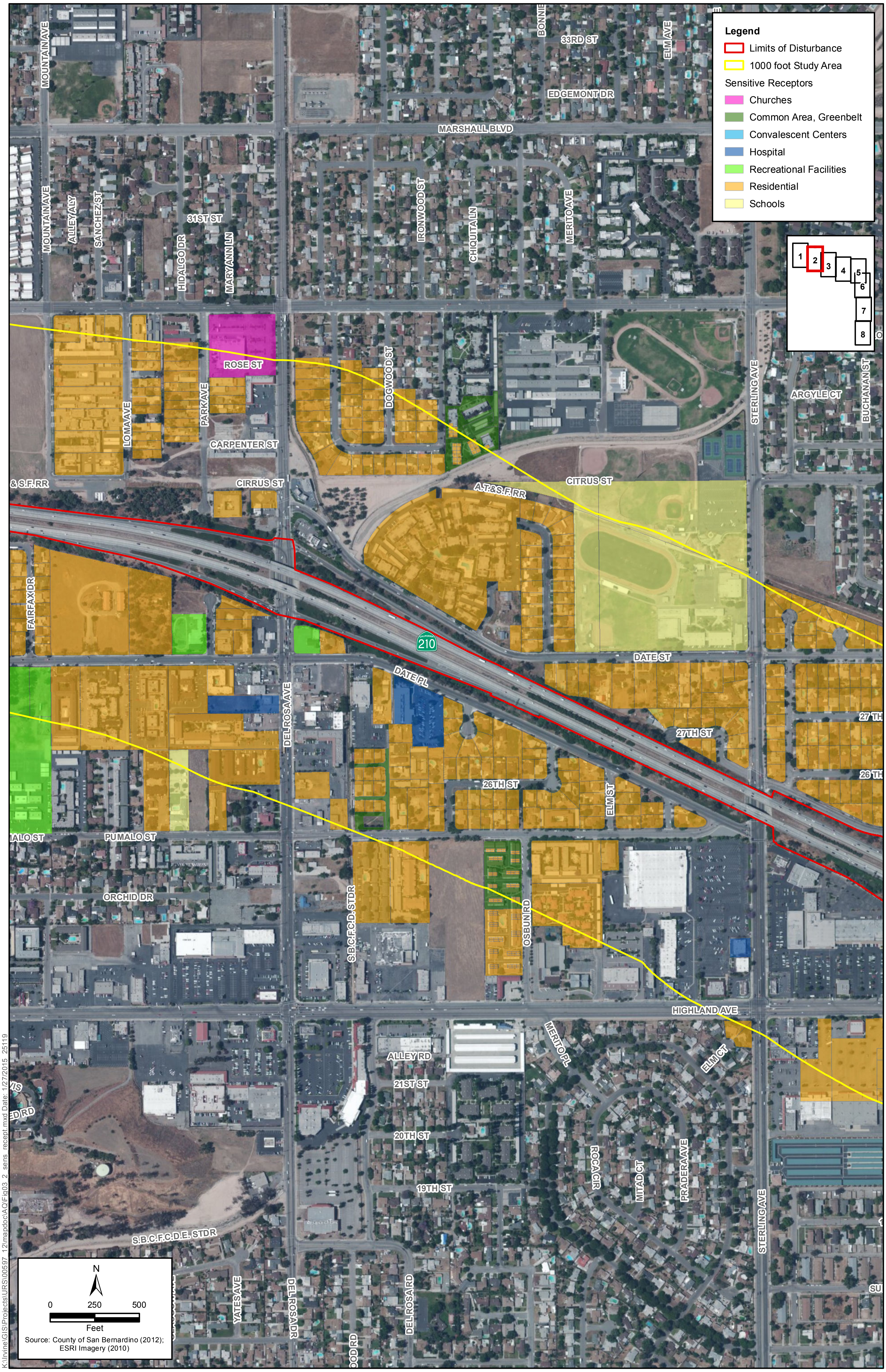

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Figure 3-2 Sheet 2
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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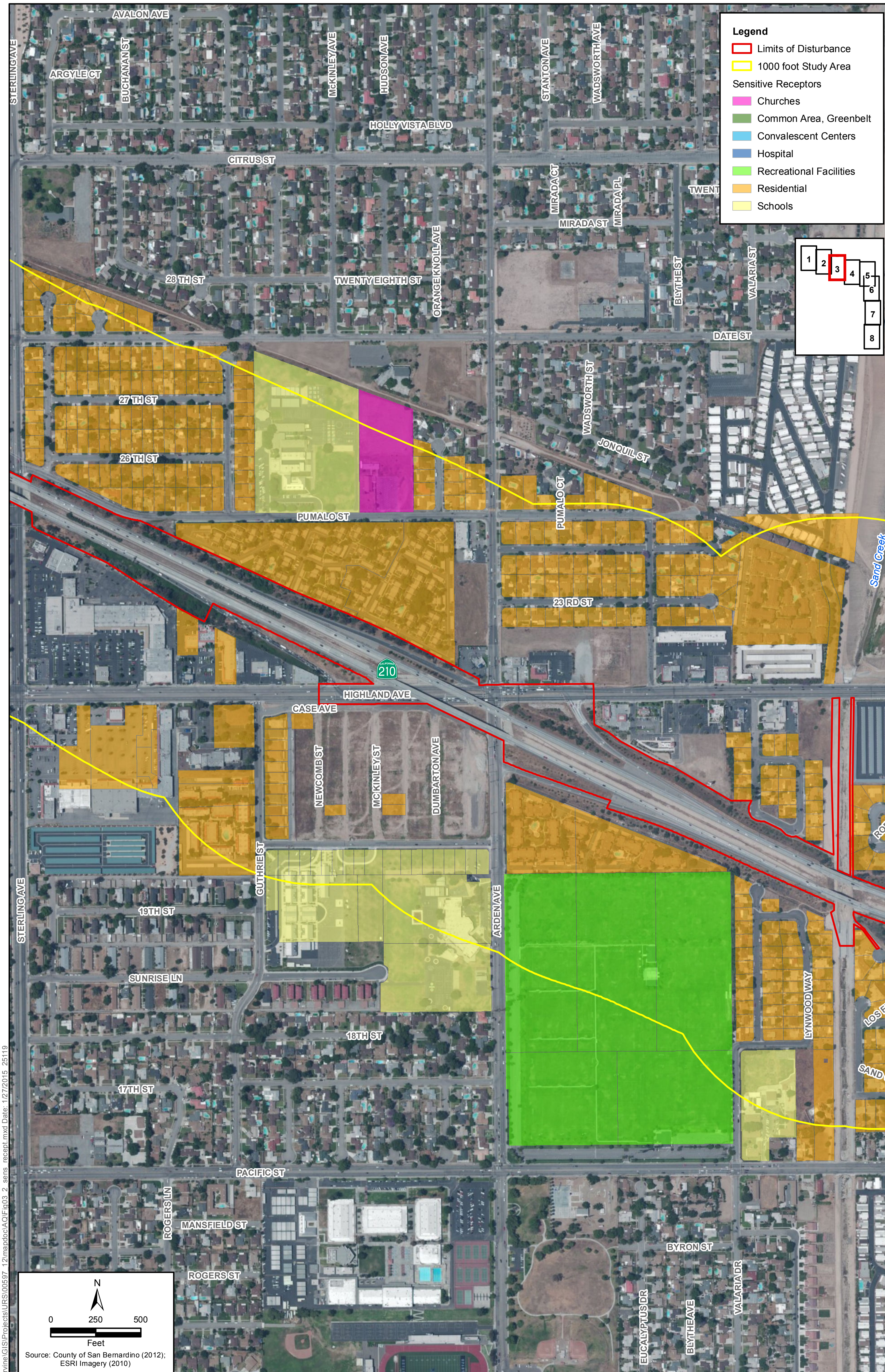

Figure 3-2 Sheet 3
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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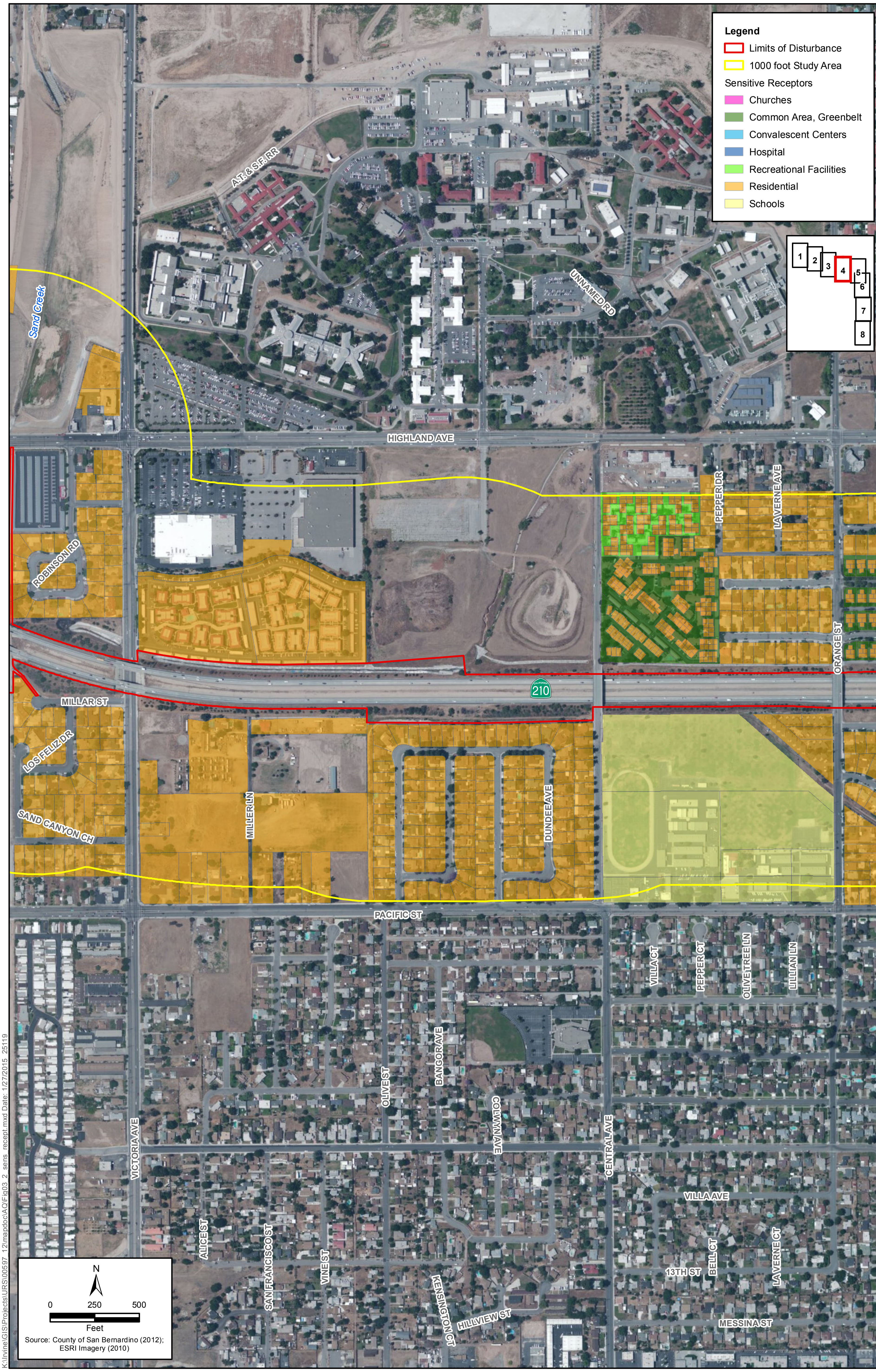

Figure 3-2 Sheet 4
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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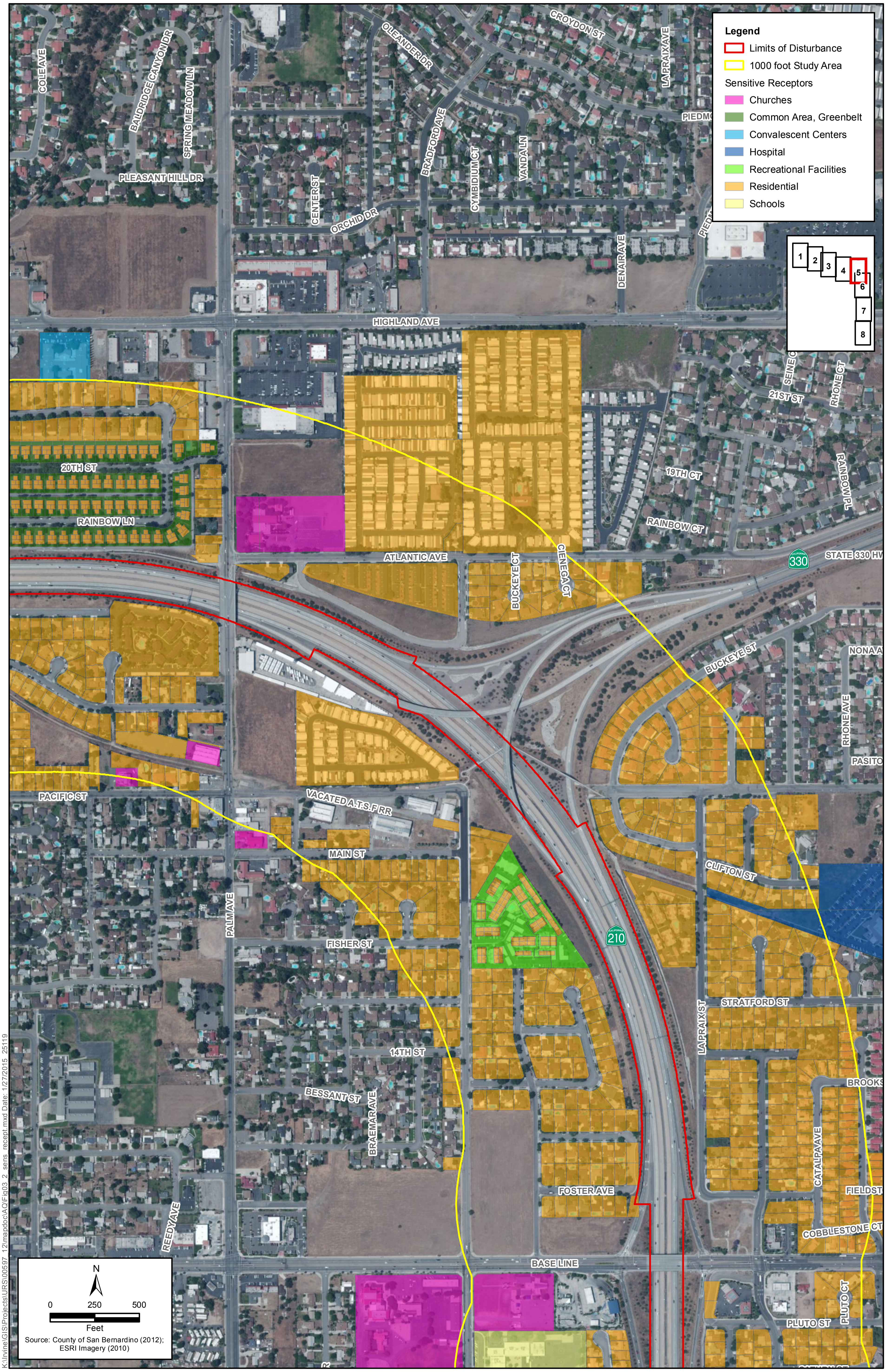

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Figure 3-2 Sheet 5
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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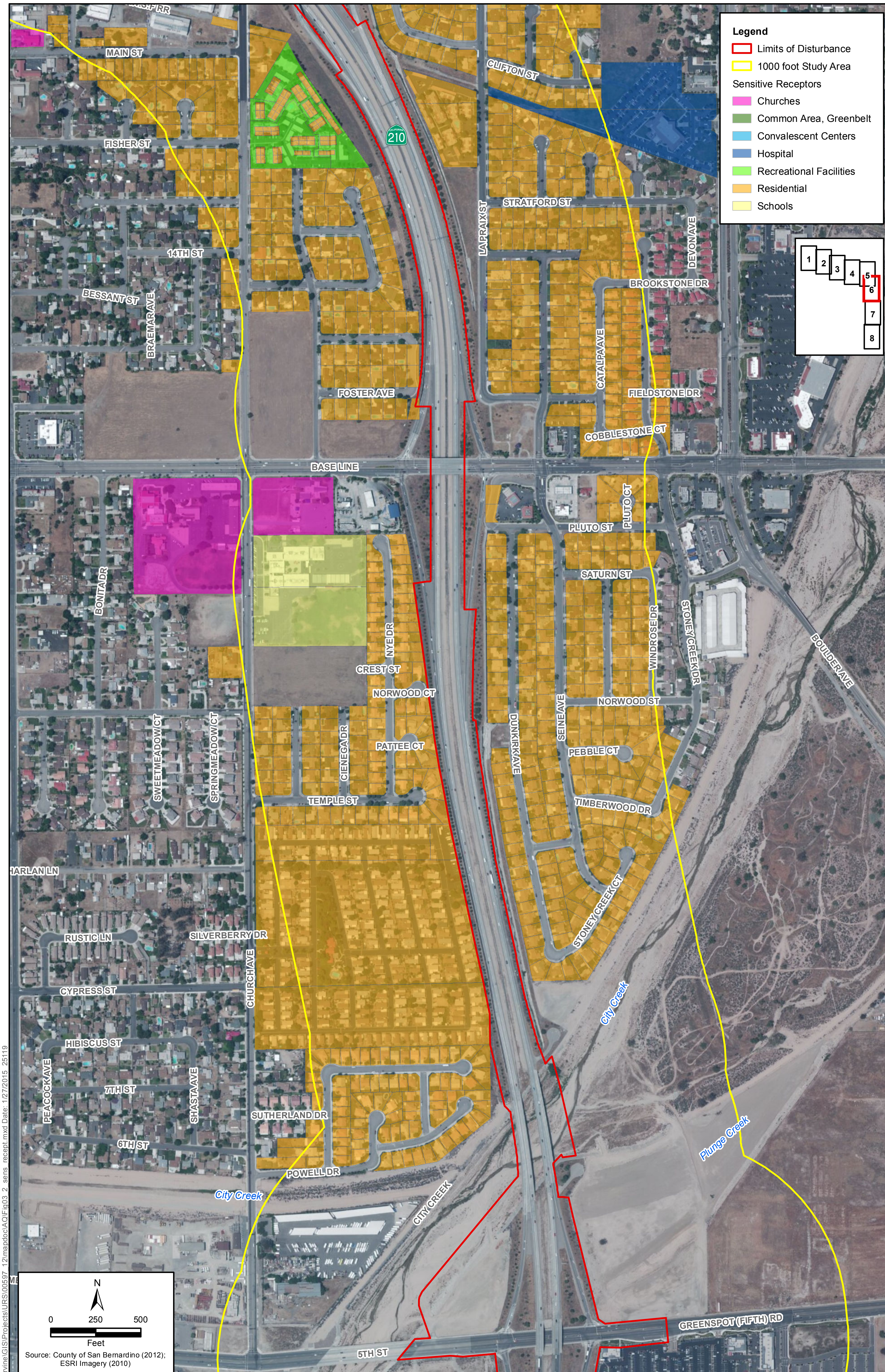

Figure 3-2 Sheet 6
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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Figure 3-2 Sheet 7
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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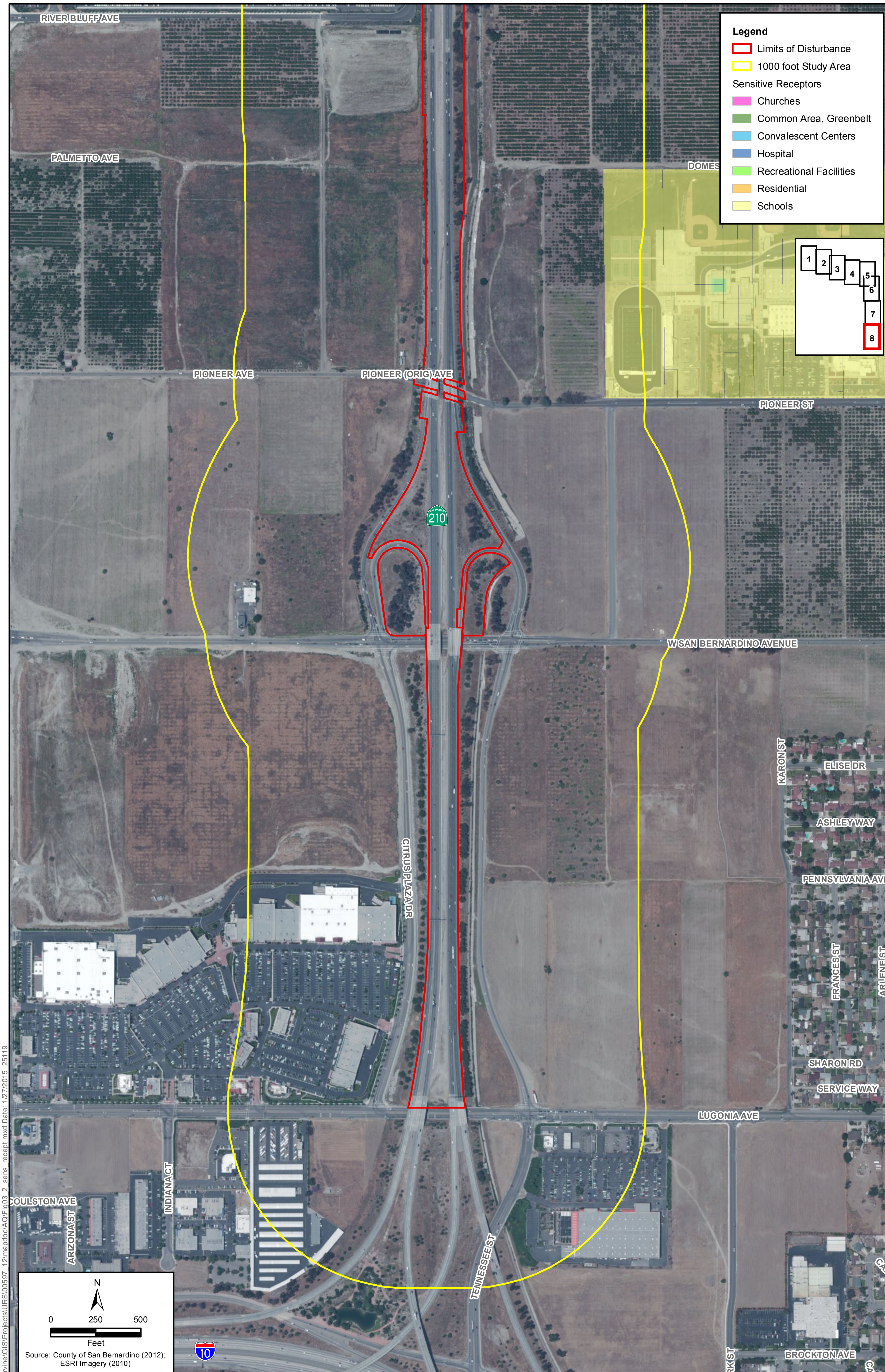

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Figure 3-2 Sheet 8
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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3.2 Environmental Consequences

3.2.1 Methods

The proposed project would generate construction-related and operational emissions. The methodology used to evaluate construction and operational effects is described below.

3.2.1.1 Construction Effect Assessment Methodology

Construction of the proposed project would be a source of fugitive dust and exhaust emissions that could have temporary effects on local air quality (i.e., exceed state air quality standards for $PM_{2.5}$ and PM_{10}). Such emissions would result from earthmoving and the use of heavy equipment as well as land clearing, ground excavation, cut-and-fill operations, and the construction of roadways. Dust emissions can vary substantially from day to day, depending on the level of activity, the specific operations, and the prevailing weather. A major portion of dust emissions for the proposed project would most likely be caused by construction traffic in temporary construction areas. A quantitative analysis of construction emissions is provided in Section 3.2.2.1, below, to disclose potential air quality effects that may result from the proposed project.

3.2.1.2 Operational Effect Assessment Methodology

The primary operational emissions associated with the proposed project are CO, PM_{10}, $PM_{2.5}$, ozone precursors (ROG and NO_X), and CO_2 emitted as vehicle exhaust. In addition to emissions from vehicle exhaust, PM_{10} and $PM_{2.5}$ can result from vehicular travel on paved roads (entrained dust). With respect to criteria pollutants, the evaluation of transportation conformity was done by affirming that the proposed project is included in the currently conforming RTP and FTIP modeling lists, as currently proposed. In addition, estimates of criteria pollutant exhaust emissions (ozone precursors, CO, PM_{10}, and $PM_{2.5}$) as well as CO_2 emissions were quantified by using EMFAC2011 emissions factors. Re-entrained dust emissions were calculated using the emission factor equation found in EPA's *Compilation of Air Pollutant Emission Factors,* AP-42, Section 13.2.1 (U.S. Environmental Protection Agency 2011).

The potential impacts related to localized CO hot-spot emissions were evaluated following the methodology prescribed in the *Transportation Project-level Carbon Monoxide Protocol* (CO Protocol) developed for Caltrans by the Institute of Transportation Studies at the University of California, Davis (Garza et al. 1997). The potential impacts related to localized particulate matter were evaluated using the EPA and FHWA's guidance manual, *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2010). MSAT emissions were evaluated using the FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (Federal Highway Administration 2012) and California-specific guidance from Caltrans (Brady pers. comm.; California Air Resources Board 2005).

Transportation Conformity

Regional Conformity

The proposed project is located in an extreme nonattainment area for the federal eight-hour ozone standard (Table 3-1). Because ozone and its precursors are regional pollutants, the proposed project must be evaluated under the transportation conformity requirements described earlier. An affirmative regional conformity determination must be made before the proposed project can proceed. A determination of conformity can be made if the proposed project is described, as currently proposed, in an EPA-approved RTP and TIP.

Project-level Conformity

Carbon Monoxide

The proposed project is located in an attainment/maintenance area for the federal CO standard (Table 3-1). Consequently, the evaluation of transportation conformity for CO is required. The CO transportation conformity analysis is based on the CO Protocol developed for Caltrans by the Institute of Transportation Studies at the University of California, Davis (Garza et al. 1997). The CO Protocol details a qualitative step-by-step procedure to determine whether project-related CO concentrations have the potential to generate new air quality violations, worsen existing violations, or delay attainment of the CAAQS or NAAQS for CO. If the screening procedure reveals that such a potential may exist, then the CO protocol details a quantitative method to ascertain project-related CO impacts.

Particulate Matter

The proposed project is located in a serious nonattainment area for the federal PM_{10} standard and a nonattainment area for the federal $PM_{2.5}$ standard (Table 3-1). On March 10, 2006, EPA published a final rule that establishes the transportation conformity criteria and procedures for determining which transportation projects must be analyzed for local air quality effects in $PM_{2.5}$ and PM_{10} nonattainment and maintenance areas. The final rule requires PM_{10} and $PM_{2.5}$ hot-spot analyses to be performed for any POAQC or any other project identified by the $PM_{2.5}$ SIP as a localized air quality concern.

For the assessment of PM_{10} hot spots, the final rule has separate requirements for PM_{10} nonattainment/maintenance areas with and without approved conformity SIPs. For areas without approved conformity SIPs, the assessment methodology is similar to the $PM_{2.5}$ analysis in that a hot-spot analysis is to be performed only for POAQCs. For areas with an approved conformity SIP, the final rule does not apply (i.e., when a state withdraws the existing provisions from its approved conformity SIP and EPA approves the withdrawal or when a state includes the revised PM_{10} hot-spot requirements in a SIP revision and EPA approves that SIP revision), and an analysis must be performed that meets the requirements in the approved PM_{10} SIP.

In November 2013, FHWA and EPA issued a guidance document titled *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (Federal Highway Administration and U.S. Environmental Protection Agency 2013). This guidance identifies examples of projects that are most likely POAQCs and details a qualitative step-by-step screening procedure to determine whether project-related particulate emissions have the potential to generate new air quality violations, worsen existing violations, or delay attainment of the NAAQS for $PM_{2.5}$ or PM_{10}.

POAQCs are certain highway and transit projects that involve significant levels of diesel traffic or any other project identified in the $PM_{2.5}$ or PM_{10} SIP as a localized air quality concern. The following list provides examples of POAQCs.

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

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

- Any new or expanded highway project that services primarily gasoline-powered vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel-powered vehicles), including such projects involving congested intersections operating at LOS D, E, or F.
- An intersection channelization project or interchange configuration project that involves either turn lanes or slots or lanes or movements that are physically separated. These kinds of projects improve freeway operations by smoothing traffic flow and vehicle speeds by improving weave and merge operations, which would not be expected to create or worsen $PM_{2.5}$ or PM_{10} violations.
- Intersection channelization projects, traffic circles or roundabouts, intersection signalization projects at individual intersections, and interchange reconfiguration projects that are designed to improve traffic flow and vehicle speeds, do not involve any increases in idling, and are expected to have a neutral or positive influence on $PM_{2.5}$ or PM_{10} emissions as a result.

For projects identified as not being a POAQC, qualitative $PM_{2.5}$ and PM_{10} (for regions without an approved conformity SIP) hot-spot analyses are not required. For these types of projects, state and local project sponsors should briefly document in their project-level conformity determinations that CAA and 40 CFR 93.116 requirements were met without a hot-spot analysis because such projects have been found to not be of air quality concern under 40 CFR 93.123(b)(1).

For areas with an approved conformity SIP, the final rule does not apply (i.e., when a state withdraws the existing provisions from its approved conformity SIP and EPA approves the withdrawal or when a state includes the revised PM_{10} hot-spot requirements in a SIP revision and EPA approves that SIP revision). For these areas, the assessment should continue to follow the PM_{10} hot-spot procedures in their existing conformity SIPs until the SIP is updated and subsequently approved by EPA.

The guidance for conducting a PM_{10} hot-spot analysis for conformity purposes has separate requirements for PM_{10} nonattainment/maintenance areas with and without approved conformity SIPs. The CFR indicates that a conformity SIP for particulate matter has not been approved for the SCAB by EPA (40 CFR 52.223). Consequently, if the project is a POAQC, it must undergo a PM_{10} (and $PM_{2.5}$) hot-spot conformity determination. Projects identified as not being a POAQC do not require qualitative $PM_{2.5}$ and PM_{10} hot-spot analyses. Because the proposed project would be located in an area classified as a nonattainment area for the federal PM_{10} and $PM_{2.5}$ standards, a determination must be made as to whether it would result in a PM_{10} or $PM_{2.5}$ hot spot.

Mobile-source Air Toxics

MSAT emissions were evaluated using a combination of FHWA's *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* (Federal Highway Administration 2012) and preliminary California-specific guidance from Caltrans. At this time, the California-specific guidance is identical to the FHWA's guidance, except for California-specific criteria for performing qualitative and quantitative analysis (Brady pers. comm.). The California-specific criteria are found in CARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB Land Use Handbook) (Brady pers. comm., California Air Resources Board 2005). FHWA's interim guidance uses a tiered approach regarding how MSATs should be addressed in NEPA documents for highway projects (Federal Highway Administration 2012). Depending on the specific project circumstances, FHWA has identified three levels of analysis:

1. No analysis for exempt projects or projects with no potential for meaningful MSAT effects.
2. Qualitative analysis for projects with low potential MSAT effects.
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Exempt Projects or Projects with No Meaningful Potential MSAT Effects

The types of projects included in this category are as follows:

- Projects qualifying for a categorical exclusion under 23 CFR 771.117(c).
- Projects exempt under the CAA conformity rule under 40 CFR 93.126.
- Other projects with no meaningful effects on traffic volumes or vehicle mix.

Projects that are categorically excluded under 23 CFR 771.117(c), or are exempt under the CAA pursuant to 40 CFR 93.126, require no analysis or discussion of MSATs. Documentation sufficient to demonstrate that the project qualifies for a categorical exclusion and/or is exempt will suffice. For other projects with no or negligible traffic effects, regardless of the class of NEPA environmental document, no MSAT analysis is required.[3] However, the project record must document the basis for the determination of "no meaningful potential effects" with a brief description of the factors considered.

[3] The types of projects categorically excluded under 23 CFR 771.117(d) or exempt from certain conformity requirements under 40 CFR 93.127 do not warrant an automatic exemption from an MSAT analysis, but they usually will have no meaningful impact.

Projects with Low Potential MSAT Effects

This category covers a broad range of projects because projects included in this category are those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to increase emissions meaningfully.

FHWA anticipates that most highway projects will fall into this category. Any projects not meeting the criteria for higher potential effects should be included in this category. Examples of these types of projects are minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where design-year AADT is projected to be less than 150,000. In California, the corresponding AADT criteria under which a project is considered to have low potential MSAT effects are 100,000 for urban non-freeways and 50,000 for rural non-freeways. In addition, California has a third criterion, which states that if freeway modifications are to be completed more than 500 to 1,000 feet from a sensitive land use (e.g., residences, schools, day care centers, playgrounds, and medical facilities), the project is anticipated to result in low potential MSAT effects (Brady pers. comm., California Air Resources Board 2005). A qualitative assessment of emissions projections should be conducted for these projects. The qualitative assessment would compare, in narrative form, the expected effect of the proposed project on traffic volumes, vehicle mix, or routing of traffic and the associated changes in MSATs for the project alternatives, based on VMT, vehicle mix, and speed. The assessment would also discuss national trend data projecting substantial overall reductions in emissions due to stricter engine and fuel regulations issued by EPA. Because the emission effects of these projects would be low, FHWA expects that there would be no appreciable difference in overall MSAT emissions among the various alternatives. In addition, quantitative emissions analysis of these types of projects will not yield credible results that are useful to project-level decision-making because of the limited capabilities of the transportation and emissions forecasting tools.

Projects with Higher Potential MSAT Effects

Projects included in this category have the potential for meaningful differences among project alternatives. FHWA expects only a limited number of projects to meet this two-pronged test. To fall into this category, projects must create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of DPM in a single location or create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes where the AADT volumes are projected to be in the range of 140,000 to 150,000,[4] or greater, by the design year. Projects in this category must also be proposed to be located in proximity to populated areas or in rural areas in proximity to concentrations of vulnerable populations (i.e., people in schools, nursing homes, hospitals). In California, the corresponding AADT criteria over which a project is considered to have higher potential for MSAT effects are 100,000 for urban non-freeways and 50,000 for rural non-freeways. In addition, California considers a project to have higher potential MSAT effects if modifications to freeways are proposed to take place within 500 to 1,000 feet of sensitive land uses

[4] Using EPA's MOVES2010b emissions model, FHWA technical staff determined that this range of AADT would result in emissions significantly lower than the CAA definition of a major HAP source (i.e., 25 tons per year for all HAPs or ten tons per year for any single HAP). Variations in conditions such as congestion or vehicle mix could warrant a different range for AADT.

(e.g., residences, schools, day care centers, playgrounds, and medical facilities) (Brady pers. comm., California Air Resources Board 2005).

Projects falling in this category should be more rigorously assessed for effects, and FHWA should be contacted for assistance in developing a specific approach for assessing effects. This approach would include a quantitative analysis that would attempt to measure the level of emissions for the seven priority MSATs for each alternative for use as a basis of comparison. This analysis also may address the potential for cumulative effects, where appropriate, based on local conditions. How and when cumulative effects should be considered would be addressed as part of the assistance outlined above. If the analysis for a project in this category indicates meaningful differences in levels of MSAT emissions, mitigation options should be identified and considered.

Applicable Project MSAT Category Assessment

The AADT data provided for the five segments on the SR-210 mainline along the project limits are summarized below in Table 3-4. As shown therein, Opening Year (2020) and Horizon Year (2040), SR-210 mainline ADT within the project vicinity would be below the 140,000 ADT criteria established by FHWA for all freeway segments, but would exceed the California criteria of 100,000 ADT. In addition, as previously mentioned in Section 3.1.2.4, "Sensitive Receptors," the project is proposed to be located in proximity to populated areas. As such, because the mainline ADT would exceed the 100,000 ADT and the receptor proximity criterion California uses, the proposed project is considered to be a project with higher potential MSAT effects, and MSAT emissions must be quantified and further evaluated.

Table 3-4. Projection of SR-210 Mainline Traffic Volumes

SR-210 Mainline Segment	Opening Year 2020		Horizon Year 2040	
	No-Build	**Build**	**No-Build**	**Build**
West of Highland Ave	95,800	98,400	127,400	129,000
Highland Ave to Victoria Ave	79,400	83,200	114,400	116,600
Victoria Ave to SR-330	79,400	83,200	103,000	106,000
SR-330 to Baseline Rd	78,800	81,000	102,000	102,800
Baseline Rd to 5th St	84,000	89,800	103,000	107,400
5th St to San Bernardino Ave	99,000	107,200	118,000	126,000
South of San Bernardino Ave	95,400	96,200	115,600	116,200
Source: URS Corporation 2012.				

Criteria Pollutant and Greenhouse Gas Emissions

Mobile exhaust emissions were calculated using the latest project-level EMission FACtors (EMFAC) model (EMFAC2011), which is maintained by CARB and approved by EPA for developing on-road motor vehicle emission inventories and conformity analyses. Re-entrained road dust emissions were calculated using the emission factor equation found in EPA's *Compilation of Air Pollutant Emission Factors,* AP-42 Section 13.2.1 document (U.S. Environmental Protection Agency 2011). Traffic data used for estimating project emissions was provided by the project traffic engineer (URS Corporation 2012, Noel Casil pers. comm.).

Emissions of ozone precursors (TOG and NO_X), CO, PM_{10}, $PM_{2.5}$, and CO_2 were modeled for the Existing Year (2012), Opening Year (2020) Build and No-Build, and the Design Year (2040) Build and No-Build Alternatives. The project traffic engineers provided peak- and off-peak–period VMT data distributed into five-mile-per-hour (mph) speed bins from five to 60 mph. VMT data included vehicle activity within the immediate project region. The traffic data provided by the project traffic engineers is summarized in Table 3-5.

3.2.2 Impact Evaluation

The evaluation of project construction and operations impacts is provided below.

3.2.2.1 Construction Impacts

Implementation of the proposed project would result in the construction of widened roads, overcrossings, interchange reconfigurations, and bypass connectors. Construction is anticipated to begin during 2017 and end during 2019 (assumed to be 24 months). Temporary construction emissions would result from grubbing/land clearing, grading/excavation, drainage/utility/ subgrade construction, paving, and the commuting patterns of construction workers. Pollutant emissions would vary daily, depending on the level of activity, specific operations, and prevailing weather conditions.

During construction, short-term degradation of air quality may occur because of the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities related to construction. Emissions from construction equipment also are anticipated and would include CO, NO_X, ROG, directly emitted particulate matter (PM_{10} and $PM_{2.5}$), and toxic air contaminants (aka MSATs), such as diesel exhaust particulate matter. Ozone is a regional pollutant that is derived from NO_X and ROG in the presence of sunlight and heat.

Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, removing or improving existing roadways, and paving roadway surfaces. 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}, $PM_{2.5}$, and small amounts of CO, SO_2, NO_X, and ROG. Sources of fugitive dust would include disturbed soils at the construction site and the trucks that carry uncovered loads of soil. 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 greater distances from the construction site.

In addition to dust-related PM_{10} and $PM_{2.5}$ emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_X, ROG, and some soot particulate (PM_{10} and $PM_{2.5}$) in exhaust emissions. If construction activities were to increase traffic congestion in the area, CO and other emissions from traffic would increase slightly while 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 CARB regulations, off-road diesel fuel used in California must meet the same sulfur and other standards as on-road diesel fuel; therefore, SO_2-related issues due to diesel exhaust would be minimal. Some phases of construction, particularly asphalt paving, would result in short-term odors in the immediate area of each paving site. Such odors would be quickly dispersed below detectable thresholds as distance from the site increases.

Construction-period criteria pollutant emissions were estimated using the Sacramento Metropolitan Air Quality Management District's Roadway Construction Emissions Model, version 7.1.2 (Sacramento Metropolitan Air Quality Management District 2012). Although the model was developed for Sacramento-area conditions in terms of fleet emission factors, silt loading, and other modeling assumptions, it is considered adequate by the San Joaquin Valley Air Pollution Control District for estimating road construction emissions under its indirect source regulations and SCAQMD in its CEQA guidance. As such, it is used for that purpose in this project analysis. A summary of emissions estimates is provided in Table 3-6. Modeling assumptions are detailed in Appendix F.

The SCAQMD significance thresholds presented in Table 3-6 are provided for informational purposes only. As Lead Agency under CEQA, Caltrans has not adopted or endorsed such thresholds for the evaluation of construction emissions. The implementation of the exhaust and fugitive dust emission control measures identified below in Section 3.3 would avoid and/or minimize any impacts on air quality.

Table 3-5. VMT Data

Analysis Period/ Facility Type	Estimate of Vehicle Miles Traveled by Speed-Bin													
	0–5	5–10	10–15	15–20	20–25	25–30	30–35	35–40	40–45	45–50	50–55	55–60	>60	TOTAL
EXISTING YEAR 2012														
Freeway	0	0	0	0	0	0	40,242	37,270	144,726	272,482	354,273	551,149	318,967	1,719,109
High Occupancy Vehicle (HOV)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramps	0	776	5,610	18,197	37,750	95,450	20,793	0	0	0	0	0	0	178,575
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	2,965	17,529	49,011	106,531	112,357	49,369	7,036	0	0	0	344,800
Minor Arterial	0	0	764	2,636	36,943	107,678	282,712	116,780	13,142	0	0	0	0	560,655
Major Collector	0	0	0	2,758	20,900	49,297	32,702	1,413	0	0	0	0	0	107,070
Minor Collector	0	0	0	0	0	2,247	0	0	0	0	0	0	0	2,247
Centroid	0	0	0	75,925	40,227	18	0	0	0	0	0	0	0	116,170
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	776	6,374	102,482	153,349	303,701	482,980	267,820	207,237	279,519	354,273	551,149	318,967	3,028,627
OPENING YEAR 2020 NO-BUILD														
Freeway	0	0	0	7,115	14,420	22,694	60,644	57,665	125,665	268,378	376,537	569,552	462,369	1,965,040
HOV	0	0	0	0	0	0	0	0	0	0	0	0	2,853	2,853
Ramps	178	2,119	7,523	21,875	39,428	102,562	23,910	0	0	0	0	0	0	197,594
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	2,118	19,254	55,736	112,381	137,155	57,822	11,546	403	0	0	396,415
Minor Arterial	0	380	946	5,077	38,538	129,096	313,271	154,666	20,317	0	0	0	0	662,292
Major Collector	0	0	295	2,821	26,079	52,378	34,271	1,044	0	0	0	0	0	116,888
Minor Collector	0	0	0	0	0	2,317	0	0	0	0	0	0	0	2,317
Centroid	0	0	0	92,363	45,752	24	0	0	0	0	0	0	0	138,139
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	178	2,499	8,764	131,369	183,472	364,807	544,477	350,531	203,803	279,925	376,940	569,552	465,223	3,481,540
OPENING YEAR 2020 BUILD														
Freeway	0	0	0	0	0	0	54,958	44,930	135,629	222,847	382,195	597,176	560,050	1,997,785
HOV	0	0	0	0	0	0	0	0	0	0	0	0	4,873	4,873
Ramps	403	2,186	8,095	22,502	39,867	104,079	24,275	0	0	0	0	0	0	201,407

Analysis Period/ Facility Type	Estimate of Vehicle Miles Traveled by Speed-Bin													
	0–5	5–10	10–15	15–20	20–25	25–30	30–35	35–40	40–45	45–50	50–55	55–60	>60	TOTAL
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	2,118	16,595	54,887	111,057	133,955	58,854	11,979	403	0	0	389,848
Minor Arterial	0	382	951	5,084	37,036	123,599	309,812	153,937	20,437	0	0	0	0	651,238
Major Collector	0	0	286	2,660	25,632	52,028	34,273	1,044	0	0	0	0	0	115,923
Minor Collector	0	0	0	0	0	2,321	0	0	0	0	0	0	0	2,321
Centroid	0	0	0	92,271	45,823	24	0	0	0	0	0	0	0	138,117
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	403	2,568	9,332	124,636	164,951	336,939	534,375	333,867	214,920	234,826	382,598	597,176	564,923	3,501,513
HORIZON/DESIGN YEAR 2040 NO-BUILD														
Freeway	0	0	0	24,903	50,471	79,429	111,649	108,653	78,012	258,118	432,196	615,561	820,874	2,579,867
HOV	0	0	0	0	0	0	0	0	0	0	0	0	9,987	9,987
Ramps	623	5,476	12,306	31,069	43,624	120,342	31,702	0	0	0	0	0	0	245,142
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	23,565	72,548	127,005	199,150	78,953	22,821	1,411	0	0	525,452
Minor Arterial	0	1,330	1,402	11,180	42,524	182,642	389,670	249,383	38,254	0	0	0	0	916,385
Major Collector	0	0	1,031	2,979	39,028	60,080	38,194	121	0	0	0	0	0	141,434
Minor Collector	0	0	0	0	0	2,492	0	0	0	0	0	0	0	2,492
Centroid	0	0	0	133,458	59,566	39	0	0	0	0	0	0	0	193,063
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	623	6,806	14,740	203,588	258,778	517,572	698,220	557,308	195,219	280,939	433,607	615,561	830,862	4,613,823
HORIZON/DESIGN YEAR 2040 BUILD														
Freeway	0	0	0	0	0	0	91,749	64,080	112,886	98,758	452,001	712,244	1,162,756	2,694,474
HOV	0	0	0	0	0	0	0	0	0	0	0	0	17,055	17,055
Ramps	1,410	5,712	14,308	33,265	45,159	125,653	32,980	0	0	0	0	0	0	258,486
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	14,258	69,578	122,371	187,951	82,567	24,336	1,409	0	0	502,469
Minor Arterial	0	1,335	1,420	11,205	37,266	163,402	377,561	246,831	38,676	0	0	0	0	877,696
Major Collector	0	0	1,000	2,415	37,462	58,857	38,201	121	0	0	0	0	0	138,057

Analysis Period/ Facility Type	Estimate of Vehicle Miles Traveled by Speed-Bin													
	0–5	5–10	10–15	15–20	20–25	25–30	30–35	35–40	40–45	45–50	50–55	55–60	>60	TOTAL
Minor Collector	0	0	0	0	0	2,506	0	0	0	0	0	0	0	2,506
Centroid	0	0	0	133,136	59,812	38	0	0	0	0	0	0	0	192,986
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,410	7,047	16,727	180,021	193,958	420,034	662,863	498,983	234,128	123,094	453,410	712,244	1,179,811	4,683,730

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Table 3-6. Estimate of Criteria Pollutant Emissions during Construction (pounds per day)

Construction Phase	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
Grubbing and Clearing	13	50	92	101	24
Grading/Excavation	14	58	109	102	25
Drainage/Utilities/Sub-Grade	10	41	61	100	23
Paving	10	42	52	4	3
Daily Maximum Regional Emissions	14	58	109	102	25
SCAQMD Regional Emissions Daily Significance Threshold	*75*	*550*	*100*	*150*	*55*
Daily Maximum Localized Emissions[1]	n/a	49	97	101	25
SCAQMD Localized Emissions Daily Significance[2]	*n/a*	*1,746*	*270*	*14*	*8*

Source: ICF International, January 2013. Detailed calculation assumptions provided in Appendix F.
[1] ROG emissions have no SCAQMD localized emissions threshold.
[2] SCAQMD SRA 34, 5-acre site, 25-meter receptor distance.

Diesel Particulate-Related Health Risk during Construction

SCAQMD does not consider diesel-related cancer risks from construction equipment to be an issue because of the short-term nature of construction activities. Construction activities associated with the proposed project would be sporadic, transitory, and short-term in nature (i.e., less than five years). The assessment of cancer risk typically is based on a 70-year exposure period. Because exposure to diesel exhaust would be well below the 70-year exposure period, construction of the proposed project is not anticipated to result in an elevated cancer risk to exposed persons due to the short-term nature of construction.

3.2.2.2 Operations Impacts

Regional Transportation Conformity

In accordance with Section 93.114 of the EPA transportation conformity regulations, the proposed project is included in both the SCAG 2012 RTP Amendment 1 (Project ID Number 4M01005) and the SCAG 2015 FTIP (Project ID Number 20111625). Within the SCAG 2012 RTP Amendment 1 and SCAG 2015 FTIP documents, the proposed project is described as follows: “SR210 LANE ADDITION-ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE TO SAN BERNARDINO AVE (REDLANDS) INCLUDES AUX. LANES BETWEEN BASE LINE AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST E/B ON RAMP AND DECELERATION LANE AT HIGHLAND AVE E/B OFF RAMP. (under ¼ miles length).”

The 2012 RTP Amendment 1 and 2015 FTIP were approved by FHWA on July 15, 2013 and December 15, 2014, respectively. Because both the 2012 RTP Amendment 1 and the currently conforming 2015 FTIP model lists include the proposed project, the proposed project’s regional conformity requirements have been satisfied. Please refer to Appendix A for conformity documentation related to the 2012 RTP Amendment 1 and the 2015 FTIP.

Project-Level Conformity for Carbon Monoxide

The proposed project was evaluated using the CO Protocol described earlier. The CO Protocol includes two flowcharts that illustrate when a detailed CO analysis needs to be prepared. The first flowchart, Figure 1 of the CO Protocol (also provided in Appendix C), is used to ascertain the CO modeling requirements for new projects. The questions (shown in the first flowchart) relevant to the proposed project, and the answers to those questions are as follows:

3.1.1: Is the project exempt from all emissions analyses?

Response: No, the proposed project does not qualify for an exemption. As shown in Table 1 of the CO protocol (provided in Appendix C), the proposed project does not fall into a project category that is exempt from all emissions analysis (proceed to 3.1.2).

3.1.2: Is the project exempt from regional emissions analyses?

Response: No, the proposed project is not exempt from a regional emissions analysis. As shown in Table 2 of the CO Protocol (provided in Appendix C), the proposed project does not meet the criteria of any of the project categories identified as exempt from regional emissions analysis (proceed to 3.1.3).

3.1.3: Is the project locally defined as regionally significant?

Response: Yes, the proposed project is considered a regionally significant transportation project according to 40 CFR 93.101 (proceed to 3.1.4).

3.1.4: Is the project in a federal attainment area?

Response: No, the proposed project is located in the San Bernardino portion of the SCAB, which is a federal extreme nonattainment area for ozone, a serious nonattainment area for PM_{10}, a nonattainment area for $PM_{2.5}$, and a maintenance area for CO (Table 3-1). If a project area is not classified as an attainment area for all transportation-related criteria pollutants, the project is subject to a regional conformity determination (proceed to 3.1.5).

3.1.5: Is there a currently conforming RTP and TIP?

Response: Yes, the 2012 RTP Amendment 1 and 2015 FTIP (proceed to 3.1.6).

3.1.6: Is the project included in the regional emissions analysis supporting the currently conforming RTP and TIP?

Response: Yes, the proposed project is listed in both the SCAG 2012 RTP Amendment 1 (project number 4M01005) and the SCAG 2015 FTIP (project number 20111625). The 2012 RTP Amendment 1 and 2015 FTIP were approved by FHWA on July 15, 2013 and December 15, 2014, respectively. Refer to Appendix A for conformity documentation related to the 2012 RTP Amendment 1 and the 2015 FTIP (proceed to 3.1.7).

3.1.7: Has the project design concept and/or scope changed significantly from that in the regional analysis?

Response: No, within the currently conforming 2012 RTP Amendment 1 and 2015 FTIP, the proposed project is described as “SR210 LANE ADDITION-ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE. TO SAN BERNARDINO AVE (REDLANDS) INCLUDES AUX. LANES BETWEEN BASE LINE AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST E/B ON RAMP AND DECELERATION LANE AT HIGHLAND AVE E/B OFF RAMP (under ¼ miles in length).” The project as currently proposed is consistent with this description (proceed to 3.1.9).

3.1.9: The conclusion from this series of questions and answers is that the project needs to be examined for its local air impacts (proceed to Section 4, Figure 3 of the CO Protocol).

On the basis of the answers to the first flowchart, a second flowchart, Figure 3 of the CO Protocol (see Appendix C), is used to determine the level of local CO effect analysis required for the project.

The questions applicable to the proposed project in the second flowchart (also provided in Appendix C) and the answers to those questions are as follows:

Level 1: Is the project in a CO nonattainment area?

Response: No, the SCAB is classified as an attainment/maintenance area for the federal CO standards (Table 3-1).

Level 1: Was the area redesignated as an attainment area after the 1990 Clean Air Act?

Response: Yes, the SCAB was reclassified to attainment/maintenance status from serious nonattainment, effective June 11, 2007.

Level 1: Has “continued attainment” been verified with the local air district, if appropriate?

Response: Yes, based on ambient air monitoring data collected by SCAQMD, the SCAB has continually met the federal ambient air quality standards for CO since 2003 (California Air Resources Board 2009) (Proceed to Level 7).

Level 7: Does project worsen air quality?

Response: Yes. According to Section 4.7.1 of the CO Protocol, the following criteria provide a basis for determining if a project has potential to worsen localized air quality:

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

  Given the nature of the proposed project, which is to add mixed-flow lanes and auxiliary lanes to an existing freeway segment, there would be no measurable effect on the percentage of vehicles operating in the cold-start mode.

- *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.*

  Tables 3-7 and 3-8 summarize anticipated freeway mainline volumes for the No-Build and Build Alternatives at Opening Year (2020) and Horizon Year (2040). As shown therein, traffic volumes are anticipated to increase by more than five percent at two SR-210 mainline segments under the Build Alternative compared to the No-Build Alternative at Opening Year (2020) and at one mainline segment at Horizon Year (2040). As such, the anticipated increase in traffic volumes is considered potentially adverse.

Table 3-7. Opening-Year (2020) AADT Volumes

SR-210 Mainline Segment	No-Build Alternative	Build Alternative	Project Effect (Percent increase over No-Build)
West of Highland Ave	95,800	98,400	2.7%
Highland Ave to SR-330	79,400	83,200	4.8%
SR-330 to Base Line	78,800	81,000	2.8%
Base Line to 5th St	84,000	89,800	6.9%
5th St to San Bernardino Ave	99,000	107,200	8.3%
South of San Bernardino Ave	95,400	96,200	0.8%
Adapted from URS Corporation 2012, Noel Casil pers. comm.			

Table 3-8. Horizon-Year 2040 AADT Volumes

SR-210 Mainline Segment	No-Build Alternative	Build Alternative	Project Effect (Percent increase over No -Build)
West of Highland Ave	127,400	129,000	1.5%
Highland Ave to Victoria Ave	114,400	116,600	1.9%
Victoria Ave to SR-330	103,000	106,000	2.9%
SR-330 to Base Line	102,000	102,800	0.8%
Base Line to 5th St	103,000	107,400	4.3%
5th St to San Bernardino Ave	118,000	126,000	6.8%
South of San Bernardino Ave	115,600	116,200	0.5%
Adapted from URS Corporation 2012, Noel Casil pers. comm.			

- *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 a worsening of traffic flow.*

  Freeway mainline and ramp operation data for the proposed project was provided by the project traffic engineer and is included in Appendix G. As shown therein, the proposed project would improve traffic flow along most freeway segments and along most freeway ramps while increasing speeds at most freeway segments and freeway ramps at Opening Year (2020) and Horizon Year (2040).

Level 7: Is the project suspected of resulting in higher CO concentrations than those existing within the region at the time of attainment demonstration?

Note: The *2012 Air Quality Management Plan* (AQMP) is the most recent EPA-approved AQMP, but no additional regional or hot-spot CO modeling has been conducted to demonstrate further attainment of the 8-hour CO standard since modeling conducted for the 2003 AQMP attainment demonstration. The 2003 AQMP is used as the basis for the following analysis; however, the 2003 AQMP did not provide model input assumptions. Instead, it refers to the 1992 CO Plan, where a general description of input assumptions was provided.

Response: No. According to Section 4.7.2 of the CO Protocol, project sponsors are encouraged to use the following criteria to determine the potential for the project to result in higher CO concentrations than those existing within the region at the time of attainment demonstration:

a. *The receptors at the location under study are at the same distance or farther from the traveled roadway than the receptors at the location where attainment has been demonstrated.*

   A receptor distance of three meters from the traveled roadway was used in the CO attainment demonstration prepared for the 2003 AQMP. With respect to the proposed project, all sensitive receptors are located more than three meters from the traveled roadway.

b. *The roadway geometry of the two locations is not significantly different. An example of a significant difference would be a larger number of lanes at the location under study compared with the location where attainment has been demonstrated.*

In the CO attainment demonstration prepared for the 2003 AQMP, four approach lanes in all directions were used to model the intersections at Wilshire/Veteran and La Cienega/Century, while three approach lanes in all directions were used to model the intersections at Sunset/Highland and Long Beach/Imperial.

It is worth noting that in the CO attainment demonstration all modeled intersections were four-leg intersections, which differ from the proposed project, which affects freeway mainline segments only. The freeway would be widened from two to three lanes in each direction. There would be no change in the number or configuration of ramp lanes under the Build Alternative, when compared to the No-Build Alternative. Therefore, the greatest number of travel lanes would be six (three mainline lanes in each direction). In comparing the total number of intersection approach lanes, the attainment demonstration intersections had 12 to 16 approach lanes each. As such, the maximum number of approach lanes under the Build Alternative would be less than the 16 lanes used in the attainment demonstration.

c. *Expected worse-case meteorology at the location under study is the same or better than the worst-case meteorology at the location where attainment has been demonstrated. Relevant meteorological variables include wind speed, wind direction, temperature, and stability class.*

In the CO attainment demonstration prepared for the 2003 AQMP, a wind speed of one meter per second, stability class D, and worst-case wind angle were used as modeling assumptions. These assumptions are considered worst-case; as such, the expected worst-case meteorology at the location under study would be the same or better. In addition, there is no meaningful difference in temperature between the attainment demonstration intersection locations and the proposed project intersection location.

d. *Traffic lane volumes at the location under study are the same or lower than those at the location where attainment has been demonstrated.*

Traffic volumes per lane used for modeling in the attainment plan demonstration are provided in Table 3-9. As stated above, the proposed project would only affect the freeway mainline. No on-/off-ramp improvements are proposed. Thus, the proposed project would not affect roadway intersections.

e. *Percentage of vehicles operating in cold-start mode at the location under study is the same or lower than the percentage at the location where attainment has been demonstrated.*

The proposed project would not increase the percentage of vehicles operating in cold-start mode in the project area because no parking facilities would be constructed as part of the proposed project.

Table 3-9. Peak-hour Approach Lane Volumes Used in the 2003 AQMP Attainment Demonstration

Location	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound AM/PM)	Northbound (AM/PM)
Wilshire and Veteran (four lanes, all directions)	1,238/517	458/829	180/350	140/233
Sunset and Highland (three lanes, all directions)	472/588	447/513	768/611	517/746
La Cienega and Century (four lanes, all directions)	635/561	473/682	346/507	205/419
Long Beach and Imperial (three lanes, all directions)	406/673	587/467	160/315	252/383
Source: South Coast Air Quality Management District 2003.				

f. *Percentage of heavy-duty gas trucks at the location under study is the same or lower than the percentage at the location where attainment has been demonstrated.*

The attainment area demonstration intersections (Table 3-9) are located along urban arterial roadways with a similar mix of urban land uses (mainly commercial and residential, with some industrial) within the SCAB, and the project area serves as a main thoroughfare for vehicles and trucks bypassing other congested highways in the region. Therefore, the proposed project area is anticipated to have a similar percentage of heavy-duty gas trucks as the attainment demonstration intersections.

g. *For projects involving intersections, average delay and queue length figures for each approach are the same or smaller for the intersection under study compared with those found in the intersection where attainment has been demonstrated.*

The proposed project involves freeway mainline improvements only. No on-/off-ramp intersection improvements are proposed.

h. *Background concentration at the location under study is the same or lower than the background concentration at the location where attainment has been demonstrated.*

As shown earlier in Table 3-3, the national maximum background CO concentration in the project area has ranged from 1.64 to 1.74 ppm during the past three years for the eight-hour averaging period. These values compare with the eight-hour average maximum background concentration of 7.8 ppm (2005) used for the 2003 AQMP attainment demonstration

Because the answer to the second Level 7 question is “no,” per the CO Protocol, the project is satisfactory, and no further analysis is needed. Because project implementation would not result in CO concentrations that exceed the one- or eight-hour ambient air quality standards, on the basis of CO Protocol analysis methodology, the Build Alternative is not expected to result in a new or more severe exceedance of either the NAAQS or CAAQS.

As previously indicated, the proposed project was evaluated using Figures 1 and 3 of the CO Protocol (also provided in Appendix C). Through this process, it was determined the Build Alternative is not expected to result in a new or more severe exceedance of either the NAAQS or CAAQS.

Project-level Conformity for Particulate Matter

While most projects create particulate emissions during construction, construction activities lasting less than five years are considered temporary impacts under the EPA Transportation Conformity Rule and are exempt. It is expected that the proposed project would be completed in less than two years. As such, hot-spot review is therefore limited to operational impacts.

EPA released a guidance document titled *Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in* $PM_{2.5}$ *and* PM_{10} *Nonattainment and Maintenance Areas* in November 2013. A project-level $PM_{2.5}$ and PM_{10} conformity review based on this most-recent EPA guidance is provided below.

EPA specifies in 40 CFR 93.123(b)(1) that only "projects of air quality concern" (POAQC) are required to undergo a $PM_{2.5}$ and PM_{10} hot-spot analysis. EPA defines projects of air quality concern as certain highway and transit projects that involve significant levels of diesel traffic or any other project that is identified by the $PM_{2.5}$ SIP as a localized air quality concern. A discussion of the proposed project compared to projects of air quality concern, as defined by 40 CFR 93.123(b)(1), is provided below:

1. **New or expanded highway projects that have a significant number of or significant increase in diesel vehicles**.[5] The project proposes to widen a 7.2 mile segment of SR-210 from just west of Highland Avenue to just north of San Bernardino Avenue. This is not a new highway project, nor is it expanding an existing highway beyond its current reach. Truck traffic volumes along the SR-210 project limits are expected to increase by a maximum of 8.3 percent at Opening Year 2020, and 6.8 percent at Horizon Year 2040, under the Build condition, when compared to No Build. Even with these truck traffic increases, total truck traffic volumes would continue to remain below the EPA/FHWA screening criterion of 10,000 truck AADT volumes for projects considered to have potential to be a POAQC. Along any SR-210 mainline segment within the project limits, maximum truck AADT volumes would be no more than 6,800 during Opening Year 2020, and no more than 8,300 during Horizon Year 2040. (see Appendix D).

2. **Projects affecting intersections that are at level-of-service (LOS) D, E, or F with a significant number of diesel vehicles or those that will change to LOS D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project**. The proposed project would improve the operational efficiency of

[5] *Significant number* is defined as greater than 125,000 AADT volumes and eight percent or more of such AADT is diesel truck traffic, or in practice 10,000 truck AADT or more regardless of total AADT. *Significant increase* is defined in practice as a ten percent increase in heavy duty truck traffic.

the SR-210 mainline between Arden Road and San Bernardino Avenue. There would be no degradation in LOS along any freeway segment or freeway ramp related to proposed project improvements.

3. **New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location**. The proposed project has no bus or rail terminal component, nor would it alter travel patterns to/from any existing bus or rail terminal.

4. **Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location**. The proposed project would not expand any bus terminal, rail terminal, or related transfer point that would increase the number of diesel vehicles congregating at any single location.

5. **Projects in or affecting locations, areas, or categories of sites that are identified in the $PM_{2.5}$- or PM_{10}-applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation**. The proposed project site is not in or affecting an area or location identified in any PM_{10} or $PM_{2.5}$ implementation plan. The immediate project area is not considered to be a site of violation or possible violation.

The proposed project meets the CAA and 40 CFR 93.116 requirements without any explicit hot-spot analysis and would not create a new, or worsen an existing, PM_{10} or $PM_{2.5}$ violation. The SCAG TCWG concurred with this determination on November 5, 2014 (see Appendix D). Clean Air Act, 40 CFR Part 93.116, requirements are met, and, as such, the proposed project can be screened from further analysis.

Mobile-source Air Toxics

Air toxics analysis is an emerging area of research. Currently, limited tools and techniques are available for assessing project-specific health effects from MSATs because there are no established criteria for determining when MSAT emissions should be considered a significant issue with respect to NEPA.

To comply with Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22[b]) regarding incomplete or unavailable information, Appendix E contains a discussion regarding how air toxics analysis is an emerging field, and current scientific techniques, tools, and data are not sufficient to estimate accurately the human health effects that would result from a transportation project in a way that would be useful to decision-makers. Also, in compliance with 40 CFR 150.22(b), Appendix E contains a summary of current studies regarding the health effects of MSATs.

As previously discussed, in addition to the federal criteria, California has its own criteria for when a project is considered to have higher potential MSAT effects. California considers freeway projects located within 500 to 1,000 feet of sensitive land uses to have higher potential MSAT effects (Brady pers. comm., California Air Resources Board 2005). As noted previously, there are numerous sensitive land uses within proximity of the SR-210 project area; therefore, under California's criteria, the proposed project is considered to be a project with higher potential MSAT effects, and MSAT emissions must be quantified and evaluated further.

An evaluation of MSAT emissions for Existing (2012), Opening Year (2020), and Horizon Year (2040) conditions was performed using the CT-EMFAC model and the traffic data presented in Table 3-5. Tables 3-10 through 3-12 present modeled MSAT emissions for the conditions analyzed. The differences in emissions between with- and without-project conditions represent emissions generated directly as a result of implementation of the proposed project.

Table 3-11 indicates that implementation of the proposed Build Alternative at Opening Year (2020) would result in small changes of MSAT emissions under the Build condition compared to No-Build, but a substantial decrease in MSAT emissions when compared to existing conditions. As shown in Table 3-12, implementation of the proposed Build Alternative at Horizon Year (2040) would also result in small changes of MSAT emissions under the Build condition when compared to No-Build, but substantial changes in MSAT emissions when compared to existing conditions. Emissions of benzene, acrolein, and butadiene are predicted to decrease, while the six remaining MSAT emissions are predicted to increase.

The increases in MSAT emissions are directly associated with increases in VMT and travel speeds anticipated under the Build Alternative compared with the No-Build Alternative. MSAT emissions increase because a parabolic relationship is typically observed between emission rates and vehicle speeds when speeds are from 0 to 25 mph or above 55 mph; the lowest rates are typically observed at 45 mph. When compared with the No-Build Alternative, implementation of the Build Alternative would result in a higher proportion of VMT occurring above the 55 mph speed bin at Horizon Year (2040) (see Table 3-5). As a result, emissions increases are associated with both an increase in VMT and by a higher proportion of vehicles traveling above 55 mph.

The traffic impact analysis conducted for the proposed project suggests that, under the Build Alternative, the proposed improvements would result in some arterial and collector surface street VMT shifting to the freeway. This shift to the freeway is noteworthy because surface street MSAT emissions occur near sensitive receptors. As such, MSAT exposure at sensitive receptors may be reduced under the Build Alternative when compared with the No-Build Alternative.

This report includes a basic quantitative analysis of the likely MSAT emissions of the proposed project. However, available technical tools do not enable an accurate prediction of the project-specific health effects of the emission changes associated with the alternatives (see Appendix E for more information regarding this issue). Although current models and procedures do not provide an accurate prediction of the health effects associated with MSATs, EPA regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Given the regulations now in effect, an analysis of national trends with EPA's MOVES2010b model forecasts a combined reduction of 83 percent in the total annual emission rate for the priority MSATs from 2010 to 2050, while VMT are projected to increase by 102 percent. This will reduce the background level of MSAT emissions within the project vicinity.

Table 3-10. Year 2012 MSAT Emissions

Pollutant	No-Build	
	Pounds/Day	Tons/Year
Benzene	27.9	5.1
Acrolein	1.0	0.2
Acetaldehyde	16.2	3.0
Formaldehyde	39.1	7.1
Butadiene	4.6	0.8
Naphthalene	1.7	0.3
POM	0.6	0.1
Diesel PM	105.0	19.0
DEOG	171.0	31.0

Table 3-11. Year 2020 MSAT Emissions

Pollutant	No-Build		Build		Build vs. No-Build		Build vs. Existing	
	Pounds/Day	Tons/Year	Pounds/Day	Tons/Year	Tons/Year	Percent Change	Tons/Year	Percent Change
Benzene	15.0	2.7	15.1	2.7	0.01	0.2%	(2.35)	-46.1%
Acrolein	0.4	0.1	0.4	0.1	0.00	0.5%	(0.10)	-55.1%
Acetaldehyde	10.1	1.9	10.0	1.8	(0.02)	-1.1%	(1.12)	-38.0%
Formaldehyde	23.5	4.3	23.3	4.2	(0.04)	-0.9%	(2.88)	-40.5%
Butadiene	2.1	0.4	2.1	0.4	0.00	0.3%	(0.45)	-54.4%
Naphthalene	1.3	0.2	1.3	0.2	(0.00)	-0.3%	(0.07)	-24.4%
POM	0.3	0.1	0.3	0.1	0.00	0.9%	(0.06)	-49.8%
Diesel PM	39.0	7.0	40.0	7.0	0.15	2.1%	(11.73)	-61.5%
DEOG	120.0	22.0	119.0	22.0	(0.30)	-1.4%	(9.62)	-30.8%

Table 3-12. Year 2040 Project MSAT Emissions

Pollutant	No-Build		Build		Build vs. No-Build		Build vs. Existing	
	Pounds/Day	Tons/Year	Pounds/Day	Tons/Year	Tons/Year	Percent Change	Tons/Year	Percent Change
Benzene	14.3	2.6	14.5	2.6	0.04	1.5%	(0.10)	-3.6%
Acrolein	0.4	0.1	0.4	0.1	0.00	3.1%	(0.01)	-12.7%
Acetaldehyde	11.8	2.2	11.6	2.1	(0.04)	-1.8%	0.26	14.1%
Formaldehyde	26.3	4.8	25.9	4.7	(0.07)	-1.4%	0.45	10.5%
Butadiene	1.9	0.3	1.9	0.3	0.01	2.4%	(0.03)	-8.5%
Naphthalene	1.8	0.3	1.8	0.3	0.00	0.3%	0.09	39.9%
POM	0.4	0.1	0.4	0.1	0.00	3.3%	0.02	43.1%
Diesel PM	52.0	10.0	55.0	10.0	0.61	6.4%	2.92	40.6%
DEOG	145.0	26.0	141.0	26.0	(0.67)	-2.5%	3.87	17.6%

3.2.2.3 Criteria Pollutants

Operation

Long-term air quality effects are those associated with motor vehicles operating on the roadway network, predominantly those operating in the project vicinity. Emissions of ROG, NO_X, CO, PM_{10}, $PM_{2.5}$, and CO_2 for Existing (2012), Opening Year (2020), and Horizon Year (2040) conditions were evaluated through modeling conducted using Caltrans' CT-EMFAC emissions factor model with traffic data provided by the project traffic engineer.

To analyze potential effects of projects, NEPA requires a comparison of a project's emissions to no-build conditions at the opening year and horizon year, whereas CEQA requires a comparison of a project's opening-year emissions with existing conditions. Table 3-13 summarizes daily operational criteria pollutant and CO_2 emissions. Vehicular emission rates, in general, are anticipated to decrease in future years because of continuing improvements in engine technology and the retirement of older, higher emitting vehicles. The NEPA and CEQA analyses of the proposed project's operational emissions of ROG, CO, NO_X, CO_2, PM_{10}, and $PM_{2.5}$ are provided below.

Table 3-13. Summary of Daily Operational Criteria Pollutant and CO_2 Emissions

		Tons per Year					
Scenario	**Daily VMT**	**ROG**	**CO**	**NO_X**	**CO_2**	**PM_{10}**	**$PM_{2.5}$**
Existing (2012)	3,028,627	237	2,896	990	551,186	83	44
2020 No-Build	3,481,540	147	1,608	573	526,795	80	37
2020 Build	3,500,250	147	1,605	576	528,209	80	37
2040 No-Build	4,613,823	142	1,401	421	673,710	107	49
2040 Build	4,683,730	143	1,402	426	682,371	109	50
Build Alternative Increase/(Decrease) Compared with Existing 2012							
Scenario	**Daily VMT**	**ROG**	**CO**	**NO_X**	**CO_2**	**PM_{10}**	**$PM_{2.5}$**
2020 Build vs. Existing	471,623	-90	-1,291	-414	-22,977	-3	-7
2040 Build vs. Existing	1,655,103	-94	-1,494	-564	131,185	26	6
Build Alternative Increase/(Decrease) Compared with Respective No-Build at 2020 and 2040							
Scenario	**Daily VMT**	**ROG**	**CO**	**NO_X**	**CO_2**	**PM_{10}**	**$PM_{2.5}$**
2020 Build vs. No-Build	18,710	--	-3	3	1,414	--	--
2040 Build vs. No-Build	69,907	1	1	5	8,661	2	1
Calculation worksheets provided in Appendix F.							

CEQA

As shown in Table 3-13, when compared with existing conditions, the Build Alternative would result in decreases of all criteria pollutants and CO_2 exhaust emissions at Opening Year (2020) when compared with existing conditions. Because VMT increases when compared with existing conditions, emissions reductions are attributable to the retirement of older, higher emitting vehicles that are replaced by less polluting vehicles. Impacts related to CO_2 emissions and climate change are further discussed in Chapter 4 "Climate Change (CEQA)."

NEPA

As shown in Table 3-13, all mobile-source criteria pollutant and CO_2 exhaust emissions are predicted to increase at Horizon Year (2040) under the Build Alternative when compared to the No-Build Alternative. However, these emissions would likely be off-set elsewhere due to traffic redistribution effects that were not accounted for in the project's traffic impact study, due to its limited scope. The proposed project is not anticipated to contribute to new violations of the NAAQS or CAAQS.

3.3 Minimization Measures

Implementation of the following measures would minimize air quality effects from construction activities.

3.3.1 Construction

3.3.1.1 Implement California Department of Transportation Standard Specifications

Most of the construction impacts on air quality are short-term in duration and therefore will not result in long-term adverse conditions. Implementation of the following measures, some of which may also be required for other purposes such as stormwater pollution control, will reduce any air quality impacts resulting from construction activities.

- The construction contractor shall comply with Caltrans' Standard Specifications in Section 14 (2010).
  - Section 14-9.01specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.
  - Section 14-9.02 is directed at controlling dust. If dust palliative materials other than water are to be used, material specifications are contained in Section 18.
- Apply water or dust palliative to the site and equipment as frequently as necessary to control fugitive dust emissions. Fugitive emissions generally must meet a "no visible dust" criterion either at the point of emission or at the right-of-way line, depending on local regulations.
- Spread soil binder on any unpaved roads used for construction purposes and all project construction parking areas.
- Wash off trucks as they leave the right-of-way as necessary to control fugitive dust emissions.
- Properly tune and maintain construction equipment and vehicles. Use low-sulfur fuel in all construction equipment, as provided in California Code of Regulations, Title 17, Section 93114.
- Develop a dust control plan documenting sprinkling, temporary paving, speed limits, and expedited revegetation of disturbed slopes as needed to minimize construction impacts on existing communities.

- Locate equipment and material storage sites as far away from residential and park uses as practical. Keep construction areas clean and orderly.
- Establish Environmentally Sensitive Areas (ESAs) or their equivalent near sensitive air receptors where construction activities involving extended idling of diesel equipment would be prohibited, to the extent feasible.
- Use track-out reduction measures such as gravel pads at project access points to minimize dust and mud deposits on roads affected by construction traffic.
- Cover all transported loads of soils and wet materials prior to transport or provide adequate freeboard (space from the top of the material to the top of the truck) to minimize emissions of dust (particulate matter) during transportation.
- Promptly and regularly remove dust and mud on paved public roads from construction activity and traffic to decrease particulate matter.
- Route and schedule construction traffic to avoid peak travel times as much as possible to reduce congestion and related air quality impacts caused by idling vehicles along local roads.
- Install mulch or plant vegetation as soon as practical after grading to reduce windblown particulate in the area. Be aware that certain methods of mulch placement, such as straw blowing, may themselves cause dust and visible emission issues; controls, such as dampened straw, may be needed.

3.3.1.2 Comply with SCAQMD’s Rule 403 Requirements to Control Construction Emissions of Fugitive Dust

To control the generation of construction-related fugitive dust emissions, Caltrans will require construction contractors to comply with SCAQMD’s Rule 403 requirements, which are summarized in Table 3-2. Compliance with SCAQMD’s Rule 403 is required for all construction projects.

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Chapter 4 Climate Change (CEQA)

4.1 Climate Change

Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. An ever-increasing body of scientific research attributes these climatological changes to greenhouse gas (GHG) emissions, particularly those generated from the production and use of fossil fuels.

While climate change has been a concern for several decades, the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations and World Meteorological Organization in 1988, has led to increased efforts devoted to GHG emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of GHGs generated by human activity including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), HFC-23 (fluoroform), HFC-134a (s, s, s, 2-tetrafluoroethane), and HFC-152a (difluoroethane).

In the U.S., the main source of GHG emissions is electricity generation, followed by transportation. In California, however, transportation sources (including passenger cars, light duty trucks, other trucks, buses, and motorcycles make up the largest source (second to electricity generation) of GHG emitting sources. The dominant GHG emitted is CO_2, mostly from fossil fuel combustion.

There are typically two terms used when discussing the impacts of climate change. “Greenhouse Gas Mitigation” is a term for reducing GHG emissions in order to reduce or “mitigate” the impacts of climate change. “Adaptation,” refers to the effort of planning for and adapting to impacts resulting from climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels).

There are four primary strategies for reducing GHG emissions from transportation sources: 1) improving the transportation system and operational efficiencies, 2) reducing growth of vehicle miles traveled (VMT), 3) transitioning to lower GHG emitting fuels, and 4) improving vehicle technologies. To be most effective all four strategies should be pursued collectively. The following Regulatory Setting section outlines state and federal efforts to comprehensively reduce GHG emissions from transportation sources.

4.1.1 Regulatory Setting

4.1.1.1 State

With the passage of several pieces of legislation including State Senate and Assembly bills and Executive Orders, California launched an innovative and pro-active approach to dealing with GHG emissions and climate change.

Assembly Bill 1493 (AB 1493), Pavley. Vehicular Emissions: Greenhouse Gases, 2002: requires the California Air Resources Board (ARB) to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year. In June 2009, the U.S. Environmental Protection Agency (U.S. EPA) Administrator granted a Clean Air Act waiver of preemption to California. This waiver allowed California to implement its own GHG emission standards for motor vehicles beginning with model year 2009. California agencies will be working with federal agencies to conduct joint rulemaking to reduce GHG emissions for passenger cars model years 2017-2025.

Executive Order (EO) S-3-05: (signed on June 1, 2005, by former Governor Arnold Schwarzenegger) the goal of this EO is to reduce California's GHG emissions to: 1) year 2000 levels by 2010, 2) year 1990 levels by the 2020, and 3) 80 percent below the year 1990 levels by the year 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32.

AB 32, the Global Warming Solutions Act of 2006, Núñez and Pavley: AB 32 sets the same overall GHG emissions reduction goals as outlined in EO S-3-05, while further mandating that ARB create a scoping plan (which includes market mechanisms) and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases."

Executive Order S-20-06: (signed on October 18, 2006 by former Governor Arnold Schwarzenegger) further directs state agencies to begin implementing AB 32, including the recommendations made by California's Climate Action Team.

Executive Order S-01-07: (signed on January 18, 2007 by former Governor Arnold Schwarzenegger) set forth the low carbon fuel standard for California. Under this EO, the carbon intensity of California's transportation fuels is to be reduced by at least ten percent by the year 2020.

Senate Bill 97 (SB 97), Chapter 185, 2007: required the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the California Environmental Quality Act (CEQA) Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

Caltrans Director's Policy 30 (DP-30) Climate Change (approved June 22, 2012): is intended to establish a Department policy that will ensure coordinated efforts to incorporate climate change into Departmental decisions and activities. This policy contributes to the Department's stewardship goal to preserve and enhance California's resources and assets.

4.1.1.2 Federal

Although climate change and GHG reduction is a concern at the federal level; currently there are no regulations or legislation that have been enacted specifically addressing GHG emissions reductions and climate change at the project level. Neither the U.S. EPA nor the Federal Highway Administration (FHWA) has promulgated explicit guidance or methodology to conduct project-level GHG analysis. As stated on FHWA's climate change website (http://www.fhwa.dot.gov/hep/climate/index.htm), climate change considerations should be integrated throughout the transportation decision-making process–from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process will facilitate decision-making and improve efficiency at the program level, and will inform the analysis and stewardship needs of project level decision-making. Climate change considerations can easily be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

The four strategies set forth by FHWA to lessen climate change impacts do correlate with efforts that the state has undertaken and is undertaking to deal with transportation and climate change; the strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and a reduction in the growth of vehicle hours travelled.

Climate change and its associated effects are also being addressed through various efforts at the federal level to improve fuel economy and energy efficiency, such as the "National Clean Car Program" and EO 13514 - *Federal Leadership in Environmental, Energy and Economic Performance*.

Executive Order 13514 is focused on reducing greenhouse gases internally in federal agency missions, programs and operations, but also direct federal agencies to participate in the Interagency Climate Change Adaptation Task Force, which is engaged in developing a national strategy for adaptation to climate change.

On April 2, 2007, in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the Supreme Court found that greenhouse gases are air pollutants covered by the Clean Air Act and that the U.S. EPA has the authority to regulate GHG. The Court held that the U.S. EPA Administrator must determine whether or not emissions of greenhouse gases from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

On December 7, 2009, the U.S. EPA Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- **Endangerment Finding:** The Administrator found that the current and projected concentrations of the six key well-mixed greenhouse gases—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)—in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The Administrator found that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing the U.S. EPA's *Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles*, which was published on September 15, 2009[1]. On May 7, 2010 the final *Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards* was published in the Federal Register.

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing the U.S. EPA's *Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles*, which was published on September 15, 2009[2]. On May 7, 2010 the final *Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards* was published in the Federal Register.

U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced GHG emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever GHG regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle GHG regulations. These steps were outlined by President Obama in a Presidential Memorandum on May 21, 2010.[3]

The final combined U.S. EPA and NHTSA standards that make up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards require these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, (the equivalent to 35.5 miles per gallon [MPG] if the automobile industry were to meet this CO_2 level solely through fuel economy improvements. Together, these standards will cut GHG emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016).

On November 16, 2011, U.S. EPA and NHTSA issued their joint proposal to extend this national program of coordinated greenhouse gas and fuel economy standards to model years 2017 through 2025 passenger vehicles.

4.1.2 Project Analysis

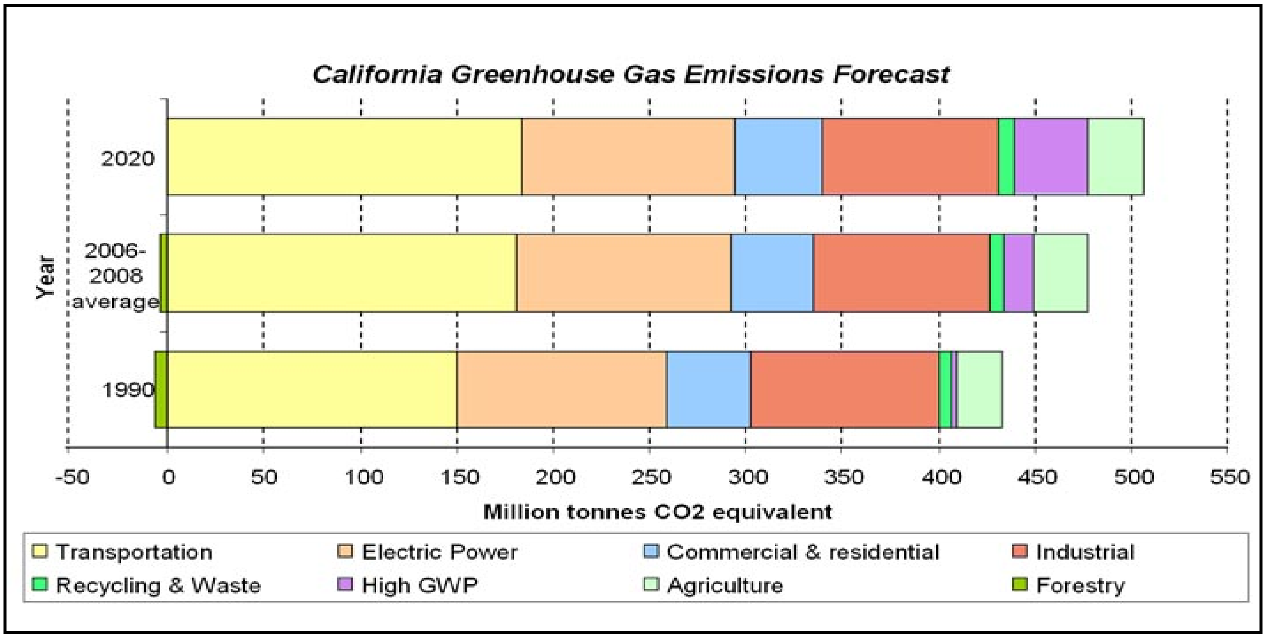
An individual project does not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may contribute to a potential impact through its *incremental* change in emissions when combined with the contributions of all other sources of GHG.[4] In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable" (CEQA Guidelines

[1] http://www.epa.gov/oms/climate/regulations.htm#1-1
[2] http://www.epa.gov/oms/climate/regulations.htm#1-1
[3] http://epa.gov/otaq/climate/regulations.htm
[4] This approach is supported by the AEP: *Recommendations by the Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents* (March 5, 2007), as well as the South Coast Air Quality Management District (Chapter 6: The CEQA Guide, April 2011) and the US Forest Service (Climate Change Considerations in Project Level NEPA Analysis, July 13, 2009).

sections 15064(h)(1) and 15130). To make this determination the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects in order to make this determination is a difficult, if not impossible, task.

The AB 32 Scoping Plan mandated by AB 32 contains the main strategies California will use to reduce GHG emissions. As part of its supporting documentation for the Draft Scoping Plan, ARB released the GHG inventory for California (forecast last updated: October 28, 2010) (see Figure 4-1). The forecast is an estimate of the emissions expected to occur in the year 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. The base year used for forecasting emissions is the average of statewide emissions in the GHG inventory for 2006, 2007, and 2008.

Figure 4-1: California Greenhouse Gas Inventory



Source: http://www.arb.ca.gov/cc/inventory/data/forecast.htm

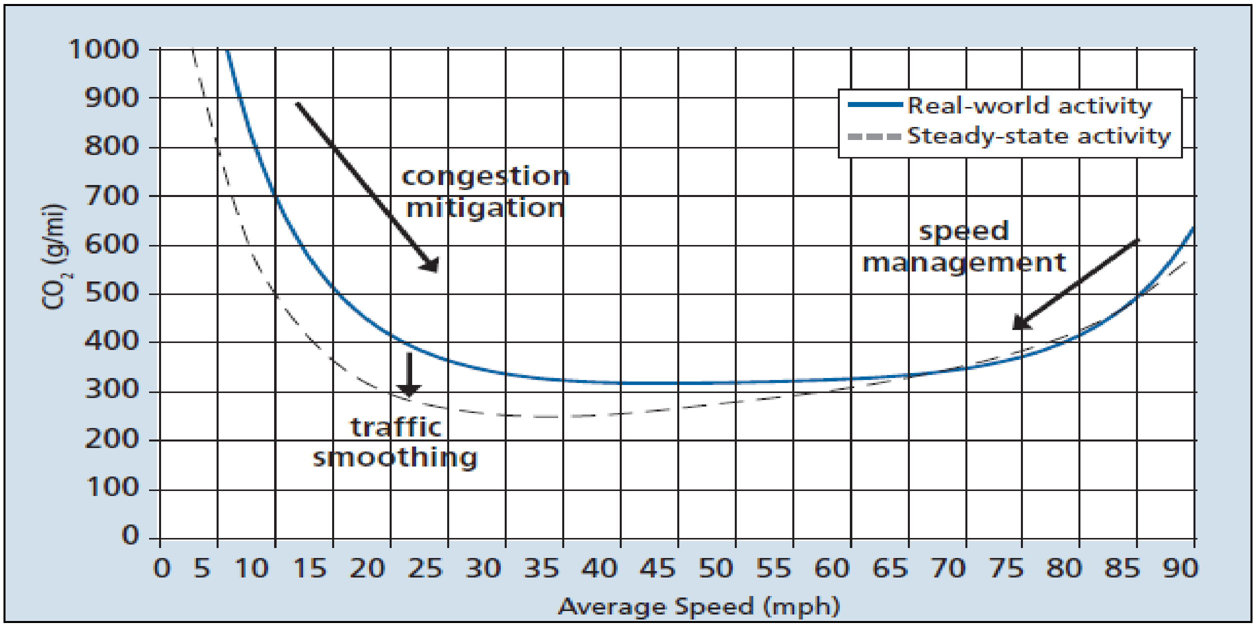
The Department and its parent agency, the Business, Transportation, and Housing Agency, have taken an active role in addressing GHG emission reduction and climate change. Recognizing that 98 percent of California's GHG emissions are from the burning of fossil fuels and 40 percent of all human made GHG emissions are from transportation, the Department has created and is implementing the Climate Action Program at Caltrans that was published in December 2006.[5]

One of the main strategies in Caltrans' Climate Action Program to reduce GHG emissions is to make California's transportation system more efficient. The highest levels of CO_2 from mobile

[5] Caltrans Climate Action Program is located at the following web address: http://www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/State_Wide_Strategy/Caltrans_Climate_Action_Program.pdf

sources, such as automobiles, occur at stop-and-go speeds (0–25 mph) and speeds over 55 mph; the most severe emissions occur at 0–25 mph (see Figure 4-2 below). To the extent that a project relieves congestion by enhancing operations and improving travel times in high-congestion travel corridors, GHG emissions, particularly CO_2, may be reduced.

Figure 4-2: Possible Effect of Traffic Operation Strategies in Reducing On-Road CO_2 Emissions



Source: Barth and Boriboonsomsin 2010.

Using EMFAC2011 emission factors within CT-EMFAC and traffic data provided by the traffic engineer (URS Corporation 2013), CO_2 emissions were forecast based on existing-year (2012), opening-year (2020), and horizon-year (2040) traffic conditions. The forecast of CO_2 emissions under the Build Alternative and No-Build Alternative is provided in Table 4-1. As shown in Table 4-1, the modeled CO_2 emissions in the horizon year (2040) are higher than those for the existing year (2012), which is attributed to the growth in VMT. At horizon-year 2040, modeled CO_2 emissions under the Build Alternative would be higher than those under the No-Build Alternative, which would be attributed to an increase in VMT and travel speed increases. As shown previously in Figure 4-2, CO_2 emissions factors increase as travel speed increases up to and beyond approximately 55 mph.

It is important to note that these modeled CO_2 emission estimates are useful only for comparison between project alternatives. These estimates 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,[6] rate of acceleration, and the aerodynamics and efficiency of the vehicles.

[6] 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.

Table 4-1. Summary of CT-EMFAC-Modeled CO_2 Emissions

Scenario	Daily VMT	Tons per Year CO_2 Emissions
Existing (2012)	3,028,627	551,186
2040 No-Build	4,613,823	673,710
2040 Build	4,683,730	683,371
Alternative Increase/(Decrease) Compared with Existing Year 2012		
2040 Build vs. Existing	+ 1,655,103	+ 132,185
Alternative Increase/(Decrease) Compared with Respective No-Build at Opening Year 2020 and Horizon Year 2040		
2040 Build vs. No-Build	+ 69,907	+ 9,661
Source: Compiled by ICF International using traffic data provided by URS Corporation, 2012 Calculation worksheets provided in Appendix F.		

In addition, the 2012–2035 RTP/SCS includes strategies to reduce VMT and associated per capita energy consumption from the transportation sector as well as mitigation measures related to energy that are designed to reduce consumption and increase the use and availability of renewable sources of energy in the region (Southern California Association of Governments 2012a). Potential mitigation programs identified in the 2012–2035 RTP/SCS to reduce GHG emissions include increased construction of infrastructure and automobile fuel efficiency to accommodate increased use of alternative-fuel motor vehicles as well as coordinating transportation, land use, and air quality planning to reduce VMT, energy use, and GHG emissions (Southern California Association of Governments 2012a).

The EIR for the 2012–2035 RTP/SCS performed a GHG emission reduction strategy consistency analysis to evaluate impacts related to climate change associated with the 2012–2035 RTP/SCS. This consistency analysis evaluated consistency with the ARB; Public Utilities Commission; Business, Transportation, and Housing Agency; State and Consumer Services Agency; and EPA GHG reduction strategies and found that impacts on climate change are considered significant even with implementation of mitigation measures. To help mitigate impacts associated with the 2012–2035 RTP/SCS, SCAG identified mitigation measures to mitigate the impacts of growing transportation energy demand associated with the RTP (Southern California Association of Governments 2012a).

4.1.3 Construction Emissions

Greenhouse gas emissions for transportation projects can be divided into those produced during construction and those produced during operations. Construction GHG emissions include emissions produced as a result of material processing, emissions produced by onsite construction equipment, and emissions arising from traffic delays due to construction. These emissions will be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases.

In addition, with innovations such as longer pavement lives, improved traffic management plans, and changes in materials, the GHG emissions produced during construction can be mitigated to some degree by longer intervals between maintenance and rehabilitation events.

A qualitative analysis of construction-related emissions was provided in Section 3.2.2.1 of Chapter 3. As stated in Chapter 3, construction emissions of criteria pollutants are considered temporary emissions. This is not the case with GHGs because of the cumulative nature of GHGs, which remain in the earth's atmosphere long after the time of emission. As detailed in the construction emissions calculation worksheet provided in Appendix F, approximately 2,129 metric tons of CO_2 emissions associated with proposed project construction would endure in the atmosphere with construction of the Build Alternative.

4.1.4 CEQA Conclusion

As discussed above, both the future build and future no-build scenarios show increases in CO_2 emissions over the existing levels; the future build CO_2 emissions are projected to be higher than the future no-build emissions within the project corridor; however, on a region-wide basis, the Build Alternative would have no substantial effect on CO_2 emissions when compared with the No-Build Alternative. In addition, as discussed above, there are also limitations with EMFAC and with assessing what a given CO_2 emissions increase means for climate change. Therefore, it is Caltrans' determination that in the absence of further regulatory or scientific information related to GHG emissions and CEQA significance, it is too speculative to make a determination regarding the significance of the project's direct impact and its contribution on the cumulative scale to climate change. However, Caltrans is firmly committed to implementing measures to help reduce the potential effects of the project. These measures are outlined in the following section. Nonetheless, Caltrans is taking further measures to help reduce energy consumption and GHG emissions. These measures are outlined below under the Assembly Bill 32 Compliance subheading.

4.1.5 Greenhouse Gas Reduction Strategies

4.1.5.1 AB 32 Compliance

The Department continues to be actively involved on the Governor's Climate Action Team as ARB works to implement Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies the Department is using to help meet the targets in AB 32 come from the California Strategic Growth Plan, which is updated each year. Former Governor Arnold Schwarzenegger's Strategic Growth Plan calls for a $222 billion infrastructure improvement program to fortify the state's transportation system, education, housing, and waterways, including $100.7 billion in transportation funding during the next decade. The Strategic Growth Plan targets a significant decrease in traffic congestion below today's level and a corresponding reduction in GHG emissions. The Strategic Growth Plan proposes to do this while accommodating growth in population and the economy. A suite of investment options has been created that combined together are expected to reduce congestion. The Strategic Growth Plan relies on a complete systems approach to attain CO_2 reduction goals: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, and operational improvements as depicted in Figure 4-3, The Mobility Pyramid.

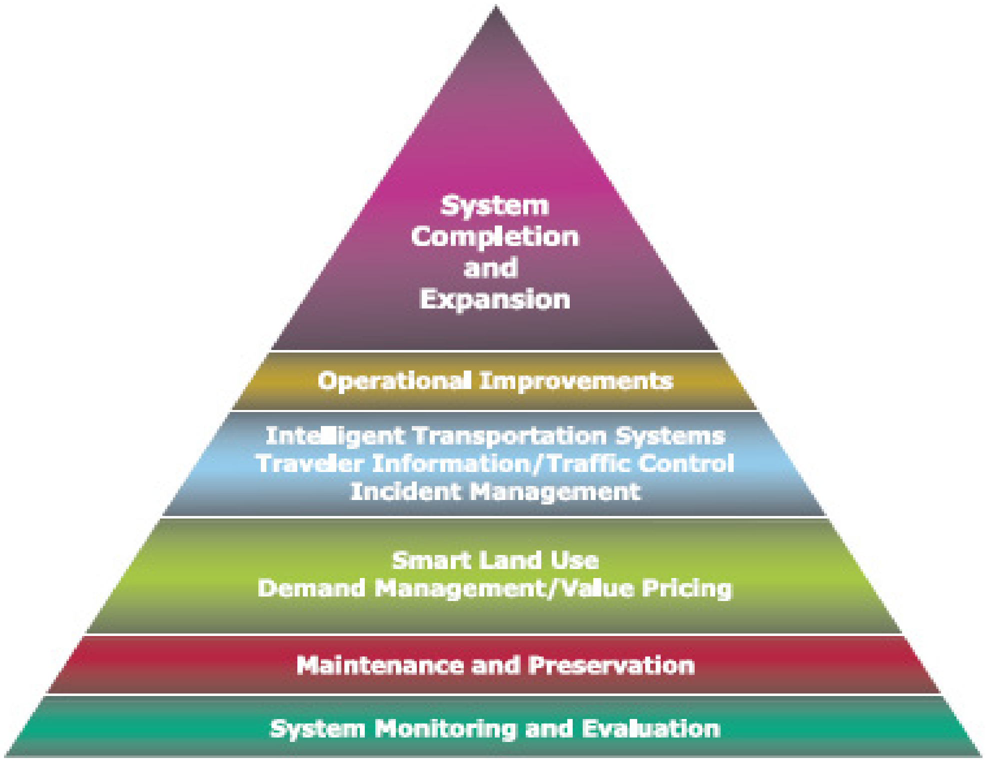


Figure 4-3: The Mobility Pyramid

The Department is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high density housing along transit corridors. The Department works closely with local jurisdictions on planning activities but does not have local land use planning authority. The Department assists efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars, light and heavy-duty trucks; the Department is doing this by supporting on-going research efforts at universities, by supporting legislative efforts to increase fuel economy, and by its participation on the Climate Action Team. It is important to note, however, that the control of the fuel economy standards is held by U.S. EPA and ARB.

Table 4-2 summarizes the Departmental and statewide efforts that the Department is implementing in order to reduce GHG emissions. More detailed information about each strategy is included in the Climate Action Program at Caltrans (December 2006).

Table 4-2. Climate Change/CO_2 Reduction Strategies

Strategy	Program	Partnership Lead	Partnership Agency	Method/Process	Estimated CO_2 Savings (MMT) 2010	Estimated CO_2 Savings (MMT) 2020
Smart Land Use	Intergovernmental Review (IGR)	Caltrans	Local governments	Review and seek to mitigate development proposals	Not Estimated	Not Estimated
	Planning Grants	Caltrans	Local and regional agencies & other stakeholders	Competitive selection process	Not Estimated	Not Estimated
	Regional Plans and Blueprint Planning	Regional Agencies	Caltrans	Regional plans and application process	.975	7.8
Operational Improvements & Intelligent Transportation System (ITS) Deployment	Strategic Growth Plan	Caltrans	Regions	State ITS; Congestion Management Plan	.07	2.17
Mainstream Energy & GHG into Plans and Projects	Office of Policy Analysis & Research; Division of Environmental Analysis	Interdepartmental effort		Policy establishment, guidelines, technical assistance	Not Estimated	Not Estimated
Educational & Information Program	Office of Policy Analysis & Research	Interdepartmental, CalEPA, ARB, CEC		Analytical report, data collection, publication, workshops, outreach	Not Estimated	Not Estimated
Fleet Greening & Fuel Diversification	Division of Equipment	Department of General Services		Fleet Replacement B20 B100	.0045	.0065 .045 .0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	.117	.34
Portland Cement	Office of Rigid Pavement	Cement and Construction Industries		2.5 % limestone cement mix 25% fly ash cement mix > 50% fly ash/slag mix	1.2 .36	4.2 3.6
Goods Movement	Office of Goods Movement	Cal EPA, ARB, BT&H, MPOs		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					**2.72**	**18.18**

The following measures will also be included in the project to reduce the GHG emissions and potential climate change impacts from the project:

1. Caltrans and the California Highway Patrol are working with regional agencies to implement intelligent transportation systems (ITS) to manage the efficiency of the existing highway system. ITS is commonly referred to as electronics, communications, or information processing, used singly or in combination, to improve the efficiency or safety of a surface transportation system.
2. Landscaping reduces surface warming and, through photosynthesis, decreases CO_2. The project proposes planting in the intersection slopes and drainage channels and seeding in areas adjacent to frontage roads. Planting a variety plant material and scattered skyline trees of different sizes, where appropriate, would not obstruct views of the mountains. Caltrans has committed to planting a minimum of 40 trees. These trees will help offset any potential CO_2 emissions increase. Based on a formula from the Tree Canada Foundation (1999),[7] it is anticipated that the planted trees will offset between seven and 10 tons of CO_2 per year.
3. The project would incorporate the use of energy-efficient lighting, such as LED traffic signals. LED bulbs—or balls, in the stoplight vernacular—cost $60 to $70 apiece but last five to six years compared with the one-year average lifespan of the incandescent bulbs that were previously used. The LED balls themselves consume 10 percent of the electricity of traditional lights, which will also help reduce the project's CO_2 emissions (Brass 2008).
4. According to Caltrans Standard Specification Provisions, the contractor must comply with all South Coast Air Quality Management District rules, ordinances, and regulations regarding air quality restrictions.

4.1.6 Adaptation Strategies

"Adaptation strategies" refer to how the Department and others can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damage to roadbeds from longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

At the federal level, the Climate Change Adaptation Task Force, co-chaired by the White House Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA), released its interagency report on October 14, 2010 outlining recommendations to President Obama for how Federal

[7] For rural areas the formula is: # of trees/360 x survival rate = tons of carbon/year removed for each of 80 years.

Agency policies and programs can better prepare the U.S. to respond to the impacts of climate change. The Progress Report of the Interagency Climate Change Adaptation Task Force recommends that the federal government implement actions to expand and strengthen the nation's capacity to better understand, prepare for, and respond to climate change.

Climate change adaption must also involve the natural environment as well. Efforts are underway on a statewide-level to develop strategies to cope with impacts to habitat and biodiversity through planning and conservation. The results of these efforts will help California agencies plan and implement mitigation strategies for programs and projects.

On November 14, 2008, former Governor Arnold Schwarzenegger signed EO S-13-08 which directed a number of state agencies to address California's vulnerability to sea level rise caused by climate change. This EO set in motion several agencies and actions to address the concern of sea level rise.

In addition to addressing projected sea level rise, the California Natural Resources Agency (Resources Agency) was directed to coordinate with local, regional, state, and federal public and private entities to develop. The California Climate Adaptation Strategy (Dec 2009)[8], which summarizes the best known science on climate change impacts to California, assesses California's vulnerability to the identified impacts, and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

The strategy outline is in direct response to EO S-13-08 that specifically asked the Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including the California Environmental Protection Agency; Business, Transportation and Housing; Health and Human Services; and the Department of Agriculture. The document is broken down into strategies for different sectors that include: Public Health; Biodiversity and Habitat; Ocean and Coastal Resources; Water Management; Agriculture; Forestry; and Transportation and Energy Infrastructure. As data continues to be developed and collected, the state's adaptation strategy will be updated to reflect current findings.

The Resources Agency was directed to prepare a Sea Level Rise Assessment Report to advise how California should plan for future sea level rise (Committee on Sea Level Rise in California, Oregon, and Washington et al. 2012). The report was released in June 2012 and included:

- Relative sea level rise projections for California, Oregon, and Washington taking into account coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge and land subsidence rates.
- The range of uncertainty in selected sea level rise projections.
- A synthesis of existing information on projected sea level rise impacts to state infrastructure (such as roads, public facilities and beaches), natural areas, and coastal and marine ecosystems.

[8] http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF

- A discussion of future research needs regarding sea level rise.

Interim guidance has been released by The Coastal Ocean Climate Action Team (CO-CAT) as well as the Department as a method to initiate action and discussion of potential risks to the states infrastructure due to projected sea level rise. Subsequently, CO-CAT updated the Sea Level Rise guidance to include information presented in the National Academies Study.

All state agencies that are planning to construct projects in areas vulnerable to future sea level rise are directed to consider a range of sea level rise scenarios for the years 2050 and 2100 to assess project vulnerability and, to the extent feasible, reduce expected risks and increase resiliency to sea level rise. Sea level rise estimates should also be used in conjunction with information on local uplift and subsidence, coastal erosion rates, predicted higher high water levels, storm surge, and storm wave data.

All projects that have filed a Notice of Preparation as of the date of EO S-13-08, and/or are programmed for construction funding through 2013, or are routine maintenance projects may, but are not required to, consider these planning guidelines. As shown in the proposed project's 2015 FTIP description (Project ID 20111625), the project is programmed for construction funding during the year 2017/2018 time period. As such, it is not exempt at this time from requirements to analyze the impacts of sea-level rise directed in Executive Order S-13-08. The *Vulnerability of Transportation Systems to Sea-Level Rise* (Caltrans 2009) report suggests that by 2100, sea-level rise along the California coast could be as much as 55 inches. Given the proposed project's distance from the coastal zone, impacts related to sea-level rise are not expected.

Executive Order S-13-08 also directed the Business, Transportation, and Housing Agency to prepare a report to assess vulnerability of transportation systems to sea level rise affecting safety, maintenance and operational improvements of the system, and economy of the state. The Department continues to work on assessing the transportation system vulnerability to climate change, including the effect of sea level rise.

Currently, the Department is working to assess which transportation facilities are at greatest risk from climate change effects. However, without statewide planning scenarios for relative sea level rise and other climate change effects, the Department has not been able to determine what change, if any, may be made to its design standards for its transportation facilities. Once statewide planning scenarios become available, the Department will be able review its current design standards to determine what changes, if any, may be warranted in order to protect the transportation system from sea level rise.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation and flooding; the increased frequency and intensity of storms and wildfires; rising temperatures; and rising sea levels. The Department is an active participant in the efforts being conducted in response to EO S-13-08 and is mobilizing to be able to respond to the National Academy of Science Sea Level Rise Assessment Report.

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5.3 Personal Communications

Brady, Mike. Air quality/conformity coordinator. California Department of Transportation. DOTP-ORIP. Sacramento, CA. January 6, 2010—email to Shannon Hill of ICF International about California-specific information applicable to the *Update on Mobile-source Air Toxic Analysis in NEPA Documents.*

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Casil, Noel (A). Senior transportation engineer. URS Corporation, Santa Ana, CA. December 28, 2012—email ICF regarding project VMT data.

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Appendix A

- 2015 FTIP Reference to Proposed Project
- 2015 FTIP FTA/FHWA Approval Letter
- 2015 FTIP Administrative Modification 15-02 SCAG Letter
- 2012-2035 RTP/SCS Amendment 1 Reference to Proposed Project
- 2012-2035 RTP/SCS Amendment 1 FTA/FHWA Approval Letter
- 2012-2035 RTP/SCS Amendment 2 Reference to Proposed Project (replaces RTP/SCS Amendment 1 once approved by FTA/FHWA)

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
20110110	San Bernardino	SCAB		4M1007	CAX70	210	19.3	20.1	S	NON-EXEMPT	1
Description:							PTC	23,770	Agency	SANBAG	

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 WIDEN PEPPER FROM 2-4 LANES FROM HIGHLAND AVE. TO EXISTING 4 LANE SECTION S/O INTERCHANGE

Fund	ENG	R/W	CON	Total	Prior	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	Total
STP LOCAL			13,131	13,131		2,714	10,417					13,131
LOCAL ADVANCE CONSTRUCTION						10,417	-10,417					
SBD CO MEASURE I	2,500	4,005	4,134	10,639	2,500	8,139						10,639
20110110 Total	2,500	4,005	17,265	23,770	2,500	21,270						23,770

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
20111625	San Bernardino	SCAB		4M01005	CAX63	210	26	33.2	S	NON-EXEMPT	2
Description:							PTC	132,163	Agency	SANBAG	

SR210 LANE ADDITION - ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE. TO SAN BERNARDINO AVE (REDLANDS) INCLUDES AUX. LANES BETWEEN BASE LINE AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST. E/B ON RAMP AND DECELRATION LANE AT HIGHLAND AVE E/B OFF RAMP. (Under 1/4 miles length)

Fund	ENG	R/W	CON	Total	Prior	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	Total
STP LOCAL			43,523	43,523					8,447	14,691	20,385	43,523
LOCAL ADVANCE CONSTRUCTION									35,076	-14,691	-20,385	
SBD CO MEASURE I	11,870	4,768	47,002	63,640	3,052		13,586		47,002			63,640
STIP ADVANCE CON-RIP			25,000	25,000	25,000							25,000
20111625 Total	11,870	4,768	115,525	132,163	28,052		13,586		90,525			132,163

ProjectID	County	Air Basin	Model	RTP ID	Program	Route	Begin	End	System	Conformity Category	Amendment
201186	San Bernardino	SCAB		REG0701	CAX62	210	29.21	29.5	S	NON-REPORTABLE TCM COMMITTED	1
Description:							PTC	15,512	Agency	SANBAG	

AT SR-210/BASE LINE IC: RECONSTRUCT/WIDEN BASE LINE BETWEEN CHURCH AVE AND BOULDER AVE FROM 4 TO 6 THROUGH LANES AND EXTEND LEFT TURN LANES, WIDEN RAMPS – WB EXIT 1 TO 3 LANES, WB AND EB ENTRANCES 1 TO 3 LANES INCLUDING HOV PREFERENTIAL LANES (EA 1C970)

Fund	ENG	R/W	CON	Total	Prior	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	Total
DEVELOPER FEES	1,143	83	5,279	6,505	535	691	5,279					6,505
SBD CO MEASURE I	1,570	116	7,321	9,007	728	958	7,321					9,007
201186 Total	2,713	199	12,600	15,512	1,263	1,649	12,600					15,512

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	0
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	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	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

U.S. Department of Transportation
Federal Highway Administration

California Division

650 Capitol Mall, Suite 4-100
Sacramento, CA 95814
(916) 498-5001
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December 15, 2014

In Reply Refer To:
HAD-CA

Ms. Rachel Falsetti
Chief, Division of Transportation Programming
California Department of Transportation
1120 N Street
Sacramento, CA 95814

SUBJECT: Approval of the 2015 Federal Statewide Transportation Improvement Program

Dear Ms. Falsetti:

We have completed our review of California's proposed 2014/15 - 2018/19 Federal Statewide Transportation Improvement Program (2015 FSTIP) and Statewide and Metropolitan Planning Certifications and related supporting documentation submitted by the California Department of Transportation (Caltrans) on November 15, 2014. The Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) approve the 2015 FSTIP and and this approval supersedes California's 2013 FSTIP and all subsequent amendments to the 2013 FSTIP that were approved by the FHWA and FTA on or after December 14, 2012.

Section 450.218 of Title 23, Code of Federal Regulations, requires the State to submit the updated FSTIP concurrently to the FTA and the FHWA at least every four years for joint approval. California's proposed 2015 FSTIP includes the project and project phase listings for proposed transportation projects located outside the planning area boundaries of the the State's designated Metropolitan Planning Organizations (MPOs). California's proposed 2015 FSTIP also incorporates, by reference, those projects included in 2015 Federal Transportation Improvements Programs (FTIPs) that were adopted in 2014 by the eighteen designated MPOs in California. This approval includes the eight MPO 2015 FTIP Amendments adopted prior to the FSTIP public review period.

The FHWA and the FTA have completed the air quality conformity determinations required by 23 CFR 450.216(b) for the MPO FTIPs in areas of the State designated as nonattainment or maintenance for national ambient air quality standards (NAAQS).

Based on our review of the information submitted with the State's proposed 2015 FSTIP, including revenue and proposed project funding information required to demonstrate financial constraint, and documentation for statewide and metropolitan planning process in support of California's Statewide Planning Certification, we are approving the 2015 FSTIP as proposed.

Any project or project phase listed in a MPO FTIP that is not included in the MPO's Regional Transportation Plan, is not approved for inclusion in the FSTIP pursuant to 23 CFR §§450.216(k) and 450.324(g).

Our FSTIP approval action includes project listings that indicate no funds are proposed for obligation during the four-year program period from 2014/15 to 2018/19. These projects and project phases cannot be advanced to implementation without an action by the FHWA and the FTA on the FSTIP pursuant to 23 CFR 450.216(l) and 450.328(e). Further, project or project phase funding included in the 2015 FSTIP that is listed/proposed for obligation outside the four year program cycle is accepted by the FHWA and the FTA as 'informational' in accord with 23 CFR §§450.216(a) and 450.324(a).

We are approving the 2015 FSTIP with the understanding that the eligibility of individual projects for funding is subject to the applicant's satisfaction of all FHWA and FTA funding requirements. This joint FHWA and FTA approval of the FSTIP does not constitute an eligibility determination for the federal funds proposed for obligation on the listed projects. If you have questions or need additional information concerning our approval of the 2015 FSTIP, please contact Wade Hobbs in the FHWA California Division office at (916) 498-5027, or by email at Wade.Hobbs@dot.gov; or Ted Matley in the FTA Region IX office at (415) 744-2590, or by email at Ted.Matley@dot.gov.

Sincerely,

Leslie T. Rogers
Regional Administrator
Federal Transit Administration

Michael J. Duman

For
Vincent P. Mammano
Division Administrator
Federal Highway Administration

cc: (email)
Ray Sukys, FTA Region IX
Ted Matley, FTA Region IX
Karina O'Connor, EPA Region IX (OConnor.Karina@epa.gov)
Cari Anderson, CARB (Cari.Anderson@arb.ca.gov)
Muhaned Aljabiry, Caltrans OFTMP (Muhaned.Aljabiry@dot.ca.gov)
Fardad Falakfarsa, Federal Resources Office (Fardad.Falakfarsa@dot.ca.gov)
Garth Hopkins, Caltrans ORIP (Garth.Hopkins@dot.ca.gov)
Bureau of Indian Affairs, Pacific Region Roads Engineer
All California MPOs (18)
Jack Lord, FHWA
Jermaine Hannon, FHWA CADO
Christina Leach, FHWA NVDO

cc:
2015 FSTIP Binder

WEH/

SOUTHERN CALIFORNIA

ASSOCIATION of GOVERNMENTS

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December 16, 2014

Administrative Modification #15-02

Ms. Rachel Falsetti
Chief, Division of Transportation Programming
Department of Transportation
Transportation Programming, MS-82
1120 "N" Street
Sacramento, CA 94274-0001

ATTENTION: Abhijit Bagde

RE: ADMINISTRATIVE MODIFICATION #15-02 TO THE 2015 FEDERAL TRANSPORTATION IMPROVEMENT PROGRAM (FTIP)

Dear Ms. Falsetti:

The Southern California Association of Governments (SCAG) is transmitting Administrative Modification #15-02 for projects in Imperial, Los Angeles, Orange, Riverside, San Bernardino, Ventura, and Various Counties. Included in this amendment package is the narrative describing the projects being amended and project listing reports. The projects meet the administrative modification criteria provided by the funding agencies in their letter dated June 3, 2011.

SCAG certifies that the projects in this administrative modification are not included in any other amendment that is currently open for public review. This administrative modification adds programming capacity in the amount of $124 million that relies on the FSTIP federal programming capacity. The financial constraint documentation will be updated to reflect this administrative modification in the next amendment.

The projects included in this administrative modification have demonstrated they satisfy the requirements of 40 CFR 93.118 and 93.119 without a new regional emissions analysis in accordance with the provisions of 40 CFR 93.122(e)(2)(ii). Therefore, SCAG through its function as the designated Metropolitan Planning Organization (MPO) has found the attached projects to conform to the applicable State Implementation Plan and to be consistent with the 2012 Regional Transportation Plan/Sustainable Communities Strategies (RTP/SCS). The updates of these projects do not impact the conformity analysis of the financial constraints of the FY 2015 FTIP.

Under the delegated authority received from Caltrans, I approve this administrative modification to the Federal Statewide Transportation Improvement Program (FSTIP).

If you have any questions, please contact Maria I. Lopez of my staff at (213) 236-1806 or via e-mail at lopez@scag.ca.gov

Sincerely,

Hasan Ikhrata
Executive Director

Attachments

HI:mil

Cc: Mr. Abhijit Bagde, Caltrans, Division of Transportation Programming
Mr. Leslie Rogers, FTA
Mr. Stew Sonnenberg, FHWA
Mr. Michael Morris, FHWA
Mr. Ted Matley, FTA
Ms. Karina O'Conner, EPA Region 9
Caltrans District 7, 8, 11, and 12
Mr. Mark Baza, Imperial County Transportation Commission
Mr. Herman Cheng, Los Angeles County Metropolitan Transportation Authority
Ms. Adriann Cardoso, Orange County Transportation Authority
Ms. Grace Alvarez, Riverside County Transportation Commission
Ms. Carrie Schindler, San Bernardino Associated Governments
Mr. Peter DeHaan, Ventura County Transportation Commission

County	System	Lead Agency	RTP ID	FTIP ID	Begin PM	End PM	Route #	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	Project Comple- tion By*
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 BRIDG	SR 210	ABOUT 150 FEET	ABOUT 0.36 MILES SOUTH OF 5TH STREET ALONG SR 210	ABOUT 0.38 MILES SOUTH OF 5TH STREET ALONG SR 210	ACCESS ROUTE BRIDGE STRUCTURE WIDENING FROM 2-3 LANES, SOUTHBOUND STRUCTURE ONLY	2	3				2015
San Bernardino	State Highway	SANBAG	4M01005	20111625	26	33.2	210				SR210 LANE ADDITION - ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE(S/B). TO LUGONIA (REDLANDS) INCLUDES AUX. LANES BETWEEN BASE LINE AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST. S/B ON RAMP	210	7.2 MILES	HIGHLAND AVE	LUGONIA	ADDING 1 LANE IN EACH DIRECTION	4	6				2020
San Bernardino	State Highway	SANBAG	4M1007	20110110	19.3	20.1	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 WIDEN PEPPER FROM 2-4 LANES FROM HIGHLAND AVE. TO EXISTING 4 LANE SECTION S/O INTERCHANGE	SR210	N/A	AT PEPPER AVE.	n/a	ALSO WIDEN 2-4 LANES FROM HIGHLAND TO EXISTING 4 LANE SECTION SOUTH OF SR210 INTERCHANGE						2015
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	2012
San Bernardino	State Highway	SANBAG	4M07007				210	I-210 @ Baseline			Interchange reconfiguration/new interchange									bridge widening from 4 to 6 lanes and ramp improvements		2020
San Bernardino	State Highway	SANBAG	4M01047				210	I-210 @ Del Rosa			Interchange reconfiguration/new interchange											2020
San Bernardino	State Highway	SANBAG	4M01049				210	I-210 @ Waterman			Interchange reconfiguration/new interchange											2020
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)											2020
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											2027
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				2018
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)	I-215	5.1 MILES	SPRUCE ST	ORANGE SHOW RD	1 HOV LANE IN EACH DIRECTION	0	2			X	2014
San Bernardino	State Highway	SANBAG	4M01043	OM630	2	3.3	215				I-215 MT. VERNON/WASHINGTON ST. INTERCHANGE-RECONSTRUCT I/C- REPLACE O/C STRUCTURE; RECONFIGURE ON/OFF RAMPS; ADD SB ACCEL AND NB DECEL LANE-IMPROVEMENTS TO LOCAL STREETS	215	0 or N/A	at Mt Vernon/ Washington St	at Mt Vernon/ Washington St	RECONSTRUCT I/C-REPLACE O/C STRUCTURE; RECONFIGURE ON/OFF RAMPS; ADD SB ACCEL AND NB DECEL LANE-IMPROVEMENTS TO LOCAL STREETS	0	0				2020
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	2012

* Represents the Plan network year for which the project was analyzed for the RTP/SCS modeling and regional emissions analysis

U.S. Department of Transportation
Federal Highway Administration

California Division

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July 15, 2013

In Reply Refer To:
HDA-CA

Mr. Hasan Ikhrata
Executive Director
Southern California Association of Governments
818 West 7th Street, 12th Floor
Los Angeles, CA 90017

SUBJECT: Conformity Determination for SCAG's 2012-2035 RTP/ SCS through Amendment No. 1 and the 2013 FTIP through Amendment No. 13-04

Dear Mr. Ikhrata:

The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) have completed our review of the conformity determination for Southern California Association of Governments' (SCAG's) 2012-2035 Regional Transportation Plan (RTP)/ Sustainable Communities Strategy (SCS) through Amendment No. 1 and the 2013 Federal Transportation Improvement Program (FTIP) through Amendment No. 13-04. A FHWA/FTA air quality conformity determination is required pursuant to the Environmental Protection Agency's (EPA) *Transportation Conformity Rule,* 40 CFR Parts 51 and 93, and the United States Department of Transportation's *Metropolitan Planning Rule,* 23 CFR Part 450.

On June 6, 2013, SCAG adopted Amendment No. 1 to the 2012-2035 RTP/ SCS, Amendment No. 13-04 to the 2013 FTIP, and the corresponding conformity determination. The conformity analysis submitted by SCAG indicates that all air quality conformity requirements have been met. Based on our review, we find that Amendment No. 1 to the 2012-2035 RTP/ SCS and Amendment No. 13-04 to the 2013 FTIP conform to the applicable state implementation plan in accordance with the provisions of 40 CFR Parts 51 and 93. In accordance with the July 15, 2004, *Memorandum of Understanding (MOU) between the Federal Highway Administration, California Division and the Federal Transit Administration, Region IX,* FTA has concurred with this conformity determination. Additionally, this conformity determination was made after consultation with the EPA Region 9 office.

If you have questions or need additional information concerning this conformity determination, please contact Mr. Stew Sonnenberg of the FHWA California Division office at (916) 498-5889 or by email at Stew.Sonnenberg@dot.gov.

Sincerely,

/s/ Leslie T. Rodgers

Leslie T. Rogers
Regional Administrator
Federal Transit Administration

For: Vincent P. Mammano
Division Administrator
Federal Highway Administration

County	System	Lead Agency	RTP ID	FTIP ID	Begin PM	End PM	Route #	Route Name	From	To	Description	Baseline	Completion Year	Model Segment	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
San Bernardino	State Highway	SANBAG	4M01005	20111625	26	33.2	210				SR210 LANE ADDITION - ADD 1 MIXED FLOW LANE IN EACH DIRECTION FROM HIGHLAND AVE(S/B). TO LUGONIA (REDLANDS) INCLUDES AUX. LANES BETWEEN BASE LINE AND 5TH STS AND AN ACCELERATION LANE AT 5TH ST. S/B ON RAMP		2020		210	7.2 MILES	HIGHLAND AVE	LUGONIA	ADDING 1 LANE IN EACH DIRECTION	4	6		
San Bernardino	State Highway	SANBAG	4M1007	20110110	19.3	20.1	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 WIDEN PEPPER FROM 2-4 LANES FROM HIGHLAND AVE. TO EXISTING 4 LANE SECTION S/O INTERCHANGE		2016		SR210	N/A	AT PEPPER AVE.	n/a	ALSO WIDEN 2-4 LANES FROM HIGHLAND TO EXISTING 4 LANE SECTION SOUTH OF SR210 INTERCHANGE	2	4		
San Bernardino	State Highway	SAN BERNARDINO ASSOCIATED GOVERNMENTS (SANBAG)	4M07007				210	I-210 @ Baseline			Interchange reconfiguration/new interchange		2020	1									bridge widening from 4 to 6 lanes and ramp improvements
San Bernardino	State Highway	SAN BERNARDINO ASSOCIATED GOVERNMENTS (SANBAG)	4M01047				210	I-210 @ Del Rosa			Interchange reconfiguration/new interchange		2020	1									
San Bernardino	State Highway	SAN BERNARDINO ASSOCIATED GOVERNMENTS (SANBAG)	4M01049				210	I-210 @ Waterman			Interchange reconfiguration/new interchange		2020	1									
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)		2020	1									
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		2025	1									
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		2018		I-215	n/a	UNIVERSITY	UNIVERSITY	INTERCHANGE RECONFIGURATION	4	4		
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)(M003)	X	2015		I-215	5.1 MILES	SPRUCE ST	ORANGE SHOW RD	1 HOV LANE IN EACH DIRECTION	0	2		
San Bernardino	State Highway	SANBAG	4M01043	OM630	2	3.3	215				I-215 MT. VERNON/WASHINGTON ST. INTERCHANGE-RECONSTRUCT I/C- REPLACE O/C STRUCTURE; RECONFIGURE ON/OFF RAMPS; ADD SB ACCEL AND NB DECEL LANE-IMPROVEMENTS TO LOCAL STREETS		2020		215	0 or N/A	at Mt Vernon/ Washington St	at Mt Vernon/ Washington St	RECONSTRUCT I/C-REPLACE O/C STRUCTURE; RECONFIGURE ON/OFF RAMPS; ADD SB ACCEL AND NB DECEL LANE-IMPROVEMENTS TO LOCAL STREETS	0	0		
San Bernardino	State Highway	VARIOUS AGENCIES	SBD31850	SBD31850	0.58	1.66	215				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. B/W VIVENDA AVE & BARTON RD, RPLCMT W/ NEW LOCAL RD,	X	2018		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		
San Bernardino	State Highway	CALTRANS	4H01008				215	I-215	SR-210	I-15	Add 1 HOV lane each direction (PM 9.5-18.0)		2025	1									
San Bernardino	State Highway	CALTRANS	4M01003				215	I-215	SR-30	I-15	Add 1 MF lane each direction (10.0-18.0)		2025	1									

Appendix B

- Local Climate Data
- Local Ambient Monitoring Data

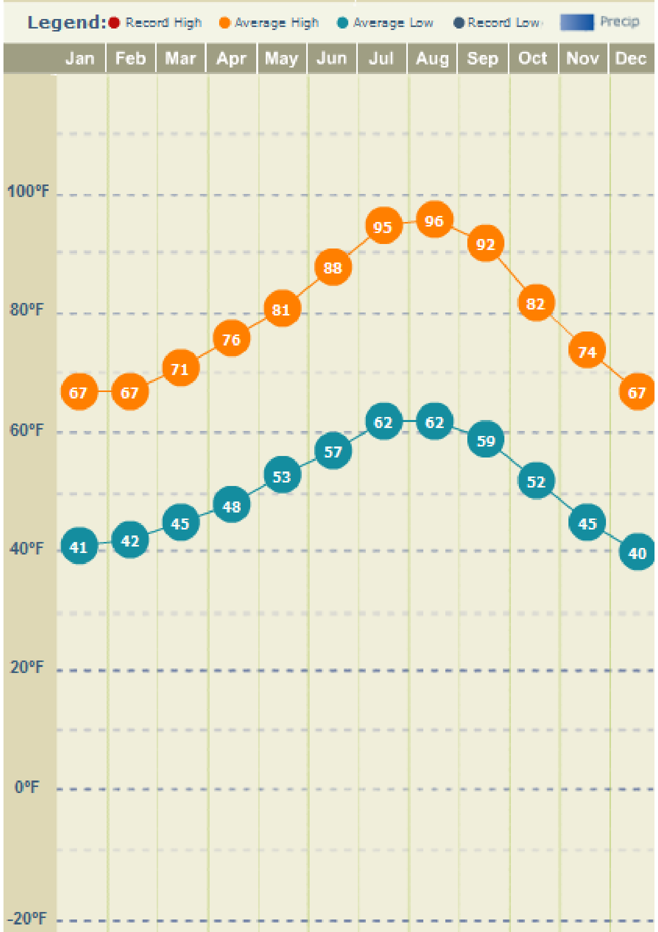
Monthly Averages for
Highland, CA
[English | Metric]

Monthly Averages

Table Display Graph Display

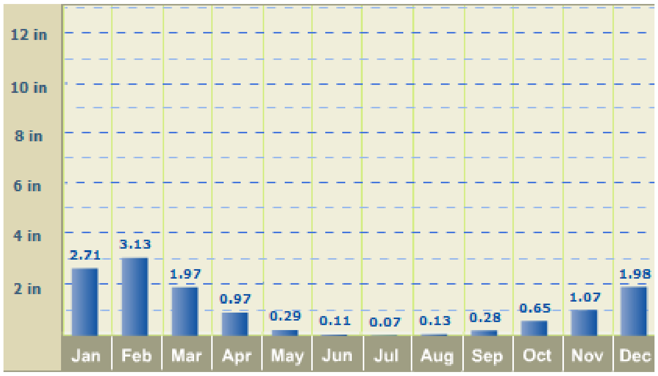
Temperature (°F)
- [x] Avg High
- [ ] Record High
- [x] Avg Low
- [ ] Record Low

Precipitation
- Avg Precip.



Today's Top Picks

- What Ticks Have to Do Lyme Disease
- Top 20 Ways to Stop Allergies
- 10 Worst Traffic Cities
- A Different Kind of Alaskan Cruise
- See Cape Cod from a New Perspective
- Check the Weather On Your Route
- How to Cook Your Catch
- Book Your Weekend Tee Time
- Bahamas Family Fun Before Back to School



Highland, CA Weather Facts

- On average, the warmest month is August.
- The highest recorded temperature was 118°F in 2006.
- The average coolest month is December.
- The lowest recorded temperature was 19°F in 2000.
- The maximum average precipitation occurs in February.

Details | Video | Text | **Averages**

More Resources

Find Local Golf Courses
Near Highland, CA
OR
Enter Course Name

- Golf Tips: Beat the Weather
- Top 10 Golf Destinations
- Local Pollen Levels
- Surf Conditions

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Enter Search Term **SEARCH** Search Web Search Site

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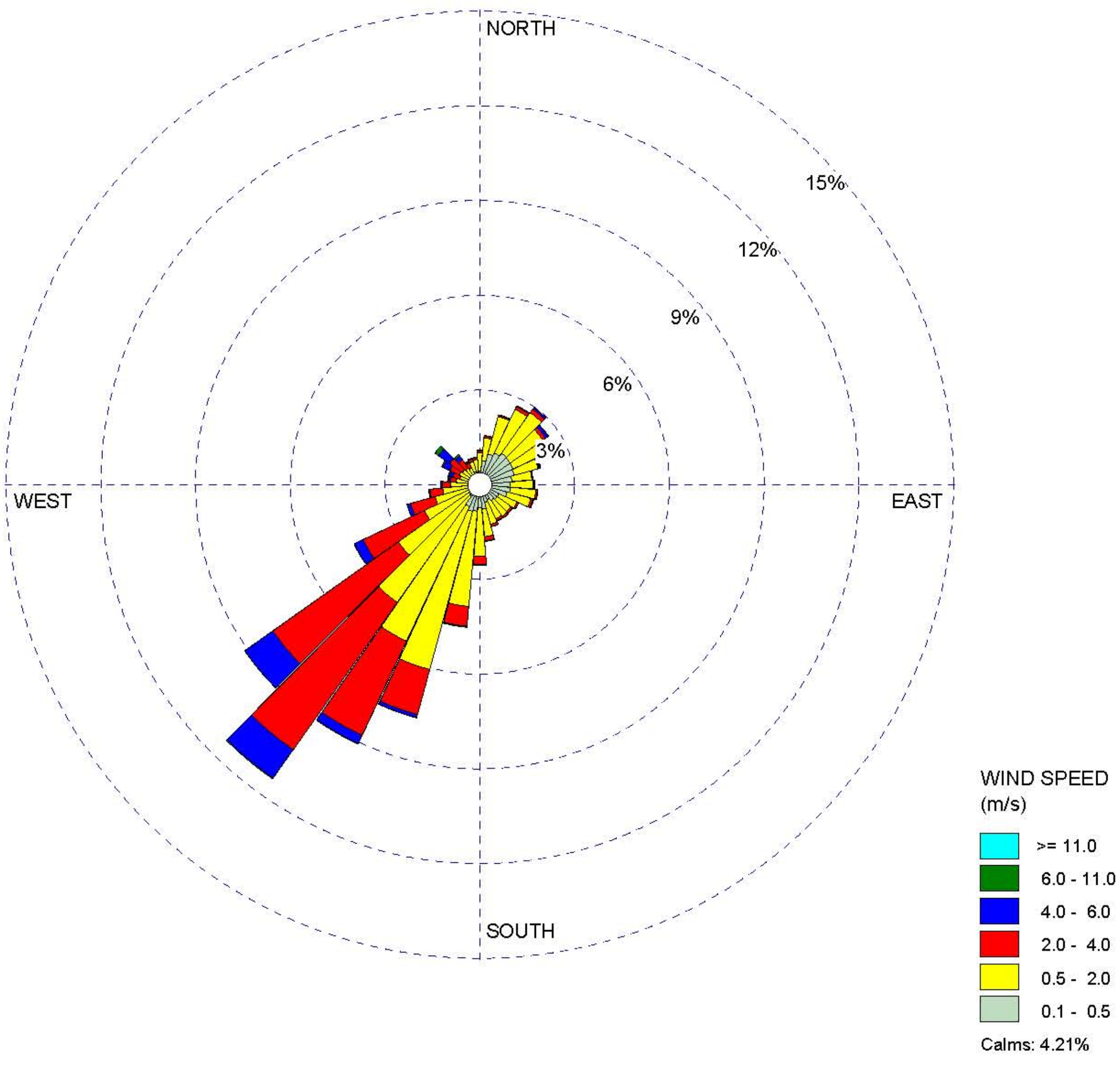
WIND ROSE PLOT:	DISPLAY:
snbo	**Wind Speed** **Direction (blowing from)**



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2005-2007 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **4.21%**	TOTAL COUNT: **26126 hrs.**	
	AVG. WIND SPEED: **1.44 m/s**	DATE: **1/28/2009**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily Maximum Hourly Ozone Measurements

at San Bernardino-4th Street

	2011		2012		2013	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Jul 2	0.135	Aug 12	0.124	Jun 29	0.139
Second High:	Aug 14	0.125	Aug 8	0.121	Jun 1	0.125
Third High:	Jun 27	0.119	Jul 11	0.119	Sep 14	0.122
Fourth High:	Aug 27	0.119	Aug 7	0.118	Jul 8	0.113
California:						
# Days Above the Standard:		40		41		22
California Designation Value:		0.13		0.13		0.13
Expected Peak Day Concentration:		0.133		0.129		0.130
National:						
# Days Above the Standard:		2		0		2
Nat'l Standard Design Value:		0.129		0.124		0.125
Year Coverage:		94		93		92

Notes:

Hourly ozone measurements and related statistics are available at San Bernardino-4th Street between 1986 and 2013. Some years in this range may not be represented.
All concentrations expressed in parts per million.
The national 1-hour ozone standard was revoked in June 2005 and is no longer in effect. Statistics related to the revoked standard are shown in italics or italics.
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Ozone Averages

at San Bernardino-4th Street

	2011		2012		2013	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National:						
First High:	Jul 2	0.121	Aug 12	0.109	Jun 29	0.112
Second High:	Aug 14	0.104	Aug 5	0.102	Jun 1	0.103
Third High:	Aug 13	0.101	Jul 11	0.100	Sep 14	0.102
Fourth High:	Aug 27	0.101	Aug 8	0.100	Sep 15	0.097
California:						
First High:	Jul 2	0.121	Aug 12	0.109	Jun 29	0.113
Second High:	Aug 14	0.105	Aug 5	0.103	Jun 1	0.104
Third High:	Aug 13	0.102	Jul 11	0.100	Sep 14	0.103
Fourth High:	Aug 27	0.102	Aug 8	0.100	Sep 15	0.098
National:						
# Days Above the Standard:		39		54		36
Nat'l Standard Design Value:		0.099		0.098		0.099
National Year Coverage:		93		93		92
California:						
# Days Above the Standard:		66		77		53
California Designation Value:		0.105		0.109		0.113
Expected Peak Day Concentration:		0.116		0.113		0.116
California Year Coverage:		92		91		90

Notes:

Eight-hour ozone averages and related statistics are available at San Bernardino-4th Street between 1986 and 2013. Some years in this range may not be represented.
All averages expressed in parts per million.
An exceedance of a standard is not necessarily related to a violation of the standard.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements

at San Bernardino-4th Street

	2011		2012		2013	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:	Oct 31	61.9	Oct 30	67.0	Nov 11	72.1
Second High:	Oct 11	60.2	Oct 29	66.7	Nov 8	63.4
Third High:	Oct 13	56.6	Oct 31	63.8	Oct 25	63.3
Fourth High:	Nov 1	55.5	Oct 16	61.3	Oct 18	62.2
California:						
First High:	Oct 31	61	Oct 30	67	Nov 11	72
Second High:	Oct 11	60	Oct 29	66	Oct 25	63
Third High:	Oct 13	56	Oct 31	63	Nov 8	63
Fourth High:	Nov 1	55	Oct 16	61	Oct 18	62
National:						
1-Hour Standard Design Value:		56		*		*
1-Hour Standard 98th Percentile:		52.9		59.7		54.5
# Days Above the Standard:		0		0		0
Annual Standard Design Value:		17		19		18
California:						
1-Hour Std Designation Value:		70		70		70
Expected Peak Day Concentration:		67		67		68
# Days Above the Standard:		0		0		0
Annual Std Designation Value:		20		*		*
Annual Average:		*		*		*
Year Coverage:		87		81		72

Notes:

Hourly nitrogen dioxide measurements and related statistics are available at San Bernardino-4th Street between 1986 and 2013. Some years in this range may not be represented.

All concentrations expressed in parts per billion.

An exceedance of a standard is not necessarily related to a violation of the standard.

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily Maximum 8-Hour Carbon Monoxide Averages

at San Bernardino-4th Street

	2011		2012		2013	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National:						
First High:	Dec 11	1.74	Jan 15	1.64		*
Second High:	Nov 29	1.48	Jan 7	1.37		*
Third High:	Dec 30	1.48	Jan 15	1.31		*
Fourth High:	Dec 31	1.42	Jan 20	1.27		*
California:						
First High:	Dec 11	1.74	Jan 14	1.64		*
Second High:	Nov 29	1.48	Jan 1	1.55		*
Third High:	Dec 30	1.48	Jan 7	1.37		*
Fourth High:	Dec 31	1.42	Jan 20	1.27		*
National:						
# Days Above the Standard:		0		0		0
California:						
# Days Above the Standard:		0		0		0
Expected Peak Day Concentration:		1.72		1.69		
Year Coverage:		98		41		*

Notes:

Eight-hour carbon monoxide averages and related statistics are available at San Bernardino-4th Street between 1986 and 2012. Some years in this range may not be represented.

All averages expressed in parts per million.

An exceedance of a standard is not necessarily related to a violation of the standard.

Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

* means there was insufficient data available to determine the value.

Available Pollutants:

8-Hour Ozone | Hourly Ozone | PM2.5 | PM10 | Carbon Monoxide | Nitrogen Dioxide | State Sulfur Dioxide | Hydrogen Sulfide

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily 24-Hour PM10 Averages

at San Bernardino-4th Street

	2011		2012		2013	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Jul 3	128.4	Jul 12	68.1	Oct 4	177.3
Second High:	Dec 1	100.1	Aug 10	63.9	Apr 27	66.8
Third High:	Sep 2	74.5	Jul 20	62.8	Nov 12	64.5
Fourth High:	Sep 23	63.5	Sep 10	61.0	Jul 18	58.9
California:						
First High:	Sep 24	54.0	May 21	51.0	Oct 25	98.0
Second High:	Oct 18	54.0	Aug 7	49.0	Nov 12	65.0
Third High:	Jul 2	49.0	May 9	47.0	Jul 21	49.0
Fourth High:	Aug 25	49.0	Jul 26	46.0	Jul 9	43.0
National:						
Estimated # Days > 24-Hour Std:		0.0		0.0		1.0
Measured # Days > 24-Hour Std:		0		0		1
3-Yr Avg Est # Days > 24-Hr Std:		0.0		0.0		0.0
Annual Average:		31.2		32.0		32.7
3-Year Average:		31		31		32
California:						
Estimated # Days > 24-Hour Std:		12.3		*		11.5
Measured # Days > 24-Hour Std:		2		1		2
Annual Average:		30.1		*		30.1
3-Year Maximum Annual Average:		31		31		30
Year Coverage:		0		0		0

Notes:

Daily PM10 averages and related statistics are available at San Bernardino-4th Street between 1989 and 2013. Some years in this range may not be represented.
All averages expressed in micrograms per cubic meter.
The national annual average PM10 standard was revoked in December 2006 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics*.
An exceedance of a standard is not necessarily related to a violation of the standard.
All values listed above represent midnight-to-midnight 24-hour averages and may be related to an exceptional event.
State and national statistics may differ for the following reasons:
State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and

California Environmental Protection Agency
Air Resources Board

Top 4 Summary: Highest 4 Daily 24-Hour PM2.5 Averages

at San Bernardino-4th Street

	2011		2012		2013	
	Date	24-Hr Average	Date	24-Hr Average	Date	24-Hr Average
National:						
First High:	Oct 24	65.0	Jul 5	34.8	Oct 25	55.3
Second High:	Oct 21	45.7	Nov 26	33.5	Mar 20	34.6
Third High:	Dec 11	32.5	Mar 31	27.1	Jan 1	33.4
Fourth High:	Mar 13	27.6	Jan 19	26.5	Mar 17	32.3
California:						
First High:	Oct 24	65.0	Jul 5	34.8	Oct 25	55.3
Second High:	Oct 21	45.7	Nov 26	33.5	Mar 20	34.6
Third High:	Dec 11	32.5	Mar 31	27.1	Jan 1	33.4
Fourth High:	Mar 13	27.6	Jan 19	26.5	Mar 17	32.3
National:						
Estimated # Days > 24-Hour Std:		*		0.0		3.3
Measured # Days > 24-Hour Std:		2		0		1
24-Hour Standard Design Value:		*		*		*
24-Hour Standard 98th Percentile:		*		27.1		33.4
Annual Standard Design Value:		*		*		*
Annual Average:		*		11.7		11.4
California:						
Annual Std Designation Value:		*		*		*
Annual Average:		*		*		*
Year Coverage:		85		86		92

Notes:

Daily PM2.5 averages and related statistics are available at San Bernardino-4th Street between 1999 and 2013. Some years in this range may not be represented.
All averages expressed in micrograms per cubic meter.
An exceedance of a standard is not necessarily related to a violation of the standard.
State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.

Appendix C

- CO Protocol Table 1
- CO Protocol Figure 1
- CO Protocol Figure 3

Table 1. Projects Exempt from All Emissions Analyses

<u>Safety</u>
Railroad/highway crossing
Hazard elimination program
Safer non-Federal-aid system roads
Shoulder improvements
Increasing sight distance
Safety improvement program
Traffic control devices and operating assistance other than signalization projects
Railroad/highway crossing warning devices
Guardrails, median barriers, crash cushions
Pavement resurfacing and/or rehabilitation
Pavement marking demonstration
Emergency relief (23 U.S.C. 125)
Fencing
Skid treatments
Safety roadside rest areas
Adding medians
Truck climbing lanes outside the urbanized area
Lighting improvements
Widening narrow pavements or reconstructing bridges (no additional travel lanes)
Emergency truck pullovers

<u>Mass Transit</u>
Operating assistance to transit agencies
Purchase of support vehicles
Rehabilitation of transit vehicles[2]
Purchase of office, shop, and operating equipment for existing facilities
Purchase of operating equipment for vehicles (e.g. radios, fareboxes, lifts, etc.)
Construction of renovation of power, signal, and communications systems
Construction of small passenger shelters and information kiosks
Reconstruction or renovation of transit buildings and structures (e.g., rail or bus buildings, storage and maintenance facilities, stations, terminals, and ancillary structures).
Rehabilitation or reconstruction of track structures, track and track bed in existing right-of-way
Purchase of new buses and rail cars to replace exiting vehicles or for minor expansions of the fleet[2]
Construction of new bus or rail storage/maintenance facilities categorically excluded in 23 CFR Part 771

<u>Air Quality</u>
Continuation of ride-sharing and van-pooling promotion activities at current level
Bicycle and pedestrian facilities

<u>Other</u>
Specific activities which do not involve or lead directly to construction, such as:
- Planning and technical studies
- Grants for training and research programs
- Planning activities conducted pursuant to titles 23 and 49 U.S.C.
- Federal-aid systems revisions

[2]PM_{10} nonattainment or maintenance areas, such projects are exempt only if they are in compliance with control measures in the applicable implementation plan.

Table 1 (continued). Projects Exempt from all Emissions Analyses

Other (cont.)
Engineering to assess social, economic, and environmental effects of the proposed action or alternatives to that action
Noise attenuation
Emergency or hardship advance land acquisitions [23 CFR 712.204(d)]
Acquisition of scenic easements
Plantings, landscaping, etc.
Sign removal
Directional and informational signs
Transportation enhancement activities (except rehabilitation and operation of historic transportation buildings, structures, or facilities)
Repair of damage caused by natural disasters, civil unrest, or terrorist acts, except projects involving substantial functional, locational or capacity changes

Source: 40 CFR Part 93, Table 2

Resources Board (CARB), Caltrans, EPA, and the FHWA (in the case of a highway project) or the FTA (in the case of a transit project) concur that a project has potential adverse local and/or regional emissions impacts for any reason [40 CFR § 93.126].

2.15 Project Exempt from Regional Emissions Analyses

Certain projects are ordinarily exempt from all regional emissions analyses according to Table 3 of 40 CFR § 93.127, reproduced in Table 2 of the Protocol. However, the exempt status may be revoked if the MPO, in consultation with the local air district, the California Air Resources Board (CARB), Caltrans, EPA, and the FHWA (in the case of a highway project) or the FTA (in the case of a transit project) concur that a project has potential regional emissions impacts for any reason [40 CFR § 93.127].

Table 2. Projects Exempt from Regional Emissions Analysis

Intersection channelization projects
Intersection signalization projects at individual intersections
Interchange reconfiguration projects
Changes in vertical and horizontal alignment
Truck size and weight inspection stations
Bus terminals and transfer points

Source: 40 CFR Part 93, Table 3

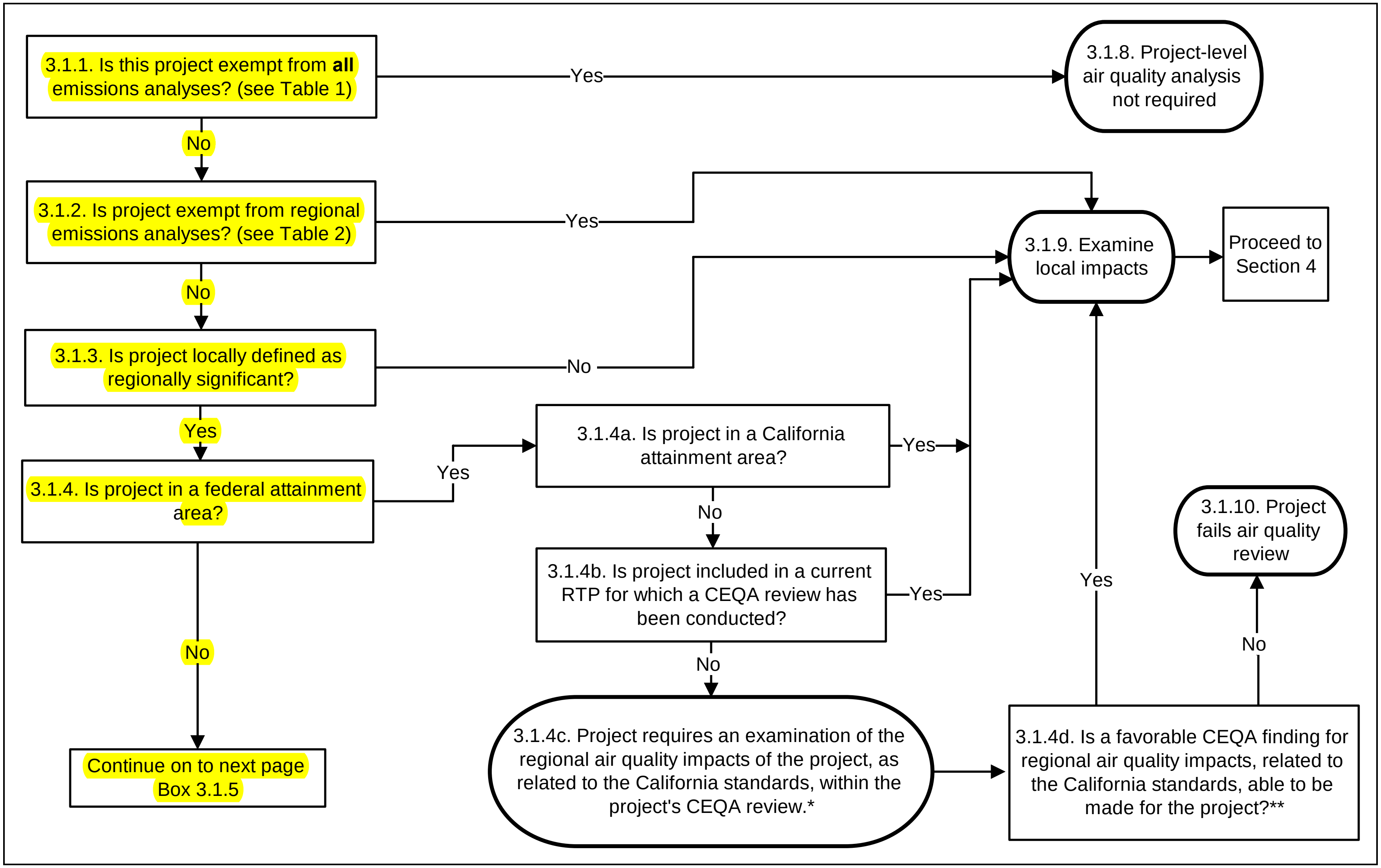
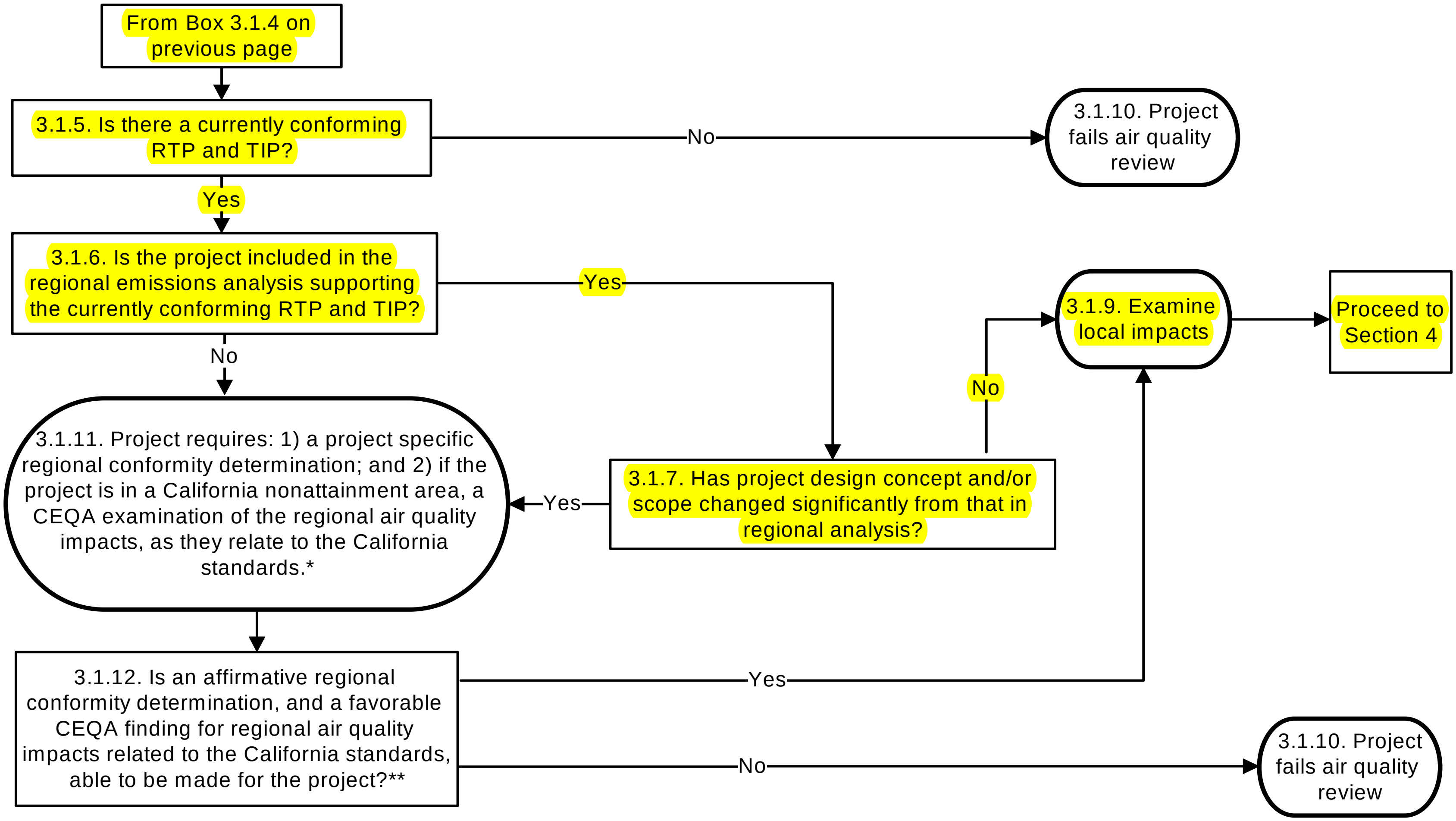


Figure 1. Requirements for New Projects



*In consultation w/MPO and Caltrans
**In consultation w/MPO, local air district, CARB and Caltrans

Figure 1 (cont.). Requirements for New Projects

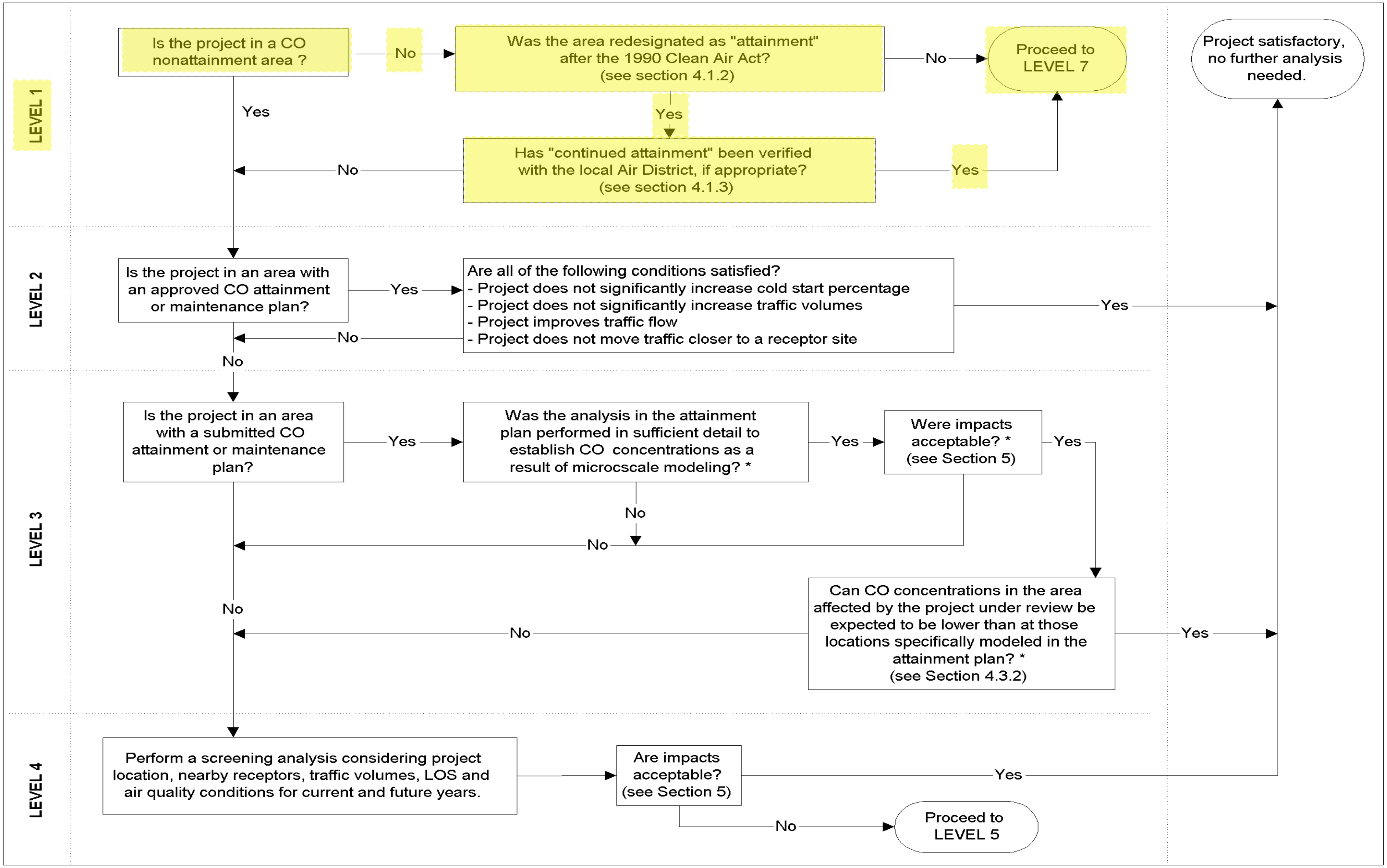
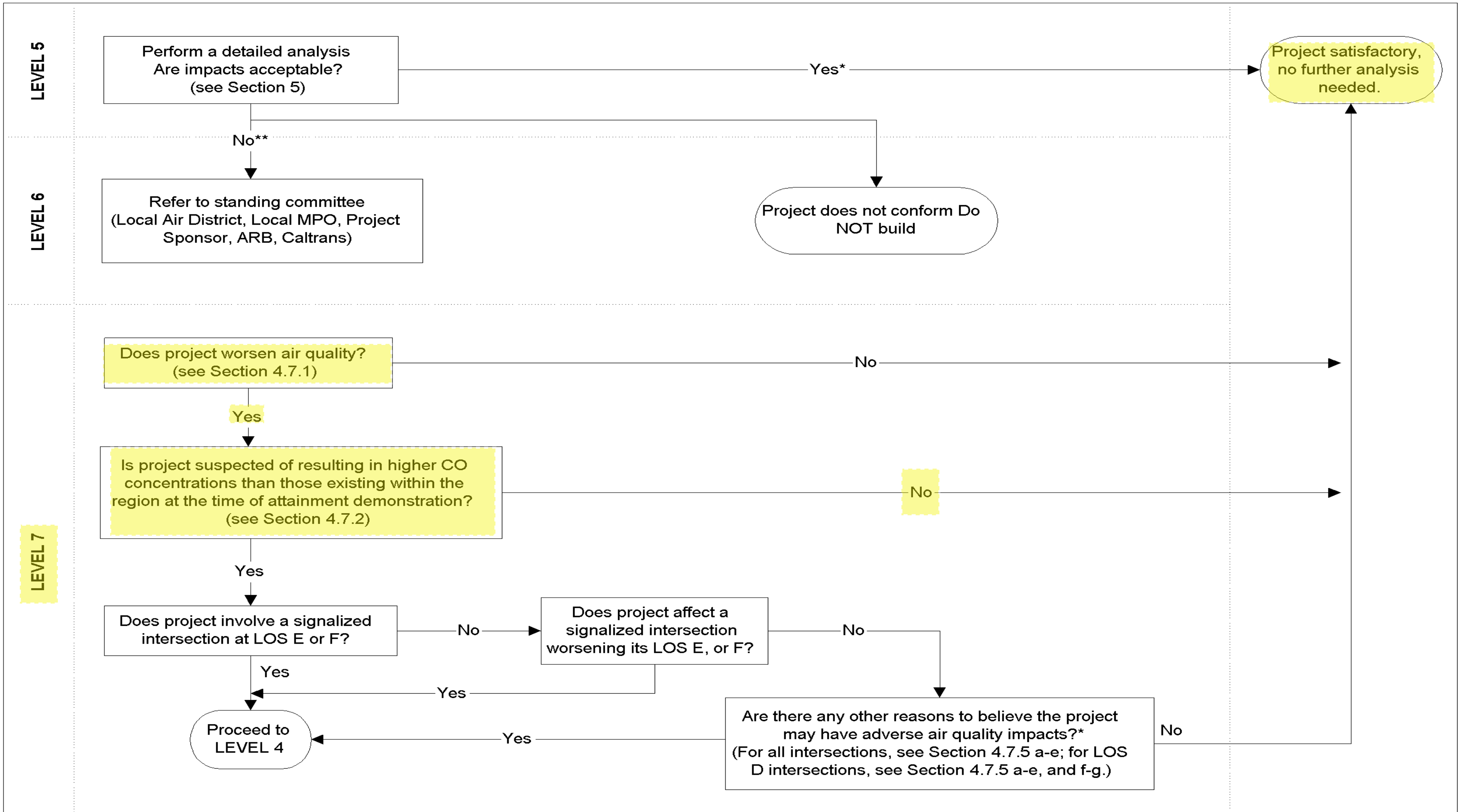


Figure 3. Local CO Analysis



*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 D

- SCAG Determination that Project is not a POAQC
- Project PM Summary Form Supplemental Information Memorandum
- Project PM Summary Form
- Project Traffic Report

January 2013

PM Hot Spot Analysis Project Lists

Review of PM Hot Spot Interagency Review Forms

January, 2013	Determination
SBD20111625 January 2013 SBD20111625 January 2013 Fig 1.2 Project Location SBD20111625 January 2013 Fig 1.1 Regional Vicinity SBD20111625 January 2013 Sensitive Receptor Map	Not a POAQC - Hot Spot Analysis Not Required (Tentative concurrence on January 22, 2013; Caltrans District concurrence received via email on November 5, 2014).

SOUTHERN CA[LIFORNIA] ASSOCIATION

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Lists of PM hot spot interagency review forms, qualitative analyses and quantitative analyses

SEARCH BY: SEARCH

PM Hot Spot Forms

- December, 2014
- October, 2014
- September, 2014
- August, 2014
- July, 2014
- June, 2014
- May, 2014
- April, 2014
- March, 2014

Qualitative Analysis

- October, 2014
- March, 2014
- January, 2014
- December, 2013
- February, 2013
- November, 2012
- September, 2012
- August, 2012
- January, 2012

Quantitative Analysis

- October, 2014
- August, 2014
- July, 2014
- June, 2014
- May, 2014
- April, 2014
- March, 2014
- June, 2011

MEMORANDUM

To: Transportation Conformity Working Group

From: Keith Cooper
Senior Technical Specialist

Date: November 4, 2014

Re: EA0C700 PM Summary Form Supplemental Information

The Particulate Matter (PM) Conformity Hot Spot Analysis Project Summary Form (attached) for the State Route (SR) 210 Mixed-Flow Lane Addition Project was reviewed by the Transportation Conformity Working Group (TCWG) on January 22, 2013. The project was reviewed during the meeting and "tentatively determined" that the project is not a project of air quality concern (POAQC) pending resolution of two issues: (1) clarification from project lead on why the predicted Build Alternative traffic volumes are lower than the No-Build Alternative traffic volumes at design year 2040 for the SR-210 segment west of Highland Avenue; and (2) concurrence from Caltrans District 8 on both the validity of the traffic data and agreement that the project is not a POAQC. This memo addresses the first issue: *clarification from project lead on why the predicted Build Alternative traffic volumes are lower than the No-Build Alternative traffic volumes at design year 2040 for the SR-210 segment west of Highland Avenue*.

The traffic volumes were developed by the San Bernardino Associated Governments (SANBAG) consultant URS Corporation using the County of San Bernardino regional traffic model (SBTAM). SBTAM is the regionally-accepted model for developing traffic projections in the project area. The SBTAM model accounts for future estimates of land use distribution and density, socioeconomic trends, transportation network/system improvements, and many other inputs. Predicted average daily traffic (ADT) volumes at design year 2040 for the SR-210 segment west of Highland Avenue are provided below.

Year 2040 Traffic Volume Estimates on SR-210 West of Highland Avenue	
Project Alternative	ADT Volume
No-Build	120,600
Build	118,400
Difference	(2,200)
Percent Change	-1.8%
Source: URS Corporation, 2014. See traffic study, attached.	

While it is expected that ADT volumes under the Build Alternative would be higher than under the No-Build Alternative for all segments along SR-210, the SBTAM prediction model output did not generate this expected result for the SR-210 segment west of Highland Avenue. As shown in the preceding table, the SBTAM model predicted Build Alternative ADT volumes to be 1.8% lower than No-Build Alternative ADT volumes.

It is not uncommon for some prediction model output results to be *insignificantly* different from what is expected. Because the variance was within an acceptable statistical range for this specific project, and because this variance would have a negligible impact on the overall analysis, SANDAG chose to not change the SBTAM model output values. It should be noted that SANBAG and Caltrans District 8 worked closely together on the project traffic analysis and have approved all traffic volumes.

In general, prediction models are neither right nor wrong. They are simply more or less useful; and more or less applicable in different circumstances. With respect to the SBTAM model, it is likely that model is simply more useful and applicable at the macro scale (i.e., larger region) than at the micro scale (i.e., an individual roadway segment).

We hope that this memorandum satisfies the TCWG request for clarification on why the predicted Build Alternative traffic volumes are lower than the No-Build Alternative traffic volumes at design year 2040 for the SR-210 segment west of Highland Avenue. Should you have further questions, please do not hesitate to contact me at 213-312-1752, or keith.cooper@icfi.com. Thank you.

Attachments

PM Summary Form – EA0C700

Final Traffic Operations Analysis Report: SR-210 Mixed Flow Lane Addition from Highland Avenue (PM R25.0) to San Bernardino Avenue (PM R33.2) in the County of San Bernardino (minus Appendix B; contact memo preparer for Appendix B)

RTIP ID# *(required)* 20111625

TCWG Consideration Date January 22, 2013

Project Description *(clearly describe project)*

The California Department of Transportation (Caltrans), in coordination with the San Bernardino Associated Governments (SANBAG), proposes to widen State Route 210 (SR-210) from just west of Highland Avenue to San Bernardino Avenue.

The proposed improvements are located within Caltrans District 8 jurisdiction, from post mile (PM) R26.0 to R33.2. The project proposes to add one mixed flow lane in each direction within the median of SR-210, create auxiliary lanes between the Base Line and Fifth Street interchanges, and add an acceleration lane at the eastbound Fifth Street on-ramp. The SR-210 project limits of approximately 7.2 miles would transverse portions of multiple jurisdictions that include City of Highland, City of Redlands, and unincorporated portions of San Bernardino County.

All work would occur within the existing Caltrans right-of-way (ROW). Regional vicinity and project location maps are attached as Figure 1-1 and Figure 1-2, respectively.

Type of Project *(use Table 1 on instruction sheet)*
Change to existing state highway

County San Bernardino	**Narrative Location/Route & Postmiles:** SR-210 from just west of Highland Avenue to San Bernardino Avenue (PM R26.0 to R33.2) **Caltrans Projects – EA#** OC700

Lead Agency: San Bernardino Associated Governments

Contact Person	**Phone#**	**Fax#**	**Email**
Keith Cooper	213-627-5376	213-627-6853	Keith.Cooper@icfi.com

Hot Spot Pollutant of Concern *(check one or both)* **PM2.5** ✓ **PM10** ✓

Federal Action for which Project-Level PM Conformity is Needed *(check appropriate box)*

Categorical Exclusion (NEPA)	✓ **EA or Draft EIS**	**FONSI or Final EIS**	**PS&E or Construction**	**Other**

Scheduled Date of Federal Action: 2014

NEPA Delegation – Project Type *(check appropriate box)*

Exempt	**Section 6004 – Categorical Exemption**	✓ **Section 6005 – Non-Categorical Exemption**

Current Programming Dates *(as appropriate)*

	PE/Environmental	**ENG**	**ROW**	**CON**
Start	2006	2014	N/A	2017
End	2013	2015	N/A	2018

Project Purpose and Need (Summary): *(attach additional sheets as necessary)*

Project Purpose

The purpose of the proposed project is to:

- Provide continuity with the number of mixed flow lanes west and east of this freeway segment along SR-210 between Highland Avenue and San Bernardino Avenue;
- Increase the efficiency of this segment of SR-210 by minimizing weaving conflicts at the termini of the third mixed flow lane east and west of this freeway segment, and;
- Reduce congestion and improve operational efficiency along SR-210 within the project limits.

Project Need

Currently, SR-210 consists of a six lane facility (three lanes in each direction) to the west of Highland Avenue. To the east of Highland Avenue the facility is four lanes (two in each direction) to approximately San Bernardino Avenue, where the existing freeway widens to four lanes in each direction at the terminus of SR-210 at Interstate (I-10). This results in a lane imbalance condition and bottleneck within the corridor. In addition, capacity and operating conditions on SR-210 between Highland Avenue and San Bernardino Avenue are projected to operate at Level of Service (LOS) F during the AM and PM peak hours by the year 2040. Freeway congestion has potential negative impacts such as increased air pollution, longer commuter and emergency vehicle delays, increased energy consumption, extended commute periods, increased driver frustration, reduced safety, as well as adverse impacts to the regional and local economy.

Surrounding Land Use/Traffic Generators *(especially effect on diesel traffic)*

Sensitive receptors in the vicinity of the project area that could be affected by the proposed project include residential, religious, recreational, convalescent, and school uses within 1,000 feet (304.8 meters) of the project alignment, with the closest receptors within 25 meters of the SR-210 mainline and ramps. Figure 2-1 (attached) provides an illustration of land uses within 1,000 feet (304.8 meters) of the project construction limits.

Traffic generating land uses in the vicinity of the project area (that could affect diesel traffic) include the following:

- Commercial uses, including Lowes and Staples, off 5th Street,
- Commercial uses, including Target, off Highland Avenue, and
- Highland Granite, with access off 5th Street.

Refer to Figure 2-1 (attached) and click here for a Google Map image of project vicinity to further explore surrounding land uses.

Opening Year: Build and No Build LOS, AADT, % and # trucks, truck AADT of proposed facility

Table 1 summarizes opening-year (2020) total and truck AADT on SR-210 mainline segments in the study area under build and no-building conditions. Total ADT was obtained from the project traffic consultant, and Truck AADT was calculated based on truck percentage for areas both north and south of the SR-330 connection as obtained from the consultant traffic engineer (Noel Casil pers. comm). Attachment A presents the AADT calculations.

Table 1. Opening-Year (2020) AADT and Truck AADT

SR-210 Mainline Segment	2020 No Build Alternative		2020 Build Alternative		Project Effect (Percent increase over No Build)	
	Total AADT	Truck AADT*	Total AADT	Truck AADT*	Total AADT	Truck AADT
West of Highland Ave	95,800	6,706	96,900	6,783	1.1%	1.1%
Highland Ave to SR-330	79,400	5,558	83,200	5,824	4.8%	4.8%
SR-330 to Baseline Rd	78,800	4,728	81,000	4,860	2.8%	2.8%
Baseline Rd to 5th St	84,000	5,040	89,800	5,388	6.9%	6.9%
5th St to San Bernardino Ave	99,000	5,940	107,200	6,432	8.3%	8.3%
South of San Bernardino Ave	95,400	5,724	96,200	5,772	0.8%	0.8%

*Truck percentage estimated to be 7% AADT volumes north of SR-330 and 6% AADT volumes south of SR-330.
Adapted from URS Corporation 2012, Noel Casil pers. comm.

AADT on all SR-210 mainline segments within the project limits would be below the FHWA and EPA guidance criterion of 125,000 for all vehicles and 10,000 truck AADT (8% of 125,000 AADT), for a roadway project considered to be a potential project of air quality concern (POAQC). Overall, the project would provide improved LOS conditions throughout the SR-210 project limits under the build condition when compared to no-build at opening-year 2020 (see Attachment A).

RTP Horizon Year / Design Year: Build and No Build LOS, AADT, % and # trucks, truck AADT of proposed facility

Table 2 summarizes horizon-year (2040) total and truck ADT on SR-210 mainline segments in the study area under build and no-building conditions. Total ADT was obtained from the project traffic consultant, and Truck ADT was calculated based on truck percentage for areas both north and south of the SR-330 connection as obtained from the consultant traffic engineer (Noel Casil pers. comm). Attachment A presents the ADT calculations.

Table 2. Horizon-Year (2040) AADT and Truck ADT

SR-210 Mainline Segment	2040 No Build Alternative		2040 Build Alternative		Project Effect (Percent increase over No Build)	
	Total AADT	Truck AADT	Total AADT	Truck AADT	Total AADT	Truck AADT
West of Highland Ave	120,600	8,442	118,400	8,288	-1.8%	-1.8%
Highland Ave to Victoria Ave	114,400	8,008	116,600	8,162	1.9%	1.9%
Victoria Ave to SR-330	103,000	7,210	106,000	7,420	2.9%	2.9%
SR-330 to Baseline Rd	102,000	6,120	102,800	6,168	0.8%	0.8%
Baseline Rd to 5th St	103,000	6,180	107,400	6,444	4.3%	4.3%
5th St to San Bernardino Ave	118,000	7,080	**126,000**	7,560	6.8%	6.8%
South of San Bernardino Ave	115,600	6,969	116,200	6,972	0.5%	0.5%

*Truck percentage estimated to be 7% AADT volumes north of SR-330 and 6% AADT volumes south of SR-330.
Adapted from URS Corporation 2012, Noel Casil pers. comm.

AADT on the one SR-210 segment, 5th Street to San Bernardino Avenue, would be in excess of FHWA and EPA guidance criterion of 125,000 for all vehicles for a roadway project considered to be a potential POAQC. AADT for all other segments would be below 125,000 AADT. In addition, truck AADT volumes on all SR-210 mainline segments would be below 10,000 AADT. Overall, the project would provide improved LOS conditions throughout the SR-210 project limits under the build condition when compared to no-build at horizon-year 2040 (see Attachment A).

Describe potential traffic redistribution effects of congestion relief *(impact on other facilities)*

The purpose of the project is to reduce congestion by improving providing continuity with the number of mixed flow lanes west and east of this freeway segment along SR-210 between Highland Avenue and San Bernardino Avenue and increasing efficiency by minimizing weaving conflicts at the termini of the third mixed flow lane east and west of this freeway segment. Specifically, the project would widen SR-210 by adding a mixed flow lane in each direction within the existing median from approximately 400 feet west of Highland Avenue to San Bernardino Avenue.

The traffic consultant evaluated mainline and ramp conditions for both the eastbound/southbound and westbound/northbound directions peak hours (URS Corporation 2012). Roadway ADT, LOS, density, and speed for both AM and PM peak hours for all segments (including both freeway ramps and mainline segments) in both directions are contained within Attachment A. As shown in Attachment A, the majority of roadway segments would see an improvement in LOS, reduction in density, and increased speed during both opening-year and horizon year peak hour conditions. The traffic modeling indicates the project will provide additional roadway capacity and reduce existing and projected congestion, consistent with the project's purpose and need.

In summary, the project's effect on improving freeway capacity would result in some redistribution of arterial and collector surface street traffic onto the freeway mainline, as shown in Attachment B. The redistribution of traffic from surface streets to the freeway is noteworthy in that surface street emissions occur closer to sensitive receptors and at lower speeds.

Comments/Explanation/Details *(attach additional sheets as necessary)*

The proposed project is not a project of air quality concern because the project does not meet the following criteria (underlined text indicates answers to 40 CFR 93.123(b)(1) criteria for Projects of Air Quality Concern:

(i) New or expanded highway projects that have a significant number of or significant increase in diesel vehicles.

Truck traffic volumes along the SR-210 project limits are expected to increase by a maximum of 8.3 % at opening year 2020, and 6.8% at horizon year 2040, under the build condition, when compared to no-build. Even with these truck traffic increases, total truck traffic volumes would continue to remain below the EPA/FHWA screening criterion of 10,000 truck AADT volumes for projects considered to have potential to be a POAQC. Maximum truck AADT volumes are estimated to be no more than 6,800 and 8,300 during opening year 2020 and horizon year 2040, along any SR-210 mainline segment.

(ii) Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project.

Attachment A indicates that several roadway segments in the study area will operate at LOS D, E, or F under existing and future no-build conditions. The project is not expected to cause a deterioration of these levels. Rather, as shown in Attachment A, the project wouldl improve LOS for the majority of roadway segments, with only a maximum of 2 segments degrading over no-build conditions (during the 2040 Horizon Year PM hour). By improving traffic flow and reducing conditions at the majority of roadway segments, the project would, therefore, be expected to reduce localized PM concentrations at surrounding land uses.

(iii) New bus and rail terminals and transfer points than have a significant number of diesel vehicles congregating at a single location.

The project does not include new bus or rail terminals and transfer points.

(iv) Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location.

The project does not include expanded bus or rail terminals and transfer points.

(v) Projects in or affecting locations, areas, or categories of sites which are identified in the PM10 or PM2.5 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The project site is not in or affecting an area or location identified in any PM10 or PM2.5 implementation plan. The immediate project area is not considered to be a site of violation or possible violation.

Based on the information provided above, the proposed project is not expected to introduce significant amounts of diesel truck traffic or negatively affect intersections with a significant number of diesel vehicles. Therefore, the project is not considered to be a POAQC based on the definition contained in 40 CFR 93.123(b)(1). The proposed project would also not be considered a project of air quality concern with respect to PM10 or PM2.5 emissions as defined by 40 CFR 93.123(b) (1). Therefore, a PM10/PM2.5 hot-spot evaluation is not required.

ATTACHMENT A
ROADWAY CONDITIONS AT PROJECT SEGMENTS

Summary of Opening Year and Horizon Year Freeway Conditions

Number of Segments and Ramps where:	Opening Year 2020				Horizon Year 2040			
	Eastbound		Westbound		Eastbound		Westbound	
	AM	PM	AM	PM	AM	PM	AM	PM
LOS improves	16	14	16	14	15	14	17	17
LOS worsens	0	1	1	1	1	0	1	2
LOS NA or no change	11	12	10	12	11	13	9	8
Speed improves	12	12	13	14	12	12	14	14
Speed worsens	4	5	5	5	5	6	5	6
Speed NA or no change	11	10	9	8	10	9	8	7

ATTACHMENT A
ROADWAY CONDITIONS AT PROJECT SEGMENTS
Opening Year 2020 Freeway Conditions

	AM PEAK HOUR								PM PEAK HOUR							
	No Build			Build			LOS	Change in	No Build			Build			LOS	Change
Location Description	LOS	Den	Speed	LOS	Den	Speed	Improves?	Speed	LOS	Den	Speed	LOS	Den	Speed	Improves?	in Speed
EASTBOUND/SOUTHBOUND																
MAINLINE																
West of Arden Ave	C	20.0	65.0	C	21.3	65.0	NC	0.0	C	20.0	65.0	C	23.4	64.8	NC	**-0.2**
Highland Ave (before OFF)	C	22.7	64.9	B	16.8	65.0	Yes	+0.1	C	22.7	64.9	C	19.4	65.0	NC	+0.7
Highland Ave (after ON)	D	28.4	62.9	C	20.0	65.0	Yes	+2.1	D	28.4	62.9	C	21.9	65.0	Yes	+3.2
Victoria Ave (before OFF)	D	26.2	63.9	C	18.2	65.0	Yes	+1.1	D	26.2	63.9	C	19.4	65.0	Yes	+1.9
Victoria Ave (after ON)	D	26.9	63.6	C	18.8	65.0	Yes	+1.4	D	26.9	63.6	C	20.9	65.0	Yes	+2.4
SR-330 (before OFF)	C	23.0	64.9	B	16.5	65.0	Yes	+0.1	C	23.0	64.9	C	18.8	65.0	NC	+0.7
SR-330 On / Baseline Rd (at Off)	C	20.5	56.2	B	16.2	57.1	Yes	+0.9	C	20.5	56.2	B	17.4	57.6	Yes	+0.2
Baseline Rd (after OFF)	C	23.5	64.8	B	17.0	65.0	Yes	+0.2	C	23.5	64.8	B	17.7	65.0	Yes	+0.4
Baseline Rd (after ON)	D	32.9	60.2	C	21.1	51.0	Yes	**-9.2**	D	32.9	60.2	B	19.9	52.0	Yes	**-10.0**
5th Street (after OFF)	D	27.8	63.2	C	19.7	65.0	Yes	+1.8	D	27.8	63.2	C	18.1	65.0	Yes	+0.6
5th Street (before ON)	E	44.3	52.6	D	26.3	63.9	Yes	+11.2	E	44.3	52.6	C	23.3	64.8	Yes	+6.2
5th St Lane Addition	C	24.1	64.7	--	--	--	--	--	C	24.1	64.7	--	--	--	--	--
San Bernardino (after OFF)	C	20.5	65.0	C	22.3	65.0	NC	0.0	C	20.5	65.0	C	19.5	65.0	NC	0.0
Lane Add	B	15.4	65.0	B	16.7	65.0	NC	0.0	B	15.4	65.0	B	14.6	65.0	NC	0.0
To I-10	C	18.2	65.0	C	19.5	65.0	NC	0.0	C	18.2	65.0	B	16.6	65.0	Yes	0.0
RAMPS																
Highland Ave offramp	N/A	N/A	N/A	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A	N/A	--	--
Highland Ave onramp	D	29.3	55.0	C	21.6	57.0	Yes	+2.0	D	30.7	55.0	C	22.8	57.0	Yes	+2.0
Victoria Ave offramp	D	33.7	54.7	C	25.8	54.4	Yes	**-0.3**	E	35.2	54.7	C	27.7	54.1	Yes	**-0.6**
Victoria Ave onramp	D	28.3	56.0	B	19.0	58.0	Yes	+2.0	D	29.9	55.0	C	21.4	57.0	Yes	+2.0
SR-330 offramp	C	23.0	54.3	B	15.4	54.2	Yes	**-0.1**	C	24.7	54.4	B	17.3	54.3	Yes	**-0.1**
SR-330 onramp	N/A	N/A	N/A	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A	N/A	--	--
Basline Rd offramp	N/A	N/A	N/A	N/A	N/A	N/A	--	--	N/A	N/A	N/A	N/A	N/A	N/A	--	--
Basline Rd onramp	D	32.2	54.0	N/A	N/A	N/A	--	--	D	30.5	55.0	N/A	N/A	N/A	--	--
5th St offramp	D	30.8	54.2	N/A	N/A	N/A	--	--	D	28.7	54.1	N/A	N/A	N/A	--	--
5th St onramp	E	37.6	49.0	D	28.4	56.0	Yes	+7.0	D	33.6	53.0	C	25.4	57.0	Yes	+4.0
San Bernardino Ave offramp	D	29.8	53.8	D	31.5	53.7	NC	**-0.1**	C	27.5	53.7	D	29.3	53.6	**No**	**-0.1**
San Bernardino Ave onramp	B	19.6	58.0	C	20.7	58.0	Yes	0.0	B	16.6	58.0	B	17.3	58.0	NC	0.0
WESTBOUND/NORTHBOUND																
MAINLINE																
West of Arden Ave	C	21.5	65.0	C	23.8	64.7	NC	**-0.3**	C	22.2	65.0	C	25.5	64.2	NC	**-0.8**
At Highland Ave onramp	B	17.9	65.0	--	--	--	--	--	B	17.7	65.0	--	--	--	--	--
At Highland Ave offramp	D	27.6	63.3	C	21.4	65.0	Yes	+1.7	D	27.1	63.5	C	22.9	64.9	Yes	+1.4
At Victoria Ave onramp	D	32.9	60.2	C	23.4	64.8	Yes	+4.6	D	30.7	61.6	C	24.5	64.5	Yes	+2.9
At Victoria Ave offramp	D	30.8	61.5	C	21.5	65.0	Yes	+3.5	D	28.5	62.9	C	22.9	64.9	Yes	+2.0
At SR-330 offramp	D	32.0	60.8	C	22.7	64.9	Yes	+4.1	D	29.0	62.6	C	24.0	64.7	Yes	+2.1
At SR-330 onramp and Baseline Rd offramp	C	25.3	64.3	C	19.3	65.0		+0.7	C	24.4	64.6	C	20.9	65.0	NC	+0.4
At Baseline Rd offramp	C	21.5	54.0	B	18.3	54.4	Yes	+0.4	C	21.8	55.3	C	20.4	55.9	NC	+0.6

ATTACHMENT A
ROADWAY CONDITIONS AT PROJECT SEGMENTS

At Baseline Rd onramp	C	20.2	65.0	B	16.0	65.0	Yes	+0.0	C	22.9	64.9	C	20.7	65.0	NC	+0.1
At 5th Street offramp	C	25.1	64.3	B	17.3	54.3	Yes	**-10.1**	D	28.1	63.0	C	22.7	51.9	Yes	-11.2
At 5th Street onramp	C	23.2	64.8	B	17.8	65.0	Yes	+0.2	C	25.2	64.3	C	21.7	65.0	NC	+0.7
At 5th St Lane Addition	D	30.2	61.9	C	22.0	65.0	Yes	+3.1	E	37.5	57.2	D	29.3	62.4	Yes	+5.2
At San Bernardino Ave offramp	C	22.9	64.9	B	17.5	65.0	Yes	+0.1	D	27.0	63.6	C	22.2	65.0	Yes	+1.4
At San Bernardino Lane Addition	B	15.3	65.0	--	--	--	**--**	--	B	17.6	65.0	--	--	--	--	--
To I-10	B	16.7	65.0	C	19.0	65.0	**No**	0.0	C	22.4	65.0	D	27.7	63.3	**No**	**-1.7**
RAMPS																
Highland Ave	C	23.1	57.0	C	24.3	57.0	NC	0.0	C	24.1	57.0	C	24.3	57.0	NC	0.0
Highland Ave	E	37.0	54.2	D	28.8	54.4	Yes	0.2	E	35.5	54.5	D	28.8	54.4	Yes	+0.1
Victoria Ave	D	32.5	54.0	C	23.8	57.0	Yes	+3.0	D	31.1	55.0	C	23.8	57.0	Yes	+2.0
Victoria Ave	E	36.4	55.0	C	28.0	54.7	Yes	**-0.3**	D	34.2	55.0	C	28.0	54.7	Yes	**-0.3**
SR-330	D	31.7	54.0	C	24.0	57.0	Yes	+3.0	D	29.8	55.0	C	24.0	57.0	Yes	+2.0
SR-330	N/A	N/A	N/A	N/A	N/A	N/A	**--**	--	--	--	--	--	--	--	--	--
Baseline Rd	N/A	N/A	N/A	N/A	N/A	N/A	**--**	--	--	--	--	--	--	--	--	--
Baseline Rd	C	24.4	53.9	N/A	N/A	N/A	**--**	--	C	27.1	54.0	--	--	--	--	--
5th St	C	26.8	56.0	N/A	N/A	N/A	**--**	--	D	29.2	55.0	--	--	--	--	--
5th St	E	35.1	53.7	D	28.4	53.4	Yes	**-0.3**	E	39.8	53.0	D	28.4	53.4	Yes	**-0.4**
San Bernardino Ave	D	30.5	55.0	C	23.9	57.0	Yes	+2.0	D	34.7	52.0	C	23.9	57.0	Yes	+3.0
San Bernardino Ave	C	22.4	54.6	C	24.7	54.5	NC	**-0.1**	D	29.0	53.2	C	24.7	54.5	Yes	0.0

Reductions in speed shown in **BOLD**
NC = No Change in LOS
Source: Adapted from URS Corporation 2012.

Horizon Year 2040 Freeway Conditions

	AM PEAK HOUR								PM PEAK HOUR							
	No Build			Build			LOS	Change in	No Build			Build			LOS	*Change*
Location Description	**LOS**	**Den**	**Speed**	**LOS**	**Den**	**Speed**	**Improves?**	**Speed**	**LOS**	**Den**	**Speed**	**LOS**	**Den**	**Speed**	**Improves?**	***in Speed***
EASTBOUND																
MAINLINE																
West of Arden Ave	D	29.2	62.5	D	31	61	NC	**-1.1**	D	30.0	62.0	D	33.3	59.9	NC	**-2.1**
Highland Ave (before OFF)	E	39.8	55.6	C	25	65	Yes	+8.9	E	44.2	52.7	D	27.3	63.4	Yes	+10.7
Highland Ave (after ON)	F	52.7	47.6	D	28	63	Yes	+15.3	F	54.9	46.4	D	30.3	61.8	Yes	+15.4
Victoria Ave (before OFF)	E	37.3	57.3	C	23	65	Yes	+7.6	E	37.5	57.2	C	23.4	64.8	Yes	+7.6
Victoria Ave (after ON)	E	41.6	54.4	C	25	64	Yes	+10.1	E	43.1	53.4	D	26.5	63.8	Yes	+10.4
SR-330 (before OFF)	D	33.5	59.8	C	22	65	Yes	+5.2	D	34.9	58.9	C	23.2	64.8	Yes	+6.0
SR-330 On / Baseline Rd (at Off)	D	28.7	53.9	C	22	55	Yes	+1.1	C	26.3	55.9	C	21.8	56.3	NC	+0.5
Basline Rd (after OFF)	D	31.3	61.2	C	21	65	Yes	+3.8	D	32.6	60.4	C	22.0	65.0	Yes	+4.6
Basline Rd (after ON)	F	48.5	50.1	C	26	49	Yes	**-1.1**	E	42.7	53.7	C	25.2	49.6	Yes	**-4.0**
5th Street (after OFF)	E	38.0	56.8	C	24	65	Yes	+7.9	D	31.6	61.0	C	21.4	65.0	Yes	+4.0
5th Street (before ON)	F	73.1	38.0	D	33	60	Yes	+22.2	F	49.6	49.4	D	27.9	63.1	Yes	+13.7
5th St Lane Addition	D	29.8	62.1	--	--	--	--	--	C	25.4	64.2	--	--	--	--	--
San Bernardino (after OFF)	C	24.8	64.5	D	27	64	**No**	**-0.8**	C	21.0	65.0	C	22.9	64.9	NC	**-0.1**
Lane Add	C	18.4	65.0	C	20	65	NC	0.0	B	15.8	65.0	B	17.1	65.0	NC	0.0

ATTACHMENT A
ROADWAY CONDITIONS AT PROJECT SEGMENTS

To I-10	C	22.3	65.0	C	24	65	*NC*	***-0.2***	C	18.7	65.0	C	19.9	65.0	*NC*	*0.0*
RAMPS																
Highland Ave	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
Highland Ave	F	40.5	45.0	D	28	56	*Yes*	+11.0	F	41.2	44.0	D	28.9	56.0	*Yes*	+12.0
Victoria Ave	F	46.1	53.6	D	33	53	*Yes*	-0.3	F	46.7	53.5	D	34.5	52.9	*Yes*	**-0.6**
Victoria Ave	E	36.9	50.0	C	25	57	*Yes*	+7.0	E	37.5	50.0	C	26.6	56.0	*Yes*	+6.0
SR-330	D	32.5	54.1	C	21	54	*Yes*	0.0	D	33.2	54.1	C	22.0	54.0	*Yes*	**-0.1**
SR-330	--	--	--	--	--	--		--	--	--	--	--	--	--		--
Basline Rd	--	--	--	--	--	--		--	--	--	--	--	--	--		--
Basline Rd	F	39.1	47.0	--	--	--		--	E	37.2	50.0	--	--	--		--
5th St	F	38.4	54.1	--	--	--		--	E	36.1	53.6	--	--	--		--
5th St	F	44.5	35.0	D	33	53	*Yes*	+18.0	F	39.4	47.0	D	29.2	55.0	*Yes*	+8.0
San Bernardino Ave	D	33.7	53.6	--	--	--		--	D	31.0	53.5	D	32.7	53.4	*NC*	**-0.1**
San Bernardino Ave	C	24.0	57.0	C	25	57	*NC*	0.0	C	20.1	58.0	C	20.8	58.0	*NC*	0.0
WESTBOUND																
MAINLINE																
West of Arden Ave	D	30.1	62.0	D	33.4	59.9	NC	**-2.1**	D	32.6	60.4	E	38.2	56.7	**No**	-3.7
Highland Ave (before OFF)	C	25.0	64.4	--	--	--		--	C	24.4	64.6	--	--	--		--
Highland Ave (after ON)	F	47.9	50.4	D	29.4	62.3	*Yes*	+11.9	F	45.6	51.8	D	31.2	61.3	*Yes*	+9.4
Victoria Ave (before OFF)	F	60.2	43.7	D	32.0	60.8	*Yes*	+17.1	F	56.2	45.7	D	34.3	59.3	*Yes*	+13.6
Victoria Ave (after ON)	E	44.1	52.8	D	26.4	63.8	*Yes*	+11.1	E	39.4	55.9	D	27.9	63.1	*Yes*	+7.3
SR-330 (before OFF)	F	52.1	47.9	D	29.6	62.2	*Yes*	+14.3	E	43.1	53.4	D	30.4	61.7	*Yes*	+8.3
SR-330 On / Baseline Rd (at Off)	E	37.3	57.3	C	24.7	64.5	*Yes*	+7.2	D	33.1	60.1	C	25.5	64.2	*Yes*	+4.1
Basline Rd (after OFF)	D	29.3	51.7	C	24.1	52.5	*Yes*	+0.8	D	28.6	52.5	C	25.6	53.3	*Yes*	+0.8
Basline Rd (after ON)	D	28.3	62.9	C	20.8	65.0	*Yes*	+2.1	D	28.6	62.8	C	24.0	64.7	*Yes*	+1.9
5th Street (after OFF)	E	36.4	57.9	C	22.4	52.8	*Yes*	**-5.1**	E	36.2	58.1	C	26.5	50.7	*Yes*	-7.3
5th Street (before ON)	D	33.0	60.1	C	22.7	64.9	*Yes*	+4.8	D	31.8	60.9	C	25.2	64.3	*Yes*	+3.4
5th St Lane Addition	F	46.0	51.6	D	28.0	63.1	*Yes*	+11.5	F	52.4	47.8	E	35.3	58.6	*Yes*	+10.9
San Bernardino (after OFF)	D	30.2	61.9	C	21.4	65.0	*Yes*	+3.1	D	32.9	60.2	C	25.1	64.3	*Yes*	+4.1
Lane Add	C	19.2	65.0	--	--	--	**--**	--	C	20.3	65.0	**--**	**--**	**--**	**--**	--
To I-10	C	21.4	65.0	C	23.9	64.7	*NC*	**-0.3**	D	27.0	63.6	D	33.7	59.7	NC	-3.9
RAMPS																
Highland Ave	D	29.7	55.0	D	30.9	55.0	*NC*	+0.0	D	32.3	54.0	D	33.9	53.0	NC	**-1.0**
Highland Ave	F	--*	54.3	D	34.2	54.5	*Yes*	+0.2	F	--	54.3	E	35.3	54.4	*Yes*	+0.1
Victoria Ave	F	--*	41.0	D	30.9	55.0	*Yes*	+14.0	F	--	43.0	D	32.2	54.0	*Yes*	+11.0
Victoria Ave	F	--*	54.5	D	33.1	54.2	*Yes*	**-0.3**	E	42.6	54.7	D	33.4	54.4	*Yes*	**-0.3**
SR-330	F	--*	45.0	D	29.3	55.0	*Yes*	+10.0	E	37.3	50.0	D	29.8	55.0	*Yes*	+5.0
SR-330	--	--	--	--	--	--	**--**	--	--	--	--	--	--	--	**--**	--
Basline Rd	--	--	--	--	--	--	**--**	--	--	--	--	--	--	--	**--**	--
Basline Rd	D	32.8	53.8	--	--	--	**--**	--	D	32.7	53.9	--	--	--	**--**	--
5th St	D	34.4	53.0	--	--	--	**--**	--	D	34.3	53.0	--	--	--	**--**	--
5th St	F	--	53.6	D	32.8	53.4	*Yes*	**-0.2**	F	--*	52.8	E	37.2	52.4	*Yes*	**-0.4**
San Bernardino Ave	F	--	48.0	D	29.3	55.0	*Yes*	+7.0	F	--*	45.0	D	34.2	52.0	*Yes*	+7.0
San Bernardino Ave	C	27.2	54.2	D	29.3	54.2	**No**	0.0	D	32.9	52.7	E	36.3	52.7	**No**	0.0

Worsening of LOS and reductions in speed shown in **BOLD**
NC = No Change in LOS
Source: Adapted from URS Corporation 2012.

ATTACHMENT B
VMT SUMMARY BY ROAD TYPE

Roadway Type	2020 No Build AM Peak	PM Peak	Mid-day	Night	TOTAL DAILY	% of daily VMT	2020 Build AM Peak	PM Peak	Mid-day	Night	TOTAL DAILY	% of daily VMT	% of daily VMT change by road type relative to No Build
Freeway	369,998	583,914	618,208	392,920	1,965,040	56%	376,420	604,911	622,319	394,135	1,997,785	57%	0.61%
HOV	1,533	191	411	718	2,853	0%	1,666	2,052	428	726	4,873	0%	0.06%
Ramps	37,120	58,830	63,954	37,691	197,594	6%	37,800	60,962	64,675	37,970	201,407	6%	0.08%
Truck	0	0	0	0	0	0%	0	0	0	0	0	0%	0.00%
Expressway/Parkway	0	0	0	0	0	0%	0	0	0	0	0	0%	0.00%
Principal Arterial	73,666	127,522	128,718	66,509	396,415	11%	72,507	123,135	127,785	66,421	389,848	11%	-0.25%
Minor Arterial	124,663	229,549	211,332	96,748	662,292	19%	122,696	221,383	210,519	96,640	651,238	19%	-0.42%
Major Collector	22,290	40,408	37,660	16,531	116,888	3%	22,241	39,509	37,637	16,537	115,923	3%	-0.05%
Minor Collector	429	781	750	357	2,317	0%	430	783	751	357	2,321	0%	0.00%
Centroid	25,482	45,124	45,571	21,963	138,139	4%	25,480	45,104	45,569	21,965	138,117	4%	-0.02%
Other	0	0	0	0	0	0%	0	0	0	0	0	0%	0.00%
Total	655,180	1,086,319	1,106,604	633,437	3,481,540	100%	659,240	1,097,839	1,109,683	634,751	3,501,513	100%	

Roadway Type	2040 No Build AM Peak	PM Peak	Mid-day	Night	TOTAL DAILY	% of daily VMT	2040 Build AM Peak	PM Peak	Mid-day	Night	TOTAL DAILY	% of daily VMT	% of daily VMT change by road type relative to No Build
Freeway	485,702	751,150	828,732	514,282	2,579,867	56%	508,179	824,641	843,120	518,534	2,694,474	58%	1.61%
HOV	5,367	669	1,440	2,512	9,987	0%	5,833	7,183	1,500	2,540	17,055	0%	0.15%
Ramps	46,407	71,204	81,693	45,838	245,142	5%	48,788	78,665	84,217	46,816	258,486	6%	0.21%
Truck	0	0	0	0	0	0%	0	0	0	0	0	0%	0.00%
Expressway/Parkway	0	0	0	0	0	0%	0	0	0	0	0	0%	0.00%
Principal Arterial	97,500	175,939	166,676	85,337	525,452	11%	93,444	160,585	163,410	85,031	502,469	11%	-0.66%
Minor Arterial	171,774	325,917	289,342	129,351	916,385	20%	164,891	297,335	286,496	128,975	877,696	19%	-1.12%
Major Collector	26,260	51,474	44,262	19,437	141,434	3%	26,089	48,328	44,183	19,456	138,057	3%	-0.12%
Minor Collector	465	825	814	389	2,492	0%	469	833	815	389	2,506	0%	0.00%
Centroid	35,028	63,500	64,193	30,343	193,063	4%	35,021	63,429	64,187	30,349	192,986	4%	-0.06%
Other	0	0	0	0	0	0%	0	0	0	0	0	0%	0.00%
Total	868,503	1,440,679	1,477,151	827,489	4,613,823	100%	882,714	1,480,999	1,487,927	832,089	4,683,730	100%	

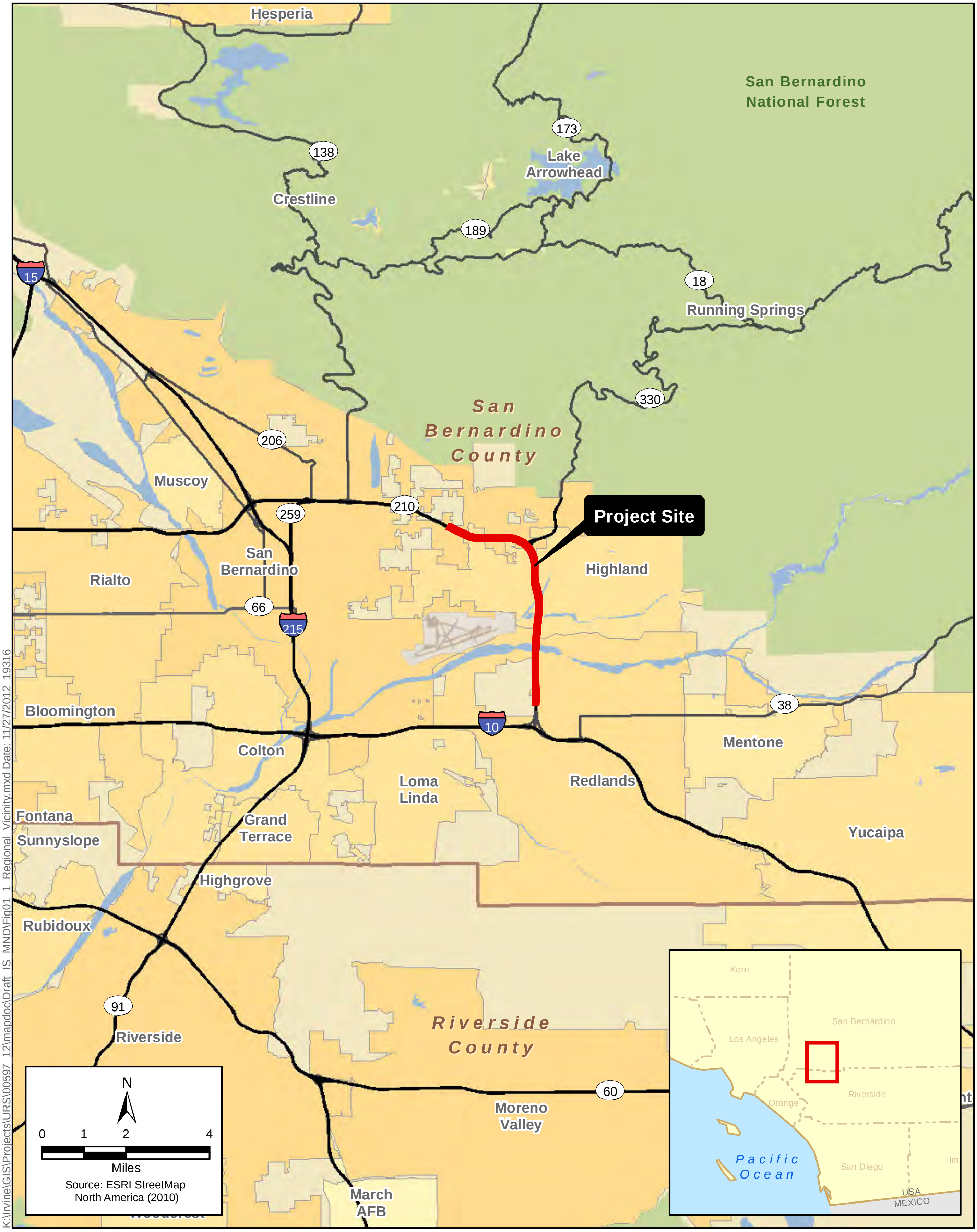

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Figure 1-1
Regional Vicinity Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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Figure 1-2
Project Location Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

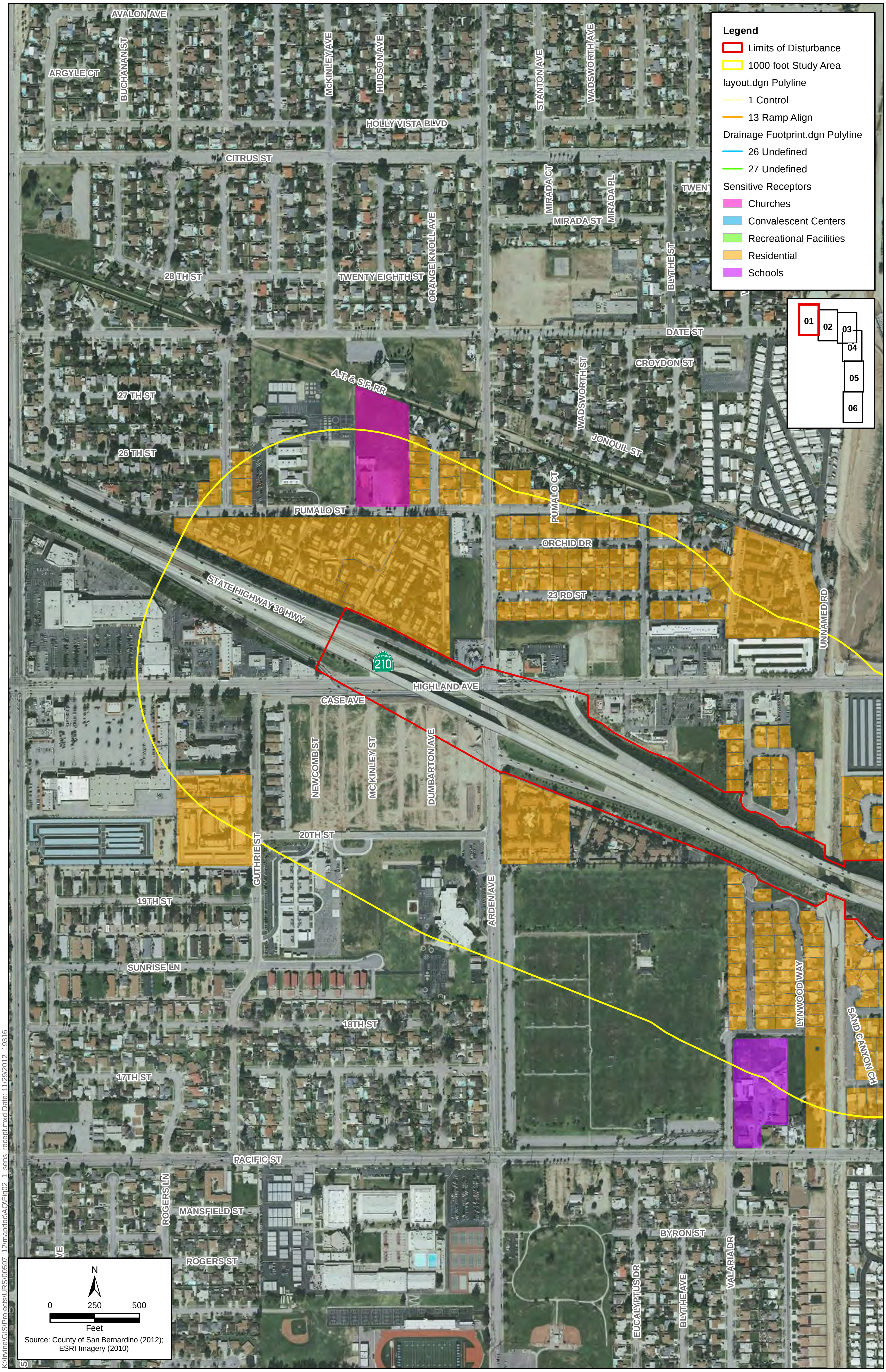

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Figure 2-1 Sheet 1
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

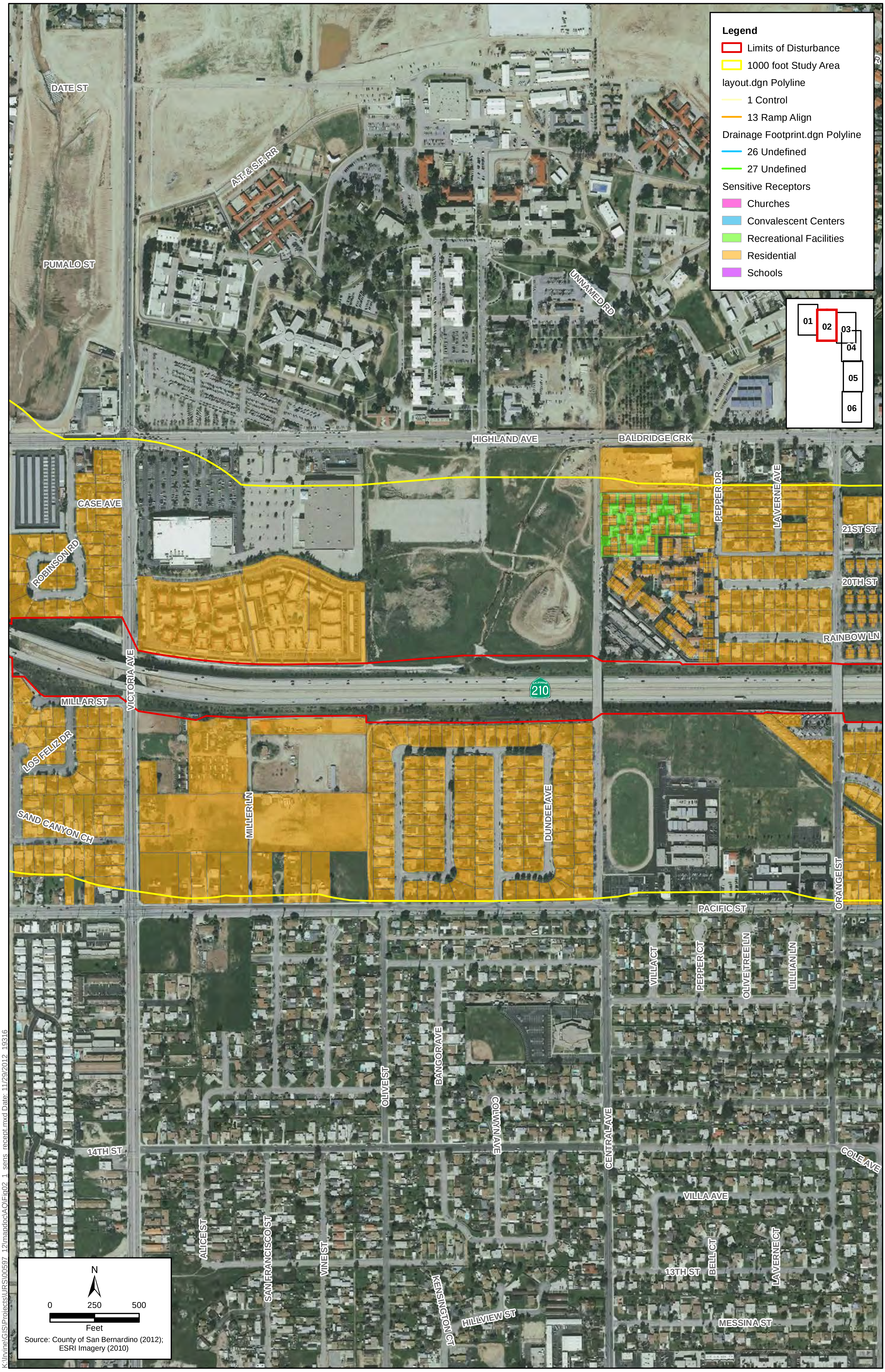

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Figure 2-1 Sheet 2
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

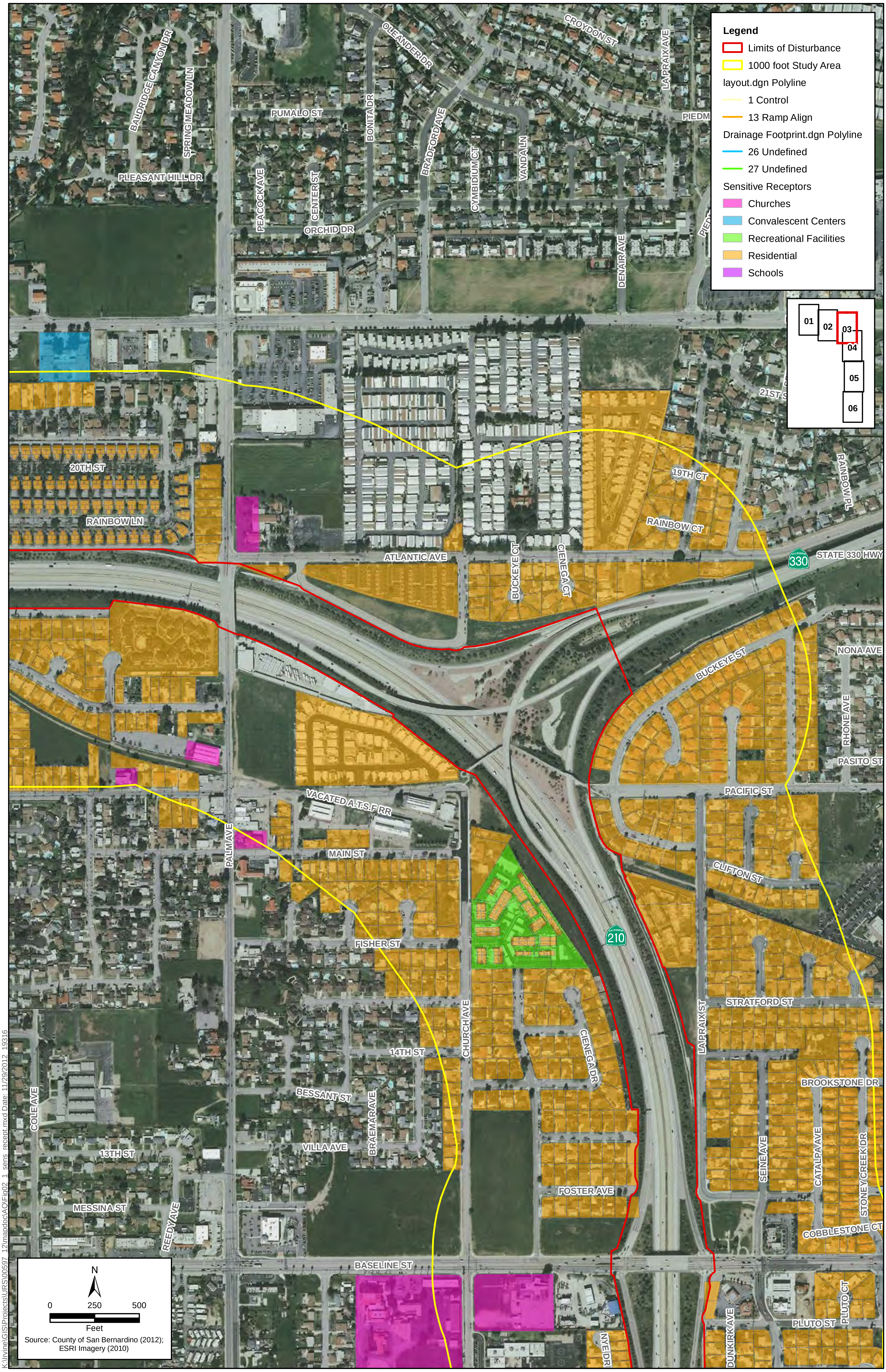

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Figure 2-1 Sheet 3
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

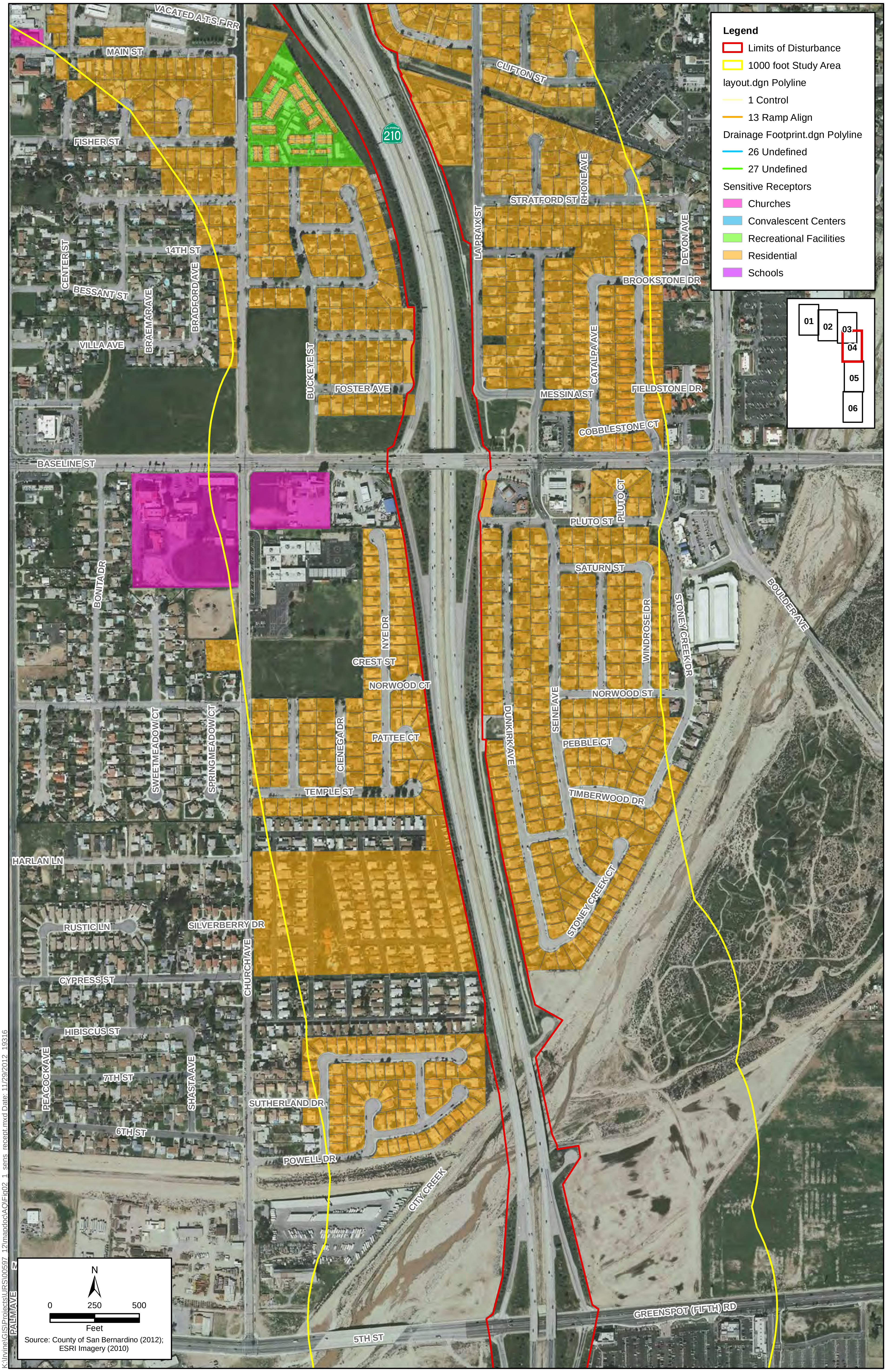

Figure 2-1 Sheet 4
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

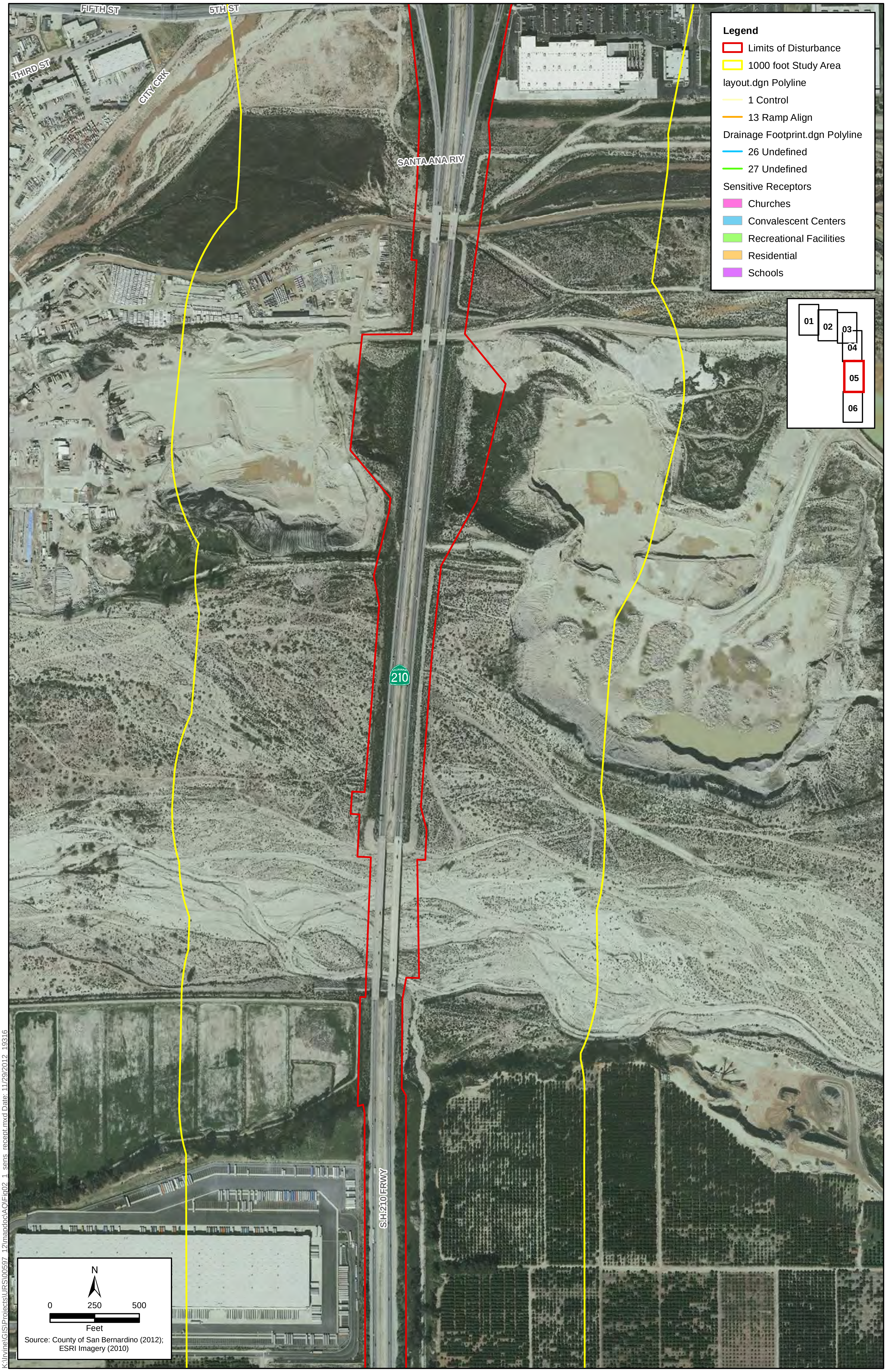

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Figure 2-1 Sheet 5
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from
Highland Avenue to San Bernardino Avenue

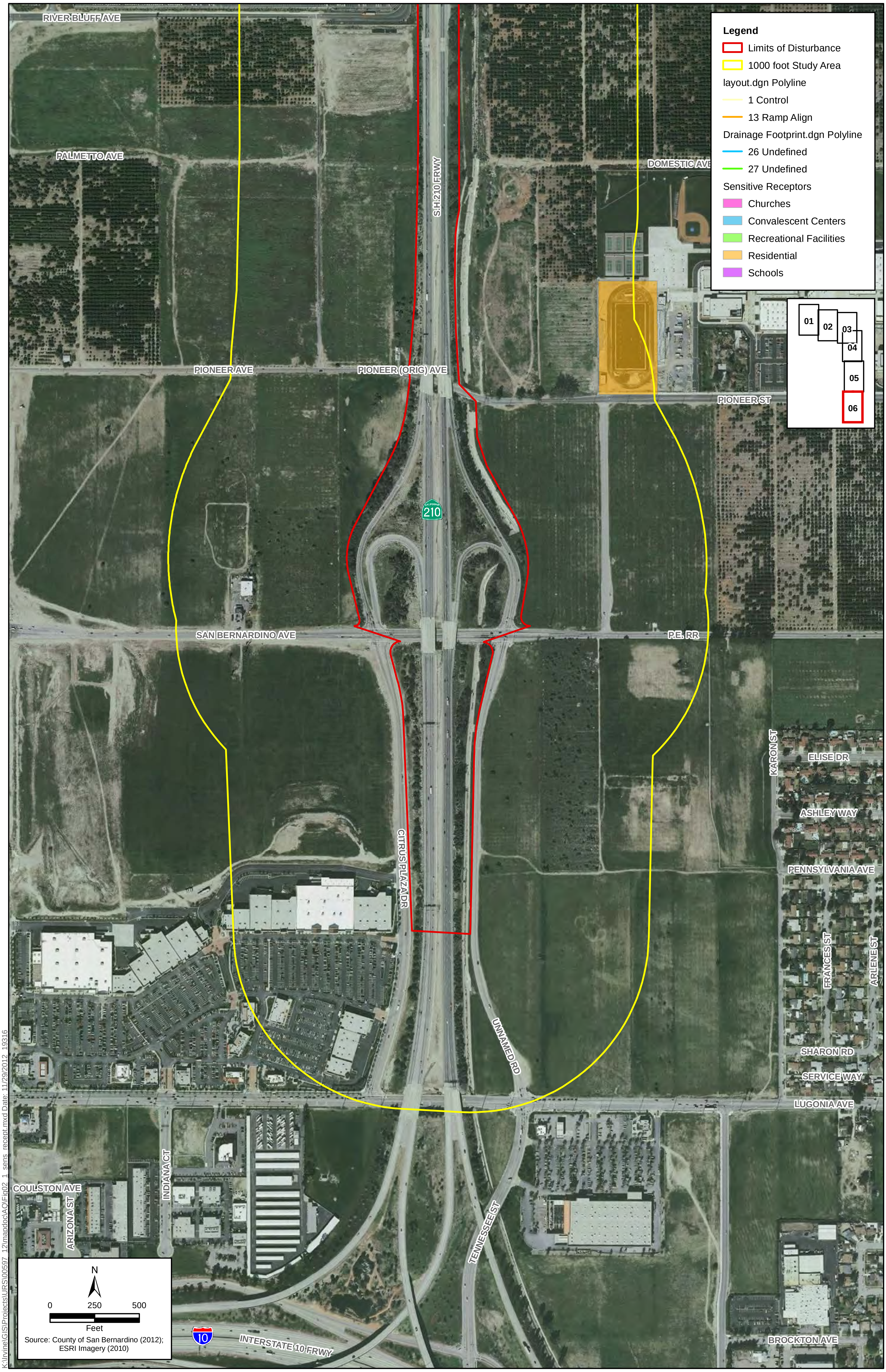

Figure 2-1 Sheet 6
Sensitive Receptor Map
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

FINAL REPORT

TRAFFIC OPERATIONS ANALYSIS REPORT

SR-210 MIXED FLOW LANE ADDITION FROM HIGHLAND AVENUE (PM R25.0) TO SAN BERNARDINO AVENUE (PM R33.2) IN THE COUNTY OF SAN BERNARDINO

EA 0C700

Prepared for

SAN BERNARDINO ASSOCIATED GOVERNMENTS

In conjunction with

Caltrans – District 8

February 2014

URS

2020 East First Street, Suite 400
Santa Ana, California 92705

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TRAFFIC OPERATIONS ANALYSIS

1.0 INTRODUCTION

This report presents the results of the traffic operations analysis conducted for the State Route 210 (SR-210) Mixed Flow Lane Addition Project ("Project') in San Bernardino County. The proposed improvements are located within Caltrans District 8 jurisdiction, from post mile (PM) R25.0 to R33.2. The traffic study area includes the freeway mainline and ramp merge and diverge areas from west of Highland Avenue/Arden Avenue to east of San Bernardino Avenue. The scope and Purpose and Need of the project focuses primarily on the mainline segment lane addition and associated improvements only. The project proposes to add one mixed flow lane in each direction within the median of SR-210, create auxiliary lanes between the Base Line and Fifth Street interchanges and add an acceleration lane at the eastbound Fifth Street on-ramp. The auxiliary lanes between Base Line and 5th Street will be created by extending the existing deceleration lanes at the off-ramps back to the adjacent interchange's on-ramps.

Existing (2012), Opening Year (2020) and Horizon Year (2040) conditions were analyzed in this traffic operations analysis report. Existing (2012) used as baseline which is the year that environmental studies were initiated.

Background

A Project Study Report/Project Development Support (PSR/PDS) was approved in 2008. The PSR/PDS had originally called for providing one additional mixed flow lane in each direction from Highland Avenue to San Bernardino Avenue and one new HOV lane in each direction from I-215 to I-10. The current project is to provide one additional mixed flow lane in each direction from Highland Avenue to San Bernardino Avenue plus associated auxiliary lane and acceleration lane improvements.

The SR-210 Mixed Flow Lane Addition Project is located within the Valley Region Planning Area as described in the San Bernardino County General Plan. The cities of Highland in the north and Redlands in the south surround much of the project study area. Adjacent jurisdictions include the City of San Bernardino and unincorporated areas of San Bernardino County.

State Route 210 (SR-210)

State Route 210 (SR-210), refers to the eastern segment and extension of Interstate 210 (I-210). SR-210 comprises the segment starting at the east end of the I-210, in the City of San Dimas, and extends eastward for approximately 33.2 miles, reaching the terminus at Interstate 10 in the City of Redlands. Within the project limits, the SR-210 provides adjacent junctions onto Interstate 15, Interstate 215, State Route 259, State Route 18, State Route 330, Interstate 10 and, adjacent interchanges onto Highland Avenue, Base Line, 5th Street/Greenspot Road and San Bernardino Avenue. A new future service interchange is under consideration at Victoria Avenue, 0.6 miles east of the Highland Avenue interchange and 1.3 miles west of the SR-210 to SR-330 interchange, approximately at PM R27.8. SR-210 is included in the National Highway System, the California Freeway and Expressway System and the "12 foot Wide Arterial System". The SR-210, within the project limit, is classified as a Principal Arterial highway.

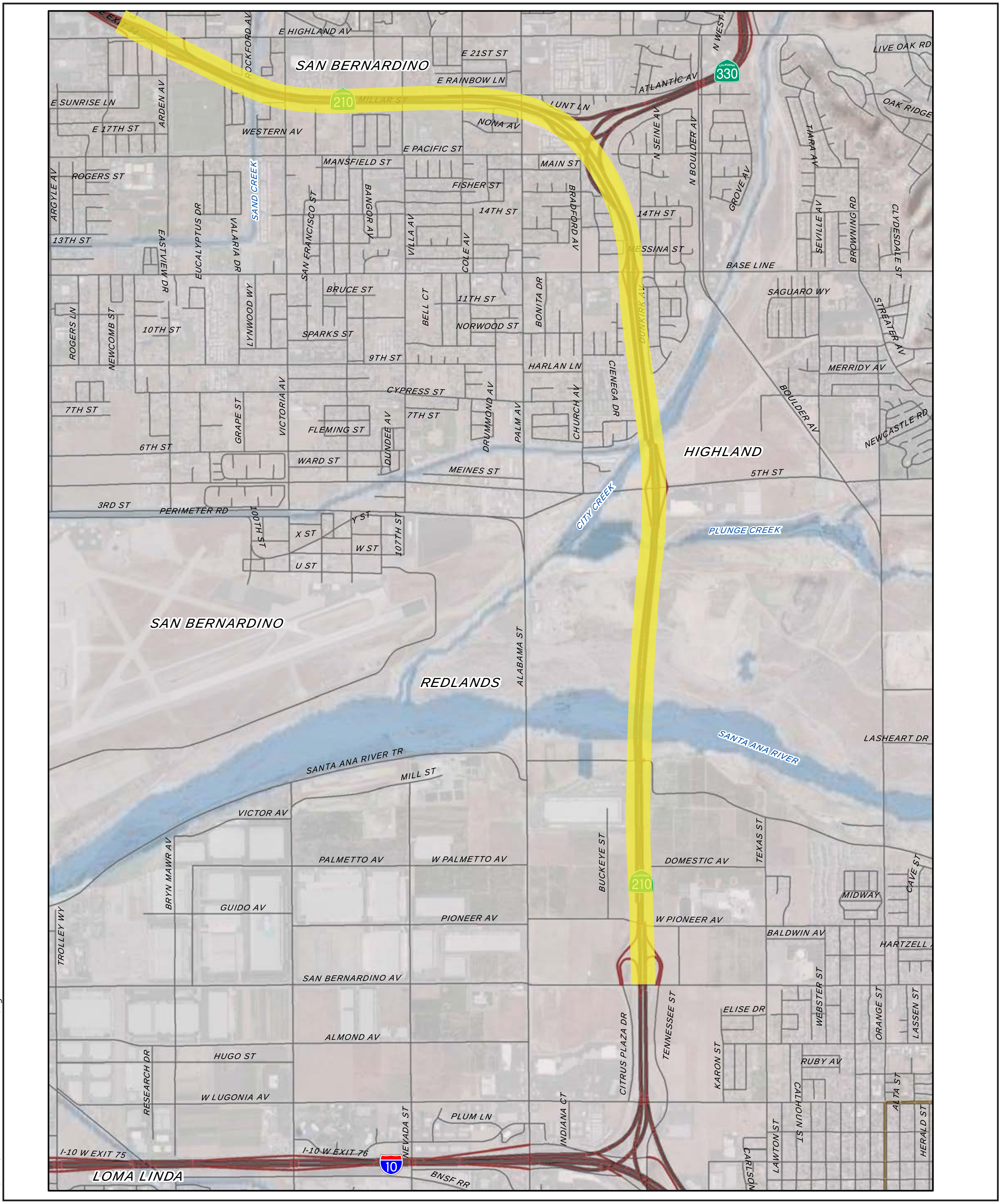
West of the Project (west of Highland Avenue) SR-210 consists of three mixed flow lanes in each direction. East of the Project (east of San Bernardino Avenue) SR-210 consists of four mixed flow lanes in each direction.

State Route 330 (SR-330)

State Route 330 (SR-330) is a 15 mile freeway/conventional two-lane highway where the westerly segment begins at the junction of the SR-210 and extends northeasterly to SR-18. SR-330 is mostly considered a conventional two-lane highway as only the initial 1-mile segment from the junction at SR-210 is constructed to freeway standards. SR-330 is located within San Bernardino County and is utilized as one of the main accesses into the cities of Big Bear and Lake Arrowhead. Access from east/westbound SR-210, onto northbound SR-330 is provided via connector ramps and access onto east/westbound SR-210 from southbound SR-330 is provided also via connector ramps.

Interstate 10 (I-10)

Interstate 10 (I-10), within the state of California, is a major east-west interstate highway that spans approximately 250 miles starting in the City of Santa Monica and ending in the City of Blythe. The segment of I-10 adjacent to the Project, where it serves as the terminus for the SR-210, is located at post mile marker 77.3. Access between east/westbound SR-210 and east/westbound I-10 is provided via connector ramps.



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Governments
SANBAG
Working Together

SR-210 Mixed Flow Lane Addition
(PM R26.0/R33.2) - EA 0C700

Figure 1
Project Location Map

2.0 TRAVEL DEMAND FORECAST MODEL

This section discusses the traffic forecast model developed by SANBAG specifically for use within San Bernardino County. The current SANBAG model is a sub-regional (subset) of the regional Southern California Associated Governments (SCAG) Model and incorporates more refined local details otherwise not included in larger scale regional models. The SANBAG Model incorporates elements of the most recent Regional Transportation Plan (RTP) (2012-2035) as compared to the earlier SCAG Model used in the preparation of the 2008 PSR/PDS document for this project.

The development of the San Bernardino County Transportation Analysis Model (SBTAM) was completed in June 2012, in partnership with Southern California Association of Governments (SCAG).

SBTAM Model Background

According to SANBAG, the San Bernardino Transportation Analysis Model, (SBTAM) "replaces the former RIVSAN subregional travel demand model, which is no longer being supported by SCAG. The model is designed as the primary travel demand forecasting tool for use throughout San Bernardino County, including the Valley, Victor Valley, Morongo Basin, and other Mountain/Desert subareas. Some of the anticipated uses of SBTAM include: highway design and environmental studies, traffic impact analysis reports for development projects, general plans, land use policy analysis, and subregional transportation studies. SBTAM will also be used for development of the County Transportation Plan, being initiated in Fiscal Year 2012-2013."

SANBAG Traffic Modeling Data

SANBAG currently has the 2008 and 2035 San Bernardino Traffic Analysis Model (SBTAM) traffic model networks applicable for the proposed project and study area. The current SBTAM model had been modified to reflect the no build and build conditions of the proposed project for traffic forecasting needs.

The applicable 2008 and 2035 SBTAM model forecast output volumes were provided by SANBAG. The provided model data, however, are mixed-flow traffic volume forecast only, and do not contain separate truck only model forecast volumes.

Project SBTAM Traffic Modeling Scenarios

The following traffic modeling data scenarios and detailed content description were used in the development of project opening year (2020) and project design year (2040) No Build and Build conditions.

<u>Future Year No Build Alternative (2035):</u>

- Include all programmed improvements from the RTP, except:
  - Delete the SR-210 Mixed Flow Lane Addition Project and all of its associated improvements from Highland Avenue to San Bernardino Avenue (i.e. this segment should generally be modeled as 2 mixed flow lanes in each direction);
  - Delete the proposed auxiliary lanes between Base Line and 5th Street;

- o Delete the proposed southbound acceleration lane at the 5th Street on-ramp.
- Include all of the SR-210/Base Line Interchange Improvement Project improvements (including widening Base Line from Church Avenue to Boulder Avenue and widening the ramps).

Future Year Build Alternative (2035):

- Include all programmed improvements from the RTP with the exception of the SR-210 HOV lanes.
- Include all of the SR-210 Mixed Flow Lane Addition Project improvements.

Model Conversion and Post Processing Methodology

The traffic model post-processing methodology follows and is consistent with SANBAG's future forecasting standards and requirements as outlined in *Appendix H – Post Processed Traffic Volume Guidelines* from the San Bernardino County CMP documentation.

SANBAG's traffic modeling output is expressed in terms of peak period traffic forecasts. In order to utilize the data, SANBAG has developed conversion factors to convert peak period volumes into usable peak hour volumes for use in the traffic analysis, which are summarized below.

Model Conversion Factors

The following conversion factors are applied to derive peak period traffic volume forecast from the traffic model peak period volume forecast. The intent is to develop usable peak hour AM/PM analysis volumes from the peak period AM/PM forecast.

Passenger Car Model

AM peak hour = 0.38 x AM peak period
PM peak hour = 0.28 x PM peak period

Traffic Model Projections for 2020 Project Opening and 2040 Future Year Project Conditions

Based on the traffic modeling updates described above, SANBAG had developed Year 2008 and Year 2035 Model run forecasts which were subsequently post-processed to develop Opening Year 2020 and Horizon Year 2040 traffic volume projections.

Consistent with the methodology used in similar projects in the area and as an acceptable method with SANBAG, the forecasted traffic volume differential between the 2008 and 2035 conditions was used to determine an annualized growth rate. Using Year 2012 as the pivot year, the annualized growth factors were used to develop Opening Year 2020 and Horizon Year 2040 projected traffic volumes. This straight-line extrapolation may over or under predict future volumes; however, it is considered an acceptable method of estimation for planning purposes given the overall accuracy level of the model's future year forecasts.

The results of the traffic model forecast post processing is summarized in Appendix A.

Related Projects in the Study Area

In addition to the proposed SR-210 Mixed Flow Lane Addition project (the project) the following projects are planned within the limits of the project. These projects are included in the 2035 San Bernardino Traffic Analysis Model (SBTAM) and were reviewed in the development of the Mixed Flow Lane Addition project traffic analysis modeling.

SR-210/Base Line Interchange Improvement Project

This project is included as a Financially Constrained Project (RTP ID 4M07007) in the SCAG 2012-2035 RTP. This improvement includes widening of at the ramps and ramp terminal junctions and is included in both 2035 No Build and Build Model.

SR-210/Victoria Avenue Interchange Project

A Project Study Report/Project Development Support (PSR/PDS) for the SR-210/Victoria Avenue Interchange was approved by Caltrans on April 8, 2011 to evaluate the feasibility of constructing a new interchange within the city limits of Highland and San Bernardino on SR-210 at Victoria Avenue. This project is included as a Financially Constrained Project (RTP ID 4M0801) in the SCAG 2012-2035 RTP. This project is included in both the 2035 No Build and Build Models.

SR-210 HOV Lane Addition Project

This project calls for the addition of one HOV lane in each direction between I-215 and I-10. Based on the 2012-2035 RTP, the HOV project is also in the Financially Constrained Project list. In order to assess the environmental impacts of the Mixed Flow Lane Addition project, the HOV Lane Addition project was not included in the 2035 No Build model used in the analysis. Consistent with the No Build assumption, the HOV Lane Addition project was similarly not included in the 2035 Build model. This approach ensures consistency of assumptions used in the evaluation of the traffic impacts for the Mixed Flow Lane Addition project.

3.0 ANALYSIS METHODOLOGY

This report documents the evaluation of the traffic operations of the SR-210 Mixed Flow Lane Addition Project (the “project”) which is generally defined as the segment of SR-210 between Highland Avenue/Arden Avenue and San Bernardino Avenue. The analysis evaluated Existing (2012) conditions, Opening Year (2020) conditions and Horizon Year (2040) conditions.

In consultation with Caltrans District 8 staff, the project traffic operational analysis was conducted in accordance with the procedures outlined in the 2010 Edition of the Highway Capacity Manual which hereinafter will also be referred to as “HCM 2010” or “HCM”. The HCM 2010 offers a significant update to the analysis procedures outlined from the previous version, HCM 2000.

As described in Volume 2 (“Uninterrupted Flow”) of the HCM 2010, and for purposes of evaluating the proposed project, SR-210 will be divided into various segments for analysis. Descriptions of the freeway facility components and the methodologies used to analyze them are described below.

Basic Freeway Segments

A basic freeway segment is a section of the freeway mainline which is not within a ramp influence area (i.e., not within 1,500 feet of a ramp junction) or weaving segment. Adding or dropping a lane results in the termination of a basic freeway segment. Peak hour volumes on basic freeway segments are analyzed using the methodology described in the *HCM* Chapter 11 ("Basic Freeway Segments") and Highway Capacity Software (HCS 2010, Version 6.4).

The TOAR did not evaluate segments between off and on ramps (within the interchanges) since mainline freeway segment operations within these areas will always result in levels of service as good or better than the upstream mainline segments prior to the interchanges.

The upgraded HCS 2010, Version 6.4 implements and automates the HCM 2010 procedures and includes modules to implement the new procedures for Basic Freeway Segments and will be used in the evaluation of the proposed project. **Table 1** provides the LOS criteria for basic freeway segments characterized by three performance measures, namely: density in passenger cars per mile per lane (*pc/mi/ln*), space mean speed in miles per hour (mi/h), and ratio of demand flow rate (volume) to capacity (*v/c*).

According to the HCM 2010, "speed is a constant through a broad range of flows and the v/c ratio is not directly discernible to road users (except at capacity), the service measure for basic freeway segments is density."

Table 1: LOS Criteria for Basic Freeway Segments

LOS	Density (pc/mi/ln)
A	≤11
B	>11-18
C	>18-26
D	>26-35
E	>35-45
	Demand exceeds capacity
F	>45

Source: Exhibit 11-5 from Highway Capacity Manual 2010.

Determining free-flow speed (FFS)

According to the HCM, the freeway FFS is best measured in the field, however, sometimes it is not possible to make field measurements e.g. future design for future facilities. In this instance, the segment's FFS may be estimated by using ***Equation 11-1*** of the HCM, which is based on the physical characteristics of the segment under study and is illustrated below:

$$FFS = 75.4 - f_{LW} - f_{LC} - 3.22\,TRD^{0.84}$$

where

FFS = FFS of basic freeway segment (mi/h)
f_{LW} = adjustment for lane width (mi/h)
f_{LC} = adjustment for right-side lateral clearance (mi/h), and
TRD = total ramp density (ramps/mi)

Weave Segments

The HCM 2010 defines weaving as the crossing of two or more traffic streams traveling in the same direction along a significant length of highway without the aid of traffic control devices or guide signs. Weave segments occur when merge segments are closely followed by diverge segments. The "close" condition implies that there is not sufficient distance between the merge and diverge segments for them to operate independently from each other.

Peak hour volumes within the freeway weaving sections are analyzed using the methodology contained in *HCM* Chapter 12 ("Freeway Weaving Segments"). A weaving segment's performance is primarily influenced by three key geometric characteristics, namely: length, width and configuration. An eight-step HCM flowchart shown in Chapter 12, Exhibit 12-6 Weaving Methodology Flowchart describes the basic steps that define the methodology for analyzing freeway weaving segments.

The upgraded HCS 2010, Version 6.4 implements and automates the HCM 2010 procedures and includes modules to implement the new procedures for Weave Segments and will be used in the evaluation of the proposed project. The LOS criteria for weaving segments are described in **Table 2**.

Table 2: LOS Criteria for Weaving Segments

LOS	Density (pc/mi/ln)
A	0-10
B	> 10-20
C	> 20-28
D	> 28-35
E	> 35
F	Demand exceeds capacity

Source: Exhibit 12-10 from Highway Capacity Manual 2010.

Determining weaving speeds

According to the HCM, the heart of the weaving segment methodology is the estimation of average speeds of weaving and non-weaving vehicles in the weaving segment. These speeds are estimated separately because they are affected by various factors and can be significantly different from each other. The algorithm for predicting the average speed of weaving vehicles in a weaving segment is illustrated by ***Equation 12-17*** of the HCM.

In cases that require the FFS to be estimated, the methodology described in Chapter 11, Basic Freeway Segments is used. The average speed of weaving vehicles within the weaving segment is estimated by using ***Equations 12-8*** and ***12-9*** of the HCM.

Freeway Merge and Diverge Segments

The following five-step *HCM* 2010 methodology is used to analyze ramp-freeway junctions calibrated specifically for one-lane, right-side ramp freeway junctions applicable for merge and diverge segments. Specific details of the computational steps and directions are provided in Chapter 13 ("Freeway Merge and Diverge Segments") of the *HCM*. For all other cases such as two-lane ramp junctions, left side ramps and major merge and diverge configurations, the analyses are conducted according to the procedures outlined in the Special Cases Section.

Step 1 – Specify Inputs and Convert Demand Volumes to Demand Flow.

Step 2 – Estimate the Approaching Flow Rate in Lanes 1 and 2 of the Freeway Immediately Upstream of the Ramp Influence Area.

Step 3 – Estimate the Capacity of the Ramp-Freeway Junction and Compare with Demand Flow Rates.

Step 4 – Estimate Density in the Ramp Influence Area and Determine the Prevailing LOS.

Step 5 – Estimate Speeds in the Vicinity of Ramp-Freeway Junctions.

The above steps are illustrated in the HCM 2010, Exhibit 13-4 Flowchart for Analysis of Ramp-Freeway Junctions. According to the HCM, other freeway lanes may be affected by merging or diverging maneuvers, but the defined area within 1,500 feet of the ramp junction generally experiences the greatest impacts across all Level of Service. Based on Figures 504.2A and 504.2B in the *Highway Design Manual (HDM)*, as per California design standards, the default acceleration and deceleration lengths employed in the evaluation of ramp merge and diverge areas are 600 feet and 141 feet, respectively.

The upgraded HCS 2010, Version 6.4 implements and automates the HCM 2010 procedures described above and includes modules to implement the new procedures for Freeway Merge and Diverge Segments and will be used in the evaluation of the proposed project. The LOS criteria for merge and diverge segments are described in Table 3 below.

Table 3: LOS Freeway Merge and Diverge Segments

LOS	Density (pc/mi/ln)	Comments
A	0-10	Unrestricted operations
B	> 10-20	Merging and diverging maneuvers noticeable to drivers
C	> 20-28	Influence area speeds begin to decline
D	> 28-35	Influence area turbulence becomes intrusive
E	> 35	Turbulence felt by virtually all drivers
F	Demand exceeds capacity	Ramp and freeway queues form

Source: Exhibit 13-2 from Highway Capacity Manual 2010.

Determining free-flow speed (FFS)

The HCM 2010 recommends that the freeway FFS is best measured in the field. However, if field measurements are not available, FFS for Freeway Merge and Diverge Segments may be estimated using the methodology used to determine the FFS for basic freeway segments presented in Chapter 11, Basic Freeway Segments.

4.0 EXISTING (2012) TRAFFIC CONDITIONS

The existing SR-210 mainline within the project limits is generally a four-lane freeway facility. Freeway ramps are provided at Highland Avenue and Arden Avenue, freeway connectors are provided at the SR-330 Junction, and interchanges currently exist at Base Line, 5th Street and San Bernardino Avenue. This section of the report presents the existing freeway operations analysis results.

Existing Volumes

Existing mainline counts were developed based on weekday (Tuesday, Wednesday, and Thursday) data from Caltrans' Traffic Data Report (15 Minute Loop Data) for the period between October 16 and October 25, 2012. The 15 minute loop counts are provided for five locations for AM and PM peak hours, 6-9 AM and 3-7 PM respectively. The five locations along SR-210 mainline are located at Post Miles (PM) 26.25, 28.7, 30.1, 31.4 and 32.6. For each location, the maximum hourly flow within the peak period is selected and an average is taken for all the days that data is available. The Existing 2012 freeway mainline traffic count data sheets are provided in Appendix C. Additionally, the SR-210 Traffic Volume summary is provided in Appendix C that shows the development of the traffic volume data from Existing 2012 to Year 2020 and Year 2040 conditions.

The 2012 ramp volume development methodology was conducted following the development and finalization of the existing SR-210 mainline flow along the freeway study segments. A combination of resources (including the SR-210 2008 PSR/PDS and 2008 SBTAM baseline forecast) were consulted to develop the ramp volumes along the study corridor. Since no existing ramp counts are available at the study corridor ramps, the SR-210 2008 PSR/PDS ramp and freeway flow data were utilized to establish the ramp-to-freeway volume split at each interchange. The Existing 2012 ramp volumes developed for this report were calculated based on either the SR-210 2008 PSR/PDS split or by applying flow conservation along the freeway.

Truck percentages were derived from the Caltrans Traffic Data Branch 2010 database and a passenger car equivalent (PCE) factor of 1.5 was applied to trucks in the Highway Capacity Software (HCS) analysis. Since ramp truck percentage values were not available, the mainline truck percentage assumptions were similarly used in the weaving, merge and diverge analysis.

Existing mainline ADT data were developed based on the existing peak hour directional volumes described above and using peak hour and ADT relationship using published Caltrans Traffic Database K and D factors table provided in Appendix C. Key steps and factors in the ADT volume development include the following:

$$AADT = PHV/KxD$$

where

K = The percentage of the AADT in both directions during the peak hour. Values in the Caltrans table are derived by dividing the measured 2-way PHV by the AADT.

D = D factor. The percentage of traffic in the peak direction during the peak hour. Values in the traffic count book are derived by dividing the measured PHV by the sum of both directions of travel during the peak hour.

KxD = The product of K and D. The percentage of AADT in the peak direction during the peak hour. Values in the Caltrans table are derived by dividing the measured 1-way PHV by the AADT.

PHV = Peak Hour Volume in the peak direction. A one way volume in vehicles per hour (vph) as used here. The PHV is analogous to the DDHV as used for design purposes.

AADT = Annual Average Daily Traffic in vehicles per day. (Derived here in this TOAR as ADT)

- Identify applicable K and D factors within the study area – Existing 2011 SR-210 K & D Factor at PM 31.72 between the San Bernardino Avenue and 5th Street-Greenspot Road. These are the only available published K and D factors for the project study segments. The source table for the K and D factors are provided in Appendix C.

- Apply K and D factors to the previously developed peak hour ramp volumes and compare ADT results between corresponding movements in the eastbound and westbound direction. For analysis purposes, it was conservaltively assumed that the higher calculated directional ADT was selected and applied to both directions. Theoretically, opposing directional ADT's are anticipated to be equal by direction on a daily basis.

- Using the mainline segment between San Bernardino Avenue and 5th Street-Greenspot Road as the starting point, the mainline ADT at this location was developed using the aforementioned K and D factors. The resulting mainline ADT was propagated through the study segments using the principles of flow conservation and taking into consideration the derived ramp ADTs.

Existing Truck Data

Based on the review of the latest 2011 and 2010 truck volume data from Caltrans Traffic Data Branch, the review indicated no usable 2011 data for the SR-210 freeway study segments within the project limits. However, the 2010 truck count data showed a combination of verified and estimated truck counts within the project limits. Additional research yielded no further information beyond those presented in the Caltrans Traffic Data Branch 2010 truck count data.

Using the 2010 truck data, we have used existing and future year truck percentage of 7 percent between Highland Avenue and SR-330 and 6 percent between SR-330 and San Bernardino

Avenue for both mainline and ramp area analysis. The aforementioned truck percentages were similarly adopted and used in the TI Analysis.

Existing Traffic Conditions

Figure 2 illustrates the roadway lane geometrics for existing conditions. **Figure 3** illustrates the SR-210 mainline and ramp ADT and peak hour volumes from Caltrans District 8. The existing 2012 count data are utilized as the starting point in the development of Opening Year 2020 and Horizon Year 2040 traffic forecast.

HCM 2010 operational analysis was conducted for existing conditions for the SR-210 study mainline, weaving, ramp merge and diverge areas within the project study limits. **Tables 4** and **5** summarize the density and level of service results of the analysis performed at the project study locations. The traffic analysis worksheets are provided in Appendix B.

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Figure 2
Existing (2012) Freeway Mainline and Ramp Geometrics

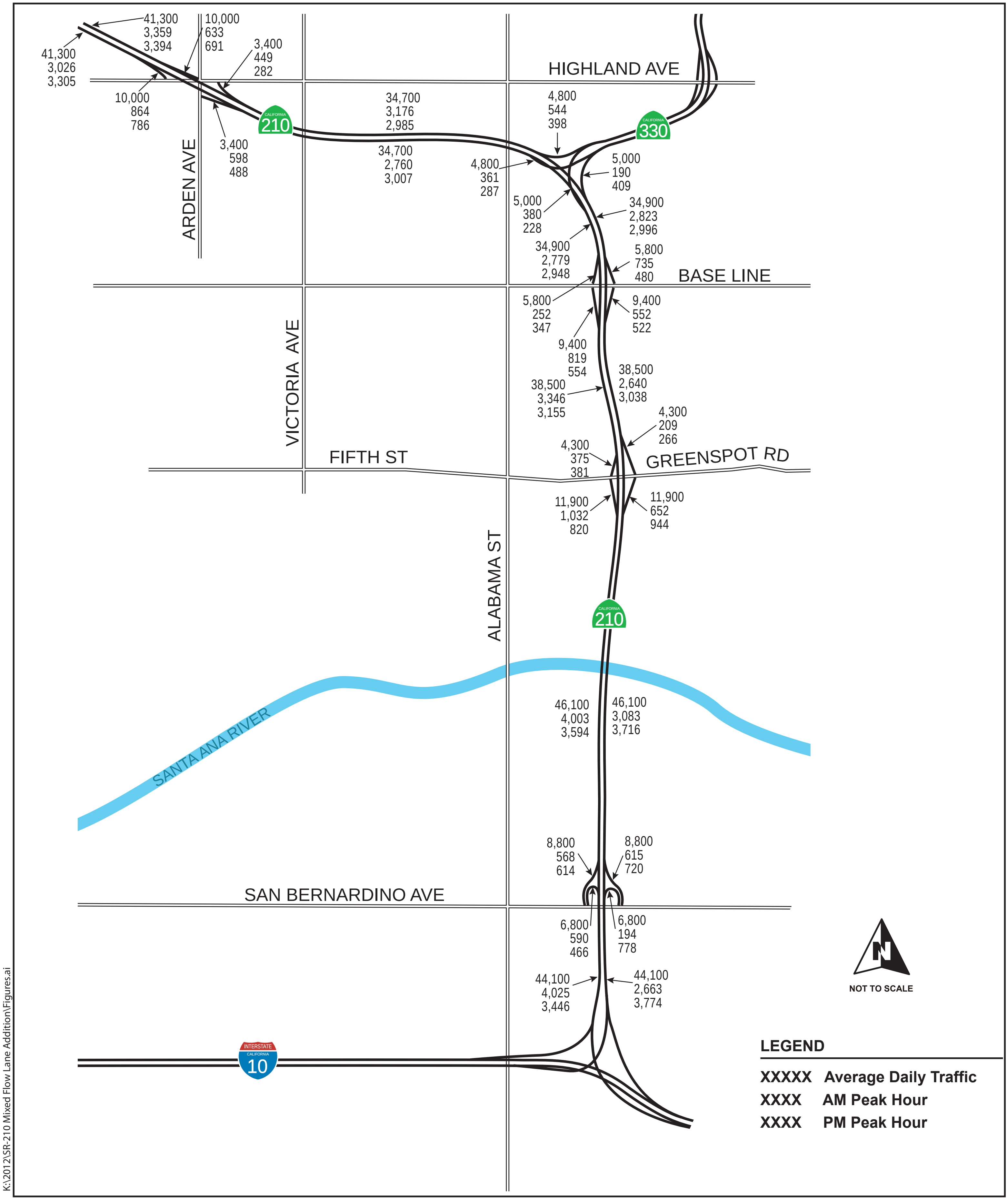

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Figure 3
Existing (2012) Freeway Mainline and Ramp Volumes

Table 4:
Existing (2012) - SR-210 Eastbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Existing (2012)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between Sterling Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	17.1	B	18.5	C
SR-210 Highland Avenue Off-ramp	Trap Lane	2MF/ 1L Trap	N/A[3]	N/A[3]	N/A[3]	N/A[3]
SR-210 Arden Avenue On-ramp	Merge	2MF/ 1L Ramp	25.1	C	27.0	C
SR-210 between Highland Avenue-Arden Avenue and SR-330	Freeway	2MF	23.4	C	25.5	C
SR-210 SR-330 Connector	Diverge	2MF/ 1L Decel	19.8	B	21.8	C
SR-210 between SR-330 and Base Line	Weave	2MF/ 1 Aux	17.8	B	18.4	B
SR-210 Base Line On-ramp	Merge	2MF/ 1L Ramp	29.9	D	28.1	D
SR-210 between Base Line and 5th Street-Greenspot Road	Freeway	2MF	29.4	D	26.9	D
SR-210 5th Street Off-ramp	Diverge	2MF/ 1L Ramp	28.2	D	26.1	C
SR-210 5th Street On-ramp	Merge	2MF/ 1L Ramp	35.4	**E**	31.7	D
SR-210 between 5th Street-Greenspot Road and San Bernardino Avenue	Freeway	2MF	39.1	**E**	32.1	D
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	28.5	D	26.3	C
SR-210 San Bernardino Avenue On-ramp	Merge	4MF/ 1L Ramp	18.2	B	15.5	B
SR-210 between San Bernardino Avenue and I-10 Freeway	Freeway	4MF	17.0	B	14.4	B

Notes:

1. “Highland Avenue-Arden Avenue” refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. “5th Street-Greenspot Road” refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.

Table 5:
Existing (2012) - SR-210 Westbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Existing (2012)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between I-10 Freeway and San Bernardino Avenue	Freeway	3MF	15.0	B	21.0	C
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	20.6	C	27.5	C
SR-210 San Bernardino Avenue On-ramp	Merge	2MF/ 1L Ramp	27.8	C	32.8	D
SR-210 between San Bernardino Avenue and 5th Street-Greenspot Road	Freeway	2MF	26.5	D	33.8	D
SR-210 Greenspot Road Off-ramp	Diverge	2MF/ 1L Ramp	32.0	D	37.6	**E**
SR-210 Greenspot Road On-ramp	Merge	2MF/ 1L Ramp	24.2	C	27.3	C
SR-210 between 5th Street-Greenspot Road and Base Line	Freeway	2MF	22.3	C	25.7	C
SR-210 Base Line Off-ramp	Diverge	2MF/ 1L Ramp	21.5	C	24.9	C
SR-210 between Base Line and SR-330	Weave	2MF/ 1 Aux	18.8	B	19.2	B
SR-210 SR-330 Connector	Merge	2MF/ 1L Ramp	28.8	D	26.9	C
SR-210 between SR-330 and Highland Avenue-Arden Avenue	Freeway	2MF	27.6	D	25.3	C
SR-210 Highland Avenue Off-ramp	Diverge	2MF/ 1L Ramp	33.1	D	31.0	D

Notes:

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.

5.0 OPENING YEAR (2020) TRAFFIC CONDITIONS

The purpose of this chapter is to present and document the forecast future traffic conditions on the anticipated Opening Year (2020) of the proposed project. Opening year traffic volumes were developed for Opening Year (2020) No Build and Build conditions. Under Opening Year (2020) No Build Traffic Conditions, it was assumed that SR-210 would be geometrically identical to existing conditions and the other related SR-210 projects are assumed to be unconstructed and not implemented.

Opening Year (2020) mainline and ramp traffic count data has been developed using annualized growth factors described previously in Chapter 2 of this report. During Opening year (2020) traffic conditions, volume proportion/flow conservation has been maintained during the development of future mainline traffic count data and the truck percentage values for the mainline were also assumed for ramp traffic and was used in the weaving, merge and diverge analysis. In addition, the previously discussed truck percentages and the 1.5 PCE factor for trucks had been maintained for use in the Opening Year (2020) traffic operations analysis.

Opening Year (2020) - No Build Traffic Conditions

Figure 4 illustrates Opening Year (2020) - No Build Freeway Mainline and Ramp Geometric configurations. **Figure 5** illustrates Opening Year (2020) – No Build Freeway Mainline and Ramp ADT and peak hour traffic volumes.

An operational analysis was conducted for the SR-210 mainline, ramp merge and diverge areas within the project study area and the results are summarized in **Table 6** for the eastbound SR-210 direction and in **Table 7** for the westbound SR-210 direction.

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Figure 4
Opening Year (2020) No Build Freeway Mainline and Ramps Geometrics

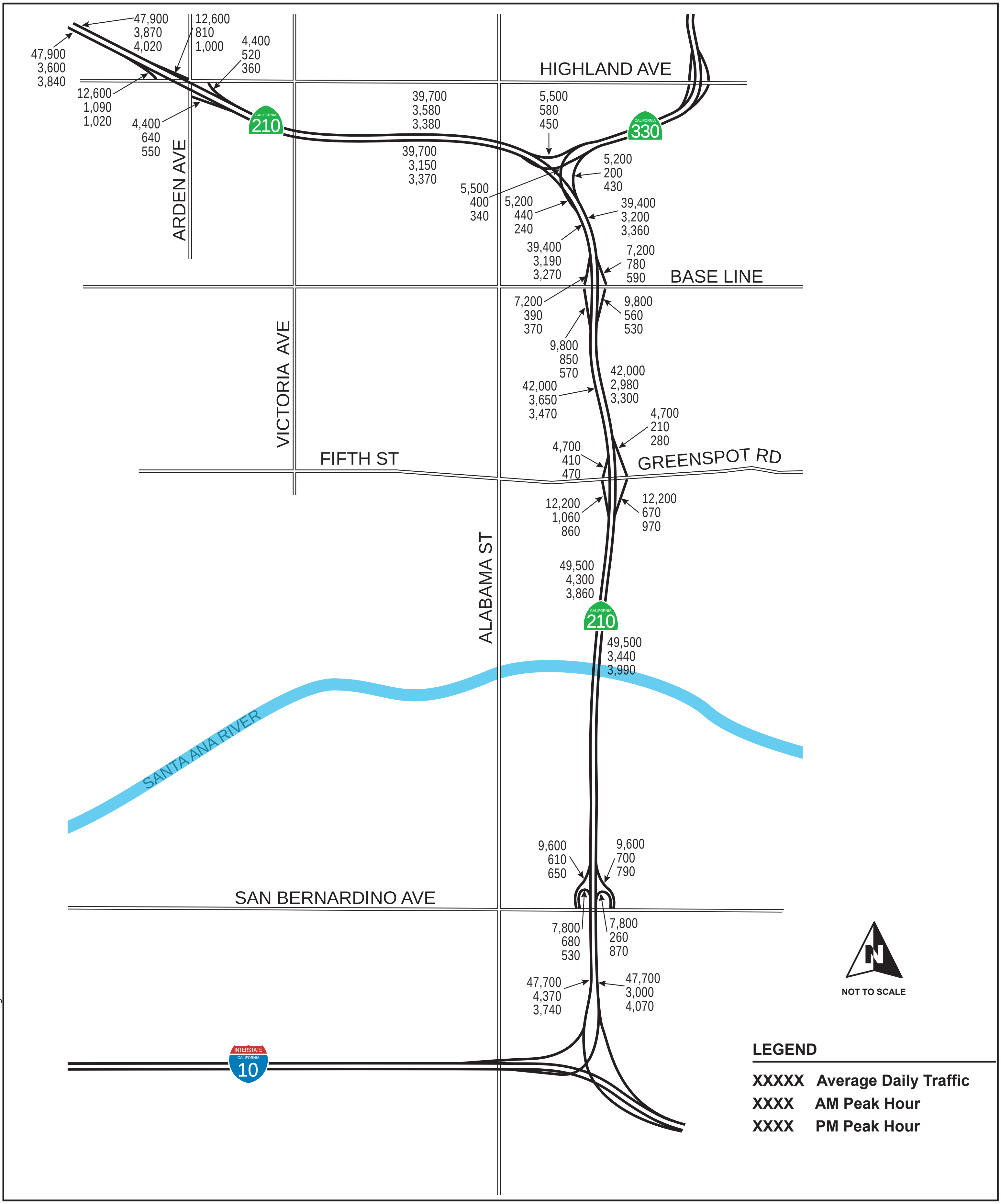

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Figure 5
Opening Year (2020) No Build Freeway Mainline and Ramp Volumes

Table 6:
Opening Year (2020) SR-210 - No Build Eastbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Opening Year (2020)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between Sterling Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	20.3	C	21.5	C
SR-210 Highland Avenue Off-ramp	Trap Lane	2MF/ 1L Trap	N/A[3]	N/A[3]	N/A[3]	N/A[3]
SR-210 Arden Avenue On-ramp	Merge	2MF/ 1L Ramp	28.4	D	30.1	D
SR-210 between Highland Avenue-Arden Avenue and SR-330	Freeway	2MF	27.3	D	29.5	D
SR-210 SR-330 Connector	Diverge	2MF/ 1L Decel	23.5	C	25.2	C
SR-210 between SR-330 and Base Line	Weave	2MF/ 1 Aux	20.7	C	20.6	C
SR-210 Base Line On-ramp	Merge	2MF/ 1L Ramp	32.5	D	30.8	D
SR-210 between Base Line and 5th Street-Greenspot Road	Freeway	2MF	33.4	D	30.5	D
SR-210 5th Street Off-ramp	Diverge	2MF/ 1L Ramp	31.1	D	29.0	D
SR-210 5th Street On-ramp	Merge	2MF/ 1L Ramp	--*	**F**	33.9	D
SR-210 between 5th Street-Greenspot Road and San Bernardino Avenue	Freeway	2MF	45.3	**F**	36.0	**E**
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	30.0	D	27.7	C
SR-210 San Bernardino Avenue On-ramp	Merge	4MF/ 1L Ramp	19.8	B	16.8	B
SR-210 between San Bernardino Avenue and I-10 Freeway	Freeway	4MF	18.4	C	15.6	B

Notes: --* = Demand exceeds capacity.

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.

Table 7:
Opening Year (2020) SR-210 - No Build Westbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Opening Year (2020)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between I-10 Freeway and San Bernardino Avenue	Freeway	3MF	16.9	B	22.7	C
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	22.6	C	29.2	D
SR-210 San Bernardino Avenue On-ramp	Merge	2MF/ 1L Ramp	30.8	D	35.1	**E**
SR-210 between San Bernardino Avenue and 5th Street-Greenspot Road	Freeway	2MF	30.6	D	38.1	**E**
SR-210 Greenspot Road Off-ramp	Diverge	2MF/ 1L Ramp	35.4	**E**	40.2	**E**
SR-210 Greenspot Road On-ramp	Merge	2MF/ 1L Ramp	27.1	C	29.5	D
SR-210 between 5th Street-Greenspot Road and Base Line	Freeway	2MF	25.4	C	28.5	D
SR-210 Base Line Off-ramp	Diverge	2MF/ 1L Ramp	24.7	C	27.4	C
SR-210 between Base Line and SR-330	Weave	2MF/ 1 Aux	21.7	C	22.0	C
SR-210 SR-330 Connector	Merge	2MF/ 1L Ramp	32.2	D	30.2	D
SR-210 between SR-330 and Highland Avenue-Arden Avenue	Freeway	2MF	32.6	D	29.6	D
SR-210 Highland Avenue Off-ramp	Diverge	2MF/ 1L Ramp	36.9	**E**	34.6	D

Notes:

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.

Opening Year 2020 - Build Traffic Conditions

Figure 6 illustrates Opening Year (2020) – Build Freeway Mainline and Ramp Geometric configurations. **Figure 7** illustrates Opening Year (2020) – Build Freeway Mainline and Ramp ADT and peak hour traffic volumes.

Similar to Opening Year (2020) – No Build conditions, an operational analysis was conducted for Build Conditions of the SR-210 mainline, ramp merge and diverge areas within the project study area and the results are summarized in **Table 8** for the eastbound SR-210 direction and in **Table 9** for the westbound SR-210 direction.

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Figure 6
Opening Year (2020) Build Freeway
Mainline and Ramp Geometrics

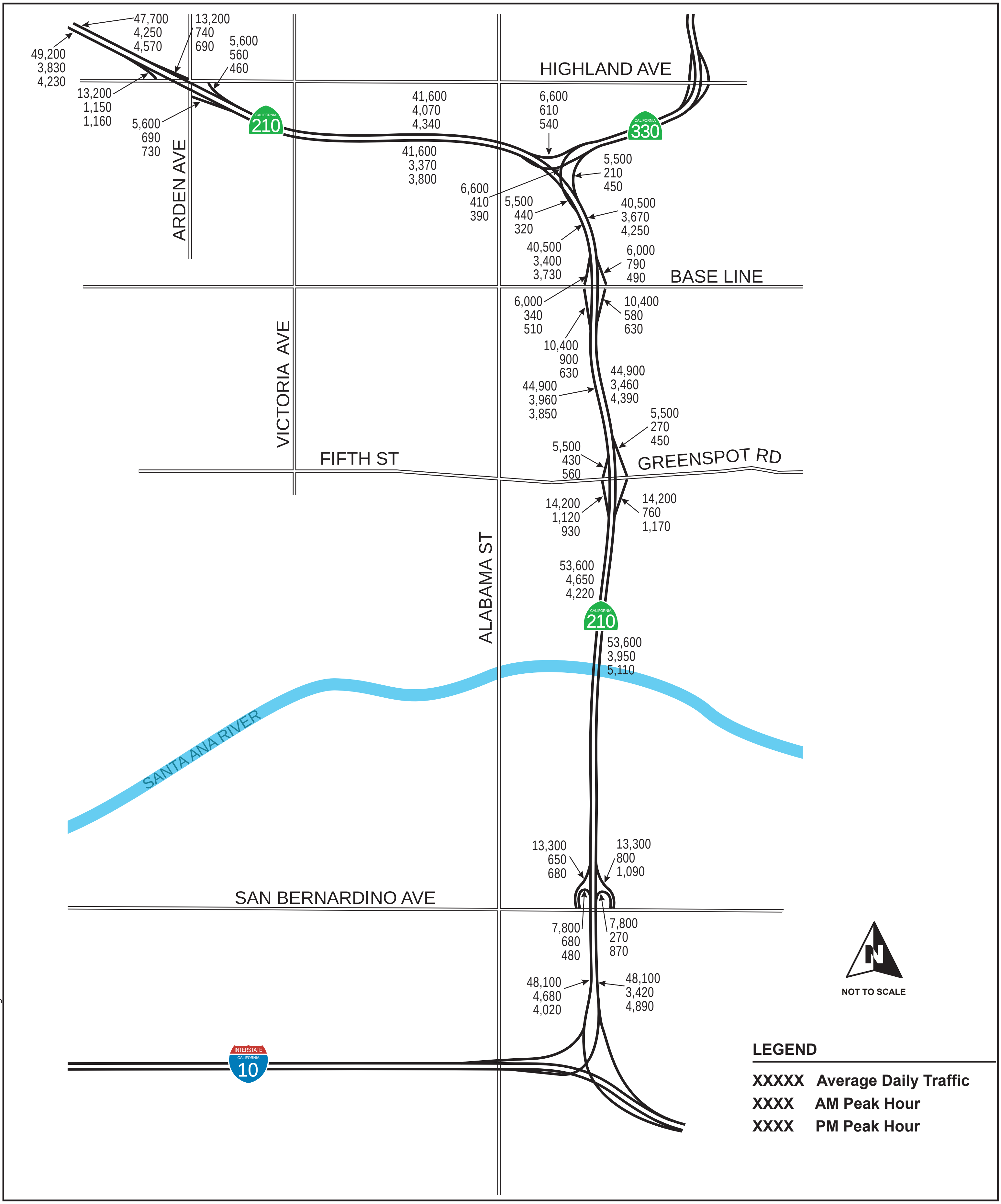

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Figure 7
Opening Year (2020) Build Freeway Mainline and Ramp Volumes

Table 8:
Opening Year (2020) SR-210 - Build Eastbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Opening Year (2020)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between Sterling Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	21.6	C	23.7	C
SR-210 Highland Avenue Off-ramp	Diverge	3MF/ 2L Ramp	19.4	B	20.9	C
SR-210 Arden Avenue On-ramp	Merge	3MF/ 1L Ramp	21.0	C	23.1	C
SR-210 between Highland Avenue-Arden Avenue and SR-330	Freeway	3MF	19.0	C	21.2	C
SR-210 SR-330 Connector	Diverge	3MF/ 1L Decel	15.7	B	17.7	B
SR-210 between SR-330 and Base Line	Weave	3MF/ 1 Aux	16.3	B	17.6	B
SR-210 Base Line On-ramp	Merge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 between Base Line and 5th Street-Greenspot Road	Weave	3MF/ 1 Aux	21.3	C	20.1	C
SR-210 5th Street Off-ramp	Diverge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 5th Street On-ramp	Merge	3MF/ 1L Accel	28.7	D	25.6	C
SR-210 between 5th Street-Greenspot Road and San Bernardino Avenue	Freeway	3MF	26.6	D	23.5	C
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	31.7	D	29.5	D
SR-210 San Bernardino Avenue On-ramp	Merge	4MF/ 1L Ramp	20.9	C	17.5	B
SR-210 between San Bernardino Avenue and I-10 Freeway	Freeway	4MF	19.7	C	16.8	B

Notes:

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
4. Ramp junction analysis is not applicable for ramp connections in weave segments.

Table 9:
Opening Year (2020) SR-210 – Build Westbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Opening Year (2020)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between I-10 Freeway and San Bernardino Avenue	Freeway	3MF	19.2	C	28.0	D
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	24.9.	C	33.0	D
SR-210 San Bernardino Avenue On-ramp	Merge	3MF/ 1L Ramp	24.2	C	30.6	D
SR-210 between San Bernardino Avenue and 5th Street-Greenspot Road	Freeway	3MF	22.2	C	29.7	D
SR-210 Greenspot Road Off-ramp	Diverge	3MF/ 1L Ramp	28.6	D	34.6	D
SR-210 Greenspot Road On-ramp	Merge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 between 5th Street-Greenspot Road and Base Line	Weave	3MF/ 1 Aux	17.5	B	23.0	C
SR-210 Base Line Off-ramp	Diverge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 between Base Line and SR-330	Weave	3MF/ 1 Aux	18.5	B	20.6	C
SR-210 SR-330 Connector	Merge	3MF/ 1L Ramp	24.4	C	25.3	C
SR-210 between SR-330 and Highland Avenue-Arden Avenue	Freeway	3MF	23.0	C	24.4	C
SR-210 Highland Avenue Off-ramp	Diverge	3MF/ 1L Ramp	28.7	D	29.8	D

Notes:

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
4. Ramp junction analysis is not applicable for ramp connections in weave segments.

6.0 HORIZON YEAR (2040) TRAFFIC CONDITIONS

The purpose of this chapter is to present and document the forecast future traffic conditions on the anticipated Horizon Year (2040) of the proposed project. Future year traffic volumes were developed for the Horizon Year (2040) No Build and Build conditions.

As part of the Horizon Year (2040) conditions, the proposed SR-210/Victoria Avenue Interchange could be potentially in-place by year 2040. However, since the proposed Victoria Avenue Interchange is currently under study and refinement, analysis of the interchange is not included due to the lack of finalized geometric configuration assumptions for the interchange itself and the adjacent interchange ramp systems. A Project Study Report/Project Development Support (PSR/PDS) for the SR-210/Victoria Avenue Interchange was approved by Caltrans on April 8, 2011 to evaluate the feasibility of constructing a new interchange within the city limits of Highland and San Bernardino on SR-210 at Victoria Avenue. The purpose of the new interchange would be to improve access to business and entertainment facilities in the Victoria Avenue corridor, such as the San Bernardino International Airport (SBIA) and the San Manuel Band of Mission Indians establishments.

Consistent with the previous analysis scenario assumptions, Horizon Year (2040) mainline and ramp traffic count data were developed using annualized growth factors described previously in Chapter 2 of this report. During Horizon Year (2040) traffic conditions, volume proportion/flow conservation had been maintained in the development of future mainline traffic volume. The truck percentage value for mainline were similarly assumed for ramp traffic and was used in the weaving, merge and diverge analysis. The PCE factor of 1.5 had been similarly maintained for use in the Horizon Year (2040) traffic operations analysis.

The following analysis provides the evaluation of 2040 No Build and Build project conditions.

Horizon Year (2040) - No Build Traffic Conditions

Figure 8 illustrates Horizon Year (2040) – No Build Freeway Mainline and Ramp Geometric configurations. **Figure 9** illustrates Horizon Year (2040) – No Build Freeway Mainline and Ramp ADT and peak hour traffic volumes.

An operational analysis was conducted for the SR-210 mainline, ramp merge and diverge areas within the project study area and the results are summarized in **Table 10** for the eastbound SR-210 direction and in **Table 11** for the westbound SR-210 direction.

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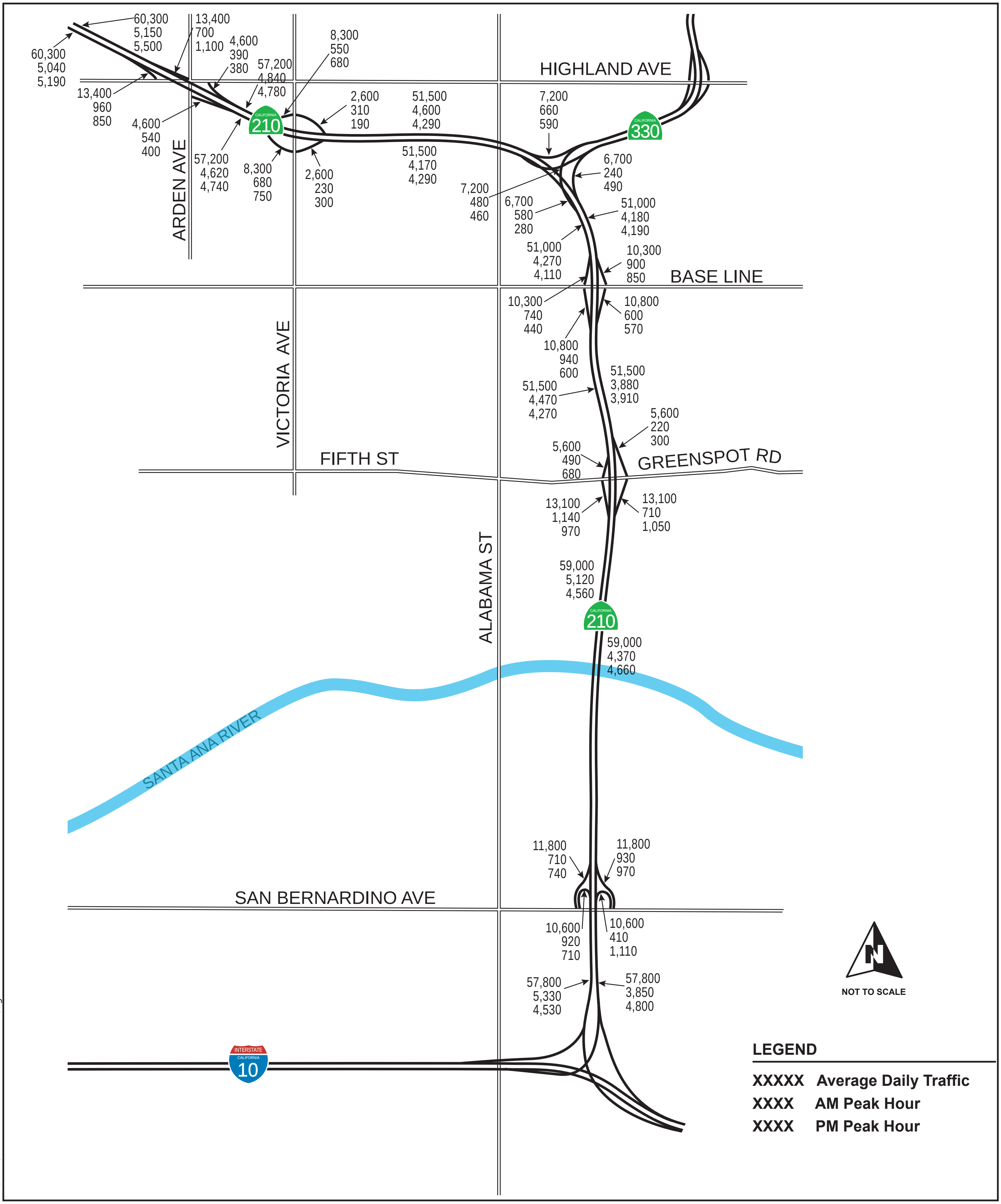
SR-210 Mixed Flow Lane Addition
(PM R26.0/R33.2) - EA 0C700

Figure 8
Horizon Year (2040) No Build Freeway Mainline
and Ramp Geometrics



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(PM R26.0/R33.2) - EA 0C700

Figure 9
Horizon Year (2040) No Build Freeway Mainline and Ramp Volumes

Table 10:
Horizon Year (2040) SR-210 – No Build Eastbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Horizon Year (2040)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between Sterling Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	29.8	D	30.6	D
SR-210 Highland Avenue Off-ramp	Trap Lane	2MF/ 1L Trap	N/A[3]	N/A[3]	N/A[3]	N/A[3]
SR-210 Arden Avenue On-ramp	Merge	2MF/ 1L Ramp	--*	**F**	--*	**F**
SR-210 between Highland Avenue-Arden Avenue and Victoria Avenue	Freeway	2MF	54.7	**F**	57.1	**F**
SR-210 between Victoria Avenue and SR-330	Freeway	2MF	42.8	**E**	44.5	**E**
SR-210 SR-330 Connector	Diverge	2MF/ 1L Decel	33.1	D	33.8	D
SR-210 between SR-330 and Base Line	Weave	2MF/ 1 Aux	29.0	D	26.6	C
SR-210 Base Line On-ramp	Merge	2MF/ 1L Ramp	--*	**F**	37.5	**E**
SR-210 between Base Line and 5th Street-Greenspot Road	Freeway	2MF	49.6	**F**	43.6	**E**
SR-210 5th Street Off-ramp	Diverge	2MF/ 1L Ramp	--*	**F**	36.5	**E**
SR-210 5th Street On-ramp	Merge	2MF/ 1L Ramp	--*	**F**	--*	**F**
SR-210 between 5th Street-Greenspot Road and San Bernardino Avenue	Freeway	2MF	75.8	**F**	50.8	**F**
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	33.9	D	31.2	D
SR-210 San Bernardino Avenue On-ramp	Merge	4MF/ 1L Ramp	24.2	C	20.3	C
SR-210 between San Bernardino Avenue and I-10 Freeway	Freeway	4MF	22.5	C	18.9	C

Notes: --* = Demand exceeds capacity.

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
4. Ramp junction analysis is not applicable for ramp connections in weave segments.

**Table 11:
Horizon Year (2040) SR-210 – No Build Westbound Mainline and Ramp Operations LOS**

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Horizon Year (2040)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between I-10 Freeway and San Bernardino Avenue	Freeway	3MF	21.6	C	27.4	D
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	27.4	C	33.1	D
SR-210 San Bernardino Avenue On-ramp	Merge	2MF/ 1L Ramp	--*	**F**	--*	**F**
SR-210 between San Bernardino Avenue and 5th Street-Greenspot Road	Freeway	2MF	47.0	**F**	53.7	**F**
SR-210 Greenspot Road Off-ramp	Diverge	2MF/ 1L Ramp	--*	**F**	--*	**F**
SR-210 Greenspot Road On-ramp	Merge	2MF/ 1L Ramp	34.8	D	34.6	D
SR-210 between 5th Street-Greenspot Road and Base Line	Freeway	2MF	36.9	**E**	36.8	**E**
SR-210 Base Line Off-ramp	Diverge	2MF/ 1L Ramp	33.2	D	33.1	D
SR-210 between Base Line and SR-330	Weave	2MF/ 1 Aux	29.6	D	28.9	D
SR-210 SR-330 Connector	Merge	2MF/ 1L Ramp	--*	**F**	37.9	**E**
SR-210 between SR-330 and Victoria Avenue	Freeway	2MF	54.1	**F**	44.5	**E**
SR-210 between Victoria Avenue and Highland Avenue-Arden Avenue	Freeway	2MF	63.0	**F**	58.6	**F**
SR-210 Highland Avenue Off-ramp	Diverge	2MF/ 1L Ramp	--*	**F**	--*	**F**

Notes: --* = Demand exceeds capacity.

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
4. Ramp junction analysis is not applicable for ramp connections in weave segments.

Horizon Year (2040) - Build Traffic Conditions

Figure 10 illustrates Horizon Year (2040) – Build Freeway Mainline and Ramp Geometric configurations. **Figure 11** illustrates Horizon Year (2040) – Build Freeway Mainline and Ramp ADT and peak hour traffic volumes.

Similar to Horizon Year (2040) – No Build conditions, an operational analysis was conducted for Build Conditions of the SR-210 mainline, ramp merge and diverge areas within the project study area and the results are summarized in **Table 12** for the eastbound SR-210 direction and in **Table 13** for the westbound SR-210 direction.

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SR-210 Mixed Flow Lane Addition
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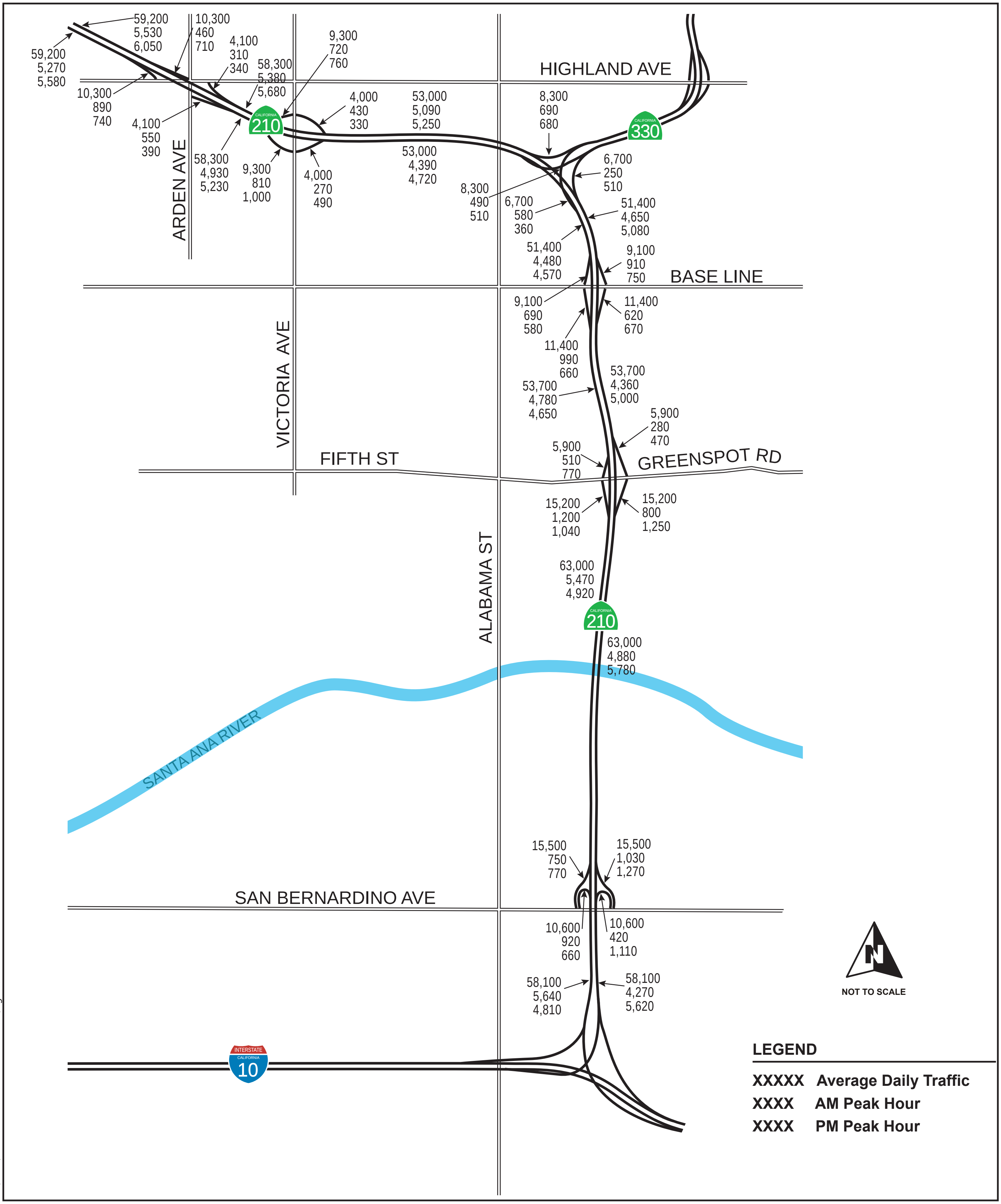
Figure 10
Horizon Year (2040) Build Freeway
Mainline and Ramp Geometrics



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SR-210 Mixed Flow Lane Addition
(PM R26.0/R33.2) - EA 0C700

Figure 11
Horizon Year (2040) Build Freeway Mainline and Ramp Volumes

Table 12:
Horizon Year (2040) SR-210 – Build Eastbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Horizon Year (2040)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between Sterling Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	31.7	D	34.1	D
SR-210 Highland Avenue Off-ramp	Diverge	3MF/ 2L Ramp	25.6	C	26.9	C
SR-210 Arden Avenue On-ramp	Merge	3MF/ 1L Ramp	28.5	D	29.3	D
SR-210 between Highland Avenue-Arden Avenue and Victoria Avenue	Freeway	3MF	28.9	D	30.9	D
SR-210 between Victoria Avenue and SR-330	Freeway	3MF	25.0	C	27.0	D
SR-210 SR-330 Connector	Diverge	3MF/ 1L Decel	21.0	C	22.3	C
SR-210 between SR-330 and Base Line	Weave	3MF/ 1 Aux	22.3	C	22.0	C
SR-210 Base Line On-ramp	Merge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 between Base Line and 5th Street-Greenspot Road	Weave	3MF/ 1 Aux	26.8	C	25.5	C
SR-210 5th Street Off-ramp	Diverge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 5th Street On-ramp	Merge	3MF/ 1L Accel	33.1	D	29.5	D
SR-210 between 5th Street-Greenspot Road and San Bernardino Avenue	Freeway	3MF	33.3	D	28.2	D
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	35.5	**E**	32.9	D
SR-210 San Bernardino Avenue On-ramp	Merge	4MF/ 1L Ramp	25.2	C	21.0	C
SR-210 between San Bernardino Avenue and I-10 Freeway	Freeway	4MF	23.9	C	20.1	C

Notes:

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
4. Ramp junction analysis is not applicable for ramp connections in weave segments.

Table 13:
Horizon Year (2040) SR-210 – Build Westbound Mainline and Ramp Operations LOS

Freeway Mainline Segment / Ramp Connection	Freeway Mainline / Ramp Connection Merge/Diverge Analyses Horizon Year (2040)					
	Facility	Lanes	AM Peak		PM Peak	
			Den.	LOS	Den.	LOS
SR-210 between I-10 Freeway and San Bernardino Avenue	Freeway	3MF	24.1	C	34.2	D
SR-210 San Bernardino Avenue Off-ramp	Diverge	3MF/ 1L Ramp	29.5	D	36.6	**E**
SR-210 San Bernardino Avenue On-ramp	Merge	3MF/ 1L Ramp	29.6	D	34.1	D
SR-210 between San Bernardino Avenue and 5th Street-Greenspot Road	Freeway	3MF	28.3	D	35.8	**E**
SR-210 Greenspot Road Off-ramp	Diverge	3MF/ 1L Ramp	33.0	D	37.5	**E**
SR-210 Greenspot Road On-ramp	Merge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 between 5th Street-Greenspot Road and Base Line	Weave	3MF/ 1 Aux	22.7	C	26.8	C
SR-210 Base Line Off-ramp	Diverge	3MF/ 1 Aux	N/A[4]	N/A[4]	N/A[4]	N/A[4]
SR-210 between Base Line and SR-330	Weave	3MF/ 1 Aux	24.3	C	25.9	C
SR-210 SR-330 Connector	Merge	3MF/ 1L Ramp	29.9	D	30.3	D
SR-210 between SR-330 and Victoria Avenue	Freeway	3MF	30.2	D	31.1	D
SR-210 between Victoria Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	32.7	D	35.1	**E**
SR-210 Highland Avenue Off-ramp	Diverge	3MF/ 1L Ramp	34.5	D	35.6	**E**

Notes:

1. "Highland Avenue-Arden Avenue" refers to SR-210 off-ramps to Highland Avenue and SR-210 on-ramps from Arden Avenue (EB) and both Arden Avenue/Highland Avenue (WB).
2. "5th Street-Greenspot Road" refers to SR-210 off/on-ramps to 5th Street (EB) and SR-210 off/on-ramps to Greenspot Road (WB).
3. Ramp junction analysis is not applicable for lane drop (trap) lane or lane addition connection to freeway.
4. Ramp junction analysis is not applicable for ramp connections in weave segments.

7.0 SUMMARY AND CONCLUSION

This chapter provides a summary of the results of the operational analyses performed for the proposed project. Existing (2012), Opening Year (2020) and Horizon Year (2040) results are discussed in the following sections.

Existing (2012) Traffic Conditions

The existing mainline SR-210 freeway is generally operating at acceptable levels of service (LOS D or better) based upon 2012 traffic volumes. The areas of heaviest congestion occur between Fifth Street-Greenspot Road and San Bernardino Avenue. One freeway segment is operating at LOS E during the morning peak hour (EB from Fifth Street-Greenspot Road to San Bernardino Avenue) and two ramp junctions are operating at LOS E (EB Fifth Street on-ramp in the morning peak hour and WB Greenspot Road off-ramp in the evening peak hour). The short weaving segment between SR-330 and Base Line is operating at LOS B in both directions during both the morning and evening peak hours. The existing freeway segments approaching the I-10 freeway junction are operating at good levels of service (LOS B and LOS C).

Opening Year (2020) Traffic Conditions

The SR-210 mainline freeway will operate at LOS D or better in all segments and at all ramp junctions under opening year with project conditions. The weaving segment between SR-330 and Base Line will operate acceptably as well (LOS B and LOS C) in 2020 in both directions during morning and evening peak hours. The auxiliary lanes proposed between Base Line and Fifth Street-Greenspot Road will provide this segment of freeway with good levels of service in both directions (LOS B and LOS C) in the opening year. The freeway segments between San Bernardino Avenue and I-10 degrade slightly from existing conditions, but still maintain adequate levels of service of B, C and D in the morning and evening peak hours.

If the proposed project was not constructed by 2020, the operational conditions are anticipated to be generally one level of service worse on each freeway segment and at each freeway ramp junction when compared to the build condition. Several segments are forecast to reach LOS E and LOS F conditions without the proposed improvements, particularly the areas between Fifth Street-Greenspot Road and San Bernardino Avenue.

Horizon Year (2040) Traffic Conditions

In the Horizon Year (2040), nearly all mainline freeway segments on SR-210 within the project limits will operate at LOS D or better after implementation of the proposed project improvements. Only one segment (westbound SR-210 from San Bernardino Avenue to Fifth Street-Greenspot Road) will operate at LOS E in the evening peak hour. In the No Build condition this segment would operate a LOS F in both the morning and evening peak hours. Because the density and level of service of this freeway segment only slightly exceeds the criteria for LOS D, the proposed improvements meet the project's Purpose and Need and implementation of the future HOV lane addition project will improve this segment to an acceptable level. The weaving segments between SR-330 and Base Line and between Base Line and Fifth-Street-Greenspot Road will all operate at LOS C in both directions in both morning and evening peak hour periods. The SR-210 freeway segment approaching the I-10 freeway junction will operate at LOS C in both morning and evening peak periods and the SR-

210 freeway segment leading away from the I-10 freeway will operate at LOS C and LOS D in the morning and evening peak periods, respectively.

In the Horizon Year (2040), the levels of service at most of the ramp junctions are anticipated to be LOS D or better. At the specific ramp junctions where the Horizon Year 2040 levels of service are forecast to be LOS E, the Mixed Flow Lane project will incrementally improve these ramp junctions compared to the No Build condition. Improvements at these ramp junctions are not included in this project because ramp and interchange improvements are beyond the Purpose and Need for the Mixed Flow Lane project. Furthermore, future interchange improvement projects are anticipated to address the specific operational issues at these locations. The projected evening peak hour LOS E conditions at the westbound off-ramp to San Bernardino Avenue will be improved as part of the interchange reconstruction project proposed in the SR-210 PSR/PDS approved in 2008. Similarly, the Greenspot Road westbound off-ramp diverge LOS E in the evening peak hour will be addressed as part of the SR-210/Fifth Street-Greenspot Road interchange improvement project under development by the City of Highland. At each of these off-ramps, the addition of a deceleration lane in advance of the off-ramp divergence point should improve the ramp junction level of service to acceptable levels.

Finally, the only other location of LOS E predicted in the Horizon Year 2040 within the project limits is the westbound off-ramp to Highland Avenue and the approaching freeway segment. Studies are currently underway for improvements at this existing interchange, which involve development of a new interchange at Victoria Avenue. While the specific improvements in this location within the SR-210 corridor are not known, it is reasonable to expect that the future year level of service issues at the westbound Highland Avenue off-ramp will be addressed by the proposed improvements considered in conjunction with the SR-210/Victoria Avenue interchange project.

The Horizon Year (2040) No Build versus Build operational results clearly demonstrates the traffic enhancement value of the proposed project improvements. Many freeway mainline segments will operate at LOS E and LOS F without the addition of the third mixed flow lane in each direction. The level of service between Base Line and Fifth Street-Greenspot Road will degrade to LOS E and LOS F by 2040 if the auxiliary lanes between these two interchanges are not constructed. The addition of the eastbound acceleration lane at the Fifth Street on-ramp improves the level of service from LOS F in both the morning and evening peak hour periods to LOS D in both peak periods under Horizon Year (2040) traffic conditions.

Conclusions

The SR-210 Mixed Flow Lane Addition project will address traffic operational issues within this segment of the corridor in both the Opening Year (2020) and Horizon Year (2040) conditions consistent with the project's Purpose and Need. The proposed improvements will maintain levels of service of LOS D or better on all mainline freeway segments, all weave segments and at all ramp junctions.

The only exceptions occur in locations where planned future interchange improvement projects would necessarily address the ramp junction diverge operations. All of the interchange on-ramps, including the freeway-to-freeway connectors at the SR-330 junction, are expected to operate at LOS D or better under future year traffic conditions. Therefore, ramp metering systems not already included in the proposed project improvements, should not be necessary to mitigate ramp junction merge levels of service.

Finally, the level of service of the freeway segment approaching the I-10 freeway junction is LOS C in both peak periods; therefore, the proposed improvements do not have a negative impact on the I-10 freeway interchange. Similarly, the project does not have any detrimental impacts on the westbound segment of the SR-210 freeway departing from the I-10 freeway junction and the level of service in this area is forecasted to remain at LOS D or better through 2040 without any additional improvements.

The proposed mixed flow lane addition in each direction will not preclude other future operational improvement projects that are planned within this corridor. In fact, the addition of the third mixed flow lane will complement the future SR-210 HOV lane addition project and the development of interchange improvement projects throughout the project study limits.

The proposed improvements meet the project's Purpose and Need and improve future operational conditions in comparison with No Build conditions. It is anticipated that after the implementation of the proposed project and with the future addition of the HOV lane project, mainline and ramp merge/diverge operating conditions will further improve in conjunction with other planned interchange improvements within the project study area.

Appendix A – Traffic Model Projections

SR-210 Mixed Flow Lane Addition
Peak Hour Freeway Volume Summary

Eastbound/Southbound

Freeway Mainline Segment / Ramp Connection	Facility	Lanes	Existing to No Build Annual Growth (1)		2012		2020				2040			
					Existing		No Build		Build		No Build		Build	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Highland Ave	Diverge	3MF/ 1L Ramp	4	2	864	786	1,090	1,020	1,150	1,160	960	850	890	740
Highland Ave	Merge	3MF/ 1L Ramp	-2	-3	598	488	640	550	690	730	540	400	550	390
SR-210 between Arden Avenue and Victoria Ave	Freeway	3MF	66	62	2,760	3,007	3,150	3,370	3,370	3,800	4,620	4,740	4,930	5,230
SR-210 between Victoria Ave and SR-330	Freeway	3MF	50	46	2,760	3,007	3,150	3,370	3,370	3,800	4,170	4,290	4,390	4,720
SR-210 to SR-330 Connector	Diverge	3MF/ 1L Ramp	4	6	361	287	400	340	410	390	480	460	490	510
SR-210 between SR-330 and Base Line	Weave	4MF	53	37	2,779	2,948	3,190	3,270	3,400	3,730	4,270	4,110	4,480	4,570
Sr-210 between Base Line and 5th Street	Weave	4MF	4	2	819	554	850	570	900	630	940	600	990	660
SR-210 5th Street On-Ramp	Merge	3MF/ 1L Ramp	4	5	1,032	820	1,060	860	1,120	930	1,140	970	1,200	1,040
SR-210 between 5th Street and San Bernardino Avenue	Freeway	3MF	39	28	4,003	3,594	4,300	3,860	4,650	4,220	5,120	4,560	5,470	4,920
SR-210 San Bernardino Avenue Off-Ramp	Diverge	3MF/ 1L Ramp	5	5	568	614	610	650	650	680	710	740	750	770
SR-210 San Bernardino Avenue On-Ramp	Merge	4MF/ 1L Ramp	12	9	590	466	680	530	680	480	920	710	920	660
SR-210 between San Bernardino Avenue and I-10 Freeway	Freeway	4MF	34	28	4,025	3,446	4,370	3,740	4,680	4,020	5,330	4,530	5,640	4,810

(1) Existing to No Build (2040) Annual Growth = [No Build (2040) - Existing (2012)] ÷ (2040 - 2012). Equation provided to illustrate general linear annual growth trends.

SR-210 Mixed Flow Lane Addition
Peak Hour Freeway Volume Summary

Westbound/Northbound

Freeway Mainline Segment / Ramp Connection	Facility	Lanes	Existing to No Build Annual Growth [1]		2012 Existing		2020 No Build		2020 Build		2040 No Build		2040 Build	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
SR-210 between I-10 Freeway and San Bernardino Avenue	Freeway	3MF	42	37	2,663	3,774	3,000	4,070	3,420	4,890	3,850	4,800	4,270	5,620
SR-210 San Bernardino Avenue Off-Ramp	Diverge	3MF/ 1L Ramp	8	12	194	778	260	870	270	870	410	1,110	420	1,110
SR-210 San Bernardino Avenue On-Ramp	Merge	3MF/ 1L Ramp	11	9	615	720	700	790	800	1,090	930	970	1,030	1,270
SR-210 between San Bernardino Avenue and Greenspot Road	Freeway	3MF	46	34	3,083	3,716	3,440	3,990	3,950	5,110	4,370	4,660	4,880	5,780
SR-210 Greenspot Road Off-Ramp	Diverge	3MF/ 1L Ramp	2	4	652	944	670	970	760	1,170	710	1,050	800	1,250
SR-210 between Greenspot Road and Base Line	Weave	4MF	44	35	2,640	3,038	2,980	3,300	3,460	4,390	3,880	3,910	4,360	5,000
SR-210 between Base Line and SR-330	Weave	4MF	48	48	2,823	2,996	3,200	3,360	3,670	4,250	4,180	4,190	4,650	5,080
SR-210 SR-330 Connector	Merge	3MF/ 1L Ramp	4	7	544	398	580	450	610	540	660	590	690	680
SR-210 between SR-330 and Victoria Avenue	Freeway	3MF	51	51	3,176	2,985	3,580	3,380	4,070	4,340	4,600	4,290	5,090	5,250
SR-210 between Victoria Avenue and Highland Avenue-Arden Avenue	Freeway	3MF	59	69	3,176	2,985	3,580	3,380	4,070	4,340	4,840	4,780	5,380	5,680
SR-210 Highland Avenue Off-Ramp	Diverge	3MF/ 1L Ramp	-2	3	449	282	520	360	560	460	390	380	310	340
SR-210 Highland Avenue On-Ramp	Merge	3MF/ 1L Ramp	3	15	633	691	810	1,000	740	690	700	1,100	460	710

(1) Existing to No Build (2040) Annual Growth = [No Build (2040) - Existing (2012)] ÷ (2040 - 2012). Equation provided to illustrate general linear annual growth trends.

Appendix E

- Compliance with 40 CFR 1502.22 Language
- Summary of Current Studies Regarding Health Effects of MSAT Emissions Exposure

Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA - Appendix C

Sec. 1502.22 INCOMPETE OR UNAVAILABLE INFORMATION

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

a. If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.
b. If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:
    1. a statement that such information is incomplete or unavailable;
    2. a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
    3. a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
    4. the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.
c. The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

INCOMPLETE OR UNAVAILABLE INFORMATION FOR PROJECT-SPECIFIC MSAT HEALTH IMPACTS ANALYSIS

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

The U.S. Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/ncea/iris/index.html). 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 (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts - 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 year) 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. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the EPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad), which documents poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring. The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating

70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

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 (http://pubs.healtheffects.org/view.php?id=282). 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 (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) 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 Clean Air Act 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 EPA to determine a "safe" or "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 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 safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to 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 (CEQ) regulations [40 CFR 1502.22(b)]. The FHWA Headquarters and Resource Center staff Victoria Martinez (787) 766-5600 X231, Shari Schaftlein (202) 366-5570, and Michael Claggett (505) 820-2047, are available to provide guidance and technical assistance and support.

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Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA - Appendix D

Human epidemiology and animal toxicology experiments indicate that many chemicals or mixtures termed air toxics have the potential to impact human health. As toxicology, epidemiology and air contaminant measurement techniques have improved over the decades, scientists and regulators have increased their focus on the levels of each chemical or material in the air in an effort to link potential exposures with potential health effects. The FHWA has embarked on an air toxics research program with the intent of understanding the mobile source contribution and its impact on local and national air quality. Several studies either initiated or supported by FHWA are described below[1].

Air toxics emissions from mobile source have the potential to impact human health and often represent a regulatory agency concern. The FHWA has responded to this concern by developing an integrated research program to answer the most important transportation community questions related to air toxics, human health, and the NEPA process. To this end, FHWA has performed or is currently managing several research projects. Many of these projects are based on an Air Toxics Research Workplan that provides a roadmap for agency research efforts[2]. These efforts include:

ESTIMATING THE TRANSPORTATION CONTRIBUTION TO PARTICULATE MATTER POLLUTION (AIR TOXICS SUPERSITE STUDY)

The purpose of this study was to improve understanding of the role of highway transportation sources in particulate matter (PM) pollution.In particular, it was important to examine uncertainties, such as the effects of the spatial and temporal distribution of travel patterns, consequences of vehicle fleet mix and fuel type, the contribution of vehicle speed and operating characteristics, and influences of geography and weather.The fundamental methodology of the study was to combine EPA research-grade air quality monitoring data in a representative sample of metropolitan areas with traffic data collected by State departments of transportation (DOTs) and local governments.

Phase I of the study, the planning and data evaluation stage, assessed the characteristics of EPA's ambient PM monitoring initiatives and recruited State DOTs and local government to participate in the research.After evaluating and selecting potential metropolitan areas based on the quality of PM and traffic monitoring data, nine cities were selected to participate in Phase II.The goal of Phase II was to determine whether correlations could be observed between traffic on highway facilities and ambient PM concentrations.The Phase I report was published in September 2002.Phase II included the collection of traffic and air quality data and data analysis.Ultimately, six cities participated:New York City (Queens), Baltimore, Pittsburgh, Atlanta, Detroit and Los Angeles.

In Phase II, air quality and traffic data were collected.The air quality data was obtained from EPA AIRS AQS system, Supersite personnel, and NARSTO data archive site. Traffic data included ITS (roadway surveillance), Coverage Counts (routine traffic monitoring) and Supplemental Counts (specifically for research project).Analyses resulted in the conclusion that only a weak correlation existed between PM2.5 concentrations and traffic activity for several of the sites.The existence of general trends indicates a relationship, which however is primarily unquantifiable.Limitations of the study include the assumption that traffic sources are close enough to ambient monitors to provide sufficiently strong source strength, that vehicle activity is an appropriate surrogate for mobile emissions, and lack of knowledge of other factors such as non-traffic sources of PM and its precursors.A paper documenting the work of Phase II was presented at the 2004 Emissions Inventory Conference and is available at http://www.epa.gov/ttn/chief/conference/ei13/mobile/black.pdf.

INVESTIGATION OF CONSISTENCY BETWEEN AMBIENT MONITORING DATA AND MOBILE6.2 EMISSIONS PREDICTIONS FOR AIR TOXICS (AIR TOXICS MONITORING AND MODELING STUDY)

The purpose of this FHWA-funded study was to investigate the consistency between MSAT concentrations measured in ambient air and emissions predictions from the MOBILE6.2 model.Data from five urban monitoring sites was evaluated for the years 2000-2002: Atlanta, Dallas, Detroit, Michigan, East Providence, and Phoenix.The focus was on locations and time periods when emissions from on-road vehicles were expected to dominate, such as weekday mornings with rush-hour commute and limited photochemical reactions.Four MSAT were analyzed based on data availability: benzene, 1,3-butadiene, formaldehyde, and acetaldehyde.Overall, MOBILE6.2 emissions predictions for benzene were approximately as consistent with ambient data as emissions predictions for criteria pollutants and their precursors.Predictions for 1,3-butadiene were somewhat less in agreement.Results for aldehydes indicate that MOBILE6.2 may under predict emissions.Researchers believe some of the model sensitivities may explain differences between monitoring-based and emissions-based ratios such as use of default verses local data and inputs on benzene content of gasoline. Uncertainties with the results include the inability to completely exclude the influences of other emissions sources, background concentrations, pollutant transport and atmospheric chemistry.An unpublished final report was completed in May 2005.

KANSAS CITY PM CHARACTERIZATION STUDY (KANSAS CITY STUDY)

This study was initiated by EPA to conduct exhaust emissions testing on 480 light-duty, gasoline vehicles in the Kansas City Metropolitan Area (KCMA).Major goals of the study included characterizing PM emissions distributions of a sample of gasoline vehicles in Kansas City; characterize gaseous and PM toxics exhaust emissions; and characterize the fraction of high emitters in the fleet.In the process, sampling methodologies were evaluated.Overall, results from the study were used to populate databases for the MOVES emissions model.The FHWA was one of the research sponsors.This study is available on EPA's website at: http://www.epa.gov/otaq/emission-factors-research/420r08009.pdf

HEI SPECIAL REPORT #16

In November 2007, the Health Effects Institute (HEI) published Special Report #16:Mobile-Source Air Toxics:A Critical Review of the Literature on Exposure and Health Effects.This study was the result of a charge to the MSAT review panel to accomplish the following tasks:

- Use information from the peer-reviewed literature to summarize the health effects of exposure to the 21 MSATs defined by the EPA in 2001;
- Critically analyze the literature for a subset of priority MSATs selected by the panel; and
- Identify and summarize key gaps in existing research and unresolved questions about the priority MSAT.

The panel chose to review literature for acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, naphthalene, and polycyclic organic matter (POM).Diesel exhaust was included but not reviewed in this study since it had been reviewed by HEI and EPA recently.In general, the panel concluded that the cancer health effects due to mobile sources are difficult to discern since the majority of quantitative assessments are derived from occupational cohorts with high concentration exposures and some cancer potency estimates are derived from animal models.The panel suggested that substantial improvements in analytical sensitively and specificity of biomarkers would provide better linkages between exposure and health effects.Noncancer endpoints were not a central focus of most research and therefore require further investigation.Subpopulation susceptibility also requires additional evaluation.The study is available from HEI's website at http://www.healtheffects.org/.The FHWA provided financial support to HEI's research work.

TRAFFIC-RELATED AIR POLLUTION

In May 2009, HEI released a preprint version of Special Report #17 investigating the health effects of traffic related air pollution.The goal of the research was to synthesize available information on the effects of traffic on health.Researchers looked at linkages between:(1) traffic emissions (at the tailpipe) with ambient air pollution in general, (2) concentrations of ambient pollutants with human exposure to pollutants from traffic, (3) exposure to pollutants from traffic with human-health effects and toxicologic data, and (4) toxicologic data with epidemiological associations.Challenges in making exposure assessments, such as quality and quantity of emissions data and models, were investigated as was the appropriateness of the use of the proximity model as an exposure-assessment model.Overall, researchers felt that there was "sufficient" evidence for causality for the exacerbation of asthma.Evidence was "suggestive but not sufficient" for other health outcomes such as cardiovascular mortality and others. Study authors also note that past epidemiologic studies may not provide an appropriate assessment of future health associations as vehicle emissions are decreasing overtime.The report is available from HEI's website at http://www.healtheffects.org/.The final version is expected by fall 2009. The FHWA provides financial support to HEI's research work.

THE NATIONAL NEAR ROADWAY MSAT STUDY

The FHWA, in conjunction with the EPA and a consortium of State departments of transportation, is studying the concentration and physical behavior of MSATs and mobile source PM 2.5 at up to three sites in the United States.To leverage resources for this effort, the Transportation Pooled Fund Program 1124, Mobile Source Air Toxics (MSAT) From Major Highways was created to fund this research.The study criteria dictate that each study site be open to traffic and have 150,000 Annual Average Daily Traffic or more.This study is intended to provide knowledge about the dispersion of MSAT emissions with the ultimate goal of enabling more informed transportation and environmental decisions at the project-level.More information is available at http://www.fhwa.dot.gov/environment/air_quality/air_toxics/research/near_road_s
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1 The information provided here is an update to research work discussed in the 2006 release of this interim guidance. The current title of each research activity is followed by the title used to describe the activity previously.
2 Available at http://www.fhwa.dot.gov/environment/air_quality/air_toxics/research/workplan/inc

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Updated: 07/06/2011

Appendix F

- Roadway Construction Emissions Model Worksheets
- CT-EMFAC Output and Summary Worksheets
- Re-entrained Road Dust Calculation Worksheets

Welcome to the Road Construction Emissions Model, Version 7.1.2

User Instructions

This spreadsheet system contains the following individual worksheets:

1. This worksheet of User Instructions
2. Emission Estimates
3. Data Entry
4. EMFAC2011
5. OFFROAD Convert
6. OFFROAD HP & LF
7. OFFROAD EF

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Changes from previous version of Road Construction Emissions Model (Version 6.3.2 to Version 7.1.0, 7.1.1, & 7.1.2) (updated by TIAX LLC, 9/3/12)

1) EMFAC2011 emission factors added (previous EMFAC versions dropped).
2) OFFROAD2011 emission factors added (and fixed error).
3) OFFROAD2007 for categories not in OFFROAD2011 (and fixed error)
4) Project length changed to include calendar years 2009 through 2025.
5) Average Offroad HP by Equipment Type calculation updated and corrected
6) Load Factor Adjustment deactivated (default load factors already incorporated in ARB's calculation of emission factors)
7) Crawler Tractor equipment added to model
8) Air Compressors ROG & Default Excavators calculation on Data Entry sheet corrected.

Changes from previous version of Road Construction Emissions Model (Version 6.3 to Version 6.3.1 and 6.3.2)

1) Corrections to calculations on Data Entry Sheet.
2) Total ROG Calculation - Water Truck for Grading/Excavation included.
3) Total CO Calculation - Worker Commute Emission and Soil Hauling corrected.
4) Total CO Calculation - Water Truck Emissions for Grading/Excavation corrected.
5) Total NOx Calculation - Worker Commute and Soil Hauling Emissions corrected.
6) Total NOx Calculation - Water Truck Emissions for Grading/Excavation corrected.
7) Total PM2.5 Calculation corrected to include exhaust and fugtive PM2.5.
8) Total Exhaust PM2.5 and Total Fugitive PM2.5 corrected.
9) Total CO2 Calculation - Soil Hauling CO2 emissions included.
10) Estimating Number of Scrapers for Grubbing/Land Clearing corrected.
11) Worker Commute Emissions for Grubbing/Land Clearing sum corrected.

The Emission Estimates worksheet calculates a project's emissions in pounds per day (and kilograms per day) by project phase and tons (and megagrams) over the entire construction period.
The worksheet can be used to estimate emissions for both vehicle exhaust and fugitive dust. The methodology used to estimate fugitive dust emissions is a simplified methodology involving estimates of the maximum area (acreage) of land disturbed daily. Detailed fugitive dust emission estimates associated with individual materials handling operations and/or activity/vehicle types cannot be conducted with this version of the model.
The Emission Estimates worksheet cannot be modified directly, it is a protected worksheet. It can only be modified indirectly by entering information for the project in selected areas of the Data Entry worksheet.
The last four of these worksheets - EMFAC2011, OFFROAD Convert, OFFROAD HP & LP, and OFFROAD EF - cannot be modified by the user. They are protected worksheets.
Even though all or portions of several worksheets are protected, the individual formulas used in the calculations can be seen by the user.
The Data Entry worksheet includes several areas that can be modified by the user.
User instructions in the Data Entry worksheet are highlighted in red.
On the Data Entry worksheet, the user has two options for entering project data: required data and optional data. Required data is entered in the data input section (yellow cells). That required data is then used by the worksheet to calculate default values for the project.
The user can override the default values (blue cells) calculated for a project and is encouraged to do so if project specific information is available. Due to the difficulty in developing reliable default values for road construction projects, the user is encouraged to enter as much site specific information as is available for the project being analyzed.
The Data Entry Worksheet also includes a button that allows the user to clear previously entered data. This button is found just at the top of and to the right of the data entry portion of the worksheet.
When projects are discontinuous, the user must make adjustments to the spreadsheet manually, since the program cannot be setup to anticpate unexpected project delays.

#VALUE! <- This error message may occur during use of the spreadsheets. This occurs whenever the user enters a non numeric value, including a space character, into a cell that is used to calculate a numeric value.
Consequently, to erase values entered into the spreadsheets, use the delete key instead of the space bar!

Note: Information in this worksheet is based on conversations with knowledgeable individuals at the Sacramento Metropolitan Air Quality Management District, the California Department of Transportation, the California Air Resources Board, the U.S. EPA, and private industry involved in road construction.
Also, the 26th edition of Walker's Building Estimator's Reference Book (1999) was used in the development of this spreadsheet.
This spreadsheet was prepared by Jones & Stokes and TIAX LLC with the financial support and direction of the Sacramento Metropolitan Air Quality Management District.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT
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Road Construction Emissions Model, Version 7.1.2

Emission Estimates for -> SR-210 Widening Project Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	10.2	46.6	80.3	99.9	3.9	96.0	23.5	3.5	20.0	8,873.3
Grading/Excavation	10.9	53.4	91.8	100.4	4.4	96.0	23.9	4.0	20.0	11,576.9
Drainage/Utilities/Sub-Grade	7.5	37.5	49.9	98.9	2.9	96.0	22.6	2.6	20.0	6,427.1
Paving	6.7	39.2	40.0	2.4	2.4	-	2.2	2.2	-	6,316.3
Maximum (pounds/day)	10.9	53.4	91.8	100.4	4.4	96.0	23.9	4.0	20.0	11,576.9
Total (tons/construction project)	2.4	11.9	18.2	22.5	0.9	21.5	5.3	0.8	4.5	2,346.9

Notes: Project Start Year -> 2017
Project Length (months) -> 24
Total Project Area (acres) -> 38
Maximum Area Disturbed/Day (acres) -> 10
Total Soil Imported/Exported (yd^3/day)-> 323

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 -> SR-210 Widening Project Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	4.7	21.2	36.5	45.4	1.8	43.6	10.7	1.6	9.1	4,033.3
Grading/Excavation	5.0	24.3	41.7	45.7	2.0	43.6	10.9	1.8	9.1	5,262.2
Drainage/Utilities/Sub-Grade	3.4	17.0	22.7	44.9	1.3	43.6	10.3	1.2	9.1	2,921.4
Paving	3.0	17.8	18.2	1.1	1.1	-	1.0	1.0	-	2,871.1
Maximum (kilograms/day)	5.0	24.3	41.7	45.7	2.0	43.6	10.9	1.8	9.1	5,262.2
Total (megagrams/construction project)	2.2	10.8	16.5	20.4	0.9	19.5	4.8	0.8	4.1	2,128.7

Notes: Project Start Year -> 2017
Project Length (months) -> 24
Total Project Area (hectares) -> 16
Maximum Area Disturbed/Day (hectares) -> 4
Total Soil Imported/Exported ($meters^3$/day)-> 247

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.

Road Construction Emissions Model **Version 7.1.2**

Data Entry Worksheet

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C25.

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

Input Type		
Project Name	SR-210 Widening Project	
Construction Start Year	2017	Enter a Year between 2009 and 2025 (inclusive)
Project Type	2	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction
Project Construction Time	24.0	months
Predominant Soil/Site Type: Enter 1, 2, or 3	1	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock
Project Length	7.2	miles
Total Project Area	38.4	acres
Maximum Area Disturbed/Day	9.6	acres
Water Trucks Used?	1	1. Yes 2. No
Soil Imported	0.0	yd^3/day
Soil Exported	323.0	yd^3/day
Average Truck Capacity	20.0	yd^3 (assume 20 if unknown)

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells C34 through C37.

Construction Periods	User Override of Construction Months	Program Calculated Months
Grubbing/Land Clearing		2.40
Grading/Excavation		9.60
Drainage/Utilities/Sub-Grade		8.40
Paving		3.60
Totals	0.00	24.00

2005	%	2006	%	2007	%
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Hauling emission default values can be overridden in cells C45 through C46.

Soil Hauling Emissions

User Input	User Override of Soil Hauling Defaults	Default Values	
Miles/round trip		30	
Round trips/day		16	
Vehicle miles traveled/day (calculated)			484.5

Hauling Emissions	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate (grams/mile)	0.15	7.43	0.65	0.16	0.09	1652.56
Emission rate (grams/trip)	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day	0.2	7.9	0.7	0.2	0.1	1763.6
Tons per contruction period	0.02	0.84	0.07	0.02	0.01	186.23

Worker commute default values can be overridden in cells C60 through C65.

Worker Commute Emissions

	User Override of Worker Commute Default Values	Default Values
Miles/ one-way trip		20
One-way trips/day		2
No. of employees: Grubbing/Land Clearing		23
No. of employees: Grading/Excavation		28
No. of employees: Drainage/Utilities/Sub-Grade		26
No. of employees: Paving		28

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.133	0.172	1.555	0.047	0.020	443.765
Emission rate - Grading/Excavation (grams/mile)	0.133	0.172	1.555	0.047	0.020	443.765
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.120	0.154	1.399	0.047	0.020	443.880
Emission rate - Paving (grams/mile)	0.120	0.154	1.399	0.047	0.020	443.880
Emission rate - Grubbing/Land Clearing (grams/trip)	0.457	0.287	3.779	0.004	0.003	95.644
Emission rate - Grading/Excavation (grams/trip)	0.457	0.287	3.779	0.004	0.003	95.644
Emission rate - Draining/Utilities/Sub-Grade (gr/trip)	0.415	0.255	3.410	0.004	0.003	95.711
Emission rate - Paving (grams/trip)	0.415	0.255	3.410	0.004	0.003	95.711
Pounds per day - Grubbing/Land Clearing	0.361	0.407	3.917	0.096	0.041	918.642
Tons per const. Period - Grub/Land Clear	0.010	0.011	0.103	0.003	0.001	24.252
Pounds per day - Grading/Excavation	0.361	0.407	3.917	0.096	0.041	918.642
Tons per const. Period - Grading/Excavation	0.038	0.043	0.414	0.010	0.004	97.009
Pounds per day - Drainage/Utilities/Sub-Grade	0.328	0.364	3.525	0.096	0.041	918.888
Tons per const. Period - Drain/Util/Sub-Grade	0.030	0.034	0.326	0.009	0.004	84.905
Pounds per day - Paving	0.381	0.364	3.525	0.096	0.041	1114.430
Tons per const. Period - Paving	0.015	0.014	0.140	0.004	0.002	44.131
tons per construction period	0.093	0.102	0.982	0.025	0.011	250.297

Water truck default values can be overriden in cells C91 through C93 and E91 through E93.

Water Truck Emissions	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Miles Traveled/Day	Default Values Miles Traveled/Day	
Grubbing/Land Clearing - Exhaust		2		80	
Grading/Excavation - Exhaust		2		80	
Drainage/Utilities/Subgrade		1		40	

	ROG	NOx	CO	PM10	PM2.5	CO2
Emission rate - Grubbing/Land Clearing (grams/mile)	0.15	7.43	0.65	0.16	0.09	1652.56
Emission rate - Grading/Excavation (grams/mile)	0.15	7.43	0.65	0.16	0.09	1652.56
Emission rate - Draining/Utilities/Sub-Grade (gr/mile)	0.15	6.66	0.67	0.16	0.09	1624.61
Pounds per day - Grubbing/Land Clearing	0.05	2.62	0.23	0.06	0.03	582.40
Tons per const. Period - Grub/Land Clear	0.01	0.28	0.02	0.01	0.00	61.50
Pound per day - Grading/Excavation	0.05	2.62	0.23	0.06	0.03	582.40
Tons per const. Period - Grading/Excavation	0.01	0.28	0.02	0.01	0.00	61.50
Pound per day - Drainage/Utilities/Subgrade	0.01	0.59	0.06	0.01	0.01	143.14
Tons per const. Period - Drainage/Utilities/Subgrade	0.00	0.05	0.01	0.00	0.00	13.23

Fugitive dust default values can be overridden in cells C110 through C112.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		9.6	96.0	2.5	20.0	0.5
Fugitive Dust - Grading/Excavation		9.6	96.0	10.1	20.0	2.1
Fugitive Dust - Drainage/Utilities/Subgrade		9.6	96.0	8.9	20.0	1.8

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
	2	Rubber Tired Dozers	2.46	8.84	26.10	1.21	1.12	1889.31
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	2	Scrapers	2.73	14.51	32.82	1.32	1.21	3215.90
	14	Signal Boards	4.63	19.09	18.31	1.22	1.13	2267.05
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day	9.8	42.4	77.2	3.8	3.5	7372.3
	Grubbing/Land Clearing	tons per phase	0.3	1.1	2.0	0.1	0.1	194.6

Grading/Excavation	Default Number of Vehicles		ROG	CO	NOx	PM10	PM2.5	CO2
Override of Default Number of Vehicles	*Program-estimate*	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
	0	Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	2	Excavators	0.76	5.58	8.10	0.40	0.37	1145.50
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	2	Graders	1.99	6.95	19.28	1.08	1.00	1338.46
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
	1	Other Construction Equipment	0.63	3.45	6.63	0.35	0.32	627.77
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
	2	Rubber Tired Loaders	0.99	6.23	12.11	0.41	0.38	1325.58
	1	Scrapers	1.37	7.25	16.41	0.66	0.61	1607.95
	14	Signal Boards	4.63	19.09	18.31	1.22	1.13	2267.05
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day	10.4	48.6	80.8	4.1	3.8	8312.3
	Grading	tons per phase	1.1	5.1	8.5	0.4	0.4	877.8

Drainage/Utilities/Subgrade Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
	1	Graders	0.87	3.46	8.31	0.47	0.43	667.39
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Pavers	0.00	0.00	0.00	0.00	0.00	0.00
		Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	2	Plate Compactors	0.08	0.42	0.50	0.02	0.02	68.90
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
		Rollers	0.00	0.00	0.00	0.00	0.00	0.00
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
	1	Scrapers	1.19	7.26	14.04	0.55	0.51	1608.56
	14	Signal Boards	4.07	18.58	17.66	1.08	0.99	2267.05
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
	2	Trenchers	0.99	4.19	8.46	0.64	0.59	753.20
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage	pounds per day	7.2	33.9	49.0	2.8	2.5	5365.1
	Drainage	tons per phase	0.7	3.1	4.5	0.3	0.2	495.7

Paving Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	CO2 pounds/day
		Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00
		Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00
		Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00
		Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00
		Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00
		Cranes	0.00	0.00	0.00	0.00	0.00	0.00
		Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Excavators	0.00	0.00	0.00	0.00	0.00	0.00
		Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00
		Graders	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00
		Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00
		Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00
	2	Pavers	0.65	5.68	6.90	0.34	0.31	964.39
	2	Paving Equipment	0.49	5.39	5.19	0.25	0.23	852.74
		Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00
		Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00
		Pumps	0.00	0.00	0.00	0.00	0.00	0.00
	4	Rollers	1.07	6.03	9.90	0.68	0.63	1117.70
		Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00
		Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Scrapers	0.00	0.00	0.00	0.00	0.00	0.00
	14	Signal Boards	4.07	18.58	17.66	1.08	0.99	2267.05
		Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00
		Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00
		Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00
		Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00
		Trenchers	0.00	0.00	0.00	0.00	0.00	0.00
		Welders	0.00	0.00	0.00	0.00	0.00	0.00
	Paving	pounds per day	6.3	35.7	39.6	2.4	2.2	5201.9
	Paving	tons per phase	0.2	1.4	1.6	0.1	0.1	206.0
Total Emissions all Phases (tons per construction period) =>			2.3	10.8	16.7	0.9	0.8	1774.1

Equipment default values for horsepower and hours/day can be overridden in cells C289 through C322 and E289 through E322.

Equipment		Default Values Horsepower		Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		106		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		10		8
Concrete/Industrial Saws		64		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		142		8
Excavators		163		8
Forklifts		89		8
Generator Sets		66		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Paving Equipment		131		8
Plate Compactors		8		8
Pressure Washers		26		8
Pumps		53		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		20		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		45		8

0

END OF DATA ENTRY SHEET

MSAT Emissions (pounds per day)

Scenario	Daily VMT[a]	Pounds per Day							
		DPM	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM
Existing (2012)	3,028,627	46.5	23.8	1.0	9.2	25.5	4.5	12.1	1.7
2020 No Build	3,481,540	28.4	14.9	0.6	5.7	15.6	2.7	12.0	1.7
2020 Build	3,501,513	28.8	15.1	0.6	5.7	15.8	2.7	12.1	1.7
2040 No Build	4,613,823	25.9	12.5	0.5	5.5	14.4	2.2	15.4	2.2
2040 Build	4,683,730	27.1	13.0	0.5	5.5	14.7	2.4	15.7	2.2
Alternative Increase/(Decrease) Compared with Existing 2012									
Scenario	Daily VMT	DPM	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM
2020 Build vs. Existing	472,886	-17.7	-8.7	-0.4	-3.5	-9.7	-1.8	0.0	0.0
2040 Build vs. Existing	1,655,103	-19.4	-10.8	-0.5	-3.7	-10.8	-2.1	3.6	0.5
Alternative Increase/(Decrease) Compared with Respective No Build at 2020 and 2040									
Scenario	Daily VMT	DPM	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM
2020 Build vs. No Build	19,973.00	0.40	0.18	0.01	0.04	0.16	0.05	0.09	0.01
2040 Build vs. No Build	69,907.00	1.20	0.48	0.03	0.04	0.29	0.13	0.29	0.04
Percent change	Daily VMT	DPM	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM
2020 Build vs. Existing	15.6%	-38.1%	-36.5%	-39.1%	-37.8%	-38.1%	-39.2%	0.0%	1.3%
2040 Build vs. Existing	54.6%	-41.7%	-45.5%	-47.6%	-40.0%	-42.3%	-46.9%	29.6%	32.5%
Percent change	Daily VMT	DPM	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM
2020 Build vs. No Build	0.6%	1.4%	1.2%	2.0%	0.7%	1.0%	1.9%	0.7%	0.8%
2040 Build vs. No Build	1.5%	4.4%	3.7%	6.0%	0.8%	2.0%	5.6%	1.9%	1.9%

Criteria Pollutant and CO2 Emissions

Scenario	Daily VMT[a]	Pounds per Day for All, Except CO_2, which Is Metrics per Day											MTCO2 per Year
		ROG	CO	NO_X	SO_X	CO_2	PM10 ex	PM2.5 ex	PM10 Dust	PM2.5 Dust	Total PM10	Total PM2.5	
Existing (2012)	3,028,627	1,061	15,745	3,050	26	1,206	135	123	820	201	955	324	440,356
2020 No Build	3,481,540	710	9,799	1,740	29	1,405	136	125	946	232	1,081	357	512,959
2020 Build	3,501,513	713	9,845	1,761	30	1,420	137	126	947	232	1,084	358	518,127
2040 No Build	4,613,823	570	7,145	1,078	41	1,934	176	163	1,259	309	1,435	472	706,025
2040 Build	4,683,730	579	7,247	1,102	41	1,984	179	167	1,263	310	1,443	477	724,338
Alternative Increase/(Decrease) Compared with Existing 2012													
Scenario	Daily VMT[a]	ROG	CO	NO_X	SO_X	CO_2	PM10[b]	PM2.5[b]	PM10 Dust	PM2.5 Dust	Total PM10	Total PM2.5	MTCO/yr
2020 Build vs. Existing	472,886	-348	-5,900	-1,289	4	213	2	3	126	31	128	34	77,771
2040 Build vs. Existing	1,655,103	-482	-8,498	-1,948	15	778	44	44	443	109	487	153	283,982
Alternative Increase/(Decrease) Compared with Respective No Build at 2020 and 2040													
Scenario	Daily VMT[a]	ROG	CO	NO_X	SO_X	CO_2	PM10[b]	PM2.5[b]	PM10 Dust	PM2.5 Dust	Total PM10	Total PM2.5	MTCO/yr
2020 Build vs. No Build	19,973	4	46	21	0	14	1	1	1	0	2	1	5,169
2040 Build vs. No Build	69,907	9	102	24	1	50	3	4	4	1	8	5	18,314
Percent change	Daily VMT[a]	ROG	CO	NO_X	SO_X	CO_2	PM10[b]	PM2.5[b]	PM10 Dust	PM2.5 Dust	Total PM10	Total PM2.5	MTCO/yr
2020 Build vs. Existing	15.6%	-32.8%	-37.5%	-42.3%	14.2%	17.7%	1.3%	2.5%	15.4%	15.4%	13.4%	10.5%	17.7%
2040 Build vs. Existing	54.6%	-45.5%	-54.0%	-63.9%	58.8%	64.5%	32.9%	36.1%	54.0%	54.0%	51.0%	47.2%	64.5%
Percent change	Daily VMT[a]	ROG	CO	NO_X	SO_X	CO_2	PM10[b]	PM2.5[b]	PM10 Dust	PM2.5 Dust	Total PM10	Total PM2.5	MTCO/yr
2020 Build vs. No Build	0.6%	0.5%	0.5%	1.2%	1.1%	1.0%	0.8%	0.7%	0.1%	0.1%	0.2%	0.3%	1.0%
2040 Build vs. No Build	1.5%	1.6%	1.4%	2.2%	2.1%	2.6%	1.9%	2.1%	0.4%	0.4%	0.5%	1.0%	2.6%

Title : SR-210 2012 Existing
Version : CT-EMFAC Version 4.1.0.0
Run Date : 29 December 2012 02:27 PM
Alternative Year : 2012
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
1514426			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0	.05	.36	3.65	6.67	10.82	18.11	8.6	10.85	14.03	15.81	10.83	.22	0	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
1514201			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0	0	0.06	3.11	3.46	9.24	13.78	9.08	2.85	4.42	7.59	25.56	20.85	0	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.574514	0.00	0.00	0.000000
10	0.377268	757.21	0.03	285.672234
15	0.255136	6,360.45	0.21	1,622.780843
20	0.186609	102,368.20	3.38	19,102.827452
25	0.149167	153,403.57	5.07	22,882.750147
30	0.124717	303,773.07	10.03	37,885.665422
35	0.108549	482,919.45	15.95	52,420.422987
40	0.100030	267,730.09	8.84	26,781.040583
45	0.097069	207,469.95	6.85	20,138.900528
50	0.098786	279,401.65	9.23	27,600.971594
55	0.107571	354,358.61	11.70	38,118.709660
60	0.122130	551,042.11	18.19	67,298.773065
65	0.144791	319,042.65	10.53	46,194.503714
70	0.164886	0.00	0.00	0.000000
75	0.197211	0.00	0.00	0.000000
Total		3,028,627.00	100.00	360,333.018230

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	4.835992	0.00	0.00	0.000000
10	4.058836	757.21	0.03	3,073.403384
15	3.498349	6,360.45	0.21	22,251.088590
20	3.085613	102,368.20	3.38	315,868.649015
25	2.777917	153,403.57	5.07	426,142.381630
30	2.540902	303,773.07	10.03	771,857.589929
35	2.359825	482,919.45	15.95	1,139,605.382601
40	2.229860	267,730.09	8.84	597,000.611352
45	2.147016	207,469.95	6.85	445,441.301096

50	2.117458	279,401.65	9.23	591,621.263241
55	2.152914	354,358.61	11.70	762,903.604954
60	2.278640	551,042.11	18.19	1,255,626.596721
65	2.539559	319,042.65	10.53	810,227.622271
70	2.884488	0.00	0.00	0.000000
75	3.487441	0.00	0.00	0.000000
Total		3,028,627.00	100.00	7,141,619.494784

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.842619	0.00	0.00	0.000000
10	0.668513	757.21	0.03	506.206734
15	0.553079	6,360.45	0.21	3,517.833648
20	0.491850	102,368.20	3.38	50,349.799219
25	0.460801	153,403.57	5.07	70,688.517907
30	0.438903	303,773.07	10.03	133,326.909811
35	0.425612	482,919.45	15.95	205,536.311421
40	0.421129	267,730.09	8.84	112,748.903724
45	0.422922	207,469.95	6.85	87,743.605982
50	0.433790	279,401.65	9.23	121,201.642621
55	0.453779	354,358.61	11.70	160,800.494099
60	0.485412	551,042.11	18.19	267,482.453379
65	0.531149	319,042.65	10.53	169,459.182221
70	0.575765	0.00	0.00	0.000000
75	0.640901	0.00	0.00	0.000000
Total		3,028,627.00	100.00	1,383,361.860767

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010624	0.00	0.00	0.000000
10	0.007883	757.21	0.03	5.969110
15	0.006107	6,360.45	0.21	38.843294
20	0.005215	102,368.20	3.38	533.850164
25	0.004352	153,403.57	5.07	667.612331
30	0.004411	303,773.07	10.03	1,339.942992
35	0.003364	482,919.45	15.95	1,624.541018
40	0.003391	267,730.09	8.84	907.872724
45	0.003416	207,469.95	6.85	708.717347
50	0.003391	279,401.65	9.23	947.451002
55	0.003391	354,358.61	11.70	1,201.630035
60	0.004442	551,042.11	18.19	2,447.729059
65	0.004435	319,042.65	10.53	1,414.954134
70	0.004336	0.00	0.00	0.000000
75	0.004221	0.00	0.00	0.000000
Total		3,028,627.00	100.00	11,839.113210

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,117.052481	0.00	0.00	0.000000
10	847.456183	757.21	0.03	641,704.838698
15	667.278508	6,360.45	0.21	4,244,194.388778
20	545.624528	102,368.20	3.38	55,854,600.861772

25	464.833749	153,403.57	5.07	71,307,155.995283
30	410.527918	303,773.07	10.03	124,707,324.165245
35	375.605777	482,919.45	15.95	181,387,333.893482
40	355.838104	267,730.09	8.84	95,268,566.470667
45	348.979251	207,469.95	6.85	72,402,707.581518
50	354.304364	279,401.65	9.23	98,993,224.612409
55	372.473750	354,358.61	11.70	131,989,279.007829
60	405.662667	551,042.11	18.19	223,537,212.539835
65	458.000385	319,042.65	10.53	146,121,654.562019
70	462.044542	0.00	0.00	0.000000
75	468.386541	0.00	0.00	0.000000
Total		3,028,627.00	100.00	1,206,454,958.917540

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.101113	0.00	0.00	0.000000
10	0.067754	757.21	0.03	51.304210
15	0.046367	6,360.45	0.21	294.915180
20	0.033556	102,368.20	3.38	3,435.067323
25	0.026108	153,403.57	5.07	4,005.060374
30	0.022148	303,773.07	10.03	6,727.965857
35	0.019361	482,919.45	15.95	9,349.803402
40	0.016841	267,730.09	8.84	4,508.842392
45	0.016922	207,469.95	6.85	3,510.806485
50	0.016129	279,401.65	9.23	4,506.469245
55	0.018103	354,358.61	11.70	6,414.953853
60	0.020293	551,042.11	18.19	11,182.297567
65	0.022762	319,042.65	10.53	7,262.048701
70	0.024819	0.00	0.00	0.000000
75	0.027240	0.00	0.00	0.000000
Total		3,028,627.00	100.00	61,249.534589

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.093982	0.00	0.00	0.000000
10	0.062340	757.21	0.03	47.204658
15	0.043146	6,360.45	0.21	274.428157
20	0.030845	102,368.20	3.38	3,157.547132
25	0.024230	153,403.57	5.07	3,716.968472
30	0.019982	303,773.07	10.03	6,069.993397
35	0.017068	482,919.45	15.95	8,242.469111
40	0.015653	267,730.09	8.84	4,190.779049
45	0.015739	207,469.95	6.85	3,265.369535
50	0.015013	279,401.65	9.23	4,194.657001
55	0.015949	354,358.61	11.70	5,651.665415
60	0.018290	551,042.11	18.19	10,078.560218
65	0.021137	319,042.65	10.53	6,743.604402
70	0.022272	0.00	0.00	0.000000
75	0.025094	0.00	0.00	0.000000
Total		3,028,627.00	100.00	55,633.246547

Pollutant Name : Diesel_PM

speed(mph) Emission Factor(grams/mile) VMT by Speed VMT-Speed Distribution (%) Emissions by Speed

5	0.026548	0.00	0.00	0.000000
10	0.018726	757.21	0.03	14.179571
15	0.012969	6,360.45	0.21	82.488731
20	0.009569	102,368.20	3.38	979.561307
25	0.008067	153,403.57	5.07	1,237.506590
30	0.006935	303,773.07	10.03	2,106.666210
35	0.006213	482,919.45	15.95	3,000.378520
40	0.005854	267,730.09	8.84	1,567.291928
45	0.005743	207,469.95	6.85	1,191.499920
50	0.006052	279,401.65	9.23	1,690.938798
55	0.006630	354,358.61	11.70	2,349.397561
60	0.007468	551,042.11	18.19	4,115.182488
65	0.008697	319,042.65	10.53	2,774.713890
70	0.010186	0.00	0.00	0.000000
75	0.011963	0.00	0.00	0.000000

Total		3,028,627.00	100.00	21,109.805513

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.123789	0.00	0.00	0.000000
10	0.070455	757.21	0.03	53.349442
15	0.035632	6,360.45	0.21	226.635704
20	0.020434	102,368.20	3.38	2,091.791801
25	0.016721	153,403.57	5.07	2,565.061074
30	0.013689	303,773.07	10.03	4,158.349495
35	0.011542	482,919.45	15.95	5,573.856250
40	0.010057	267,730.09	8.84	2,692.561483
45	0.009252	207,469.95	6.85	1,919.511973
50	0.009133	279,401.65	9.23	2,551.775288
55	0.009755	354,358.61	11.70	3,456.768206
60	0.010993	551,042.11	18.19	6,057.605931
65	0.012913	319,042.65	10.53	4,119.797684
70	0.015488	0.00	0.00	0.000000
75	0.018782	0.00	0.00	0.000000

Total		3,028,627.00	100.00	35,467.064330

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013745	0.00	0.00	0.000000
10	0.009117	757.21	0.03	6.903511
15	0.006257	6,360.45	0.21	39.797362
20	0.004628	102,368.20	3.38	473.760030
25	0.003705	153,403.57	5.07	568.360222
30	0.003117	303,773.07	10.03	946.860645
35	0.002746	482,919.45	15.95	1,326.096800
40	0.002545	267,730.09	8.84	681.373071
45	0.002480	207,469.95	6.85	514.525475
50	0.002545	279,401.65	9.23	711.077204
55	0.002769	354,358.61	11.70	981.218981
60	0.003146	551,042.11	18.19	1,733.578482
65	0.003788	319,042.65	10.53	1,208.533542
70	0.004369	0.00	0.00	0.000000
75	0.005287	0.00	0.00	0.000000

Total		3,028,627.00	100.00	9,192.085326

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000600	0.00	0.00	0.000000
10	0.000412	757.21	0.03	0.311972
15	0.000297	6,360.45	0.21	1.889055
20	0.000227	102,368.20	3.38	23.237581
25	0.000181	153,403.57	5.07	27.766046
30	0.000153	303,773.07	10.03	46.477279
35	0.000135	482,919.45	15.95	65.194125
40	0.000126	267,730.09	8.84	33.733991
45	0.000124	207,469.95	6.85	25.726274
50	0.000127	279,401.65	9.23	35.484010
55	0.000139	354,358.61	11.70	49.255846
60	0.000158	551,042.11	18.19	87.064654
65	0.000190	319,042.65	10.53	60.618103
70	0.000219	0.00	0.00	0.000000
75	0.000265	0.00	0.00	0.000000
Total		3,028,627.00	100.00	456.758935

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.011341	0.00	0.00	0.000000
10	0.006653	757.21	0.03	5.037738
15	0.003618	6,360.45	0.21	23.012123
20	0.002241	102,368.20	3.38	229.407136
25	0.001823	153,403.57	5.07	279.654706
30	0.001516	303,773.07	10.03	460.519967
35	0.001299	482,919.45	15.95	627.312361
40	0.001164	267,730.09	8.84	311.637821
45	0.001102	207,469.95	6.85	228.631884
50	0.001115	279,401.65	9.23	311.532842
55	0.001207	354,358.61	11.70	427.710838
60	0.001379	551,042.11	18.19	759.887072
65	0.001651	319,042.65	10.53	526.739408
70	0.001983	0.00	0.00	0.000000
75	0.002445	0.00	0.00	0.000000
Total		3,028,627.00	100.00	4,191.083897

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.026967	0.00	0.00	0.000000
10	0.016236	757.21	0.03	12.294110
15	0.009346	6,360.45	0.21	59.444805
20	0.006086	102,368.20	3.38	623.012866
25	0.004923	153,403.57	5.07	755.205769
30	0.004106	303,773.07	10.03	1,247.292207
35	0.003546	482,919.45	15.95	1,712.432357
40	0.003207	267,730.09	8.84	858.610388
45	0.003061	207,469.95	6.85	635.065515
50	0.003108	279,401.65	9.23	868.380334
55	0.003367	354,358.61	11.70	1,193.125428
60	0.003835	551,042.11	18.19	2,113.246497

65	0.004597	319,042.65	10.53	1,466.639042
70	0.005436	0.00	0.00	0.000000
75	0.006645	0.00	0.00	0.000000
Total		3,028,627.00	100.00	11,544.749320

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.002791	0.00	0.00	0.000000
10	0.001886	757.21	0.03	1.428104
15	0.001332	6,360.45	0.21	8.472125
20	0.001003	102,368.20	3.38	102.675305
25	0.000803	153,403.57	5.07	123.183066
30	0.000677	303,773.07	10.03	205.654365
35	0.000599	482,919.45	15.95	289.268748
40	0.000558	267,730.09	8.84	149.393388
45	0.000546	207,469.95	6.85	113.278592
50	0.000562	279,401.65	9.23	157.023728
55	0.000613	354,358.61	11.70	217.221826
60	0.000698	551,042.11	18.19	384.627394
65	0.000843	319,042.65	10.53	268.952950
70	0.000975	0.00	0.00	0.000000
75	0.001185	0.00	0.00	0.000000
Total		3,028,627.00	100.00	2,021.179592

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.037108	73,104.77	162,766.302813

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000367	73,104.77	1,609.766981

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	73,104.77	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	73,104.77	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	73,104.77	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000003	73,104.77	13.158858

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	523,099.321042	523.099321	0.576618298
CO	7,141,619.494784	7,141.619495	7.872287947
NOX	1,383,361.860767	1,383.361861	1.524895426
SO2	11,839.113210	11.839113	0.013050388
CO2	1,206,454,958.917540	1,206,454.958918	1,329.888947336
PM10	61,249.534589	61.249535	0.067516055
PM2.5	55,633.246547	55.633247	0.061325157
Diesel_PM	21,109.805513	21.109806	0.023269577
DEOG	35,467.064330	35.467064	0.039095746
BENZENE	10,801.852307	10.801852	0.011907004
ACROLEIN	456.758935	0.456759	0.000503491
ACETALDEHYDE	4,191.083897	4.191084	0.004619879
FORMALDEHYDE	11,544.749320	11.544749	0.012725908
BUTADIENE	2,034.338450	2.034338	0.002242474

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Title             :       SR-210 2020 No Build
Version           :       CT-EMFAC Version 4.1.0.0
Run Date          :       04 January 2013  05:52 PM
Alternative Year  :       2020
Season            :       Annual
Temperature       :       68F
Relative Humidity :       50%
Area              :       San Bernardino (SC) County

Peak User Input   :
                         Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                           1741499
                         VMT Distribution(%) by Speed(mph)
               (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %   .01   .12  .421   4.2 7.31412.19818.41210.455 8.46011.59714.16810.637 2.008     0     0
Offpeak User Input:
                         Total VMT        Volume (vph)     Road Length(mi)     Number of Hours
                           1740041
                         VMT Distribution(%) by Speed(mph)
               (mph)     5    10    15    20    25    30    35    40    45    50    55    60    65    70   >75
                   %     0 0.024 0.082 3.347 3.224 8.75812.864 9.681 3.244 4.481 7.48322.08624.726     0     0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.291054	174.15	0.01	50.687025
10	0.191156	2,507.41	0.07	479.306206
15	0.129901	8,758.54	0.25	1,137.743677
20	0.095813	131,382.13	3.77	12,588.116048
25	0.076565	183,472.16	5.27	14,047.545831
30	0.064886	364,820.84	10.48	23,671.764946
35	0.057447	544,483.67	15.64	31,278.953397
40	0.053400	350,527.09	10.07	18,718.146588
45	0.053032	203,777.75	5.85	10,806.741396
50	0.054085	279,932.88	8.04	15,140.169611
55	0.058897	376,942.85	10.83	22,200.802821
60	0.068555	569,548.70	16.36	39,045.411395
65	0.083144	465,211.84	13.36	38,679.573024
70	0.101468	0.00	0.00	0.000000
75	0.128514	0.00	0.00	0.000000
Total		3,481,540.00	100.00	227,844.961966

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	2.446284	174.15	0.01	426.020114
10	2.110261	2,507.41	0.07	5,291.286664
15	1.857300	8,758.54	0.25	16,267.244533
20	1.663533	131,382.13	3.77	218,558.509314
25	1.515270	183,472.16	5.27	278,009.857913
30	1.396033	364,820.84	10.48	509,301.930052
35	1.299414	544,483.67	15.64	707,509.703725
40	1.226202	350,527.09	10.07	429,817.018395

45	1.173705	203,777.75	5.85	239,174.958712
50	1.145821	279,932.88	8.04	320,752.968186
55	1.148186	376,942.85	10.83	432,800.498979
60	1.194034	569,548.70	16.36	680,060.517101
65	1.303967	465,211.84	13.36	606,620.884214
70	1.536438	0.00	0.00	0.000000
75	1.943482	0.00	0.00	0.000000
Total		3,481,540.00	100.00	4,444,591.397903

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.419451	174.15	0.01	73.047350
10	0.340396	2,507.41	0.07	853.511871
15	0.284027	8,758.54	0.25	2,487.663093
20	0.251590	131,382.13	3.77	33,054.430155
25	0.231699	183,472.16	5.27	42,510.315699
30	0.218663	364,820.84	10.48	79,772.819075
35	0.210535	544,483.67	15.64	114,632.869489
40	0.206153	350,527.09	10.07	72,262.211115
45	0.206694	203,777.75	5.85	42,119.637316
50	0.211748	279,932.88	8.04	59,275.226678
55	0.221887	376,942.85	10.83	83,638.717348
60	0.238525	569,548.70	16.36	135,851.604595
65	0.263654	465,211.84	13.36	122,654.961825
70	0.290741	0.00	0.00	0.000000
75	0.332079	0.00	0.00	0.000000
Total		3,481,540.00	100.00	789,187.015608

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010413	174.15	0.01	1.813423
10	0.007714	2,507.41	0.07	19.342150
15	0.005958	8,758.54	0.25	52.183408
20	0.005095	131,382.13	3.77	669.391954
25	0.004244	183,472.16	5.27	778.655842
30	0.004311	364,820.84	10.48	1,572.742636
35	0.003262	544,483.67	15.64	1,776.105732
40	0.003262	350,527.09	10.07	1,143.419366
45	0.003322	203,777.75	5.85	676.949670
50	0.003297	279,932.88	8.04	922.938693
55	0.003297	376,942.85	10.83	1,242.780564
60	0.004380	569,548.70	16.36	2,494.623323
65	0.004348	465,211.84	13.36	2,022.741070
70	0.004256	0.00	0.00	0.000000
75	0.004115	0.00	0.00	0.000000
Total		3,481,540.00	100.00	13,373.687831

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,122.264174	174.15	0.01	195,442.193676
10	851.423700	2,507.41	0.07	2,134,867.141681
15	670.272084	8,758.54	0.25	5,870,607.814497

20	547.941763	131,382.13	3.77	71,989,756.086840
25	466.942228	183,472.16	5.27	85,670,898.559348
30	412.470993	364,820.84	10.48	150,478,013.646929
35	377.419273	544,483.67	15.64	205,498,630.937062
40	357.561266	350,527.09	10.07	125,334,909.946125
45	350.649774	203,777.75	5.85	71,454,620.384766
50	355.966376	279,932.88	8.04	99,646,691.478409
55	374.174501	376,942.85	10.83	141,042,401.438531
60	407.458995	569,548.70	16.36	232,067,742.490572
65	459.965083	465,211.84	13.36	213,981,201.485067
70	464.435727	0.00	0.00	0.000000
75	471.426039	0.00	0.00	0.000000
Total		3,481,540.00	100.00	1,405,365,783.603500

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088936	174.15	0.01	15.488196
10	0.059006	2,507.41	0.07	147.952154
15	0.041042	8,758.54	0.25	359.468180
20	0.029967	131,382.13	3.77	3,937.128298
25	0.023965	183,472.16	5.27	4,396.910283
30	0.019503	364,820.84	10.48	7,115.100819
35	0.016791	544,483.67	15.64	9,142.425305
40	0.014722	350,527.09	10.07	5,160.459814
45	0.014583	203,777.75	5.85	2,971.690862
50	0.014153	279,932.88	8.04	3,961.889997
55	0.015561	376,942.85	10.83	5,865.607632
60	0.016570	569,548.70	16.36	9,437.422023
65	0.019561	465,211.84	13.36	9,100.008755
70	0.020170	0.00	0.00	0.000000
75	0.021660	0.00	0.00	0.000000
Total		3,481,540.00	100.00	61,611.552318

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.083336	174.15	0.01	14.512956
10	0.054998	2,507.41	0.07	137.902460
15	0.037679	8,758.54	0.25	330.013195
20	0.027498	131,382.13	3.77	3,612.745818
25	0.021298	183,472.16	5.27	3,907.590036
30	0.017950	364,820.84	10.48	6,548.534056
35	0.015123	544,483.67	15.64	8,234.226543
40	0.014326	350,527.09	10.07	5,021.651086
45	0.013025	203,777.75	5.85	2,654.205134
50	0.013703	279,932.88	8.04	3,835.920203
55	0.013991	376,942.85	10.83	5,273.807363
60	0.015063	569,548.70	16.36	8,579.112127
65	0.018183	465,211.84	13.36	8,458.946843
70	0.018948	0.00	0.00	0.000000
75	0.019422	0.00	0.00	0.000000
Total		3,481,540.00	100.00	56,609.167822

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010035	174.15	0.01	1.747594
10	0.007565	2,507.41	0.07	18.968546
15	0.005740	8,758.54	0.25	50.274045
20	0.004516	131,382.13	3.77	593.321700
25	0.003994	183,472.16	5.27	732.787802
30	0.003497	364,820.84	10.48	1,275.778473
35	0.003271	544,483.67	15.64	1,781.006085
40	0.003139	350,527.09	10.07	1,100.304534
45	0.003125	203,777.75	5.85	636.805455
50	0.003379	279,932.88	8.04	945.893189
55	0.003635	376,942.85	10.83	1,370.187246
60	0.003985	569,548.70	16.36	2,269.651585
65	0.004514	465,211.84	13.36	2,099.966235
70	0.005174	0.00	0.00	0.000000
75	0.005930	0.00	0.00	0.000000
Total		3,481,540.00	100.00	12,876.692490

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.062921	174.15	0.01	10.957686
10	0.035803	2,507.41	0.07	89.772752
15	0.018597	8,758.54	0.25	162.882650
20	0.011398	131,382.13	3.77	1,497.493521
25	0.009639	183,472.16	5.27	1,768.488138
30	0.008202	364,820.84	10.48	2,992.260520
35	0.007048	544,483.67	15.64	3,837.520907
40	0.006170	350,527.09	10.07	2,162.752143
45	0.005568	203,777.75	5.85	1,134.634487
50	0.005247	279,932.88	8.04	1,468.807802
55	0.005126	376,942.85	10.83	1,932.209030
60	0.005342	569,548.70	16.36	3,042.529176
65	0.005732	465,211.84	13.36	2,666.594253
70	0.006390	0.00	0.00	0.000000
75	0.007304	0.00	0.00	0.000000
Total		3,481,540.00	100.00	22,766.903064

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006382	174.15	0.01	1.111425
10	0.004221	2,507.41	0.07	10.583772
15	0.002900	8,758.54	0.25	25.399779
20	0.002164	131,382.13	3.77	284.310930
25	0.001767	183,472.16	5.27	324.195304
30	0.001509	364,820.84	10.48	550.514646
35	0.001342	544,483.67	15.64	730.697085
40	0.001273	350,527.09	10.07	446.220985
45	0.001261	203,777.75	5.85	256.963737
50	0.001322	279,932.88	8.04	370.071262
55	0.001466	376,942.85	10.83	552.598213
60	0.001714	569,548.70	16.36	976.206478
65	0.002114	465,211.84	13.36	983.457825
70	0.002618	0.00	0.00	0.000000
75	0.003435	0.00	0.00	0.000000

Total		3,481,540.00	100.00	5,512.331441

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000272	174.15	0.01	0.047369
10	0.000187	2,507.41	0.07	0.468885
15	0.000135	8,758.54	0.25	1.182403
20	0.000104	131,382.13	3.77	13.663742
25	0.000085	183,472.16	5.27	15.595133
30	0.000072	364,820.84	10.48	26.267100
35	0.000065	544,483.67	15.64	35.391439
40	0.000062	350,527.09	10.07	21.732680
45	0.000062	203,777.75	5.85	12.634220
50	0.000065	279,932.88	8.04	18.195637
55	0.000073	376,942.85	10.83	27.516828
60	0.000087	569,548.70	16.36	49.550737
65	0.000108	465,211.84	13.36	50.242878
70	0.000134	0.00	0.00	0.000000
75	0.000177	0.00	0.00	0.000000

Total		3,481,540.00	100.00	272.489052

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.005576	174.15	0.01	0.971060
10	0.003254	2,507.41	0.07	8.159108
15	0.001781	8,758.54	0.25	15.598968
20	0.001151	131,382.13	3.77	151.220832
25	0.000967	183,472.16	5.27	177.417577
30	0.000827	364,820.84	10.48	301.706834
35	0.000724	544,483.67	15.64	394.206177
40	0.000655	350,527.09	10.07	229.595244
45	0.000616	203,777.75	5.85	125.527091
50	0.000608	279,932.88	8.04	170.199189
55	0.000634	376,942.85	10.83	238.981765
60	0.000697	569,548.70	16.36	396.975447
65	0.000808	465,211.84	13.36	375.891165
70	0.000970	0.00	0.00	0.000000
75	0.001220	0.00	0.00	0.000000

Total		3,481,540.00	100.00	2,586.450455

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013152	174.15	0.01	2.290419
10	0.007875	2,507.41	0.07	19.745843
15	0.004548	8,758.54	0.25	39.833860
20	0.003053	131,382.13	3.77	401.109644
25	0.002542	183,472.16	5.27	466.386227
30	0.002172	364,820.84	10.48	792.390862
35	0.001907	544,483.67	15.64	1,038.330359
40	0.001747	350,527.09	10.07	612.370826
45	0.001665	203,777.75	5.85	339.289946
50	0.001672	279,932.88	8.04	468.047769
55	0.001776	376,942.85	10.83	669.450495

60	0.001991	569,548.70	16.36	1,133.971469
65	0.002353	465,211.84	13.36	1,094.643454
70	0.002848	0.00	0.00	0.000000
75	0.003624	0.00	0.00	0.000000
Total		3,481,540.00	100.00	7,077.861174

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001266	174.15	0.01	0.220474
10	0.000855	2,507.41	0.07	2.143834
15	0.000606	8,758.54	0.25	5.307678
20	0.000460	131,382.13	3.77	60.435780
25	0.000376	183,472.16	5.27	68.985532
30	0.000322	364,820.84	10.48	117.472310
35	0.000287	544,483.67	15.64	156.266813
40	0.000275	350,527.09	10.07	96.394950
45	0.000274	203,777.75	5.85	55.835102
50	0.000290	279,932.88	8.04	81.180534
55	0.000324	376,942.85	10.83	122.129482
60	0.000381	569,548.70	16.36	216.998056
65	0.000474	465,211.84	13.36	220.510411
70	0.000591	0.00	0.00	0.000000
75	0.000782	0.00	0.00	0.000000
Total		3,481,540.00	100.00	1,203.880957

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.023976	84,888.16	122,116.706530

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000248	84,888.16	1,263.135770

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	84,888.16	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	84,888.16	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	84,888.16	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000002	84,888.16	10.186579

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	349,961.668497	349.961668	0.385766706
CO	4,444,591.397903	4,444.591398	4.899323370
NOX	789,187.015608	789.187016	0.869929774
SO2	13,373.687831	13.373688	0.014741967
CO2	1,405,365,783.603500	1,405,365.783604	1,549.150599252
PM10	61,611.552318	61.611552	0.067915111
PM2.5	56,609.167822	56.609168	0.062400926
Diesel_PM	12,876.692490	12.876692	0.014194124
DEOG	22,766.903064	22.766903	0.025096215
BENZENE	6,775.467211	6.775467	0.007468674
ACROLEIN	272.489052	0.272489	0.000300368
ACETALDEHYDE	2,586.450455	2.586450	0.002851074
FORMALDEHYDE	7,077.861174	7.077861	0.007802006
BUTADIENE	1,214.067535	1.214068	0.001338280

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Title : SR-210 2020 Build
Version : CT-EMFAC Version 4.1.0.0
Run Date : 04 January 2013 05:57 PM
Alternative Year : 2020
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
1757079			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	.023	.122	.458	3.769	6.199	10.476	17.69	9.452	9.043	10.323	15.252	12.767	4.426		

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
1744434			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0	0.024	0.074	3.348	3.212	8.763	12.815	9.619	3.211	3.064	6.572	1.374	27.926	0	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.291054	404.13	0.01	117.623120
10	0.191156	2,562.30	0.07	489.799122
15	0.129901	9,338.30	0.27	1,213.054895
20	0.095813	124,627.96	3.56	11,940.978524
25	0.076565	164,952.55	4.71	12,629.591783
30	0.064886	336,936.35	9.62	21,862.451841
35	0.057447	534,376.49	15.26	30,698.326347
40	0.053400	333,876.21	9.54	17,828.989803
45	0.053032	214,906.43	6.14	11,396.917780
50	0.054085	234,832.72	6.71	12,700.927820
55	0.058897	382,599.00	10.93	22,533.933473
60	0.068555	597,181.60	17.05	40,939.784526
65	0.083144	564,918.96	16.13	46,969.621626
70	0.101468	0.00	0.00	0.000000
75	0.128514	0.00	0.00	0.000000
Total		3,501,513.00	100.00	231,322.000661

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	2.446284	404.13	0.01	988.612276
10	2.110261	2,562.30	0.07	5,407.122900
15	1.857300	9,338.30	0.27	17,344.030125
20	1.663533	124,627.96	3.56	207,322.720573
25	1.515270	164,952.55	4.71	249,947.646332
30	1.396033	336,936.35	9.62	470,374.259954
35	1.299414	534,376.49	15.26	694,376.295236
40	1.226202	333,876.21	9.54	409,399.680795

45	1.173705	214,906.43	6.14	252,236.751083
50	1.145821	234,832.72	6.71	269,076.265420
55	1.148186	382,599.00	10.93	439,294.818721
60	1.194034	597,181.60	17.05	713,055.133488
65	1.303967	564,918.96	16.13	736,635.675490
70	1.536438	0.00	0.00	0.000000
75	1.943482	0.00	0.00	0.000000
Total		3,501,513.00	100.00	4,465,459.012392

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.419451	404.13	0.01	169.511965
10	0.340396	2,562.30	0.07	872.196855
15	0.284027	9,338.30	0.27	2,652.330181
20	0.251590	124,627.96	3.56	31,355.147910
25	0.231699	164,952.55	4.71	38,219.340255
30	0.218663	336,936.35	9.62	73,675.512545
35	0.210535	534,376.49	15.26	112,504.954785
40	0.206153	333,876.21	9.54	68,829.583050
45	0.206694	214,906.43	6.14	44,419.869582
50	0.211748	234,832.72	6.71	49,725.359415
55	0.221887	382,599.00	10.93	84,893.744952
60	0.238525	597,181.60	17.05	142,442.740923
65	0.263654	564,918.96	16.13	148,943.142262
70	0.290741	0.00	0.00	0.000000
75	0.332079	0.00	0.00	0.000000
Total		3,501,513.00	100.00	798,703.434679

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010413	404.13	0.01	4.208187
10	0.007714	2,562.30	0.07	19.765586
15	0.005958	9,338.30	0.27	55.637609
20	0.005095	124,627.96	3.56	634.979445
25	0.004244	164,952.55	4.71	700.058611
30	0.004311	336,936.35	9.62	1,452.532594
35	0.003262	534,376.49	15.26	1,743.136118
40	0.003262	333,876.21	9.54	1,089.104209
45	0.003322	214,906.43	6.14	713.919159
50	0.003297	234,832.72	6.71	774.243488
55	0.003297	382,599.00	10.93	1,261.428912
60	0.004380	597,181.60	17.05	2,615.655404
65	0.004348	564,918.96	16.13	2,456.267618
70	0.004256	0.00	0.00	0.000000
75	0.004115	0.00	0.00	0.000000
Total		3,501,513.00	100.00	13,520.936940

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,122.264174	404.13	0.01	453,538.566895
10	851.423700	2,562.30	0.07	2,181,603.406279
15	670.272084	9,338.30	0.27	6,259,203.799428

20	547.941763	124,627.96	3.56	68,288,862.932460
25	466.942228	164,952.55	4.71	77,023,309.945868
30	412.470993	336,936.35	9.62	138,976,469.814619
35	377.419273	534,376.49	15.26	201,683,987.194414
40	357.561266	333,876.21	9.54	119,381,201.600649
45	350.649774	214,906.43	6.14	75,356,891.008958
50	355.966376	234,832.72	6.71	83,592,553.347604
55	374.174501	382,599.00	10.93	143,158,790.985722
60	407.458995	597,181.60	17.05	243,327,014.197704
65	459.965083	564,918.96	16.13	259,842,994.199635
70	464.435727	0.00	0.00	0.000000
75	471.426039	0.00	0.00	0.000000
Total		3,501,513.00	100.00	1,419,526,421.000240

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088936	404.13	0.01	35.941543
10	0.059006	2,562.30	0.07	151.191106
15	0.041042	9,338.30	0.27	383.262631
20	0.029967	124,627.96	3.56	3,734.726012
25	0.023965	164,952.55	4.71	3,953.087796
30	0.019503	336,936.35	9.62	6,571.269585
35	0.016791	534,376.49	15.26	8,972.715681
40	0.014722	333,876.21	9.54	4,915.325616
45	0.014583	214,906.43	6.14	3,133.980464
50	0.014153	234,832.72	6.71	3,323.587528
55	0.015561	382,599.00	10.93	5,953.623084
60	0.016570	597,181.60	17.05	9,895.299097
65	0.019561	564,918.96	16.13	11,050.379686
70	0.020170	0.00	0.00	0.000000
75	0.021660	0.00	0.00	0.000000
Total		3,501,513.00	100.00	62,074.389827

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.083336	404.13	0.01	33.678425
10	0.054998	2,562.30	0.07	140.921405
15	0.037679	9,338.30	0.27	351.857918
20	0.027498	124,627.96	3.56	3,427.019584
25	0.021298	164,952.55	4.71	3,513.159352
30	0.017950	336,936.35	9.62	6,048.007437
35	0.015123	534,376.49	15.26	8,081.375692
40	0.014326	333,876.21	9.54	4,783.110635
45	0.013025	214,906.43	6.14	2,799.156247
50	0.013703	234,832.72	6.71	3,217.912802
55	0.013991	382,599.00	10.93	5,352.942649
60	0.015063	597,181.60	17.05	8,995.346427
65	0.018183	564,918.96	16.13	10,271.921366
70	0.018948	0.00	0.00	0.000000
75	0.019422	0.00	0.00	0.000000
Total		3,501,513.00	100.00	57,016.409940

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010035	404.13	0.01	4.055426
10	0.007565	2,562.30	0.07	19.383804
15	0.005740	9,338.30	0.27	53.601859
20	0.004516	124,627.96	3.56	562.819858
25	0.003994	164,952.55	4.71	658.820474
30	0.003497	336,936.35	9.62	1,178.266407
35	0.003271	534,376.49	15.26	1,747.945506
40	0.003139	333,876.21	9.54	1,048.037434
45	0.003125	214,906.43	6.14	671.582593
50	0.003379	234,832.72	6.71	793.499771
55	0.003635	382,599.00	10.93	1,390.747375
60	0.003985	597,181.60	17.05	2,379.768672
65	0.004514	564,918.96	16.13	2,550.044165
70	0.005174	0.00	0.00	0.000000
75	0.005930	0.00	0.00	0.000000
Total		3,501,513.00	100.00	13,058.573344

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.062921	404.13	0.01	25.428149
10	0.035803	2,562.30	0.07	91.738046
15	0.018597	9,338.30	0.27	173.664421
20	0.011398	124,627.96	3.56	1,420.509463
25	0.009639	164,952.55	4.71	1,589.977603
30	0.008202	336,936.35	9.62	2,763.551922
35	0.007048	534,376.49	15.26	3,766.285517
40	0.006170	333,876.21	9.54	2,060.016238
45	0.005568	214,906.43	6.14	1,196.599001
50	0.005247	234,832.72	6.71	1,232.167297
55	0.005126	382,599.00	10.93	1,961.202489
60	0.005342	597,181.60	17.05	3,190.144102
65	0.005732	564,918.96	16.13	3,238.115452
70	0.006390	0.00	0.00	0.000000
75	0.007304	0.00	0.00	0.000000
Total		3,501,513.00	100.00	22,709.399700

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.006382	404.13	0.01	2.579146
10	0.004221	2,562.30	0.07	10.815471
15	0.002900	9,338.30	0.27	27.081079
20	0.002164	124,627.96	3.56	269.694901
25	0.001767	164,952.55	4.71	291.471151
30	0.001509	336,936.35	9.62	508.436948
35	0.001342	534,376.49	15.26	717.133253
40	0.001273	333,876.21	9.54	425.024420
45	0.001261	214,906.43	6.14	270.997008
50	0.001322	234,832.72	6.71	310.448860
55	0.001466	382,599.00	10.93	560.890138
60	0.001714	597,181.60	17.05	1,023.569261
65	0.002114	564,918.96	16.13	1,194.238672
70	0.002618	0.00	0.00	0.000000
75	0.003435	0.00	0.00	0.000000

Total		3,501,513.00	100.00	5,612.380306

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000272	404.13	0.01	0.109923
10	0.000187	2,562.30	0.07	0.479150
15	0.000135	9,338.30	0.27	1.260671
20	0.000104	124,627.96	3.56	12.961308
25	0.000085	164,952.55	4.71	14.020967
30	0.000072	336,936.35	9.62	24.259417
35	0.000065	534,376.49	15.26	34.734472
40	0.000062	333,876.21	9.54	20.700325
45	0.000062	214,906.43	6.14	13.324199
50	0.000065	234,832.72	6.71	15.264127
55	0.000073	382,599.00	10.93	27.929727
60	0.000087	597,181.60	17.05	51.954799
65	0.000108	564,918.96	16.13	61.011247
70	0.000134	0.00	0.00	0.000000
75	0.000177	0.00	0.00	0.000000

Total		3,501,513.00	100.00	278.010331

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.005576	404.13	0.01	2.253419
10	0.003254	2,562.30	0.07	8.337726
15	0.001781	9,338.30	0.27	16.631518
20	0.001151	124,627.96	3.56	143.446779
25	0.000967	164,952.55	4.71	159.509113
30	0.000827	336,936.35	9.62	278.646359
35	0.000724	534,376.49	15.26	386.888580
40	0.000655	333,876.21	9.54	218.688920
45	0.000616	214,906.43	6.14	132.382361
50	0.000608	234,832.72	6.71	142.778296
55	0.000634	382,599.00	10.93	242.567768
60	0.000697	597,181.60	17.05	416.235575
65	0.000808	564,918.96	16.13	456.454516
70	0.000970	0.00	0.00	0.000000
75	0.001220	0.00	0.00	0.000000

Total		3,501,513.00	100.00	2,604.820929

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.013152	404.13	0.01	5.315094
10	0.007875	2,562.30	0.07	20.178117
15	0.004548	9,338.30	0.27	42.470602
20	0.003053	124,627.96	3.56	380.489155
25	0.002542	164,952.55	4.71	419.309375
30	0.002172	336,936.35	9.62	731.825747
35	0.001907	534,376.49	15.26	1,019.055971
40	0.001747	333,876.21	9.54	583.281745
45	0.001665	214,906.43	6.14	357.819205
50	0.001672	234,832.72	6.71	392.640313
55	0.001776	382,599.00	10.93	679.495829

60	0.001991	597,181.60	17.05	1,188.988564
65	0.002353	564,918.96	16.13	1,329.254302
70	0.002848	0.00	0.00	0.000000
75	0.003624	0.00	0.00	0.000000
Total		3,501,513.00	100.00	7,150.124018

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.001266	404.13	0.01	0.511626
10	0.000855	2,562.30	0.07	2.190767
15	0.000606	9,338.30	0.27	5.659012
20	0.000460	124,627.96	3.56	57.328861
25	0.000376	164,952.55	4.71	62.022158
30	0.000322	336,936.35	9.62	108.493504
35	0.000287	534,376.49	15.26	153.366053
40	0.000275	333,876.21	9.54	91.815959
45	0.000274	214,906.43	6.14	58.884362
50	0.000290	234,832.72	6.71	68.101490
55	0.000324	382,599.00	10.93	123.962077
60	0.000381	597,181.60	17.05	227.526189
65	0.000474	564,918.96	16.13	267.771585
70	0.000591	0.00	0.00	0.000000
75	0.000782	0.00	0.00	0.000000
Total		3,501,513.00	100.00	1,227.633642

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.023976	83,707.91	120,418.853322

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000248	83,707.91	1,245.573725

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	83,707.91	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	83,707.91	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	83,707.91	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000002	83,707.91	10.044949

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	351,740.853983	351.740854	0.387727922
CO	4,465,459.012392	4,465.459012	4.922325978
NOX	798,703.434679	798.703435	0.880419830
SO2	13,520.936940	13.520937	0.014904282
CO2	1,419,526,421.000240	1,419,526.421000	1,564.760030025
PM10	62,074.389827	62.074390	0.068425302
PM2.5	57,016.409940	57.016410	0.062849834
Diesel_PM	13,058.573344	13.058573	0.014394613
DEOG	22,709.399700	22.709400	0.025032828
BENZENE	6,857.954031	6.857954	0.007559600
ACROLEIN	278.010331	0.278010	0.000306454
ACETALDEHYDE	2,604.820929	2.604821	0.002871324
FORMALDEHYDE	7,150.124018	7.150124	0.007881663
BUTADIENE	1,237.678591	1.237679	0.001364307

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Title : SR-210 2040 No Build
Version : CT-EMFAC Version 4.1.0.0
Run Date : 29 December 2012 02:45 PM
Alternative Year : 2040
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
2309182			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	.03	.23	.52	5.1	8.37	14.46	18.9	13.49	4.57	7.6	11.48	10.31	4.94	0	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
2304641			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0	0.06	.12	3.73	2.84	7.97	11.36	10.67	3.89	4.57	7.31	16.38	31.1	0	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.166165	692.75	0.02	115.111568
10	0.107428	6,693.90	0.15	719.112633
15	0.071303	14,773.32	0.32	1,053.381722
20	0.052238	203,731.39	4.42	10,642.520419
25	0.042702	258,730.34	5.61	11,048.302885
30	0.036966	517,587.60	11.22	19,133.143403
35	0.032804	698,242.62	15.13	22,905.150762
40	0.030346	557,413.85	12.08	16,915.280586
45	0.031135	195,180.15	4.23	6,076.934042
50	0.032541	280,819.93	6.09	9,138.161202
55	0.035778	433,563.35	9.40	15,512.029561
60	0.040962	615,576.86	13.34	25,215.259339
65	0.050399	830,816.94	18.01	41,872.343050
70	0.062411	0.00	0.00	0.000000
75	0.082562	0.00	0.00	0.000000
Total		4,613,823.00	100.00	180,346.731172

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.265977	692.75	0.02	877.011390
10	1.101853	6,693.90	0.15	7,375.697323
15	0.976672	14,773.32	0.32	14,428.683694
20	0.883159	203,731.39	4.42	179,927.211809
25	0.811474	258,730.34	5.61	209,952.942136
30	0.752294	517,587.60	11.22	389,378.049641
35	0.703636	698,242.62	15.13	491,308.641070
40	0.666457	557,413.85	12.08	371,492.359897

45	0.638924	195,180.15	4.23	124,705.283628
50	0.625168	280,819.93	6.09	175,559.631310
55	0.628792	433,563.35	9.40	272,621.166413
60	0.655768	615,576.86	13.34	403,675.606328
65	0.721449	830,816.94	18.01	599,392.051845
70	0.872868	0.00	0.00	0.000000
75	1.139096	0.00	0.00	0.000000
Total		4,613,823.00	100.00	3,240,694.336484

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.215359	692.75	0.02	149.190938
10	0.174321	6,693.90	0.15	1,166.887900
15	0.144756	14,773.32	0.32	2,138.526073
20	0.125409	203,731.39	4.42	25,549.750052
25	0.115238	258,730.34	5.61	29,815.566667
30	0.107442	517,587.60	11.22	55,610.647446
35	0.101954	698,242.62	15.13	71,188.627631
40	0.097716	557,413.85	12.08	54,468.251425
45	0.095925	195,180.15	4.23	18,722.656109
50	0.096385	280,819.93	6.09	27,066.828539
55	0.100330	433,563.35	9.40	43,499.410976
60	0.105852	615,576.86	13.34	65,160.041785
65	0.113767	830,816.94	18.01	94,519.551018
70	0.123636	0.00	0.00	0.000000
75	0.138520	0.00	0.00	0.000000
Total		4,613,823.00	100.00	489,055.936557

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010907	692.75	0.02	7.555874
10	0.008361	6,693.90	0.15	55.967725
15	0.006702	14,773.32	0.32	99.010761
20	0.005916	203,731.39	4.42	1,205.274911
25	0.005110	258,730.34	5.61	1,322.112026
30	0.003971	517,587.60	11.22	2,055.340379
35	0.004154	698,242.62	15.13	2,900.499825
40	0.002920	557,413.85	12.08	1,627.648432
45	0.003007	195,180.15	4.23	586.906718
50	0.002980	280,819.93	6.09	836.843379
55	0.004213	433,563.35	9.40	1,826.602396
60	0.004091	615,576.86	13.34	2,518.324934
65	0.004056	830,816.94	18.01	3,369.793516
70	0.005167	0.00	0.00	0.000000
75	0.004993	0.00	0.00	0.000000
Total		4,613,823.00	100.00	18,411.880877

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,149.207960	692.75	0.02	796,119.100647
10	871.977395	6,693.90	0.15	5,836,932.274718
15	686.267617	14,773.32	0.32	10,138,448.092001

20	560.848863	203,731.39	4.42	114,262,519.168013
25	478.443454	258,730.34	5.61	123,787,836.471619
30	422.948574	517,587.60	11.22	218,912,939.412530
35	387.165049	698,242.62	15.13	270,335,136.482662
40	366.808606	557,413.85	12.08	204,464,195.999763
45	359.609401	195,180.15	4.23	70,188,617.655692
50	364.836248	280,819.93	6.09	102,453,288.056027
55	383.163290	433,563.35	9.40	166,125,559.877636
60	416.800741	615,576.86	13.34	256,572,891.390453
65	469.946202	830,816.94	18.01	390,439,266.356165
70	475.280876	0.00	0.00	0.000000
75	483.615039	0.00	0.00	0.000000
Total		4,613,823.00	100.00	1,934,313,750.337930

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088790	692.75	0.02	61.509681
10	0.058556	6,693.90	0.15	391.968196
15	0.040048	14,773.32	0.32	591.641743
20	0.029635	203,731.39	4.42	6,037.579781
25	0.022946	258,730.34	5.61	5,936.826331
30	0.017909	517,587.60	11.22	9,269.476416
35	0.015973	698,242.62	15.13	11,153.029299
40	0.014814	557,413.85	12.08	8,257.528722
45	0.013435	195,180.15	4.23	2,622.245346
50	0.014059	280,819.93	6.09	3,948.047335
55	0.014389	433,563.35	9.40	6,238.543053
60	0.015611	615,576.86	13.34	9,609.770361
65	0.018982	830,816.94	18.01	15,770.567189
70	0.018877	0.00	0.00	0.000000
75	0.019757	0.00	0.00	0.000000
Total		4,613,823.00	100.00	79,888.733455

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.082353	692.75	0.02	57.050420
10	0.053870	6,693.90	0.15	360.600565
15	0.037508	14,773.32	0.32	554.117522
20	0.026841	203,731.39	4.42	5,468.354274
25	0.021279	258,730.34	5.61	5,505.522858
30	0.017384	517,587.60	11.22	8,997.742924
35	0.014258	698,242.62	15.13	9,955.543213
40	0.013091	557,413.85	12.08	7,297.104665
45	0.012867	195,180.15	4.23	2,511.383020
50	0.012281	280,819.93	6.09	3,448.749508
55	0.013925	433,563.35	9.40	6,037.369658
60	0.015329	615,576.86	13.34	9,436.177687
65	0.017463	830,816.94	18.01	14,508.556255
70	0.017457	0.00	0.00	0.000000
75	0.018493	0.00	0.00	0.000000
Total		4,613,823.00	100.00	74,138.272567

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.004281	692.75	0.02	2.965682
10	0.003633	6,693.90	0.15	24.318950
15	0.003005	14,773.32	0.32	44.393813
20	0.002610	203,731.39	4.42	531.738931
25	0.002370	258,730.34	5.61	613.190901
30	0.002173	517,587.60	11.22	1,124.717865
35	0.002121	698,242.62	15.13	1,480.972588
40	0.002196	557,413.85	12.08	1,224.080807
45	0.002214	195,180.15	4.23	432.128857
50	0.002414	280,819.93	6.09	677.899301
55	0.002665	433,563.35	9.40	1,155.446330
60	0.002885	615,576.86	13.34	1,775.939241
65	0.003228	830,816.94	18.01	2,681.877088
70	0.003753	0.00	0.00	0.000000
75	0.004129	0.00	0.00	0.000000

Total		4,613,823.00	100.00	11,769.670355

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.050635	692.75	0.02	35.077629
10	0.028471	6,693.90	0.15	190.582118
15	0.014466	14,773.32	0.32	213.710783
20	0.009061	203,731.39	4.42	1,846.010137
25	0.007736	258,730.34	5.61	2,001.537893
30	0.006790	517,587.60	11.22	3,514.419837
35	0.005947	698,242.62	15.13	4,152.448835
40	0.005266	557,413.85	12.08	2,935.341316
45	0.004724	195,180.15	4.23	922.031039
50	0.004256	280,819.93	6.09	1,195.169604
55	0.003959	433,563.35	9.40	1,716.477305
60	0.003799	615,576.86	13.34	2,338.576491
65	0.003749	830,816.94	18.01	3,114.732715
70	0.003868	0.00	0.00	0.000000
75	0.004125	0.00	0.00	0.000000

Total		4,613,823.00	100.00	24,176.115703

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.003779	692.75	0.02	2.617920
10	0.002471	6,693.90	0.15	16.540635
15	0.001673	14,773.32	0.32	24.715757
20	0.001256	203,731.39	4.42	255.886627
25	0.001030	258,730.34	5.61	266.492248
30	0.000897	517,587.60	11.22	464.276082
35	0.000813	698,242.62	15.13	567.671246
40	0.000781	557,413.85	12.08	435.340214
45	0.000780	195,180.15	4.23	152.240519
50	0.000830	280,819.93	6.09	233.080538
55	0.000931	433,563.35	9.40	403.647480
60	0.001104	615,576.86	13.34	679.596853
65	0.001374	830,816.94	18.01	1,141.542478
70	0.001748	0.00	0.00	0.000000
75	0.002357	0.00	0.00	0.000000

Total		4,613,823.00	100.00	4,643.648597

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000150	692.75	0.02	0.103913
10	0.000103	6,693.90	0.15	0.689472
15	0.000075	14,773.32	0.32	1.107999
20	0.000058	203,731.39	4.42	11.816421
25	0.000047	258,730.34	5.61	12.160326
30	0.000041	517,587.60	11.22	21.221092
35	0.000038	698,242.62	15.13	26.533219
40	0.000037	557,413.85	12.08	20.624312
45	0.000037	195,180.15	4.23	7.221666
50	0.000040	280,819.93	6.09	11.232797
55	0.000046	433,563.35	9.40	19.943914
60	0.000056	615,576.86	13.34	34.472304
65	0.000070	830,816.94	18.01	58.157186
70	0.000090	0.00	0.00	0.000000
75	0.000123	0.00	0.00	0.000000

Total		4,613,823.00	100.00	225.284621

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.004103	692.75	0.02	2.842372
10	0.002354	6,693.90	0.15	15.757448
15	0.001261	14,773.32	0.32	18.629151
20	0.000818	203,731.39	4.42	166.652278
25	0.000703	258,730.34	5.61	181.887427
30	0.000614	517,587.60	11.22	317.798789
35	0.000544	698,242.62	15.13	379.843983
40	0.000494	557,413.85	12.08	275.362440
45	0.000458	195,180.15	4.23	89.392510
50	0.000443	280,819.93	6.09	124.403227
55	0.000445	433,563.35	9.40	192.935691
60	0.000471	615,576.86	13.34	289.936701
65	0.000527	830,816.94	18.01	437.840528
70	0.000618	0.00	0.00	0.000000
75	0.000772	0.00	0.00	0.000000

Total		4,613,823.00	100.00	2,493.282547

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.009286	692.75	0.02	6.432919
10	0.005448	6,693.90	0.15	36.468385
15	0.003055	14,773.32	0.32	45.132479
20	0.002048	203,731.39	4.42	417.241889
25	0.001739	258,730.34	5.61	449.932057
30	0.001517	517,587.60	11.22	785.180397
35	0.001350	698,242.62	15.13	942.627531
40	0.001241	557,413.85	12.08	691.750584
45	0.001172	195,180.15	4.23	228.751138
50	0.001160	280,819.93	6.09	325.751114
55	0.001202	433,563.35	9.40	521.143148

60	0.001317	615,576.86	13.34	810.714725
65	0.001525	830,816.94	18.01	1,266.995836
70	0.001837	0.00	0.00	0.000000
75	0.002354	0.00	0.00	0.000000
Total		4,613,823.00	100.00	6,528.122202

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000726	692.75	0.02	0.502940
10	0.000489	6,693.90	0.15	3.273319
15	0.000345	14,773.32	0.32	5.096794
20	0.000264	203,731.39	4.42	53.785087
25	0.000216	258,730.34	5.61	55.885753
30	0.000189	517,587.60	11.22	97.824057
35	0.000172	698,242.62	15.13	120.097730
40	0.000167	557,413.85	12.08	93.088112
45	0.000169	195,180.15	4.23	32.985446
50	0.000182	280,819.93	6.09	51.109226
55	0.000206	433,563.35	9.40	89.314050
60	0.000247	615,576.86	13.34	152.047484
65	0.000311	830,816.94	18.01	258.384069
70	0.000399	0.00	0.00	0.000000
75	0.000543	0.00	0.00	0.000000
Total		4,613,823.00	100.00	1,013.394068

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.014649	114,344.79	100,502.206250

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000150	114,344.79	1,029.103074

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	114,344.79	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	114,344.79	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	114,344.79	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000001	114,344.79	6.860687

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	280,848.937422	280.848937	0.309582960
CO	3,240,694.336484	3,240.694336	3.572254022
NOX	489,055.936557	489.055937	0.539091891
SO2	18,411.880877	18.411881	0.020295625
CO2	1,934,313,750.337930	1,934,313.750338	2,132.215925874
PM10	79,888.733455	79.888733	0.088062255
PM2.5	74,138.272567	74.138273	0.081723456
Diesel_PM	11,769.670355	11.769670	0.012973841
DEOG	24,176.115703	24.176116	0.026649606
BENZENE	5,672.751672	5.672752	0.006253138
ACROLEIN	225.284621	0.225285	0.000248334
ACETALDEHYDE	2,493.282547	2.493283	0.002748374
FORMALDEHYDE	6,528.122202	6.528122	0.007196023
BUTADIENE	1,020.254755	1.020255	0.001124638

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Title : SR-210 2040 Build
Version : CT-EMFAC Version 4.1.0.0
Run Date : 29 December 2012 02:48 PM
Alternative Year : 2040
Season : Annual
Temperature : 68F
Relative Humidity : 50%
Area : San Bernardino (SC) County

Peak User Input :

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
2363714			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	.06	.24	.61	3.96	5.44	9.93	17.01	10.81	6.17	4.38	14.36	15.86	11.17	0	0

Offpeak User Input:

Total VMT	Volume (vph)	Road Length(mi)	Number of Hours
2320016			

VMT Distribution(%) by Speed(mph)

(mph)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	>75
%	0	0.06	.10	3.73	2.81	7.99	11.24	10.5	3.80	0.85	4.91	14.54	39.47	0	0

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Running Exhaust Emissions (grams)

Pollutant Name : TOG_exh

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.166165	1,418.23	0.03	235.659922
10	0.107428	7,064.92	0.15	758.970570
15	0.071303	16,738.67	0.36	1,193.517487
20	0.052238	180,139.67	3.85	9,410.136144
25	0.042702	193,778.49	4.14	8,274.729131
30	0.036966	420,086.08	8.97	15,528.901982
35	0.032804	662,837.55	14.15	21,743.722984
40	0.030346	499,119.16	10.66	15,146.270133
45	0.031135	234,001.76	5.00	7,285.644854
50	0.032541	123,250.81	2.63	4,010.704582
55	0.035778	453,342.12	9.68	16,219.674226
60	0.040962	712,215.37	15.21	29,173.765855
65	0.050399	1,179,737.17	25.19	59,457.573580
70	0.062411	0.00	0.00	0.000000
75	0.082562	0.00	0.00	0.000000
Total		4,683,730.00	100.00	188,439.271449

Pollutant Name : CO

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1.265977	1,418.23	0.03	1,795.444535
10	1.101853	7,064.92	0.15	7,784.506823
15	0.976672	16,738.67	0.36	16,348.191674
20	0.883159	180,139.67	3.85	159,091.971877
25	0.811474	193,778.49	4.14	157,246.207368
30	0.752294	420,086.08	8.97	316,028.236414
35	0.703636	662,837.55	14.15	466,396.362191
40	0.666457	499,119.16	10.66	332,641.460282

45	0.638924	234,001.76	5.00	149,509.341656
50	0.625168	123,250.81	2.63	77,052.461886
55	0.628792	453,342.12	9.68	285,057.895804
60	0.655768	712,215.37	15.21	467,048.046656
65	0.721449	1,179,737.17	25.19	851,120.200838
70	0.872868	0.00	0.00	0.000000
75	1.139096	0.00	0.00	0.000000
Total		4,683,730.00	100.00	3,287,120.328004

Pollutant Name : NOX

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.215359	1,418.23	0.03	305.428250
10	0.174321	7,064.92	0.15	1,231.564477
15	0.144756	16,738.67	0.36	2,423.023117
20	0.125409	180,139.67	3.85	22,591.136026
25	0.115238	193,778.49	4.14	22,330.645769
30	0.107442	420,086.08	8.97	45,134.888457
35	0.101954	662,837.55	14.15	67,578.939552
40	0.097716	499,119.16	10.66	48,771.928171
45	0.095925	234,001.76	5.00	22,446.619001
50	0.096385	123,250.81	2.63	11,879.529245
55	0.100330	453,342.12	9.68	45,483.814498
60	0.105852	712,215.37	15.21	75,389.421007
65	0.113767	1,179,737.17	25.19	134,215.158506
70	0.123636	0.00	0.00	0.000000
75	0.138520	0.00	0.00	0.000000
Total		4,683,730.00	100.00	499,782.096075

Pollutant Name : SO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.010907	1,418.23	0.03	15.468617
10	0.008361	7,064.92	0.15	59.069823
15	0.006702	16,738.67	0.36	112.182576
20	0.005916	180,139.67	3.85	1,065.706295
25	0.005110	193,778.49	4.14	990.208090
30	0.003971	420,086.08	8.97	1,668.161818
35	0.004154	662,837.55	14.15	2,753.427182
40	0.002920	499,119.16	10.66	1,457.427957
45	0.003007	234,001.76	5.00	703.643298
50	0.002980	123,250.81	2.63	367.287411
55	0.004213	453,342.12	9.68	1,909.930335
60	0.004091	712,215.37	15.21	2,913.673066
65	0.004056	1,179,737.17	25.19	4,785.013957
70	0.005167	0.00	0.00	0.000000
75	0.004993	0.00	0.00	0.000000
Total		4,683,730.00	100.00	18,801.200425

Pollutant Name : CO2

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	1,149.207960	1,418.23	0.03	1,629,839.366378
10	871.977395	7,064.92	0.15	6,160,453.327811
15	686.267617	16,738.67	0.36	11,487,208.133424

20	560.848863	180,139.67	3.85	101,031,129.773714
25	478.443454	193,778.49	4.14	92,712,050.640637
30	422.948574	420,086.08	8.97	177,674,807.901122
35	387.165049	662,837.55	14.15	256,627,532.447357
40	366.808606	499,119.16	10.66	183,081,204.554640
45	359.609401	234,001.76	5.00	84,149,233.393843
50	364.836248	123,250.81	2.63	44,966,362.791492
55	383.163290	453,342.12	9.68	173,704,056.662122
60	416.800741	712,215.37	15.21	296,851,892.633827
65	469.946202	1,179,737.17	25.19	554,413,001.929782
70	475.280876	0.00	0.00	0.000000
75	483.615039	0.00	0.00	0.000000

Total		4,683,730.00	100.00	1,984,488,773.556150

Pollutant Name : PM10

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.088790	1,418.23	0.03	125.924500
10	0.058556	7,064.92	0.15	413.693643
15	0.040048	16,738.67	0.36	670.350312
20	0.029635	180,139.67	3.85	5,338.439156
25	0.022946	193,778.49	4.14	4,446.441259
30	0.017909	420,086.08	8.97	7,523.321582
35	0.015973	662,837.55	14.15	10,587.504183
40	0.014814	499,119.16	10.66	7,393.951287
45	0.013435	234,001.76	5.00	3,143.813670
50	0.014059	123,250.81	2.63	1,732.783127
55	0.014389	453,342.12	9.68	6,523.139707
60	0.015611	712,215.37	15.21	11,118.394091
65	0.018982	1,179,737.17	25.19	22,393.770942
70	0.018877	0.00	0.00	0.000000
75	0.019757	0.00	0.00	0.000000

Total		4,683,730.00	100.00	81,411.527458

Pollutant Name : PM2.5

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.082353	1,418.23	0.03	116.795363
10	0.053870	7,064.92	0.15	380.587413
15	0.037508	16,738.67	0.36	627.834087
20	0.026841	180,139.67	3.85	4,835.128915
25	0.021279	193,778.49	4.14	4,123.412514
30	0.017384	420,086.08	8.97	7,302.776390
35	0.014258	662,837.55	14.15	9,450.737785
40	0.013091	499,119.16	10.66	6,533.968968
45	0.012867	234,001.76	5.00	3,010.900669
50	0.012281	123,250.81	2.63	1,513.643188
55	0.013925	453,342.12	9.68	6,312.788965
60	0.015329	712,215.37	15.21	10,917.549358
65	0.017463	1,179,737.17	25.19	20,601.750182
70	0.017457	0.00	0.00	0.000000
75	0.018493	0.00	0.00	0.000000

Total		4,683,730.00	100.00	75,727.873798

Pollutant Name : Diesel_PM

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.004281	1,418.23	0.03	6.071436
10	0.003633	7,064.92	0.15	25.666866
15	0.003005	16,738.67	0.36	50.299708
20	0.002610	180,139.67	3.85	470.164542
25	0.002370	193,778.49	4.14	459.255024
30	0.002173	420,086.08	8.97	912.847049
35	0.002121	662,837.55	14.15	1,405.878443
40	0.002196	499,119.16	10.66	1,096.065683
45	0.002214	234,001.76	5.00	518.079901
50	0.002414	123,250.81	2.63	297.527453
55	0.002665	453,342.12	9.68	1,208.156739
60	0.002885	712,215.37	15.21	2,054.741333
65	0.003228	1,179,737.17	25.19	3,808.191582
70	0.003753	0.00	0.00	0.000000
75	0.004129	0.00	0.00	0.000000
Total		4,683,730.00	100.00	12,312.945758

Pollutant Name : DEOG

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.050635	1,418.23	0.03	71.811995
10	0.028471	7,064.92	0.15	201.145428
15	0.014466	16,738.67	0.36	242.141620
20	0.009061	180,139.67	3.85	1,632.245561
25	0.007736	193,778.49	4.14	1,499.070408
30	0.006790	420,086.08	8.97	2,852.384474
35	0.005947	662,837.55	14.15	3,941.894909
40	0.005266	499,119.16	10.66	2,628.361514
45	0.004724	234,001.76	5.00	1,105.424323
50	0.004256	123,250.81	2.63	524.555444
55	0.003959	453,342.12	9.68	1,794.781437
60	0.003799	712,215.37	15.21	2,705.706178
65	0.003749	1,179,737.17	25.19	4,422.834647
70	0.003868	0.00	0.00	0.000000
75	0.004125	0.00	0.00	0.000000
Total		4,683,730.00	100.00	23,622.357938

Pollutant Name : BENZENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.003779	1,418.23	0.03	5.359485
10	0.002471	7,064.92	0.15	17.457425
15	0.001673	16,738.67	0.36	28.003797
20	0.001256	180,139.67	3.85	226.255427
25	0.001030	193,778.49	4.14	199.591846
30	0.000897	420,086.08	8.97	376.817213
35	0.000813	662,837.55	14.15	538.886928
40	0.000781	499,119.16	10.66	389.812067
45	0.000780	234,001.76	5.00	182.521374
50	0.000830	123,250.81	2.63	102.298172
55	0.000931	453,342.12	9.68	422.061510
60	0.001104	712,215.37	15.21	786.285765
65	0.001374	1,179,737.17	25.19	1,620.958870
70	0.001748	0.00	0.00	0.000000
75	0.002357	0.00	0.00	0.000000

Total		4,683,730.00	100.00	4,896.309879

Pollutant Name : ACROLEIN

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000150	1,418.23	0.03	0.212734
10	0.000103	7,064.92	0.15	0.727687
15	0.000075	16,738.67	0.36	1.255400
20	0.000058	180,139.67	3.85	10.448101
25	0.000047	193,778.49	4.14	9.107589
30	0.000041	420,086.08	8.97	17.223529
35	0.000038	662,837.55	14.15	25.187827
40	0.000037	499,119.16	10.66	18.467409
45	0.000037	234,001.76	5.00	8.658065
50	0.000040	123,250.81	2.63	4.930032
55	0.000046	453,342.12	9.68	20.853737
60	0.000056	712,215.37	15.21	39.884061
65	0.000070	1,179,737.17	25.19	82.581602
70	0.000090	0.00	0.00	0.000000
75	0.000123	0.00	0.00	0.000000
Total		4,683,730.00	100.00	239.537774

Pollutant Name : ACETALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.004103	1,418.23	0.03	5.818991
10	0.002354	7,064.92	0.15	16.630829
15	0.001261	16,738.67	0.36	21.107465
20	0.000818	180,139.67	3.85	147.354251
25	0.000703	193,778.49	4.14	136.226279
30	0.000614	420,086.08	8.97	257.932852
35	0.000544	662,837.55	14.15	360.583627
40	0.000494	499,119.16	10.66	246.564867
45	0.000458	234,001.76	5.00	107.172807
50	0.000443	123,250.81	2.63	54.600108
55	0.000445	453,342.12	9.68	201.737242
60	0.000471	712,215.37	15.21	335.453438
65	0.000527	1,179,737.17	25.19	621.721488
70	0.000618	0.00	0.00	0.000000
75	0.000772	0.00	0.00	0.000000
Total		4,683,730.00	100.00	2,512.904244

Pollutant Name : FORMALDEHYDE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.009286	1,418.23	0.03	13.169669
10	0.005448	7,064.92	0.15	38.489702
15	0.003055	16,738.67	0.36	51.136641
20	0.002048	180,139.67	3.85	368.926047
25	0.001739	193,778.49	4.14	336.980796
30	0.001517	420,086.08	8.97	637.270581
35	0.001350	662,837.55	14.15	894.830692
40	0.001241	499,119.16	10.66	619.406882
45	0.001172	234,001.76	5.00	274.250065
50	0.001160	123,250.81	2.63	142.970939
55	0.001202	453,342.12	9.68	544.917223

60	0.001317	712,215.37	15.21	937.987638
65	0.001525	1,179,737.17	25.19	1,799.099183
70	0.001837	0.00	0.00	0.000000
75	0.002354	0.00	0.00	0.000000
Total		4,683,730.00	100.00	6,659.436057

Pollutant Name : BUTADIENE

speed(mph)	Emission Factor(grams/mile)	VMT by Speed	VMT-Speed Distribution (%)	Emissions by Speed
5	0.000726	1,418.23	0.03	1.029634
10	0.000489	7,064.92	0.15	3.454747
15	0.000345	16,738.67	0.36	5.774842
20	0.000264	180,139.67	3.85	47.556873
25	0.000216	193,778.49	4.14	41.856154
30	0.000189	420,086.08	8.97	79.396269
35	0.000172	662,837.55	14.15	114.008059
40	0.000167	499,119.16	10.66	83.352900
45	0.000169	234,001.76	5.00	39.546298
50	0.000182	123,250.81	2.63	22.431647
55	0.000206	453,342.12	9.68	93.388476
60	0.000247	712,215.37	15.21	175.917196
65	0.000311	1,179,737.17	25.19	366.898260
70	0.000399	0.00	0.00	0.000000
75	0.000543	0.00	0.00	0.000000
Total		4,683,730.00	100.00	1,074.611354

Idling Emissions (grams) (Currently NOT Available)

Evaporative Running Loss Emissions (grams)

Pollutant Name : TOG_los

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.014649	110,210.93	96,868.798937

Pollutant Name : BENZENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000150	110,210.93	991.898412

Pollutant Name : ACROLEIN

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	110,210.93	0.000000

Pollutant Name : ACETALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	110,210.93	0.000000

Pollutant Name : FORMALDEHYDE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000000	110,210.93	0.000000

Pollutant Name : BUTADIENE

Emission Factor(grams/min)	total running time(hrs)	Emissions
0.000001	110,210.93	6.612656

Total Emissions

Pollutant Name	Total Emissions (grams)	Total Emissions (Kilograms)	Total Emissions (US Tons)
TOG	285,308.070386	285.308070	0.314498313
CO	3,287,120.328004	3,287.120328	3.623429918
NOX	499,782.096075	499.782096	0.550915458
SO2	18,801.200425	18.801200	0.020724776
CO2	1,984,488,773.556150	1,984,488.773556	2,187.524421493
PM10	81,411.527458	81.411527	0.089740848
PM2.5	75,727.873798	75.727874	0.083475692
Diesel_PM	12,312.945758	12.312946	0.013572699
DEOG	23,622.357938	23.622358	0.026039192
BENZENE	5,888.208291	5.888208	0.006490639
ACROLEIN	239.537774	0.239538	0.000264045
ACETALDEHYDE	2,512.904244	2.512904	0.002770003
FORMALDEHYDE	6,659.436057	6.659436	0.007340772
BUTADIENE	1,081.224010	1.081224	0.001191845

-- END--

Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

TASK ORDER 1
Agreement 43A0270

Spreadsheet Tool for Estimating Naphthalene and Polycyclic Organic Matter Emissions from Transportation Projects (Beta Version 1.0)

STI-909101

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September 20, 2010

Input Data

Scenario Title:	SR-210 2012 Existing
Geographic Area:	San Bernardino (SC)
Analysis Year:	2012
Peak Trucks (%):	7
Off-Peak Trucks (%):	7
Peak PM10 Emissions (g/day):	29875
Off-Peak PM10 Emissions (g/day):	31375
Peak TOG Emissions (g/day):	259972
Off-Peak TOG Emissions (g/day:)	263127

Intermediate Lookups

Scenario Title:	SR-210 2012 Existing
Percent Diesel in Truck Fleet:	28%
VOC to TOG Ratio:	0.92
Peak Naphthalene Adjustment Factors:	0.0864
Off-Peak Naphthalene Adjustment Factors:	0.0864
Peak POM Adjustment Factors:	0.0122
Off-Peak POM Adjustment Factors:	0.0122

Output

Scenario Title:	SR-210 2012 Existing
Peak Naphthalene Emissions (g/day):	2675
Off-Peak Naphthalene Emissions (g/day):	2806
Total Naphthalene Emissions (g/day):	5482
Peak POM Emissions (g/day):	366
Off-Peak POM Emissions (g/day):	384
Total POM Emissions (g/day):	750

Input Data

Scenario Title:	SR-210 2020 No Build
Geographic Area:	San Bernardino (SC)
Analysis Year:	2020
Peak Trucks (%):	7
Off-Peak Trucks (%):	7
Peak PM10 Emissions (g/day):	30491
Off-Peak PM10 Emissions (g/day):	31120
Peak TOG Emissions (g/day):	174712
Off-Peak TOG Emissions (g/day:)	175250

Intermediate Lookups

Scenario Title:	SR-210 2020 No Build
Percent Diesel in Truck Fleet:	30%
VOC to TOG Ratio:	0.92
Peak Naphthalene Adjustment Factors:	0.0862
Off-Peak Naphthalene Adjustment Factors:	0.0862
Peak POM Adjustment Factors:	0.0122
Off-Peak POM Adjustment Factors:	0.0122

Output

Scenario Title:	SR-210 2020 No Build
Peak Naphthalene Emissions (g/day):	2694
Off-Peak Naphthalene Emissions (g/day):	2748
Total Naphthalene Emissions (g/day):	5442
Peak POM Emissions (g/day):	373
Off-Peak POM Emissions (g/day):	381
Total POM Emissions (g/day):	754

Input Data

Scenario Title:	SR-210 2020 Build
Geographic Area:	San Bernardino (SC)
Analysis Year:	2020
Peak Trucks (%):	7
Off-Peak Trucks (%):	7
Peak PM10 Emissions (g/day):	30634
Off-Peak PM10 Emissions (g/day):	31440
Peak TOG Emissions (g/day):	175000
Off-Peak TOG Emissions (g/day:)	176740

Intermediate Lookups

Scenario Title:	SR-210 2020 Build
Percent Diesel in Truck Fleet:	30%
VOC to TOG Ratio:	0.92
Peak Naphthalene Adjustment Factors:	0.0862
Off-Peak Naphthalene Adjustment Factors:	0.0862
Peak POM Adjustment Factors:	0.0122
Off-Peak POM Adjustment Factors:	0.0122

Output

Scenario Title:	SR-210 2020 Build
Peak Naphthalene Emissions (g/day):	2706
Off-Peak Naphthalene Emissions (g/day):	2776
Total Naphthalene Emissions (g/day):	5482
Peak POM Emissions (g/day):	375
Off-Peak POM Emissions (g/day):	385
Total POM Emissions (g/day):	759

Input Data

Scenario Title:	SR-210 2040 No Build
Geographic Area:	San Bernardino (SC)
Analysis Year:	2040
Peak Trucks (%):	7
Off-Peak Trucks (%):	7
Peak PM10 Emissions (g/day):	39926
Off-Peak PM10 Emissions (g/day):	39963
Peak TOG Emissions (g/day):	141306
Off-Peak TOG Emissions (g/day:)	139543

Intermediate Lookups

Scenario Title:	SR-210 2040 No Build
Percent Diesel in Truck Fleet:	34%
VOC to TOG Ratio:	0.92
Peak Naphthalene Adjustment Factors:	0.0860
Off-Peak Naphthalene Adjustment Factors:	0.0860
Peak POM Adjustment Factors:	0.0122
Off-Peak POM Adjustment Factors:	0.0122

Output

Scenario Title:	SR-210 2040 No Build
Peak Naphthalene Emissions (g/day):	3486
Off-Peak Naphthalene Emissions (g/day):	3488
Total Naphthalene Emissions (g/day):	6974
Peak POM Emissions (g/day):	487
Off-Peak POM Emissions (g/day):	488
Total POM Emissions (g/day):	975

Input Data

Scenario Title:	SR-210 2040 Build
Geographic Area:	San Bernardino (SC)
Analysis Year:	2040
Peak Trucks (%):	7
Off-Peak Trucks (%):	7
Peak PM10 Emissions (g/day):	40334
Off-Peak PM10 Emissions (g/day):	41077
Peak TOG Emissions (g/day):	142560
Off-Peak TOG Emissions (g/day:)	142748

Intermediate Lookups

Scenario Title:	SR-210 2040 Build
Percent Diesel in Truck Fleet:	34%
VOC to TOG Ratio:	0.92
Peak Naphthalene Adjustment Factors:	0.0860
Off-Peak Naphthalene Adjustment Factors:	0.0860
Peak POM Adjustment Factors:	0.0122
Off-Peak POM Adjustment Factors:	0.0122

Output

Scenario Title:	SR-210 2040 Build
Peak Naphthalene Emissions (g/day):	3521
Off-Peak Naphthalene Emissions (g/day):	3585
Total Naphthalene Emissions (g/day):	7106
Peak POM Emissions (g/day):	492
Off-Peak POM Emissions (g/day):	502
Total POM Emissions (g/day):	994

State Route 210 Mixed Flow Lane Addition Project Re-entrained Fugitive Dust Analysis

Methodology

Calculation Methodology: USEPA AP-42, Paved Roads, Section 13.2.1, Revised January 2011:
http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s0201.pdf

Average vehicle weight and silt loading from:
http://www.arb.ca.gov/ei/areasrc/fullpdf/full7-9.pdf

Precipitation Days >0.254mm (.01 in) for San Bernardino from:
http://www.wrcc.dri.edu/cgi-bin/cliGCStP.pl?ca7723

conversions

365.25	days per year
2000	lbs per ton

Emission Factors Calculation

$$E_{ext} = [\ k\ (sL)^{0.91} \times (W)^{1.02}\ ]\ (1 - P/4N)$$

Pollutant	Variables						Emission Factor lbs/VMT, freeway and ramps	Emission Factor lbs/VMT, arterials and collectors
	k	sL freeway	sL major and collectors	W	P	N		
PM10	0.0022	0.02	0.037	3.4	43	365	0.000212	0.000370
PM2.5	0.00054	0.02	0.037	3.4	43	365	0.000052	0.000091

E = particulate emission factor (lbs of particulate matter/VMT)	--
k = particle size multiplier (lb/VMT)	(AP-42 default)
sL = roadway silt loading (g/m2)	(from CARB 1997, sL for Freeways and Major/Collector roads in San Bernardino County (SC))
W = average weight of vehicles on the road (tons)	(from CARB 1997, Avg Vehicle Weight for San Bernardino County (SC))
P = number of wet days with at least 0.254mm of precipitation	(WRCC for San Bernardino)
N = number of days in the averaging period	(annual)

VMT Data (from URS 2012)

	2012	2020		2040	
	Existing	NB	Build	NB	Build
Freeway	1,719,109	1,965,040	1,997,785	2,579,867	2,694,474
HOV	0	2,853	4,873	9,987	17,055
Ramps	178,575	197,594	201,407	245,142	258,486
Truck	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0
Principal Arterial	344,800	396,415	389,848	525,452	502,469
Minor Arterial	560,655	662,292	651,238	916,385	877,696
Major Collector	107,070	116,888	115,923	141,434	138,057
Minor Collector	2,247	2,317	2,321	2,492	2,506
Centroid	116,170	138,139	138,117	193,063	192,986
Other	0	0	0	0	0
Total Freeways and Ramps	1,897,685	2,165,488	2,204,065	2,834,996	2,970,016
Total Arterial and Collectors	1,130,942	1,316,052	1,297,448	1,778,827	1,713,714
VMT change over NB	fwy + ramps		1.8%		4.8%
	arterial + colls		-1.4%		-3.7%
	Total		0.6%		1.5%

Emission Calculations

Alternative	Pounds Per Day PM10			Percent change over No Project	Pounds Per Day PM2.5			Percent change over No Project
	Total Freeways and Ramps	Total Arterial and Collectors	Total		Total Freeways and Ramps	Total Arterial and Collectors	Total	
Existing (2012)	402	419	820	--	99	103	201	--
2020 No-Build	458	487	946	--	112	120	232	--
2020 Build Alt	466	481	947	0.1%	114	118	232	0.1%
2040 No-Build	600	659	1259	--	147	162	309	--
2040 Build Alt	628	635	1263	0.4%	154	156	310	0.4%

Alternative	Tons per Year PM10			Percent change over No Project	Tons Per Year PM2.5			Percent change over No Project
	Total Freeways and Ramps	Total Arterial and Collectors	Total		Total Freeways and Ramps	Total Arterial and Collectors	Total	
Existing (2012)	73	76	150	--	18	19	37	--
2020 No-Build	84	89	173	--	21	22	42	--
2020 Build Alt	85	88	173	0.1%	21	22	42	0.1%
2040 No-Build	110	120	230	--	27	30	56	--
2040 Build Alt	115	116	231	0.4%	28	28	57	0.4%

Appendix G

- VMT by Speed Bin Summary (prepared by URS Corporation)
- Excerpts from Project Traffic Report (prepared by URS Corporation)

SR-210 Widening
VMT Summary by Facility Type and Speed Bin by Time Period, Existing

	Existing													
	Speed Bin (mph)													
Facility Type	**0-5**	**5-10**	**10-15**	**15-20**	**20-25**	**25-30**	**30-35**	**35-40**	**40-45**	**45-50**	**50-55**	**55-60**	**>60**	**TOTAL**
AM PEAK PERIOD														
Freeway	0	0	0	0	0	0	0	0	43,112	75,779	95,901	107,103	1,819	323,716
HOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramps	0	203	2,003	2,701	9,162	16,746	2,591	0	0	0	0	0	0	33,405
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expwy/Pkwy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	1,110	3,525	11,012	18,851	22,958	5,849	827	0	0	0	64,132
Minor Arterial	0	0	0	864	7,398	20,453	57,433	17,458	2,213	0	0	0	0	105,818
Major Collector	0	0	0	741	4,166	9,756	5,784	254	0	0	0	0	0	20,702
Minor Collector	0	0	0	0	0	414	0	0	0	0	0	0	0	414
Centroid	0	0	0	14,323	7,337	3	0	0	0	0	0	0	0	21,663
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**203**	**2,003**	**19,738**	**31,588**	**58,385**	**84,659**	**40,670**	**51,175**	**76,606**	**95,901**	**107,103**	**1,819**	**569,851**
PM PEAK PERIOD														
Freeway	0	0	0	0	0	0	40,242	37,270	101,613	135,929	143,513	56,984	1,469	517,020
HOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramps	0	573	2,693	5,196	22,848	18,356	4,214	0	0	0	0	0	0	53,880
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	1,855	10,740	20,637	38,397	26,883	9,644	0	0	0	0	108,155
Minor Arterial	0	0	764	1,773	14,909	49,104	97,599	25,207	1,647	0	0	0	0	191,002
Major Collector	0	0	0	2,017	7,908	16,574	9,198	284	0	0	0	0	0	35,981
Minor Collector	0	0	0	0	0	763	0	0	0	0	0	0	0	763
Centroid	0	0	0	24,743	13,024	7	0	0	0	0	0	0	0	37,774
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**573**	**3,457**	**35,583**	**69,429**	**105,441**	**189,650**	**89,644**	**112,903**	**135,929**	**143,513**	**56,984**	**1,469**	**944,575**
MID-DAY PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	60,774	114,860	333,775	24,590	533,998
HOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramps	0	0	914	6,778	5,218	37,953	5,996	0	0	0	0	0	0	56,858
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	3,265	16,559	37,516	40,529	15,666	0	0	0	0	113,535
Minor Arterial	0	0	0	0	13,714	25,880	97,398	38,554	4,581	0	0	0	0	180,128
Major Collector	0	0	0	0	6,857	17,870	9,880	412	0	0	0	0	0	35,019
Minor Collector	0	0	0	0	0	725	0	0	0	0	0	0	0	725
Centroid	0	0	0	24,784	13,332	6	0	0	0	0	0	0	0	38,122
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**914**	**31,561**	**42,386**	**98,992**	**150,790**	**79,495**	**20,248**	**60,774**	**114,860**	**333,775**	**24,590**	**958,385**
NIGHT PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	0	0	53,287	291,089	344,375
HOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramps	0	0	0	3,523	522	22,395	7,992	0	0	0	0	0	0	34,432
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	803	11,767	21,988	18,210	6,210	0	0	0	58,977
Minor Arterial	0	0	0	0	922	12,242	30,282	35,560	4,701	0	0	0	0	83,706
Major Collector	0	0	0	0	1,969	5,096	7,840	464	0	0	0	0	0	15,369
Minor Collector	0	0	0	0	0	345	0	0	0	0	0	0	0	345
Centroid	0	0	0	12,075	6,533	2	0	0	0	0	0	0	0	18,611
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**15,599**	**9,946**	**40,883**	**57,881**	**58,011**	**22,911**	**6,210**	**0**	**53,287**	**291,089**	**555,816**
TOTAL DAILY														
Freeway	0	0	0	0	0	0	40,242	37,270	144,726	272,482	354,273	551,149	318,967	1,719,109
HOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ramps	0	776	5,610	18,197	37,750	95,450	20,793	0	0	0	0	0	0	178,575
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	2,965	17,529	49,011	106,531	112,357	49,369	7,036	0	0	0	344,800
Minor Arterial	0	0	764	2,636	36,943	107,678	282,712	116,780	13,142	0	0	0	0	560,655
Major Collector	0	0	0	2,758	20,900	49,297	32,702	1,413	0	0	0	0	0	107,070
Minor Collector	0	0	0	0	0	2,247	0	0	0	0	0	0	0	2,247
Centroid	0	0	0	75,925	40,227	18	0	0	0	0	0	0	0	116,170
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	776	6,374	102,482	153,349	303,701	482,980	267,820	207,237	279,519	354,273	551,149	318,967	3,028,627

SR-210 Widening
Study Area VMT Summary Comparison - No Build 2040

	No Build													
	Speed Bin (mph)													
Facility Type	**0-5**	**5-10**	**10-15**	**15-20**	**20-25**	**25-30**	**30-35**	**35-40**	**40-45**	**45-50**	**50-55**	**55-60**	**>60**	**TOTAL**
AM PEAK PERIOD														
Freeway	0	0	0	0	0	11,995	34,039	15,590	67,677	71,038	66,700	163,629	55,035	485,702
HOV	0	0	0	0	0	0	0	0	0	0	0	0	5,367	5,367
Ramps	0	2,471	5,129	3,772	9,001	20,469	5,566	0	0	0	0	0	0	46,407
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expwy/Pkwy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	2,955	16,729	28,582	36,250	9,870	3,114	0	0	0	97,500
Minor Arterial	0	0	996	2,784	8,169	32,710	76,437	46,113	4,566	0	0	0	0	171,774
Major Collector	0	0	172	697	7,106	12,320	5,965	0	0	0	0	0	0	26,260
Minor Collector	0	0	0	0	0	465	0	0	0	0	0	0	0	465
Centroid	0	0	0	24,195	10,827	6	0	0	0	0	0	0	0	35,028
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**2,471**	**6,296**	**31,448**	**38,058**	**94,693**	**150,589**	**97,953**	**82,113**	**74,152**	**66,700**	**163,629**	**60,402**	**868,503**
PM PEAK PERIOD														
Freeway	0	0	0	24,903	50,471	67,434	77,611	93,063	10,335	101,354	198,337	74,526	53,116	751,150
HOV	0	0	0	0	0	0	0	0	0	0	0	0	669	669
Ramps	623	1,546	4,446	8,046	27,319	23,133	6,089	0	0	0	0	0	0	71,204
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	20,610	36,212	48,188	60,867	10,062	0	0	0	0	175,939
Minor Arterial	0	1,330	407	7,015	19,657	91,240	143,657	59,573	3,038	0	0	0	0	325,917
Major Collector	0	0	860	2,123	17,802	20,353	10,337	0	0	0	0	0	0	51,474
Minor Collector	0	0	0	0	0	825	0	0	0	0	0	0	0	825
Centroid	0	0	0	44,132	19,350	18	0	0	0	0	0	0	0	63,500
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**623**	**2,876**	**5,713**	**86,219**	**155,210**	**239,215**	**285,882**	**213,503**	**23,435**	**101,354**	**198,337**	**74,526**	**53,785**	**1,440,679**
MID-DAY PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	85,726	167,159	377,406	198,441	828,732
HOV	0	0	0	0	0	0	0	0	0	0	0	0	1,440	1,440
Ramps	0	1,459	2,731	13,765	6,187	47,650	9,901	0	0	0	0	0	0	81,693
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	17,845	40,427	76,192	23,444	8,768	0	0	0	166,676
Minor Arterial	0	0	0	1,380	13,890	45,514	127,547	82,705	18,305	0	0	0	0	289,342
Major Collector	0	0	0	159	11,526	20,182	12,396	0	0	0	0	0	0	44,262
Minor Collector	0	0	0	0	0	814	0	0	0	0	0	0	0	814
Centroid	0	0	0	44,802	19,380	11	0	0	0	0	0	0	0	64,193
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**1,459**	**2,731**	**60,106**	**50,983**	**132,016**	**190,271**	**158,897**	**41,749**	**94,494**	**167,159**	**377,406**	**199,880**	**1,477,151**
NIGHT PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	0	0	0	514,282	514,282
HOV	0	0	0	0	0	0	0	0	0	0	0	0	2,512	2,512
Ramps	0	0	0	5,486	1,117	29,089	10,145	0	0	0	0	0	0	45,838
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	1,762	9,807	25,841	35,576	10,940	1,411	0	0	85,337
Minor Arterial	0	0	0	0	807	13,178	42,028	60,992	12,345	0	0	0	0	129,351
Major Collector	0	0	0	0	2,594	7,225	9,497	121	0	0	0	0	0	19,437
Minor Collector	0	0	0	0	0	389	0	0	0	0	0	0	0	389
Centroid	0	0	0	20,329	10,009	4	0	0	0	0	0	0	0	30,343
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**25,815**	**14,527**	**51,647**	**71,478**	**86,955**	**47,922**	**10,940**	**1,411**	**0**	**516,794**	**827,489**

TOTAL DAILY														
Freeway	0	0	0	24,903	50,471	79,429	111,649	108,653	78,012	258,118	432,196	615,561	820,874	2,579,867
HOV	0	0	0	0	0	0	0	0	0	0	0	0	9,987	9,987
Ramps	623	5,476	12,306	31,069	43,624	120,342	31,702	0	0	0	0	0	0	245,142
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	23,565	72,548	127,005	199,150	78,953	22,821	1,411	0	0	525,452
Minor Arterial	0	1,330	1,402	11,180	42,524	182,642	389,670	249,383	38,254	0	0	0	0	916,385
Major Collector	0	0	1,031	2,979	39,028	60,080	38,194	121	0	0	0	0	0	141,434
Minor Collector	0	0	0	0	0	2,492	0	0	0	0	0	0	0	2,492
Centroid	0	0	0	133,458	59,566	39	0	0	0	0	0	0	0	193,063
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	623	6,806	14,740	203,588	258,778	517,572	698,220	557,308	195,219	280,939	433,607	615,561	830,862	4,613,823

SUMMARY BY ROAD TYPE

	2020 No Build					2020 Build					2020 net				
	AM	**PM**	**Mid-day**	**night**	**TOTAL**	**AM**	**PM**	**Mid-day**	**night**	**TOTAL**	**AM**	**PM**	**Mid-day**	**night**	**TOTAL**
Freeway	485,702	751,150	828,732	514,282	2,579,867	508,179	824,641	843,120	518,534	2,694,474	22,478	73,490	14,388	4,252	114,607
HOV	5,367	669	1,440	2,512	9,987	5,833	7,183	1,500	2,540	17,055	466	6,514	60	28	7,068
Ramps	46,407	71,204	81,693	45,838	245,142	48,788	78,665	84,217	46,816	258,486	2,381	7,461	2,524	978	13,344
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	97,500	175,939	166,676	85,337	525,452	93,444	160,585	163,410	85,031	502,469	-4,056	-15,355	-3,266	-306	-22,983
Minor Arterial	171,774	325,917	289,342	129,351	916,385	164,891	297,335	286,496	128,975	877,696	-6,884	-28,582	-2,846	-377	-38,688
Major Collector	26,260	51,474	44,262	19,437	141,434	26,089	48,328	44,183	19,456	138,057	-171	-3,146	-79	19	-3,377
Minor Collector	465	825	814	389	2,492	469	833	815	389	2,506	4	8	1	0	14
Centroid	35,028	63,500	64,193	30,343	193,063	35,021	63,429	64,187	30,349	192,986	-6	-71	-6	6	-77
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	868,503	1,440,679	1,477,151	827,489	4,613,823	882,714	1,480,999	1,487,927	832,089	4,683,730	14,211	40,320	10,776	4,600	69,907

SR-210 Widening
Study Area VMT Summary Comparison - Build 2040

Build														
	Speed Bin (mph)													
Facility Type	**0-5**	**5-10**	**10-15**	**15-20**	**20-25**	**25-30**	**30-35**	**35-40**	**40-45**	**45-50**	**50-55**	**55-60**	**>60**	**TOTAL**
AM PEAK PERIOD														
Freeway	0	0	0	0	0	0	0	11,401	60,924	41,604	65,304	188,368	140,577	508,179
HOV	0	0	0	0	0	0	0	0	0	0	0	0	5,833	5,833
Ramps	233	2,055	6,098	3,147	10,022	21,664	5,569	0	0	0	0	0	0	48,788
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	2,545	14,413	28,632	34,609	9,710	3,535	0	0	0	93,444
Minor Arterial	0	0	998	2,956	7,645	31,341	72,911	44,548	4,492	0	0	0	0	164,891
Major Collector	0	0	270	429	7,398	12,059	5,933	0	0	0	0	0	0	26,089
Minor Collector	0	0	0	0	0	469	0	0	0	0	0	0	0	469
Centroid	0	0	0	24,139	10,877	6	0	0	0	0	0	0	0	35,021
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**233**	**2,055**	**7,367**	**30,670**	**38,486**	**79,952**	**113,044**	**90,559**	**75,127**	**45,139**	**65,304**	**188,368**	**146,410**	**882,714**
PM PEAK PERIOD														
Freeway	0	0	0	0	0	0	91,749	52,678	51,961	57,154	274,150	186,544	110,403	824,641
HOV	0	0	0	0	0	0	0	0	0	0	0	0	7,183	7,183
Ramps	1,177	2,184	5,968	10,293	27,889	23,835	7,320	0	0	0	0	0	0	78,665
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	11,714	35,709	44,387	53,588	13,994	1,193	0	0	0	160,585
Minor Arterial	0	1,335	421	6,866	15,078	74,958	135,194	58,652	4,830	0	0	0	0	297,335
Major Collector	0	0	730	1,768	16,026	19,377	10,427	0	0	0	0	0	0	48,328
Minor Collector	0	0	0	0	0	833	0	0	0	0	0	0	0	833
Centroid	0	0	0	43,902	19,511	17	0	0	0	0	0	0	0	63,429
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1,177**	**3,519**	**7,119**	**62,828**	**90,218**	**154,729**	**289,078**	**164,919**	**70,785**	**58,347**	**274,150**	**186,544**	**117,586**	**1,480,999**
MID-DAY PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	0	112,547	337,332	393,242	843,120
HOV	0	0	0	0	0	0	0	0	0	0	0	0	1,500	1,500
Ramps	0	1,473	2,241	14,336	6,123	50,053	9,991	0	0	0	0	0	0	84,217
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	17,697	39,569	73,979	23,460	8,703	0	0	0	163,410
Minor Arterial	0	0	0	1,383	13,734	43,925	127,416	82,981	17,055	0	0	0	0	286,496
Major Collector	0	0	0	218	11,446	20,160	12,359	0	0	0	0	0	0	44,183
Minor Collector	0	0	0	0	0	815	0	0	0	0	0	0	0	815
Centroid	0	0	0	44,762	19,415	11	0	0	0	0	0	0	0	64,187
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**1,473**	**2,241**	**60,699**	**50,718**	**132,661**	**189,336**	**156,961**	**40,516**	**8,703**	**112,547**	**337,332**	**394,741**	**1,487,927**
NIGHT PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	0	0	0	518,534	518,534
HOV	0	0	0	0	0	0	0	0	0	0	0	0	2,540	2,540
Ramps	0	0	0	5,489	1,124	30,101	10,101	0	0	0	0	0	0	46,816
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	1,758	9,783	25,774	35,403	10,904	1,409	0	0	85,031
Minor Arterial	0	0	0	0	809	13,178	42,040	60,649	12,298	0	0	0	0	128,975
Major Collector	0	0	0	0	2,592	7,261	9,482	121	0	0	0	0	0	19,456
Minor Collector	0	0	0	0	0	389	0	0	0	0	0	0	0	389
Centroid	0	0	0	20,334	10,010	4	0	0	0	0	0	0	0	30,349
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**25,823**	**14,536**	**52,692**	**71,405**	**86,545**	**47,700**	**10,904**	**1,409**	**0**	**521,074**	**832,089**

TOTAL DAILY														
Freeway	0	0	0	0	0	0	91,749	64,080	112,886	98,758	452,001	712,244	1,162,756	2,694,474
HOV	0	0	0	0	0	0	0	0	0	0	0	0	17,055	17,055
Ramps	1,410	5,712	14,308	33,265	45,159	125,653	32,980	0	0	0	0	0	0	258,486
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	14,258	69,578	122,371	187,951	82,567	24,336	1,409	0	0	502,469
Minor Arterial	0	1,335	1,420	11,205	37,266	163,402	377,561	246,831	38,676	0	0	0	0	877,696
Major Collector	0	0	1,000	2,415	37,462	58,857	38,201	121	0	0	0	0	0	138,057
Minor Collector	0	0	0	0	0	2,506	0	0	0	0	0	0	0	2,506
Centroid	0	0	0	133,136	59,812	38	0	0	0	0	0	0	0	192,986
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,410	7,047	16,727	180,021	193,958	420,034	662,863	498,983	234,128	123,094	453,410	712,244	1,179,811	4,683,730

SR-210 Widening
Study Area VMT Summary Comparison - No Build 2020

	No Build													
	Speed Bin (mph)													
Facility Type	**0-5**	**5-10**	**10-15**	**15-20**	**20-25**	**25-30**	**30-35**	**35-40**	**40-45**	**45-50**	**50-55**	**55-60**	**>60**	**TOTAL**
AM PEAK PERIOD														
Freeway	0	0	0	0	0	3,427	9,725	4,454	50,131	74,425	87,558	123,254	17,024	369,998
HOV	0	0	0	0	0	0	0	0	0	0	0	0	1,533	1,533
Ramps	0	851	2,896	3,007	9,116	17,810	3,441	0	0	0	0	0	0	37,120
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expwy/Pkwy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	793	3,362	12,646	21,631	26,756	6,998	1,480	0	0	0	73,666
Minor Arterial	0	0	284	1,412	7,618	23,955	62,863	25,645	2,885	0	0	0	0	124,663
Major Collector	0	0	49	729	5,006	10,489	5,836	182	0	0	0	0	0	22,290
Minor Collector	0	0	0	0	0	429	0	0	0	0	0	0	0	429
Centroid	0	0	0	17,144	8,334	4	0	0	0	0	0	0	0	25,482
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**851**	**3,230**	**23,084**	**33,436**	**68,759**	**103,496**	**57,037**	**60,014**	**75,905**	**87,558**	**123,254**	**18,557**	**655,180**
PM PEAK PERIOD														
Freeway	0	0	0	7,115	14,420	19,267	50,919	53,211	75,534	126,050	159,177	61,996	16,225	583,914
HOV	0	0	0	0	0	0	0	0	0	0	0	0	191	191
Ramps	178	851	3,194	6,010	24,126	19,721	4,750	0	0	0	0	0	0	58,830
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	1,325	13,560	25,087	41,194	36,593	9,763	0	0	0	0	127,522
Minor Arterial	0	380	662	3,270	16,266	61,142	110,758	35,026	2,044	0	0	0	0	229,549
Major Collector	0	0	246	2,047	10,735	17,654	9,524	203	0	0	0	0	0	40,408
Minor Collector	0	0	0	0	0	781	0	0	0	0	0	0	0	781
Centroid	0	0	0	30,283	14,831	10	0	0	0	0	0	0	0	45,124
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**178**	**1,231**	**4,102**	**50,051**	**93,938**	**143,662**	**217,145**	**125,032**	**87,341**	**126,050**	**159,177**	**61,996**	**16,416**	**1,086,319**
MID-DAY PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	67,903	129,802	346,241	74,262	618,208
HOV	0	0	0	0	0	0	0	0	0	0	0	0	411	411
Ramps	0	417	1,433	8,774	5,495	40,723	7,112	0	0	0	0	0	0	63,954
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	2,332	16,926	38,348	50,718	17,889	2,505	0	0	0	128,718
Minor Arterial	0	0	0	394	13,764	31,490	106,012	51,169	8,503	0	0	0	0	211,332
Major Collector	0	0	0	45	8,191	18,531	10,599	294	0	0	0	0	0	37,660
Minor Collector	0	0	0	0	0	750	0	0	0	0	0	0	0	750
Centroid	0	0	0	30,503	15,060	7	0	0	0	0	0	0	0	45,571
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**417**	**1,433**	**39,717**	**44,843**	**108,428**	**162,070**	**102,181**	**26,391**	**70,408**	**129,802**	**346,241**	**74,673**	**1,106,604**
NIGHT PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	0	0	38,062	354,858	392,920
HOV	0	0	0	0	0	0	0	0	0	0	0	0	718	718
Ramps	0	0	0	4,084	692	24,308	8,607	0	0	0	0	0	0	37,691
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	1,077	11,207	23,089	23,172	7,561	403	0	0	66,509
Minor Arterial	0	0	0	0	889	12,509	33,638	42,826	6,885	0	0	0	0	96,748
Major Collector	0	0	0	0	2,147	5,705	8,313	366	0	0	0	0	0	16,531
Minor Collector	0	0	0	0	0	357	0	0	0	0	0	0	0	357
Centroid	0	0	0	14,434	7,526	3	0	0	0	0	0	0	0	21,963
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**18,518**	**11,255**	**43,959**	**61,766**	**66,281**	**30,057**	**7,561**	**403**	**38,062**	**355,576**	**633,437**

TOTAL DAILY														
Freeway	0	0	0	7,115	14,420	22,694	60,644	57,665	125,665	268,378	376,537	569,552	462,369	1,965,040
HOV	0	0	0	0	0	0	0	0	0	0	0	0	2,853	2,853
Ramps	178	2,119	7,523	21,875	39,428	102,562	23,910	0	0	0	0	0	0	197,594
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	2,118	19,254	55,736	112,381	137,155	57,822	11,546	403	0	0	396,415
Minor Arterial	0	380	946	5,077	38,538	129,096	313,271	154,666	20,317	0	0	0	0	662,292
Major Collector	0	0	295	2,821	26,079	52,378	34,271	1,044	0	0	0	0	0	116,888
Minor Collector	0	0	0	0	0	2,317	0	0	0	0	0	0	0	2,317
Centroid	0	0	0	92,363	45,752	24	0	0	0	0	0	0	0	138,139
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	178	2,499	8,764	131,369	183,472	364,807	544,477	350,531	203,803	279,925	376,940	569,552	465,223	3,481,540

SUMMARY BY ROAD TYPE

	2040 No Build					2040 Build					2040 net				
	AM	**PM**	**Mid-day**	**night**	**TOTAL**	**AM**	**PM**	**Mid-day**	**night**	**TOTAL**	**AM**	**PM**	**Mid-day**	**night**	**TOTAL**
Freeway	369,998	583,914	618,208	392,920	1,965,040	376,420	604,911	622,319	394,135	1,997,785	6,422	20,997	4,111	1,215	32,745
HOV	1,533	191	411	718	2,853	1,666	2,052	428	726	4,873	133	1,861	17	8	2,019
Ramps	37,120	58,830	63,954	37,691	197,594	37,800	60,962	64,675	37,970	201,407	680	2,132	721	279	3,813
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	73,666	127,522	128,718	66,509	396,415	72,507	123,135	127,785	66,421	389,848	-1,159	-4,387	-933	-87	-6,567
Minor Arterial	124,663	229,549	211,332	96,748	662,292	122,696	221,383	210,519	96,640	651,238	-1,967	-8,166	-813	-108	-11,054
Major Collector	22,290	40,408	37,660	16,531	116,888	22,241	39,509	37,637	16,537	115,923	-49	-899	-23	5	-965
Minor Collector	429	781	750	357	2,317	430	783	751	357	2,321	1	2	0	0	4
Centroid	25,482	45,124	45,571	21,963	138,139	25,480	45,104	45,569	21,965	138,117	-2	-20	-2	2	-22
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	655,180	1,086,319	1,106,604	633,437	3,481,540	659,240	1,097,839	1,109,683	634,751	3,501,513	4,060	11,520	3,079	1,314	19,974

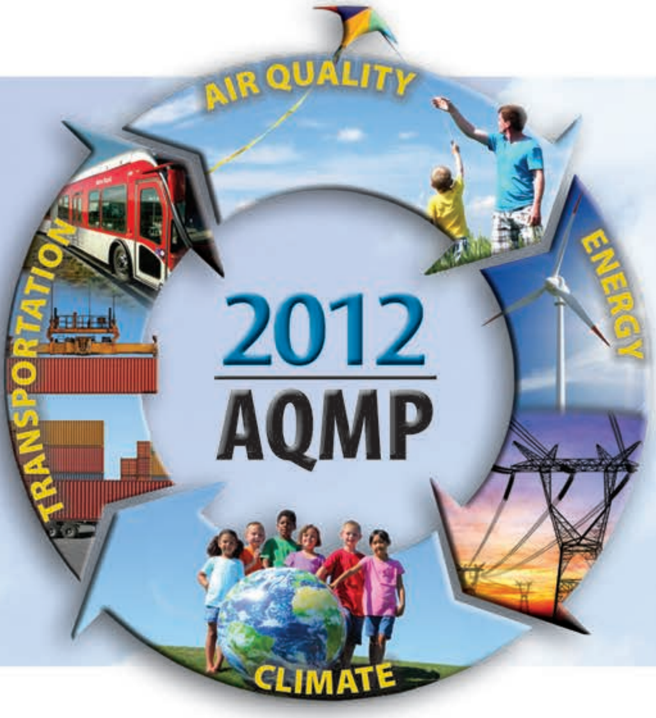
SR-210 Widening
Study Area VMT Summary Comparison - Build 2020

	Build													
	Speed Bin (mph)													
Facility Type	**0-5**	**5-10**	**10-15**	**15-20**	**20-25**	**25-30**	**30-35**	**35-40**	**40-45**	**45-50**	**50-55**	**55-60**	**>60**	**TOTAL**
AM PEAK PERIOD														
Freeway	0	0	0	0	0	0	0	3,258	48,202	66,015	87,159	130,322	41,465	376,420
HOV	0	0	0	0	0	0	0	0	0	0	0	0	1,666	1,666
Ramps	67	732	3,173	2,828	9,408	18,151	3,441	0	0	0	0	0	0	37,800
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expwy/Pkwy	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	793	3,245	11,984	21,646	26,287	6,952	1,600	0	0	0	72,507
Minor Arterial	0	0	285	1,461	7,468	23,564	61,855	25,198	2,864	0	0	0	0	122,696
Major Collector	0	0	77	652	5,089	10,414	5,827	182	0	0	0	0	0	22,241
Minor Collector	0	0	0	0	0	430	0	0	0	0	0	0	0	430
Centroid	0	0	0	17,128	8,349	4	0	0	0	0	0	0	0	25,480
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**67**	**732**	**3,535**	**22,862**	**33,559**	**64,547**	**92,769**	**54,924**	**58,018**	**67,615**	**87,159**	**130,322**	**43,131**	**659,240**
PM PEAK PERIOD														
Freeway	0	0	0	0	0	0	54,958	41,673	87,427	113,422	180,838	94,001	32,593	604,911
HOV	0	0	0	0	0	0	0	0	0	0	0	0	2,052	2,052
Ramps	336	1,033	3,629	6,652	24,288	19,921	5,101	0	0	0	0	0	0	60,962
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	1,325	11,018	24,943	40,109	34,513	10,886	341	0	0	0	123,135
Minor Arterial	0	382	666	3,228	14,957	56,491	108,340	34,763	2,556	0	0	0	0	221,383
Major Collector	0	0	208	1,946	10,227	17,375	9,549	203	0	0	0	0	0	39,509
Minor Collector	0	0	0	0	0	783	0	0	0	0	0	0	0	783
Centroid	0	0	0	30,217	14,877	10	0	0	0	0	0	0	0	45,104
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**336**	**1,415**	**4,503**	**43,368**	**75,369**	**119,523**	**218,058**	**111,151**	**100,870**	**113,763**	**180,838**	**94,001**	**34,645**	**1,097,839**
MID-DAY PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	43,410	114,199	334,791	129,919	622,319
HOV	0	0	0	0	0	0	0	0	0	0	0	0	428	428
Ramps	0	421	1,293	8,937	5,476	41,410	7,137	0	0	0	0	0	0	64,675
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	2,332	16,884	38,103	50,086	17,893	2,487	0	0	0	127,785
Minor Arterial	0	0	0	395	13,720	31,036	105,974	51,248	8,145	0	0	0	0	210,519
Major Collector	0	0	0	62	8,168	18,524	10,588	294	0	0	0	0	0	37,637
Minor Collector	0	0	0	0	0	751	0	0	0	0	0	0	0	751
Centroid	0	0	0	30,492	15,070	7	0	0	0	0	0	0	0	45,569
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**421**	**1,293**	**39,887**	**44,767**	**108,612**	**161,803**	**101,628**	**26,039**	**45,897**	**114,199**	**334,791**	**130,348**	**1,109,683**
NIGHT PERIOD														
Freeway	0	0	0	0	0	0	0	0	0	0	0	38,062	356,073	394,135
HOV	0	0	0	0	0	0	0	0	0	0	0	0	726	726
Ramps	0	0	0	4,085	694	24,597	8,595	0	0	0	0	0	0	37,970
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	0	0	1,076	11,200	23,070	23,122	7,551	403	0	0	66,421
Minor Arterial	0	0	0	0	890	12,509	33,642	42,728	6,871	0	0	0	0	96,640
Major Collector	0	0	0	0	2,147	5,715	8,309	366	0	0	0	0	0	16,537
Minor Collector	0	0	0	0	0	357	0	0	0	0	0	0	0	357
Centroid	0	0	0	14,435	7,527	3	0	0	0	0	0	0	0	21,965
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**18,520**	**11,257**	**44,257**	**61,745**	**66,164**	**29,993**	**7,551**	**403**	**38,062**	**356,799**	**634,751**

TOTAL DAILY														
Freeway	0	0	0	0	0	0	54,958	44,930	135,629	222,847	382,195	597,176	560,050	1,997,785
HOV	0	0	0	0	0	0	0	0	0	0	0	0	4,873	4,873
Ramps	403	2,186	8,095	22,502	39,867	104,079	24,275	0	0	0	0	0	0	201,407
Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expressway/Parkway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Arterial	0	0	0	2,118	16,595	54,887	111,057	133,955	58,854	11,979	403	0	0	389,848
Minor Arterial	0	382	951	5,084	37,036	123,599	309,812	153,937	20,437	0	0	0	0	651,238
Major Collector	0	0	286	2,660	25,632	52,028	34,273	1,044	0	0	0	0	0	115,923
Minor Collector	0	0	0	0	0	2,321	0	0	0	0	0	0	0	2,321
Centroid	0	0	0	92,271	45,823	24	0	0	0	0	0	0	0	138,117
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	403	2,568	9,332	124,636	164,951	336,939	534,375	333,867	214,920	234,826	382,598	597,176	564,923	3,501,513

Appendix H

- SCAQMD 2012 AQMP Chapter 2 – Air Quality and Health Effects



Chapter 2

Air Quality and Health Effects

South Coast Air Quality Management District

Cleaning the air that we breathe...™

South Coast AQMD

CHAPTER 2

AIR QUALITY AND HEALTH EFFECTS

Introduction

Ambient Air Quality Standards

Current Air Quality

Comparison to Other U.S. Areas

Summary

INTRODUCTION

In this chapter, air quality is summarized for the year 2011, along with prior year trends, in both the South Coast Air Basin (Basin) and the Riverside County portion of the Salton Sea Air Basin (SSAB), primarily the Coachella Valley, as monitored by the South Coast Air Quality Management District (District). The District's 2011 air quality is compared to national ambient air quality standards (NAAQS). Nationwide air quality data for 2011 is also briefly summarized in this chapter, comparing air quality in the Basin to that of other U.S. and California urban areas. Health effects of the criteria air pollutants, that is, those that have NAAQS, are also discussed. More detailed information on the health effects of air pollution can be found in Appendix I: Health Effects.

Statistics presented in this chapter indicate the current attainment or non-attainment status of the various NAAQS for the criteria pollutants to assist the District in planning for future attainment. For ozone (O_3) and fine particulate matter (PM2.5, particles less that 2.5 microns in diameter), the main pollutants for which the U.S. EPA has declared the Basin to be a nonattainment area, maps are included to spatially compare the air quality throughout the Basin in 2011. The Los Angeles County portion of the Basin is also currently a nonattainment area for the federal lead (Pb) standard due to source-specific monitoring, but Pb air quality data and attainment has been addressed separately in greater detail in the 2012 Lead SIP for Los Angeles County. The Basin is a nonattainment area for the federal PM10 (particules less than 10 microns in diameter) standard, although a request to U.S. EPA to redesignate to attainment is pending. The Coachella Valley is currently declared a nonattainment area for both ozone and PM10 by U.S. EPA, although a request to redesignate to attainment for PM10 is pending. Appendix II: Current Air Quality provides additional information on current air quality and air quality trends, changes in the NAAQS, the impact on the District's attainment status for different pollutants, and air quality compared to state standards, as well as more information on specific monitoring station data.

There were some minor changes to the AQMD monitoring network since the 2007 AQMP, which included air quality data through 2005. New stations were added at South Long Beach, close to the Ports of Los Angeles and Long Beach, and at Temecula in southern Riverside County. In addition, the extent and frequency of PM2.5 monitoring has been increased throughout the District.

AMBIENT AIR QUALITY STANDARDS

Federal and State Standards

Ambient air quality standards for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM10 and PM2.5), and lead (Pb) have been set by both the State of California and the federal government. The state has also set standards for sulfates (SO_4^{2-}) and visibility. The state and federal ambient air quality standards for each of the criteria pollutants and their effects on health are summarized in Table 2-1.

Several changes to the NAAQS have occurred since the last AQMP update in 2007. The federal 1-hour ozone standard was revoked by the U.S. EPA and replaced by the 8-hour average ozone standard, effective June 15, 2005. However, the Basin and the former Southeast Desert Modified Air Quality Management Area (which included the Coachella Valley) had not attained the 1-hour federal ozone NAAQS by the attainment date and have some continuing obligations under the former standard. The 8-hour ozone NAAQS was subsequently lowered from 0.08 to 0.075 ppm, effective May 27, 2008. However, the SIP submittal for this standard is not due until 2015. In 2010, U.S. EPA proposed to lower the 8-hour ozone NAAQS again and solicited comments on a proposed standard between 0.060 and 0.070 ppm. To date, U.S. EPA has not taken final action on a lower ozone standard and the NAAQS currently remains at 0.075 ppm, as established in 2008. Statistics presented in this chapter refer to the most current 2008 8-hour ozone standard (0.075 ppm) and the former 1979 1-hour ozone standard for purposes of historical comparison.

U.S. EPA revoked the annual PM10 NAAQS (50 $\mu g/m^3$) and lowered the 24-hour PM2.5 NAAQS from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, effective December 17, 2006. On June 14, 2012, U.S. EPA proposed to strengthen the annual PM2.5 federal standard from 15 $\mu g/m^3$ to a proposed range between 12 and 13 $\mu g/m^3$. U.S. EPA also proposed to require near-roadway PM2.5 monitoring. Final action on the proposed PM2.5 standards is expected by December 14, 2012.

The national standard for Pb was revised on October 15, 2008 to a rolling 3-month average of 0.15 $\mu g/m^3$, from a quarterly average of 1.5 $\mu g/m^3$. Most recently, U.S. EPA established a new 1-hour NO_2 federal standard of 0.100 ppm, effective April 7, 2010, and revised the SO_2 federal standard by establishing a new 1-hour standard of 0.075 ppm and revoking the annual (0.03 ppm) and 24-hour (0.14 ppm) standards, effective August 2, 2010.

TABLE 2-1

Current Ambient Air Quality Standards and Health Effects

AIR POLLUTANT	STATE STANDARD Concentration, Averaging Time	FEDERAL STANDARD (NAAQS) Concentration, Averaging Time	RELEVANT HEALTH EFFECTS[#]
Ozone (O_3)	0.09 ppm, 1-Hour 0.070 ppm, 8-Hour	0.075 ppm, 8-Hour (2008) 0.08 ppm, 8-Hour (1997)	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (e) Vegetation damage; (f) Property damage
Carbon Monoxide (CO)	20 ppm, 1-Hour 9.0 ppm, 8-Hour	35 ppm, 1-Hour 9 ppm, 8-Hour	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
Nitrogen Dioxide (NO_2)	0.18 ppm, 1-Hour 0.030 ppm, Annual	100 ppb, 1-Hour 0.053 ppm, Annual	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
Sulfur Dioxide (SO_2)	0.25 ppm, 1-Hour 0.04 ppm, 24-Hour	75 ppb, 1-Hour	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma
Suspended Particulate Matter (PM10)	50 $\mu g/m^3$, 24-Hour 20 $\mu g/m^3$, Annual	150 $\mu g/m^3$, 24-Hour	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Decline in pulmonary function or growth in children; (c) Increased risk of premature death
Suspended Particulate Matter (PM2.5)	12.0 $\mu g/m^3$, Annual	35 $\mu g/m^3$, 24-Hour 15.0 $\mu g/m^3$, Annual	
Sulfates-PM10 (SO_4^{2-})	25 $\mu g/m^3$, 24-Hour	N/A	(a) Decrease in lung function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead (Pb)	1.5 $\mu g/m^3$, 30-day	0.15 $\mu g/m^3$, 3-month rolling	(a) Learning disabilities; (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	In sufficient amount such that the extinction coefficient is greater than 0.23 inverse kilometers at relative humidity less than 70 percent, 8-hour average (10am - 6pm)	N/A	Visibility impairment on days when relative humidity is less than 70 percent

ppm – parts per million by volume ppb – parts per billion by volume
State standards are "not-to-exceed" values; Federal standards follow the design value form of the NAAQS
[#] More detailed health effect information can be found in the 2012 AQMP Appendix I or the U.S. EPA NAAQS documentation at http://www.epa.gov/ttn/naaqs/

U.S. EPA allows certain air quality data to be flagged in the U.S. EPA Air Quality System (AQS) database and not considered for NAAQS attainment status when that data is influenced by exceptional events, such as high winds, wildfires, volcanoes, or some cultural events (Independence Day fireworks) that meet strict requirements. For a few PM measurements in the Basin in 2007 and 2008, the District applied the U.S. EPA Exceptional Events Rule to flag PM10 and PM2.5 data due to high wind natural events, wildfires and Independence Day fireworks (the District has submitted the required documentation and U.S EPA concurrence with these flags is pending). In the Coachella Valley, PM10 data has been flagged for high wind natural events, under the current Exceptional Events Rule and the previous U.S. EPA Natural Events Policy[1]. All of the exceptional event flags through 2011 have been submitted by the District to U.S. EPA's AQS along with the data. The most recent of these are pending submittal of the District's final documentation for each event and all are pending U.S. EPA concurrence. The pending PM10 redesignation request for the Coachella Valley may hinge on U.S EPA's concurrence with the exceptional event flags and the appropriate treatment of these uncontrollable natural events.

In this chapter and in Appendix II, air quality statistics are presented for the maximum concentrations measured at stations or in air basins, as well as for the number of days exceeding state or federal standards. These statistics are instructive in regards to trends and control effectiveness. However, it should be noted that an exceedance of the concentration level of a federal standard does not necessarily mean that the NAAQS was violated or that it would cause a nonattainment designation. The form of the standard must also be considered. For example, for 24-hour PM2.5, the form of the standard is the 98th percentile measurement of all of the 24-hour PM2.5 samples at each station. For 8-hour ozone, the form of the standard is the 4th highest measured 8-hour average concentration at each station. For NAAQS attainment/nonattainment decisions, the most recent 3 years of data are considered (1 year for CO and 24-hour SO_2), along with the form of the standard, and are typically averaged to calculate a *design value*[2] for each station. The overall design value for an air basin is the highest

[1] The U.S. EPA Exceptional Events Rule, *Treatment of Data Influence by Exceptional Events*, became effective May 21, 2007. The previous U.S. EPA *Natural Events Policy* for Particulate Matter was issued May 30, 1996. On July 6, 2012, U.S. EPA released the *Draft Guidance To Implement Requirements for the Treatment of Air Quality Monitoring Data Influenced by Exceptional Events* for public comment.

[2] A design value is a statistic that describes the air quality status of a given area relative to the level and form of the National Ambient Air Quality Standards (NAAQS). For most criteria pollutants, the design value is a 3-year average and takes into account the form of the short-term standard (e.g., 98th percentile, fourth high value, etc.) Design values are especially helpful when the standard is exceedance-based (e.g. 1-hour ozone, 24-hour PM10, etc.) because they are expressed as a concentration instead of an exceedance count, thereby allowing a direct comparison to the level of the standard.

design value of all the stations in that basin. Table 2-2 shows the NAAQS, along with the design value and form of each federal standard.

TABLE 2-2

National Ambient Air Quality Standards (NAAQS) and Design Value Requirements

POLLUTANT	AVERAGING TIME	STANDARD LEVEL	DESIGN VALUES AND FORM OF STANDARDS*
Ozone (O_3)	1-Hour** (1979)	0.12 ppm	Not to be exceeded more than once per year averaged over 3 years
	8-Hour** (1997)	0.08 ppm	Annual fourth highest 8-hour average concentration, averaged over 3 years
	8-Hour (2008)	0.075 ppm	Annual fourth highest 8-hour average concentration, averaged over 3 years
Carbon Monoxide (CO)	1-Hour	35 ppm	Not to be exceeded more than once a year
	8-Hour	9 ppm	
Nitrogen Dioxide (NO_2)	1-Hour	100 ppb	3-year avg. of the annual 98th percentile of the daily maximum 1-hour average concentrations (rounded)
	Annual	0.053 ppm	Annual avg. concentration, averaged over 3 years
Sulfur Dioxide (SO_2)	1-Hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	24-Hour#	0.14 ppm	Not to be exceeded more than once per year
	Annual#	0.03 ppm	Annual arithmetic average
Particulate Matter (PM10)	24-Hour	150 $\mu g/m^3$	Not to be exceeded more than once per year averaged over 3 years
	Annual**	50 $\mu g/m^3$	Annual average concentration, averaged over 3 years
Particulate Matter (PM2.5)	24-Hour	35 $\mu g/m^3$	3-year average of the annual 98th percentile of daily 24-hour concentration
	Annual	15.0 $\mu g/m^3$	Annual avg. concentration, averaged over 3 years
Lead (Pb)	3-Month Rolling##	0.15 $\mu g/m^3$	Highest rolling 3-month average of the 3 years

* Standard is attained when the design value (form of concentration listed) is equal to or less than the NAAQS; for pollutants with the design values based on "exceedances" (1-hour O_3, 24-hour PM10, CO, and 24-hour SO_2), the NAAQS is attained when the concentration associated with the design value is less than or equal to the standard:

- For 1-hour O_3 and 24-hour PM10, the standard is attained when the 4th highest daily concentrations of the 3-year period is less than or equal to the standard
- For CO and 24-hour SO_2, the standard is attained when the 2nd highest daily concentration of the most recent year is equal to or less than the standard

** Standard is revoked or revised. For 1-hour O_3, nonattainment areas have some continuing obligations under the former 1979 standard. For 8-hour O_3, standard is lowered from (0.08 ppm to 0.075 ppm), but the 1997 O_3 standard and most related implementation rules remain in place until the 1997 standard is revoked by U.S. EPA

\# Annual and 24-hour SO_2 NAAQS will be revoked one year from attainment designations for the new (2010) 1-hour SO_2 standard

\## 3-month rolling averages of the first year (of the three year period) include November and December monthly averages of the prior year. The 3-month average is based on the average of "monthly" averages

NAAQS Attainment Status

Figure 2-1 shows the South Coast and Coachella Valley 3-year design values (2009-2011) for ozone and PM2.5, as a percentage of the corresponding federal standards. The current status of NAAQS attainment for the criteria pollutants is presented in Table 2-3 for the Basin and in Table 2-4 for the Riverside County portion of the SSAB (Coachella Valley).

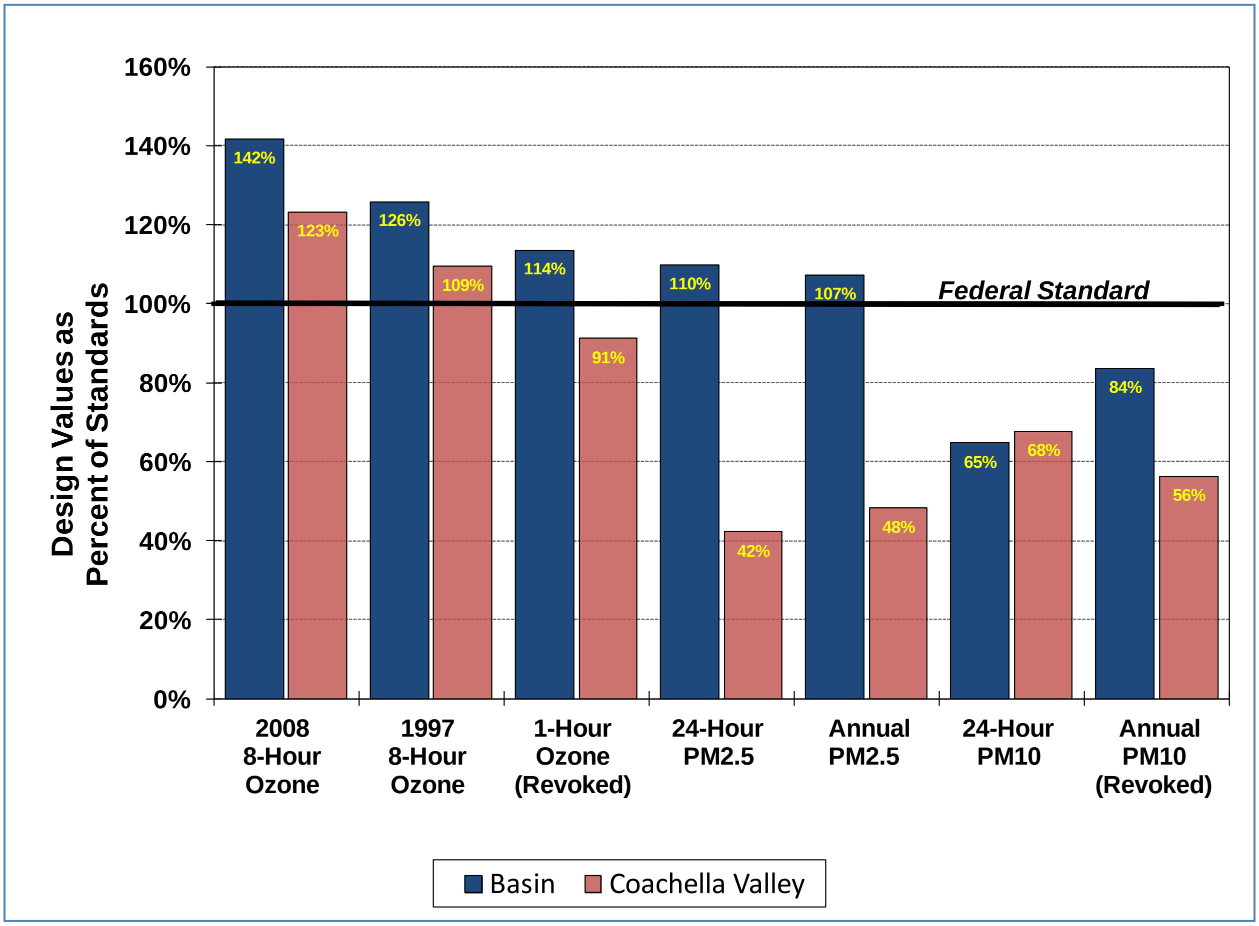


FIGURE 2-1

South Coast Air Basin and Coachella Valley 3-Year (2009-2011) Design Values
(Percentage of Federal Standards, by Criteria Pollutant)

TABLE 2-3

National Ambient Air Quality Standards (NAAQS) Attainment Status
South Coast Air Basin

CRITERIA POLLUTANT	AVERAGING TIME	DESIGNATION [a)]	ATTAINMENT DATE [b)]
1979 **1-Hour Ozone**[c)]	1-Hour (0.12 ppm)	Nonattainment (Extreme)	11/15/2010 (not attained)[c)]
1997 **8-Hour Ozone**[d)]	8-Hour (0.08 ppm)	Nonattainment (Extreme)	6/15/2024
2008 **8-Hour Ozone**	8-Hour (0.075 ppm)	Nonattainment (Extreme)	12/31/2032
CO	1-Hour (35 ppm) 8-Hour (9 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
NO_2[e)]	1-Hour (100 ppb)	Unclassifiable/Attainment	Attained
	Annual (0.053 ppm)	Attainment (Maintenance)	9/22/1998
SO_2[f)]	1-Hour (75 ppb)	Designations Pending	Pending
	24-Hour (0.14 ppm) Annual (0.03 ppm)	Unclassifiable/Attainment	3/19/1979 (attained)
PM10	24-hour (150 $\mu g/m^3$)	Nonattainment (Serious)[g)]	12/31/2006 (redesignation request submitted)[g)]
PM2.5	24-Hour (35 $\mu g/m^3$)	Nonattainment	12/14/2014[h)]
	Annual (15.0 $\mu g/m^3$)	Nonattainment	4/5/2015
Lead	3-Months Rolling (0.15 $\mu g/m^3$)	Nonattainment (Partial)[i)]	12/31/2015

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable

b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for attainment demonstration

c) 1-hour O_3 standard (0.12 ppm) was revoked, effective June 15, 2005; however, the Basin has not attained this standard based on 2008-2010 data and has some continuing obligations under the former standard

d) 1997 8-hour O_3 standard (0.08 ppm) was reduced (0.075 ppm), effective May 27, 2008; the 1997 O_3 standard and most related implementation rules remain in place until the 1997 standard is revoked by U.S. EPA

e) New NO_2 1-hour standard, effective August 2, 2010; attainment designations January 20, 2012; annual NO_2 standard retained

f) The 1971 annual and 24-hour SO_2 standards were revoked, effective August 23, 2010; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO_2 1-hour standard. Area designations are expected in 2012, with Basin designated Unclassifiable /Attainment

g) Annual PM10 standard was revoked, effective December 18, 2006; redesignation request to Attainment of the 24-hour PM10 standard is pending with U.S. EPA

h) Attainment deadline for the 2006 24-Hour PM2.5 NAAQS is December 14, 2014

i) Partial Nonattainment designation – Los Angeles County portion of Basin only

TABLE 2-4

National Ambient Air Quality Standards (NAAQS) Attainment Status
Coachella Valley Portion of the Salton Sea Air Basin

CRITERIA POLLUTANT	AVERAGING TIME	DESIGNATION [a]	ATTAINMENT DATE [b]
1979 **1-Hour Ozone**[c]	1-Hour (0.12 ppm)	Nonattainment (Severe-17)	11/15/2007 (not timely attained[c])
1997 **8-Hour Ozone**[d]	8-Hour (0.08 ppm)	Nonattainment (Severe-15)	6/15/2019
2008 **8-Hour Ozone**	8-Hour (0.075 ppm)	Nonattainment (Severe-15)	12/31/2027
CO	1-Hour (35 ppm) 8-Hour (9 ppm)	Unclassifiable/Attainment	Attained
NO_2[e]	1-Hour (100 ppb)	Unclassifiable/Attainment	Attained
	Annual (0.053 ppm)	Unclassifiable/Attainment	Attained
SO_2[f]	1-Hour (75 ppb)	Designations Pending	Pending
	24-Hour (0.14 ppm) Annual (0.03 ppm)	Unclassifiable/Attainment	Attained
PM10	24-hour (150 $\mu g/m^3$)	Nonattainment (Serious)[g]	12/31/2006 (redesignation request submitted)[g]
PM2.5	24-Hour (35 $\mu g/m^3$) Annual (15.0 $\mu g/m^3$)	Unclassifiable/Attainment	Attained
Lead	3-Months Rolling (0.15 $\mu g/m^3$)	Unclassifiable/Attainment	Attained

a) U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable
b) A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for attainment demonstration
c) 1-hour O_3 standard (0.13 ppm) was revoked, effective June 15, 2005; the Southeast Desert Modified Air Quality Management Area, including the Coachella Valley, has not attained this standard based on 2005-2007 data and has some continuing obligations under the former standard (latest 2009-2011 data shows attainment)
d) 1997 8-hour O_3 standard (0.08 ppm) was reduced (0.075 ppm), effective May 27, 2008; the 1997 O_3 standard and most related implementation rules remain in place until the 1997 standard is revoked by U.S. EPA
e) New NO_2 1-hour standard, effective August 2, 2010; attainment designations January 20, 2012; annual NO_2 standard retained
f) The 1971 Annual and 24-hour SO_2 standards were revoked, effective August 23, 2010; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO_2 1-hour standard. Area designations expected in 2012 with SSAB designated Unclassifiable /Attainment
g) Annual PM10 standard was revoked, effective December 18, 2006; redesignation request to Attainment of the 24-hour PM10 standard is pending with U.S. EPA

In 2011, the Basin exceeded federal standards for either ozone or PM2.5 at one or more locations on a total of 124 days, based on the current federal standards for 8-hour ozone and 24-hour PM2.5. Despite substantial improvement in air quality over the past few decades, some air monitoring stations in the Basin still exceed the NAAQS for ozone more frequently than any other stations in the U.S. In 2011, three of the top five stations in the nation most frequently exceeding the 8-hour federal ozone NAAQS were located within the Basin (i.e., Central San Bernardino Mountains, East San Bernardino Valley and Metropolitan Riverside County). In the year 2011, the former 1-hour[3] and current 8-hour average federal standard levels for ozone were exceeded at one or more Basin locations on 16 and 106 days, respectively.

PM2.5 in the Basin has improved significantly in recent years, with 2010 and 2011 being the cleanest years on record. In 2011, only one station in the Basin (Metropolitan Riverside County at Mira Loma) exceeded the annual PM2.5 NAAQS and the 98th percentile form of the 24-hour PM2.5 NAAQS, as well as the 3-year design values for these standards. (Although other stations had 24-hour averages exceeding the federal 24-hour PM2.5 standard concentration level in 2011, the 98th percentile concentration did not exceed.) Basin-wide, the federal PM2.5 24-hour standard level was exceeded in 2011 on 17 sampling days[4].

The Basin and the Coachella Valley have technically met the PM10 NAAQS and redesignation for attainment for the federal PM10 standard has been requested for both. These requests are still pending with U.S. EPA at this time[5].

The District is currently in attainment for the federal standards for SO_2, CO, and NO_2. While the concentration level of the new 1-hour NO_2 federal standard (100 ppb) was exceeded in the Basin at two stations (Central Los Angeles and Long Beach, on the same day) in 2011, the NAAQS NO_2 design value has not been exceeded (the 3-year average of the annual 98th percentile of the daily 1-hour maximums). Therefore, the Basin remains in attainment of the NO_2 NAAQS. U.S. EPA requirements for future

[3] The federal 1-hour O_3 NAAQS has been revoked by U.S. EPA, although certain nonattainment areas, including the Basin, may be still required to demonstrate attainment of that standard based on recent court decisions.

[4] The number of PM exceedances may have been higher at some locations, since PM2.5 samples are collected every 3 days at most sites. However, seven sites sample every day, including the Basin maximum concentration stations. PM10 filter samples are collected every 6 days, except at the design value maximum sites in the Basin and the Coachella Valley at which samples are collected every 3 days. Daily PM10 data for the Basin maximum stations is provided by supplementing the filter measurements with Federal Equivalent Method (FEM) continuous monitors. The gaseous pollutants, including O_3, NO_2, SO_2, and CO, are sampled continuously.

[5] U.S. EPA has requested additional PM10 monitoring in the southeastern Coachella Valley for a 1-year period to further assess windblown dust in that area. This project is currently ongoing.

near-road NO_2 measurements are not a part of the current ambient NO_2 NAAQS determinations.

U.S. EPA designated the Los Angeles County portion of the Basin (excluding the high desert areas, and San Clemente and Santa Catalina Islands) as nonattainment for the recently revised (2008) federal lead standard (0.15 $\mu g/m^3$, rolling 3-month average), due to the addition of source- specific monitoring under the new federal regulation. This designation was based on two source-specific monitors in Vernon and in the City of Industry exceeding the new standard in the 2007-2009 period of data used. For the most recent 2009-2011 data period, only one of these stations (Vernon) still exceeded the lead standard, with a maximum 3-month rolling average of 0.67 $\mu g/m^3$ occurring in 2009. In 2011, the rolling 3-month average at that site was 0.46 $\mu g/m^3$.

The remainder of the Basin, outside the Los Angeles County nonattainment area, and the Coachella Valley remain in attainment of the 2008 lead standard and no ambient monitors exceed that are not source-oriented. For areas in attainment of the old 1978 lead standard (1.5 $\mu g/m^3$, as a quarterly average), the old standard remained in effect until one year after an area was designated for the 2008 standard. While the entire Basin and the Coachella Valley have remained in attainment of the 1978 lead standard, U.S. EPA's current lead designations for the new standard became effective on December 31, 2010; thus, the old standard is now superseded by the 2008 revised NAAQS. A separate SIP revision addressing the 2008 lead standard has been submitted to U.S. EPA.

CURRENT AIR QUALITY

In 2011, O_3, PM2.5, NO_2 and Pb exceeded federal standard concentration levels at one or more of the routine monitoring stations in the Basin. An exceedance of the concentration level does not necessarily mean a violation of the NAAQS, given that the form of the standard must be considered. For example, the Basin did not violate the federal NO_2 standard, based on the form of the standard. Ozone and PM10 concentrations exceeded the federal standard concentration levels in the Coachella Valley.

The PM2.5 2011 maximum 24-hour average (94.6 $\mu g/m^3$, measured in the East San Gabriel Valley area) and annual average (15.3 $\mu g/m^3$, measured in the Metropolitan Riverside County area) concentrations were 266 and 101 percent of the federal 24-hour and annual average standard concentration levels, respectively. The highest 24-

hour PM2.5 concentration in the Basin, mentioned above, was recorded on July 5, 2011, associated with Independence Day firework activities and has been flagged in the U.S. EPA Air Quality System (AQS) database for exclusion for NAAQS compliance consideration according to the U.S. EPA Exceptional Event Rule. The next highest 24-hour average PM2.5 concentration was 65 $\mu g/m^3$ recorded in Central San Bernardino Valley. The PM2.5 federal standard was nearly exceeded on one day in the Coachella Valley, during an exceptional event in which dust was entrained by outflow from a large summertime thunderstorm complex over Arizona and Mexico, transporting high concentrations of PM10 and PM2.5 into the Coachella Valley. None of these three stations with the highest 24-hour average PM2.5 concentrations had 98th percentile concentrations exceeding the standard. Only the Metropolitan Riverside County (Mira Loma) station had a 98th percentile concentration over the 24-hour federal standard.

The 2011 maximum PM10 24-hour average concentration measured in the South Coast Air Basin was 152 $\mu g/m^3$ in the Metropolitan Riverside County area, nearly 100% of the federal standard (but not exceeding it, since a concentration of 155 $\mu g/m^3$ is needed to exceed the PM10 standard). This maximum 24-hour average concentration was measured with a Federal Equivalent Method (FEM) continuous monitor. The highest 24-hour PM10 concentration in the Basin measured with the Federal Reference Method (FRM) filter sampler was 84 $\mu g/m^3$ recorded in Central San Bernardino Valley, 56 percent of the standard. The maximum annual average PM10 concentration (42.3 $\mu g/m^3$ in the Metropolitan Riverside County area) is 85 percent of the former (now revoked) federal annual average standard level. The two routine AQMD monitoring stations in the Coachella Valley exceeded the 24-hour PM10 federal standard on two days, both related to windblown dust generated by thunderstorm activity. These two days have been flagged by the District in the U.S. EPA AQS database for consideration under the Exceptional Event Rule.

The 2011 maximum ozone concentrations continued to exceed federal standards by wide margins. Maximum 1-hour and 8-hour average ozone concentrations (0.160 ppm and 0.136 ppm, both recorded in the Central San Bernardino Mountains area) were 128 and 181 percent of the former 1-hour and current 8-hour federal standards, respectively. The Coachella Valley did not exceed the former 1-hour federal standard in 2011, but the maximum 8-hour concentration (0.098 ppm) was 130 percent of the current federal standard.

The maximum 1-hour average NO_2 concentration in 2011 (110 ppb, measured in Central Los Angeles) was 109 percent of the federal standard, exceeding the concentration level, but not the 98th percentile form of the NAAQS. Lead concentrations in 2011 were well below the recently (2008) revised federal standard at all ambient monitoring sites not located near lead sources. However, the source-specific monitoring site immediately downwind of a stationary lead source in the City of Vernon recorded a maximum 3-month rolling average of 0.46 μg/m^3, or 297 percent of the standard. Concentrations of other criteria pollutants (SO_2 and CO) remained well below the federal standards.

Figure 2-2 shows the trend of maximum pollutant concentrations in the Basin for the past two decades, as percentages of the corresponding federal standards. Most pollutants show significant improvement over the years, with PM2.5 showing the most dramatic decrease. Again, these are maximum concentrations and actual attainment of the standards is based on the design value.

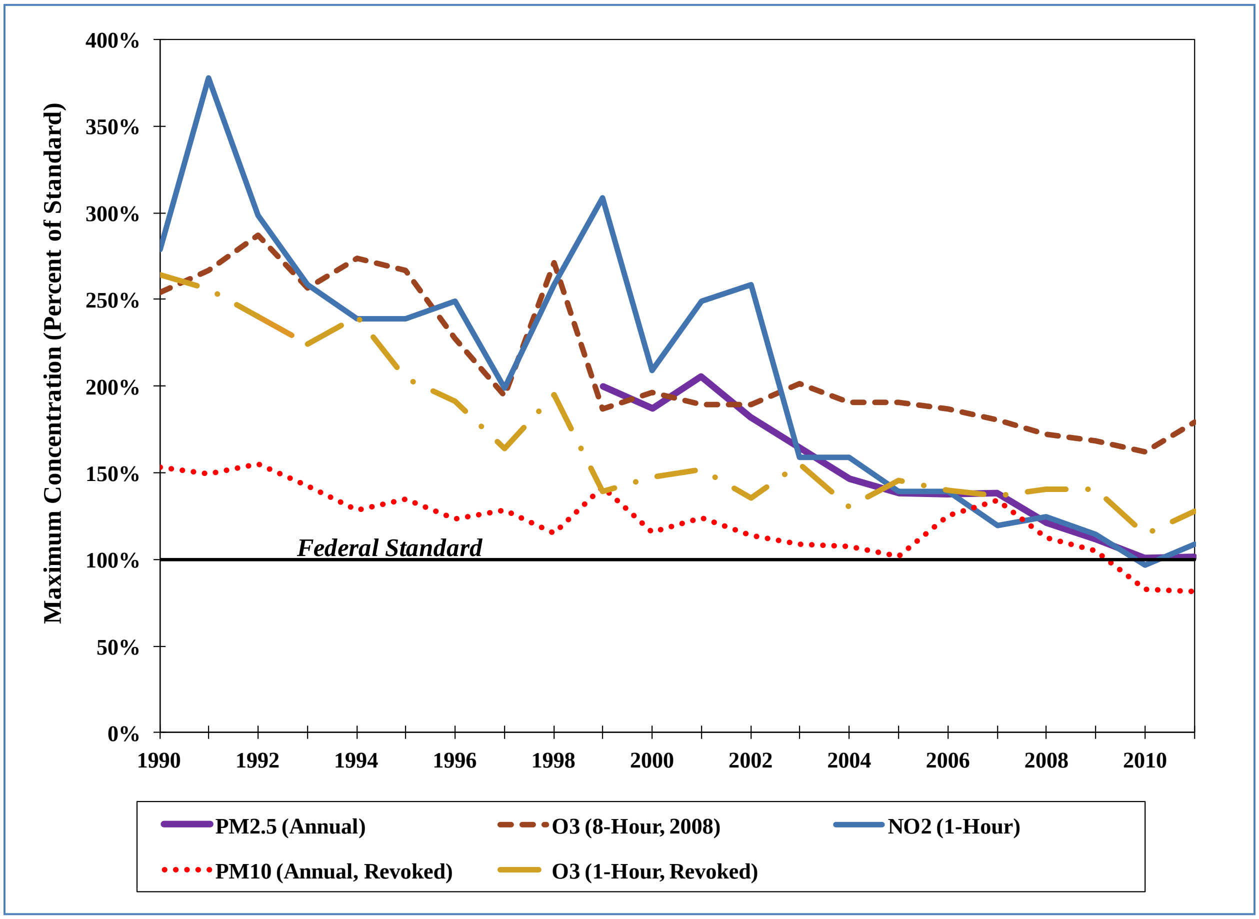


FIGURE 2-2

Trends of South Coast Air Basin Maximum Pollutant Concentrations
(Percentages of Federal Standards)

Particulate Matter (PM2.5 and PM10) Specific Information

Health Effects, Particulate Matter

A significant body of peer-reviewed scientific research, including studies conducted in Southern California, points to adverse impacts of particulate matter air pollution on both increased illness (morbidity) and increased death rates (mortality). The 2009 U.S. EPA *Integrated Science Assessment for Particulate Matter*[6] describes these health effects and discusses the state of the scientific knowledge. A summary of health effects information and additional references can also be found in the 2012 AQMP, Appendix I.

There was considerable controversy and debate surrounding the review of particulate matter health effects and the consideration of ambient air quality standards when U.S. EPA promulgated the initial PM2.5 standards in 1997[7]. Since that time, numerous additional studies have been published[8]. In addition, some of the key studies supporting the 1997 standards were closely scrutinized and the analyses repeated and extended. These reanalyses confirmed the initial findings associating adverse health effects with PM exposures.

Several studies have found correlations between elevated ambient particulate matter levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks, and the number of hospital admissions in different parts of the United States and in various areas around the world. In recent years, studies have reported an association between long-term exposure to PM2.5 and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in PM2.5 concentration levels have also been related to increased mortality due to cardiovascular or respiratory diseases, hospital admissions for acute respiratory conditions, school and kindergarten absences, a decrease in respiratory function in normal children, and increased medication use in children and adults with asthma. Long-term exposure to PM has been found to be associated with reduced lung function growth in children. The elderly, people with pre-existing respiratory

[6] U.S. EPA. (2009). Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F.

[7] Vedal, S. (1997). Critical Review. Ambient Particles and Health: Lines that Divide. JAMA, 47(5):551-581.

[8] Kaiser, J. (2005). Mounting Evidence Indicts Fine-Particle Pollution. Science, 307:1858-1861.
Enstrom, J.E. (2005), "Fine particulate air pollution and total mortality among elderly Californians, 1973–2002," *Inhalation Toxicology* 17:803–16

and/or cardiovascular disease, and children appear to be more susceptible to the effects of PM10 and PM2.5.

The U.S. EPA, in its most recent review, has concluded that long term exposure to PM2.5 is causally related to increases in mortality rates. Despite this, skepticism remains among some quarters whether exposures to PM2.5 in California are responsible for increases in mortality.[9] An expanded discussion of studies relating to PM exposures and mortality is contained in Appendix I of this document.

Air Quality, PM2.5

The District began regular monitoring of PM2.5 in 1999 following the U.S. EPA's adoption of the national PM2.5 standards in 1997. In 2011, PM2.5 concentrations were monitored at 21 locations throughout the District, 20 of which had filter-based FRM monitoring sites while one had only continuous monitoring. Six sites had collocated, continuous monitoring in addition to the FRM samplers. The maximum 24-hour and annual average PM2.5 concentrations in 2011 are shown in Tables 2-5 and 2-6.

Figure 2-3 maps the distribution of annual average PM2.5 concentrations in different areas of the Basin. Similar to PM10 concentrations, PM2.5 concentrations were higher in the inland valley areas of metropolitan Riverside County (highest at the Mira Loma Station). PM2.5 concentrations were also elevated in the metropolitan area of Los Angeles County, but did not exceed the level of the annual federal standard in 2011. Although maximum 24-hour concentrations exceed the standard, the 98th percentile form of the 2009-2011 design value only exceeded the standard at one station in Metropolitan Riverside County (Mira Loma).

The higher PM2.5 concentrations in the Basin are mainly due to the secondary formation of smaller particulates resulting from mobile, stationary and area source emissions of precursor gases (i.e., NOx, SOx, NH_4, and VOC) that are converted to PM in the atmosphere. In contrast to PM10, PM2.5 concentrations were low in the Coachella Valley area of SSAB. PM10 concentrations are normally higher in the desert areas due to windblown and fugitive dust emissions; PM2.5 is relatively low in the desert area due to fewer combustion-related emissions sources.

[9] CARB Symposium: Estimating Premature Deaths from Long-term Exposure to PM2.5, February 26, 2010, [http://www.arb.ca.gov/research/health/pm-mort/pm-mort-ws_02-26-10.htm].

TABLE 2-5

2011 Maximum 24-hour Average PM2.5 Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 24-HR AVERAGE# (μG/M^3)	PERCENT OF FEDERAL STANDARD* (35 μG/M^3)	AREA
South Coast Air Basin			
Los Angeles**	49.5	139	East San Gabriel Valley
Orange	39.2	110	Central Orange County
Riverside	60.8	171	Metropolitan Riverside County
San Bernardino	65.0	183	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside***	35.4	99.7	Coachella Valley

Based on FRM data

* Although maximum 24-hour concentrations exceed the standard, the 98th percentile form of the 2009-2011 design value only exceeded the standard at one station in Metropolitan Riverside County (Mira Loma)

** One higher concentration that was recorded due to "Independence Day" firework activities has been flagged for exclusion from NAAQS comparison in accordance with the U.S. EPA Exceptional Events Rule; with this data included, the 2009-2011 design value for East San Gabriel Valley would also exceed the federal standard

*** While this concentration of 35.4 μg/m^3 is near the level of the standard, it is technically not exceeding the standard (35.5 μg/m^3 exceeds); this concentration was associated with a high wind exceptional event

TABLE 2-6

2011 Maximum Annual Average PM2.5 Concentrations by Basin and County

BASIN/COUNTY	ANNUAL AVERAGE* (μG/M^3)	PERCENT OF FEDERAL STANDARD (15 μG/M^3)	AREA
South Coast Air Basin			
Los Angeles	13.3	89	Central Los Angeles
Orange	11.0	73	Central Orange County
Riverside	15.3	101	Metropolitan Riverside County
San Bernardino	13.3	89	Southwest San Bernardino Valley
Salton Sea Air Basin			
Riverside	7.1	47	Coachella Valley

* Based on FRM data

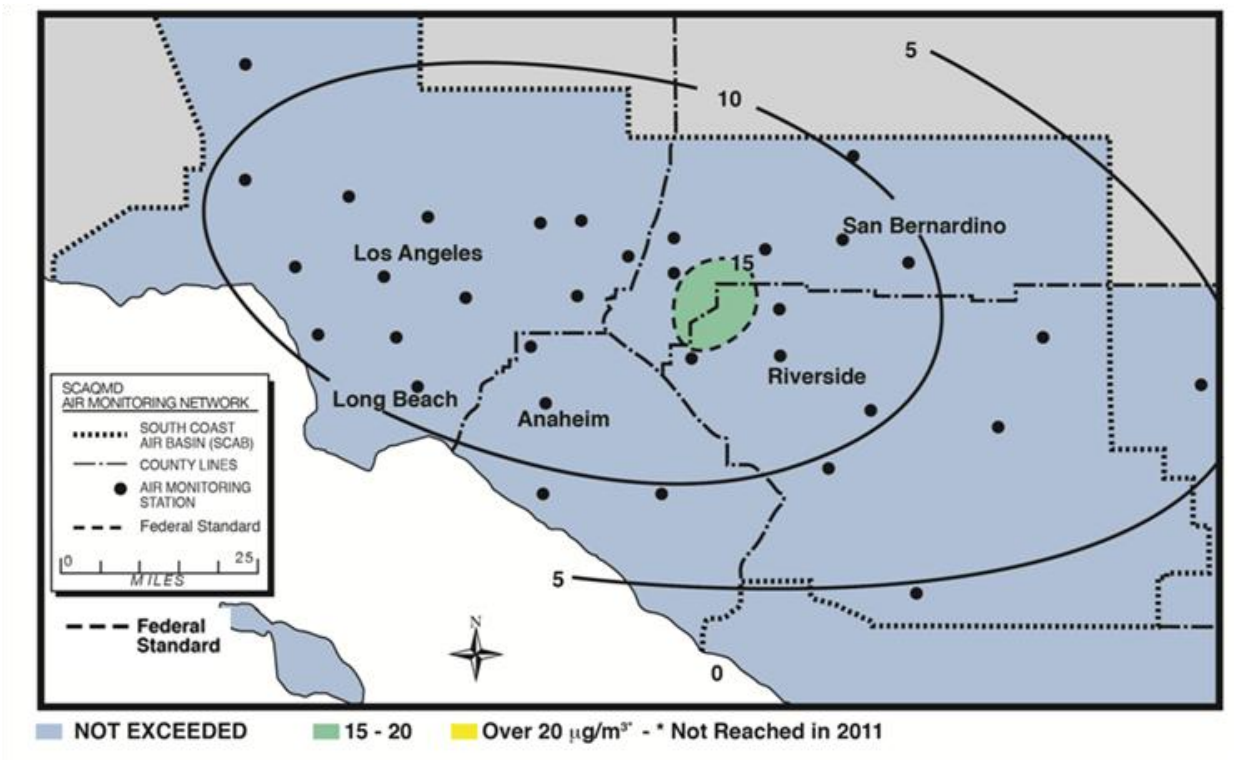


FIGURE 2-3

2011 PM2.5: Annual Average Concentration Compared to the Federal Standard
(Federal standard = 15 µg/m^3, annual arithmetic mean)

Air Quality, PM10

In 2011, the District monitored PM10 concentrations at 25 routine sampling locations, 22 with Federal Reference Method (FRM) filter samplers and 3 with Federal Equivalent Method (FEM) continuous monitors. Five sites had collocated FRM and FEM samplers. Maximum 24-hour and annual average PM10 concentrations in 2011 are shown in Tables 2-7 and 2-8.

The highest annual PM10 concentrations were recorded in Riverside and San Bernardino Counties, in and around the metropolitan Riverside County area and further inland in the San Bernardino valley areas. The federal 24-hour standard was not exceeded at any of the locations monitored in 2011, although Riverside County came close with a 24-hour average concentration of 152 µg/m^3 (155 µg/m^3 is needed to exceed). The revoked annual average PM10 federal standard (50 µg/m^3) was not exceeded in either the Basin or the Coachella Valley in 2011. The much more stringent state standards were exceeded in most areas of the Basin and in the Coachella Valley.

TABLE 2-7

2011 Maximum 24-hour Average PM10 Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 24-HR AVERAGE* (μG/M^3)	PERCENT OF FEDERAL STANDARD (150 μG/M^3)#	AREA
South Coast Air Basin			
Los Angeles	119	77	Central Los Angeles
Orange	79	51	Central Orange County
Riverside	152	98	Metropolitan Riverside County
San Bernardino	127	82	Central San Bernardino Valley
Salton Sea Air Basin**			
Riverside	120	77	Coachella Valley

* Based on the FRM and FEM data

** Higher concentrations were recorded for high wind events in the Coachella Valley which have been flagged for exclusion from NAAQS comparison in accordance with the U.S. EPA Exceptional Events Rule

\# 155 μg/m^3 is needed to exceed the PM10 standard

TABLE 2-8

2011 Maximum Annual Average PM10 Concentrations by Basin and County

BASIN/COUNTY	ANNUAL AVERAGE* (μG/M^3)	PERCENT OF FEDERAL STANDARD** (50 μG/M^3)	AREA
South Coast Air Basin			
Los Angeles	32.7	64	East San Gabriel Valley
Orange	24.9	49	Central Orange County
Riverside	41.4	81	Metropolitan Riverside County
San Bernardino	31.8	62	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	32.6	64	Coachella Valley

* Based on the FRM and FEM data

** The federal annual PM10 standard was revoked in 2006

Ozone (O_3) Specific Information

Health Effects, O_3

The adverse effects of ozone air pollution exposure on health have been studied for many years, as is documented by a significant body of peer-reviewed scientific research, including studies conducted in southern California. The 2006 U.S. EPA document, *Air Quality Criteria for Ozone and Related Photochemical Oxidants*[10], describes these health effects and discusses the state of the scientific knowledge and research. A summary of health effects information and additional references can also be found in the 2012 AQMP, Appendix I.

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups to ozone effects. Short-term exposures (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences and daily hospital admission rates. An increased risk for asthma has been found in children who participate in multiple sports and live in high ozone communities.

Ozone exposure under exercising conditions is known to increase the severity of the above-mentioned observed responses. Animal studies suggest that exposures to a combination of pollutants which include ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Air Quality, O_3

In 2011, the District regularly monitored ozone concentrations at 29 locations in the Basin and the Coachella Valley portion of the SSAB. All areas monitored measured 1-hour average ozone levels well below the Stage 1 episode level (0.20 ppm), but the maximum concentrations measured in the Basin exceeded the health advisory level (0.15 ppm, 1-hour) in San Bernardino County. The maximum ozone concentrations in Los Angeles, Riverside and San Bernardino Counties all exceeded the former

[10] U.S. EPA. (2006). Air Quality Criteria for Ozone and Related Photochemical Oxidants (2006 Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/004aF-cF.

1-hour federal standard in 2011; Orange County and the Coachella Valley did not exceed that standard. Maximum ozone concentrations in the SSAB areas monitored by the District were lower than in the Basin and were below the health advisory level. All counties of the Basin and the Coachella Valley exceeded the current 8-hour ozone standard in 2011. Tables 2-9 and 2-10 show maximum 1-hour and 8-hour ozone concentrations by air basin and county.

TABLE 2-9

2011 Maximum 1-Hour Average Ozone Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 1-HR AVERAGE (PPM)	PERCENT OF FEDERAL STANDARD (0.12 PPM)	AREA
South Coast Air Basin			
Los Angeles	0.144	115	Santa Clarita Valley
Orange	0.095	76	North Orange County
Riverside	0.133	106	Lake Elsinore
San Bernardino	0.160	128	Central San Bernardino Mountains
Salton Sea Air Basin			
Riverside	0.124	99	Coachella Valley

TABLE 2-10

2011 Maximum 8-Hour Average Ozone Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 8-HR AVERAGE (PPM)	PERCENT OF FEDERAL STANDARD (0.075 PPM)	AREA
South Coast Air Basin			
Los Angeles	0.122	162	Santa Clarita Valley
Orange	0.083	110	Saddleback Valley
Riverside	0.115	152	Metropolitan Riverside County
San Bernardino	0.136	180	Central San Bernardino Mountains
Salton Sea Air Basin			
Riverside	0.098	130	Coachella Valley

The number of days exceeding federal standards for ozone in the Basin varies widely by area. Figures 2-4 and 2-5 map the number of days in 2011 exceeding the current 8-hour and former 1-hour ozone federal standards in different areas of the Basin in 2011. The former 1-hour federal standard was not exceeded in areas along or near the coast in the Counties of Los Angeles and Orange, due in large part to the prevailing sea breeze which transports emissions inland before high ozone concentrations are reached. The standard was exceeded most frequently in the Central San Bernardino Mountains. Ozone exceedances also extended through San Bernardino and Riverside County valleys in the eastern Basin, as well as the northeast and northwest portions of Los Angeles County in the foothill and valley areas. The number of exceedances of the 8-hour federal ozone standard was also lowest at the coastal areas, increasing towards the Riverside and San Bernardino valleys and the adjacent mountain areas. The Central San Bernardino Mountains area recorded the greatest number of exceedances of the 1-hour and 8-hour federal standards (8 days and 84 days, respectively) and 8-hour state standard (103 days). While the Coachella Valley did not exceed the former 1-hour ozone standard in 2011, the 2008 8-hour federal standard was exceeded on 54 days.

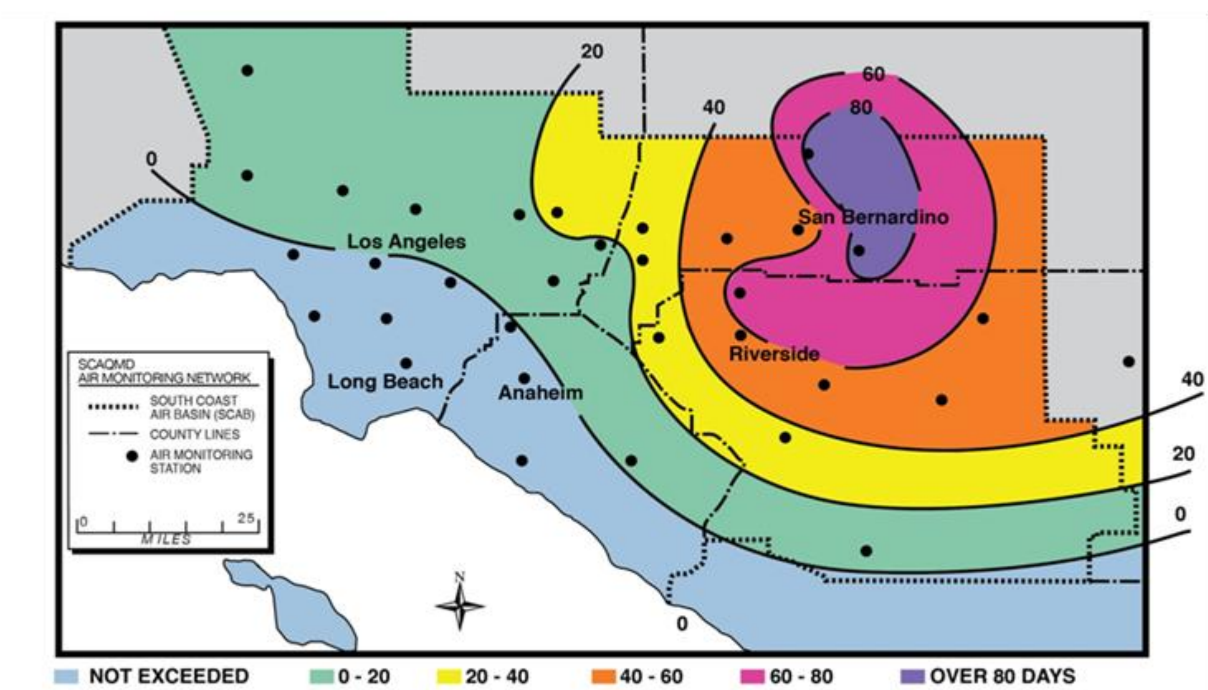


FIGURE 2-4

Number of Days in 2011 Exceeding the 2008 8-Hour Ozone Federal Standard
(8-hour average O_3 > 0.075 ppm)

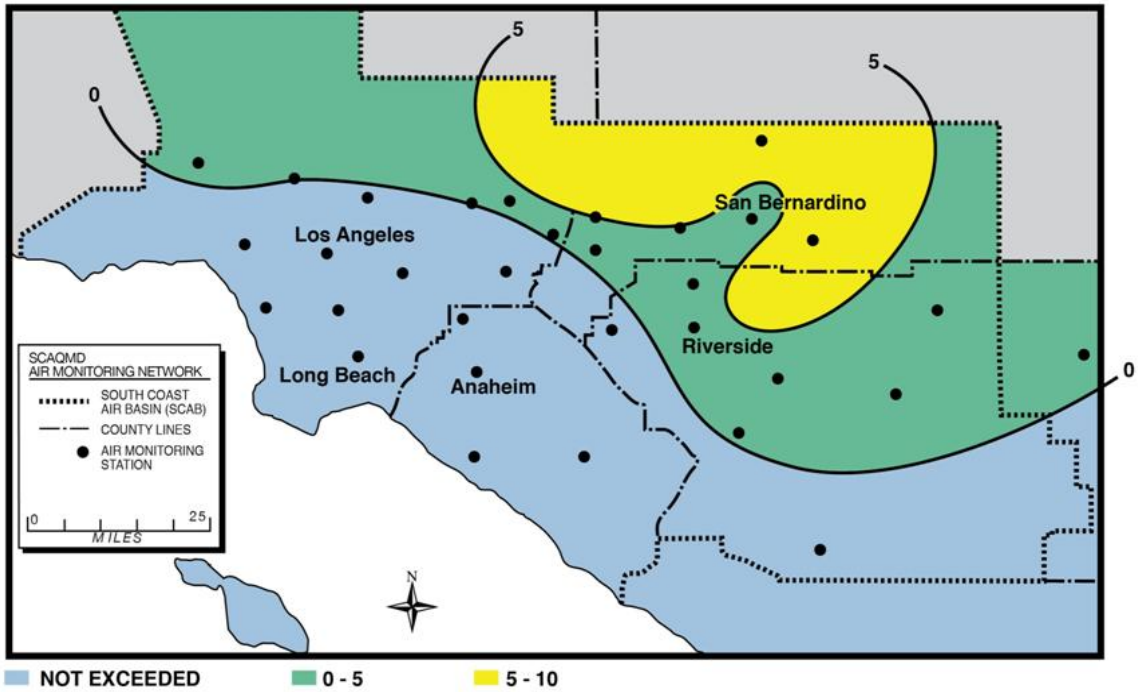


FIGURE 2-5

Number of Days in 2011 Exceeding the 1979 1-Hour Federal Ozone Standard
(1-hour average O_3 > 0.12 ppm)

Other Criteria Air Pollutants

Carbon Monoxide (CO) Specific Information

Health Effects, CO

The adverse effects of ambient carbon monoxide air pollution exposure on health have been recently reviewed in the 2006 U.S. EPA *Integrated Science Assessment for Carbon Monoxide.*[11] This document presents a detailed review of the available scientific studies and conclusions on the causal determination of the health effects of CO. A summary of health effects information and additional references can also be found in the 2012 AQMP, Appendix I.

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest

[11] U.S. EPA. (2010). Integrated Science Assessment for Carbon Monoxide (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/019F.

pain with exercise, and electrocardiograph changes indicative of worsening oxygen supply delivery to the heart.

Inhaled CO has no known direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport, by competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, people with conditions requiring an increased oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include patients with diseases involving heart and blood vessels, fetuses, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reductions in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels. These include pre-term births and heart abnormalities.

Air Quality, CO

Carbon monoxide concentrations were measured at 25 locations in the Basin and neighboring SSAB areas in 2011. Table 2-11 shows the 2011 maximum 8-hour and 1-hour average concentrations of CO by air basin and county.

In 2011, no areas exceeded the CO air quality standards. The highest concentrations of CO continued to be recorded in the areas of Los Angeles County where vehicular traffic is most dense, with the maximum 8-hour and 1-hour concentration (4.7 ppm and 6.0 ppm, respectively) recorded in the South Central Los Angeles County area. All areas of the Basin have continued to remain below the federal standard level since 2003.

TABLE 2-11

2011 Maximum 8-Hour and 1-Hour CO Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 8-HR AVERAGE (PPM)	PERCENT OF FEDERAL STANDARD (9 PPM)	MAXIMUM 1-HR AVERAGE (PPM)	PERCENT OF FEDERAL STANDARD (35 PPM)	AREA
South Coast Air Basin					
Los Angeles	4.7	49	6.0	17	South Central L.A. County
Orange	2.2	23	3.4	10	North Coastal Orange County
Riverside	1.9	20	2.7	8	Metropolitan Riverside County
San Bernardino	1.7	18	1.8	5	Central San Bernardino Valley
Salton Sea Air Basin					
Riverside	0.6	6	3.0	8	Coachella Valley

Nitrogen Dioxide (NO_2) Specific Information

Health Effects, NO_2

The adverse effects of ambient nitrogen dioxide air pollution exposure on health have been recently reviewed in the 2008 U.S. EPA *Integrated Science Assessment for Oxides of Nitrogen – Health Criteria*[12]. This document presents a detailed review of the available scientific studies and conclusions on the causal determination of the health effects of NO_2, including evidence supporting the recently adopted short-term NO_2 standard (1-hour, 100 ppb). A summary of health effects information and additional references can also be found in the 2012 AQMP, Appendix I.

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposures to NO_2 at levels found in homes with gas stoves, which are higher than ambient concentrations found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in

[12] U.S. EPA. (2008). Integrated Science Assessment for Oxides of Nitrogen – Health Criteria (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/071.

individuals with asthma and/or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups. More recent studies have found associations between NO_2 exposures and cardiopulmonary mortality, decreased lung function, respiratory symptoms, and emergency room asthma visits.

In animals, exposure to levels of NO_2 that are considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO_2.

Based on the review of the NO_2 standards, U.S. EPA has established the 1-hour NO_2 standard to protect the public health against short-term exposure. The standard is set at 100 ppb 1-hour average, effective April 7, 2010.

Air Quality, NO_2

In 2011, NO_2 concentrations were monitored at 25 locations, including one in the Coachella Valley. The Basin has not exceeded the federal annual standard for NO_2 (0.0534 ppm) since 1991, when the Los Angeles County portion of the Basin recorded the last exceedance of the standard in any U.S. county. The recently established 1-hour average NO_2 standard (100 ppb), however, was exceeded on one day in 2011 (but the 98th percentile form of the standard was not exceeded). The higher relative concentrations in the Los Angeles area are indicative of the concentrated emission sources, especially motor vehicles. The maximum 1-hour and annual average concentrations for 2011 are shown in Table 2-12, by basin and county.

TABLE 2-12

2011 Maximum 1-Hour and Annual Average NO_2 Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 1-HOUR AVERAGE (PPB)	PERCENT OF FEDERAL STANDARD (100 PPB)	MAXIMUM ANNUAL AVERAGE (PPB)	PERCENT OF FEDERAL STANDARD (53 PPB)	AREA
South Coast Air Basin					
Los Angeles	109.6*	109	24.6	46	Central Los Angeles County; Pomona/Walnut Valley
Orange	73.8	73	17.7	33	Central Orange County
Riverside	63.3	63	16.9	32	Metropolitan Riverside County
San Bernardino	76.4	76	21.1	39	Central San Bernardino Valley
Salton Sea Air Basin					
Riverside	44.7	44	8.0	15	Coachella Valley

* Although the maximum 1-hour concentrations exceeded the standard, the 98th percentile form of the design value did not exceed the NAAQS

Sulfur Dioxide (SO_2) Specific Information

Health Effects, SO_2

The adverse effects of SO_2 air pollution exposure on health have been recently reviewed in the 2008 U.S. EPA *Integrated Science Assessment (ISA) for Sulfur Oxides – Health Criteria*.[13] This document presents a detailed review of the available scientific studies and conclusions on the causal determination of the health effects of SO_2, including the justification to rescind the 24-hour standard and replace it with the new (2010) 1-hour standard (75 ppb). A summary of health effects information and additional references can also be found in the 2012 AQMP, Appendix I.

Individuals affected by asthma are especially sensitive to the effects of SO_2. Exposure to low levels (0.2 to 0.6 ppm) of SO_2 for a few (5-10) minutes can result in airway constriction in some exercising asthmatics. In asthmatics, increase in

[13] U.S. EPA. (2008). Integrated Science Assessment (ISA) for Sulfur Oxides – Health Criteria (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/047F.

resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute high exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2.

Animal studies suggest that even though SO_2 is a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Based on the review of the SO_2 standards, U.S. EPA has established the 1-hour SO_2 standard to protect the public health against short term exposure. The 1-hour average standard is set at 75 ppb, revoking the existing annual (0.03 ppm) and 24-hour (0.14 ppm) standards, effective August 2, 2010.

Air Quality, SO_2

No exceedances of federal or state standards for sulfur dioxide occurred in 2011 at any of the seven District locations monitored. Though sulfur dioxide concentrations remain well below the standards, sulfur dioxide is a precursor to sulfate, which is a component of fine particulate matter. Maximum concentrations of sulfur dioxide for 2011 are shown in Table 2-13. Sulfur dioxide was not measured at the Coachella Valley sites in 2011. Historical measurements showed concentrations in the Coachella Valley to be well below state and federal standards and monitoring has been discontinued.

TABLE 2-13

2011 Maximum 1-Hour Average SO_2 Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 1-HR AVERAGE (PPB)	PERCENT OF FEDERAL STANDARD (75 PPB)	AREA
South Coast Air Basin			
Los Angeles	43.4	57	South Coastal LA County
Orange	7.8	10	North Coastal Orange County
Riverside	51.2	68	Metropolitan Riverside County
San Bernardino	12.4	16	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	N.D.		Coachella Valley

N.D. = No Data. Historical measurements and lack of emissions sources indicate concentrations are well below standards

Sulfates (SO_4^{2-}) Specific Information

Health Effects, SO_4^{2-}

In 2002, CARB reviewed and retained the state standard for sulfates, retaining the concentration level (25 µg/m^3) but changing the basis of the standard from a Total Suspended Particulate (TSP) measurement to a PM10 measurement. In their 2002 staff report,[14] CARB reviewed the health studies related to exposure to ambient sulfates, along with particulate matter, and found an association with mortality and the same range of morbidity effects as PM10 and PM2.5, although the associations were not as consistent as with PM10 and PM2.5. The 2009 U.S. EPA *Integrated Science Assessment for Particulate Matter*[15] also contains a review of sulfate studies. A summary of health effects information can also be found in the 2012 AQMP, Appendix I.

Most of the health effects associated with fine particles and SO_2 at ambient levels are also associated with sulfates. Thus, both mortality and morbidity effects have been observed with an increase in ambient sulfate concentrations. However, efforts to

[14] CARB. (2002). Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates. California Air Resources Board, Sacramento, CA. http://www.arb.ca.gov/regact/aaqspm/isor.pdf

[15] U.S. EPA. (2009). Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F.

separate the effects of sulfates from the effects of other pollutants have generally not been successful.

Clinical studies of asthmatics exposed to sulfuric acid suggest that adolescent asthmatics are possibly a subgroup susceptible to acid aerosol exposure. Animal studies suggest that acidic particles such as sulfuric acid aerosol and ammonium bisulfate are more toxic than non-acidic particles like ammonium sulfate. Whether the effects are attributable to acidity or to particles remains unresolved.

Air Quality, SO_4^{2-}

Sulfate from PM10 was measured at 22 stations in 2011, including one in the Coachella Valley. In 2011, the state PM10-sulfate standard was not exceeded anywhere in the Basin or the Coachella Valley. Maximum concentrations by air basin and county are shown in Table 2-14.

TABLE 2-14

2011 Maximum 24-Hour Average Sulfate (PM10) Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 24-HR AVERAGE (µG/M^3)	PERCENT OF STATE STANDARD (25 µG/M^3)	AREA
South Coast Air Basin			
Los Angeles	8.0	32	Central Los Angeles County
Orange	6.5	26	Central Orange County
Riverside	5.4	22	Metropolitan Riverside County
San Bernardino	6.0	24	Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	5.7	23	Coachella Valley

Lead (Pb) Specific Information

Health Effects, Pb

The adverse effects of ambient lead exposures on health have been reviewed in the 2006 U.S. EPA document, *Air Quality Criteria for Lead (2006) Final Report*.[16] This document presents a detailed assessment of the available scientific studies and presents conclusions on the causal determination of the health effects of lead, including the justification to lower the federal lead standard.

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure.

Lead poisoning can cause anemia, lethargy, seizures, and death. It appears that there are no direct effects of lead on the respiratory system. Lead can be stored in the bone from early-age environmental exposure, and elevated blood lead levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

Air Quality, Pb

Based on the review of the NAAQS for lead, U.S. EPA has established a new standard of 0.15 $\mu g/m^3$ for a rolling 3-month average, effective October 15, 2008 (measured from total suspended particulates, TSP). Except for the source-specific monitoring that is now required under the new standard, there have been no violations of the lead standards at the District's regular air monitoring stations since 1982, as a result of removal of lead from gasoline. However, monitoring at two stations immediately adjacent to stationary sources of lead have recorded exceedances of the standards in localized areas of the Basin in more recent years. Table 2-15 shows the maximum 3-month rolling average concentrations recorded in 2011. In 2011, lead concentrations in the Basin exceeded the new 3-month rolling average standard (0.15 $\mu g/m^3$) at one source-specific monitoring site in Los Angeles County, located immediately downwind of a stationary lead source. The federal rolling 3-month and

[16] U.S. EPA. (2006). Air Quality Criteria for Lead (2006) Final Report. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/144aF-bF, 2006.

state 30-day standards for lead were not exceeded in any other area of the District in 2011.

TABLE 2-15

2011 Maximum 3-Month Rolling Average Lead Concentrations by Basin and County

BASIN/COUNTY	MAXIMUM 3-MONTH ROLLING AVERAGE (μG/M^3)	PERCENT OF FEDERAL STANDARD (0.15 μG/M^3)	AREA
South Coast Air Basin			
Los Angeles*	0.46	297	Central Los Angeles
Orange	N.D.		
Riverside	0.01	6	Metropolitan Riverside County
San Bernardino	0.01	6	Northwest San Bernardino Valley, Central San Bernardino Valley
Salton Sea Air Basin			
Riverside	N.D.		Coachella Valley

* This high lead concentration was measured at a site immediately downwind of a lead source.
N.D. = No Data. Historical measurements indicate concentrations are well below standards.

COMPARISON TO OTHER U.S. AREAS

The Basin's severe air pollution problem is a consequence of the combination of emissions from the nation's second largest urban area, mountainous terrain surrounding the Basin that traps pollutants as they are pushed inland with the sea breeze, and meteorological conditions which are adverse to the dispersion of those emissions. The average wind speed for Los Angeles is the lowest of the nation's ten largest urban areas. In addition, the summertime daily maximum mixing heights (an index of how well pollutants can be dispersed vertically in the atmosphere) in Southern California are the lowest, on average, in the U.S., due to strong temperature inversions in the lower atmosphere that effectively trap pollutants near the surface. The Southern California area is also an area with abundant sunshine, which drives the photochemical reactions which form pollutants such as ozone and a significant portion of PM2.5.

In the Basin, high concentrations of ozone are normally recorded during the late spring and summer months, when more intense sunlight drives enhanced photochemical reactions. In contrast, higher concentrations of carbon monoxide are generally recorded in late fall and winter, when nighttime radiation inversions trap the emissions at the surface. High PM10 and PM2.5 concentrations can occur throughout the year, but occur most frequently in fall and winter in the Basin. Although there are changes in emissions by season, the observed variations in pollutant concentrations are largely a result of seasonal differences in weather conditions.

Figures 2-6 and 2-7 show maximum pollutant concentrations in 2011 for the South Coast Air Basin compared to other urban areas in the U.S. and California, respectively. Maximum concentrations in all of these areas exceeded the federal 8-hour ozone standard. The annual PM2.5 standard was exceeded in the Basin and in one other California air basin (San Joaquin Valley). The 24-hour PM2.5 standard, however, was exceeded in a few of the other large U.S. urban areas and in many California air basins. The 24-hour PM10 standard was exceeded in one of the U.S. urban areas shown (Phoenix), although potential flagging of exceptional events may affect the treatment of that data. It is important to note that maximum pollutant concentrations do not necessarily indicate potential nonattainment designations, as the design values that are used for attainment status are based on the form of the standard.

Nitrogen dioxide concentrations exceeded the recently established 1-hour standard in the Basin and Phoenix (on one day each). Denver, Colorado (not shown in Figure 2-7), was the only other U.S. urban area exceeding the NO_2 standard in 2011. Sulfur dioxide concentrations were below the recently established 1-hour federal standard in the Basin and all of the urban areas shown in Figures 2-6 and 2-7. However, the SO_2 standard was exceeded in other U.S. areas, with the highest concentrations recorded in Hawaii, due to volcano emissions. The CO standards were not exceeded in the U.S. in 2011.

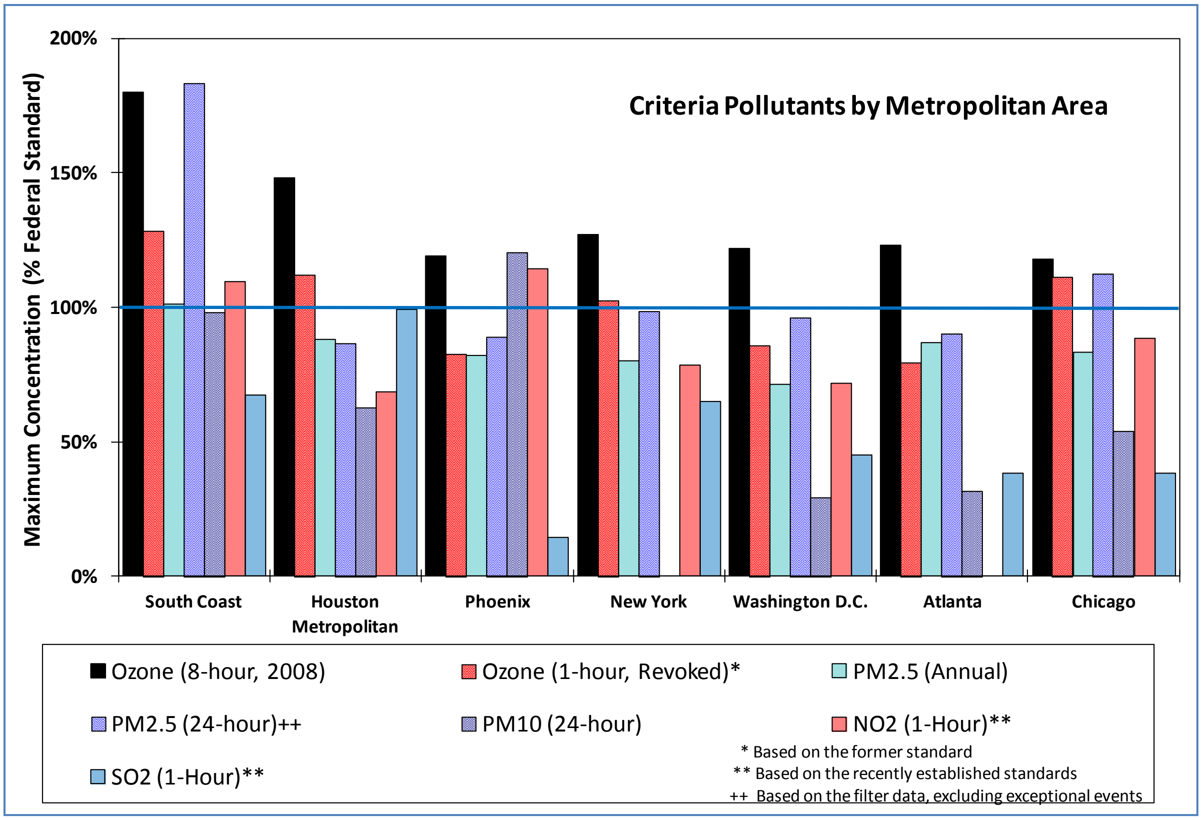


FIGURE 2-6

2011 South Coast Air Basin Air Quality Compared to Other U.S. Metropolitan Areas (Maximum Pollutant Concentrations as Percentages of Corresponding Federal Standards)

In 2011, the Central San Bernardino Mountains area in the Basin recorded the highest maximum 1-hour and 8-hour average ozone concentrations in the nation (0.160 and 0.136 ppm, respectively). The highest 8-hour average concentration was more than one and a half times the federal standard level. In 2011, seven out of ten stations with the highest maximum 8-hour average ozone concentrations in the nation were located in the Basin[17]. The South Coast Air Basin also exceeded the 8-hour ozone standard on more days (106) than most other urban areas in the country in 2011, with only California's San Joaquin Valley exceeding on more days (109).

[17] The 10 highest measured ozone concentrations in 2011 included 7 Basin stations: Central San Bernardino Mountains (Crestline), East San Bernardino Valley (Redlands), Central San Bernardino Valley (Fontana and San Bernardino), Santa Clarita Valley (Santa Clarita), Northwest San Bernardino Valley (Upland), and Metropolitan Riverside (Rubidoux).

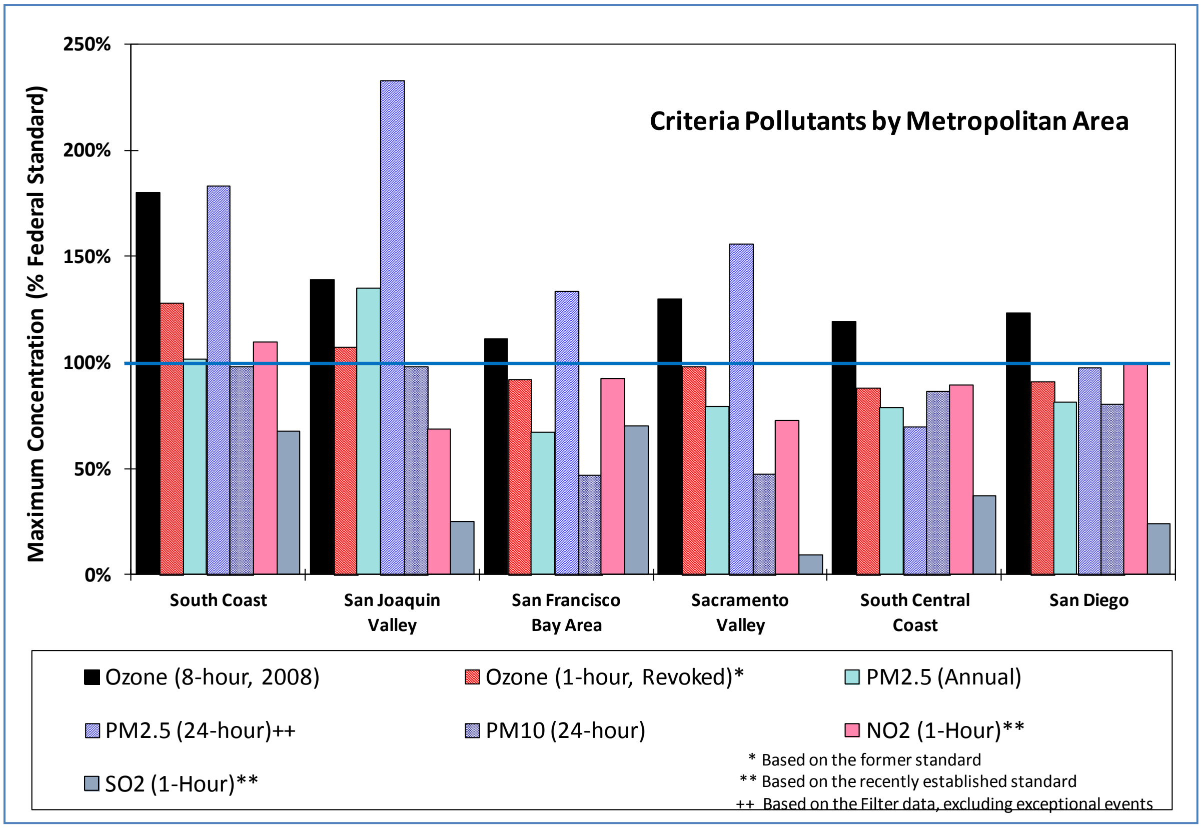


FIGURE 2-7

2011 South Coast Air Basin Air Quality Compared to Other California Air Basins (Maximum Pollutant Concentrations as Percentages of Corresponding Federal Standards)

SUMMARY

In 2011, the Basin continued to exceed federal and state standards for ozone and PM2.5. The maximum measured concentrations for these pollutants were among the highest in the country, although significant improvement has been seen in recent years for both 24-hour and annual PM2.5 concentrations and only one location in the Basin is currently exceeding the 24-hour and annual design value form of the PM2.5 federal standards. The Basin's federal 3-year design values for ozone and PM2.5 have continued to exhibit downward trends through 2011.

The Coachella Valley area in the Riverside County portion of the Salton Sea Air Basin exceeded federal and state standards for ozone and PM10. However, the high PM10 concentrations exceeding the federal 24-hour PM10 standard occurred on days influenced by high-wind natural events, which the District has flagged in the U.S. EPA AQS database so that U.S. EPA will consider excluding such data when determining the NAAQS attainment status in accordance with U.S. EPA's Exceptional Events Rule. For the stations in the Coachella Valley, the federal 3-year design values for 8-hour ozone have continued to exhibit downward trends through 2011.

The NO_2 concentrations in Los Angeles County exceeded the recently established short-term federal standard on one day at two locations, but did not exceed the standards anywhere on any other day in the Basin. The 98^{th} percentile form of the federal NO_2 standard was not exceeded and the Basin's attainment status remains intact. The Los Angeles County portion of the Basin also exceeded the 3-month rolling average Pb federal standard at one source-specific monitor adjacent to a Pb source. A separate SIP revision has been submitted to address Pb violations. Maximum concentrations for SO_2, CO, and sulfate (measured from PM10) continued to remain below the state and federal standards.

Appendix I

- Build Alternative Project Details

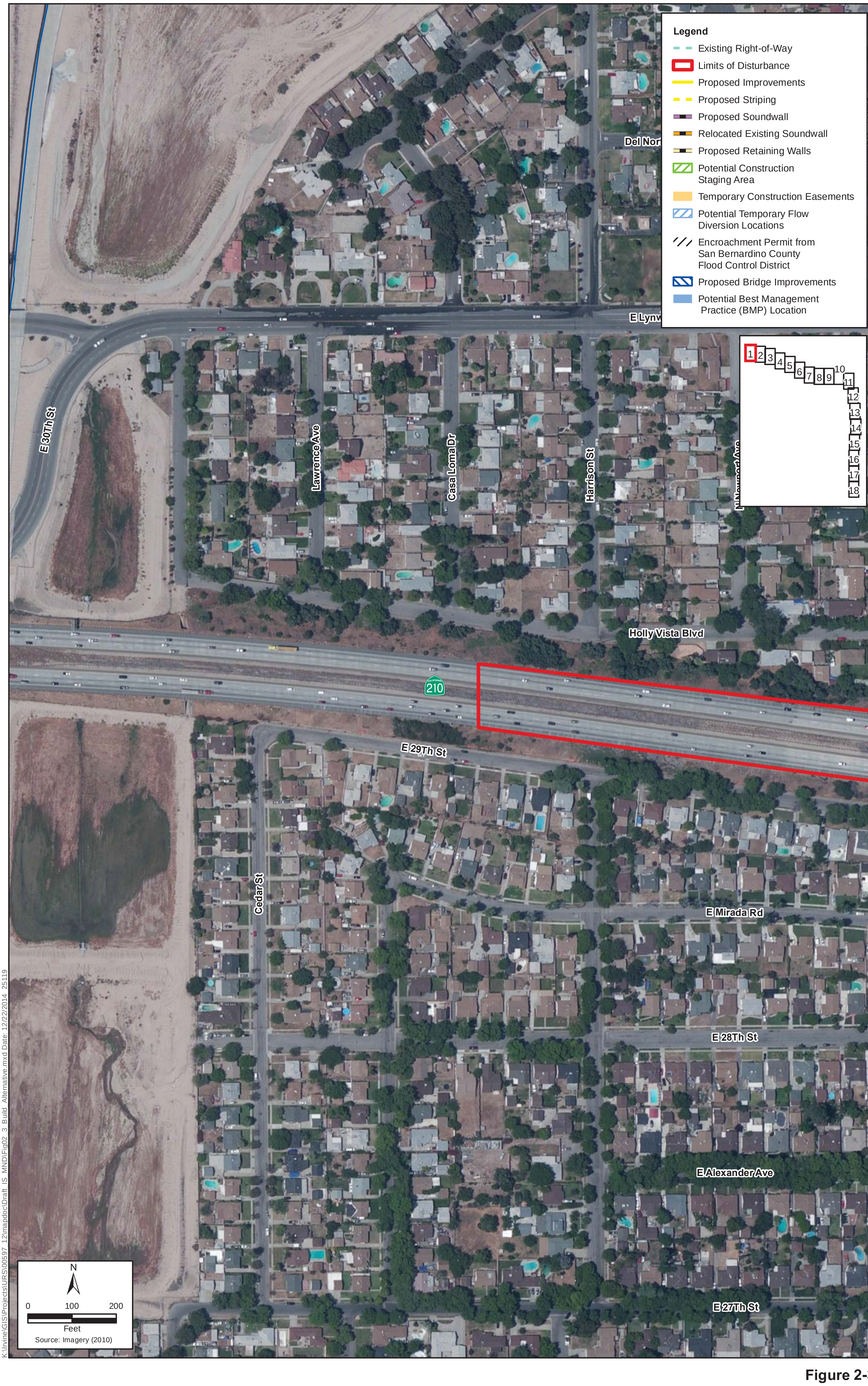


Figure 2-3
Build Alternative - Sheet 1
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

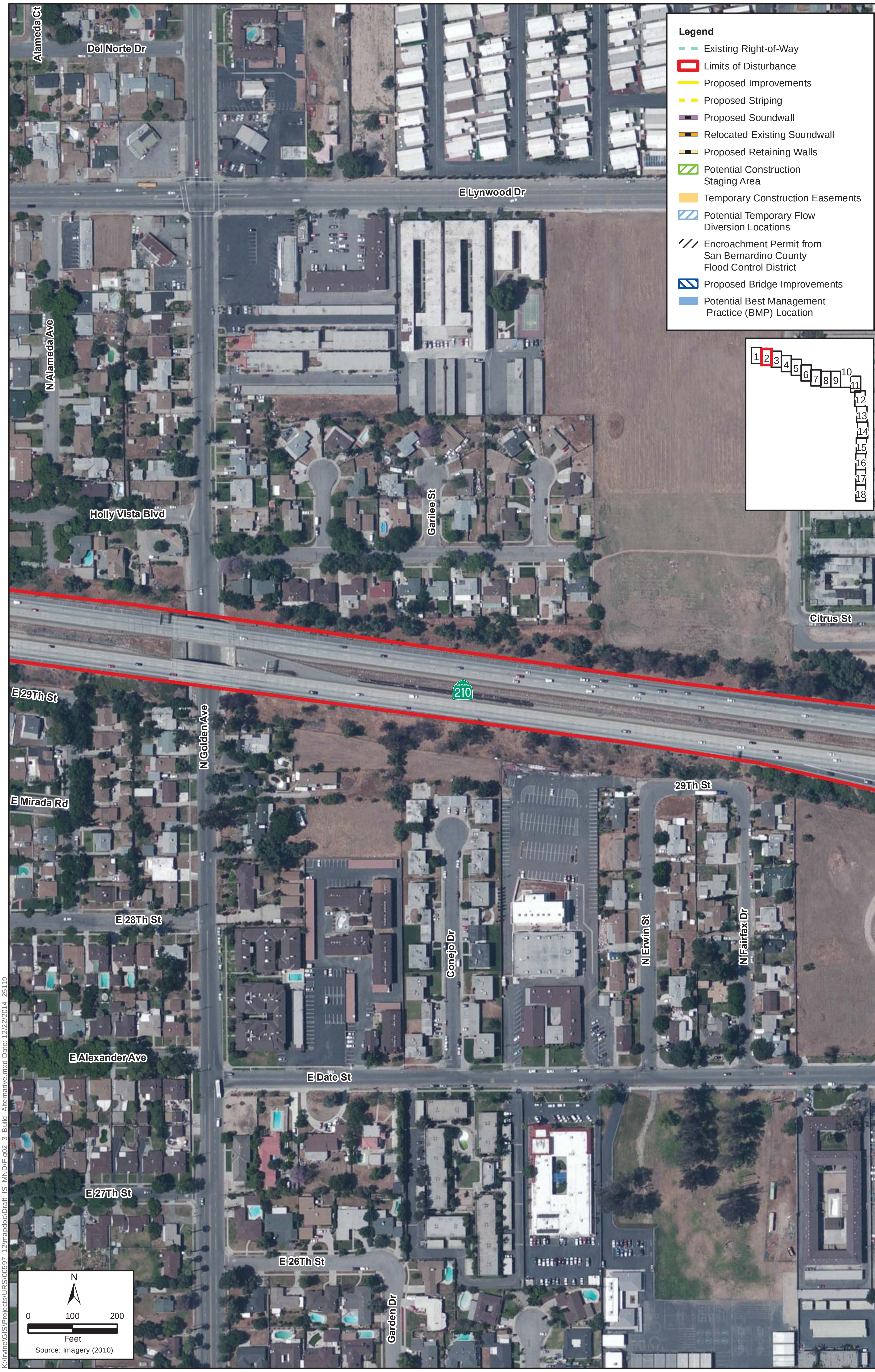


Figure 2-3
Build Alternative - Sheet 2
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

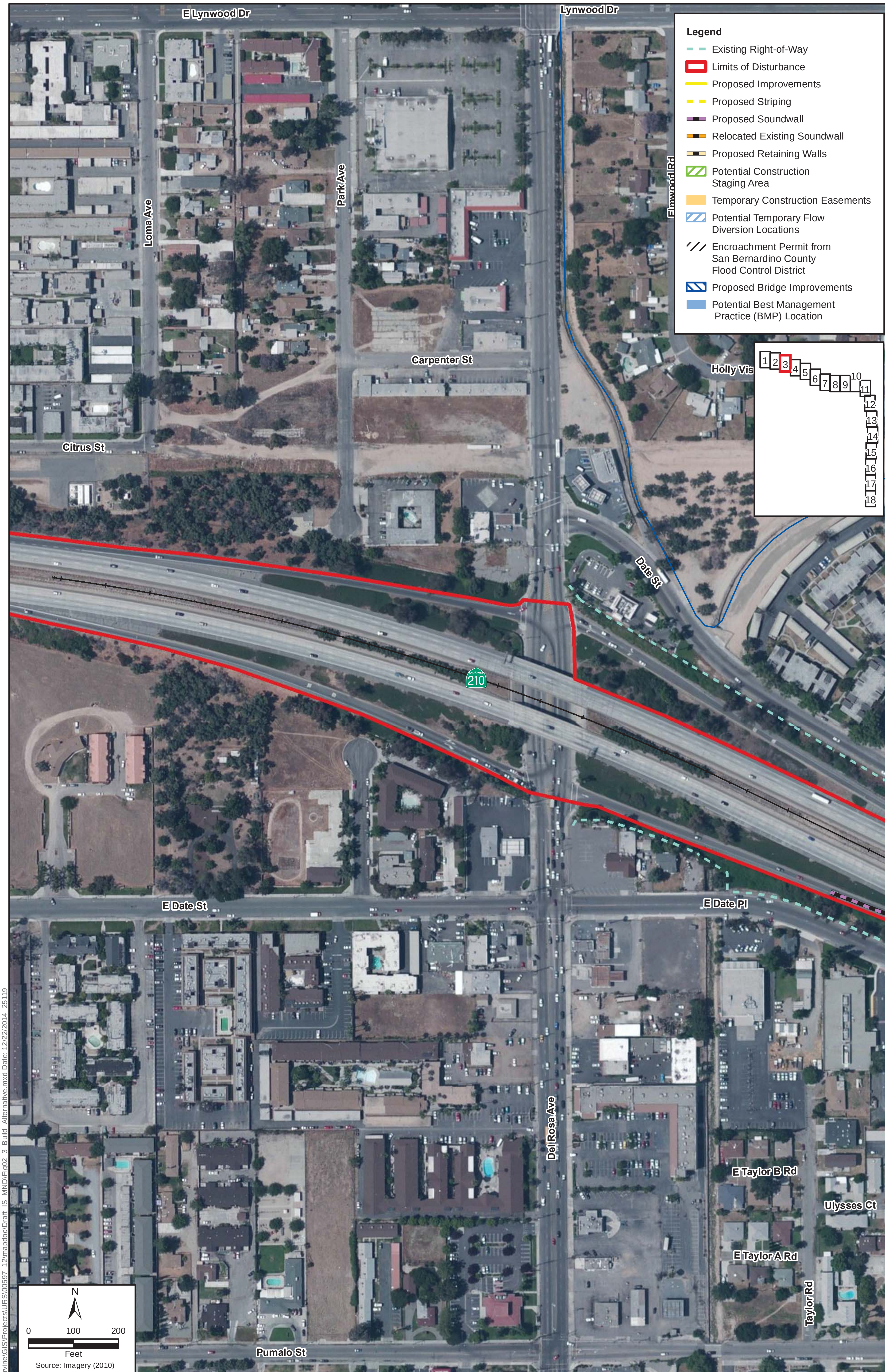


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Figure 2-3
Build Alternative - Sheet 3
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

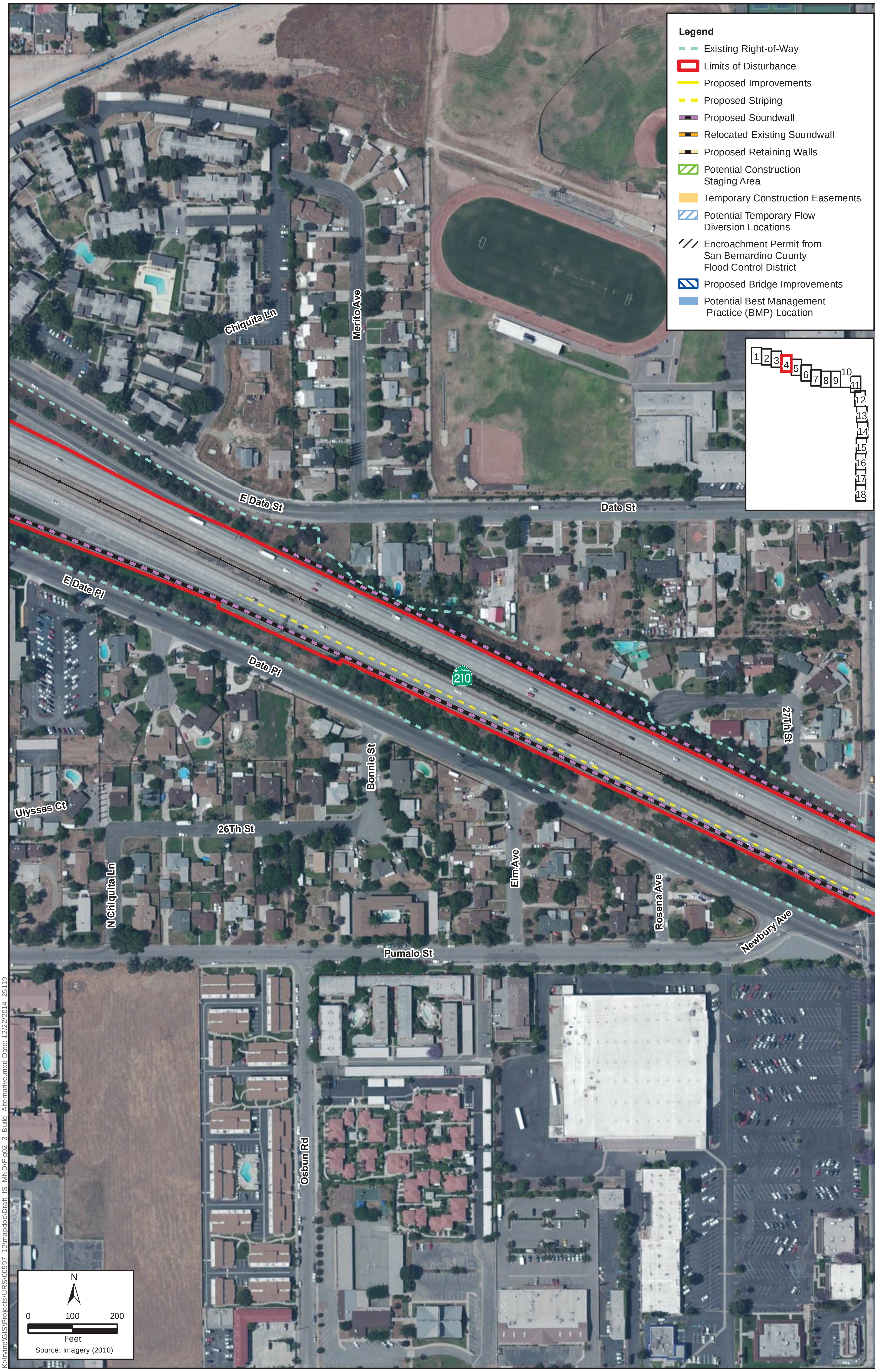

Figure 2-3
Build Alternative - Sheet 4
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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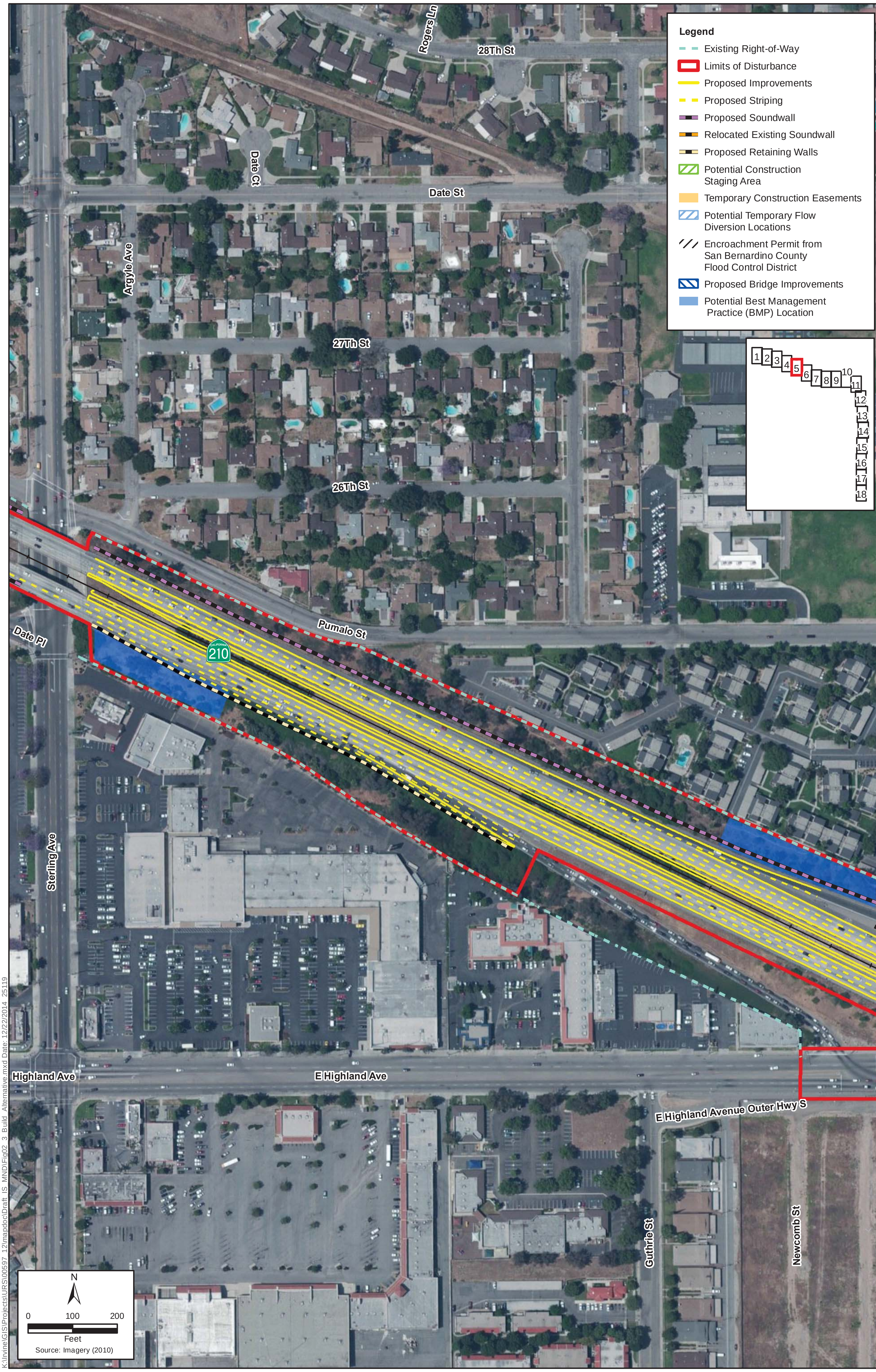

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Figure 2-3
Build Alternative - Sheet 5
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

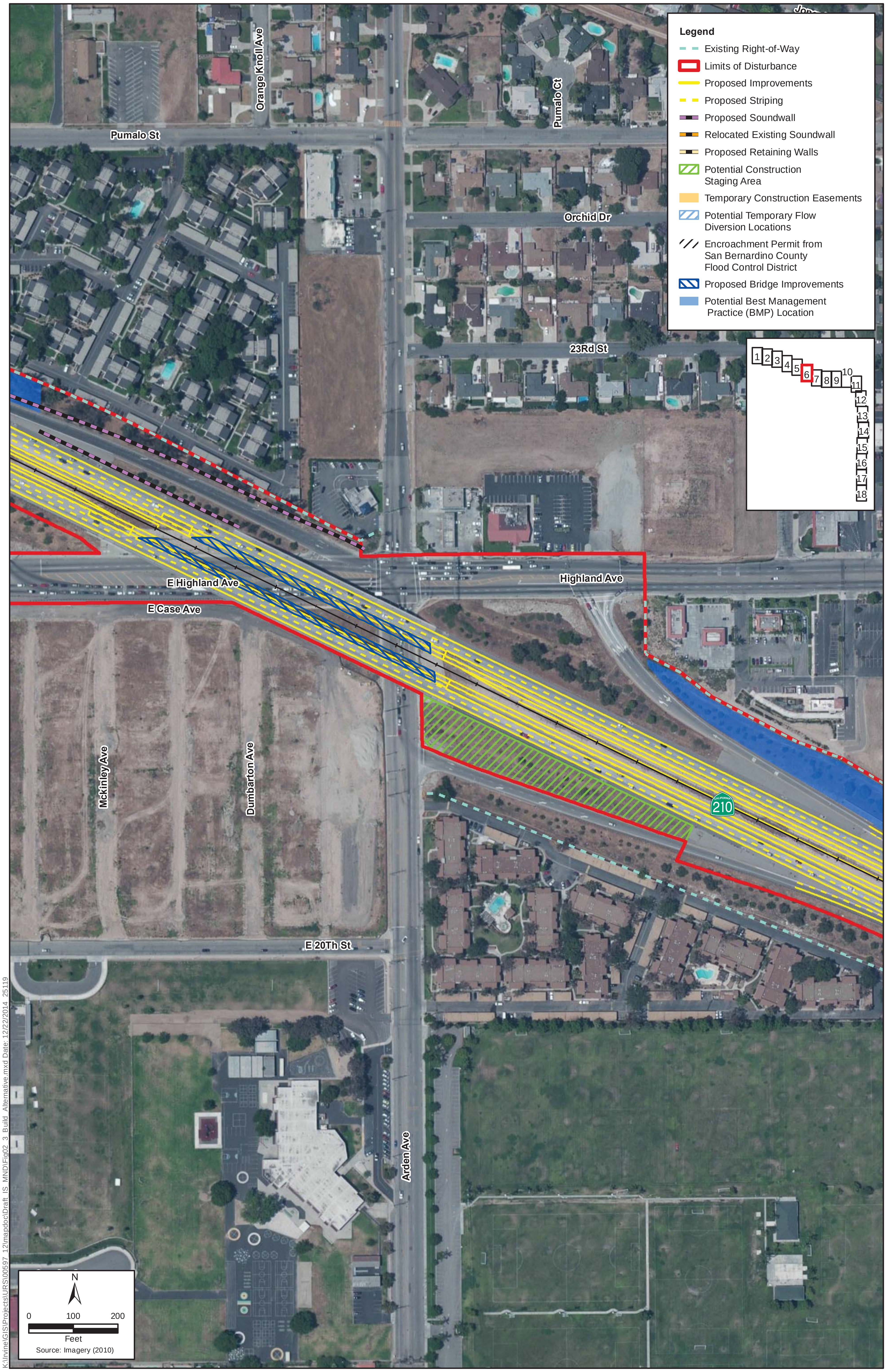

Figure 2-3
Build Alternative - Sheet 6
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

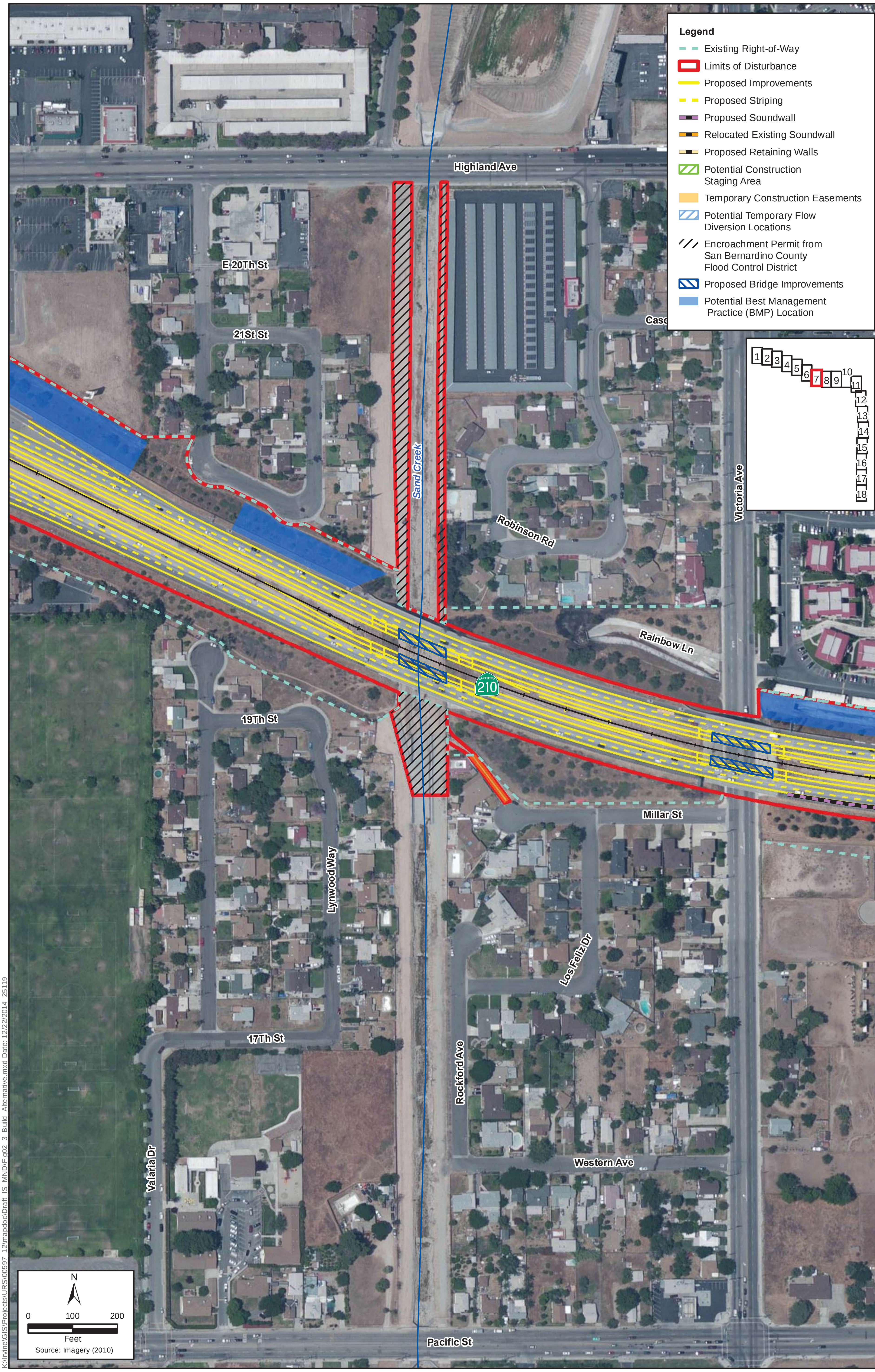

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Figure 2-3
Build Alternative - Sheet 7
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

Figure 2-3
Build Alternative - Sheet 8
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

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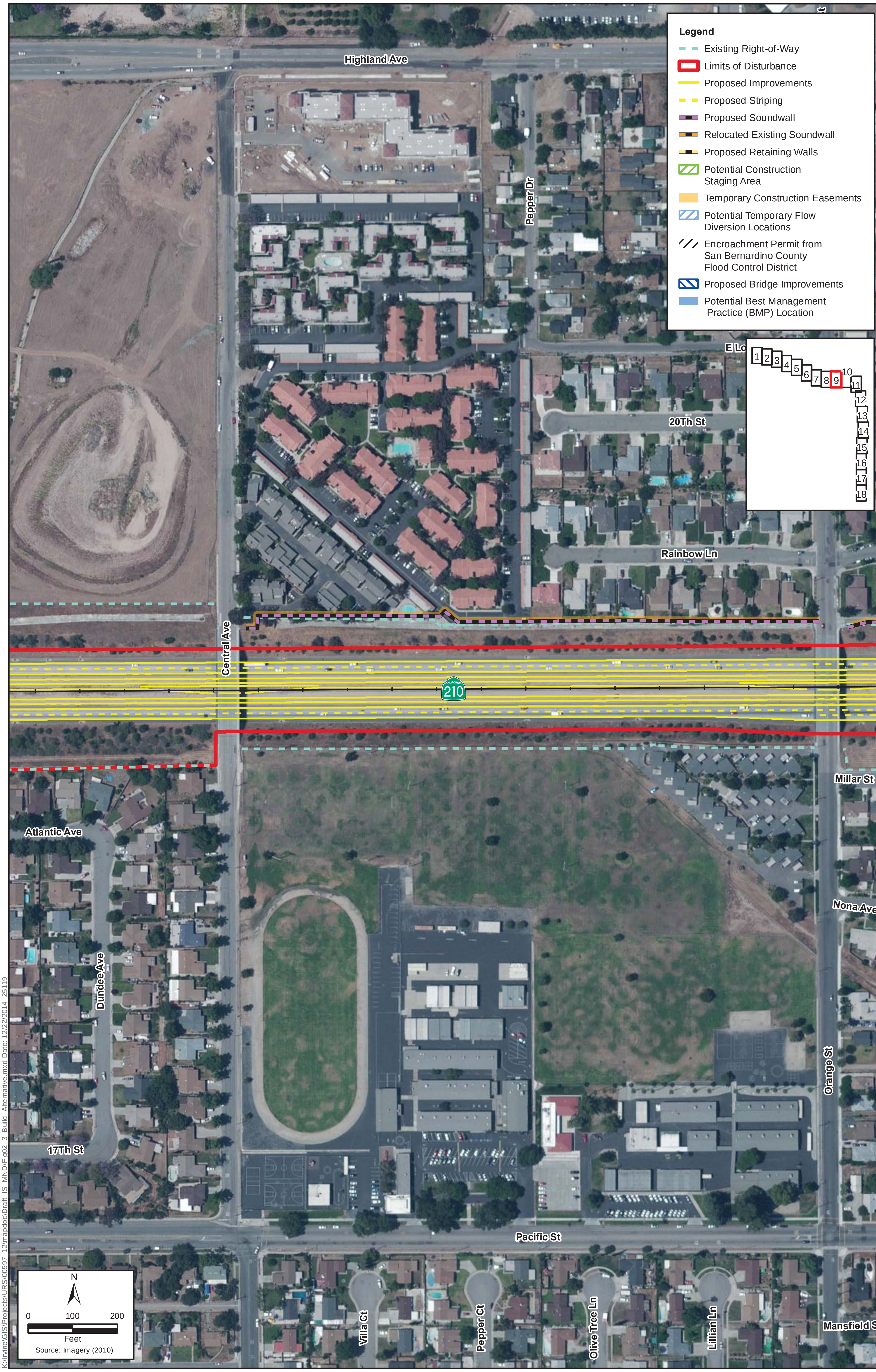

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Figure 2-3
Build Alternative - Sheet 9
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

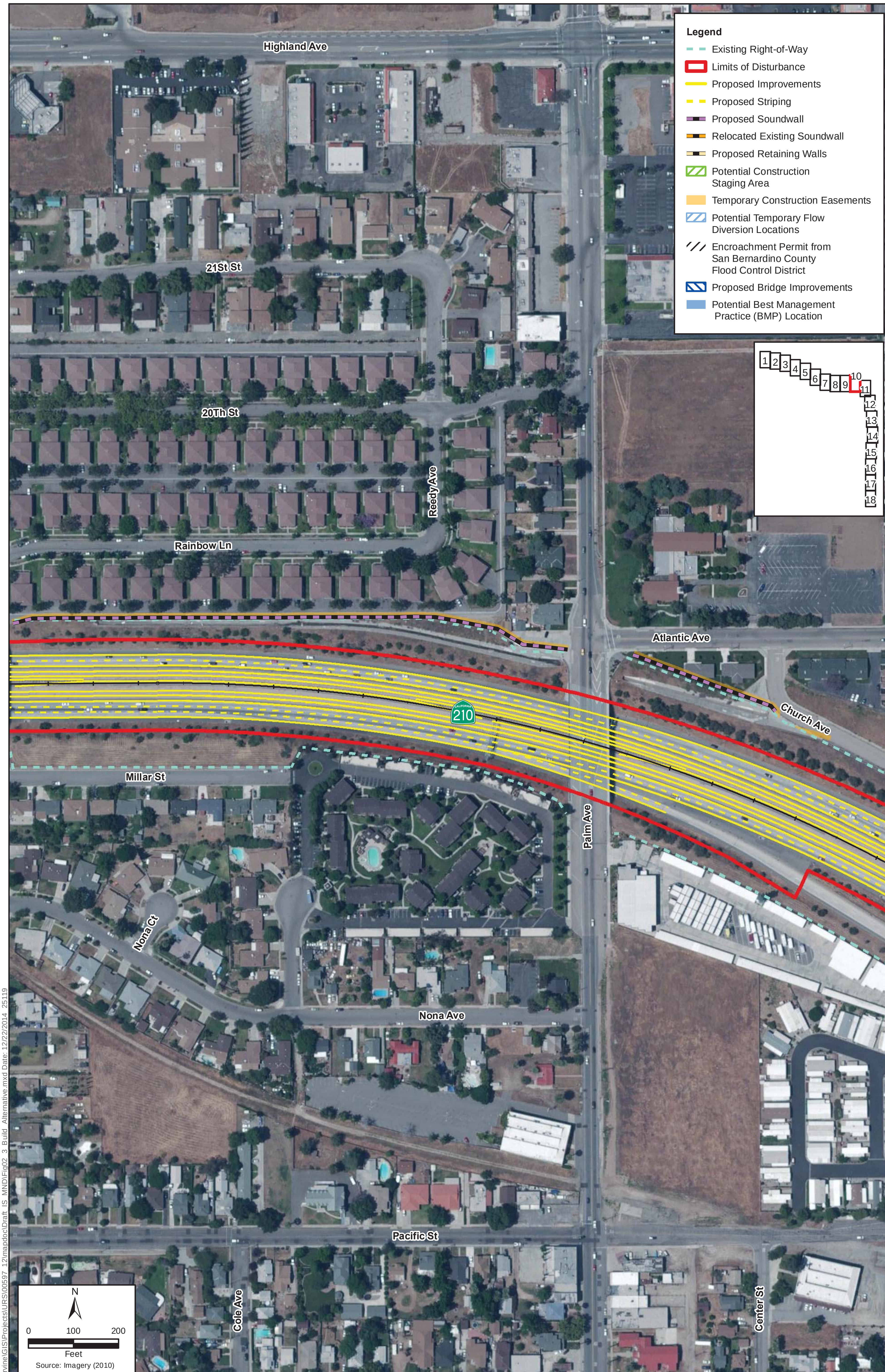

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Figure 2-3
Build Alternative - Sheet 10
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

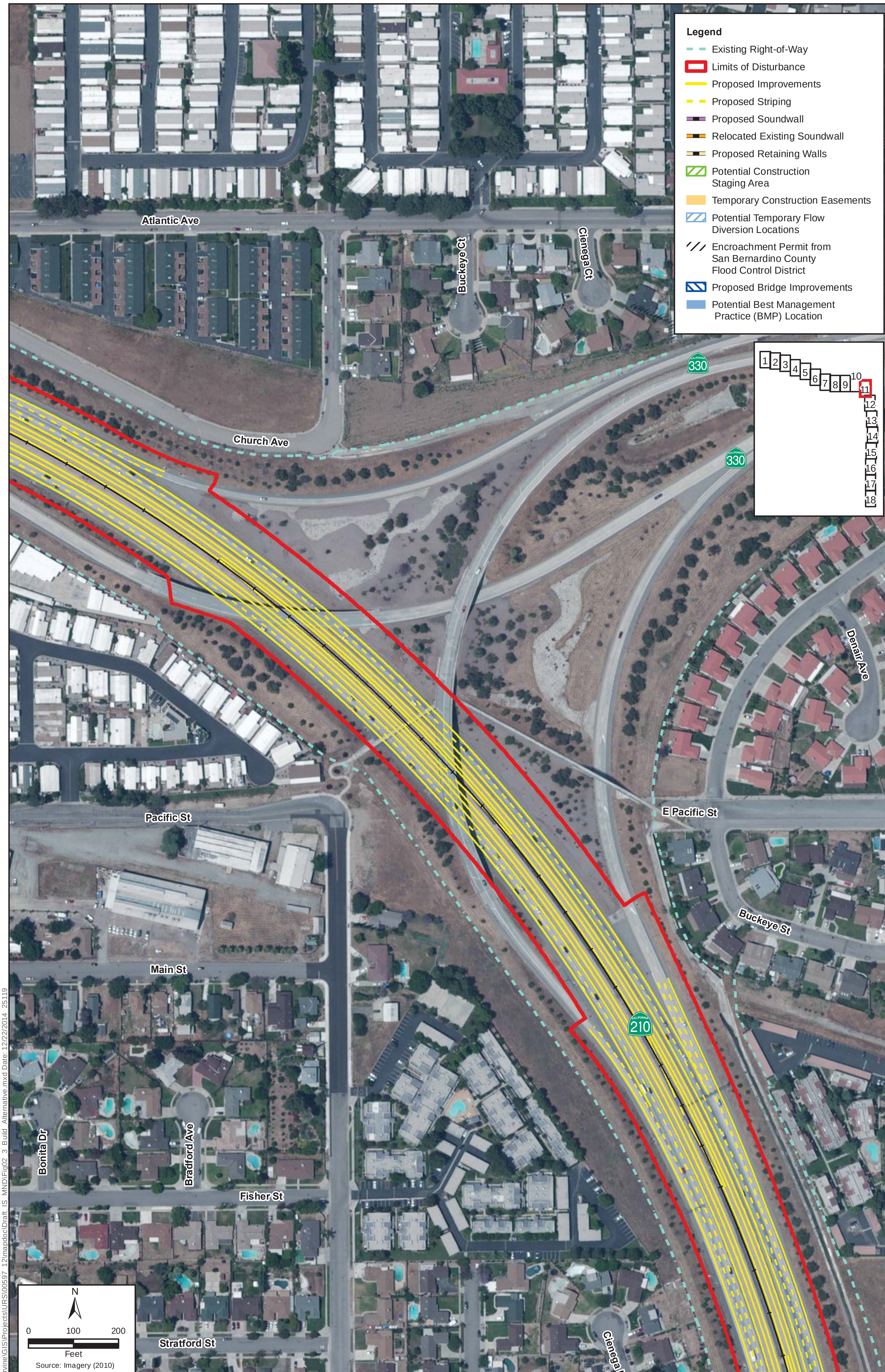

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Figure 2-3
Build Alternative - Sheet 11
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

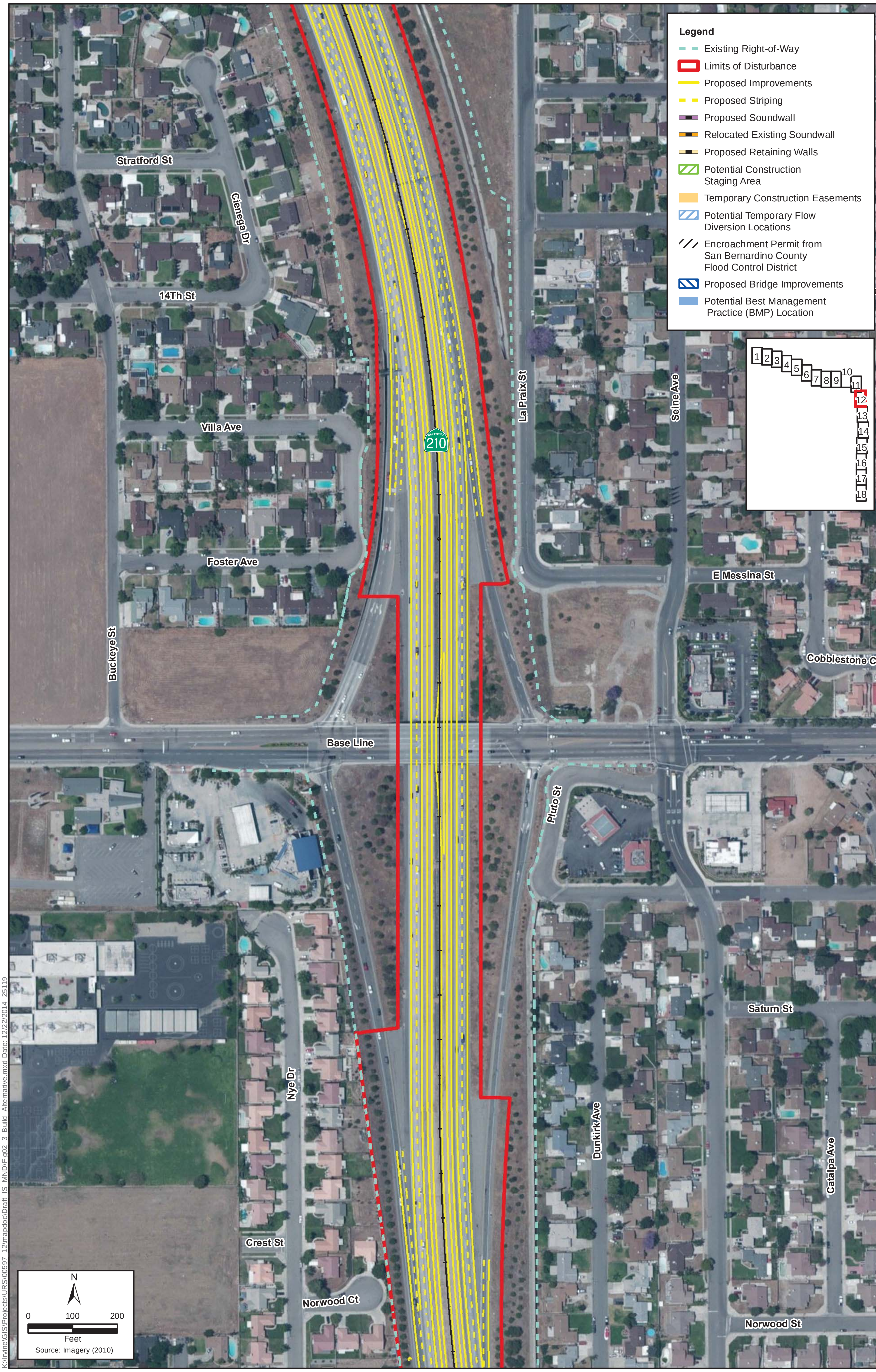

Figure 2-3
Build Alternative - Sheet 12
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

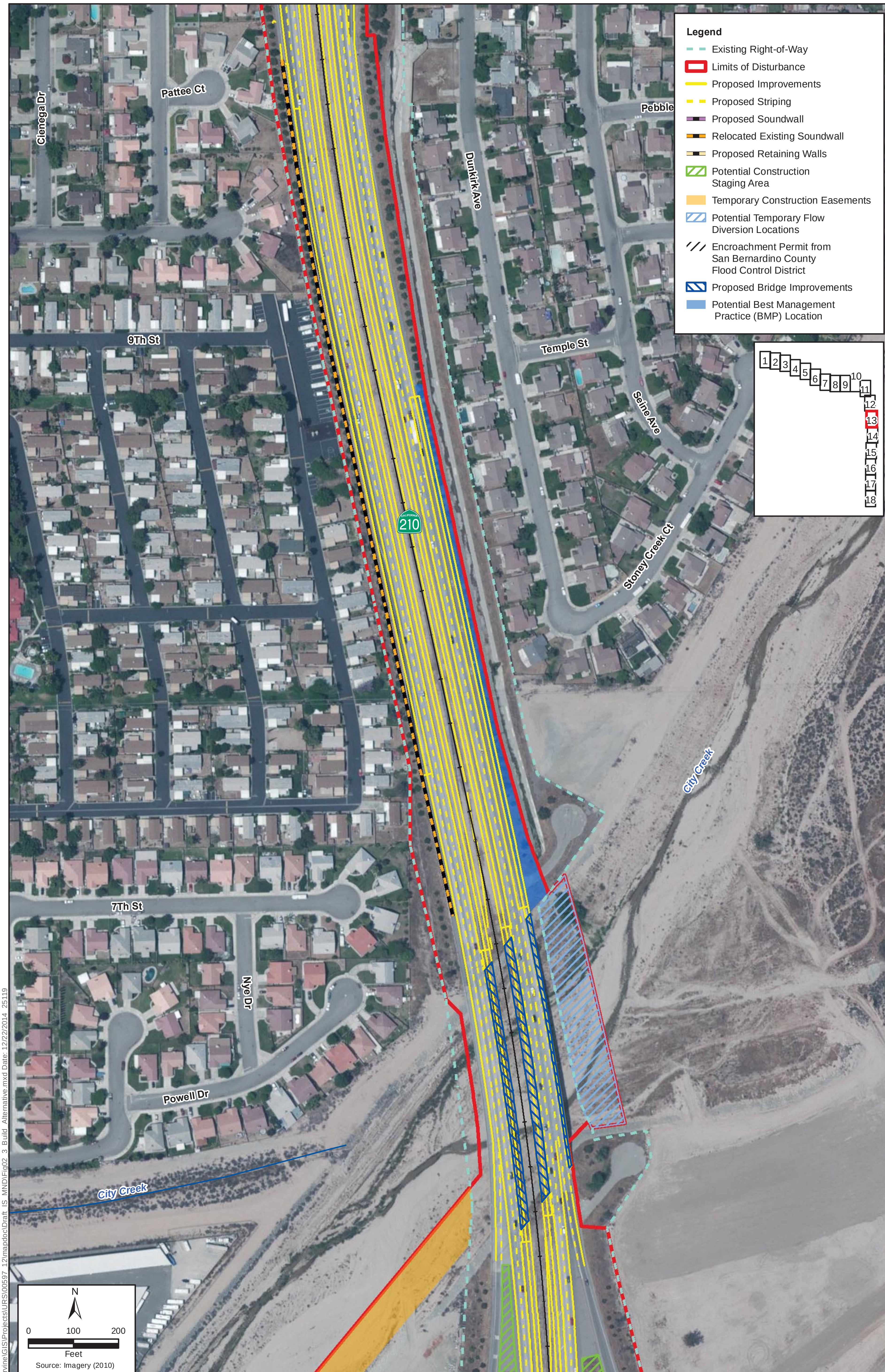

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Figure 2-3
Build Alternative - Sheet 13
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

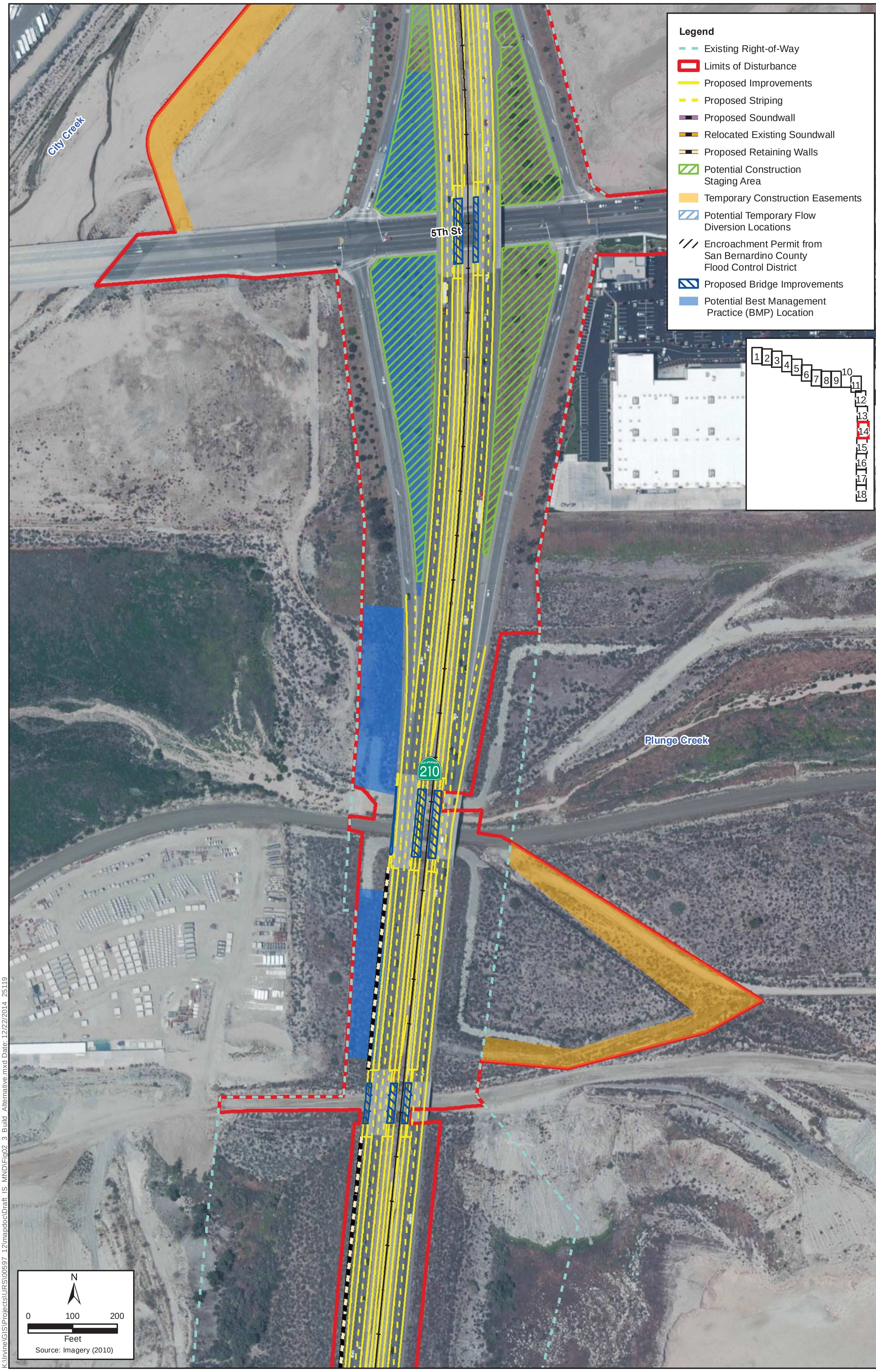

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Figure 2-3
Build Alternative - Sheet 14
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

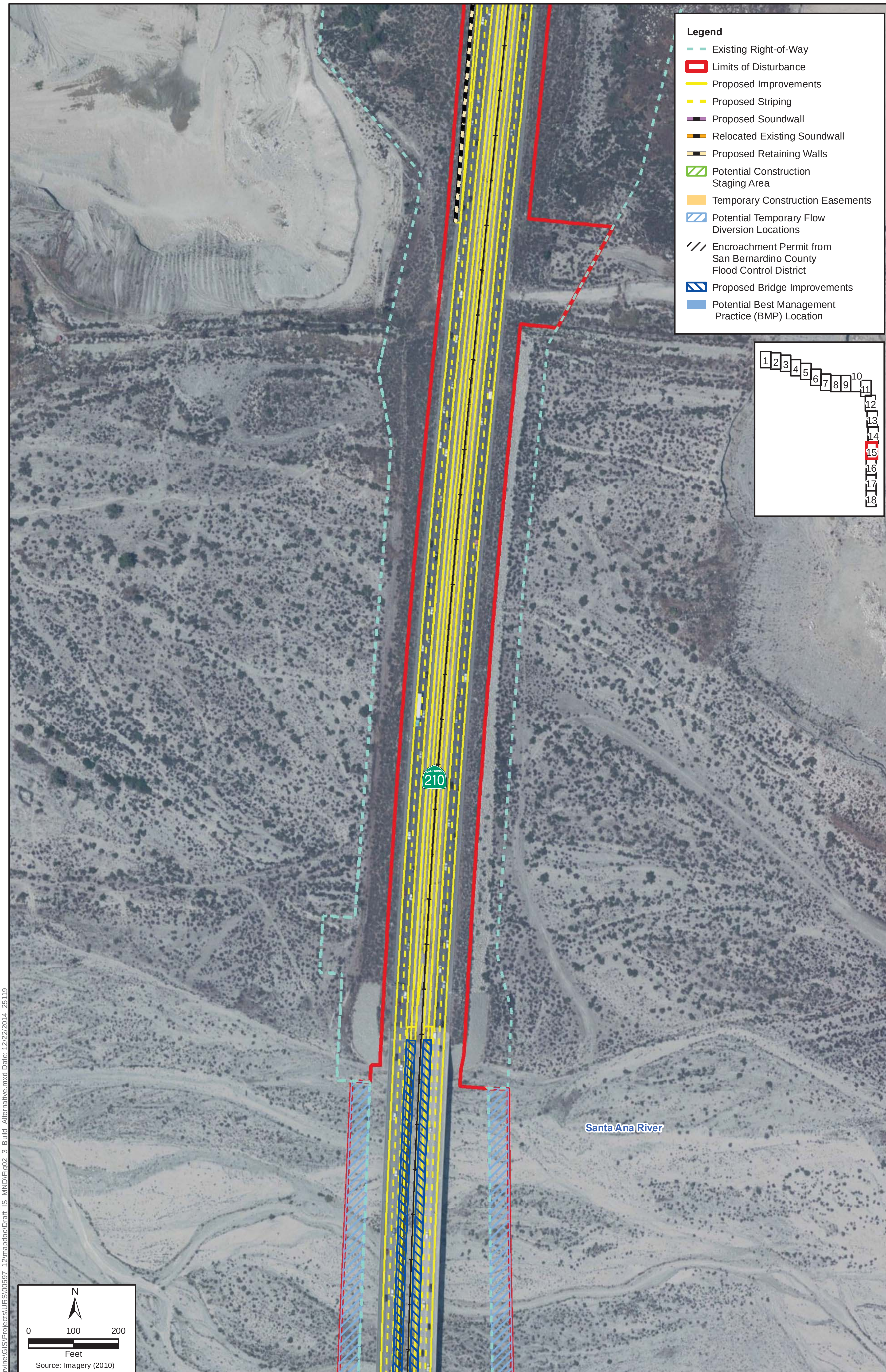

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Figure 2-3
Build Alternative - Sheet 15
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

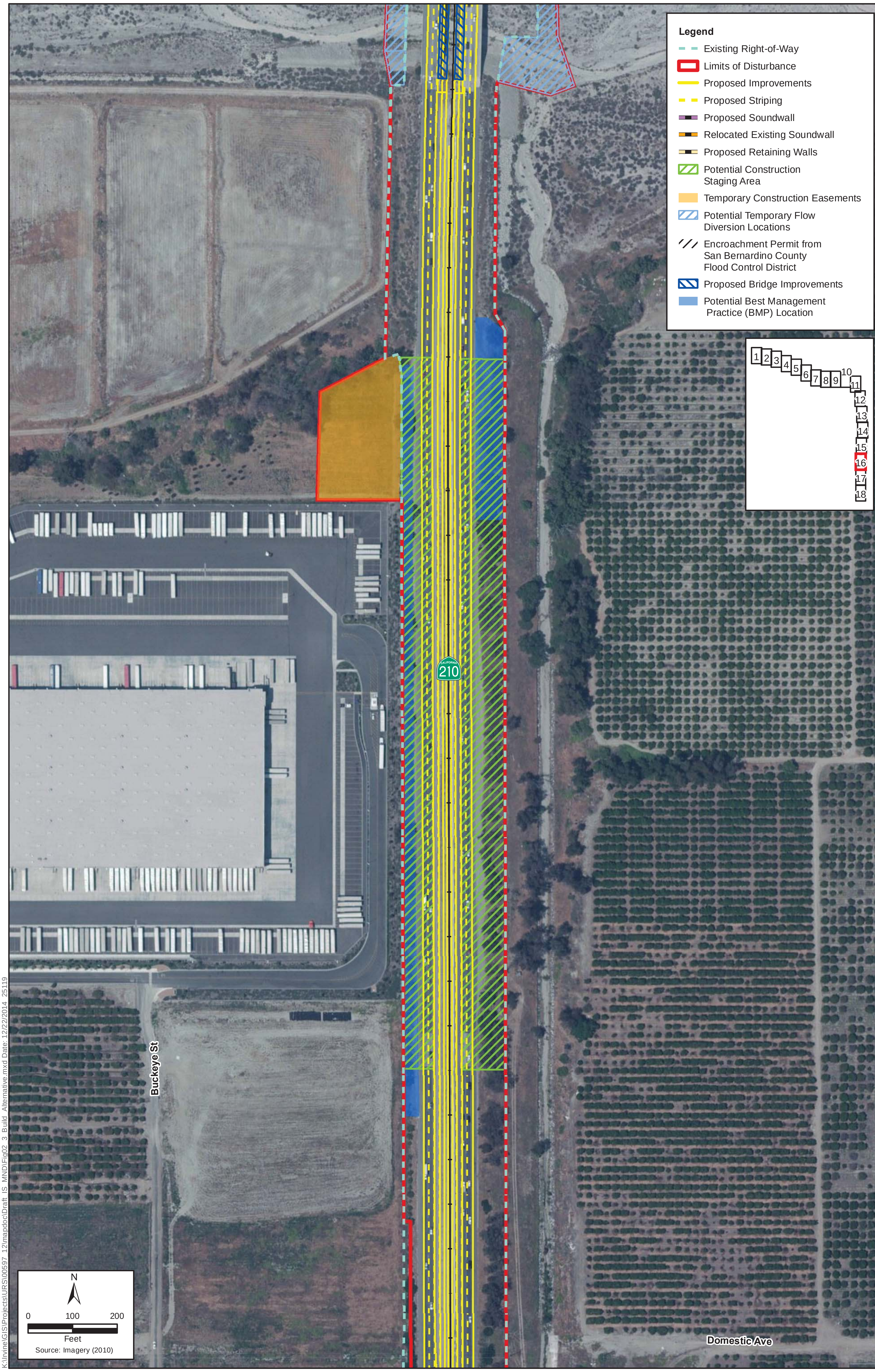

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Figure 2-3
Build Alternative - Sheet 16
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

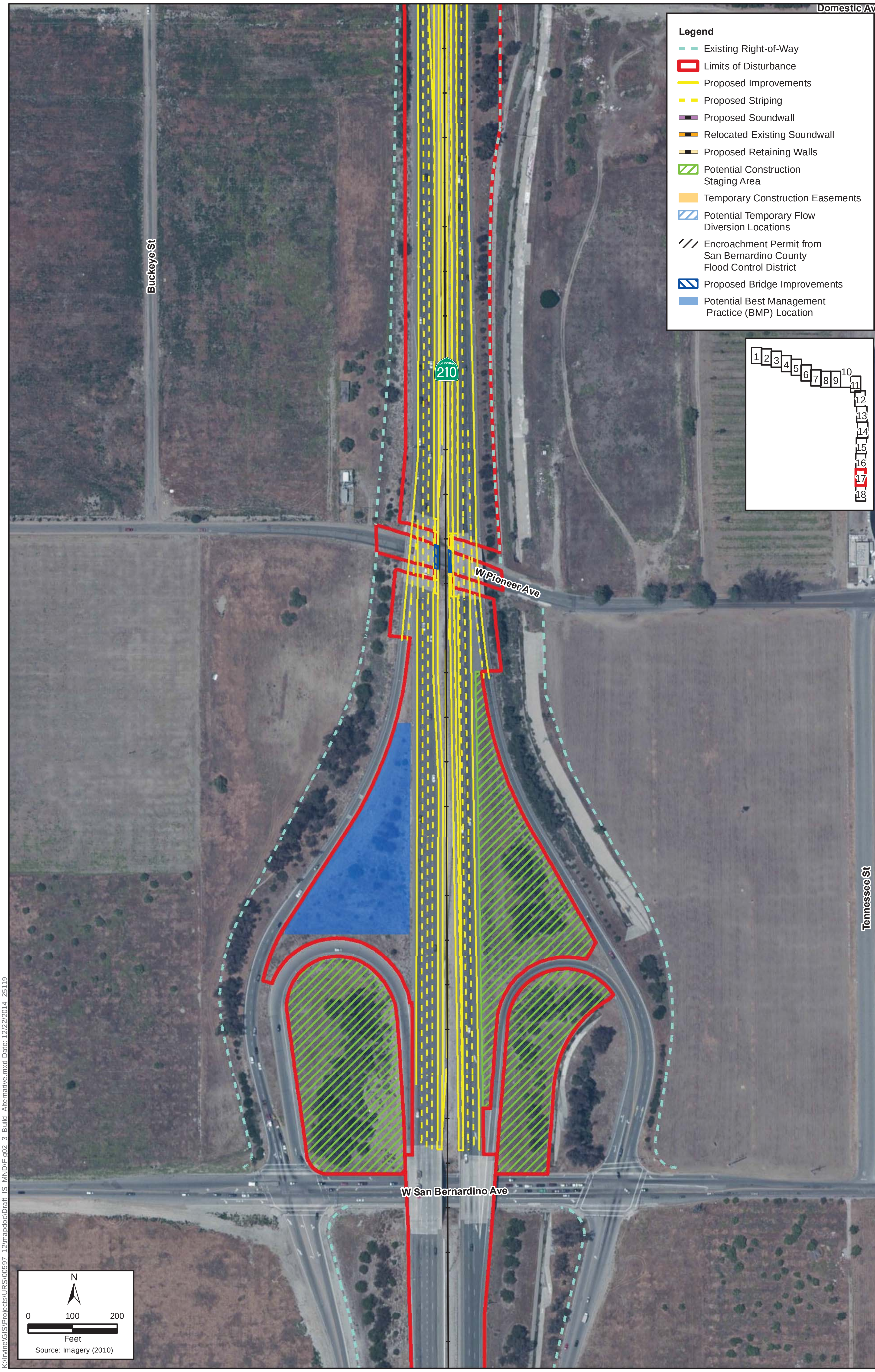

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Figure 2-3
Build Alternative - Sheet 17
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue

Figure 2-3
Build Alternative - Sheet 18
State Route 210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue