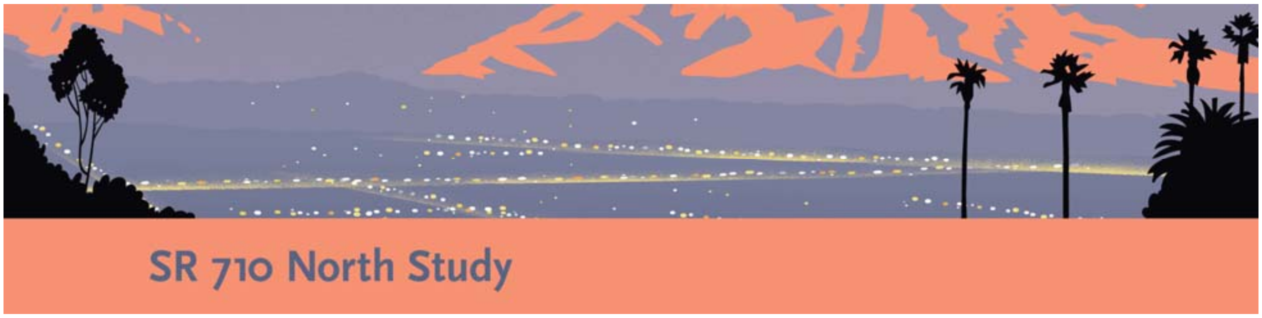

Air Quality Assessment Report

Prepared for

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Metro
Los Angeles County
Metropolitan Transportation Authority

January 2015

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Executive Summary

The California Department of Transportation (Caltrans), in cooperation with the Los Angeles County Metropolitan Transportation Authority (Metro) proposes transportation improvements to improve mobility and relieve congestion in the area between State Route 2 (SR 2) and Interstates 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively) in east/northeast Los Angeles and the western San Gabriel Valley. The study area for the State Route 710 (SR 710) North Study is approximately 100 square miles and generally bounded by I-210 on the north, I-605 on the east, I-10 on the south, and I-5 and SR 2 on the west. Caltrans is the Lead Agency under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

The lack of continuous north-south transportation facilities in the study area has the following consequences, which have been identified as the elements of need for the project:

- Degradation of the overall efficiency of the larger regional transportation system
- Congestion on freeways in the study area
- Congestion on the local streets in the study area
- Poor transit operations within the study area

The purpose of the proposed action is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:

- Improve efficiency of the existing regional freeway and transit networks.
- Reduce congestion on local arterials adversely affected due to accommodating regional traffic volumes.
- Minimize environmental impacts related to mobile sources.

The proposed alternatives for the project include the No Build Alternative, the Transportation System Management/Transportation Demand Management (TSM/TDM) Alternative, the Bus Rapid Transit (BRT) Alternative, the Light Rail Transit (LRT) Alternative, and the Freeway Tunnel Alternative. Components of the TSM/TDM Alternative will also be included with the BRT, LRT and Freeway Tunnel Alternatives.

The No Build Alternative includes projects/planned improvements through 2035 that are contained in the Federal Transportation Improvement Program (FTIP), as listed in the Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) Measure R and the funded portion of Metro's 2009 Long Range Transportation Plan (LRTP). The No Build Alternative does not include any planned improvements to the SR 710 Corridor.

The TSM/TDM Alternative consists of strategies and improvements to increase efficiency and capacity for all modes in the transportation system with lower capital cost investments and/or lower potential impacts. The TSM/TDM Alternative is designed to maximize the efficiency of the existing transportation system by improving capacity and reducing the effects of bottlenecks and chokepoints. TSM strategies include Intelligent Transportation Systems (ITS), local street and intersection improvements, and Active Traffic Management (ATM). The TDM strategies include expanded bus service, bus service improvements, and bicycle improvements.

The BRT Alternative would provide high-speed, high-frequency bus service through a combination of new, dedicated, and existing bus lanes, and mixed-flow traffic lanes to key destinations between East Los Angeles and Pasadena.

The LRT Alternative would include passenger rail operated along a dedicated guideway, similar to other Metro light rail lines. The LRT Alternative would begin on Mednik Avenue adjacent to the existing East Los Angeles Civic Center Station on the Metro Gold Line and end at Raymond Avenue adjacent to the existing Fillmore Station on the Metro Gold Line.

The Freeway Tunnel Alternative would start at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connect to the existing northern stub of SR 710, south of the I-210/State Route 134 (SR 134) interchange in Pasadena. The Freeway Tunnel Alternative has two design variations: a dual-bore tunnel and a single-bore tunnel.

Five operational variations for the Freeway Tunnel Alternative include:

- Freeway Tunnel Alternative without tolls;
- Freeway Tunnel Alternative with trucks excluded;
- Freeway Tunnel Alternative with tolls;
- Freeway Tunnel Alternative with tolls and trucks excluded; and
- Freeway Tunnel Alternative with toll and express bus.

This Air Quality Assessment Report provides a discussion of the proposed project, the physical setting of the project area, and the regulatory framework for air quality. The analysis provides data on existing air quality, evaluates potential air quality impacts associated with the proposed project, and identifies avoidance, minimization, and/or mitigation measures.

Compliance with South Coast Air Quality Management District (SCAQMD) Rule 403 and Caltrans Standard Specifications Sections 14.9-02 and 14-9.03 during construction will reduce construction-related air quality impacts from fugitive dust emissions and construction equipment emissions.

The project is located in Los Angeles County (County), which is among the counties listed as containing serpentine and ultramafic rock. However, the portion of the County in which the project lies is not known to contain serpentine or ultramafic rock. Therefore, the impact from naturally occurring asbestos (NOA) during project construction would be minimal to none.

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

The proposed project is within a federal nonattainment area for particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) and within a maintenance area for particulate matter less than 10 microns in diameter (PM_{10}). Therefore, per 40 Code of Federal Regulations (CFR), Part 93, analyses are required for conformity purposes. A $PM_{2.5}$ and PM_{10} hot-spot form (LSA, May 2014) was submitted to and reviewed by the Transportation Conformity Working Group on May 27, 2014, and additional requested information was provided in June 2014. The primary TCWG members are EPA, FHWA, and Caltrans Headquarters. On October 28, 2014, the TCWG determined that the TSM/TDM, BRT, and LRT Alternatives are not Projects of Air Quality Concern (POAQC). The Freeway Tunnel Alternatives with either the Single or Dual-Bore design variations are POAQC. If the Freeway Tunnel Alternative with either the single-bore or dual-bore design variation is identified as the preferred alternative, a quantitative PM hot-spot analysis will be conducted to demonstrate that the project would not delay attainment of or worsen existing violation of or cause and exceedance of the $PM_{2.5}$ or PM_{10} national ambient air quality standards and meets conformity requirements.

The proposed project is required to include an analysis of Mobile Source Air Toxics (MSAT) as part of the NEPA process for highways. It is expected that there would be similar MSAT emissions in the study area under the Build Alternatives relative to the No Build Alternative in the design year.

The proposed project is included in the SCAG 2012 RTP for Los Angeles County (Project ID: 1M0101). The description provided in the RTP states the following:

> SR-710 North Extension (tunnel) (alignment TBD). 4 toll lanes in each direction in tunnel.

The project is also in the 2015 FTIP, which was found to be conforming by the Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) on December 15, 2014 (Project ID: 18790). The project description provided in the FTIP states the following:

> Route 710: Study to perform alternative analysis, engineering and environmental studies to close 710 Freeway gap.

The Freeway Build Alternatives are consistent with the scope of the design concept of the RTP and FTIP. Therefore, the Freeway Build Alternatives are in conformance with the State Implementation Plan (SIP). Should the TSM/TDM, LRT, or BRT Alternative be selected, the RTP and FTIP would have to be amended.

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AADT	average annual daily traffic
AB	Assembly Bill
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
ATM	Active Traffic Management
BACM	best available control measures
BRT	Bus Rapid Transit
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal State LA	California State University, Los Angeles
Cal/EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	methane
CMS	changeable message signs
CO	carbon monoxide
CO_2	carbon dioxide
CO-CAT	Coastal Ocean Climate Action Team
County	Los Angeles County
diesel PM	diesel particulate matter plus diesel exhaust organic gases
EO	Executive Order
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
ft	feet
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GHGs	greenhouse gases
HFC-134a	s,s,s,2-tetrafluoroethane
HFC-152a	difluoroethane
HFC-23	fluoroform
I-10	Interstate 10
I-105	Interstate 105

I-110	Interstate 110
I-210	Interstate 210
I-405	Interstate 405
I-5	Interstate 5
I-605	Interstate 605
I-710	Interstate 710
IEN	Information Exchange Network
IPCC	Intergovernmental Panel on Climate Change
ITS	Intelligent Transportation Systems
LED	light-emitting diode
LOS	levels of service
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan
Metro	Los Angeles County Metropolitan Transportation Authority
mi	miles
MOVES	Motor Vehicle Emissions Simulator
mph	miles per hour
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxics
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos
NO_X	nitrogen oxide
O&M	operations and maintenance
O_3	ozone
OMB	White House Office of Management & Budget
OPR	Office of Planning and Research
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
ppm	parts per million
Protocol	Transportation Project-Level Carbon Monoxide Protocol
ROGs	reactive organic gases

ROW	right of way
RTP	Regional Transportation Plan
SB	Senate Bill
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategy
SIP	State Implementation Plan
SO_2	sulfur dioxide
SR 110	State Route 110
SR 118	State Route 118
SR 134	State Route 134
SR 170	State Route 170
SR 2	State Route 2
SR 22	State Route 22
SR 57	State Route 57
SR 60	State Route 60
SR 710	State Route 710
SR 91	State Route 91
TACs	toxic air contaminants
TAP	Transit Access Pass
TDM	Transportation Demand Management
TIP	Transportation Improvement Program
TSM	Transportation System Management
TSSP	Traffic Signal Synchronization Program
US-101	United States Route 101
USC	United States Code
USDOT	United States Department of Transportation
UV	ultraviolet
VHT	vehicle hours traveled
VMT	vehicle miles traveled
VOCs	volatile organic compounds

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1. Project Description

1.1 Introduction

The California Department of Transportation (Caltrans), in cooperation with the Los Angeles County Metropolitan Transportation Authority (Metro) proposes transportation improvements to improve mobility and relieve congestion in the area between State Route 2 (SR 2) and Interstates 5, 10, 210 and 605 (I-5, I-10, I-210, and I-605, respectively) in east/northeast Los Angeles and the western San Gabriel Valley. The study area for the State Route 710 (SR 710) North Study as depicted on Figure 1-1 is approximately 100 square miles and generally bounded by I-210 on the north, I-605 on the east, I-10 on the south, and I-5 and SR 2 on the west. Caltrans is the Lead Agency under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

1.2 Purpose and Need

1.2.1 Purpose of the Project

Due to the lack of continuous north-south transportation facilities in the study area, there is congestion on freeways, cut-through traffic that affects local streets, and low-frequency transit operations in the study area. Therefore, the following project purpose has been established.

The purpose of the proposed action is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles, including the following considerations:

- Improve efficiency of the existing regional freeway and transit networks.
- Reduce congestion on local arterials adversely affected due to accommodating regional traffic volumes.
- Minimize environmental impacts related to mobile sources.

1.2.2 Need for the Project

The study area is centrally located within the extended urbanized area of Southern California. With few exceptions, the area from Santa Clarita in the north to San Clemente in the south (a distance of approximately 90 miles [mi]) is continuously urbanized. Physical features such as the San Gabriel Mountains and Angeles National Forest on the north, and the Puente Hills and Cleveland National Forest on the south, have concentrated urban activity between the Pacific Ocean and these physical constraints. This urbanized area functions as a single social and economic region that is identified by the Census Bureau as the Los Angeles-Long Beach-Santa Ana Metropolitan Statistical Area (MSA).

There are seven major east-west freeway routes:

- State Route 118 (SR 118)
- United States Route 101 (US-101)/State Route 134 (SR 134)/I-210
- I-10
- State Route 60 (SR 60)

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Figure 1-1: Project Location

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- Interstate 105 (I-105)
- State Route 91 (SR 91)
- State Route 22 (SR 22)

There are seven major north-south freeway routes:

- Interstate 405 (I-405)
- US-101/State Route 170 (SR 170)
- I-5
- Interstate 110 (I-110)/State Route 110 (SR 110)
- Interstate 710 (I-710)
- I-605
- State Route 57 (SR 57)

All of these major routes are located in the central portion of the Los Angeles-Long Beach-Santa Ana MSA. Of the seven north-south routes, four are located partially within the study area (I-5, I-110/ SR 110, I-710, and I-605), two of which (I-110/SR 110 and I-710) terminate within the study area without connecting to another freeway. As a result, a substantial amount of north-south regional travel demand is concentrated on a few freeways, or diverted to local streets within the study area. This effect is exacerbated by the overall southwest-to-northeast orientation of I-605, which makes it an unappealing route for traffic between the southern part of the region and the urbanized areas to the northwest in the San Fernando Valley, the Santa Clarita Valley, and the Arroyo-Verdugo region.

The lack of continuous north-south transportation facilities in the study area has the following consequences, which have been identified as the elements of need for the project:

- Degradation of the overall efficiency of the larger regional transportation system
- Congestion on freeways in the study area
- Congestion on the local streets in the study area
- Poor transit operations within the study area

1.3 Alternatives

The proposed alternatives include the No Build Alternative, the Transportation System Management/Transportation Demand Management (TSM/TDM) Alternative, the Bus Rapid Transit (BRT) Alternative, the Light Rail Transit (LRT) Alternative, and the Freeway Tunnel Alternative. These alternatives are each discussed below.

1.3.1 No Build Alternative

The No Build Alternative includes projects/planned improvements through 2035 that are contained in the Federal Transportation Improvement Program (FTIP), as listed in the Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), Measure R, and the funded portion of Metro's 2009 Long Range Transportation

Plan (LRTP). The No Build Alternative does not include any planned improvements to the SR 710 Corridor. Figure 1-2 illustrates the projects in the No Build Alternative.

1.3.2 Transportation System Management/Transportation Demand Management (TSM/TDM) Alternative

The TSM/TDM Alternative consists of strategies and improvements to increase efficiency and capacity for all modes in the transportation system with lower capital cost investments and/or lower potential impacts. The TSM/TDM Alternative is designed to maximize the efficiency of the existing transportation system by improving capacity and reducing the effects of bottlenecks and chokepoints. Components of the TSM/TDM Alternative are shown on Figure 1-3. TSM strategies increase the efficiency of existing facilities (i.e., TSM strategies are actions that increase the number of vehicle trips which a facility can carry without increasing the number of through lanes).

1.3.2.1 Transportation System Management

TSM strategies include Intelligent Transportation Systems (ITS), local street and intersection improvements, and Active Traffic Management (ATM):

- **ITS Improvements:** ITS improvements include traffic signal upgrades, synchronization and transit prioritization, arterial changeable message signs (CMS), and arterial video and speed data collection systems. The TSM/TDM Alternative includes signal optimization on corridors with signal coordination hardware already installed by Metro's Traffic Signal Synchronization Program (TSSP). These corridors include Del Mar Avenue, Rosemead Boulevard, Temple City Boulevard, Santa Anita Avenue, Fair Oaks Avenue, Fremont Avenue, and Peck Road. The only remaining major north-south corridor in the San Gabriel Valley in which TSSP has not been implemented is Garfield Avenue; therefore, TSSP on this corridor is included in the TSM/TDM Alternative. The locations are shown in Table 1.1. The following provide a further explanation of the ITS elements listed above:
  - Traffic signal upgrades include turn arrows, vehicle and/or bicycle detection, pedestrian countdown timers, incorporation into regional management traffic center for real-time monitoring of traffic and updating of signal timing.
  - Synchronization is accomplished through signal coordination to optimize travel times and reduce delay.
  - Transit signal prioritization includes adjusting signal times for transit vehicles to optimize travel times for public transit riders.
  - Arterial CMS are used to alert travelers about unusual road conditions, special event traffic, accident detours, and other incidents.
  - Video and speed data collection includes cameras and other vehicle detection systems that are connected to a central monitoring location, allowing for faster detection and response to traffic incidents and other unusual traffic conditions.

Figure 1-2: No Build Alternative

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Figure 1-3: TSM/TDM Alternative

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TABLE 1.1:
TSM/TDM Alternative Elements

ID No.	Description	Location
ITS Improvements		
ITS-1	Transit Signal Priority	Rosemead Boulevard (from Foothill Boulevard to Del Amo Boulevard)
ITS-2	Install Video Detection System on SR 110	SR 110 north of US-101
ITS-3	Install Video Detection System at Intersections	At key locations in study area
ITS-4	Arterial Speed Data Collection	On key north/south arterials
ITS-5	Install Arterial CMS	At key locations in study area
ITS-6	Traffic Signal Synchronization on Garfield Avenue	Huntington Drive to I-10
ITS-7	Signal optimization on Del Mar Avenue	Huntington Drive to I-10
ITS-8	Signal optimization on Rosemead Boulevard	Foothill Boulevard to I-10
ITS-9	Signal optimization on Temple City Boulevard	Duarte Road to I-10
ITS-10	Signal optimization on Santa Anita Avenue	Foothill Boulevard to I-10
ITS-11	Signal optimization on Peck Road	Live Oak Avenue to I-10
ITS-12	Signal optimization on Fremont Avenue	Huntington Drive to I-10

CMS = changeable message signs
I-10 = Interstate 10
ITS = Intelligent Transportation Systems
SR 110 = State Route 110
TDM = Transportation Demand Management
TSM = Transportation System Management
US-101 = United States Route 101

- **Local Street and Intersection Improvements:** The local street and intersection improvements are within the Cities of Los Angeles, Pasadena, South Pasadena, Alhambra, San Gabriel, Rosemead, and San Marino. Table 1.2 outlines the location of the proposed improvements to local streets, intersections, and freeway ramps as well as two new local roadways.
- **Active Traffic Management:** ATM technology and strategies are also included in the TSM/TDM Alternative. The major elements of ATM are arterial speed data collection and CMS. Data on arterial speeds would be collected and distributed through Los Angeles County's Information Exchange Network (IEN). Many technologies are available for speed data collection or the data could be purchased from a third-party provider. Travel time data collected through this effort could be provided to navigation system providers for distribution to the traveling public. In addition, arterial CMS or "trailblazer" message signs would be installed at key locations to make travel time and other traffic data available to the public.

1.3.2.2 Transportation Demand Management

TDM strategies focus on regional means of reducing the number of vehicle trips and vehicle miles traveled as well as increasing vehicle occupancy. TDM strategies facilitate higher vehicle occupancy or reduce traffic congestion by expanding the traveler's transportation options in terms of travel method, travel time, travel route, travel costs, and the quality and convenience of the travel experience. The TDM strategies include reducing the demand for travel during peak periods, reducing the use of motor vehicles, shifting the use of motor vehicles to uncongested times of the day, encouraging rideshare and transit use, eliminating trips (i.e., telecommuting), and improved transportation options. The TDM strategies include expanded bus service, bus service improvements, and bicycle improvements:

TABLE 1.2:
Local Street and Intersection Improvements of the TSM/TDM Alternative

ID No.	Description	Location
Local Street Improvements		
L-1	Figueroa Street from SR 134 to Colorado Boulevard	City of Los Angeles (Eagle Rock)
L-2a	Fremont Avenue from Huntington Drive to Alhambra Road	City of South Pasadena
L-2c	Fremont Avenue from Mission Road to Valley Boulevard	City of Alhambra
L-3	Atlantic Boulevard from Glendon Way to I-10	City of Alhambra
L-4	Garfield Avenue from Valley Boulevard to Glendon Way	City of Alhambra
L-5	Rosemead Boulevard from Lower Azusa Road to Marshall Street	City of Rosemead
L-8	Fair Oaks Avenue from Grevelia Street to Monterey Road	City of South Pasadena
Intersection Improvements		
I-1	West Broadway/Colorado Boulevard	City of Los Angeles (Eagle Rock)
I-2	Eagle Rock Boulevard/York Boulevard	City of Los Angeles (Eagle Rock)
I-3	Eastern Avenue/Huntington Drive	City of Los Angeles (El Sereno)
I-8	Fair Oaks Avenue/Monterey Road	City of South Pasadena
I-9	Fremont Street/Monterey Road	City of South Pasadena
I-10	Huntington Drive/Fair Oaks Avenue	City of South Pasadena
I-11	Fremont Avenue/Huntington Drive	City of South Pasadena
I-13	Huntington Drive/Garfield Avenue	Cities of Alhambra/South Pasadena/San Marino
I-14	Huntington Drive/Atlantic Boulevard	Cities of Alhambra/South Pasadena/San Marino
I-15	Atlantic Boulevard/Garfield Avenue	Cities of Alhambra/South Pasadena/San Marino
I-16	Garfield Avenue/Mission Road	City of Alhambra
I-18	San Gabriel Boulevard/Huntington Drive	City of San Marino/Unincorporated Los Angeles County (East Pasadena/East San Gabriel)
I-19	Del Mar Avenue/Mission Road	City of San Gabriel
I-22	San Gabriel Boulevard/Marshall Street	City of San Gabriel
I-24	Huntington Drive/Oak Knoll Avenue	City of San Marino
I-25	Huntington Drive/San Marino Avenue	City of San Marino
I-43	Del Mar Avenue/Valley Boulevard	City of San Gabriel
I-44	Hellman Avenue/Fremont Avenue	City of Alhambra
I-45	Eagle Rock Boulevard/Colorado Boulevard	City of Los Angeles (Eagle Rock)
Other Road Improvements		
T-1	Valley Boulevard to Mission Road Connector Road	Cities of Alhambra/Los Angeles (El Sereno)
T-2	SR 110/Fair Oaks Avenue Hook Ramps	Cities of South Pasadena/Pasadena
T-3	St. John Avenue Extension between Del Mar Boulevard and California Boulevard	City of Pasadena

I-10 = Interstate 10
I-710 = Interstate 710
NB = northbound
SB = southbound
SR 110 = State Route 110
SR 134 = State Route 134
TDM = Transportation Demand Management
TSM = Transportation System Management

- **Expanded Bus Service and Bus Service Improvements:** Transit service improvements included in the TSM/TDM Alternative are summarized in Tables 1.3 and 1.4 and illustrated on Figure 1-3. The transit service improvements enhance bus headways between 10 and 30 minutes during the peak hour and 15 to 60 minutes during the off-peak period. Bus headways are the amount of time between consecutive bus trips (traveling in the same direction) on the bus route. Some of the bus service enhancements almost double existing bus service.
- **Bicycle Facility Improvements:** The bicycle facility improvements include on-street Class III bicycle facilities that support access to transit facilities through the study area and expansion of bicycle parking facilities at existing Metro Gold Line stations. Proposed bicycle facility improvements are outlined in Table 1.4.

TABLE 1.3:
Transit Refinements of the TSM/TDM Alternative

Bus Route	Operator	Route Type	Route Description	Existing Headways		Enhanced Headways	
				Peak	Off-Peak	Peak	Off-Peak
70	Metro	Local	From Downtown Los Angeles to El Monte via Garvey Avenue	10-12	15	10	15
770	Metro	Rapid	From Downtown Los Angeles to El Monte via Garvey Avenue/Cesar Chavez Avenue	10-13	15	10	15
76	Metro	Local	From Downtown Los Angeles to El Monte via Valley Boulevard	12-15	16	10	15
78	Metro	Local	From Downtown Los Angeles to Irwindale via Las Tunas Drive	10-20	16-40	10	15
378	Metro	Limited	From Downtown Los Angeles to Irwindale via Las Tunas Drive	18-23	-	20	30
79	Metro	Local	From Downtown Los Angeles to Santa Anita via Huntington Drive	20-30	40-45	15	30
180	Metro	Local	From Hollywood to Altadena via Los Feliz/Colorado Boulevard	30	30-32	15	30
181	Metro	Local	From Hollywood to Pasadena via Los Feliz/Colorado Boulevard	30	30-32	15	30
256	Metro	Local	From Commerce to Altadena via Hill Avenue/Avenue 64/Eastern Avenue	45	45	30	40
258	Metro	Local	From Paramount to Alhambra via Fremont Avenue/ Eastern Avenue	48	45-55	20	30
260	Metro	Local	From Compton to Altadena via Fair Oaks Avenue/ Atlantic Boulevard	16-20	24-60	15	30
762[1]	Metro	Rapid	From Compton to Altadena via Atlantic Boulevard	25	30-60	15	30
266	Metro	Local	From Lakewood to Pasadena via Rosemead Boulevard/Lakewood Boulevard	30-35	40-45	15	30
267	Metro	Local	From El Monte to Pasadena via Temple City Boulevard/Del Mar Boulevard	30	30	15	30
485	Metro	Express	From Union Station to Altadena via Fremont/Lake Avenue	40	60	30	60
487	Metro	Express	From Westlake to El Monte via Santa Anita Avenue/ Sierra Madre Boulevard/San Gabriel Boulevard	18-30	45	15	30
489	Metro	Express	From Westlake to East San Gabriel via Rosemead Boulevard	18-20	-	15	-
270	Metro	Local	From Norwalk to Monrovia via Workman Mill/Peck Road	40-60	60	30	60
780	Metro	Rapid	From West LA to Pasadena via Fairfax Avenue/ Hollywood Boulevard/Colorado Boulevard	10-15	22-25	10	20
187	Foothill	Local	From Pasadena to Montclair via Colorado Boulevard/ Huntington Drive/Foothill Boulevard	20	20	15	15

[1] This route would not be included as part of the BRT Alternative because the BRT Alternative would replace this service.
BRT = Bus Rapid Transit
Express = Express Bus
Foothill = Foothill Transit
Metro = Los Angeles County Metropolitan Transportation Authority
Rapid = Bus Rapid Transit
TDM = Transportation Demand Management
TSM = Transportation System Management

TABLE 1.4:
Active Transportation and Bus Enhancements of the TSM/TDM Alternative

ID No.	Description	Location
Bus Service Improvements		
Bus-1	Additional bus service	See Table 1.3 and Figure 1-3
Bus-2	Bus stop enhancements	Along routes listed in Table 1.3
Bicycle Facility Improvements		
Bike-1	Rosemead Boulevard bike route (Class III)	Colorado Boulevard to Valley Boulevard (through Los Angeles County, Temple City, Rosemead)
Bike-2	Del Mar Avenue bike route (Class III)	Huntington Drive to Valley Boulevard (through San Marino, San Gabriel)
Bike-3	Huntington Drive bike route (Class III)	Mission Road to Santa Anita Avenue (through the City of Los Angeles, South Pasadena, San Marino, Alhambra, Los Angeles County, Arcadia)
Bike-4	Foothill Boulevard bike route (Class III)	In La Cañada Flintridge
Bike-5	Orange Grove bike route (Class III)	Walnut Street to Columbia Street (in Pasadena)
Bike-6	California Boulevard bike route (Class III)	Grand Avenue to Marengo Avenue (in Pasadena)
Bike-7	Add bike parking at transit stations	Metro Gold Line stations
Bike-8	Improve bicycle detection at existing intersections	Along bike routes in study area

Metro = Los Angeles County Metropolitan Transportation Authority
TDM = Transportation Demand Management
TSM = Transportation System Management

1.3.3 Bus Rapid Transit (BRT) Alternative

The BRT Alternative would provide high-speed, high-frequency bus service through a combination of new, dedicated, and existing bus lanes, and mixed-flow traffic lanes to key destinations between East Los Angeles and Pasadena. The proposed route length is approximately 12 mi. Figure 1-4 illustrates the BRT Alternative.

The BRT Alternative includes the BRT trunk line arterial street and station improvements, frequent bus service, new bus feeder services, and enhanced connecting bus services. BRT includes bus enhancements identified in the TSM/TDM Alternative, except for improvements to Route 762.

Buses are expected to operate every 10 minutes during peak hours and every 20 minutes during off-peak hours. The BRT service would generally replace, within the study area, the existing Metro Route 762 service. The 12 mi route would begin at Atlantic Boulevard and Whittier Boulevard to the south, follow Atlantic Boulevard, Huntington Drive, Fair Oaks Avenue, Del Mar Boulevard, and end with a terminal loop in Pasadena to the north. Buses operating in the corridor would be given transit signal priority from a baseline transit signal priority project that will be implemented separately by Metro.

Where feasible, buses would run in dedicated bus lanes adjacent to the curb, either in one direction or both directions, during peak periods. The new dedicated bus lanes would generally be created within the existing street rights of way (ROW) through a variety of methods that include restriping the roadway, restricted on-street parking during peak periods, narrowing medians, planted parkways, or sidewalks. Buses would share existing lanes with other traffic in cases where there is not enough ROW. The exclusive lanes would be exclusive to buses and right-turning traffic during a.m. and p.m. peak hours only. At other times of day, the exclusive lanes would be available for on-street parking use.

Figure 1-4: BRT Alternative

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A total of 17 BRT stations with amenities would be placed on average, at approximately 0.8 mi intervals at major activity centers and cross streets. Typical station amenities would include new shelters, branding elements, seating, wind screens, leaning rails, variable message signs (next bus information), lighting, bus waiting signals, trash receptacles, and stop markers. Some of these stops will be combined with existing stops, while in some cases, new stops for BRT will be provided. The BRT service would include 60-foot (ft) articulated buses with three doors, and would have the latest fare collection technology such as on-board smart card (Transit Access Pass [TAP] card) readers to reduce dwell times at stations. The BRT stops would be provided at the following 17 locations:

- Atlantic Boulevard at Whittier Boulevard
- Atlantic Boulevard between Pomona Boulevard and Beverly Boulevard
- Atlantic Boulevard at Cesar Chavez Avenue/Riggin Street
- Atlantic Boulevard at Garvey Avenue
- Atlantic Boulevard at Valley Boulevard
- Atlantic Boulevard at Main Street
- Huntington Drive at Garfield Avenue
- Huntington Drive at Marengo Avenue
- Fair Oaks Avenue at Mission Street
- Fair Oaks Avenue at Glenarm Street
- Fair Oaks Avenue at California Boulevard
- Fair Oaks Avenue at Del Mar Boulevard
- Del Mar Boulevard at Los Robles Avenue
- Del Mar Boulevard at Lake Avenue
- Del Mar Boulevard at Hill Avenue (single direction only)
- Colorado Boulevard at Hill Avenue (single direction only)
- Colorado Boulevard at Lake Avenue (single direction only)

Additionally, this alternative would include bus feeder routes that would connect additional destinations with the BRT mainline. Two bus feeder routes are proposed: one that would run along Colorado Boulevard, Rosemead Boulevard, and Valley Boulevard to the El Monte transit station; and another bus feeder route that would travel from Atlantic Boulevard near the Gold Line station to the Metrolink stations in the City of Commerce and Montebello via Beverly Boulevard and Garfield Avenue. In addition, other existing bus services in the study area would be increased in frequency and/or span of service. The El Sol shuttle improvements are an existing bus service that would be increased in frequency. The headways on the El Sol shuttle “City Terrace/East Los Angeles College (ELAC)” route that connect ELAC to the proposed Floral Station would be reduced from 60 minutes to 15 minutes.

The TSM/TDM Alternative improvements would also be constructed as part of the BRT Alternative, except as noted below. These improvements would provide the additional enhancements to maximize the efficiency of the existing transportation system by improving capacity and reducing the effects of bottlenecks and chokepoints. Local Street Improvements L-8 (Fair Oaks Avenue from Grevelia Street to Monterey Road) and the reversible lane component of L-3 (Atlantic Boulevard from Glendon Way to I-10) would not be constructed with the BRT Alternative.

1.3.4 Light Rail Transit (LRT) Alternative

The LRT Alternative would include passenger rail operated along a dedicated guideway, similar to other Metro light rail lines. The LRT alignment is approximately 7.5 mi long, with 3 mi of aerial segments and 4.5 mi of bored tunnel segments. Figure 1-5 illustrates the LRT Alternative.

The LRT Alternative would begin at an aerial station on Mednik Avenue adjacent to the existing East Los Angeles Civic Center Station on the Metro Gold Line. The alignment would remain elevated as it travels north on Mednik Avenue, west on Floral Drive, north across Corporate Center Drive, and then along the west side of I-710, primarily in Caltrans ROW, to a station adjacent to the California State University, Los Angeles (Cal State LA). The alignment would descend into a tunnel south of Valley Boulevard and travel northeast to Fremont Avenue, north under Fremont Avenue, and easterly to Fair Oaks Avenue. The alignment would then cross under SR 110 and end at an underground station beneath Raymond Avenue adjacent to the existing Fillmore Station on the Metro Gold Line.

Two directional tunnels are proposed with tunnel diameters approximately 20 ft each, located approximately 60 ft below the ground surface. Other supporting tunnel systems include emergency evacuation cross passages for pedestrians, a ventilation system consisting of exhaust fans at each portal and an exhaust duct along the entire length of the tunnel, fire detection and suppression systems, communications and surveillance systems, and 24-hour monitoring, similar to the existing LRT system.

Trains would operate at speeds of up to 65 miles per hour (mph) approximately every 5 minutes during peak hours and 10 minutes during off-peak hours.

Seven stations would be located along the LRT alignment at Mednik Avenue in East Los Angeles, Floral Drive in Monterey Park, Cal State LA, Fremont Avenue in Alhambra, Huntington Drive in South Pasadena, Mission Street in South Pasadena, and Fillmore Street in Pasadena. The Fremont Avenue Station, the Huntington Drive Station, the Mission Street Station, and the Fillmore Street Station would be underground stations. New Park-and-Ride facilities would be provided at all of the proposed stations except for the Mednik Avenue, Cal State LA, and Fillmore Street stations.

A maintenance yard to clean, maintain, and store light rail vehicles would be located on both sides of Valley Boulevard at the terminus of SR 710. A track spur from the LRT mainline to the maintenance yard would cross above Valley Boulevard.

Two bus feeder services would be provided. One would travel from the Commerce Station on the Orange County Metrolink line and the Montebello Station on the Riverside Metrolink line to the Floral Station, via East Los Angeles College. The other would travel from the El Monte Bus Station to the Fillmore Station via Rosemead and Colorado Boulevards. In addition, other existing bus services in the study area would be increased in frequency and/or span of service.

Figure 1-5: LRT Alternative

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As part of the LRT Alternative, the I-710 northbound off-ramp at Valley Boulevard would be modified.

The TSM/TDM Alternative improvements would also be constructed as part of the LRT Alternative. These improvements would provide the additional enhancements to maximize the efficiency of the existing transportation system by improving capacity and reducing the effects of bottlenecks and chokepoints. The only component of the TSM/TDM Alternative improvements that would not be constructed with the LRT Alternative is Other Road Improvement T-1 (Valley Boulevard to Mission Road Connector Road).

1.3.5 Freeway Tunnel Alternative

The alignment for the Freeway Tunnel Alternative starts at the existing southern stub of SR 710 in Alhambra, just north of I-10, and connects to the existing northern stub of SR 710, south of the I-210/SR 134 interchange in Pasadena. The Freeway Tunnel Alternative would include the following tunnel support systems: emergency evacuation for pedestrians and vehicles, air scrubbers, a ventilation system consisting of exhaust fans at each portal, an exhaust duct along the entire length of the tunnel and jet fans within the traffic area of the tunnel, fire detection and suppression systems, communications and surveillance systems, and 24-hour monitoring. An operations and maintenance (O&M) building would be constructed at the northern and southern ends of the tunnel. There would be no operational restrictions for the tunnel, with the exception of vehicles carrying flammable or hazardous materials. As part of both design variations of the Freeway Tunnel Alternative, the I-710 northbound off-ramp and southbound on-ramp at Valley Boulevard would be modified.

The TSM/TDM Alternative improvements would also be constructed as part of the Freeway Tunnel Alternative, including either the dual-bore or single-bore design variations. These improvements would provide the additional enhancements to maximize the efficiency of the existing transportation system by improving capacity and reducing the effects of bottlenecks and chokepoints. The only components of the TSM/TDM Alternative improvements that would not be constructed with the Freeway Tunnel Alternative are Other Road Improvements T-1 (Valley Boulevard to Mission Road Connector Road) and T-3 (St. John Avenue Extension between Del Mar Boulevard and California Avenue).

1.3.5.1 Design Variations

The Freeway Tunnel Alternative includes two design variations. These variations relate to the number of tunnels constructed. The dual-bore design variation includes two tunnels that independently convey northbound and southbound vehicles. The single-bore design variation includes one tunnel that carries both northbound and southbound vehicles. Figure 1-6 illustrates the dual-bore and single-bore tunnel design variations for the Freeway Tunnel Alternative. Each of these design variations is described below.

- **Dual-Bore Tunnel:** The dual-bore tunnel design variation is approximately 6.3 mi long, with 4.2 mi of bored tunnel, 0.7 mi of cut-and-cover tunnel, and 1.4 mi of at-grade segments. The dual-bore tunnel design variation would consist of two side-by-side tunnels (the east tunnel would convey northbound traffic, and the west tunnel would convey southbound traffic). Each tunnel would have two levels with traffic traveling in the same direction. Each tunnel would consist of two lanes of traffic on each level, traveling in one direction, for a total of four lanes in each

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Figure 1-6: Freeway Tunnel Alternative Single and Dual Bore

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tunnel. The eastern tunnel would be constructed for northbound traffic, and the western tunnel would be constructed for southbound traffic. Each bored tunnel would have an outside diameter of approximately 58.5 ft and would be located approximately 120 to 250 ft below the ground surface. Vehicle cross passages would be provided throughout this tunnel variation that would connect one tunnel to the other tunnel for use in an emergency situation. Figure 1-6 illustrates the dual-bore tunnel variation of the Freeway Tunnel Alternative.

Short segments of cut-and-cover tunnels would be located at the south and north termini to provide access via portals to the bored tunnels. The portal at the southern terminus would be located south of Valley Boulevard. The portal at the northern terminus would be located north of Del Mar Boulevard. No intermediate interchanges are planned for the tunnel.

- **Single-Bore Tunnel:** The single-bore tunnel design variation is also approximately 6.3 mi long, with 4.2 mi of bored tunnel, 0.7 mi of cut-and-cover tunnel, and 1.4 mi of at-grade segments. The single-bore tunnel design variation would consist of one tunnel with two levels. Each level would have two lanes of traffic traveling in one direction. The northbound traffic would traverse the upper level, and the southbound traffic would traverse the lower level. The single-bore tunnel would provide a total of four lanes. The single-bore tunnel would also have an outside diameter of approximately 58.5 ft and would be located approximately 120 to 250 ft below the ground surface. The single-bore tunnel would be in the same location as the northbound tunnel in the dual-bore tunnel design variation. Figure 1-7 illustrates the single-bore tunnel variation cross section of the Freeway Tunnel Alternative.

1.3.5.2 Operational Variations

There were three different parameters related to the operational variations of the Freeway Tunnel Alternative:

- **Tolling:** Tolls could be charged for vehicles using the tunnel, or it could be free for all drivers (a conventional freeway).
- **Trucks:** Trucks could be prohibited or allowed.
- **Express Bus:** A dedicated Express Bus could be operated using the tunnel. The Express Bus route would start at the Commerce Station on the Orange County Metrolink line, and then serve the Montebello Station on the Riverside Metrolink line and East Los Angeles College before entering I-710 at Floral Drive. The bus would travel north to Pasadena via the proposed freeway tunnel, making a loop serving Pasadena City College, the California Institute of Technology, and downtown Pasadena before re-entering the freeway and making the reverse trip.

The following operational variations have been studied for the Freeway Tunnel Alternative:

- **Freeway Tunnel Alternative without Tolls:** The facility would operate as a conventional freeway with lanes open to all vehicles. Trucks would be allowed and there would be no Express Bus service. This operational variation would be considered for only the dual-bore tunnel design variation.
- **Freeway Tunnel Alternative with Trucks Excluded:** The facility would operate as a conventional freeway; however, trucks would be excluded from using the tunnel. There would be no Express Bus service. Signs would be provided along I-210, SR 134, I-710, and I-10 to provide advance notice of the truck restriction. This operational variation would be considered for the dual-bore tunnel only.

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Figure 1-7: Freeway Tunnel Alternative Single Bore Cross Section

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- **Freeway Tunnel Alternative with Tolls:** All vehicles, including trucks, using the tunnel would be tolled. There would be no Express Bus service. This operational variation would be considered for both the dual- and single-bore tunnels described above.
- **Freeway Tunnel Alternative with Trucks Excluded and with Tolls:** The facility would be tolled for all automobiles. There would be no Express Bus service. Trucks would be excluded from using the tunnel. Signs would be provided along I-210, SR 134, I-710, and I-10 to provide advance notice of the truck restriction. This operational variation would be considered for the single-bore tunnel only.
- **Freeway Tunnel Alternative with Toll and Express Bus:** The freeway tunnel would operate as a tolled facility and include an Express Bus component. The Express Bus would be allowed in any of the travel lanes in the tunnel; no bus-restricted lanes would be provided. Trucks would be permitted. This operational variation would be considered for the single-bore tunnel only.

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2. Environmental Setting

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

The project site is in Los Angeles County, an area within the South Coast Air Basin (SCAB), which includes Orange County and the nondesert parts of Los Angeles, Riverside, and San Bernardino Counties. Air quality regulation in the SCAB is administered by the South Coast Air Quality Management District (SCAQMD).

2.1 Meteorology

2.1.1 Climate

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

The annual average temperature varies little throughout the SCAB, ranging from the low to middle 60s (measured in degrees Fahrenheit [°F]). With a more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas. The climatological station closest to the site monitoring temperature is the Pasadena Station[1]. The annual average maximum temperature recorded at this station is 76.8°F, and the annual average minimum is 51.0°F. January is typically the coldest month in this area of the SCAB.

The majority of rainfall in the SCAB occurs between November and April. Summer rainfall is minimal and generally limited to scattered thundershowers in coastal regions and slightly heavier showers in the eastern part of the SCAB along the coastal side of the mountains. The closest climatological station to the project limits that monitors precipitation is the Pasadena Station. Average rainfall measured at this station varied from a high of 4.54 inches in February to 0.43 inch or less between May and September, with an average annual total of 20.24 inches. Patterns in monthly and yearly rainfall totals are unpredictable due to fluctuations in the weather.

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

1 Western Regional Climatic Center. 2013. http://www.wrcc.dri.edu (accessed December 4, 2013).

Winds in the vicinity of the project area blow predominantly from the west and southwest at relatively low velocities, with wind speeds averaging approximately 4 mph. Summer wind speeds average slightly higher than winter wind speeds. Low average wind speeds together with a persistent temperature inversion limit the vertical dispersion of air pollutants throughout the SCAB. Strong, dry, northerly or northeasterly winds, known as Santa Ana winds, occur during the fall and winter months, dispersing air contaminants. Santa Ana conditions tend to last for several days at a time.

Inversion layers have a substantial role in determining ozone (O_3) formation. O_3 and its precursors will mix and react to produce higher concentrations under an inversion. The inversion will also simultaneously trap and hold directly emitted pollutants such as carbon dioxide (CO_2). Particulate matter less than 10 microns in diameter (PM_{10}) is both directly emitted and created indirectly in the atmosphere as a result of chemical reactions. Concentration levels are directly related to inversion layers due to the limitation of mixing space.

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

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

2.1.2 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 gases (GHGs), 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 related to human activity that include CO_2, methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, hydrofluorocarbon (HFC)-23 (fluoroform), HFC-134a (s,s,s,2 –tetrafluoroethane), and HFC-152a (difluoroethane).

In the United States, 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 due to climate change (such as adjusting transportation design standards to withstand more intense storms and higher sea levels)[1].

There are four primary strategies for reducing GHG emissions from transportation sources: (1) improve system and operation efficiencies, (2) reduce growth of vehicle miles traveled (VMT), (3) transition to lower GHG fuels, and (4) improve 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.

2.1.2.1 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 (AB) 1493, Pavley, Vehicular Emissions: Greenhouse Gases, 2002:** This bill requires the 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.
- **Executive Order (EO) S-3-05 (June 1, 2005):** 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 2050. In 2006, this goal was further reinforced with the passage of AB 32.
- **AB 32, Núñez and Pavley, The Global Warming Solutions Act of 2006:** 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 and implement rules to achieve “real, quantifiable, cost-effective reductions of greenhouse gases.”
- **EO S-20-06 (October 18, 2006):** This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency (Cal/EPA) and state agencies with regard to climate change.
- **EO S-01-07 (January 18, 2007):** This order 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 10 percent by 2020.
- **Senate Bill (SB) 97, Chapter 185, 2007, Greenhouse Gas Emissions:** Required the Governor's Office of Planning and Research (OPR) to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

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1 http://climatechange.transportation.org/ghg_mitigation/ (accessed December 4, 2013).

- **SB 375, Chapter 728, 2008, Sustainable Communities and Climate Protection:** This bill requires the ARB to set regional emissions reduction targets from passenger vehicles. The Metropolitan Planning Organization (MPO) for each region must then develop a "Sustainable Communities Strategy" (SCS) that integrates transportation, land-use, and housing policies to plan for the achievement of the emissions target for their region.
- **SB 391 Chapter 585, 2009 California Transportation Plan:** This bill requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

2.1.2.2 Federal

Although climate change and GHG reduction are a concern at the federal level; currently no regulations or legislation have been enacted specifically addressing GHG emissions reductions and climate change at the project level. Neither the United States Environmental Protection Agency (EPA) nor the Federal Highway Administration (FHWA) has issued explicit guidance or methods to conduct project-level GHG analysis[1]. FHWA supports the approach that 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 assist in 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 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 outlined by FHWA to lessen climate change impacts correlate with efforts that the State is undertaking to deal with transportation and climate change; these strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and a reduction in travel activity.

Climate change and its associated effects are 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 (October 5, 2009). EO 13514 is focused on reducing GHGs internally in federal agency missions, programs, and operations, but also directs 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.

The EPA's authority to regulate GHG emissions stems from the US Supreme Court decision in *Massachusetts v. EPA* (2007). The Supreme Court ruled that GHGs meet the definition of air pollutants under the existing Clean Air Act and must be regulated if these gases could be reasonably anticipated to endanger public health or welfare. Responding to the Court's ruling, the EPA finalized an endangerment finding in December 2009. Based on scientific evidence it found that six greenhouse gases constitute a threat to public health and welfare. Thus, it is the Supreme Court's interpretation of the existing Act and the EPA's assessment of the scientific evidence that form the basis for the EPA's regulatory actions. The EPA, in conjunction with the National Highway Traffic

[1] To date, no national standards have been established regarding mobile source GHGs, nor has U.S. EPA established any ambient standards, criteria or thresholds for GHGs resulting from mobile sources.

Safety Administration (NHTSA), issued the first of a series of GHG emission standards for new cars and light-duty vehicles in April 2010[1].

The EPA and the 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.

The final combined standards that made 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 implemented by this program are expected to reduce 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 August 28, 2012, the EPA and the NHTSA issued a joint Final Rulemaking to extend the National Program for fuel economy standards to model year 2017 through 2025 passenger vehicles. Over the lifetime of the model year 2017–2025 standards, this program is projected to save approximately 4 billion barrels of oil and 2 billion metric tons of GHG emissions.

The complementary EPA and NHTSA standards that make up the Heavy-Duty National Program apply to combination tractors (semi-trucks), heavy-duty pickup trucks and vans, and vocational vehicles (including buses and refuse or utility trucks). Together, these standards will cut GHG gas emissions and domestic oil use significantly. This program responds to President Barack Obama's 2010 request to jointly establish greenhouse gas emissions and fuel efficiency standards for the medium- and heavy-duty highway vehicle sector. The agencies estimate that the combined standards will reduce CO_2 emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of model year 2014 to 2018 heavy-duty vehicles.

2.2 Air Quality Management

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

The six criteria pollutants are O_3, CO, particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. PM includes fine particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10}). In addition to these six criteria pollutants, California has set CAAQS for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Table 2.1 shows the federal and State standards for these pollutants and the health effects from exposure to the criteria pollutants are described later in this analysis.

1 http://www.c2es.org/federal/executive/epa/greenhouse-gas-regulation-faq (accessed December 4, 2013).

TABLE 2.1:
State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard[8]	Federal Standard[9]	Principal Health and Atmospheric Effects	Typical Sources	Attainment Status
Ozone (O_3)[2]	1 hour 8 hours	0.09 ppm 0.070 ppm	---[4] 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 VOC may also contribute.	Low-altitude ozone is almost entirely formed from reactive organic gases/volatile organic compounds (ROG or VOC) and nitrogen oxides (NO_X) in the presence of sunlight and heat. Major sources include motor vehicles and other mobile sources, solvent evaporation, and industrial and other combustion processes.	Federal: Extreme Nonattainment (8-hour) State: Nonattainment (1-hour and 8-hour)
Carbon Monoxide (CO)	1 hour 8 hours 8 hours (Lake Tahoe)	20 ppm 9.0 ppm[1] 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.	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 < or equal to 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 contaminants. Many aerosol and solid compounds are part of PM_{10}.	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; natural sources.	Federal: Attainment/Maintenance State: Nonattainment
Fine Particulate Matter ($PM_{2.5}$)[2]	24 hours Annual Secondary Standard (annual)	--- 12 µg/m^3 ---	35 µg/m^3 12.0 µg/m^3 15 µg/m^3 (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 – a toxic air contaminant – 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 (including photochemical) reactions involving other pollutants including NO_X, sulfur oxides (SO_X), ammonia, and ROG.	Federal: Nonattainment State: Nonattainment
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. Part of the "NO_X" group of ozone precursors.	Motor vehicles and other mobile sources; refineries; industrial operations.	Federal: Attainment/ Maintenance State: Nonattainment
Sulfur Dioxide (SO_2)	1 hour 3 hours 24 hours	0.25 ppm --- 0.04 ppm	0.075 ppm[7] (98th percentile over 3 years) 0.5 ppm	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, 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 like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.	Federal: Attainment/ Unclassified State: Attainment/ Unclassified

TABLE 2.1:
State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard[8]	Federal Standard[9]	Principal Health and Atmospheric Effects	Typical Sources	Attainment Status
Lead (Pb)[3]	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 like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from gasoline may exist in soils along major roads.	Federal: Nonattainment (Los Angeles County only) State: Nonattainment (Los Angeles County only)
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 like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.	Federal: N/A State: Attainment/ Unclassified
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm	---	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.	Federal: N/A State: Attainment/ Unclassified
Visibility Reducing Particles (VRP)	8 hours	Visibility of 10 miles or more (Tahoe: 30 miles) at relative humidity less than 70 percent	---	Reduces visibility. Produces haze. NOTE: not related to the Regional Haze program under the Federal Clean Air Act, which is oriented primarily toward visibility issues in National Parks and other “Class I” areas.	See particulate matter above.	Federal: N/A State: Attainment/ Unclassified
Vinyl Chloride[3]	24 hours	0.01 ppm	---	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes	Federal: N/A State: Attainment/ Unclassified

Source 1: www.arb.ca.gov/research/aaqs/aaqs2.pdf (June 4, 2013).
Source 2: California Air Resources Board, Area Designations, http://www.arb.ca.gov/desig/desig.htm (accessed April 2014).
Footnotes are continued on the next page.

TABLE 2.1:
State and Federal Criteria Air Pollutant Standards, Effects, and Sources

[1] Rounding to an integer value is not allowed for the State 8-hour CO standard. Violation occurs at or above 9.05 ppm.

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

[3] The ARB 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 the ARB and the 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 substantial health effect 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.

[4] Prior to June 2005, the 1-hour 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.

[5] 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] The 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] 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.

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

[10] Lead NAAQS are not considered in Transportation Conformity analysis.

µg/m^3 = micrograms per cubic meter
ARB = California Air Resources Board
EPA = United States Environmental Protection Agency
N/A = not applicable
NAAQS = national ambient air quality standards
NO_X = nitrogen oxides
ppb = parts per billion
ppm = parts per million
ROG = reactive organic gases
VOC = volatile organic compounds

2.3 Transportation Conformity Rule

The conformity requirement is based on Federal Clean Air Act Section 176(c), which prohibits the United States. Department of Transportation (USDOT) and other federal agencies from funding, authorizing, or approving plans, programs, or projects that do not conform to State Implementation Plan (SIP) for attaining the NAAQS. “Transportation Conformity” applies to highway and transit projects and takes place on two levels: the regional (or planning and programming) level and the project level. The proposed project must conform at both levels to be approved.

Conformity requirements apply only in nonattainment and “maintenance” (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. EPA regulations at 40 Code of Federal Regulations (CFR) 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/attainment areas for NAAQS and do not apply at all for State standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for CO, NO_2, O_3, PM_{10}, and $PM_{2.5}$, and in some areas (although not in California), SO_2. California has nonattainment or maintenance areas for all of these transportation-related “criteria pollutants” except SO_2, and also has a nonattainment area for lead; however, lead is not currently required by the CAA to be covered in transportation conformity analysis.

As part of the Clean Air Rules of 2004, the EPA published a final rule in the Federal Register on July 1, 2004, to amend the Transportation Conformity Rule to include criteria and procedures for the new 8-hour O_3 and $PM_{2.5}$ NAAQS. The final rule addressed a March 2, 1999, court decision by incorporating the EPA and USDOT guidance. On July 20, 2004, the EPA published a technical correction notice to correct two minor errors in the July 1, 2004, notice. To remain consistent with the stricter federal standards, the ARB approved a new 8-hour O_3 standard (0.07 parts per million [ppm], not to be exceeded) for O_3 on April 28, 2005. Additionally, the ARB retained the current 1-hour-average standard for O_3 (0.09 ppm) and the current monitoring method for O_3, which uses the ultraviolet (UV) photometry method.

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

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

Air quality monitoring stations are located throughout the nation and maintained by the local air districts and State air quality regulating agencies. Data collected at permanent monitoring stations are used by the EPA to identify regions as "attainment," "nonattainment," or "maintenance," depending on whether the regions meet the requirements stated in the primary NAAQS. Nonattainment areas are imposed with additional restrictions as required by the EPA. In addition, different classifications of nonattainment, such as marginal, moderate, serious, severe, and extreme, are used to classify each air basin in the State on a pollutant-by-pollutant basis. The classifications are used as a foundation to create air quality management strategies to improve air quality and comply with the NAAQS. Table 2.1 lists attainment status for each of the criteria pollutants in the Los Angeles County portion of the SCAB.

2.4 Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than the general population. Sensitive populations (sensitive receptors) that are in proximity to localized sources of toxics and CO are of particular concern. Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, hospitals, rehabilitation centers, convalescent centers, and retirement homes. The majority of the sensitive receptors within or adjacent to the project area are residential, park, and school uses.

3. Regulatory Framework

3.1 Federal Clean Air Act

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

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

3.2 California Clean Air Act

The ARB administers the air quality policy in California. These standards, included with the NAAQS in previously referenced Table 2.1, are generally more stringent and apply to more pollutants than the NAAQS. In addition to the criteria pollutants, California Ambient Air Quality Standards (CAAQS) have been established for visibility-reducing particulates, hydrogen sulfide, and sulfates. The California Clean Air Act (CCAA), which was approved in 1988, requires that each local air district prepare and maintain an Air Quality Management Plan (AQMP) to achieve compliance with the CAAQS. These AQMPs also serve as the basis for preparation of the SIP for the State of California.

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

3.3 California State Implementation Plan

Federal clean air laws require areas with unhealthy levels of O_3, CO, NO_2, SO_2, and inhalable particulate matter to develop plans, known as SIPs, describing how they will attain the NAAQS. The 1990 amendments to the CAA set new deadlines for attainment based on the severity of the pollution problem and launched a comprehensive planning process for attaining the NAAQS. The promulgation of the new national 8-hour O_3 standard and the $PM_{2.5}$ standards in 1997 will result in additional statewide air quality SIPs, which are not single documents, but a compilation of new and previously submitted plans, programs (such as monitoring, modeling, permitting), district rules, State regulations, and federal controls. Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations, and limits on emissions from consumer products. State law makes the ARB the Lead Agency for all purposes related to the SIP. Local air districts and other agencies, such as the Bureau of Automotive Repair, prepare SIP elements and submit them to the ARB for review and approval. The ARB then forwards SIP revisions to the EPA for approval and publication in the Federal Register. Code of Federal

Regulations (CFR) Title 40, Chapter I, Part 52, Subpart F, Section 52.220 lists all of the items included in the California SIP. Many additional California submittals are pending EPA approval.

3.4 Air Quality Management Plan

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

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

The 2003 AQMP proposes policies and measures to achieve federal and State standards for healthful air quality in the SCAB and those portions of the Salton Sea Air Basin (formerly named the Southeast Desert Air Basin) that are under District jurisdiction (namely, Coachella Valley). The Coachella Valley PM_{10} Plan was revised in June 2002 and forwarded to the ARB and EPA for approval. The EPA approved the 2002 Coachella Valley SIP on April 18, 2003.This revision to the AQMP also addresses several State and federal planning requirements and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes and new air quality modeling tools. This AQMP is consistent with and builds upon the approaches taken in the 1997 AQMP and the 1999 Amendments to the O_3 SIP for the SCAB for the attainment of the federal O_3 air quality standard. However, this revision points to the urgent need for additional emission reductions (beyond those incorporated in the 1997/99 Plan) to offset increased emission estimates from mobile sources and meet all federal criteria pollutant standards within the timeframes allowed under the federal CAA.

The SCAQMD adopted the 2007 AQMP on June 1, 2007, which it describes as a regional and multiagency effort (i.e., the SCAQMD Governing Board, ARB, SCAG, and EPA). State and federal planning requirements will include developing control strategies, attainment demonstration, reasonable further progress, and maintenance plans. The 2007 AQMP also incorporates substantial new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools. The 2007 AQMP includes a request to have the SCAB's federal 8-hour O3 attainment status changed from severe to extreme. This change would extend the attainment deadline from 2021 to 2023. The ARB approved the 2007 AQMP on September 27, 2007, and adopted it as part of the 2007 SIP.

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

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

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

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4. Monitored Air Quality

The SCAQMD operates several air quality monitoring stations within the SCAB. The closest monitoring station to the project area is South Wilson Avenue Pasadena Station. Table 4.1 lists air quality trends identified from data collected at this air quality monitoring station between 2009 and 2013. The next closest station is the North Main Street Los Angeles Station. Table 4.2 lists air quality trends identified from data collected at this air quality monitoring station between 2009 and 2013. These stations are located within close proximity to SR-710, I-10, I-210, I-5, and SR-110; freeways that would be affected by the proposed build alternatives. The ambient air quality monitoring is conducted for the criteria pollutants of concern, which do not include mobile source air toxics (MSATs). Therefore, the air quality levels measured at these stations represent the ambient conditions for the criteria pollutants in the project area.

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

4.1 Carbon Monoxide

CO is formed by the incomplete combustion of fossil fuels, and is emitted almost entirely from automobiles. It is a colorless, odorless gas that can cause dizziness, fatigue, and impairments to central nervous system functions. The SCAB is in attainment for the State and in Attainment/Maintenance for the federal CO standards. State and federal standards were not exceeded at either monitoring station between 2009 and 2013.

4.2 Ozone

O_3, a colorless gas with a sharp odor, is one of a number of substances called photochemical oxidants (highly reactive secondary pollutants). These oxidants are formed when hydrocarbons, NO_X, and related compounds interact in the presence of ultraviolet sunlight. The SCAB is a nonattainment area for both the federal and State O_3 standards. The State 1-hour standard was exceeded at both monitoring stations. The State and federal 8-hour standards were exceeded at both monitoring stations.

4.3 Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a reddish-brown gas with an odor similar to bleach and is a byproduct of fuel combustion, which results from mobile and stationary sources. It has complex daily (diurnal) concentrations that are typically higher at night. NO_2 is itself a regulated pollutant, but it also reacts with hydrocarbons in the presence of sunlight to form O_3 and other compounds that make up photochemical smog. NO2 decreases lung function and may reduce resistance to infection. The SCAB is in nonattainment for the State and in Attainment/Maintenance for the federal NO_2 standards. State standards were not exceeded at either monitoring station. The federal 1 hour standard was exceeded at both monitoring stations in 2011 and at the Los Angeles Station in 2009.

TABLE 4.1:
Air Quality Levels Measured at the South Wilson Avenue Pasadena Station

Pollutant	Standard	2009	2010	2011	2012	2013
Carbon Monoxide						
Max 1-hr concentration (ppm)		3.6	2.4	2.9	2.4	2.5
No. days exceeded: State	> 20 ppm/1-hr	0	0	0	0	0
Federal	> 35 ppm/1-hr	0	0	0	0	0
Max 8-hr concentration (ppm)		2.13	1.94	2.15	1.58	1.7
No. days exceeded: State	>9.1 ppm/8-hr	0	0	0	0	0
Federal	>9.5 ppm/8-hr	0	0	0	0	0
Ozone						
Max 1-hr concentration (ppm)		0.176	0.101	0.107	0.111	0.099
No. days exceeded: State	> 0.09 ppm/1-hr	12	1	5	8	2
Ozone						
Max 8-hr concentration (ppm)		0.114	0.081	0.084	0.086	0.075
No. days exceeded: State	> 0.07 ppm/8-hr	19	6	13	20	2
Federal	> 0.075 ppm/8-hr	12	3	5	9	0
Particulate matter less than 10 microns in size (PM_{10})						
Max 24-hr concentration (µg/m3)		N/A	N/A	N/A	N/A	N/A
No. days exceeded: State	> 50 µg/m3	N/A	N/A	N/A	N/A	N/A
Federal	> 150 µg/m3	N/A	N/A	N/A	N/A	N/A
Annual avg. concentration (µg/m3)		N/A	N/A	N/A	N/A	N/A
Exceeds Standard? State	> 20 µg/m3	N/A	N/A	N/A	N/A	N/A
Particulate matter less than 2.5 microns in size ($PM_{2.5}$)						
Max 24-hr concentration (µg/m3)		51.9	35.2	43.8	30.5	25.7
No. days exceeded: Federal	> 35 µg/m3	3	0	1	0	0
Annual avg. concentration (µg/m3)		12.2	10.2	10.8	10.1	N/A
Exceeds Standard? State	> 12 µg/m3	Yes	No	No	No	N/A
Federal	> 15 µg/m3	No	No	No	No	N/A
Nitrogen Dioxide						
Max 1-hr concentration (ppb)		80.0	71.0	101.5	71.2	66.7
No. days exceeded: State	> 180 ppb/1-hr	0	0	0	0	0
Federal	> 100 ppb/1-hr	0	0	1	0	0
Annual avg. concentration (ppb)		22	20	20	17	20
Exceeds Standard? Federal	53 ppb annual avg	No	No	No	No	No
Sulfur Dioxide						
Max 1-hr concentration (ppb)		N/A	N/A	N/A	N/A	N/A
No. days exceeded: State	250 ppb	N/A	N/A	N/A	N/A	N/A
Federal	75 ppb					
Max 24-hr concentration (ppb)		N/A	N/A	N/A	N/A	N/A
Exceed standard? State	40 ppb	N/A	N/A	N/A	N/A	N/A

Sources: EPA and ARB 2009 to 2013.
ARB = California Air Resources Board
avg = average
EPA = United States Environmental Protection Agency
hr = hour(s)
µg/m3 = micrograms per cubic meter
N/A = there was insufficient (or no) data available to determine a value.
ppm = parts per million
ppb = parts per billion

TABLE 4.2:
Air Quality Levels Measured at the North Main Street Los Angeles Station

Pollutant	Standard	2009	2010	2011	2012	2013
Carbon Monoxide						
Max 1-hr concentration (ppm)		2.7	2.7	2.8	2.2	2.5
No. days exceeded: State	> 20 ppm/1-hr	0	0	0	0	0
Federal	> 35 ppm/1-hr	0	0	0	0	0
Max 8-hr concentration (ppm)		2.2	2.32	2.40	1.91	2.0
No. days exceeded: State	>9.1 ppm/8-hr	0	0	0	0	0
Federal	>9.5 ppm/8-hr	0	0	0	0	0
Ozone						
Max 1-hr concentration (ppm)		0.139	0.098	0.087	0.093	0.081
No. days exceeded: State	> 0.09 ppm/1-hr	3	1	0	0	0
Ozone						
Max 8-hr concentration (ppm)		0.100	0.080	0.065	0.077	0.069
No. days exceeded: State	> 0.07 ppm/8-hr	5	1	0	2	0
Federal	> 0.075 ppm/8-hr	2	1	0	1	0
Particulate matter less than 10 microns in size (PM_{10})						
Max 24-hr concentration (µg/m3)		72	42	53	80	57
No. days exceeded: State	> 50 µg/m3	4	0	9	43	20
Federal	> 150 µg/m3	0	0	0	0	0
Annual avg. concentration (µg/m3)		33.1	27.1	29.0	30.2	29.5
Exceeds Standard? State	> 20 µg/m3	Yes	Yes	Yes	Yes	Yes
Particulate matter less than 2.5 microns in size ($PM_{2.5}$)						
Max 24-hr concentration (µg/m3)		61.6	39.2	49.3	58.7	43.1
No. days exceeded: Federal	> 35 µg/m3	7	2	4	4	1
Annual avg. concentration (µg/m3)		15.7	14.1	13.0	13.1	12.5
Exceeds Standard? State	> 12 µg/m3	Yes	Yes	Yes	Yes	Yes
Federal	> 15 µg/m3	Yes	No	No	No	No
Nitrogen Dioxide						
Max 1-hr concentration (ppb)		115	89.0	109.6	77.3	90.3
No. days exceeded: State	> 180 ppb/1-hr	0	0	0	0	0
Federal	> 100 ppb/1-hr	2	0	1	0	0
Annual avg. concentration (ppb)		28	25	25	25	22
Exceeds Standard? Federal	53 ppb annual avg	No	No	No	No	No
Sulfur Dioxide						
Max 1-hr concentration (ppb)		9.0	9.8	19.8	5.2	6.0
No. days exceeded: State	250 ppb	0	0	0	0	0
Federal	75 ppb	0	0	0	0	0
Max 24-hr concentration (ppb)		1.7	1.5	11.0	5.0	1.6
Exceed standard? State	40 ppb	No	No	No	No	No

Sources: EPA and ARB 2009 to 2013.
ARB = California Air Resources Board
avg = average
EPA = United States Environmental Protection Agency
hr = hour(s)
µg/m3 = micrograms per cubic meter
N/A = there was insufficient (or no) data available to determine a value.
ppm = parts per million
ppb = parts per billion

4.4 Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels. SO_2 irritates the respiratory tract, can injure lung tissue when combined with $PM_{2.5}$, and reduces visibility and the level of sunlight. The entire SCAB is in attainment with both federal and State SO_2 standards. State and federal standards were not exceeded at either monitoring station between 2009 and 2013.

4.5 Respirable Particulate Matter (PM_{10})

PM_{10} occurs from sources such as road dust, diesel soot, combustion products, construction operations, and dust storms. PM10 scatters light and substantially reduces visibility. In addition, these particulates penetrate into lungs and can potentially damage the respiratory tract. Over 99 percent of inhaled particulate matter is either exhaled or trapped in the upper areas of the respiratory system and expelled. The balance enters the windpipe and lungs, where some particulates cling to protective mucus and are removed. Other mechanisms, such as coughing, also filter out or remove particles. Collectively, these pulmonary clearance mechanisms protect the lungs from the majority of inhalable particles.

Irritating odors are often associated with particulates. Some examples of sources of these types of odors are gasoline and diesel engine exhausts, large-scale coffee roasting, paint spraying, street paving, and trash burning. The SCAB is a nonattainment area for State PM_{10} standards and a maintenance/ attainment area for the federal standards. The State 24-hour standard was exceeded at the Los Angeles Station in 2009, 2011, 2012 and 2013. The federal 24-hour standard was not exceeded between 2009 and 2013. The average annual concentrations exceeded the State standard in each of the past five years.

4.6 Fine Particulate Matter ($PM_{2.5}$)

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

The SCAB is a nonattainment area for both the federal and State $PM_{2.5}$ standards. The federal 24-hour standard was exceeded at both stations. The State annual standard was exceeded in each of the past five years at the Los Angles Station and in 2009 at the Pasadena Station. The average annual concentrations exceeded the federal standard at the Los Angeles Station in 2009.

4.7 Volatile Organic Compounds or Reactive Organic Gases

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

4.8 Lead

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

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5. Potential Air Quality Impacts

The air quality analysis for the BRT, LRT, and Tunnel Alternatives described in this section includes the effects of the TSM/TDM Alternative improvements that would be included in these Build Alternatives. These improvements include the complete TSM/TDM Alternative, minus the following portions:

- Local Street Improvement L-8 (Fair Oaks Avenue from Grevelia Street to Monterey Road), the reversible lane component of Local Street Improvement L-3 (Atlantic Boulevard from Glendon Way to I-10), and enhancements to Route 762 would not be implemented with the BRT Alternative.
- Other Road Improvement T-1 (Valley Boulevard to Mission Road Connector Road) would not be implemented with the LRT Alternative.
- Other Road Improvements T-1 (Valley Boulevard to Mission Road Connector) and T-3 (St. John Extension between Del Mar Boulevard and California Boulevard) would not be implemented with the Freeway Tunnel Alternative.

5.1 Short-Term Impacts

During construction, short-term degradation of air quality may occur due to 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, VOCs, directly-emitted particulate matter (PM_{10} and $PM_{2.5}$), and toxic air contaminants (TACs) such as diesel exhaust particulate matter. Ozone is a regional pollutant that is derived from NO_X and VOCs in the presence of sunlight and heat.

Site preparation and construction would involve clearing, cut-and-fill activities, grading, removing or improving existing transportation facilities, and paving. Construction-related effects on air quality from most transportation 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 VOCs. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions would vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

Construction activities for large projects are estimated by the EPA to add 1.09 tonne (1.2 tons) of fugitive dust per acre of soil disturbed per month of activity. If water or other soil stabilizers are used to control dust, the emissions can be reduced by up to 50 percent. Caltrans Standard Specifications (Section 10) pertaining to dust minimization requirements requires use of water or dust palliative compounds and will reduce potential fugitive dust emissions during construction.

In addition to dust-related PM_{10} emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate CO, SO_2, NO_X, VOCs and some soot particulate (PM_{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 those vehicles are delayed. These emissions would be temporary and limited to the immediate area surrounding the construction site.

SO_2 is generated by oxidation during combustion of organic sulfur compounds contained in diesel fuel. Off-road diesel fuel meeting federal standards can contain up to 5,000 ppm of sulfur, whereas on-road diesel is restricted to less than 15 ppm of sulfur. However, under California law and ARB regulations, off-road diesel fuel used in California must meet the same sulfur and other standards as on-road diesel fuel, so SO_2-related issues due to diesel exhaust will be minimal. Some phases of construction, particularly asphalt paving, would result in short-term odors in the immediate area of each paving site(s). Such odors would be quickly dispersed below detectable thresholds as distance from the site(s) increases.

Construction emissions were estimated for the project alternatives using detailed equipment inventories and project construction scheduling information provided by CH2MHill (April 2014) combined with emissions factors from the EMFAC2011 and OFFROAD models. Short-term off-road construction equipment was calculated using emission rates based on Tier 2 emission standards. Construction-related emissions for the TSM/TDM, BRT, and LRT Alternatives, and the single-bore and dual-bore design variations of the Freeway Tunnel Alternative are presented in Tables 5.1 through 5.5. The results of the construction emission calculations are included in Appendix A. The EMFAC2011 model does not include emission rates for SO_2; therefore, SO_2 was not included in Tables 5.1 through 5.5. The emissions presented below are based on the best information available at the time of calculations. The emissions listed in Tables 5.1 through 5.5 represent the peak daily construction emissions that would be generated by each alternative. The single-bore and dual-bore freeway alternatives would require 57 to 59 months to complete the construction at the tunnel portals. These are the longest construction activities that would occur at one location. Therefore, as project construction is expected to last less than 5 years, construction-related emissions were not considered in the conformity analysis.

In addition to the Caltrans' Standard Specifications, the SCAQMD has established Rule 403 for reducing fugitive dust emissions. The best available control measures (BACM), as specified in SCAQMD Rule 403, shall be incorporated into the project commitments. Compliance with the standard construction measures such as frequent watering (e.g., minimum twice per day) and Minimization Measures AQ-1 through AQ-5 (refer to Chapter 6.0) will reduce construction-related air quality impacts from fugitive dust emissions and construction equipment emissions.

5.1.1 Naturally Occurring Asbestos

The project is located in Los Angeles County, which is among the counties listed as containing serpentine and ultramafic rock. However, the portion of the County known to contain serpentine or ultramafic rock is limited to the island of Santa Catalina. Therefore, the impact from naturally occurring asbestos (NOA) during project construction would be minimal to none.

TABLE 5.1:
TSM/TDM – Maximum Construction Emissions (lbs/day)

Alternative Phases	ROGs	CO	NO_X	PM_{10}	$PM_{2.5}$
Mobilization/Utility Relocation	7.07	83.23	133.96	5.40	4.85
Phase I Intersections	33.25	365.63	629.13	21.02	19.09
Phase II Intersections	49.28	547.98	934.59	32.63	29.68
Phase III Intersections	16.39	179.77	310.06	10.33	9.37
Phase IV Intersections	19.74	216.74	373.27	12.45	11.30
Fugitive Dust				480.00	100.80
Peak Phase (pounds/day)	**49.28**	**547.98**	**934.59**	**512.63**	**129.68**

CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROGs = reactive organic gases
TSM = Transportation System Management
TDM = Transportation Demand Management

TABLE 5.2:
BRT – Maximum Construction Emissions (lbs/day)

Alternative Phases	ROGs	CO	NO_X	PM_{10}	$PM_{2.5}$
Mobilization/Staging	4.81	55.94	90.60	3.42	3.04
Phase I – Whittier to SR-60	8.09	90.20	152.83	5.35	4.82
Phase II – SR-60 to I-10	10.88	123.08	205.59	7.25	6.53
Phase III – I-10 to Huntington	8.09	90.20	152.83	5.35	4.82
Phase IV – Huntington to Del Mar	10.88	123.08	205.59	7.25	6.53
Phase V – Del Mar to Colorado	6.16	68.84	116.59	4.13	3.72
Fugitive Dust				320.00	67.20
Peak Phase (pounds/day)	**10.88**	**123.08**	**205.59**	**327.25**	**73.73**

BRT = Bus Rapid Transit
CO = carbon monoxide
lbs/day = pounds per day
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROGs = reactive organic gases

TABLE 5.3:
LRT – Maximum Construction Emissions (lbs/day)

Alternative Phases	ROGs	CO	NO_X	PM_{10}	$PM_{2.5}$
Mobilization/Staging	6.49	78.28	123.27	5.30	4.75
Aerial Structure	34.25	375.09	648.48	21.57	19.64
At Grade Structures	33.15	369.89	627.03	21.58	19.56
Tunnel Work	20.85	229.41	394.43	13.19	11.98
Above Grade Construction	15.59	179.86	294.74	11.05	9.90
Rail Tracks and Maintenance Yard	8.12	102.16	154.06	7.20	6.40
Fugitive Dust				640.00	134.40
Total (pounds/day)	**118.5**	**1,334.7**	**2,242.0**	**719.9**	**206.6**

CO = carbon monoxide
lbs/day = pounds per day
LRT = Light Rail Transit
NO_X = oxides of nitrogen
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROGs = reactive organic gases

TABLE 5.4:
Single-Bore Tunnel – Maximum Construction Emissions (lbs/day)

Alternative Phases	ROGs	CO	NO_X	PM_{10}	$PM_{2.5}$
South Portal					
Staging and Survey	2.85	33.80	54.17	2.25	2.02
Earth Work	62.60	580.04	1326.45	48.89	37.66
Bridge Construction	16.34	183.46	307.73	10.53	9.40
Tunnel Preparation	26.53	295.79	505.08	17.43	15.60
North Portal					
Staging and Survey	2.85	33.80	54.17	2.25	2.02
Earth Work	88.39	875.13	1796.49	63.91	52.15
Tunnel Preparation	13.37	155.86	256.72	9.46	8.41
Material Delivery	1.45	8.80	36.33	1.49	0.92
Fugitive Dust				960.00	201.60
Total (pounds/day)	**214.4**	**2,166.7**	**4,337.1**	**1,116.2**	**329.8**

CO = carbon monoxide — PM_{10} = particulate matter less than 10 microns in size
lbs/day = pounds per day — $PM_{2.5}$ = particulate matter less than 2.5 microns in size
NO_X = oxides of nitrogen — ROGs = reactive organic gases

TABLE 5.5:
Dual-Bore Tunnel – Maximum Construction Emissions (lbs/day)

Alternative Phases	ROGs	CO	NO_X	PM_{10}	$PM_{2.5}$
South Portal					
Staging and Survey	2.85	33.80	54.17	2.25	2.02
Earth Work	78.79	692.90	1715.05	64.37	47.85
Bridge Construction	23.47	256.05	449.70	15.45	13.57
Tunnel Preparation	26.50	294.35	504.92	17.36	15.57
North Portal					
Staging and Survey	2.86	34.27	54.22	2.28	2.03
Earth Work	60.11	524.89	1314.07	49.56	36.57
Bridge Construction	21.28	231.92	408.25	14.04	12.31
Tunnel Preparation	21.43	232.70	409.25	13.80	12.34
Material Delivery	2.81	17.07	70.47	2.88	1.79
Fugitive Dust				1,280.00	268.80
Total (pounds/day)	**237.2**	**2,284.2**	**4,925.9**	**1,459.7**	**410.8**

CO = carbon monoxide — PM_{10} = particulate matter less than 10 microns in size
lbs/day = pounds per day — $PM_{2.5}$ = particulate matter less than 2.5 microns in size
NO_X = oxides of nitrogen — ROGs = reactive organic gases

5.2 Air Quality Conformity

The proposed project is within a nonattainment area for the federal $PM_{2.5}$ standards and within an attainment/maintenance area for the federal CO and PM_{10} standards. Therefore, per 40 CFR Part 93, CO and PM hot-spot analyses are required for conformity purposes.

5.2.1 Project Level Air Quality Conformity

5.2.1.1 Carbon Monoxide Screening Analysis

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

- 3.1.1. Is this project exempt from all emissions analyses?

  NO.

  Table 1 of the Protocol is Table 2 of Section 93.126 of 40 CFR. Section 3.1.1 is inquiring if the project is exempt. Such projects appear in Table 1 of the Protocol. The Freeway Build Alternatives include the construction of a freeway tunnel. In addition, the BRT and TSM/TDM Alternatives would widen local streets. Therefore, the project is not exempt from all emissions analyses.

- 3.1.2. Is the project exempt from regional emissions analyses?

  NO.

  Table 2 of the Protocol is Table 3 of Section 93.127. The question is attempting to determine whether the project is listed in Table 2. Projects that are included in Table 2 of the Protocol are exempt from regional conformity. Because the project will be constructing a new freeway tunnel and/or will widen existing local roads, it is not exempt from regional emissions analysis.

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

  YES.

  As mentioned above, the proposed project will be constructing a new highway tunnel and/or widen existing local roadways. Therefore, the project is potentially significant.

- 3.1.4. is the Project in a Federal Attainment area?

  NO.

  The project is located within an attainment/maintenance area for the federal CO standard; therefore, the project is subject to a regional conformity determination.

- 3.1.5. Are there a currently conforming Regional Transportation Plan [RTP] and transportation improvement program [TIP]?

  YES.

- 3.1.6. Is the project included in the regional emissions analysis supporting the currently conforming Regional Transportation Plan [RTP] and transportation improvement program [TIP]?

  YES.

  The project is included in the SCAG 2012 RTP (Project ID: 1M0101. SR-710 North Extension [tunnel] [alignment TBD]. 4 toll lanes in each direction in tunnel) and the 2015 FTIP (Project ID: 18790. Route 710: Study to perform alternative analysis, engineering and environmental studies to close 710 Freeway gap). Copies of the 2012 RTP and 2015 FTIP listings are included in Appendix C.

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

  NO.

- 3.1.9. Examine local impacts.

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

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

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

  NO.

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

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

  YES.

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

  YES.

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

- Level 7. Does the project worsen air quality?

  YES.

  As the proposed project would add a new freeway tunnel to the project area and/or will widen existing local roads, it would potentially worsen air quality.

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

  NO.

  Four intersections were evaluated in the 1997 CO Attainment Demonstration: Wilshire Boulevard at Veteran Avenue, Sunset Boulevard at Highland Avenue, La Cienega Boulevard at Century Boulevard, and Long Beach Boulevard at Imperial Highway. CO concentrations at the intersections under study will be lower than those reported for the maximum of the intersections analyzed in the CO attainment plan because all of the following conditions, listed in Section 4.7.2 of the Protocol, are satisfied:

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

- The project intersection traffic volumes and geometries are not substantially different from those included in the attainment plan. Also, the intersections under study have less total traffic and the same number of lanes or fewer than the intersections in the attainment plan.
- The assumed meteorology for the intersections under study is the same as the assumed meteorology for the intersections in the attainment plan. Both use the worst-case scenario meteorology settings in the CALINE4 and/or CAL3QHC model.
- As shown in Table 5.6, total intersection volumes are lower for the intersections under study than those assumed for the intersection in the attainment plan.
- Percentages of vehicles operating in cold start mode are the same or lower for the intersection under study compared to those used for the intersection in the attainment plan. It is assumed that all vehicles in the intersection are in a fully warmed-up mode.
- The percentage of heavy-duty gas trucks in the intersections under study is the same or lower than the percentages used for the intersections in the attainment plan analysis. It is assumed that the traffic distribution at the intersections under study do not vary from the EMFAC standards.
- Average delay and queue length for each approach are the same or less for the intersection under study compared to those found in the intersection in the attainment plan. The predicted levels of service (LOS) for the intersections under study range from A to F. The LOS for the intersections in the attainment plan are not listed; however, the traffic counts and intersection geometries correspond to LOS F for three out of four intersections in the attainment plan.
- The background concentration in the area of the intersection under study is 2.9 ppm for 1 hour and 2.4 ppm for 8 hours, which is lower than the background concentrations for the intersections in the attainment plan. These varied from 5.3 to 13.2 ppm for 1 hour and 3.7 to 9.9 ppm for 8 hours.

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

5.2.1.2 $PM_{2.5}$/PM_{10} Hot Spot Analysis

The proposed project is within a nonattainment area for the federal $PM_{2.5}$ standards and within an attainment/maintenance area for the federal PM_{10} standard. Therefore, per 40 CFR Part 93, analyses are required for conformity purposes. However, the EPA does not require hot-spot analyses, qualitative or quantitative, for projects that are not listed in Section 93.123(b)(1) as an air quality concern. As the proposed project will be constructing a new freeway tunnel, it is potentially a project of air quality concern.

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TABLE 5.6:
Total Intersection Traffic Volume Comparisons

Attainment Plan Maximum Volumes							
INTERSECTION 1: Wilshire Blvd/ Veteran Ave		INTERSECTION 2: Sunset Blvd/ Highland Ave		INTERSECTION 3: La Cienega Blvd/Century Blvd		INTERSECTION 4: Long Beach Blvd/Imperial Hwy	
AM	PM	AM	PM	AM	PM	AM	PM
8,062	7,719	6,614	7,374	6,635	8,674	4,212	5,514

Alternatives	2035 Proposed Project Maximum Volumes															
	INTERSECTION 1: Fremont Ave / Norwood Ave		INTERSECTION 2: Garfield Ave / Norwood Pl		INTERSECTION 3: I-210 EB Ramps / Berkshire Pl		INTERSECTION 4: I-210 WB Ramps / Berkshire Pl		INTERSECTION 5: Broadway / Colorado Blvd		INTERSECTION 6: Concord Ave / Alhambra Ave		INTERSECTION 7: Pasadena Ave / Broadway		INTERSECTION 8: Rosemead Blvd / Mission Dr	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
No Build Alternative	2,028	2,254	2,740	3,291	1,101	764	1,903	1,283	1,697	2,976	1,437	1,822	3,746	2,288	4,065	4,188
TSM/TDM Alternative	1,714	1,980	2,551	2,975	1,099	766	1,924	1,289	1,749	3,055	2,314	3,874	3,624	2,270	5,473	5,300
BRT Alternative	1,724	1,978	2,503	2,981	1,095	768	1,921	1,295	1,744	3,037	2,326	3,838	3,667	2,284	5,493	5,293
LRT Alternative	2,011	2,405	2,744	3,157	1,095	763	1,925	1,294	1,759	3,053	1,360	1,808	3,790	2,313	5,878	5,369
Freeway Tunnel Alternative																
Single-Bore Operational Variations																
With Tolls	2,200	2,420	2,569	3,072	1,232	935	2,118	1,582	1,805	3,247	1,297	1,796	3,732	2,311	5,434	5,231
With Tolls and No Trucks	2,127	2,380	2,580	3,061	1,161	873	2,114	1,681	1,793	3,223	1,306	1,793	3,747	2,298	5,385	5,220
With Tolls and Express Bus	2,213	2,373	2,559	3,061	1,239	923	2,123	1,571	1,804	3,266	1,286	1,740	3,748	2,314	5,418	5,224
Dual-Bore Operational Variations																
No Tolls	2,134	2,355	2,573	2,960	1,499	1,124	2,395	1,681	1,825	3,359	1,277	1,666	3,593	2,314	5,506	5,089
No Trucks	2,097	2,350	2,569	2,958	1,475	995	2,309	1,582	1,823	3,414	1,265	1,659	3,547	2,309	5,471	5,049
With Tolls	2,134	2,355	2,573	2,960	1,551	1,103	2,407	1,667	1,825	3,359	1,277	1,666	3,593	2,314	5,506	5,089

Source: *Air Quality Assessment Report* (2014).
Ave = Avenue
Blvd = Boulevard
BRT = Bus Rapid Transit
Dr = Drive
EB = eastbound
Hwy = Highway
I-210 = Interstate 210
LRT = Light Rail Transit
Pl = Place
TSM/TDM = Transportation System Management/Transportation Demand Management
WB = westbound

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A $PM_{2.5}$ and PM_{10} hot-spot form (LSA, May 2014) was submitted to and reviewed by the Transportation Conformity Working Group on May 27, 2014, and additional requested information was provided in June 2014. The primary TCWG members are EPA, FHWA, and Caltrans Headquarters. On October 28, 2014, the TCWG determined that the TSM/TDM, BRT, and LRT Alternatives are not Projects of Air Quality Concern (POAQC). The Freeway Tunnel Alternatives with either the Single or Dual-Bore design variations are POAQC. If the Freeway Tunnel Alternative with either the single-bore or dual-bore design variation is identified as the preferred alternative, a quantitative PM hot-spot analysis will be conducted to demonstrate that the project would not delay attainment of or worsen existing violation of or cause and exceedance of the $PM_{2.5}$ or PM_{10} national ambient air quality standards and meets conformity requirements.

In addition to the demonstration of conformity requirement, $PM_{2.5}$ and PM_{10}, 24-hour $PM_{2.5}$, annual $PM_{2.5}$, and 24-hour PM_{10} concentration values were calculated along the existing and proposed roadways within the project area. These values were calculated based on the EPA Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas (EPA Guidance November 2013).

Types of Emissions Considered

In accordance with the EPA Guidance, this quantitative analysis was based on directly emitted and re-entrained $PM_{2.5}$ and PM_{10} emissions. Tailpipe, brake wear, tire wear, and road dust $PM_{2.5}$ and PM_{10} emissions were therefore considered in this analysis.

Vehicles cause dust from paved and unpaved roads to be re-entrained, or re-suspended, in the atmosphere. The SCAQMD 2012 Air Quality Management Plan (AQMP) identified re-entrained road dust as a substantial source of particulate matter in the area's emission budget. Therefore, re-entrained road dust was considered in this analysis.

Secondary particles formed through $PM_{2.5}$ and PM_{10} precursor emissions from a transportation project take several hours to form in the atmosphere, giving emissions time to disperse beyond the immediate study area of concern for localized analyses; therefore, they were not considered in this analysis. Secondary emissions of $PM_{2.5}$ and PM_{10} are considered part of the regional emissions analysis prepared for the conforming RTP and FTIP.

Emission and Dispersion Models Used

The EPA Guidance requires use of the latest emissions model in quantitative analyses. This quantitative analysis was prepared based on the latest EPA-approved emissions model for use in California (EMFAC2011). As recommended by the EPA Guidance, this quantitative analysis applied the simplified approach, using the assessment tool EMFAC2011 to help generate emission rates for the traffic forecasted within the South Coast Air Basin portion of Los Angeles County in the years 2020, 2025, and 2035.

The EPA Guidance recommends that quantitative analyses be developed consistent with the EPA's current recommended model under Appendix W to 40 CFR Part 51. While the American Meteorological Society/EPA Regulatory Model (AERMOD) is the EPA's recommended near-field dispersion model, Section 3.2 of Appendix W provides applicable guidance with which an EPA's Regional Office may determine acceptability of alternative models (e.g., some commercial Graphical User Interface [GUI] versions of AERMOD). Due to the magnitude of the study area and complexity of the project scope, this analysis has been prepared utilizing the Lakes Environmental AERMOD View Message Passing Interface (Lakes AERMOD View MPI version 8. 8.8.9, which includes AERMOD version 14134).

The PM modeling was set up to capture the areas that are potentially of air quality concern for particulates, based on an initial discussion with the EPA. Thus, the $PM_{2.5}$ and PM_{10} quantitative analysis includes:

- I-210, approximately 0.5 mile (mi) east of the SR 710 interchange;
- SR 134, approximately 0.5 mi west of the SR 710 interchange;
- I-210, approximately 0.5 mi west of the SR 710 interchange;
- SR 710 South, either to the current terminus or the proposed tunnel entrance;
- I-10, between the SR 710 interchange and the I-5 interchange and approximately 0.5 mi west of the I-5 interchange;
- SR 710 North, either to the current terminus or the proposed tunnel entrance;
- I-5, approximately 0.5 mi south of the I-10 interchange;
- I-5, approximately 0.5 mi north of the SR 2 interchange;
- SR 2, approximately 0.5 mi east of the I-5 interchange;
- SR 2, approximately 0.5 mi west of the I-5 interchange;
- SR 110, approximately 0.5 mi east of the I-5 interchange;
- I-10, approximately 1 mi east of the SR 710 interchange; and
- Principal arterials Colorado Boulevard and Valley Boulevard, which are each approximately 0.5 mi on either side of SR 710.

In addition to the roadways, the modeling included the freeway tunnel ventilation towers at both the north and south portals. The subsections below describe each source type modeled in AERMOD. The AERMOD model was configured to run in “flat” mode with either the PM_{10} or $PM_{2.5}$ pollutant ID used for the separate analyses for each pollutant.

Vehicle emissions from highways and principal arterials were modeled as volume sources. Emissions from the freeway tunnel ventilation towers were modeled as point sources. A summary of the parameters used for each type of source is shown in Table 5.7 and explained further in the following sections.

For volume sources, initial horizontal and vertical dimensions (σ_{y0} and σ_{z0}, respectively) were based on Table 3.1 in the User’s Guide for the AMS/EPA Regulatory Model-AERMOD EPA-454/B-03-001 September 2004. As specified in the EPA Guidance, the initial vertical dimensions (σ_{z0}) were based on a weighted average of the vehicle mix (22 ft for trucks and 8.5 ft for cars). The line source spacing, or separation of the volume sources, was twice the width of each individual volume source. The width of the volume source for each roadway segment was calculated based on the average width of the roadway. The initial horizontal dimensions (σ_{y0}) are equal to the source separation divided by 2.15. All sources were considered to be elevated sources not on or adjacent to a building, with initial vertical dimensions (σ_{z0}) equal to the vertical source extent divided by 4.3.

TABLE 5.7:
AERMOD Source Parameters for the $PM_{2.5}$ and PM_{10} Quantitative Analysis

Source Type	Source Description	AERMOD Source Type	Release Height (ft)	Source Width	Line Source Spacing	Exit Velocity (fpm)	Exit Temperature (˚F)	Stack Diameter (ft)
Vehicle Exhaust Emissions	Highway Mainlines	Volume	Various[1]	Various[2]	Various[2]	-	-	-
	Highway Interchanges	Volume	Various[3]	Various[2]	Various[2]	-	-	-
	Principal Arterials	Volume	Various[4]	Various[2]	Various[2]	-	-	-
Vehicle Fugitive Emissions	Highway Mainlines	Volume	1	Various[2]	Various[2]	-	-	-
	Principal Arterials	Volume	1	Various[2]	Various[2]	-	-	-
Tunnel Ventilation Towers	North and South Portal Exhaust and Fugitive	Point	50[5]	-	-	Various[5]	Ambient	22.97[6]

Source: LSA Associates, Inc. (2014)

1 Vehicle emissions from all highway and arterial mainlines were modeled with volume source dimensions corresponding to trucks. Initial release heights of 11 ft for trucks and 4 ft for cars are assumed. A weighted average of the vehicle mix was used to determine an average release height for each roadway segment. Selected values are consistent with the parameters used in the *Human Health Risk Assessment for the Schuyler-Heim Bridge Replacement and SR 47 Expressway Project* (Western Solutions, Inc. October 2008).

2 Source width and line spacing are dependent on specific road width.

3 A highway interchange release height of 30 ft was used to capture over- and underpasses of the interchange.

4 Vehicle emissions from all principal arterials were modeled with source dimensions corresponding to cars. The initial release height of 3 ft is based on the review of recent EIR/EIS documents for projects near the Port of Los Angeles and Port of Long Beach. Selected values are consistent with parameters used in the *Human Health Risk Assessment for the Schuyler-Heim Bridge Replacement and SR 47 Expressway Project* (Western 2008).

5 Exhaust flow exit velocity is dependent on the tunnel design and traffic directions.

6 Stack height and diameter were based on preliminary engineering design specifications.

°F = degrees Fahrenheit
AERMOD = American Meteorological Society/EPA Regulatory Model
EIR/EIS = Environmental Impact Report/Environmental Impact Statement
EPA = United States Environmental Protection Agency
fpm = feet per minute
ft = feet
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
SR 47 = State Route 47

Freeway Mainlines

The freeway mainline roads modeled in AERMOD included existing roadways as well as new alignments to be constructed as part of the project. Roadway alignments, widths, and elevations were determined using engineering drawings, geographic information system (GIS) layers, and aerial photographs of the project. The operational vehicle exhaust emissions from roadways were modeled as a line of volume sources. Volume source representations of the highways were developed based on roadway configurations and assumed vertical dimensions for car and truck traffic. The major freeways were modeled with the average width of each specific freeway. Roadway volume source spacings were determined based on road widths. The initial release height relative to the roadbed was 11 ft for trucks (EPA Guidance, November 2013) and 4 ft for cars. A weighted average of the vehicle mix was used to determine an average release height for each roadway segment. For both at-grade and elevated roadways, the final modeled release height was calculated relative to terrain elevation at the receptor location. Because the fugitive PM emissions can be characterized with the same modeling parameters as the vehicle exhaust (other than release height), they were modeled with identical volume sources, except for the release heights, which were all set to 3 ft.

Freeway Interchanges

Similar to the freeway mainlines, a line of volume sources following the average centerline of the interchange was used. The width of the volume source and source spacing were adjusted to the average width of each specific freeway interchange.

Principal Arterials

Principal arterials were modeled as a line of volume sources using the average centerline of the roadway. Most major arterials were modeled with the width of a four-lane roadway, with the exception of a few arterials that are mainly two-lane roadways. Vehicle exhaust and fugitive dust emissions from principal arterials were modeled the same way the freeway mainlines were.

Tunnel Ventilation Towers

The tunnel ventilation tower emissions for the north and south tunnel portals were modeled as point sources. Exhaust flow rates of the ventilation towers vary depending on the tunnel design variation (i.e., single-bore or dual-bore). For the Freeway Tunnel Alternative, emissions from the freeway tunnel were adjusted to take into account the control efficiency of an air pollution control system. The PM emissions from the SR 710 new freeway tunnel will be treated with PM filters. Control efficiency of the PM filter is dependent on the particle size distribution and varies between a low of 80 percent and a high of greater than 99 percent for the proposed PM emission control system (ILF Consulting Engineers, 2013). To be conservative, the lowest control efficiency of 80 percent was used to estimate the emissions from the ventilation towers such that 20 percent of total PM emissions will be released to the atmosphere. It is assumed that both ventilation towers of the tunnel (i.e., the southbound and northbound ventilation towers) will be equipped with PM control systems. As such, emissions were separately calculated for each ventilation tower to most accurately represent controlled emissions associated with either the northbound or southbound traffic.

Data Inputs and Receptors

The AERMOD model uses emission rates based on traffic data, emission factors, and meteorological data to estimate ground-level concentrations of $PM_{2.5}$ and PM_{10} at a series of receptors. AERMOD requires specific information for each roadway segment and emissions from vehicles operating on that roadway segment. The forecast average daily traffic data were applied to appropriate emission factors to estimate emissions for each of the segments along the proposed alignment. Emissions for tire and brake wear, as well as re-entrained road dust, were calculated and included according to the same forecasted traffic data.

Meteorological input files were processed using surface data and upper air data from the Central Los Angeles Monitoring Station. As provided by the SCAQMD, surface meteorological data from the Central Los Angeles Station and upper meteorological air data from the Miramar Station in San Diego for the 5-year period of 2006 through 2011 (2008 was left out because the raw data from the Central Los Angeles Station did not meet the EPA data completeness requirement for meteorological data) were used to meet the EPA' s modeling guidance that recommends use of data sets with 90 percent or more complete per parameter and per quarter.

Receptors were placed in order to estimate the highest concentrations of $PM_{2.5}$ and PM_{10} to determine any possible violations of the NAAQS. As specified in the EPA Guidance, a line of receptors was placed at the right of way (ROW) line or roadway boundary for conformity analysis. Layers of receptor grids were then placed every 25-meter spacing along highway boundaries and 100-meter spacing along arterials.

Calculation of Emission Concentrations

24-Hour $PM_{2.5}$

Using appropriate control and output pathways, AERMOD was programmed to calculate and identify the highest average 24-hour concentration from the AERMOD run among all the receptors. As specified by the EPA Guidance, all values were rounded to the nearest 1 $\mu g/m^3$. Table 5.8 shows the results of the 24-Hour $PM_{2.5}$ analysis for every scenario.

Annual $PM_{2.5}$

Using appropriate control and output pathways, AERMOD was programmed to calculate and identify the highest average annual concentration from the AERMOD run among all the receptors. As specified by the EPA Guidance, all values were rounded to the nearest tenth of a $\mu g/m^3$. Table 5.9 shows the results of the annual $PM_{2.5}$ concentration for every scenario.

24-Hour PM_{10}

Using appropriate control and output pathways, AERMOD was programmed to calculate and identify the highest of all sixth-highest concentrations from the AERMOD run among all the receptors. Table 5.10 shows the results of the PM_{10} analysis, listing the sixth-highest 24-hour concentration for every scenario.

5.2.2 Regional Air Quality Conformity

If a project is not exempt from conformity requirements and is regionally significant (40 CFR 93.101), it must come from a conforming RTP and TIP. Documentation of the nonattainment or maintenance status of the area, including SIP submittal/approval dates, is needed. Also, documentation of the RTP and TIP conformity status (most recent amendment dates, date of last full and updated conformity determinations) is needed. The Design Concept and Scope of the project must match the Design Concept and Scope used in the RTP and FTIP project listing. The project is in the 2012 RTP, which was found to be conforming by the FHWA/Federal Transit Administration (FTA) on June 5, 2012 (Project ID: 1M0101). The description provided in the RTP states the following:

> SR-710 North Extension (tunnel) (alignment TBD). 4 toll lanes in each direction in tunnel.

The project is also in the 2015 FTIP, which was found to be conforming by the FHWA/FTA on December 15, 2014 (Project ID: 18790). The project description provided in the FTIP states the following:

> Route 710: Study to perform alternative analysis, engineering and environmental studies to close 710 Freeway gap.

The Tolled, Dual-Bore Freeway Build Alternative design variations are consistent with the scope of the design concept of the RTP and FTIP. Therefore, the Tolled, Dual-Bore Freeway Build Alternative design variations are in conformance with the SIP. Should the Single-Bore Freeway Tunnel design variations, the non-toll Dual-Bore Freeway Tunnel design variation, TSM/TDM, LRT, or BRT Alternative be selected, the RTP and FTIP would have to be amended. The project will also comply with all SCAQMD requirements. The 2012 RTP and 2015 FTIP listings are included in Appendix C.

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TABLE 5.8:
24-Hour $PM_{2.5}$ Quantitative Results

Scenario	Highest 24-hour $PM_{2.5}$ Concentration from AERMOD (µg/m³)
Opening Year 2025	
No Build Alternative	5.280
Freeway Tunnel Alternative	
Single-Bore Design Variation Operational Variations	
– With Toll	5.137
– With Toll without Trucks	5.234
– With Toll with Express Bus	5.165
Dual-Bore Design Variation Operational Variations	
– Without Toll	4.963
– Without Toll without Trucks	5.139
– With Toll	5.085
Horizon Year 2035	
No Build Alternative	5.233
Freeway Tunnel Alternative	
Single-Bore Design Variation Operational Variations	
– With Toll	5.101
– With Toll without Trucks	5.165
– With Toll with Express Bus	5.095
Dual-Bore Design Variation Operational Variations	
– Without Toll	4.903
– Without Toll without Trucks	5.096
– With Toll	5.030

Source: LSA Associates, Inc. (2014)
Note: Concentrations are provided for the alternatives that were determined to be of air quality concern for particulate matter.
µg/m³ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than 2.5 microns in size

TABLE 5.9:
Annual $PM_{2.5}$ Quantitative Results

Scenario	Highest Annual $PM_{2.5}$ Concentration from AERMOD (µg/m³)
Opening Year 2025	
No Build Alternative	3.671
Freeway Tunnel Alternative	
Single-Bore Design Variation Operational Variations	
– With Toll	3.572
– With Toll without Trucks	3.640
– With Toll with Express Bus	3.598
Dual-Bore Design Variation Operational Variations	
– Without Toll	3.444
– Without Toll without Trucks	3.570
– With Toll	3.531
Horizon Year 2035	
No Build Alternative	3.634
Freeway Tunnel Alternative	
Single-Bore Design Variation Operational Variations	
– With Toll	3.543
– With Toll without Trucks	3.591
– With Toll with Express Bus	3.539
Dual-Bore Design Variation Operational Variations	
– Without Toll	3.404
– Without Toll without Trucks	3.538
– With Toll	3.492

Source: LSA Associates, Inc. (2014)
Note: Concentrations are provided for the alternatives that were determined to be of air quality concern for particulate matter.
µg/m³ = micrograms per cubic meter
$PM_{2.5}$ = particulate matter less than 2.5 microns in size

TABLE 5.10:
24-Hour PM_{10} Quantitative Results

Scenario	Highest 24-Hour PM_{10} Concentration from AERMOD (µg/m³)
Opening Year 2025	
No Build Alternative	15.836
Freeway Tunnel Alternative	
Single-Bore Design Variation Operational Variations	
– With Toll	15.408
– With Toll without Trucks	15.696
– With Toll with Express Bus	15.491
Dual-Bore Design Variation Operational Variations	
– Without Toll	14.884
– Without Toll without Trucks	15.412
– With Toll	15.252
Horizon Year 2035	
No Build Alternative	15.685
Freeway Tunnel Alternative	
Single-Bore Design Variation Operational Variations	
– With Toll	15.299
– With Toll without Trucks	15.474
– With Toll with Express Bus	15.279
Dual-Bore Design Variation Operational Variations	
– Without Toll	14.704
– Without Toll without Trucks	15.282
– With Toll	15.084

Source: LSA Associates, Inc. (2014)
Note: Concentrations are provided for the alternatives that were determined to be of air quality concern for particulate matter.
µg/m³ = micrograms per cubic meter
PM_{10} = particulate matter less than 10 microns in size

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5.3 Long-term Regional Vehicle Emissions

The purpose of the proposed action is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles. The proposed project would not generate new vehicular traffic trips since it would not construct new homes or businesses. However, there is a possibility that some traffic currently utilizing other routes would use the new facilities, thus resulting in increased VMT within the project area. Therefore, the potential impact of the proposed project on regional vehicle emissions was calculated using traffic data for the project region and emission rates from the EMFAC2011 emission model.

The traffic analysis estimated the impact that the proposed project would have on regional VMT and vehicle hours traveled (VHT). The VMT and VHT data, along with the EMFAC2011 emission rates, were used to calculate the CO, ROGs, NO_X, PM_{10}, $PM_{2.5}$, and CO_2 emissions for the Existing (2012), 2020, 2025, and 2035 regional conditions. The results of the modeling are summarized in Table 5.11.

5.3.1 TSM/TDM Alternative

As shown in Table 5.11, the 2020 TSM/TDM Alternative criteria pollutant emissions are lower than the existing condition emissions and, with the exception of PM_{10}, are lower than the 2020 No Build Alternative emissions. As also shown in Table 5.11, the 2035 TSM/TDM Alternative criteria pollutant emissions are lower than the existing condition emissions. With the exception of the reactive organic gas (ROG) emissions, the 2035 TSM/TDM Alternative criteria pollutant emissions are all higher than the 2035 No Build Alternative emissions.

5.3.2 BRT Alternative

As shown in Table 5.11, the 2020 BRT Alternative criteria pollutant emissions are lower than the existing condition emissions and the 2020 No Build Alternative emissions. As shown in Table 5.11, the 2035 BRT Alternative criteria pollutant emissions are lower than the existing condition emissions. With the exception of the ROG emissions, the 2035 BRT Alternative criteria pollutant emissions are all higher than the 2035 No Build Alternative emissions.

5.3.3 LRT Alternative

As shown in Table 5.11, the 2025 LRT Alternative criteria pollutant emissions are lower than the existing condition emissions and the 2025 No Build Alternative emissions. As shown in Table 5.11, the 2035 LRT Alternative criteria pollutant emissions are lower than the existing condition emissions. With the exception of the ROG emissions, the 2035 LRT Alternative criteria pollutant emissions are all higher than the 2035 No Build Alternative emissions.

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TABLE 5.11:
2020/2025 Opening Year and 2035 Horizon Year Regional Vehicle Emissions – Project Study Area (lbs/day)

Alternative	2020 Opening Year					2025 Opening Year					2035 Horizon Year				
	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$	CO	ROG	NO_X	PM_{10}	$PM_{2.5}$
2012 Existing	117,533.1	5,117.9	35,829.8	3,295.9	1,724.2	117,533.1	5,117.9	35,829.8	3,295.9	1,724.2	117,533.1	5,117.9	35,829.8	3,295.9	1,724.2
No Build Alternative	60,727.8	2,435.2	20,353.7	3,059.4	1,391.1	47,936.4	2,034.0	14,176.0	3,116.4	1,416.4	40,058.8	1,872.8	12,405.9	3,251.4	1,486.2
Change from Existing	*-56,805.3*	*-2,682.7*	*-15,476.1*	*-236.5*	*-333.1*	*-69,596.7*	*-3,083.9*	*-21,653.8*	*-179.5*	*-307.8*	-77,474.2	-3,245.2	-23,424.0	-44.4	-238.0
TSM/TDM Alternative	60,605.3	2,419.7	20,317.6	3,059.7	1,390.7	–	–	–	–	–	40,103.1	1,868.0	12,418.7	3,259.8	1,489.6
Change from Existing	*-56,927.8*	*-2,698.2*	*-15,512.2*	*-236.2*	*-333.5*	–	–	–	–	–	-77,430.0	-3,249.9	-23,411.1	-36.0	-234.5
Change from No Build	*-122.5*	*-15.5*	*-36.1*	*0.3*	*-0.4*	–	–	–	–	–	44.2	-4.8	12.8	8.4	3.5
BRT Alternative	60,544.2	2,416.4	20,299.5	3,057.2	1,389.6	–	–	–	–	–	40,093.9	1,869.2	12,416.6	3,257.8	1,488.8
Change from Existing	*-56,988.9*	*-2,701.5*	*-15,530.3*	*-238.7*	*-334.6*	–	–	–	–	–	-77,439.2	-3,248.7	-23,413.3	-38.1	-235.4
Change from No Build	*-183.6*	*-18.8*	*-54.2*	*-2.2*	*-1.5*	–	–	–	–	–	35.1	-3.6	10.7	6.4	2.6
LRT Alternative	–	–	–	–	–	47,843.1	2,024.1	14,157.8	3,116.0	1,416.0	40,117.5	1,868.5	12,411.7	3,255.4	1,487.2
Change from Existing	–	–	–	–	–	*-69,690.0*	*-3,093.8*	*-21,672.0*	*-179.9*	*-308.2*	-77,415.6	-3,249.4	-23,418.2	-40.4	-236.9
Change from No Build	–	–	–	–	–	*-93.3*	*-9.9*	*-18.2*	*-0.4*	*-0.4*	58.6	-4.2	5.8	4.0	1.0
Freeway Tunnel Alternative															
Single-Bore Operational Variation: *With Tolls*	–	–	–	–	–	47,692.1	1,995.6	14,140.8	3,129.3	1,421.0	39,994.3	1,843.2	12,382.5	3,271.5	1,493.7
Change from Existing	–	–	–	–	–	*-69,841.0*	*-3,122.3*	*-21,689.0*	*-166.6*	*-303.2*	-77,538.7	-3,274.7	-23,447.4	-24.3	-230.4
Change from No Build	–	–	–	–	–	*-244.3*	*-38.4*	*-35.2*	*12.9*	*4.6*	-64.5	-29.6	-23.4	20.1	7.6
Single-Bore Operational Variation: *With Tolls and No Trucks*	–	–	–	–	–	47,699.8	1,994.8	14,148.2	3,131.8	1,422.0	40,002.6	1,842.6	12,386.0	3,273.9	1,494.8
Change from Existing	–	–	–	–	–	*-69,833.3*	*-3,123.1*	*-21,681.6*	*-164.1*	*-302.2*	-77,530.4	-3,275.3	-23,443.8	-22.0	-229.4
Change from No Build	–	–	–	–	–	*-236.6*	*-39.2*	*-27.8*	*15.4*	*5.6*	-56.2	-30.1	-19.9	22.4	8.6
Single-Bore Operational Variation: *With Tolls and Express Bus*	–	–	–	–	–	47,707.5	1,998.2	14,148.8	3,129.9	1,421.4	39,987.1	1,840.4	12,377.8	3,271.4	1,493.6
Change from Existing	–	–	–	–	–	*-69,825.6*	*-3,119.7*	*-21,681.0*	*-166.0*	*-302.8*	-77,545.9	-3,277.5	-23,452.0	-24.5	-230.5
Change from No Build	–	–	–	–	–	*-228.9*	*-35.8*	*-27.2*	*13.5*	*5.0*	-71.7	-32.3	-28.1	20.0	7.5
Dual-Bore Operational Variation: *No Tolls*	–	–	–	–	–	47,835.0	1,989.0	14,204.0	3,155.8	1,432.3	40,137.9	1,840.8	12,435.5	3,299.7	1,506.3
Change from Existing	–	–	–	–	–	*-69,698.1*	*-3,128.9*	*-21,625.8*	*-140.1*	*-291.9*	-77,395.2	-3,277.2	-23,394.4	3.9	-217.9
Change from No Build	–	–	–	–	–	*-101.4*	*-45.0*	*28.0*	*39.4*	*15.9*	79.1	-32.0	29.6	48.3	20.1
Dual-Bore Operational Variation: *No Trucks*	–	–	–	–	–	47,891.7	1,992.1	14,228.7	3,161.1	1,434.8	40,199.4	1,841.9	12,453.9	3,306.3	1,509.2
Change from Existing	–	–	–	–	–	*-69,641.4*	*-3,125.8*	*-21,601.1*	*-134.8*	*-289.4*	-77,333.6	-3,276.1	-23,376.0	10.4	-214.9
Change from No Build	–	–	–	–	–	*-44.7*	*-41.9*	*52.7*	*44.7*	*18.4*	140.6	-30.9	48.0	54.8	23.0
Dual-Bore Operational Variation: *With Tolls*	–	–	–	–	–	47,894.5	1,994.7	14,226.8	3,158.3	1,433.7	40,133.0	1,840.2	12,436.9	3,300.8	1,506.9
Change from Existing	–	–	–	–	–	*-69,638.6*	*-3,123.2*	*-21,603.0*	*-137.6*	*-290.5*	-77,400.1	-3,277.8	-23,392.9	5.0	-217.2
Change from No Build	–	–	–	–	–	*-41.9*	*-39.3*	*50.8*	*41.9*	*17.3*	74.2	-32.6	31.0	49.4	20.8
SCAQMD Thresholds	**550**	**55**	**55**	**150**	**55**	**550**	**55**	**55**	**150**	**55**	**550**	**55**	**55**	**150**	**55**

Source: *Air Quality Assessment Report* (2014).
BRT = Bus Rapid Transit
CO = carbon monoxide
lbs/day = pounds per day
LRT = Light Rail Transit
NO_X = nitrogen oxides
PM_{10} = particulate matter less than 10 microns in size
$PM_{2.5}$ = particulate matter less than 2.5 microns in size
ROG = reactive organic gases
SCAQMD = South Coast Air Quality Management District
TSM/TDM = Transportation System Management/Transportation Demand Management

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5.3.4 Freeway Tunnel Alternative Single-Bore Design Variation

As shown in Table 5.11, the 2025 criteria pollutant emissions for the Freeway Tunnel Alternative single-bore design variation are lower than the existing condition emissions and, with the exception of PM_{10} and $PM_{2.5}$, are lower than the 2025 No Build Alternative emissions. As shown in Table 5.11, the 2035 criteria pollutant emissions for the Freeway Tunnel Alternative single-bore design variation are lower than the existing condition emissions and, with the exception of PM_{10} and $PM_{2.5}$, are lower than the 2035 No Build Alternative emissions.

5.3.5 Freeway Tunnel Alternative Dual-Bore Design Variation

As shown in Table 5.11, the 2025 criteria pollutant emissions for the Freeway Tunnel Alternative dual-bore design variation are lower than the existing condition emissions. With the exception of the CO and ROG emissions, the 2025 criteria pollutant emissions are all higher than the 2025 No Build Alternative emissions. As shown in Table 5.11, with the exception of PM_{10}, the 2035 criteria pollutant emissions for the Freeway Tunnel Alternative dual-bore design variation are lower than the existing condition emissions.

With the exception of the ROG emissions, the 2035 criteria pollutant emissions are all higher than the 2035 No Build Alternative emissions.

5.4 Qualitative Project-level Mobile Source Air Toxics Discussion

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

Controlling air toxic emissions became a national priority with the passage of the CAA Amendments of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System. In addition, the EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (Diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While the FHWA considers these seven compounds to be the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines.

Based on an FHWA analysis using EPA's MOVES2010b model, as shown in Figure 5-1, even if VMT increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period.[1] The projected reduction in MSAT emissions would be slightly different in California due to the use of the EMFAC emission model in place of the MOVES model.

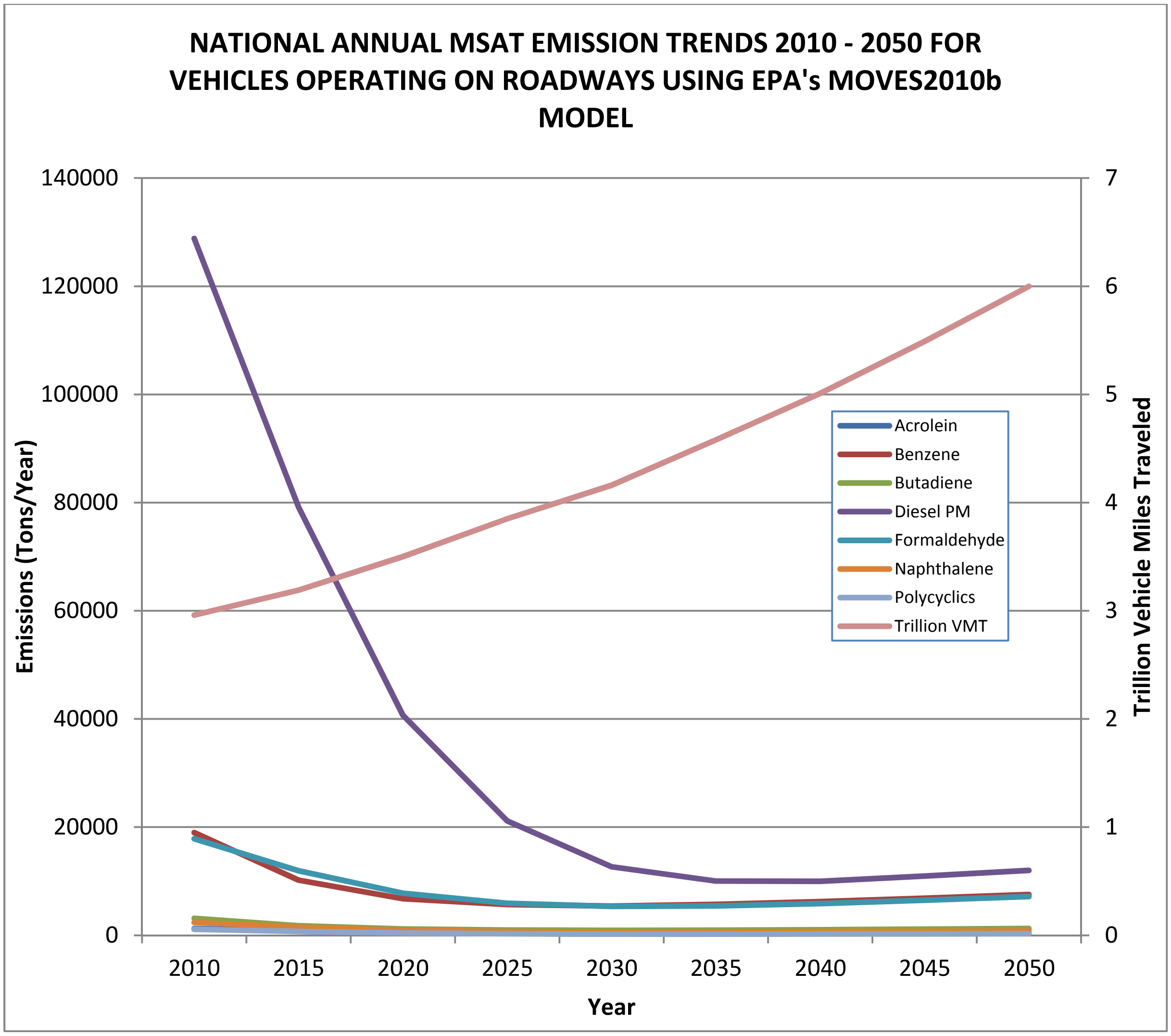

Figure 5-1: National MSAT Emission Trends

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

1 FHWA, Interim Guidance on Air Toxics Analysis in NEPA Documents, December 2012.

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

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

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

5.4.1 Information that is Unavailable or Incomplete

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The 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 CAA 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, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." 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. Two Health Effects Institute 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 or in the future as vehicle emissions substantially decrease.

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 builds 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.

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

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by the Health Effects Institute. 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 and the Health Effects Institute have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires the EPA to determine 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 United States Court of Appeals for the District of Columbia Circuit upheld the EPA’s approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than 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, which are better suited for quantitative analysis.

5.4.2 Qualitative MSAT Analysis

Depending on the specific project circumstances, FHWA has identified three levels of analysis.

(1) Projects with No Meaningful Potential MSAT Effects, or Exempt Projects

The types of projects included in this category are:

- Projects qualifying as a Categorical Exclusion under 23 CFR 771.117(c) (subject to consideration whether unusual circumstances exist under 23 CFR 771.117(b));
- Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

For projects that are categorically excluded under 23 CFR 771.117(c), or that are exempt from conformity requirements under the Clean Air Act pursuant to 40 CFR 93.126, no analysis or discussion of MSAT is necessary. Documentation sufficient to demonstrate that the project qualifies as a Categorical Exclusion and/or exempt project will suffice. For other projects with no or negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is recommended.[1] However, the project record should document the basis for the determination of "no meaningful potential impacts" with a brief description of the factors considered.

(2) Projects with Low Potential MSAT Effects

The types of 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 meaningfully increase MSAT emissions. This category covers a broad range of projects.

It is anticipated that most highway projects that need an MSAT assessment will fall into this category. Any projects not meeting the criteria in Category (1) or Category (3) below should be included in this category. Examples of these types of projects are minor widening projects; new interchanges or replacement of a signalized intersection on a surface street; or projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT).

For these projects, a qualitative assessment of emissions projections should be conducted. This qualitative assessment would compare, in narrative form, the expected effect of the project on traffic volumes, vehicle mix, or routing of traffic and the associated changes in MSAT for the project alternatives, including No Build, based on VMT, vehicle mix, and speed. It would also discuss national trend data projecting substantial overall reductions in emissions due to stricter engine and fuel regulations issued by the EPA. Because the emission effects of these projects are typically low, it is expected that there would be no appreciable difference in overall MSAT emissions among the various alternatives.

[1] 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.

(3) Projects with Higher Potential MSAT Effects

This category includes projects that have the potential for meaningful differences in MSAT emissions among project alternatives. It is expected that a limited number of projects would meet this two-pronged test. To fall into this category, a project should:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location, involving a significant number of diesel vehicles for new projects or accommodating a significant increase in the number of diesel vehicles for expansion projects; or
- Create new capacity or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000[1] or greater by the design year;

The project should also be:

- Proposed to be located in proximity to populated areas.

Projects falling within this category should be more rigorously assessed for impacts. For these projects, a quantitative assessment of emissions projections should be conducted. This approach would include a quantitative analysis to forecast local-specific emission trends of the priority MSAT for each alternative for use as a basis of comparison.

As indicated in the *Traffic Analysis* (CH2MHill, April 2014), the traffic volumes along I-10, I-210, SR 60, and SR 134 within the project area have average annual daily trips exceeding 140,000. In addition, the Freeway Tunnel Alternatives and their design variations would construct a new highway facility within 500 to 1000 ft of sensitive land uses. Consequently, this project is considered to have higher potential MSAT effects, and a quantitative analysis of MSAT emissions is required (FHWA 2012; California ARB 2005). The results of this analysis are summarized below.

5.4.3 Quantitative MSAT Analysis Methodology

The basic procedure for analyzing emissions for on-road MSATs is to calculate emission factors using CT-EMFAC 5.0 and apply the emission factors to speed and VMT data specific to the project. CT-EMFAC 5.0 is an emission model developed by Caltrans that calculates emission inventories for motor vehicles using EMFAC2011 emission rates.

This analysis focuses on seven MSAT pollutants identified by the EPA as being the highest priority MSATs. The seven pollutants are: acrolein, benzene, 1,3-butadiene, diesel PM, formaldehyde, naphthalene, and polycyclic organic matter. EMFAC2011 provides emission factor information for diesel PM, but does not provide emissions factors for the remaining six MSATs. Each of the remaining six MSATs, however, is a constituent of motor vehicle total organic gas emissions, and EMFAC2011 provides emission factors for total organic gas. The ARB has supplied Caltrans with “speciation factors” for each of the remaining six MSATs not directly estimated by EMFAC2011.

1 Using EPA’s MOVES2010b emissions model, FHWA staff determined that this range of AADT would result in emissions significantly lower than the Clean Air Act definition of a major hazardous air pollutant (HAP) source (i.e., 25 tons/yr for all HAPs or 10 tons/yr for any single HAP). Variations in conditions such as congestion or vehicle mix could warrant a different range for AADT.

Each speciation factor represents the portion of total organic gas emissions estimated to be a given MSAT. For example, if a speciation factor of 0.03 is provided for benzene, its emissions level is estimated to be 3 percent of total organic gas emissions, utilizing the speciation factor as a multiplier once total organic gas emissions are known. This analysis used the ARB-supplied speciation factors to estimate emissions of the aforementioned six MSATs as a function of total organic gas emissions.

5.4.4 Quantitative MSAT Analysis Results

Emissions factors for each of the MSATs were obtained for the Basin using emission rates generated by CT-EMFAC 5.0. Individual MSAT emissions were calculated using VMTs separated by speed bins and the emission rates. Results of the analyses are tabulated in Table 5.12 for the 2020, 2025, and 2035 conditions.

The analysis indicates that a substantial decrease in MSAT emissions can be expected between the existing (2012) and future (2020, 2025, and 2035) No Build Alternative conditions. This decrease is prevalent throughout the highest priority MSATs and the analyzed alternatives. This decrease is also consistent with the aforementioned EPA study that projects a substantial reduction in on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde between 2000 and 2050. Based on the analysis for this project, between the 2012 Existing and 2035 No Build Alternative conditions, reductions in MSAT expected are: 59 percent of diesel PM, 67 percent of benzene, 70 percent of 1,3-butadiene, 24 percent of naphthalene, 46 percent of POM, 73 percent of acrolein, and 46 percent of formaldehyde. These projected reductions are achieved while total VMT in the project area increase by 11.3 percent.

5.4.4.1 TSM/TDM Alternative

As shown in Table 5.12, the 2020 TSM/TDM Alternative MSAT emissions are lower than the existing condition emissions and the 2020 No Build Alternative emissions. As shown in Table 5.12, the 2035 TSM/TDM Alternative MSAT emissions are lower than the existing condition emissions. With the exception of the diesel PM emissions, the 2035 TSM/TDM Alternative MSAT emissions are all lower than the 2035 No Build Alternative emissions. While the TSM/TDM Alternative would result in a small increase in localized MSAT emissions, the EPA’s vehicle and fuel regulations, coupled with fleet turnover, would cause substantial reductions over time that would cause regionwide MSAT levels to be substantially lower than they are today.

BRT Alternative

As shown in Table 5.12, the 2020 BRT Alternative MSAT emissions are lower than the existing condition emissions and the 2020 No Build Alternative emissions. As shown in Table 5.12, the 2035 BRT Alternative MSAT emissions are lower than the existing condition emissions and, with the exception of diesel PM, are lower than the 2035 No Build Alternative emissions. While the BRT Alternative would result in a small increase in localized MSAT emissions, the EPA’s vehicle and fuel regulations, coupled with fleet turnover, would cause substantial reductions over time that would cause regionwide MSAT levels to be substantially lower than they are today.

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TABLE 5.12:
2020/2025 Opening Year and 2035 Horizon Year MSAT Emissions – Project Study Area (lbs/day)

Alternative	2020 Opening Year							2025 Opening Year							2035 Horizon Year						
	Diesel PM	Benzene	1,3-Btadiene	Naphthalene	POM	Acrolein	Formaldehyde	Diesel PM	Benzene	1,3-Btadiene	Naphthalene	POM	Acrolein	Formaldehyde	Diesel PM	Benzene	1,3-Btadiene	Naphthalene	POM	Acrolein	Formaldehyde
2012 Existing	669.2	164.8	35.2	12.0	4.4	7.7	270.8	669.2	164.8	35.2	12.0	4.4	7.7	270.8	669.2	164.8	35.2	12.0	4.4	7.7	270.8
No Build Alternative	245.3	71.2	14.2	8.4	2.2	3.0	147.7	248.3	59.7	11.6	8.6	2.2	2.4	137.2	276.3	55.1	10.4	9.1	2.4	2.1	145.7
Change from Existing	*-423.9*	*-93.6*	*-21.0*	*-3.6*	*-2.2*	*-4.7*	*-123.1*	*-420.9*	*-105.1*	*-23.6*	*-3.4*	*-2.2*	*-5.3*	*-133.6*	-392.8	-109.7	-24.8	-2.9	-2.0	-5.6	-125.0
TSM/TDM Alternative	245.1	70.8	14.1	8.3	2.2	3.0	146.6	–	–	–	–	–	–	–	276.9	55.0	10.4	9.1	2.4	2.1	145.1
Change from Existing	*-424.1*	*-94.0*	*-21.1*	*-3.7*	*-2.2*	*-4.7*	*-124.2*	–	–	–	–	–	–	–	-392.2	-109.8	-24.8	-2.9	-2.0	-5.6	-125.6
Change from No Build	*-0.2*	*-0.4*	*-0.1*	*-0.1*	*0.0*	*0.0*	*-1.1*	–	–	–	–	–	–	–	0.6	-0.1	0.0	0.0	0.0	0.0	-0.6
BRT Alternative	244.9	70.7	14.1	8.3	2.2	3.0	146.3	–	–	–	–	–	–	–	276.8	55.0	10.4	9.1	2.4	2.1	145.3
Change from Existing	*-424.3*	*-94.1*	*-21.1*	*-3.7*	*-2.2*	*-4.7*	*-124.5*	–	–	–	–	–	–	–	-392.4	-109.8	-24.8	-2.9	-2.0	-5.6	-125.5
Change from No Build	*-0.4*	*-0.5*	*-0.1*	*-0.1*	*0.0*	*0.0*	*-1.4*	–	–	–	–	–	–	–	0.4	-0.1	0.0	0.0	0.0	0.0	-0.4
LRT Alternative	–	–	–	–	–	–	–	248.5	59.4	11.6	8.6	2.2	2.4	136.3	275.5	55.0	10.4	9.1	2.4	2.1	145.6
Change from Existing	–	–	–	–	–	–	–	*-420.7*	*-105.4*	*-23.6*	*-3.4*	*-2.2*	*-5.3*	*-134.5*	-393.7	-109.8	-24.8	-2.9	-2.0	-5.6	-125.2
Change from No Build	–	–	–	–	–	–	–	*0.2*	*-0.3*	*0.0*	*0.0*	*0.0*	*0.0*	*-0.9*	-0.8	-0.1	0.0	0.0	0.0	0.0	-0.2
Freeway Tunnel Alternative																					
Single-Bore Operational Variation: *With Tolls*	–	–	–	–	–	–	–	249.6	58.6	11.4	8.4	2.2	2.4	133.8	277.7	54.3	10.3	8.9	2.4	2.1	142.6
Change from Existing	–	–	–	–	–	–	–	*-419.6*	*-106.2*	*-23.8*	*-3.6*	*-2.2*	*-5.3*	*-137.0*	-391.5	-110.5	-25.0	-3.1	-2.0	-5.6	-128.1
Change from No Build	–	–	–	–	–	–	–	*1.3*	*-1.1*	*-0.2*	*-0.2*	*0.0*	*0.0*	*-3.4*	1.4	-0.8	-0.1	-0.2	0.0	0.0	-3.1
Single-Bore Operational Variation: *With Tolls and No Trucks*	–	–	–	–	–	–	–	249.8	58.6	11.4	8.4	2.2	2.4	133.8	278.0	54.2	10.3	8.9	2.4	2.1	142.5
Change from Existing	–	–	–	–	–	–	–	*-419.4*	*-106.2*	*-23.8*	*-3.6*	*-2.2*	*-5.3*	*-137.0*	-391.2	-110.5	-25.0	-3.1	-2.0	-5.6	-128.2
Change from No Build	–	–	–	–	–	–	–	*1.5*	*-1.1*	*-0.2*	*-0.2*	*0.0*	*0.0*	*-3.4*	1.6	-0.9	-0.1	-0.2	0.0	0.0	-3.2
Single-Bore Operational Variation: *With Tolls and Express Bus*	–	–	–	–	–	–	–	249.8	58.7	11.4	8.4	2.2	2.4	134.0	277.7	54.2	10.3	8.9	2.4	2.1	142.3
Change from Existing	–	–	–	–	–	–	–	*-419.4*	*-106.1*	*-23.8*	*-3.6*	*-2.2*	*-5.3*	*-136.8*	-391.5	-110.6	-25.0	-3.1	-2.0	-5.6	-128.5
Change from No Build	–	–	–	–	–	–	–	*1.5*	*-1.0*	*-0.2*	*-0.2*	*0.0*	*0.0*	*-3.2*	1.4	-0.9	-0.1	-0.2	0.0	0.0	-3.5
Dual-Bore Operational Variation: *No Tolls*	–	–	–	–	–	–	–	251.8	58.4	11.4	8.4	2.2	2.4	133.1	280.9	54.2	10.3	8.9	2.4	2.1	141.9
Change from Existing	–	–	–	–	–	–	–	*-417.4*	*-106.4*	*-23.8*	*-3.6*	*-2.2*	*-5.3*	*-137.7*	-388.3	-110.6	-25.0	-3.1	-2.0	-5.6	-128.9
Change from No Build	–	–	–	–	–	–	–	*3.5*	*-1.3*	*-0.2*	*-0.2*	*0.0*	*0.0*	*-4.1*	4.6	-0.9	-0.1	-0.2	0.0	0.0	-3.8
Dual-Bore Operational Variation: *No Trucks*	–	–	–	–	–	–	–	252.5	58.5	11.4	8.4	2.2	2.4	133.3	281.5	54.2	10.3	8.9	2.4	2.1	141.9
Change from Existing	–	–	–	–	–	–	–	*-416.7*	*-106.3*	*-23.8*	*-3.6*	*-2.2*	*-5.3*	*-137.5*	-391.2	-110.5	-25.0	-3.1	-2.0	-5.6	-128.2
Change from No Build	–	–	–	–	–	–	–	*4.2*	*-1.2*	*-0.2*	*-0.2*	*0.0*	*0.0*	*-3.9*	5.2	-0.9	-0.1	-0.2	0.0	0.0	-3.8
Dual-Bore Operational Variation: *With Tolls*	–	–	–	–	–	–	–	252.2	58.6	11.4	8.4	2.2	2.4	133.5	281.3	54.2	10.3	8.9	2.4	2.1	141.7
Change from Existing	–	–	–	–	–	–	–	*-417.0*	*-106.2*	*-23.8*	*-3.6*	*-2.2*	*-5.3*	*-137.3*	-391.5	-110.6	-25.0	-3.1	-2.0	-5.6	-128.5
Change from No Build	–	–	–	–	–	–	–	*3.9*	*-1.1*	*-0.2*	*-0.2*	*0.0*	*0.0*	*-3.7*	4.9	-0.9	-0.1	-0.2	0.0	0.0	-4.0

Source: *Air Quality Assessment Report* (2014).
BRT = Bus Rapid Transit
Diesel PM = diesel particulate matter plus diesel exhaust organic gases
lbs/day = pounds per day
LRT = Light Rail Transit
MSAT = Mobile Source Air Toxics
POM = polycyclic organic matter
TSM/TDM = Transportation System Management/Transportation Demand Management

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LRT Alternative

As shown in Table 5.12, the 2025 LRT Alternative MSAT emissions are lower than or equal to the existing condition emissions and, with the exception of diesel PM, are lower than the 2025 No Build Alternative emissions. As shown in Table 5.12, the 2035 LRT Alternative MSAT emissions are lower than or equal to the existing condition emissions and the 2035 No Build Alternative emissions. While the LRT Alternative would result in a small increase in localized MSAT emissions, the EPA's vehicle and fuel regulations, coupled with fleet turnover, would cause substantial reductions over time that would cause regionwide MSAT levels to be substantially lower than they are today.

Freeway Tunnel Alternative Single-Bore Design Variation

As shown in Table 5.12, the 2025 MSAT emissions for the Freeway Tunnel Alternative single-bore design variation are lower than the existing condition emissions and, with the exception of diesel PM, are lower than or equal to the 2025 No Build Alternative emissions. As shown in Table 5.12, the 2035 MSAT emissions for the Freeway Tunnel Alternative single-bore design variation are lower than the existing condition emissions and, with the exception of diesel PM, are lower than or equal to the 2035 No Build Alternative emissions. While the Freeway Tunnel Alternative single-bore design variation would result in a small increase in localized MSAT emissions, the EPA's vehicle and fuel regulations, coupled with fleet turnover, would cause substantial reductions over time that would cause regionwide MSAT levels to be substantially lower than they are today.

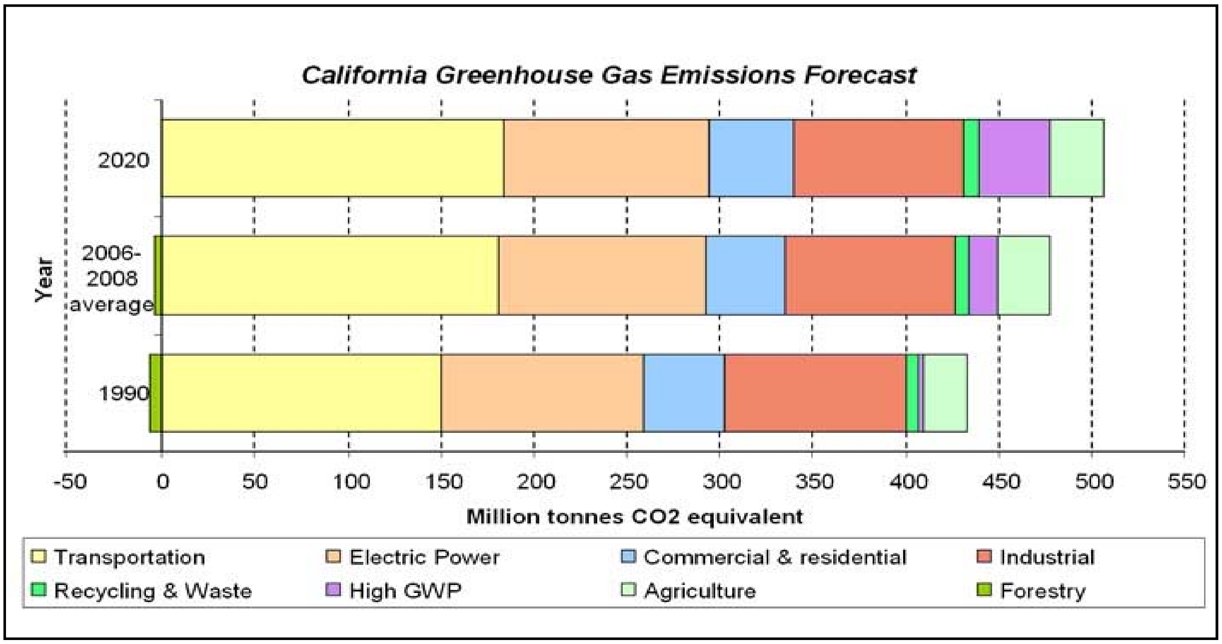
Freeway Tunnel Alternative Dual-Bore Design Variation

As shown in Table 5.12, the 2025 MSAT emissions for the Freeway Tunnel Alternative dual-bore design variation are lower than the existing condition emissions and, with the exception of diesel PM, are lower than or equal to the 2025 No Build Alternative emissions. As shown in Table 5.12, the 2035 MSAT emissions for the Freeway Tunnel Alternative dual-bore design variation are lower than the existing condition emissions and, with the exception of diesel PM, are lower than or equal to the 2035 No Build Alternative emissions. While the Freeway Tunnel Alternative dual-bore design variation would result in a small increase in localized MSAT emissions, the EPA's vehicle and fuel regulations, coupled with fleet turnover, would cause substantial reductions over time that would cause regionwide MSAT levels to be substantially lower than they are today.

5.5 Climate Change/Greenhouse Gases

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 participate in a potential impact through its incremental contribution combined with the contributions of all other sources of GHG. In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable." See CEQA Guidelines 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 contains the main strategies California will use to reduce GHG. As part of its supporting documentation for the Draft Scoping Plan, ARB released the GHG inventory for California (Forecast last updated: 28 October 2010). The forecast (shown in Figure 5-2) 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.



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

Figure 5-2: California Greenhouse Gas Forecast

Caltrans 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, Caltrans has created and is implementing the Climate Action Program at Caltrans that was published in December 2006 (see Climate Action Program at Caltrans [December 2006])[1].

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 carbon dioxide from mobile sources, such as automobiles, occur at stop-and-go speeds (0-25 mph) and speeds over 55 mph; the most severe emissions occur from 0-25 mph (see Figure 5-3 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.

[1] Caltrans Climate Action Program is located at the following web address: www.dot.ca.gov/hq/tpp/offices/ogm/key_reports_files/State_Wide_Strategy/Caltrans_Climate_Action_Program.pdf, accessed December 2013.

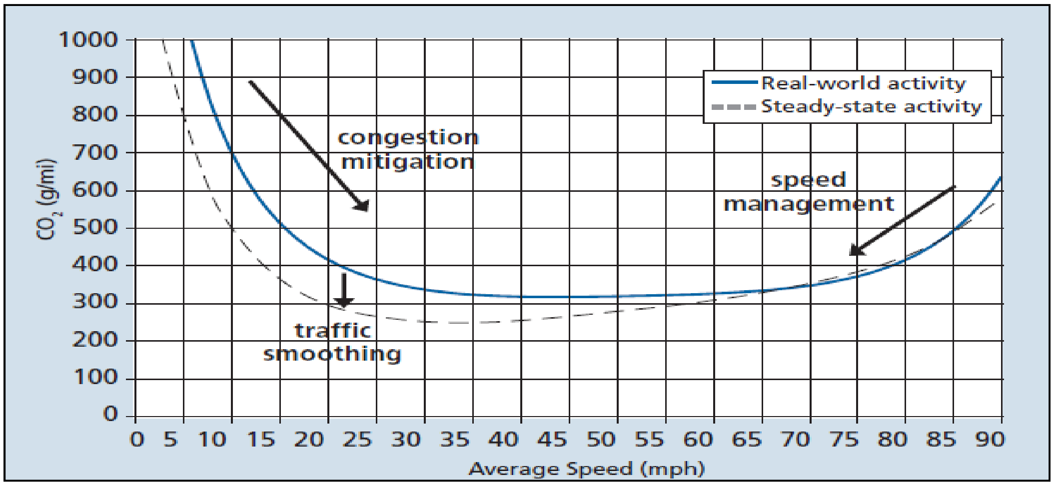


Figure 5-3: Possible Effect of Traffic Operation Strategies in Reducing On-Road CO_2 Emission[1]

5.5.1 Project Operational Emissions

The purpose of the proposed action is to effectively and efficiently accommodate regional and local north-south travel demands in the study area of the western San Gabriel Valley and east/northeast Los Angeles. The proposed project will not generate new vehicular traffic trips since new homes or businesses will not be constructed. However, there is a possibility that some traffic currently utilizing other routes would be attracted to use the new facility, thus resulting in slight increases in VMT. The impact of GHG emissions is a global rather than a local issue. However, due to lack of global models for project-level analyses, the impact of the Build Alternatives on GHG emissions was calculated using traffic data for the project region.

The traffic study (CH2MHill, April 2014) calculated the VMT and VHT for all of the vehicle trips within the project region. This traffic data, in conjunction with the CT-EMFAC 5.0 emission model, was used to calculate and compare the CO_2 emissions for the 2012, 2020, 2025, and 2035 regional conditions.

The results of the modeling were used to calculate the CO_2 emissions listed in Tables 5.13, 5.14, and 5.15. The CO_2 emissions numbers listed in Tables 5.13, 5.14, and 5.15 are only useful for a comparison between project alternatives. The numbers are not necessarily an accurate reflection of what the true CO_2 emissions will be because CO_2 emissions are dependent on other factors that are not part of the model, such as the fuel mix (EMFAC model emission rates are only for direct engine-out CO_2 emissions, not full fuel cycle; fuel cycle emission rates can vary dramatically depending on the amount of additives like ethanol and the source of the fuel components), rate of acceleration, and the aerodynamics and efficiency of the vehicles. As shown in Tables 5.13, 5.14, and 5.15, with the exception of the Freeway Tunnel Alternative (Dual Bore No Toll) and Freeway Tunnel Alternative (Dual Bore No Truck) scenarios in 2035, the Build Alternatives would result in small decreases in CO_2 emissions within the region when compared to the No Build conditions. When compared to the Existing (2012) conditions, all of the future alternatives (No Build and Build) would result in a net decrease in CO_2 emissions.

[1] Traffic Congestion and Greenhouse Gases: Matthew Barth and Kanok Boriboonsomsin (TR News 268 May-June 2010)<http://onlinepubs.trb.org/onlinepubs/trnews/trnews268.pdf>

TABLE 5.13:
2020 Opening Year Greenhouse Gas Emissions – Project Study Area (Metric Tons/day)

Alternative	CO_2
2012 Existing	10,156.3
2020 No Build	8,992.4
Change from Existing	-1,163.9
TSM/TDM	8,965.2
Change from Existing	-1,191.1
Change from No Build	-27.2
BRT	8,955.3
Change from Existing	-1,201.1
Change from No Build	-37.1

BRT = Bus Rapid Transit
CO_2 = carbon dioxide
TSM = Transportation System Management
TDM = Transportation Demand Management

TABLE 5.14:
2025 Opening Year Greenhouse Gas Emissions – Project Study Area (Metric Tons/day)

Alternative	CO_2
2012 Existing	10,156.3
2025 No Build	8,805.8
Change from Existing	-1,350.5
LRT	8,785.8
Change from Existing	-1,370.5
Change from No Build	-20.0
Single-Bore with Tolls	8,736.8
Change from Existing	-1,419.6
Change from No Build	-69.0
Single-Bore with Tolls and No Trucks	8,738.2
Change from Existing	-1,418.1
Change from No Build	-67.6
Single-Bore with Tolls and Express Buses	8,743.0
Change from Existing	-1,413.4
Change from No Build	-62.9
Dual-Bore No Tolls	8,752.1
Change from Existing	-1,404.2
Change from No Build	-53.7
Dual-Bore No Trucks	8,766.3
Change from Existing	-1,390.1
Change from No Build	-39.6
Dual-Bore with Tolls	8,770.1
Change from Existing	-1,386.3
Change from No Build	-35.7

CO_2 = carbon dioxide
LRT = Light Rail Transit

TABLE 5.15:
2035 Greenhouse Gas Emissions – Project Study Area (Metric Tons/day)

Alternative	CO_2
2012 Existing	10,156.30
2035 No Build	9,077.10
Change from Existing	-1,079.20
TSM/TDM	9,078.80
Change from Existing	-1,077.50
Change from No Build	1.7
BRT	9,078.50
Change from Existing	-1,077.90
Change from No Build	1.4
LRT	9,075.00
Change from Existing	-1,081.40
Change from No Build	-2.2
Single-Bore with Tolls	9,027.30
Change from Existing	-1,129.00
Change from No Build	-49.8
Single-Bore with Tolls and No Trucks	9,028.90
Change from Existing	-1,127.40
Change from No Build	-48.2
Single-Bore with Tolls and Express Buses	9,023.10
Change from Existing	-1,133.30
Change from No Build	-54
Dual-Bore No Tolls	9,051.40
Change from Existing	-1,105.00
Change from No Build	-25.7
Dual-Bore No Trucks	9,062.70
Change from Existing	-1,093.60
Change from No Build	-14.4
Dual-Bore with Tolls	9,052.90
Change from Existing	-1,103.50
Change from No Build	-24.2

BRT = Bus Rapid Transit
CO_2 = carbon dioxide
LRT = Light Rail Transit
TSM = Transportation System Management
TDM = Transportation Demand Management

5.5.2 Construction Emissions

GHG 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 on-site construction equipment, and emissions arising from traffic delays due to construction. The total construction-related GHG emissions for each project alternative are presented in Table 5.16 (model data is provided in Appendix A). The emissions presented below are based on the best information available at the time of calculations.

TABLE 5.16:
Total Construction Greenhouse Gas Emissions

Project Alternative	Total CO_2e (Metric Tons)
TSM/TDM	1,653.1
BRT	209.1
LRT	4,933.6
Freeway Tunnel (Single Bore)	26,345.5
Freeway Tunnel (Dual Bore)	48,490.2

BRT = Bus Rapid Transit
LRT = Light Rail Transit
TDM = Transportation Demand Management
TSM = Transportation System Management

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. As discussed below in Section 6.0, idling times would be restricted to 10 minutes in each direction for passenger cars during lane closures and 5 minutes for construction vehicles. Restricting idling times reduces harmful emissions from passenger cars and diesel-powered construction vehicles.

5.5.3 Greenhouse Gas Reduction Strategies

5.5.3.1 Assembly Bill 32 Compliance

Caltrans continues to be actively involved on the Governor's Climate Action Team as ARB works to implement the EO S-3-05 and EO S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies Caltrans 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 5-4: The Mobility Pyramid.

Figure 5-4: The Mobility Pyramid

Metro and Caltrans are 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. Metro and Caltrans are working closely with local jurisdictions on planning activities; however, they do not have local land use planning authority Metro and Caltrans are also supporting efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars, light and heavy-duty trucks; and by supporting legislative efforts to increase fuel economy. It is important to note, however, that the control of the fuel economy standards is held by the EPA and ARB. Lastly, the use of alternative fuels is also being considered; Caltrans is participating in funding for alternative fuel research at UC Davis.

Table 5.17 summarizes Caltrans and statewide efforts that it 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).

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

1. Landscaping reduces surface warming, and through photosynthesis, decreases CO_2. Landscaping would be provided where necessary within the corridor to provide aesthetic treatment, replacement planting, or mitigation planting for the project. The landscape planting would help offset any potential CO_2 emissions increase.
2. The project would recommend the use of energy-efficient lighting, such as light-emitting diode (LED) traffic signals. LED bulbs—or balls, in the stoplight vernacular—cost $60 to $70 apiece but last 5 to 6 years, compared to the 1-year average lifespan of the incandescent bulbs 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.

TABLE 5.17:
Climate Change/CO_2 Reduction Strategies

Strategy	Program	Partnership		Method/Process	Estimated CO_2 Savings (MMT)	
		Lead	Agency		2010	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	0.975	7.8
Operational Improvements & Intelligent Trans. System (ITS) Deployment	Strategic Growth Plan	Caltrans	Regions	State ITS; Congestion Management Plan	0.007	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, Cal/EPA, 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	0.0045	0.0065 0.045 0.0225
Non-vehicular Conservation Measures	Energy Conservation Program	Green Action Team		Energy Conservation Opportunities	0.117	0.34
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 0.36	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**

ARB = California Air Resources Board
BT&H = Business, Transportation and Housing Agency
Cal/EPA = California Environmental Protection Agency
CEC = California Energy Commission
CO_2 = carbon dioxide
GHG = greenhouse gases
MMT = million metric tons
MPOs = Metropolitan Planning Organizations

3. According to Caltrans Standard Specification Provisions, idling time for lane closure during construction is restricted to 10 minutes in each direction. In addition, the contractor must comply with Title 13, California Code of Regulations (CCR) Section 2449(d)(3) that was adopted by the ARB on June 15, 2008. This regulation restricts idling of construction vehicles to no longer than 5 consecutive minutes. Compliance with this regulation reduces harmful emissions from diesel-powered construction vehicles.

5.5.3.2 Adaption Strategies

"Adaptation strategies" refer to how Metro, Caltrans, and other transportation agencies 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, storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damaging roadbeds by 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, the Office of Science and Technology Policy, and the National Oceanographic and Atmospheric Administration, released its interagency report October 14, 2010, outlining recommendations to President Obama for how federal agency policies and programs can better prepare the United States 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, Governor 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 Executive Order set in motion several agencies and actions to address the concern of sea level rise.

The California Natural Resources Agency was directed to coordinate with local, regional, state, and federal public and private entities to develop the California Climate Adaptation Strategy (December 2009)[1], 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 California Natural 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

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

were involved in the creation of the Adaptation Strategy document, including Environmental Protection; 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 continue to be developed and collected, the State's adaptation strategy will be updated to reflect current findings.

The California Natural Resources Agency was also directed to request the National Academy of Science to prepare a Sea Level Rise Assessment Report by December 2010[1] to advise how California should plan for future sea level rise. The report is to include:

- 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; and
- A discussion of future research needs regarding sea level rise

In 2010, interim guidance was released by The Coastal Ocean Climate Action Team (CO-CAT) as well as Caltrans 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, and/or are programmed for construction funding through 2013, or are routine maintenance projects as of the date of EO S-13-08 may, but are not required to, consider these planning guidelines. The Notice of Preparation for the project was submitted February 28, 2011. Construction is scheduled to begin in 2016.

Furthermore, EO S-13-08 directed the Business, Transportation, and Housing Agency to prepare a report to assess the vulnerability of transportation systems to sea level affecting safety, maintenance, and operational improvements of the system, and the economy of the State. Caltrans continues to work on assessing the transportation system vulnerability to climate change, including the effect of a rise in sea level.

Currently, Caltrans 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

[1] The Sea Level Rise Assessment report is currently due to be completed in 2012 and will include information for Oregon and Washington, as well as California.

other climate change impacts, Caltrans 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, Caltrans will be able to 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. Caltrans 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 report on Sea Level Rise Assessment, which was released on June 22, 2012.

While estimates vary, sea level is expected to rise an additional 22 to 35 inches by the year 2100. Although these projections are on a global scale, the rate of sea level rise along California's coast is relatively consistent with the worldwide average rate observed over the past century. Therefore, it is reasonable to assume that changes in worldwide sea level rise will also be experienced along California's coast. As the proposed project site is located approximately 800 ft above sea level and 18 mi from the coast, the area of the project would not be affected by an approximately 39-inch rise in sea level.

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6. Standard Conditions

The following required regulatory measures would reduce or minimize air pollutant emissions associated with construction activities:

- The construction contractor will adhere to the requirements of South Coast Air Quality Management District (SCAQMD) rules and regulations on cutback and emulsified asphalt paving materials.
- To reduce fugitive dust emissions, the construction contractor will adhere to the requirements of SCAQMD Rule 403. The best available control measures specified in SCAQMD Rule 403 will be incorporated into the project construction. The best available control measures are listed in Table 6.1.
- The construction contractor will utilize electric or alternative-fuel-powered equipment in lieu of gasoline or diesel-powered engines where feasible.
- The construction contracts and/or grading plans will include a statement that work crews will shut off equipment when not in use.
- The construction contractor will time the construction activities so as to not interfere with peak-hour traffic and minimize obstruction of through traffic lanes adjacent to the site; if necessary, a flagger shall be retained to maintain safety adjacent to existing roadways.
- The grading plans shall include a statement that the construction contractor will ensure that all construction equipment is tuned and maintained in accordance with manufacturer specifications.

In addition to the SCAQMD standard measures to reduce construction emissions, Caltrans Standard Construction Specifications will be adhered to in order to reduce emissions. The following is a list of Caltrans standard measures provided to reduce the emission of fugitive dust:

A. All disturbed areas, including storage piles, not being actively utilized for construction purposes will be effectively stabilized for dust emissions using water, chemical stabilizers/suppressants, or vegetative ground cover.

B. All on-site unpaved roads and off-site unpaved access roads will be effectively stabilized for dust emissions using water or chemical stabilizers/suppressants.

C. All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities will be effectively controlled for fugitive dust emissions by utilizing applications of water or by presoaking.

D. When materials are transported off site, all material will be covered or effectively wetted to limit visible dust emissions, or at least 6 inches of freeboard space from the top of the container will be maintained.

E. All operations will limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. (The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.)

TABLE 6.1:
Best Available Control Measures

Source Category	Control Measure	Guidance
Backfilling	• Stabilize backfill material when not actively handling; and • Stabilize backfill material during handling; and • 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	• Maintain stability of soil through pre-watering of site prior to clearing and grubbing; and • Stabilize soil during clearing and grubbing activities; and • 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	• Use water spray to clear forms; or • Use sweeping and water spray to clear forms; or • Use vacuum system to clear forms.	• Use of high pressure air to clear forms may cause exceedance of Rule requirements.
Crushing	• Stabilize surface soils prior to operation of support equipment; and • 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	• Pre-water soils prior to cut and fill activities; and • 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	• Stabilize wind erodible surfaces to reduce dust; and • Stabilize surface soil where support equipment and vehicles will operate; and • Stabilize loose soil and demolition debris; and • Comply with Air Quality Management District Rule 1403.	• Apply water in sufficient quantities to prevent the generation of visible dust plumes
Disturbed soil	• Stabilize disturbed soil throughout the construction site; and • 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.
Earth-moving activities	• Pre-apply water to depth of proposed cuts; and • 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 • Stabilize soils once earth-moving 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.
Importing/ exporting of bulk materials	• Stabilize material while loading to reduce fugitive dust emissions; and • Maintain at least 6 inches of freeboard on haul vehicles; and • Stabilize material while transporting to reduce fugitive dust emissions; and • Stabilize material while unloading to reduce fugitive dust emissions; and • Comply with Vehicle Code Section 23114.	• Use tarps or other suitable enclosures on haul trucks. • Check belly-dump truck seals 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.

TABLE 6.1:
Best Available Control Measures

Source Category	Control Measure	Guidance
Landscaping	• 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	• Apply water to unpaved shoulders prior to clearing; and • Apply chemical dust suppressants and/or washed gravel to maintain a stabilized surface after completing road shoulder maintenance.	• Installation of curbing and/or paving of road shoulders can reduce recurring maintenance costs. • Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder maintenance costs.
Screening	• Pre-water material prior to screening; and • Limit fugitive dust emissions to opacity and plume length standards; and • 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	• Stabilize staging areas during use; and • Stabilize staging area soils at project completion.	• Limit size of staging area. • Limit vehicle speeds to 15 mph. • Limit number and size of staging area entrances/exits.
Stockpiles/bulk material handling	• Stabilize stockpiled materials. • 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	• Stabilize all off-road traffic and parking areas; and • Stabilize all haul routes; and • 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 only used on established parking areas/haul routes.
Trenching	• Stabilize surface soils where trencher or excavator and support equipment will operate; and • 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 resume trenching. • Washing mud and soils from equipment at the conclusion of trenching activities can prevent crusting and drying of soil on equipment.
Truck loading	• Pre-water material prior to loading; and • Ensure that freeboard exceeds 6 inches (CVC 23114)	• Empty loader bucket such that no visible dust plumes are created. • Ensure that the loader bucket is close to the truck to minimize drop height while loading.
Turf Overseeding	• Apply sufficient water immediately prior to conducting turf vacuuming activities to meet opacity and plume length standards; and • Cover haul vehicles prior to exiting the site.	• Haul waste material off site immediately.

TABLE 6.1:
Best Available Control Measures

Source Category	Control Measure	Guidance
Unpaved roads/ parking lots	• Stabilize soils to meet the applicable performance standards; and • 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	• 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, Rule 403 (June 2005).
CVC = California Vehicle Code
mph = miles per hour

F. Following the addition of materials to or the removal of materials from the surface of outdoor storage piles, said piles will be effectively stabilized for fugitive dust emissions utilizing sufficient water or chemical stabilizers/suppressants.

G. Traffic speeds on unpaved roads will be limited to 15 mph.

H. Sandbags or other erosion control measures will be installed to prevent silt runoff to public roadways from sites with a slope greater than 1 percent.

I. Wheel washers for all exiting trucks will be installed, or all trucks and equipment shall be washed off before leaving the site.

J. Wind breaks will be installed at windward side(s) of construction areas.

K. Excavation and grading activity will be suspended when winds exceed 20 mph.

L. Areas subject to excavation, grading, and other construction activity will be limited at any one time.

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7. Avoidance and Minimization Measures

7.1 Construction Impacts

In addition to the standard regulatory requirements listed in Section 6, the following measures are recommended for implementation to reduce air pollutants generated by vehicle and equipment exhaust during the project construction phase.

7.1.1 Fugitive Dust Sources Controls

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate. This applies to both inactive and active sites during workdays, weekends, holidays, and windy conditions.
- Install wind fencing, and phase grading operations where appropriate and operate water trucks for stabilization of surfaces under windy conditions.
- When hauling material and operating non-earthmoving equipment, prevent spillage and limit speeds to 15 mph. Limit speed of earthmoving equipment to 10 mph.

7.1.2 Mobile and Stationary Source Controls

- Reduce use, trips, and unnecessary idling from heavy equipment.
- Solar powered, instead of diesel powered, changeable message signs will be used.
- Electricity from power poles, rather than from generators, will be used where feasible.
- Maintain and tune engines per manufacturer's specifications to perform at EPA certification levels and to perform at verified standards applicable to retrofit technologies. Employ periodic, unscheduled inspections to limit unnecessary idling and to ensure that construction equipment is properly maintained, tuned, and modified consistent with established specifications.
- Prohibit any tampering with engines and require continuing adherence to manufacturer's recommendations.
- Use new, clean (diesel or retrofitted diesel) equipment meeting the most stringent applicable federal or state standards and commit to the best available emissions control technology. Use Tier 3, or higher, engines for construction equipment with a rated horsepower exceeding 75. Use Tier 2, or higher, engines for construction equipment with a rated horsepower of less than 75. If non-road construction equipment that meets or exceeds Tier 2 or 3 engine standards is not available, the Construction Contractor will be required to use the best available emissions control technologies on all equipment.
- Utilize EPA-registered particulate traps and other appropriate controls where suitable to reduce emissions of diesel particulate matter (PM) and other pollutants at the construction site.

7.1.3 Administrative Controls

- Meet EPA diesel fuel requirements for off-road and on-highway, and where appropriate use alternative fuels such as natural gas and electric.

- Identify sensitive receptors in the project area, such as residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes, and specify the means by which impacts to these populations will be minimized. For example, locate construction equipment and staging zones away from sensitive receptors and away from fresh air intakes to building and air conditioners.

7.2 Operational Impacts

No mitigation is identified.

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Appendix A: Construction Emission Calculations

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Appendix B: CO Hot-Spot Analysis

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Appendix C: FTIP and RTP Project Listings

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Appendix D: PM Hot-Spot Analysis

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Appendix E: Regional Emissions Analysis

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