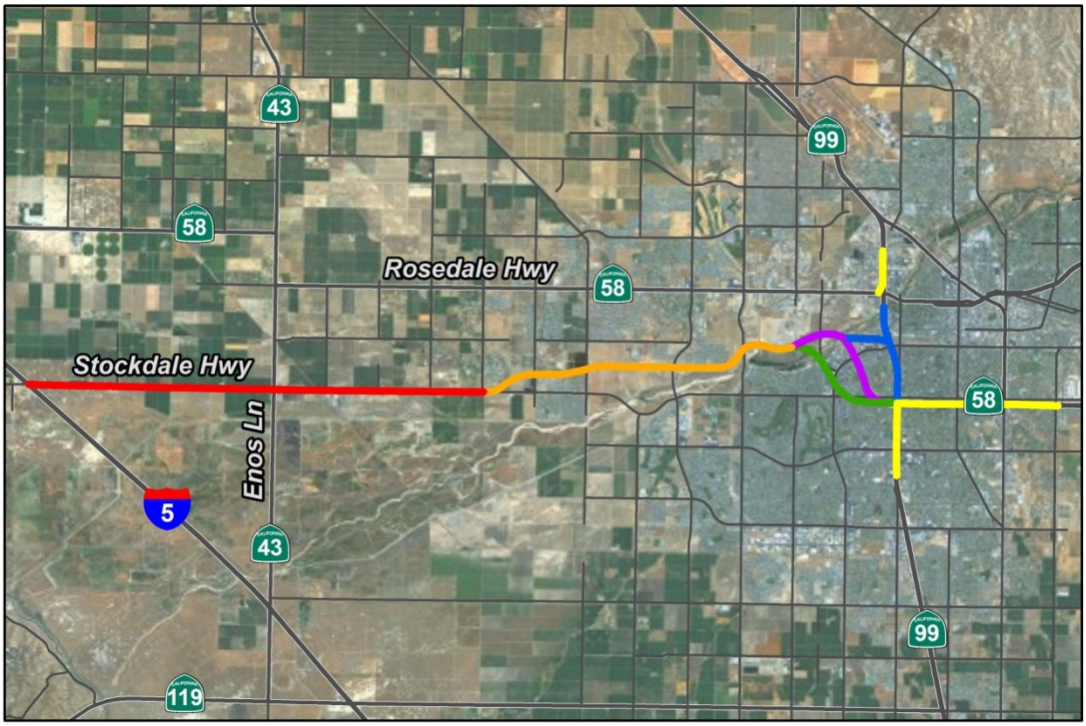
Centennial Corridor Project

City of Bakersfield and Kern County, CA

District 06 - KERN – 58 - PM T31.7 to PM R55.6
District 06 - KERN – 99 - PM 21.2 to PM 26.2
Project ID# 06-0000-0484

Air Quality Study Report



November 2013
(Revised February 2014)

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District 06 - KERN - 58 - PM T31.7 to PM R55.6
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Project ID No. 06-0000-0484

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November 2013

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Summary

This technical study provides an air quality impact assessment for the Centennial Corridor project. The California Department of Transportation (Caltrans) proposes to establish a new alignment for State Route (SR) 58, which would provide a continuous route along State Route (SR) 58 from Interstate (I) 5 via the Westside Parkway to Cottonwood Road on existing SR 58, east of SR 99 (post miles T31.7 to R55.6). Improvements to SR 99 (post mile 21.2 to 26.2) would also be required to accommodate the connection with SR 58. The project is located at the southern end of the San Joaquin Valley in the City of Bakersfield in Kern County. The proposed continuous route, known as the Centennial Corridor, has been divided into three distinct segments. The focus of this air quality study is Segment 1 of the Centennial Corridor which is the furthest eastern segment. Segment 1 would connect what is locally known as the Westside Parkway to the existing SR 58 (East) Freeway. This segment is all new construction and three alignment alternatives are being evaluated.

The air quality analyses have been developed using methodology and assumptions that are consistent with the requirements of the National Environmental Policy Act (NEPA), the California Environmental Quality Act (CEQA), the Clean Air Act Amendments of 1990, the California Clean Air Act of 1988. The analysis also utilizes guidelines and procedures provided in applicable air quality analysis protocols such as the *Transportation Project-Level Carbon Monoxide Protocol* (Caltrans, 1997); Federal Highway Administration (FHWA) and the U.S. Environmental Protection Agency (EPA), *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (EPA, 2006), and the FHWA *Interim Air Toxics Analysis in NEPA Documents* (FHWA, 2006) and its update *Interim Guidance Update on Air Toxics Analysis in NEPA Documents* (FHWA, 2009). The analysis also uses the guidelines of the local air District in the San Joaquin Valley Air Pollution Control District's *Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI)* (SJVAPCD, 2002).

The key findings of the analysis are as follows:

<u>Project Operations</u>: Project operation would conform to regional conformity requirements of the Clean Air Act's Transportation Conformity Rule.

- The project is located in the San Joaquin Valley Air Basin (SJVAB), which is currently designated as State and federal nonattainment area for ozone (O_3) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). The SJVAB is designated as a State

nonattainment and a federal maintenance area for particulate matter less than 10 microns in diameter (PM_{10}), and a maintenance area for carbon monoxide (CO). The SJVAB is designated as attainment and/or unclassified for all other pollutants.

The Kern Council of Governments is the Metropolitan Planning Organization (MPO) responsible for the project. The proposed project is fully funded and is included in the 2011 Final Regional Transportation Plan (RTP) and the Kern Council of Governments' financially constrained 2011 Federal Transportation Improvement Program (FTIP). The design concept and scope of the proposed project is consistent with the project description in the 2013 Final RTP, the 2013 FTIP and the assumptions in the Kern Council of Governments regional emissions analysis. As such, the project demonstrates regional conformity.

- The project operational emissions would not exceed the federal or state ambient air quality standards for carbon monoxide and would not generate CO hot spots.

- EPA's Transportation Conformity Rule (40 CFR 51.390 and Part 93, March 2012) addresses local air quality impacts in PM_{10} and $PM_{2.5}$ nonattainment and maintenance areas. The rule provides criteria and procedures to ensure that any such project will not cause or contribute to new violations, increase the frequency or severity of any existing violations, or delay the timely attainment of the relevant National Ambient Air Quality Standard (NAAQS) as described in 40 CFR 93.101 A qualitative project-level conformity analysis was completed for this project.[1] The qualitative analysis results were based on the EPA's "Transportation Conformity Guidance for Qualitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas." Each build alternative (A, B and C) meets the PM_{10} and $PM_{2.5}$ conformity tests without further analysis or mitigation.

- A quantitative analysis of local emissions of mobile source air toxics (MSATs) was conducted for comparison of the project alternatives. A significant decrease in all mobile source air toxics emissions can be expected for the project alternatives from the base year (2008) levels through future year levels. This is directly due to the improved pollution emission performance of a modernizing fleet of all diesel-fueled vehicles, which is a trend that is expected to continue throughout the planning horizon.

- The mobile source air toxics emissions from each build alternative would be less than the No-Build Alternative along several studied roadways. For most of the study area roadways, the three build alternatives are comparable in level of emissions, while

[1] See http://www.gpo.gov/fdsys/pkg/FR-2010-12-20/pdf/2010-31909.pdf

Alternative A exhibits lower mobile source air toxics emissions than Alternatives B and C in the opening year and slightly lower emissions than Alternatives B and C in the horizon year. The mobile source air toxics emissions level of Alternatives B and C are in the same order of magnitude.

- A quantitative analysis of the greenhouse gas (GHG) emissions from operation of the project is also included, per the Governor's Office of Planning and Research guidelines.

Construction Emissions

- Construction of the project would result in temporary short-term emissions of air pollutants. Construction emissions of reactive organic gases (ROG) and exhaust particulate matters (PM_{10} and $PM_{2.5}$) do not exceed the SJVAPCD's thresholds. During the 2.5 years of project construction, nitrogen oxides (NOx) emissions would potentially exceed the 2 tons per year threshold that is established by District Rule 9510. Implementation of recommended mitigation measures of using newer engine equipment with EPA Tier 2 or better standards would reduce construction-related emissions of NO_x to the less than significant threshold level established by the District.

- Project construction would not expose receptors to significant levels of toxic air contaminants (including airborne asbestos) or objectionable odors.

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LIST OF ACRONYMS

AADT	annual average daily traffic
AB	Assembly Bill
AEP	Association of Environmental Professionals
AQMP	Air Quality Management Plan
Basin	San Joaquin Valley Air Basin, also SJVAB
BACMs	best available control measures
BMPs	best management practices
C2F6	hexafluoroethane
C-D	collector-distributor
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CARB	California Air Resources Board
Caltrans	California Department of Transportation
CAAA-1990	Clean Air Act Amendments of 1990
CCAA	California Clean Air Act
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CF4	tetrafluoromethane
CFR	Code of Federal Regulations
CH4	methane
CO	carbon monoxide
CO2	carbon dioxide
County	Kern County
DEOG	diesel exhaust organic gas
DOT	United States Department of Transportation
DPM	diesel particulate matter
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GHG	greenhouse gas
HEI	Health Effects Institute
IPCC	Intergovernmental Panel on Climate Change
IRIS	Integrated Risk Information System
ISR	Indirect Source Review
KCOG	Kern Council of Governments, also used as Kern COG
LED	light-emitting diode
LOS	level of service
MPO	Metropolitan Planning Organization
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
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos
NO_x	nitrogen oxides or oxides of nitrogen
NTE	not-to-exceed
O_3	ozone
OPR	Governor's Office of Planning and Research
PM	particulate matter
PM_{10}	particulate matter less than 10 microns in size, also Respirable (or inhalable) particulate matter
$PM_{2.5}$	particulate matter less than 2.5 microns in size, also fine particulate matter
POAQC	Project of Air Quality Concern
POM	polycyclic organic matter
ppm	parts per million
Protocol	Transportation Project-Level Carbon Monoxide Protocol, CO Protocol
ROGs	reactive organic gases
ROW	right-of-way
RTP	Regional Transportation Plan
RTIP	Regional Transportation Improvement Program
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users
SET	supplemental emission test
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District, also District or air District
SO_2	sulfur dioxide
SR	State Route
TOG	total organic gases
VMT	vehicle miles traveled
VOC(s)	volatile organic compound(s)
$\mu g/m^3$	micrograms per cubic meter

Chapter 1 Project Description

1.1 Purpose of Air Quality Study Report

This Air Quality Study Report provides an assessment of potential impacts of the air emissions generated by the construction and operation of the proposed project and documents the anticipated air quality effects of the project. Because this document is intended to satisfy the requirements of both, the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), it addresses both State and federal air quality standards and regulations.

1.2 Project Location, Description, and Alternatives

1.2.1 Project Background

The California Department of Transportation (Caltrans) proposes to establish a new alignment for State Route (SR) 58, which would provide a continuous route along State Route 58 from Cottonwood Road on existing State Route 58, east of State Route 99 (post mile R55.6), to Interstate 5 (I-5) (post mile T31.7). Improvements to SR 99 (post miles 21.2 to 26.2) and Westside Parkway would also be made to accommodate the connection with SR 58.

The project is located at the southern end of the San Joaquin Valley in the City of Bakersfield in Kern County, California. The study site is bound on the east by Cottonwood Road, on the west by I-5, on the north by Gilmore Avenue and on the south by Wilson Road. Caltrans is the lead agency for the project pursuant to the CEQA and NEPA.

The proposed continuous route, known as the Centennial Corridor, has been divided into three segments, as shown in Figure 1-1.

Segment 1 is the easternmost segment, which would connect the existing State Route 58 (East) freeway to the Westside Parkway. Multiple alignment alternatives are being evaluated for this segment and are discussed below.

Segment 2 is composed of the Westside Parkway, which extends westerly from Truxtun Avenue to Heath Road. This roadway is a local facility that is currently under construction and would be transferred into the State Highway System. The analysis evaluates potential impacts associated with incorporating the Westside Parkway as part of the State Highway System, as well as improvements to the Westside Parkway from Truxtun Avenue to the Calloway Drive interchange

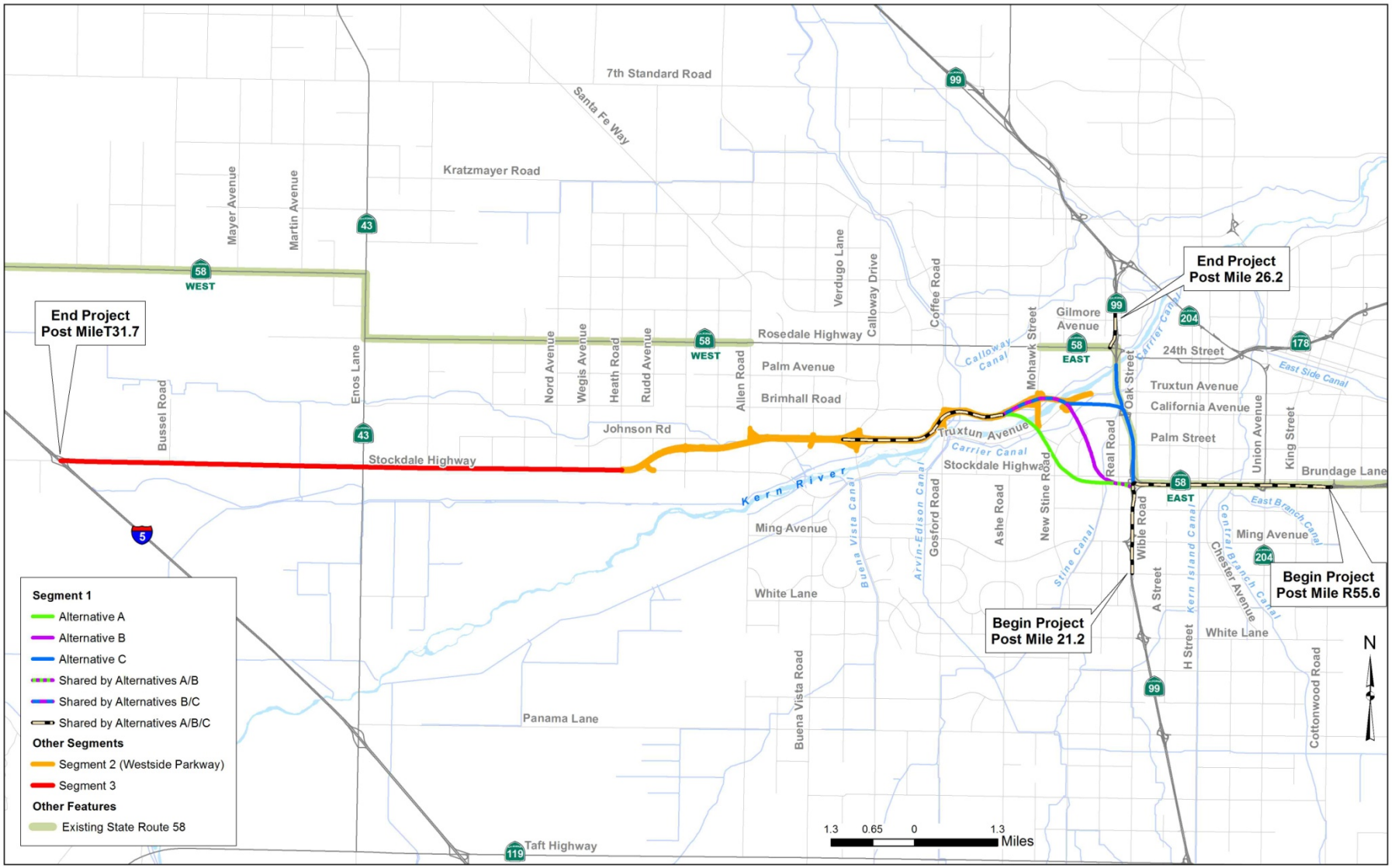


Figure 1-1 Project Location Map – Segments of the Centennial Corridor

which would be made to facilitate traffic operations between the Westside Parkway and the Centennial Corridor. Because of the connection with Segment 1 of the Centennial Corridor project, would substantially increase traffic on the Westside Parkway (Segment 2), the project-level analyses addressed in this *Air Quality Study Report* extends west of Segment 1 into the Westside Parkway using the projected traffic volume prepared for the Centennial Corridor project.

Segment 3 would extend from Heath Road to I-5. This segment will need route adoptions for the use of Stockdale Highway between Heath Road and I-5 as an interim connection for State Route 58. A future new alignment (ultimate) as identified in the 2002 *Route 58 Route Adoption Project Tier I Environmental Impact Statement/Environmental Impact Report* (EIS/EIR) will be constructed when there is greater traffic demand and funding is available. Since traffic would use Stockdale Highway between Heath Road and I-5 on an interim basis, the potential impacts will also be evaluated for the interim use of Stockdale Highway. Improvements to the Stockdale Highway/State Route 43 (known locally as Enos Lane) intersection would be made to accommodate the additional traffic.

1.2.2 Purpose and Need

The purpose of the Centennial Corridor project is to provide route continuity and the associated traffic congestion relief along SR 58 within Metropolitan Bakersfield and Kern County from the SR 58 east (at Cottonwood Road) to I-5.

SR 58 is a critical link in the state transportation network that is used by interstate travelers, commuters, and a large number of trucks. Under existing conditions, SR 58 does not meet the capacity needs of the area, and this is expected to get worse as the population grows. SR 58 lacks continuity in central Bakersfield, which results in severe traffic congestion and reduced levels of service on adjoining highways and local streets. This route is offset by about 1 mile at SR 43 and by about 2 miles at SR 99. The merging of two major state routes (58 and 99) into one alignment between the eastern and western legs of SR 58 degrades the traffic level of service on this segment of freeway. In addition, SR 99's close spacing for its two interchanges with SR 58 (East and West), in addition to an interchange at California Avenue, results in vehicles aggressively changing lanes, which adds to the congestion.

1.2.3 Project Alternatives

The project alternatives for Segment 1 include three build alternatives and a No-Build Alternative.

No-Build Alternative

No construction of Segment 1 would occur under the No-Build Alternative. In addition no improvements to the Westside Parkway from Truxtun Avenue to the Calloway Drive interchange would be required. There would also be no improvements made to the Stockdale Highway/SR 43 intersection. The No-Build Alternative would involve the following actions: (1) the Westside Parkway would be route adopted into the State Highway System; (2) the portion of Mohawk Street from the Westside Parkway to Rosedale Highway would be designated as part of SR 58, which would provide a connection to SR 99; (3) Stockdale Highway between Heath Road and Interstate 5 would serve as an interim alignment for SR 58 until ultimate improvements are constructed; and (4) the portion of SR 58 (West) from Allen Road to Interstate 5 would be relinquished) to the local jurisdictions as a local facility.

Build Alternatives

As shown in Figure 1-2, the three build alternatives (Alternatives A, B, and C) within Segment 1 propose new alignments that would extend from Cottonwood Road on the existing SR 58 (East) and connect I-5 via the Westside Parkway. Alternatives A and B would be west of SR 99, and Alternative C would parallel SR 99 to the west. Under Alternative A, the eastern end of the Westside Parkway mainline would be realigned to conform to the Alternative A alignment, and ramp connections would be provided to the Mohawk Street interchange. Under Alternatives B and C, the alignments would connect to the Westside Parkway by extending the mainline lanes built as part of the Westside Parkway project. Detailed descriptions of the alternatives are provided on the following pages.

Common Design Features of the Build Alternatives

The build alternatives would connect SR 58 (East) to the east end of the Westside Parkway by means of a six-lane freeway. All the build alternatives would involve a route adoption to include the selected Segment 1 alignment and the Westside Parkway into the State Highway System as SR 58. In Segment 3 the route adoption would include the adoption of Stockdale Highway as the interim SR 58 connection to Interstate 5, as well as the designation of the ultimate alignment (the Cross Valley Canal alignment addressed in the 2001 EIS/EIR), which would be constructed at a later date. Though the alignment and design characteristics vary by alternative, the three build alternatives have the following common design features:

Segment 1

All the alternatives would provide the following connections between SR 58 and SR 99 using high speed connection ramps:

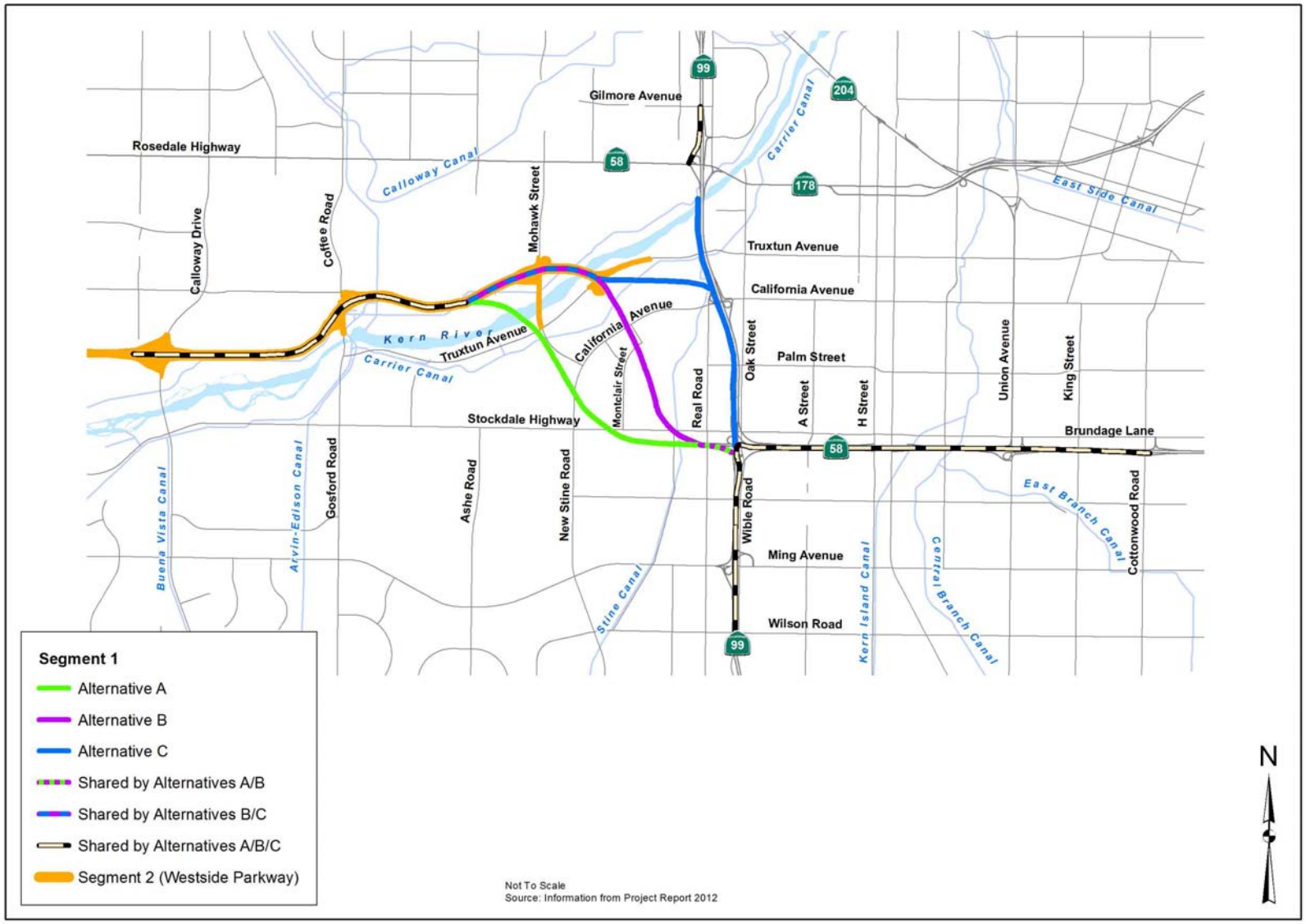


Figure 1-2 Alternatives for Segment 1 of Centennial Corridor

- Northbound SR-99 to westbound Centennial Corridor
- Northbound SR-99 to eastbound SR-58 (East)
- Southbound SR-99 to eastbound SR-58 (East)
- Eastbound Centennial Corridor to southbound SR-99
- Westbound SR-58 (East) to southbound and northbound SR-99.

Direct connector ramps from southbound SR 99 to westbound SR 58 are not being provided as part of this project. However, to accommodate this movement, the southbound SR 99/Rosedale Highway off-ramp would have two lanes off the freeway and be widened to four lanes at the intersection with Rosedale Highway. Additionally, an auxiliary lane would be provided on SR 99 from south of Gilmore Avenue to the SR 58 (Rosedale Highway) off-ramp. Direct connector ramps from eastbound SR 58 to northbound SR 99 are not being provided as part of this project.

The project would require the widening of the South P Street Undercrossing and the westbound SR 58 Grade Separation over SR 99. In addition, the Stockdale Highway off-ramp from southbound SR 99 and the Wible Road on- and off-ramps on SR 99, located just south of the existing SR 58/SR 99 interchange, would be removed.

Segment 2

The Westside Parkway would be incorporated into the State Highway System with each of the Build Alternatives. Improvements to connect Centennial Corridor to the Westside Parkway would extend from where each build alternative connects at the eastern end of the Westside Parkway towards the west, ending at the Calloway Drive interchange. The proposed improvements would widen the Westside Parkway by constructing one additional lane in the median to provide auxiliary lanes. In the westbound direction, the median widening would extend from east of the Friant-Kern Canal through the Calloway Drive interchange. The limits of the added lane in the eastbound direction would differ between each alternative, as described in Unique Design Features of the Build Alternative section below. With each build alternative, modifications to the westbound diamond off-ramp to Calloway Drive and the eastbound loop on-ramp from Coffee Drive would be required.

Though the improvements described above are physically located in Segment 2, construction would be undertaken as part of Segment 1 construction to facilitate traffic operations between the Westside Parkway and the Centennial Corridor.

Segment 3

With each build alternative, the Stockdale Highway/State Route 43 intersection would be widened and traffic signals would be added to control the traffic movements. SR 43 would be widened to add a dedicated left-turn lane in both directions. Stockdale Highway would be widened to add a dedicated left-turn lane and a shared through/right-turn lane in both directions.

Though physically located in Segment 3, these improvements would be built as part of Segment 1 to ensure adequate traffic operations at this intersection.

Unique Design Features of the Build Alternatives

Alternative A

Alternative A would travel westerly from the existing SR-58/SR-99 interchange for about 1 mile, south of Stockdale Highway, where it would turn northwesterly and go over Stockdale Highway/ Montclair Street, California Avenue/Lennox Avenue, Truxtun Avenue, and the Kern River before joining the eastern end of the Westside Parkway near the Mohawk Street interchange.

A link would be provided from northbound SR 99 to westbound SR 58 and from eastbound SR 58 to southbound SR 99 via high-speed connectors. No direct connector ramps would be built from southbound SR 99 to westbound SR 58 or from eastbound SR 58 to northbound SR 99. Southbound SR 99 would be widened to accommodate the additional traffic from eastbound SR 58 to the southbound SR 99 connector. The existing westbound SR 58 to southbound SR 99 loop-ramp connector would be realigned and would connect to the proposed eastbound SR 58 to southbound SR 99 connector before merging onto southbound SR 99. The existing southbound SR 99 to eastbound SR 58 connector and northbound SR 99 to eastbound SR 58 would be preserved with some changes.

The limits of widening on SR 99 would extend to the Wilson Road overcrossing. On northbound SR 99, a three-lane exit would be provided just north of Wilson Road to carry the northbound SR 99 to westbound SR 58 traffic on two lanes and the Ming Avenue on- and off-ramp traffic on the third lane. All ramps in this area would have to be realigned to provide for the additional lanes. The Wible Road on- and off-ramps just south of the existing SR 58/SR 99 interchange, which is in conflict with the Caltrans standards of interchange spacing, would have to be removed to accommodate this design. The Stockdale Highway off-ramp on the southbound SR 99 to eastbound SR 58 connector would be removed as well. Under this concept, SR 58 would also lose its link with Real Road. Also, Alternative A would provide an auxiliary lane on southbound SR 99 from south of Gilmore Avenue to the Rosedale Highway off-ramp.

The median widening to provide an auxiliary lane along the Westside Parkway would extend westerly from the connection point with Centennial Corridor between Coffee Road and Mohawk Street to the Coffee Road off-ramp.

Other features with this alternative include 1) the construction of 19 soundwalls; 2) the construction of a park and ride facility off Mohawk Street, between California Avenue and Truxtun Avenue, to replace the facility that would be displaced by the project; 3) 7 infiltration basins, which would be placed throughout the study area to retain stormwater runoff for water

quality improvement purposes; and 4) 48 retaining walls of varying sizes located throughout the study area.

Alternative B

Alternative B would run westerly from the existing SR-58/SR-99 interchange for about 1,000 feet, south of Stockdale Highway, where it would turn northwesterly and span Stockdale Highway/Stine Road, California Avenue, Commerce Drive, Truxtun Avenue, and the Kern River before joining the east end of the Westside Parkway between the Mohawk Street and Coffee Road interchanges. This alignment would depress SR-58 between California Avenue and Ford Avenue. Overcrossings are proposed at Marella Way and La Mirada Drive to ease traffic circulation.

Alternative B proposes the same connections to SR 99 that Alternative A does and would require similar improvements on SR 99 and existing SR 58.

The median widening to provide an auxiliary lane along the Westside Parkway would extend westerly from the connection point with Centennial Corridor between Coffee Road and Mohawk Street to the Coffee Road off-ramp. Modifications would be required to the eastbound Mohawk Street off-ramp, westbound Truxtun Avenue on-ramp, and reconstruction of the eastbound Mohawk Street loop on-ramp. In addition, construction of the proposed westbound Mohawk Street off-ramp and realignment of the Cross Valley Canal maintenance access road from Mohawk Street would be required.

Other features with this alternative include 1) the construction of 24 soundwalls; 2) the construction of a park and ride facility north of California Avenue, next to the Centennial Corridor, to replace the facility that would be displaced by the project; 3) 8 infiltration basins that would be placed throughout the study area to retain stormwater runoff for water quality improvement purposes; and 4) 42 retaining walls of varying sizes located throughout the study area.

Alternative C

Near the existing SR 58/SR 99 interchange, Alternative C would turn north and run parallel to the west of SR 99 for about 1 mile. The freeway would turn west and span the BNSF Railway rail yard, Truxtun Avenue, and the Kern River. This alternative proposes undercrossings at Brundage Lane, Oak Street, SR 99, Palm Avenue, and California Avenue.

Connections would be provided from eastbound SR 58 to southbound SR 99 and from northbound SR 99 to westbound SR 58. The existing westbound SR 58 to southbound SR 99 loop-ramp connector would connect to the proposed eastbound SR 58 to southbound SR 99 connector before merging onto southbound SR 99. The southbound SR 99 Ming Avenue

off-ramp would be relocated north of the eastbound SR 58 to southbound SR 99 connector to facilitate weaving between the Ming Avenue off-ramp and the eastbound SR 58 to southbound SR 99 connector traffic. A connector would be provided east of northbound SR 99 from Brundage Lane to south of California Avenue to facilitate weaving between westbound SR 58 to northbound SR 99 traffic with northbound SR 99 to westbound SR 58 traffic.

Improvements on SR 99 would extend from the Wilson Road overcrossing (south of the SR 58/SR 99 interchange) to the Gilmore Avenue overcrossing (north of the SR 58/SR 99 interchange). A collector-distributor (C-D) road system would provide access from westbound SR 58 to northbound SR 99, as well as from northbound SR 99 to westbound SR 58. The Wible Road on- and off-ramps just south of the existing SR 58/SR 99 interchange would have to be removed to accommodate the northbound SR 99 auxiliary lane. The Stockdale Highway off-ramp on the southbound SR 99 to eastbound SR 58 connector would be removed as well. Under this concept, southbound SR 99 would also lose its link with Real Road.

The median widening to provide an auxiliary lane along the Westside Parkway would extend westerly from the connection point with Centennial Corridor between Coffee Road and Mohawk Street to the Coffee Road off-ramp. Modifications would be required to the eastbound Mohawk Street off-ramp, westbound Truxtun Avenue on-ramp, and reconstruction of the eastbound Mohawk Street loop on-ramp. In addition, construction of the proposed westbound Mohawk Street off-ramp and realignment of the Cross Valley Canal maintenance access road from Mohawk Street would be required.

Other features with this alternative include (1) the construction of 17 soundwalls; (2) the construction of a park and ride facility at Real Road and Chester Lane to replace the facility that would be displaced by the project; (3) 11 infiltration basins that would be placed throughout the study area to retain stormwater runoff for water quality improvement purposes; and (4) 42 retaining walls of varying sizes located throughout the study area.

1.2.4 Temporary Project Components – Construction

The City of Bakersfield and the County of Kern would acquire the additional right-of-way required for the project. Caltrans would clear the area of all improvements. After site clearing/demolition is initiated, major construction work would begin and include utility relocation, roadway construction, and landscaping/finishing work. A construction schedule of about 30 months is expected to begin in June 2016 and be completed in December 2018. Construction would be divided in phases to avoid traffic congestion within the project area and its vicinity. Construction phases are briefly described below. Table 1-1 shows the proposed construction schedule.

Table 1-1 Conceptual Construction Schedule

Step	Activity	Months																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Mobilization & Staging																														
2	Site Clearing and Demolition																														
3	Utility Relocation																														
4	Roadway Construction (including structures)																														
5	Landscaping and Finish Work																														

Source: *Project Report* 2012.

Step 1: Mobilization and Staging

The first step in the construction process involves contractor preparation for construction activities. Mobilization includes activities such as installation of a temporary field office, power and water supply; obtaining required permits; posting the required notices; and moving equipment to the construction staging areas.

Step 2: Site Clearing and Demolition

Site clearing and demolition would begin once the right-of-way acquisition process is complete. The corridor would be cleared of conflicting structures and improvements in preparation for the project construction. Asphalt and concrete from roadways, parking lots, and walkways would be removed and disposed. The project construction site would be cleared of all vegetation. During this step, dust-control methods would be used where soil disturbance and demolition-related activities could substantively increase dust (airborne particulate) levels.

Freeway ramps in the vicinity of the SR 99/SR 58 interchange, and local streets would be closed during construction. Hazardous materials would be removed in advance of either relocation or demolition of any of the residential, commercial, or other affected building structures. The duration of steps 1 and 2 would be approximately 6 months.

Step 3: Utility Relocation

Electrical transmission towers, oil wells, canal culverts, and other existing utilities that would interfere with construction of the corridor improvements would be removed and relocated or encased for continuing service. In addition, utilities crossing the alignment may need to be removed and relocated to either temporary (requiring final relocation later in the construction process) or permanent locations. It is noted that all utility relocations/handling may not occur at the beginning of the project, but they must be completed before the appropriate construction stage. The estimated duration for this activity is about 15 months.

Step 4: Roadway Construction

Roadway construction would occur during a two-year period. Roadway construction involves activities such as excavation and grading; construction of structures such as bridges, overcrossings, undercrossings, soundwalls, retaining walls, and storm water drainage system; paving and asphalt, and traffic signal installation activities.

Step 5: Landscaping and Finish Work

This phase would include landscaping, striping and signage and finish work, which would take about 6 months.

Chapter 2 Regulatory Framework

2.1 Federal, State, and Local Regulations

The primary legislation that governs federal air quality regulations is the Clean Air Act Amendments of 1990 (CAAA-1990). The act delegates primary responsibility for clean air to the U.S. Environmental Protection Agency (EPA). The EPA develops rules and regulations to preserve and improve air quality and delegates specific responsibilities to state and local agencies. Under the act, the EPA has established the National Ambient Air Quality Standards (NAAQS) for six potential air pollutants: carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), suspended particulate matter (PM_{10} & $PM_{2.5}$), sulfur dioxide (SO_2), and lead (Pb).

The State of California has developed the California Ambient Air Quality Standards (CAAQS). The California Air Resources Board (CARB), which is part of the California EPA regulatory agency, develops air quality regulations at the state level. The state regulations mirror federal regulations by establishing industry-specific pollution controls for criteria, toxic, and nuisance pollutants. California also requires that plans and strategies for attaining state ambient air quality standards as set forth in the California Clean Air Act (CCAA) of 1988 be developed throughout the state. The ARB is also responsible for developing motor emissions standards for California vehicles.

The project is located in Kern County, within the San Joaquin Valley Air Basin (SJVAB or the Basin). The SJVAB includes all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties, and the Valley portion of Kern County. The project area is within the jurisdiction of the San Joaquin Valley Unified Air Pollution Control District (SJVAPCD or District) and the Kern Council of Governments (Kern COG), that administer air quality regulations developed at the federal, state, and local levels. These regulations are described below.

2.2 Air Quality Pollutants and Standards

As stated, the federal and state governments have established ambient air quality standards for six criteria pollutants: carbon monoxide (CO), ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb). See Table 2-1. Ozone and particulate matter are generally seen as regional pollutants because they or their precursors affect air quality across a region. Pollutants such as CO, NO_2, SO_2, and Pb are local pollutants in that they tend to accumulate in the air locally. In addition to being a regional pollutant, particulate matter is also

considered a local pollutant. In the area of the proposed project site, ozone and particulate matters are of particular concern because of their attainment status at the regional level.

A. **Carbon Monoxide (CO)**: Carbon monoxide is a public health concern because it combines readily with hemoglobin in human blood, reducing the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death. State and federal carbon monoxide standards have been set for both 1-hour and 8-hour averaging times. The state 1-hour standard is 20 parts per million (ppm) by volume, and the federal 1-hour standard is 35 ppm. Both the state and federal standard is 9.0 ppm for the 8-hour averaging period. Motor vehicles are the predominant source of carbon monoxide emissions in most areas. High levels develop primarily during winter when periods of light wind combine with ground-level temperature inversions. These conditions result in reduced dispersion of the carbon monoxide in vehicle emissions. In addition, motor vehicles emit more carbon monoxide in cool temperatures than in warm temperatures.

B. **Ozone (O_3):** Ozone is not directly emitted into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include oxides of nitrogen and reactive organic gases, react in the atmosphere in the presence of sunlight to form ozone. State and federal standards for ozone have been set for a 1-hour and an 8-hour averaging time. The state requires that ozone concentration not exceed 0.09 ppm produced in a given area in 1 hour. The federal 1-hour ozone standard is 0.12 ppm, but it does not apply in California. The federal 8-hour ozone standard is 0.075 ppm and the state standard is 0.07 ppm.

C. **Particulate Matter (PM_{10} and $PM_{2.5}$)**: Particulate matter emissions are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic and construction equipment, and secondary aerosols formed by reactions in the atmosphere. The National Ambient Air Quality Standards for particulate matter applies to two classes of particulate: particulate matter 2.5 microns or less in diameter ($PM_{2.5}$) and particulate matter 10 microns or less in diameter (PM_{10}). The state PM_{10} standards are 50 micrograms per cubic meter ($\mu g/m^3$) as a 24-hour average and 20 $\mu g/m^3$ as an annual arithmetic mean. There is no separate federal standard for annual PM_{10}. The federal PM_{10} standards are 150 $\mu g/m^3$ as a 24-hour average. The state standard for $PM_{2.5}$ is 12 $\mu g/m^3$ as an annual arithmetic mean. There is no separate state standard for 24-hour $PM_{2.5}$. The federal standards for $PM_{2.5}$ are 15 $\mu g/m^3$ and 35 $\mu g/m^3$ for annual and 24-hours respectively. Note that on December 14, 2012, U.S. EPA lowered the federal

primary PM2.5 annual standard from 15.0 μg/m^3 to 12.0 μg/m^3. The new annual standard will become effective 60 days after publication in the Federal Register (March 18, 2013).

D. **Nitrogen Dioxide (NO_2):** Nitrogen dioxide belongs to a family of highly reactive gases called nitrogen oxides (NOx). These gases form when fuel is burned at high temperatures, and come principally from motor vehicle exhaust and stationary sources such as electric utilities and industrial boilers. A suffocating, brownish gas, nitrogen dioxide is a strong oxidizing agent that reacts in air to form corrosive nitric acid, as well as toxic organic nitrates. It also plays a major role in the atmospheric reactions that produce ground-level ozone (or smog). The state standard annual arithmetic mean is 0.030 ppm and the state 1-hour standard is 0.18 ppm. The EPA's health-based annual national air quality standard for nitrogen dioxide is 0.053 ppm. A new 1-hour standard of 0.100 ppm went into effect January 22, 2010.

E. **Sulfur Dioxide (SO_2):** Sulfur dioxide belongs to the family of sulfur oxide gases (SOx). These gases are formed when fuel containing sulfur (mainly coal and oil) is burned, and during metal smelting and other industrial processes. The state 24 hour standard is 0.04 ppm and the state one hour standard is 0.025 ppm. The EPA's health-based national air quality standard for sulfur dioxide is 0.030 ppm (measured on an annual average) and 0.14 ppm (measured over 24 hours). The SO_2 standards are in transition, please see footnote 9 for Table 2-1.

F. **Lead (Pb):** Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles and industrial sources. Due to the phase out of leaded gasoline, metal processing is the major source of lead emissions to the air today. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. The state 30 day average is 1.5 μg/m^3. The federal calendar quarter standard is 1.5 μg/m^3 and the federal 3-month rolling average standard is 0.15 μg/m^3.

G. **State-Designated Pollutants, Regulated by the California Air Resources Board**

Visibility Reducing Particles: Any particles in the atmosphere that obstruct the range of visibility. The 8 hour standard extinction coefficient of 0.23 per kilometer visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent.

Sulfates: Pungent solids, formed primarily by the combustion of sulfur-containing fossil fuels especially coal and oil. Considered major air pollutants, sulfates may impact human

health and damage vegetation. The 24-hour standard is 25 $\mu g/m^3$, measured using the ion chromatography method.

Hydrogen Sulfide (H_2S): A colorless, flammable, poisonous compound, having a characteristic rotten-egg odor. It is used in industrial processes and may be emitted into the air. The 1-hour standard is 0.03 ppm (42 $\mu g/m^3$) as determined by ultraviolet fluorescence.

Vinyl Chloride: Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Vinyl chloride is mainly used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents. The 24-hour standard is 0.01 ppm (26 $\mu g/m^3$) as determined by gas chromatography.

H. Other Air Pollutants:

Air Toxics - Mobile Source Air Toxics (MSATs): These toxics are a subset of the 188 air toxics defined in the Clean Air Act. They are now federally regulated under 40 Code of Federal Regulations 1502.22 by the EPA. Mobile source air toxics are 21 compounds emitted from highway vehicles and non-road equipment. The seven main toxics are acrolein, benzene, 1-3 butadiene, diesel particulate matter, formaldehyde, naphthalene and polycyclic organic matter. The Federal Highway Administration issued interim guidance on September 30, 2009, for analysis in NEPA documents. There are no existing ambient air standards for the six main toxics. Currently, available technical tools do not enable us to predict the project-specific health impacts, so generally a qualitative analysis is conducted.

Airborne Asbestos: Asbestos occurs naturally in ultramafic rock (which includes serpentine). When this material is disturbed in connection with construction, grading, quarrying, or surface mining operations, asbestos-containing dust can be generated. Asbestos is a known carcinogen. Exposure to asbestos can result in adverse health effects such as lung cancer, mesothelioma (cancer of the linings of the lungs and abdomen), and asbestosis (scarring of lung tissues that results in constricted breathing).

Table 2-1 Ambient Air Quality Standards

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)[8]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[8]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[9]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[10]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[10]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[10]	—	
Lead[11,12]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[13]	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[11]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page ...

Source: California Air Resources Board (6/4/13)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

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

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

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

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

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

8. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

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

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

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

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

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

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

2.2.1 Attainment Status

The project is located within the SJVAB. The Basin is currently classified as a nonattainment area based on national standards (NAAQS) for 8-hour O_3, and fine particulates ($PM_{2.5}$). Nonattainment designations for the project area are as follows: nonattainment for $PM_{2.5}$, and extreme nonattainment for 8-hour O_3, requiring attainment by 2024 (the former 1-hour O_3 standard was revoked by EPA on June 15, 2005; thus, is no longer in effect for the state of California). For PM_{10}, the SJVAB was classified as "serious nonattainment", with a 2010 attainment date, up to 2006. In October 2006, EPA determined that the SJVAB attained the PM_{10} standards based on air quality data from 2003 to 2005. In August 2007, EPA followed with a proposed affirmation of attainment, based on the evaluation of 2006 monitoring data (72 Federal Register 49046). The redesignation, however, requires further CAA requirements to be met. The San Joaquin Valley Air Pollution Control District (SJVAPCD, or District) prepared the 2007 PM_{10} Maintenance Plan to address these requirements and to request official redesignation to attainment. EPA has proposed to approve the District's 2007 PM_{10} Maintenance Plan and Request for Redesignation in the Federal Register on April 18, 2008. On September 25, 2008, EPA approved the request for Redesignation to attainment/maintenance for the SJVAB.

Based on the state standards (CAAQS), the SJVAB is classified as serious non-attainment for the California 1-hour ozone standard, non-attainment for California standards for 8-hour O_3, PM_{10} and $PM_{2.5}$. The Basin is designated as attainment for all other criteria pollutants. Table 2-2 provides the Basin's attainment status with respect to federal and state standards.

Table 2-2 San Joaquin Valley Air Basin Attainment Status

Pollutant	Federal Standards	California Standards
Ozone (O_3) – 1-hour	— [a]	Severe Nonattainment
Ozone (O_3) – 8-hour	Extreme Nonattainment	Nonattainment
PM_{10}	Attainment/Maintenance	Nonattainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment/Maintenance	Attainment
Nitrogen Dioxide (NO_2)	Attainment /Unclassified	Attainment
Sulfur Dioxide (SO_2)	Attainment	Attainment
Lead (Pb)	Attainment	Attainment

[a] *The National 1-hour Ozone standard was revoked by EPA on June 15, 2005 and thus, is no longer in effect for California.*

[b] *The SJVAB was determined as Attainment for PM_{10} NAAQS by the EPA, on April 18, 2008 and the area designation became effective on November 12, 2008.*

Source: CARB, 2011b; EPA, 2011; SJVAPCD, 2012.

2.3 Air Quality Conformity

The 1990 Federal Clean Air Act Amendments (the amendments), enacted on November 15, 1990, placed strict new requirements on sources and causes of air pollution in areas failing to meet federal air quality standards. The amendments require substantial reduction from all pollution sources, including pollutants from the transportation sector. The amendments included more stringent requirements for demonstrating that transportation plans and projects contributed to improvement in air quality contained in the conformity provisions in section 176(a). On November 15, 1993, the EPA published a conformity rule delineating specific criteria and procedures for fulfilling the conformity requirements of the amendments.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) made a number of revisions to the Clean Air Act's transportation conformity provisions. In particular, SAFETEA-LU made the following changes:

- Changes 18-month trigger to two years for redetermination of conformity after certain air quality planning actions.
- Changes frequency of conformity for plans and transportation improvement programs (TIPs) from every three years to every four years.
- Provides option for metropolitan planning organizations (MPOs) to shorten the time horizon for conformity determination.
- Allows transportation conformity measures (TCMs) to be substituted or to be added to existing TCMs without a state implementation plan (SIP) mechanism.
- Provides a 12-month grace period after an applicable deadline is missed before a lapse occurs.
- Limits conformity SIPs to interagency consultation and enforcement provisions.

On July 6, 2012 SAFETEA-LU was replaced with MAP-21 which did not affect the above conformity requirements mentioned above.

2.4 Transportation Conformity

The Federal Clean Air Act (CAA) requires that all transportation plans and programs pass the air quality conformity test. This process involves forecasting future emissions of air pollution to determine whether the amount of future pollution resulting from the plan or program would be within the allowable limit for motor vehicle emissions.

Transportation conformity must be determined for all nonattainment area pollutants classified as regional pollutants. In the SJVAB, those pollutants are ozone and particulate matter ($PM_{2.5}$ and

PM_{10} are in nonattainment and attainment/maintenance status, respectively). Transportation projects also generate carbon monoxide, which is considered a localized pollutant. Carbon monoxide micro-scale modeling is required to determine whether a transportation project would cause or contribute to localized violations of carbon monoxide NAAQS.

Regional conformity must be determined based on a full study at least every three years. In California, it is determined at least every two years when the state-required regional transportation plan (RTP) updates are done. In addition, a new federal transportation improvement program (FTIP) is required every four years, for which a conformity determination is required. Amendments to both the RTP and FTIP between mandated conformity analyses also must have conformity demonstrated, including a full-scale revision of the regional analysis if regionally significant projects are added, deleted, or significantly modified.

Regional conformity is demonstrated by showing that the project is included in a conforming RTP and FTIP with substantially the same design concept and scope that was used for the regional conformity analysis.

Project level conformity is demonstrated by showing that it will not cause a localized exceedance of carbon monoxide and/or $PM_{2.5}$ and/or PM_{10} standards, and that it will not interfere with "timely implementation" of transportation control measures called out in the SIP.

The EPA's March 10, 2006 transportation conformity final rule has the following key elements:

- This rule requires that $PM_{2.5}$ hot spot analyses be performed only for new transportation projects with significant diesel traffic. Examples of such "projects of air quality concern" (POAQC) include intermodal freight or bus terminals, and major highway projects and congested intersections involving significant diesel traffic. No hot spot analyses will be required for most projects in $PM_{2.5}$ areas, because most projects are not of air quality concern. This final rule also streamlines existing PM_{10} hot spot requirements in a similar way.
- The streamlined approach in this final rule will ensure that transportation and air quality agencies in $PM_{2.5}$ and PM_{10} areas use their resources efficiently, while achieving clean air goals.
- In both $PM_{2.5}$ and PM_{10} areas, a quantitative hot spot analysis is not required until EPA issues a new motor vehicles emissions model capable of estimating local emissions and future hot spot modeling guidance. Qualitative analyses applied for analyses began in the interim. In December 2010, EPA issued a guidance document with a methodology for quantitative PM analysis. The quantitative analysis is required effective December 20, 2012.

- This rule extends an existing flexibility by allowing the U.S. Department of Transportation to make "categorical hot spot findings," which waive $PM_{2.5}$ and PM_{10} hot spot reviews for categories of projects where modeling shows that there is no air quality concern.

2.5 Local Regulations

The CARB coordinates and oversees both state and federal air pollution control programs in California. CARB has divided the state into 15 air basins. Authority for air quality control within each basin has been given to local Air Pollution Control Districts (APCD) or Air Quality Management Districts (AQMD) to regulate stationary source emissions and develop local plans for achieving and maintaining attainment. The project is located within SJVAB. The Basin includes all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties, and the Valley portion of Kern County.

The SJVAPCD is responsible for air quality planning programs and for regulating stationary, area, and indirect emission sources in the SJVAB. The District's mission is to improve the health and quality of life for all Valley residents through efficient, effective and entrepreneurial air quality management strategies. The SJVAPCD administers air quality regulations developed at the federal, state and local levels. The SJVAPCD regulates air quality within the SJVAB by continuously monitoring its progress in implementing attainment plans, establishing regional air quality regulations, permitting stationary sources, periodically reporting to CARB and EPA, and periodically revising its attainment plans to reflect new conditions and requirements in accordance with schedules mandated by the 1990 CAAA amendments and the CCAA. The SJVAPCD has adopted several attainment plans to achieve state and federal air quality standards to comply with the CAAA and the CCAA. Following are descriptions and current statuses of the SJVAPCD's various air quality plans.

Ozone

Federal 1-hour standards

Originally classified as a "serious" nonattainment area, the SJVAB was reclassified as a "severe" nonattainment area after being unable to attain the federal ozone standard by 1999. The Basin was further reclassified from severe to "extreme" nonattainment in October 2004, per SJVAPCD request. The Air District adopted the 2004 Extreme Ozone Attainment Demonstration Plan in November 2004 and its last amendment in August 2008. The amended plan was approved by EPA on March 8, 2010.

Effective June 15, 2005, the EPA revoked the federal 1-hour ozone standard; as such, transportation conformity and de minimis thresholds for the 1-hour standard no longer apply.

However, other requirements are still applicable including anti-backsliding provisions, rate of progress reductions, and the use of reasonably available control technology (RACT).

State 1-hour standard

In accordance with the CCAA requirements, the District prepared the Air Quality Attainment Plan in 1991 which was approved by ARB in 1992. The California Health and Safety Code requires that a report be prepared every three years that summarizes the progress made by the air District in meeting the goals of the Attainment Plan. The latest update is in Chapter 8 of the 2004 Extreme Ozone Attainment Plan. This represents the third Triennial Progress Report and Plan Revision and covers the years 2000-2002. It was submitted in September of 2005. The SJVAPCD has not yet submitted an update to this report.

Federal 8-hour standards

The SJVAB was classified as a "serious" nonattainment area for the federal 8-hour ozone standard on April 14, 2004, and was given an attainment deadline of June 15, 2013. On June 4, 2010, EPA approved the Basin's reclassification to extreme nonattainment. The District has implemented an Ozone Attainment Demonstration Plan since 2004. The currently approved 8-hour ozone plan is the 2007 plan which was adopted by the District Governing Board on April 30, 2007, and was approved by CARB on June 14, 2007. The 2007 Plan reflects that mobile and stationary sources will become subject to new and more stringent regulatory requirements. As this plan is implemented, more areas of the SJVAB would attain the 8-hour O_3 standard. Based on the Plan, the project area in Bakersfield will reach attainment in 2020; however, for western Kern County[2] and the entire Basin, the attainment will be achieved by 2023.

Carbon Monoxide

On April 26, 1996, CARB approved the "Carbon Monoxide Redesignation Request and Maintenance Plan for Ten Federal Planning Areas", which includes the study area, as part of the State Implementation Plan (SIP) for Carbon Monoxide. EPA approved this revision on June 1, 1998 and redesignated the ten areas to attainment. On October 22, 1998, CARB revised the SIP to incorporate the effects of its recent action to remove the wintertime oxygen requirement for gasoline in certain areas. On July 22, 2004, CARB approved an update to the SIP that shows how the ten areas will maintain the standard through 2018, revises emission estimates, and establishes new on-road motor vehicle emission budgets for transportation conformity purposes.

[2] Eastern Kern County which is within the Mojave Desert Air Basin will reach attainment for ozone standards in 2021.

Particulate Matter

PM_{10}. The Basin was originally classified as nonattainment for PM_{10} under the CAAA-1990. It was reclassified as a "serious" nonattainment area when it could not demonstrate attainment by December 31, 1994. An attainment plan was approved by EPA in May of 2004. Amendments to the plan were approved in May of 2005. On September 25, 2008, EPA redesignated the San Joaquin Valley to attainment for the PM_{10} NAAQS and approved the District's 2007 PM_{10} Maintenance Plan.

$PM_{2.5}$. The Basin was classified by EPA as nonattainment, based on the 1997 $PM_{2.5}$ standards. The District prepared the 2008 $PM_{2.5}$ Attainment Demonstration Plan, which was adopted on April 30, 2008. The plan includes the District's strategy for achieving the NAAQS for $PM_{2.5}$. The 2008 Plan is built upon previous clean-air plans with additional stringent measures to reach attainment for the 1997 $PM_{2.5}$ standard while making progress towards more stringent standards established by the EPA and CARB in 2006. EPA revised the 24-hour average $PM_{2.5}$ standard to 35 $\mu g/m^3$ in October 2006. EPA designated the Valley as nonattainment for the 2006 $PM_{2.5}$ standard in 2009, effective December 14, 2009. The District's attainment plan for the 2006 $PM_{2.5}$ standard presented in a public workshop on April 27, 2012. CARB approved the plan on January 24, 2013. According to this plan, the 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ will be achieved by 2019.

Local Rules and Regulations

The air District has a number of rules and regulations that could apply to the proposed project. These are listed below.

- **Regulation VIII** – Fugitive Dust Control. This Regulation consists of District Rules 8011 through 8081. These rules are designed to reduce emissions of particulate matter (mainly PM_{10} as fugitive dust), generated by activities such as demolition and construction, road construction, bulk materials storage, material hauling on paved and unpaved roads, carryout and track-out and landfill operations.

- **Rule 4102 (Nuisance)**. Under this Rule, no air contaminant shall be released into the atmosphere that causes a public nuisance. The rule prohibits discharge of air contaminants that could cause injury, detriment, nuisance, or annoyance to the public. An offensive odor can be considered a nuisance or annoyance.

- **Rule 4601 (Architectural Coating)** limits the amount of volatile organic compounds emissions from paving, asphalt, concrete curing and cement coatings operations.

- **Rule 9510 (Indirect Source Review).** Indirect sources are land uses that attract or generate motor vehicle trips and are sources of many pollutants, principally PM_{10}, ROGs, and NOx. In December 2005, the SJVAPCD adopted Rule 9510 to reduce emissions of NOx and PM_{10} from new development projects. This rule applies to transportation or transit projects with construction exhaust emissions of at least two (2.0) tons of NO_x or two (2.0) tons of PM_{10} per year. These projects are required to reduce their construction exhaust emissions of NO_x and PM_{10}, by 20% and 45%, respectively, compared to the statewide average for construction equipment. If, after implementation of all feasible onsite mitigation measures, the required emission reduction is not achieved, the rule provides a mechanism by which the developer can pay an offsite mitigation fee to the District. Methods of calculating the offsite emission reduction fee are provided in section 7.1.1 of Rule 9510 and in District Rule 3180 (Administrative Fees for ISR). District Rule 3180 establishes a four percent administration fee to cover the District's cost of operating an off-site emission reduction program.

Chapter 3 Affected Environment

3.1 Regional Climate and Topography

The project is located in Bakersfield, in Kern County within the SJVAB. Encompassing 24,840 square miles, the San Joaquin Valley is the second largest air basin in California. Cumulatively, counties within the Air Basin represent approximately 16 percent of the state's geographic area. The Basin is bordered by the Sierra Nevada Mountains on the east, the Pacific Coast Range on the west, the Tehachapi Mountains on the south, and is open to the north extending to the Sacramento Valley Air Basin.

Ambient air quality is affected by the climate, topography, and the type and amount of pollutants emitted. The climate in Bakersfield is typical for the southern Basin area with hot dry summers and cooler winters characterized by dense Tule fog. In the summer, the average high temperatures are about 97° F, and the average low temperatures are about 68° F. The wind in the summer is thermally driven by rising air in the Mojave Desert. Wind flow thus becomes northwesterly and flows through the valley, through the Tehachapi pass into the Mojave Desert.

In the winter the average high temperature is about 59° F, and the average low temperature is about 43° F. During periods of “Tule fog” condition in the winter, temperature will reach a high of about 40° F. In addition to ambient temperatures, the factors affecting ambient air quality impacts include wind direction and speed, as well as atmospheric stability. The meteorological profile of the Basin is dominated by synoptic conditions and by a diurnal, thermally-driven wind circulation pattern. This pattern is affected by mountain ranges and valleys.

Precipitation in the southern Basin is influenced by Pacific storms in the winter months, with little or no precipitation in the summer. About 90 percent of the precipitation in the area occurs between December 1 and April 1.

The Basin area is characterized by persistent temperature inversions, which have a direct effect on the dispersion rates of air pollutants. During the summer months the inversion periods can augment the formation of ozone. In the winter months, steep inversion layers typically set up after the passage of a cold front, forming what is commonly referred to as a Tule fog. These fogs can last for days, and under stagnant conditions can be characterized by a buildup of particulates or carbon monoxide.

3.2 Existing Local Ambient Air Quality

3.2.1 Criteria Pollutants

The CARB and the SJVAPCD maintain a network of air quality monitoring stations located throughout the Basin. The nearest most representative air monitoring station to the project site is the Bakersfield-California Avenue Station, located at 5558 California Avenue, which is west of the project alignments. The monitoring station distance is about 0.2 mile, 0.6 mile and 1.1 mile from the Alternatives A, B, and C alignments, respectively. All criteria pollutants are monitored at this station (i.e., O_3, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$). Table 3-1 presents ambient air quality data, which was recorded at this station, for the past 4 years. Table 3-1 shows the following trend in local ambient criteria pollutant concentrations:

- Ozone – The maximum 1-hour ozone concentration recorded during the 2007 to 2011 period was 0.127 ppm. During this period, the California standard of 0.09 ppm was exceeded between 4 to 16 times annually, with the highest number of exceedances recorded in 2009. The 8-hour O_3 standards, for both national and state standards were exceeded every year and the highest number of exceedances occurred in 2008.
- Respirable Particulate Matter (PM_{10}) – During the recorded period of 2007 to 2011, the maximum 24-hour monitored data were below the NAAQS, with the exception of 2008. In 2008, the highest 24-hour concentration recorded was 196 $\mu g/m^3$. The exceedance was recorded only once; the second high measured concentration in 2008 was 128 $\mu g/m^3$, which is below the standard level.
- Fine Particulate Matter ($PM_{2.5}$) – During the recorded period of 2007 to 2011, the 3-year average of 98th percentile of 24-hour concentrations exceeded the 2006 NAAQS every year. The annual mean $PM_{2.5}$ concentration exceeded the national ambient air quality standard every year except in 2010 and 2011. Although the recorded data do not show a consistent trend, they do indicate an overall declining trend for ambient $PM_{2.5}$ concentrations in the project area.

3.2.2 Toxic Air Contaminants

Toxic air contaminants consist of a variety of compounds including metals, minerals, and hydrocarbon-based chemicals. There are hundreds of different air toxics with varying degrees of toxicity. Main sources of air toxics include industrial processes, such as petroleum refining; commercial operations such as gasoline stations and dry cleaners; and motor vehicles engine exhaust, brake wear and tire wear. The California Toxics Inventory currently provides emissions estimates by stationary (point and aggregated point), area-wide, on-road mobile (gasoline and

Table 3-1 Criteria Air Pollutants Data Summary (California Avenue Monitoring Station)

Pollutant	Averaging Time	Standard	2007	2008	2009	2010	2011
Ozone (O_3)	1-Hour	Maximum Concentration (ppm)	0.117	0.127	0.120	0.109	0.107
		Days > CAAQS (0.09 ppm)	4	15	16	8	5
	8-Hour	4th Maximum Concentration (ppm)[a]	0.085	0.101	0.086	0.093	0.087
		Days > NAAQS (0.075 ppm)	**25**	**40**	**34**	**28**	**25**
		Days > CAAQS (0.07 ppm)	49	60	58	48	51
Particulate Matter (PM_{10})	24-Hour	Maximum Concentration ($\mu g/m^3$)	115	262	95	86	97
		Days > CAAQS (50 $\mu g/m^3$)	130	170	84	47	116
		Days > NAAQS (150 $\mu g/m^3$)	0	**3**	0	0	0
	Annual	State Annual Average (20 $\mu g/m^3$)	49	55	41	33	n/a
Particulate Matter ($PM_{2.5}$)	24-Hour	Maximum Concentration ($\mu g/m^3$)	86	99	196	92	53
		Days > NAAQS (35 $\mu g/m^3$)	n/a	**67**	**46**	**29**	n/a
		National Std. 98th Percentile[b]	73	65	67	53	38
	Annual	National Annual (15.0 $\mu g/m^3$)	**21.9**	**21.9**	**19.0**	14.1	13.1
Carbon Monoxide[c] (CO)	1-Hour	Maximum Concentration (ppm)	2.8	3.5	2.2	2.1	n/a
		Days > CAAQS (20 ppm)	0	0	0	0	0
		Days > NAAQS (35 ppm)	0	0	0	0	0
	8-Hour	Maximum Concentration (ppm)	1.97	2.17	1.51	1.34	n/a
		Days > CAAQS (9.0 ppm)	0	0	0	0	0
Nitrogen Dioxide (NO_2)	1-hour	Maximum Concentration (ppm)	0.072	0.083	0.069	0.079	0.064
		Days > CAAQS (0.18 ppm)	0	0	0	0	0
	Annual	Arithmetic Average (0.053 ppm)	0.017	0.016	0.016	0.014	0.015

AAM – Annual Arithmetic Mean; CAAQS – California ambient air quality standards; $\mu g/m^3$ – micrograms per cubic meter; NAAQS – National ambient air quality standards; ppm – parts per million; n/a – sufficient data not available to determine the value

*The estimated number of measured concentrations above national standards are shown in **bold**.*

Note: Ambient data for SO_2 and airborne lead are not included in this table since the Basin is currently in compliance with state and federal standards for these pollutants.

[a] *The 8-hour ozone standard is attained when the fourth highest concentration in a year, averaged over 3 years, is equal to or less than the new national standard of 0.075 ppm (effective May 27, 2008).*

Values listed in the table represent midnight-to-midnight 24-hour averaged and may be related to an exceptional event.

[b] *Attainment condition for $PM_{2.5}$ is that the 3-year average of the 98th percentile of 24-hour concentrations at each monitor within an area must not exceed the standard (65 $\mu g/m^3$ at the time of monitoring).*

[c] *Carbon monoxide concentrations have not been measured at the California station since 2005; the listed data are from the Golden State Monitoring Station located at 1128 Golden State Highway, about 2.7 miles northeast of Alternative A, 2.2 miles northeast of Alternative B, and 2 miles northeast of Alternative C alignment.*

Source: CARB, 2012 and EPA, 2012.

diesel), off-road mobile (gasoline, diesel, and other), and natural sources. Stationary sources include point sources provided by facility operators and/or districts pursuant to the Air Toxics "Hot Spots" Program (AB 2588), and aggregated point sources estimated by the CARB and/or districts. Area-wide sources are those that do not have specific locations and are spread out over

large areas such as consumer products and unpaved roads. Mobile sources consist of on-road vehicles such as passenger cars and trucks, motorcycles, buses, and heavy-duty trucks. Off-road sources include trains, ships, and boats. Natural sources like wildfires are also included.

Asbestos

Asbestos is classified as a known human carcinogen by state, federal, and international agencies and was identified as a toxic air contaminant (TAC) by the CARB in 1986. Naturally occurring asbestos areas are identified based on the type of rock found in the area. The most common asbestos containing rocks found in California are ultramafic rocks including serpentine rocks, which are found near fault zones (California Division of Mines and Geology, 2003).

Serpentine and ultramafic rocks are known to be present in 44 of California's 58 counties. According to the California Division of Mines and Geology, Kern County is among the counties listed as containing serpentine and ultramafic rocks in a small area, however, the project area is not an area of naturally occurring asbestos (*A general Location Guide for Ultramafic Rocks in California – Areas most likely to Contain Naturally Occurring Asbestos*, Department of Conservation, Division of Mines and Geology, August 2000 [ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf]).

3.3 Sensitive Receptors

Some land uses are considered more sensitive to changes in air quality than others, depending on the demographic characteristics of occupants and users and the activities involved. Sensitive receptors include residential areas, hospitals, elder-care facilities, rehabilitation centers, elementary schools, daycare centers, and parks. Residential areas are considered sensitive to air pollution because residents, including children and the elderly, tend to be at home for extended periods of time, resulting in sustained exposure to pollutants.

Land uses within the project study area include residential, commercial, industrial, and recreational uses. The northwest portion of the study area is mainly industrial and the easternmost portion, north and south of the existing SR 58 East, is mostly residential. The immediately surrounding land uses of the three alternative alignments within Segment 1 and nearest sensitive receptors are described in the paragraphs that follow. Figure 3-1 shows the location of air quality sensitive receptor sites near each of the build alternative alignment; and the representative air quality monitoring station.

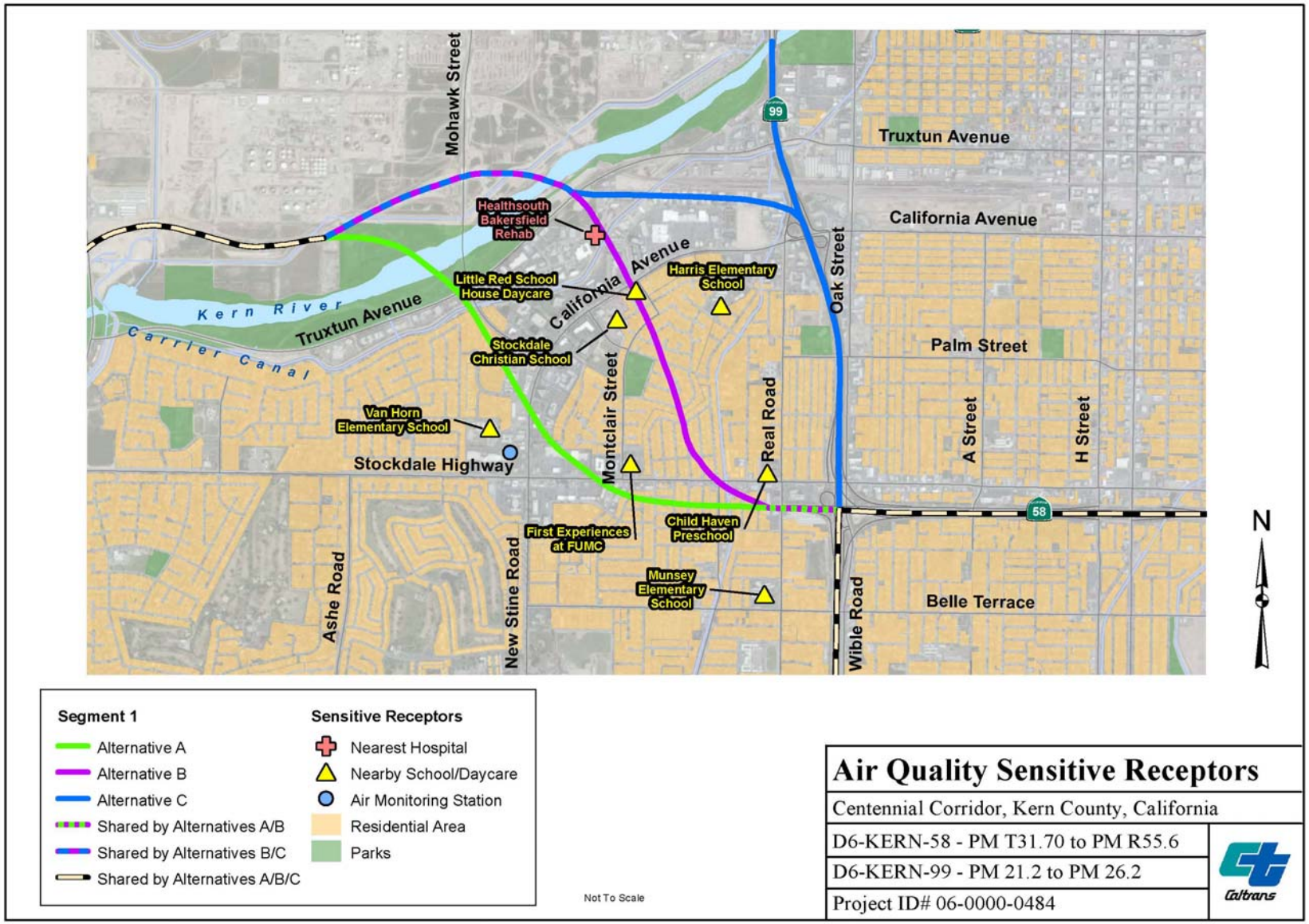


Figure 3-1 Sensitive Receptors and Monitoring Station Locations

Alternative A – Land uses adjacent to this alignment include open space and commercial on the north; residential uses south of the Kern River Canal extending to Lennox Avenue located to the west of the alignment; and commercial uses to the southwest. The southernmost portion of Alternative A, from south of Stockdale Highway to just west of Real Road, is surrounded by residential uses and extends through commercial uses to join SR 58 East. The air quality sensitive receptors located within the vicinity of the Alternative A alignment include the Van Horn Elementary School (5501 Kleinpell Avenue), located approximately 1,000 feet west of the alignment; Healthsouth Bakersfield Rehab (5001 Commerce Drive), located more than 2,000 feet to the northeast; and Quailwood Park, located more than 2,000 feet to the west of the alignment.

Alternative B – Similar to Alternative A, the northern portion of the Alternative B alignment is surrounded by open space and industrial uses to just south of California Avenue. South of California Avenue, land uses adjacent to the Alternative B alignment are residential on both sides. The air quality sensitive receptors located within the vicinity of the Alternative B alignment include the Caroline Harris Elementary School (4110 Gamsey Lane), located approximately 800 feet east of the alignment; the Stockdale Christian Elementary School, located about 1,000 feet west of the alignment; Healthsouth Bakersfield Rehab (5001 Commerce Drive), about 500 feet west of the alignment; and Centennial Park, located less than 100 feet west of the alignment.

Alternative C – The main portion of this alignment runs parallel to and west of SR 99 within the project limits. The immediate land uses surrounding Alternative C are mostly commercial which are not considered as sensitive receptors to air quality. Residential uses are farther to the west of the alignment and to the east of SR 99. The air quality sensitive receptors located within the vicinity of the Alternative C alignment include the Caroline Harris Elementary School, located about 1,900 feet west of the project alignment, and Child Haven Preschool (5 Real Road) located about 1,000 feet west of the project alignment, and Saunders Park, located less than 100 feet west of the alignment.

In addition to the above, the Caring Daycare Center is located about 300 feet from all alternative alignments south of SR 58 east of SR 99, which is an existing freeway (note that this receptor is located beyond the boundary of the map shown in Figure 3-1 to the south).

Chapter 4 Emissions Analyses

This air quality analysis has been developed using methodology and assumptions that are consistent with the requirements of NEPA, CEQA, the Clean Air Act Amendments of 1990 (CAAA-1990), the California Clean Air Act of 1988 (CCAA). The analysis also utilizes guidelines and procedures provided in applicable air quality analysis protocols such as the *Transportation Project-Level Carbon Monoxide Protocol* (Caltrans, 1997); Federal Highway Administration (FHWA) and EPA, *Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (EPA, 2006), and the FHWA *Interim Air Toxics Analysis in NEPA Documents* (FHWA, 2006) and its update *Interim Guidance Update on Air Toxics Analysis in NEPA Documents* (FHWA, 2009).

4.1 Long-Term Operational Emissions

The analysis is carried out for all build alternatives of Segment 1. Regional and project-level conformity for the Westside Parkway (Segment 2), which is under construction, were analyzed in the *Westside Parkway Environmental Assessment/Final Environmental Impact Report.* Regional conformity was demonstrated and no further analysis is required. A conformity finding for the ultimate improvements in Segment 3 will be required at the time the improvements are proposed for construction. The No-Build Alternative would not implement the proposed project improvements; thereby, it would not result in any operational air quality impacts including the beneficial impact of congestion management which would result from the build alternatives. The No-Build Alternative is not consistent with regional goals and policies for improvement of air quality within the Basin and would not be consistent with the projected regional growth and the local government goals and policies for reduction of air quality emissions within its respective jurisdiction.

4.1.1 Criteria Pollutants

Regional Air Quality Conformity

As described in Section 2.4, regional conformity is demonstrated by showing that the project is included in a conforming RTP and FTIP with substantially the same design concept and scope that was used for the regional conformity analysis.

In determining whether a project conforms to an approved air quality plan, agencies must use current emission estimates based on the most recent population, employment, travel, and congestion estimates determined by the Kern Council of Governments (Kern COG). As the Metropolitan Planning Organization for the region (MPO), the Council of Governments is required to develop and maintain long-range plans and programs, such as the 20-year RTP and

4-year (or longer) RTIP that set out transportation policies and programs for the region. A conforming RTIP Regional Emissions model projects that the regulated pollutants will be reduced to acceptable levels within time frames that meet the NAAQS.

The project is fully funded and is in the 2011 Kern County RTP, page 4-25 (Project Identification Number: KER08RTP020) which was found to conform by the Kern COG on July 15, 2010; and FHWA and FTA approved the air quality conformity finding on December 14, 2010. Segments 1 and 2 of the project are included in the Kern COG's 2013 FTIP, which was also federally approved on December 14, 2012 (Identification Number KER050104) on pages 25. The project is funded and listed under the Constrained Program of Projects for Major Highway Improvements. Segments 1 and 2 of the project are also included in the Kern Council of Governments 2013 Federal Transportation Improvement Program, which was determined to conform by the Federal Highway Administration and Federal Transportation Administration on December 14, 2012. The design concept and scope of the proposed project are consistent with the project description in the 2011 Regional Transportation Program, and the 2013 Federal Transportation Improvement Program, and the "open to traffic" assumptions of the Kern Council of Government's regional emissions analysis.

Project Level Conformity

As stated above, the Basin is currently designated as a nonattainment area for federal and state ozone, federal $PM_{2.5}$, and state PM_{10}; and as attainment/maintenance for federal CO and PM_{10} standards; therefore, a project-level transportation conformity determination is required for the proposed project. Project-level transportation conformity was determined by conducting hot-spot analysis for CO, PM_{10}, and $PM_{2.5}$. Because of the connection with Segment 1 of the Centennial Corridor project would substantially increase traffic on the Westside Parkway (Segment 2), the project-level analyses extends west of Segment 1 into the Westside Parkway.

Carbon Monoxide Hot Spot Analysis

Localized CO impacts from the project alternatives were evaluated following the 1997 Caltrans guidance document, *Transportation Project-Level Carbon Monoxide Protocol*. The Protocol has a screening exercise that would determine whether the project requires a qualitative or quantitative analysis, or whether none would be necessary. The screening analysis is provided in Appendix B of this report. Following the screening procedure, a quantitative hot-spot analysis was conducted at 10 intersections (see Figure 4-1), which according to the project traffic study, would have the highest traffic volume and worst peak hour level of service. Table 4-1 shows the comparison of intersections level of service (LOS) and delay for existing (2008), and horizon year (2038), as the worst case for No Build and Build Alternatives A, B and C. The analyzed intersections were also selected based on their proximity to residential sites.

Localized CO concentrations were estimated for the existing conditions (2008), the opening year (2018), and horizon year (2038) for each build alternative and the No-Build Alternative using the CALINE4 dispersion model, developed by Caltrans. The modeling was performed in conjunction with emission factors from the CARB emission factor model EMFAC2007. Background CO concentrations were taken from the nearest monitoring station to the project site, the Bakersfield-California Avenue Monitoring Station, located at 5558 California Avenue, which is west of the proposed new alignments. The monitoring station distance from the proposed alignments of Alternatives A, B and C is, about 0.2 mile, 0.6 mile and 1.1 mile, respectively. Because the Basin is in maintenance for CO standards, using the average ambient concentrations during the past 4 years at this monitoring station is appropriate for background concentrations for future years as well as the existing conditions.

Receptor locations were placed 3 meters from each intersection corner, based on CO Protocol guidelines. The results of the analysis are provided in Tables 4-3 through 4-5 for Alternatives A, B, and C, respectively.

Alternative A. The results of localized CO analysis, shown in Table 4-3 indicate that for all analyzed intersections, future predicted CO concentrations are less than the existing levels. These reductions, even with projected regional growth and increased traffic, are due to compliance with adopted regulations and control measures in the air quality management plans that are aimed at controlling emissions from mobile sources. Control measures include use of alternative or reformulated fuels, retrofit control on engines, and installing or encouraging the use of new engines and cleaner in-use heavy-duty vehicles.

All predicted concentrations are estimated to be less than 50 percent of the applicable standards. The modeled data show very little difference between CO concentrations without and with the project. As Table 4-3 shows, the project would not have a considerable impact upon 1-hour or 8-hour local CO concentrations at the intersections with the highest traffic volumes, subsequently no substantial adverse effect is anticipated to occur at any other locations in the study area. The proposed project would not contribute to a violation of standards and project level CO conformity is satisfied.

Alternatives B and C. The modeled localized CO concentrations for Alternatives B and C are shown in Tables 4-4 and 4-5, respectively. The results are very similar to those for Alternative A, presented in Table 4-3. Therefore, these alternatives would not contribute to a violation of standards and project level CO conformity is satisfied.

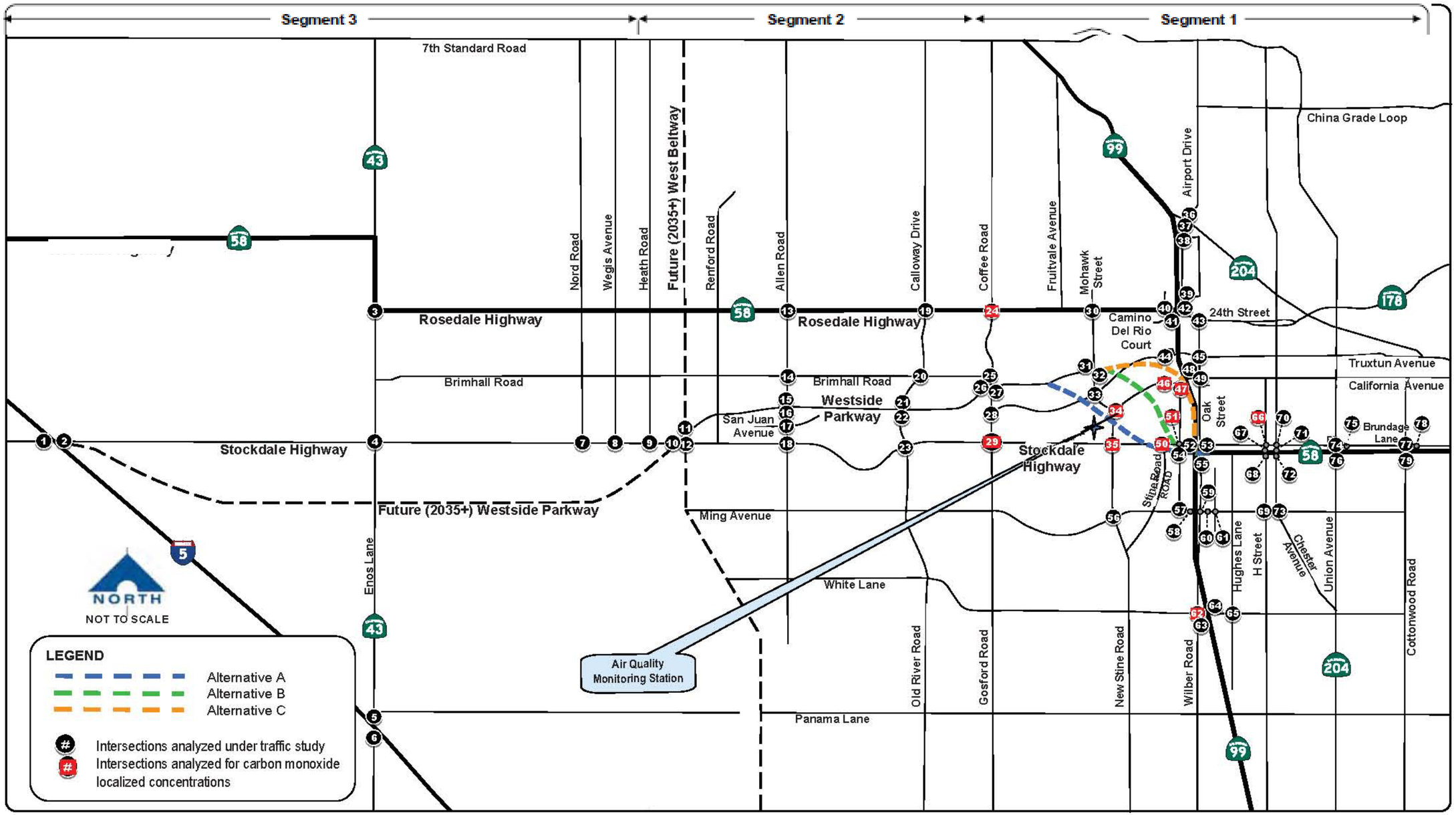


Figure 4-1 Intersections Analyzed for Carbon Monoxide Local Concentrations

Table 4-1
Comparison of Intersections Traffic Conditions
for Existing (2008), and Horizon Year (2038) for No-Build and Build Alternatives

Intersection/ Ramp Junction	Peak Hour	Existing 2008		No Build		Alternative A		Alternative B		Alternative C	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Coffee Road/Rosedale Highway [1]	AM	E	75.7	**F**	**83.1**	E	79.4	E	67.1	E	69.7
	PM	E	65.7	**F**	**98.0**	**F**	**97.1**	**F**	**134.5**	**F**	**110.3**
Coffee Road/Westside Parkway westbound Ramp	AM	-	-	-	-	-	-	-	-	-	-
	PM	-	-	-	-	-	-	-	-	-	-
Coffee Road/ Westside Parkway eastbound Ramps	AM	-	-	C	28.7	B	18.2	B	18.1	B	11.1
	PM	-	-	B	19.0	B	11.0	B	14.3	B	14.1
Coffee Road/Truxtun Avenue [2]	AM	E	67.2	C	20.5	B	12.4	B	13.4	B	12.5
	PM	**F**	**81.2**	C	24.5	B	18.5	B	16.7	B	17.8
Coffee Road/Stockdale Highway	AM	**F**	**112.0**	E	55.6	E	67.1	E	57.1	E	69.9
	PM	**F**	**90.2**	**F**	**99.2**	**F**	**84.0**	**F**	**82.8**	**F**	**86.7**
Mohawk Street/Rosedale Highway (Existing STOP) [1]	AM	**F**	**62.4**	**F**	**103.6**	E	78.8	E	73.1	E	76.8
	PM	**F**	**53.2**	**F**	**123.2**	**F**	**108.2**	**F**	**99.5**	**F**	96.7
Mohawk Street/ Westside Parkway westbound Ramps	AM	-	-	-	-	-	-	B	10.9	B	11.4
	PM	-	-	-	-	-	-	A	8.9	A	8.0
Mohawk Street/ Westside Parkway eastbound Ramps	AM	-	-	C	24.4	B	11.8	B	18.3	B	18.2
	PM	-	-	B	19.5	B	13.8	B	12.3	B	14.4
Mohawk Street/Truxtun Avenue	AM	C	29.0	C	31.1	C	26.4	C	33.6	C	33.5
	PM	D	41.5	E	59.8	C	25.5	C	28.8	C	29.7
Mohawk Street/California Avenue	AM	C	30.5	**F**	**105.5**	D	37.1	D	40.6	D	35.2
	PM	C	34.3	**F**	**175.0**	E	70.3	E	62.4	E	65.6
Stockdale Highway/ California Avenue	AM	E	55.9	**F**	**94.5**	D	43.3	D	46.2	D	44.0
	PM	**F**	**81.9**	**F**	**104.3**	E	62.5	E	60.1	E	60.9
Airport Drive/ SR 204	AM	D	35.9	C	20.2	C	22.2	C	21.9	C	21.5
	PM	D	42.5	C	21.9	C	22.6	C	26.7	C	21.9
Airport Drive/SR 99 NB Ramp	AM	A	8.8	A	7.1	A	9.5	A	9.1	A	8.9
	PM	C	21.9	B	10.6	B	11.6	B	12.0	B	11.0
Buck Owens Boulevard/Rio Mirada Drive	AM	D	43.7	C	29.1	C	21.7	C	30.9	C	32.6
	PM	B	17.8	C	28.6	C	25.0	C	29.4	C	27.5
SR99 northbound Ramps/ Buck-Owens Boulevard	AM	D	38.9	D	37.5	D	41.7	D	45.3	D	42.4
	PM	D	37.5	D	46.2	D	43.4	D	42.3	D	42.6
Rosedale Highway/Camino Del Rio Court [1]	AM	C	28.6	C	20.9	C	30.4	C	33.7	C	32.8
	PM	D	37.0	D	49.9	D	49.4	D	45.3	D	46.4
Rosedale Highway/SR 99 southbound Ramps	AM	D	41.0	C	22.7	C	21.2	C	20.5	C	20.7
	PM	D	44.5	D	37.6	C	21.8	C	20.9	C	22.6
Rosedale Highway/SR99 northbound Ramps [1]	AM	D	50.9	C	26.6	C	33.2	C	24.2	C	26.1
	PM	**F**	**125.6**	C	30.0	D	42.9	D	36.3	D	37.7
24th Street/Oak Street [3]	AM	**F**	**89.4**	D	37.5	C	31.3	C	33.2	C	30.4
	PM	**F**	**100.3**	C	29.5	D	38.4	D	39.0	D	36.9
Truxtun Avenue/Empire Drive [2]	AM	-	-	C	21.6	C	29.4	C	30.0	C	29.7
	PM	-	-	D	47.6	D	42.5	D	52.4	D	47.6
Truxtun Avenue/Oak Street [2]	AM	D	43.3	E	61.9	D	52.0	D	52.7	D	51.8
	PM	E	74.4	E	73.9	D	46.3	D	45.3	D	48.1
California Avenue/Chester Lane	AM	B	17.5	C	23.7	C	20.2	C	28.7	C	21.1
	PM	C	27.8	C	30.1	**F**	**130.7**	**F**	**123.6**	**F**	**121.3**
California Avenue/SR99 southbound Ramps	AM	D	48.8	D	54.6	**E**	**57.8**	**E**	**60.1**	**E**	**58.9**
	PM	D	44.5	E	76.1	**F**	**90.3**	**F**	**83.2**	**F**	**83.2**
California Avenue/SR99 northbound Ramps	AM	E	74.8	C	28.5	C	32.5	C	28.1	C	30.7
	PM	C	25.1	D	51.5	C	25.9	C	21.2	C	24.5

Table 4-1
Comparison of Intersections Traffic Conditions for Existing (2008), and Horizon Year (2038) for No-Build and Build Alternatives

Intersection/ Ramp Junction	Peak Hour	Existing 2008		No Build		Alternative A		Alternative B		Alternative C	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
California Avenue/Oak Street	AM	D	44.1	C	28.3	C	29.7	C	27.5	C	28.2
	PM	E	78.7	E	61.5	E	58.6	E	57.9	E	58.1
Stockdale Highway/Stine Road	AM	-	-	**F**	**90.7**	D	36.1	D	38.7	D	35.9
	PM	-	-	**F**	**>150**	**F**	**90.0**	**F**	**83.8**	**F**	**94.0**
Stockdale Highway/Real Road	AM	**F**	**95.8**	D	48.3	D	36.0	D	42.8	D	45.2
	PM	**F**	**93.2**	**F**	**94.0**	D	53.1	D	50.7	**F**	**91.3**
Stockdale Highway/SR99 southbound Ramp	AM	B	12.2	B	16.8	-	-	-	-	-	-
	PM	B	10.5	B	18.0	-	-	-	-	-	-
Brundage Lane/Oak Street	AM	C	28.9	C	31.9	C	25.9	C	25.3	C	29.9
	PM	D	38.8	D	40.3	C	30.4	C	31.4	C	30.6
Real Road/SR58	AM	C	27.0	C	21.8	-	-	-	-	C	21.1
	PM	C	27.3	D	39.3	-	-	-	-	D	39.9
Wible Road/SR99 northbound Ramps	AM	B	17.9	B	15.5	-	-	-	-	-	-
	PM	C	32.2	C	28.4	-	-	-	-	-	-
Ming Avenue/New Stine	AM	E	56.5	E	57.2	D	42.1	D	48.0	D	44.4
	PM	E	79.6	E	70.3	D	44.4	D	44.6	D	44.0
White Lane/Wible Road	AM	D	54.7	E	70.3	E	72.6	E	71.7	E	69.9
	PM	**F**	83.3	**F**	115.6	**F**	115.8	**F**	118.3	**F**	**114.0**
H Street/Brundage Lane	AM	C	20.7	C	29.2	C	26.2	C	26.9	C	24.9
	PM	D	35.3	E	68.0	D	53.8	D	47.9	C	25.8

LOS – level of service; Delay – intersection vehicle delay in seconds per vehicle; SR – SR
The cells with no data indicate that the intersection/ ramp junction does not exist under the alternative
Decline of level of service to unacceptable LOS of F, compared with the No Build scenario is shown in boldface underlined

1 *In the existing condition, Rosedale Highway is a 4-lane road. Under a separate Rosedale Highway project, this roadway will be widened to 6 lanes in the 2038 no-build and other scenarios.*
2 *In the existing condition, Truxtun Avenue is a 4-lane road. With a separate Truxtun widening project, this roadway will be widened to 6 lanes in the 2038 no-build and other scenarios.*
3 *In the existing condition, 24th Street is a 4-lane road. With a separate 24th Street project, this roadway will be widened to 6 lanes in the 2038 no-build and other scenarios.*
4 *Shaded cells indicate the analyzed intersections in Segment 1.*

Source: Centennial Corridor Traffic Operations Analysis, 2012

Table 4-2 Localized Carbon Monoxide Concentrations – Alternative A

Intersection	Peak Hour	1-hour Concentration (ppm)					8-hour Concentration (ppm)				
			Opening Year 2018		Horizon Year 2038			Opening Year 2018		Horizon Year 2038	
		Base Year 2008	No Build	Build Alternative	No Build	Build Alternative	Base Year 2008	No Build	Build Alternative	No Build	Build Alternative
Coffee Road and Stockdale Highway	AM	8.2	4.5	4.5	4.1	4.1	4.79	2.83	2.83	2.62	2.62
	PM	7.4	4.7	4.8	4.3	4.2	4.44	2.97	3.04	2.76	2.69
Mohawk Street and California Avenue	AM	8.1	6.6	6.4	5.5	5.0	4.65	3.67	3.60	3.18	2.97
	PM	6.4	5.4	5.3	4.7	4.3	4.09	3.46	3.39	3.11	2.90
California Avenue and Stockdale Highway	AM	6.6	4.9	4.7	4.5	4.0	4.02	3.04	2.97	2.83	2.62
	PM	7.9	5.2	5.0	4.5	4.3	4.93	3.25	3.18	2.90	2.76
Chester Lane and California Avenue	AM	5.1	4.2	4.2	3.8	3.8	3.11	2.62	2.69	2.41	2.48
	PM	5.8	4.5	4.5	4.0	4.0	3.46	2.76	2.76	2.48	2.55
SR 99 southbound Ramp and California Avenue	AM	6.1	4.7	4.7	4.1	4.1	3.74	2.83	2.90	2.62	2.62
	PM	7.2	5.0	5.2	4.2	4.4	4.30	3.11	3.18	2.69	2.76
Coffee Road and Rosedale Highway	AM	6.3	4.7	4.7	4.1	4.1	3.88	2.97	2.97	2.62	2.62
	PM	6.6	5.0	5.1	4.2	4.2	4.02	3.18	3.25	2.76	2.69
Stine Road and Stockdale Highway	AM	- [a]	5.0	4.3	4.4	3.8	- [a]	2.97	2.76	2.76	2.48
	PM	- [a]	5.3	4.7	4.6	4.1	- [a]	3.18	2.97	2.90	2.62
Real Road and Stockdale Highway	AM	8.8	5.8	4.5	4.6	3.9	4.30	3.18	2.76	2.76	2.48
	PM	8.9	5.9	4.8	4.7	4.1	4.44	3.25	2.83	2.83	2.55
Wible Road and White Lane	AM	6.3	4.5	4.6	4.0	4.0	3.81	2.83	2.83	2.55	2.55
	PM	6.7	4.8	4.8	4.1	4.1	4.02	2.97	3.04	2.62	2.62
H Street and Brundage Lane	AM	5.1	4.1	4.2	3.8	3.8	3.11	2.62	2.69	2.48	2.48
	PM	5.4	4.3	4.4	3.9	3.9	3.32	2.76	2.76	2.55	2.55
State Standard (parts per million)		20					9.0				
Federal Standard (parts per million)		35					9				

ppm – parts per million; AM – morning peak hour; PM – afternoon peak hour

- *Total CO concentrations include background 1-hour and 8-hour concentrations of 3.3 and 2.2 ppm, respectively, based on the maximum values recorded during the past 4 years at the California Street monitoring station. Model files are included in the Air Quality Study Report.*
- *Emission factors were obtained using EMFAC2007 model and for winter (worst case for CO exhaust emissions).*

[a] *Future intersection, that did not exist in the base year 2008.*

Source: Calculations performed by Parsons, 2012

Table 4-3 Localized Carbon Monoxide Concentrations – Alternative B

Intersection	Peak Hour	1-hour Concentration (ppm)					8-hour Concentration (ppm)				
			Opening Year 2018		Horizon Year 2038			Opening Year 2018		Horizon Year 2038	
		Base Year 2008	No Build	Build Alternative	No Build	Build Alternative	Base Year 2008	No Build	Build Alternative	No Build	Build Alternative
Coffee Road and Stockdale Highway	AM	8.2	4.5	4.6	4.1	4.1	4.79	2.83	2.90	2.62	2.62
	PM	7.4	4.7	4.9	4.3	4.2	4.44	2.97	3.04	2.76	2.69
Mohawk Street and California Avenue	AM	8.1	6.6	6.3	5.5	5.0	4.65	3.67	3.60	3.18	2.97
	PM	6.4	5.4	5.3	4.7	4.3	4.09	3.46	3.39	3.11	2.83
California Avenue and Stockdale highway	AM	6.6	4.9	4.7	4.5	4.0	4.02	3.04	2.97	2.83	2.62
	PM	7.9	5.2	5.0	4.5	4.2	4.93	3.25	3.18	2.90	2.76
Chester Lane and California Avenue	AM	5.1	4.2	4.2	3.8	3.8	3.11	2.62	2.69	2.41	2.48
	PM	5.8	4.5	4.5	4.0	4.0	3.46	2.76	2.76	2.48	2.48
SR 99 southbound Ramp and California Avenue	AM	6.1	4.7	4.6	4.1	4.2	3.74	2.83	2.90	2.62	2.62
	PM	7.2	5.0	5.2	4.2	4.3	4.30	3.11	3.18	2.69	2.76
Coffee Road and Rosedale Highway	AM	6.3	4.7	4.7	4.1	4.1	3.88	2.97	2.97	2.62	2.69
	PM	6.6	5.0	5.1	4.2	4.2	4.02	3.18	3.18	2.76	2.69
Stine Road and Stockdale Highway	AM	- [a]	5.0	4.4	4.4	3.8	- [a]	2.97	2.76	2.76	2.48
	PM	- [a]	5.3	4.7	4.6	4.1	- [a]	3.18	2.90	2.90	2.62
Real Road and Stockdale Highway	AM	8.8	5.8	4.4	4.6	3.9	4.30	3.18	2.69	2.76	2.48
	PM	8.9	5.9	4.8	4.7	4.2	4.44	3.25	2.90	2.83	2.62
Wible Road and White Lane	AM	6.3	4.5	4.5	4.0	4.0	3.81	2.83	2.83	2.55	2.55
	PM	6.7	4.8	4.8	4.1	4.1	4.02	2.97	2.97	2.62	2.62
H Street and Brundage Lane	AM	5.1	4.1	4.2	3.8	3.8	3.11	2.62	2.69	2.48	2.48
	PM	5.4	4.3	4.5	3.9	3.9	3.32	2.76	2.83	2.55	2.55
State Standard (parts per million)		20					9.0				
Federal Standard (parts per million)		35					9				

ppm – parts per million; AM – morning peak hour; PM – afternoon peak hour

- *Total CO concentrations include background 1-hour and 8-hour concentrations of 3.3 and 2.2 ppm, respectively, based on the maximum values recorded during the past 4 years at the California Street monitoring station. Model files are included in the Air Quality Study Report.*
- *Emission factors were obtained using EMFAC2007 model and for winter (worst case for CO exhaust emissions).*

[a] *Future intersection, that did not exist in the base year 2008.*

Source: Calculations performed by Parsons, 2012

Table 4-4 Localized Carbon Monoxide Concentrations – Alternative C

Intersection	Peak Hour	1-hour Concentration (ppm)					8-hour Concentration (ppm)				
			Opening Year 2018		Horizon Year 2038			Opening Year 2018		Horizon Year 2038	
		Base Year 2008	No Build	Build Alternative	No Build	Build Alternative	Base Year 2008	No Build	Build Alternative	No Build	Build Alternative
Coffee Road and Stockdale Highway	AM	8.2	4.5	4.6	4.1	4.1	4.79	2.83	2.90	2.62	2.62
	PM	7.4	4.7	4.7	4.3	4.2	4.44	2.97	2.97	2.76	2.69
Mohawk Street and California Avenue	AM	8.1	6.6	6.4	5.5	5.1	4.65	3.67	3.60	3.18	2.97
	PM	6.4	5.4	5.2	4.7	4.4	4.09	3.46	3.39	3.11	2.83
California Avenue and Stockdale highway	AM	6.6	4.9	4.7	4.5	4.0	4.02	3.04	2.97	2.83	2.55
	PM	7.9	5.2	5.0	4.5	4.2	4.93	3.25	3.18	2.90	2.76
Chester Lane and California Avenue	AM	5.1	4.2	4.2	3.8	3.8	3.11	2.62	2.69	2.41	2.48
	PM	5.8	4.5	4.5	4.0	4.0	3.46	2.76	2.76	2.48	2.48
SR 99 southbound Ramp and California Avenue	AM	6.1	4.7	4.5	4.1	4.0	3.74	2.83	2.90	2.62	2.62
	PM	7.2	5.0	5.1	4.2	4.3	4.30	3.11	3.18	2.69	2.76
Coffee Road and Rosedale Highway	AM	6.3	4.7	4.7	4.1	4.1	3.88	2.97	3.04	2.62	2.62
	PM	6.6	5.0	5.0	4.2	4.3	4.02	3.18	3.18	2.76	2.76
Stine Road and Stockdale Highway	AM	- [a]	5.0	4.4	4.4	3.9	- [a]	2.97	2.69	2.76	2.48
	PM	- [a]	5.3	4.8	4.6	4.1	- [a]	3.18	2.97	2.90	2.62
Real Road and Stockdale Highway	AM	8.8	5.8	5.2	4.6	4.2	4.30	3.18	2.97	2.76	2.62
	PM	8.9	5.9	5.3	4.7	4.4	4.44	3.25	3.11	2.83	2.69
Wible Road and White Lane	AM	6.3	4.5	4.5	4.0	4.0	3.81	2.83	2.83	2.55	2.55
	PM	6.7	4.8	4.7	4.1	4.1	4.02	2.97	2.97	2.62	2.62
H Street and Brundage Lane	AM	5.1	4.1	4.1	3.8	3.7	3.11	2.62	2.62	2.48	2.41
	PM	5.4	4.3	4.2	3.9	3.8	3.32	2.76	2.69	2.55	2.41
State Standard (ppm)		20					9.0				
Federal Standard (ppm)		35					9				

ppm – parts per million; AM – morning peak hour; PM – afternoon peak hour

- *Total CO concentrations include background 1-hour and 8-hour concentrations of 3.3 and 2.2 ppm, respectively, based on the maximum values recorded during the past 4 years at the California Street monitoring station. Model files are included in the Air Quality Study Report.*
- *Emission factors were obtained using EMFAC2007 model and for winter (worst case for CO exhaust emissions).*

[a] *Future intersection, that did not exist in the base year 2008.*

Source: Calculations performed by Parson, 2012

Particulate Matter (PM) Hot Spot Analysis

The EPA's Transportation Conformity Rule (40 CFR Parts 51.390 and Part 93, March 2012) addresses local air quality impacts in particulate matter (PM_{10} and $PM_{2.5}$) federal non-attainment and maintenance areas. The rule provides criteria and procedures to ensure that any such project will not cause or contribute to new violations, increase the frequency or severity of any existing violations, or delay the timely attainment of the relevant NAAQS as described in 40 CFR Part 93.101. In March 2006, the EPA issued a guidance document with a methodology for qualitative particulate matter analysis. The qualitative analysis was required effective March 10, 2006. The qualitative analysis requires analysis based on the EPA's *Transportation Conformity Guidance for Qualitative Hot-spot Analyses in Particulate Matter ($PM_{2.5}$ and PM_{10}) Nonattainment and Maintenance Areas.*

The following subsections describe methodology and results of the PM Hot-Spot Analysis prepared for this project. The detailed analysis is provided in Appendix C of this report.

Methodology

The qualitative particulate matter hot spot analysis was conducted following the joint EPA/ FHWA Transportation Conformity Guidance for Qualitative Hot Spot Analysis in particulate matter (PM_{10} and $PM_{2.5}$) nonattainment and maintenance areas dated March of 2006. As per the guidance, the project was analyzed for total emission burden of direct PM_{10} or $PM_{2.5}$ emissions which can be attributed to the implementation of the project (including re-entrained road dust). Roadway construction emissions were not included since the construction is anticipated to last less than the 5 year requirement (anticipated construction will last 3 years). The analysis encompassed all roadways (including local surface streets) that would be affected by the project. As mentioned previously the project is included in the current approved RTP and FTIP as required for a project-level conformity determination.

The EPA and FHWA established in the Transportation Conformity Guidance for Qualitative Hot-Spot Analyses in PM_{10} and $PM_{2.5}$ Nonattainment and Maintenance Areas (FHWA and EPA 2006) highlighted two of the following methods for completing a PM_{10} or $PM_{2.5}$ hot-spot analysis:

1. Comparison to another location with similar characteristics – (pollutant trend within the air basin)
2. Air quality studies for the proposed project location – (ambient particulate matter trend analysis in the project area)

This project level analysis uses a hybrid approach to demonstrate that the proposed project would not result in a new or worsened PM_{10} or $PM_{2.5}$ violation. Air data gathered from the local air district was used to establish the ambient particulate matter trend in the proposed project area

and will not delay attainment of the NAAQS. Documentation from the San Joaquin Valley Air District SIP was referenced as shown in previous sections of this analysis to establish the regional emissions trends for the project area.

In addition to meeting regional conformity requirements as demonstrated in the Regional Transportation Plan, the project is required to demonstrate that the project will not cause or contribute to any localized violations of particulate matter thresholds, or add to existing violations of the standard, or delay timely attainment of the relevant standard. As such, the project needed to be analyzed at the project level and broken down into more detailed emissions calculations. As the qualitative analysis evolved it became apparent that the example methodologies listed in the EPA guidance would not adequately address the project level impacts with respect to this project. A methodology was derived using a quasi quantitative element that would use the EPA approved EMFAC emissions model to compare the project alternatives to the no-build condition.

The analysis included the proposed Segment 1 alignment and also all major local surface streets that would be affected by the project. The following roadway segments and intersections were included in the analysis:

- State Route 58 – State Route 99 to Cottonwood
- State Route 99 – White Lane to State Route 204
- State Route 204 – State Route 99 to Union Road
- Segment 1 – Alternative A, B, and C
- Rosedale Highway – Allen Road to State Route 99
- Stockdale Highway – Allen Road to Oak Street
- Truxtun Avenue – Coffee Road to Oak Street
- Hageman Avenue – Allen Road to State Route 99
- Union Avenue – State Route 204 to State Route 58
- Ming Avenue – Allen Road to Union
- Real Road – State Route 58 to California
- California Avenue – Stockdale Highway to Oak Avenue
- Brundage Lane – Oak Avenue to Union Avenue
- Mohawk Street – California to Hageman Road
- Westside Parkway – West Beltway to State Route 99
- Allen Road – Ming Avenue to Hageman Road
- Calloway Drive – Ming Avenue to Hageman Road
- Coffee Road – Ming Avenue to Hageman Road
- Wible Road/Oak Street – Ming Avenue to 24th Street

- Off-/On-Ramps: State Route 99 from White Lane Road to State Route 204, State Route 58 from State Route 99 to Cottonwood Road, Westside Parkway from Allen Road to State Route 99
- Intersections: Rosedale Hwy/Calloway Drive, Rosedale Hwy/Coffee Road, Rosedale Hwy/Mohawk Street, Mohawk Street/Truxtun Avenue, Mohawk Street/California Avenue, Stockdale Highway/California Avenue, California Avenue/Chester Lane, California Avenue, SR 99 SB Off-/On Ramps, Stockdale Highway Avenue/Stine Road, Stockdale Highway/Real Road, H Street/SR 58 WB Ramp, and H Street/SR 58 EB Ramp

Each roadway listed above was subdivided into segments that were characterized by volume, speed, length, truck and car proportion. A total of 330 roadway segments were used to calculate emissions. Emissions were calculated for the build and no-build conditions. The emissions of each roadway segments were summed up to provide the total emissions.

The analysis compared future emissions (year 2038) for the horizon or design year of the No-Build Alternative to the three build alternatives. In addition, further analysis compared opening year (2018) emissions for Alternative B (the preferred alternative) to the No-Build Alternative. The emissions were calculated using the latest Environmental Protection Agency's approved emissions model -EMFAC 2011. There is an older version of EMFAC (EMFAC 2007); however, it was decided that to be more accurate with the project emissions the latest and recently updated EMFAC 2011 should be used. Since EMFAC 2011 does not provide emission factors beyond 2035, the 2035 emission factors were used with the 2038 traffic data to develop the 2038 emissions results.

<u>$PM_{2.5}$ and PM_{10} Emissions</u>

Table 4-5 provides the sum total of tailpipe, brake wear, and tire wear of $PM_{2.5}$ and PM_{10} emissions.

Table 4-5 Future PM_{10} and $PM_{2.5}$ Emission Reductions by Project Alternatives

Alternative	Existing (Lb/day)	Year 2018		Year 2038	
		Emissions (Lb/day)	% Emission Reduction when compared to No Build	Emissions (Lb/day)	% Emission Reduction when compared to No Build
Particulate Matter (PM10)					
No-Build	782.4	409.1		534.5	
Alternative A	--	Not calculated		467.1	-12.6%
Alternative B	--	407.6	0.37%	534.3	-0.04%
Alternative C	--	Not calculated		503.0	-5.9%
Fine Particulate Matter (PM2.5)					
No-Build	480.3	196.3		250.4	
Alternative A	--	Not calculated		217.4	-13.2%
Alternative B	--	195.5	0.41%	246.1	-1.7%
Alternative C	--	Not calculated		233.7	-6.7%

Source: Centennial Corridor Project Qualitative PM_{10} and $PM_{2.5}$ Hot-Spot Analysis, 2013

Re-entrained PM_{10} road dust was also considered. It was estimated based on the existing and projected traffic data; and was computed using the emission factor equations provided in the Fifth Edition, Volume I of the EPA's AP-42 document dated November 1, 2006. As shown in Table 4-6, implementation of the proposed project is anticipated to result in reduction of re-entrained PM_{10} road dust for Alternatives A and C, with a slight increase in Alternative B.

Table 4-6 PM10 Re-entrained Road Dust by Project Alternatives (Year 2038)

Alternative	Re-entrained Dust (lb/day)
No-Build	0.57
Alternative A	0.51
Alternative B	0.59
Alternative C	0.55
Source: *Centennial Corridor Project Qualitative PM_{10} and $PM_{2.5}$ Hot-Spot Analysis, 2013*	

Summaries of $PM_{2.5}$ and PM_{10} emissions in Table 4-6 indicate that the implementation of the project would result in reduction of $PM_{2.5}$ and PM_{10} emissions when compared to the No-Build scenario. It should be noted that this reduction in the Build emissions has resulted despite its overall increase in the truck and total volumes along the Centennial Corridor within the project limits. Additionally, traffic data did not include increased idling times on the local streets that would occur without the project being built. Idling times would dramatically raise the particulate matter quantities for the No-Build with most concentrations added along Rosedale and Stockdale Highways.

Conformity Determination

As mentioned earlier, the project is contained in the approved Regional Transportation Plan and included in the regional emissions analysis that was used to meet regional conformity for the Kern County Area. Based upon the above analysis results, this project will not delay timely attainment of the PM_{10} or $PM_{2.5}$ NAAQS for the Kern County area.

As indicated in Tables 4-5 and 4-6, the project would result in lower PM_{10} and $PM_{2.5}$ emissions when compared to the No-Build scenario. This decrease in the particulate matter emissions is the result of increase in vehicle speeds and reduction of congestion anticipated with implementation of the project. As such the project will not cause any new particulate matter violations or worsen existing particulate matter violations in the project area. Activities of this project should, therefore, be considered consistent with the purpose of the State Implementation Plan and it should be determined that this project conforms to the requirements of the Clean Air Act.

4.1.2 Toxic Air Contaminants – Mobile Source Air Toxics

General Background

Controlling air toxics emissions became a national priority with the passage of the CAAA-1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics. These are compounds emitted from roadway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Airborne toxic metals can also result from engine wear or from impurities in oil or gasoline (see document No. EPA420-R-00-023, December 2000). EPA has assessed the expansive list of hazardous air pollutants in their latest rule on the *Control of Hazardous Air Pollutants from Mobile Sources* (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their *Integrated Risk Information System* (IRIS) (www.epa.gov/ncea/iris/index.html). In addition, the Agency identified six compounds with significant contributions from mobile sources (FHWA, 2006) that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). The list of priority mobile source air toxics was revised in the 2009 Update Memorandum (FHWA, 2009) which added one more compound to the previous list. The priority mobile source air toxics are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM, or DPM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules. Of these pollutants, diesel particulate matter, 1,3-butadiene, and benzene account for approximately 89 percent of the total toxic air pollutants for potential excess cancer risk. Diesel particulate matter accounts for 71.2 percent of the total toxic air pollutants for potential excess cancer risk. FHWA released interim guidance on February 3, 2006, determining when and how to address MSAT impacts in the NEPA process for transportation projects. The guidance document was updated on September 30, 2009 (FHWA, 2009). FHWA has identified three levels of analysis:

- No analysis for exempt projects or projects with no potential for meaningful MSAT effects;
- Qualitative analysis for projects with low potential MSAT effects; and
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

For projects warranting MSAT analysis, the seven priority MSATs should be analyzed.

Under Category 1, three types of projects are included: *(a)* projects qualifying as a categorical exclusion under 23 Code of Federal Regulation 771.117(c); *(b)* projects exempt under the CAA

conformity rule under 40 CFR 93.126; and *(c)* other projects with no meaningful impacts on traffic volumes or vehicle mix.

The types of projects included in Category 2 are those that serve to improve operations of highway, transit, or freight movement without adding substantial new capacity or without creating a facility that is likely to meaningfully increase emissions. This category covers a broad range of projects. Any projects not meeting the threshold criteria for higher potential effects set forth in Category 3 below and not meeting the criteria in Category 1 should be included in this category. Examples of these types of projects are minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where design year traffic is not projected to meet the 140,000 to 150,000 annual average daily traffic criterion.

Category 3 includes projects that have the potential for meaningful differences among project alternatives. Only a limited number of projects meet this two-pronged test. To fall into this category, projects must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location; or
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the annual average daily traffic is projected to be in the range of 140,000 to 150,000, or greater, by the design year; and
- Projects proposed to be located in proximity to populated areas or in rural areas, in proximity to concentrations of vulnerable populations (i.e., schools, nursing homes, hospitals).

The project includes a new highway segment to provide a continuous route along an existing highway with a high volume of traffic; in addition, two of the three proposed project alternative alignments are in close proximity to an existing residential area. Based on the Interim Guidance, the project would be considered to have a potential for mobile source air toxics effects.

As discussed above, several studies have concluded that mobile sources (i.e., on-road and non-road combined) are responsible for most of the excess cancer risk associated with exposure to urban air toxics. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. Currently, the tools and techniques for assessing project-specific health impacts from mobile source air toxics are limited. Furthermore, neither EPA nor CARB have established regulatory concentration targets for the six relevant mobile source air toxics appropriate for use in the project development process. For the same reason, states are neither required to achieve an identified level of air toxics in the ambient air nor identify air toxics reduction measures in the State Implementation Plan. Developing strategies for reduction of

MSATs is a cooperative effort between federal and local authorized agencies. The CAA provides EPA with the authority to establish and regulate emission standards for engines and vehicles. The State of California also has certain rights to adopt its own emission regulations, which are often more stringent than the federal rules. To reduce mobile source emissions, mandatory and incentive-based programs are developed in conjunction with new engine emission regulations; additional emission testing requirements (i.e., supplemental emission test [SET], not-to-exceed [NTE] limits); and limiting fuel sulfur content. These programs are implemented by all levels of government: federal, state, and local. Currently, FHWA's interim guidance update is used for analysis of potential impacts of MSATs to be included in environmental documents.

The 2007 EPA rule requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an analysis conducted by FHWA, using EPA's MOBILE6.2 emission factors model, at the national level, even if vehicle activity (VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSATs is projected from 1999 to 2050, as shown in Figure 4-2.

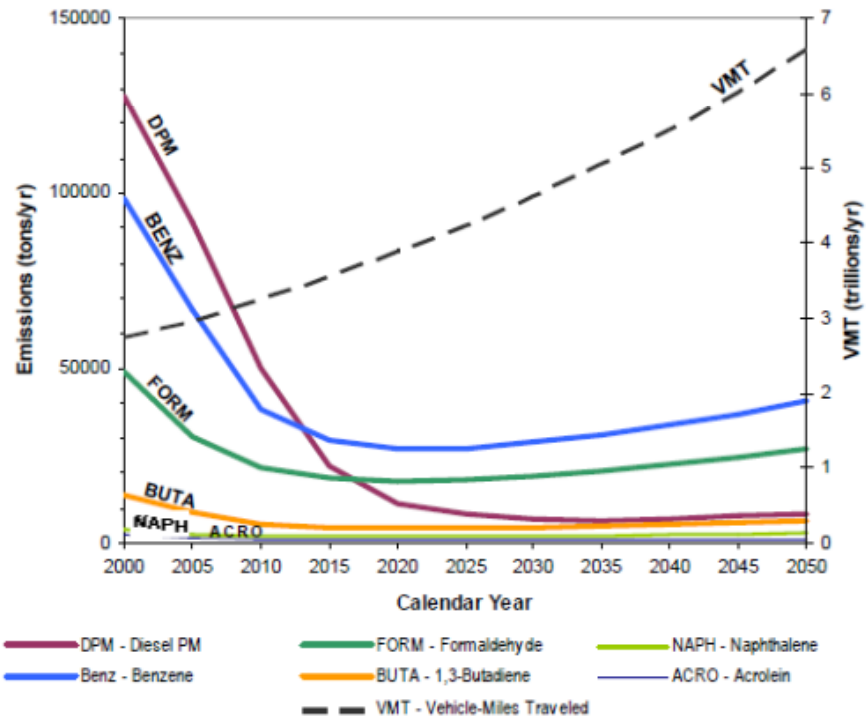


Figure 4-2 National Mobile Source Air Toxic Emissions Trend, 1999 - 2050 for Vehicles Operating on Roadways

Notes: (1) The projected data were estimated using EPA's MOBIL6.2 Model run 20 August 2009.
(2) Annual emissions of polycyclic organic mater are projected to be 561 tons/yr for 1999, decreasing to 373 tons/yr for 2050.
(3) Trends for a specific location may be different, depending on locally derived information representing vehicle-miles traveled, vehicle speeds, vehicle mix, fuels, emission control programs, methodology, and other factors

Source: FHWA, 2009

California's vehicle emission control and fuel standards are more stringent than federal standards and are effective sooner, so the effect of combined state and federal regulations is expected to result in greater reduction of mobile source air toxics sooner than the FHWA analysis predicts.

Based on FHWA's tiered approach in their interim guidance document, the proposed project would be considered to have potential effects from mobile source air toxics emissions. The following analysis provides an assessment of the project's local effects from mobile source air toxics emissions. The analysis was conducted using the projected traffic data, including peak and off-peak roadway traffic volumes and VMT, fleet mix, traffic diversion data, average speed, and associated changes in air toxics emissions from project alternatives.

Unavailable Information for Project Specific Mobile Source Air Toxics Impact Analysis

Available technical tools do not enable us to predict the project-specific health impacts of the emission changes associated with the alternatives in this environmental document. Due to these limitations, the following discussion is included in accordance with Council on Environmental Quality regulations (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from mobile source air toxics on a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the mobile source air toxic health impacts of this project.

Exposure Levels and Health Effects

Shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of mobile source air toxics near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various mobile source air toxics, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the

results of such assessments would not be useful to decision makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of mobile source air toxics is ongoing. For different emission types, there are a variety of studies that show that some are either statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the NATA in 1996 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or State level.

In California, the South Coast Air Quality Management District (SCAQMD) conducted a comprehensive study on air toxics for the South Coast Air Basin (SCAQMD, 2000 and .2008). These studies identified particulate emissions, attributed mostly to diesel engines, as an important cancer risk factor. According to the studies, diesel particulate matter accounted for about 84 percent of the total cancer risk associated with the investigated group of air pollutants. The studies also provided regional trends in estimated outdoor cancer risk from air toxics emissions.

The EPA is in the process of assessing the risks of various kinds of exposures to MSAT emissions. The Agency's IRIS is a database of human health effects that may result from exposure to various substances found in the environment.

Other studies have addressed mobile source air toxics health impacts on humans in proximity to roadways. The Health Effects Institute, which is a nonprofit organization funded by EPA, FHWA, and the automotive industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years.

Analysis of Mobile Source Air Toxics

Mobile source air toxics emissions were estimated along segments of the roadways studied by the Centennial Corridor Traffic Operations Analysis (Parsons, 2012). Emission estimates were performed for opening year 2018 and the horizon year 2038, as well as for the base year 2008. For each future year, a No Build scenario and the proposed Build Alternatives A, B, and C were

analyzed for comparison. The 2008 emissions are included to show the effect of current VMT levels and the degree of control plans on emissions of mobile source air toxics.

The analysis was conducted for seven air toxics that are currently identified as priority MSATs by the EPA. The EMFAC2011 model and the latest version of the Caltrans' CT-EMFAC Model (Version 4.0 - Sonoma Technology, Inc., 2010) were used to estimate project-specific MSAT emissions.

The EMFAC2011 model was used to provide the emissions and emission factors of total organic gases (TOG) and PM_{10} in the San Joaquin Valley portion of Kern County for the considered analysis years. It should be noted that EMFAC2011 model provides emission data for up to the year 2035. The 2035 emission rates were used for the horizon year 2038, assuming that the emission data would be similar to 2035 data (considering that current rules and plans for improving motor vehicles and reducing emissions have implementation targets before 2035).

The data obtained from EMFAC2011 were also processed to calculate PM_{10} and TOG emissions from diesel-powered vehicles. These data were used to estimate the priority MSAT termed as diesel particulate matter (DPM). More detailed methodology and calculation worksheets are provided in Appendix D.

Tables 4-7 and 4-8 present the estimated daily emissions of priority mobile source air toxics from the analyzed roadways for opening year 2018 and horizon year 2038, respectively. Because the health impact of mobile source air toxics on humans in proximity to roadways is still under study, this quantitative analysis is provided for the purpose of comparison of different project alternatives. It should be noted that the results shown in these tables are conservative. Actual emissions would likely be less for most roadways and also the overall project because the number of roadway segments used in the calculations is fewer than that used in the particulate matter hot-spot analysis described above. In addition, the predicted truck volumes and speeds on each roadway used in the model were higher than the traffic model results due to the averaging methodology used.

Table 4-7 Comparison of Mobile Source Toxics Emission of Project Alternatives Opening Year 2018

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
***Rosedale Highway** – between Allen Road and SR 99*							
Base Year (2008)	1,096	227	2,180	48	605	85	15,993
No Build	427	84	1,012	17	160	22	6,167
Alternative A	314	62	734	13	124	17	4,613
Alternative B	307	61	719	13	122	17	4,535
Alternative C	307	61	719	13	122	17	4,531

Table 4-7 Comparison of Mobile Source Toxics Emission of Project Alternatives Opening Year 2018

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
Project increment (change from No Build)							
Alternative A	-113	-22	-278	-4	-36	-5	-1554
Alternative B	-120	-23	-293	-4	-38	-5	-1632
Alternative C	-120	-23	-293	-4	-38	-5	-1636
Project increment (change from 2008)							
Alternative A	-782	-165	-1,446	-35	-481	-68	-11,380
Alternative B	-789	-166	-1,461	-35	-483	-68	-11,458
Alternative C	-789	-166	-1,461	-35	-483	-68	-11,462
Stockdale Highway – *between Allen Road and H Street*							
Base Year (2008)	1,078	221	2,227	47	636	88	16,830
No Build	264	56	464	12	69	9	2,190
Alternative A	199	42	352	9	53	7	1,704
Alternative B	191	40	337	9	51	7	1,632
Alternative C	181	38	321	8	48	6	1,553
Project increment (change from No Build)							
Alternative A	-65	-14	-112	-3	-16	-2	-486
Alternative B	-73	-16	-127	-3	-18	-2	-558
Alternative C	-83	-18	-143	-4	-21	-3	-637
Project increment (change from 2008)							
Alternative A	-879	-179	-1,875	-38	-583	-81	-15,126
Alternative B	-887	-181	-1,890	-38	-585	-81	-15,198
Alternative C	-897	-183	-1,906	-39	-588	-82	-15,277
California Avenue – *between Stockdale Highway and SR 99*							
Base Year (2008)	234	48	489	10	143	20	3,785
No Build	83	17	144	4	21	3	661
Alternative A	78	16	137	4	21	3	658
Alternative B	73	15	128	3	19	3	615
Alternative C	72	15	126	3	19	3	605
Project increment (change from No Build)							
Alternative A	-5	-1	-7	0	0	0	-3
Alternative B	-10	-2	-16	-1	-2	0	-46
Alternative C	-11	-2	-18	-1	-2	0	-56
Project increment (change from 2008)							
Alternative A	-156	-32	-352	-6	-122	-17	-3,127
Alternative B	-161	-33	-361	-7	-124	-17	-3,170
Alternative C	-162	-33	-363	-7	-124	-17	-3,180
Westside Parkway – *between Allen Road and SR 99*							
Base Year (2008)	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]	--[b]
No Build	538	112	1,042	24	148	20	3,147
Alternative A	963	201	1,874	43	266	37	5,688
Alternative B	1,106	230	2,170	49	324	45	7,073

Table 4-7 Comparison of Mobile Source Toxics Emission of Project Alternatives Opening Year 2018

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
Alternative C	1,087	226	2,139	48	322	45	7,062
Project increment (change from No Build)							
Alternative A	**425**	**89**	**832**	**19**	**118**	**17**	**2,541**
Alternative B	**568**	**118**	**1,128**	**25**	**176**	**25**	**3,926**
Alternative C	**549**	**114**	**1,097**	**24**	**174**	**25**	**3,915**
Project increment (change from 2008)							
Alternative A	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
Alternative B	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
Alternative C	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
SR 58 East – *between SR 99 and Cottonwood Road*							
Base Year (2008)	1,174	259	1,693	57	343	46	6,488
No Build	576	119	1,165	25	210	29	4,522
Alternative A	605	126	1,183	27	186	25	3,719
Alternative B	606	126	1,182	27	185	25	3,689
Alternative C	611	127	1,217	27	210	29	4,418
Project increment (change from No Build)							
Alternative A	**29**	**7**	**18**	**2**	-24	-4	-803
Alternative B	**30**	**7**	**17**	**2**	-25	-4	-833
Alternative C	**35**	**8**	**52**	**2**	0	0	-104
Project increment (change from 2008)							
Alternative A	-569	-133	-510	-30	-157	-21	-2,769
Alternative B	-568	-133	-511	-30	-158	-21	-2,799
Alternative C	-563	-132	-476	-30	-133	-17	-2,070
SR 99 – *between Airport Drive and White Lane*							
Base Year (2008)	4,048	895	5,748	197	1,014	141	20,814
No Build	1,601	323	3,632	67	581	82	14,609
Alternative A	1,502	303	3383	63	573	81	14,143
Alternative B	1,485	300	3346	62	572	81	14,077
Alternative C	1,483	300	3329	62	554	78	13,559
Project increment (change from No Build)							
Alternative A	-99	-20	-249	-4	-8	-1	-466
Alternative B	-116	-23	-286	-5	-9	-1	-532
Alternative C	-118	-23	-303	-5	-27	-4	-1050
Project increment (change from 2008)							
Alternative A	-2,546	-592	-2,365	-134	-441	-60	-6,671
Alternative B	-2,563	-595	-2,402	-135	-442	-60	-6,737
Alternative C	-2,565	-595	-2,419	-135	-460	-63	-7,255
Mohawk Street – *between California Avenue and Rosedale Highway*							
Base Year (2008)	126	26	246	6	76	10	1,867
No Build	71	15	118	3	19	3	552
Alternative A	58	12	95	3	16	2	446
Alternative B	74	16	122	3	20	3	573

Table 4-7 Comparison of Mobile Source Toxics Emission of Project Alternatives Opening Year 2018

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
Alternative C	84	16	210	3	38	5	1,386
Project increment (change from No Build)							
Alternative A	-13	-3	-23	0	-3	-1	-106
Alternative B	**3**	**1**	**4**	0	**1**	0	**21**
Alternative C	**13**	**1**	**92**	0	**19**	**2**	**834**
Project increment (change from 2008)							
Alternative A	-68	-14	-151	-3	-60	-8	-1,421
Alternative B	-52	-10	-124	-3	-56	-7	-1,294
Alternative C	-42	-10	-36	-3	-38	-5	-481
Real Road – *between Stockdale Highway and California Avenue*							
Base Year (2008)	78	16	146	3	28	4	756
No Build	17	4	28	0.8	4	<1	101
Alternative A	24	5	40	1	5	<1	145
Alternative B	23	5	38	1	5	<1	138
Alternative C	23	5	39	1	5	<1	143
Project increment (change from No Build)							
Alternative A	**7**	**1**	**12**	**0.2**	**1**	0	**44**
Alternative B	**6**	**1**	**10**	**0.2**	**1**	0	**37**
Alternative C	**6**	**1**	**11**	**0.2**	**1**	0	**42**
Project increment (change from 2008)							
Alternative A	-54	-11	-106	-2	-23	0	-611
Alternative B	-55	-11	-108	-2	-23	0	-618
Alternative C	-55	-11	-107	-2	-23	0	-613
Total *– All studied roadways*							
Base Year (2008)	7,835	1,692	12,728	368	2,845	395	66,533
No Build	3,577	730	7,606	153	1,211	168	31,948
Alternative A	3,743	768	7,797	162	1,244	173	31,115
Alternative B	3,864	793	8,042	167	1,297	180	32,332
Alternative C	3,848	788	8,098	165	1,319	183	33,257
Project increment (change from No Build)							
Alternative A	**166**	**38**	**191**	**9**	**33**	**5**	-833
Alternative B	**287**	**63**	**436**	**14**	**86**	**12**	**384**
Alternative C	**270**	**58**	**492**	**12**	**108**	**15**	**1309**
Project increment (change from 2008)							
Alternative A	-4,092	-924	-4,931	-206	-1,601	-222	-35,418
Alternative B	-3,971	-899	-4,686	-201	-1,548	-215	-34,201
Alternative C	-3,987	-904	-4,630	-203	-1,526	-212	-33,276

[a] *Diesel Particulate Matter (DPM) includes emissions of PM_{10} and total organic gases (TOG) from diesel-powered vehicles traveling along the roadway.*

[b] *Roadway segment(s) did not exist in 2008.*

Table 4-7 Comparison of Mobile Source Toxics Emission of Project Alternatives Opening Year 2018

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]

[c] *Methodology and calculation worksheets are provided in Appendix D to this report.*

The results of calculation shown in this table are conservative. Actual emissions would likely be less for most roadways and also the overall project because the number of roadway segments used in the calculations is fewer than that used in the particulate matter hot-spot analysis. In addition, the predicted truck volumes and speeds on each roadway used in the model were higher than the traffic model results due to the averaging methodology used..

Source: Calculations performed by Parsons, 2012

Table 4-8 Comparison of Mobile Source Toxics Emission of Project Alternatives Horizon Year 2038

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
Rosedale Highway *– between Allen Road and SR 99*							
Base Year (2008)	1,096	227	2,180	48	605	85	15,993
No Build	368	72	925	15	162	22	6,004
Alternative A	296	58	761	12	139	19	5,155
Alternative B	294	57	759	11	138	19	5,145
Alternative C	295	58	759	12	139	19	5,148
Project increment (change from No Build)							
Alternative A	-72	-14	-164	-3	-23	-3	-849
Alternative B	-74	-15	-166	-4	-24	-3	-859
Alternative C	-73	-14	-166	-3	-23	-3	-856
Project increment (change from 2008)							
Alternative A	-800	-169	-1,419	-36	-466	-66	-10,838
Alternative B	-802	-170	-1,421	-37	-467	-66	-10,848
Alternative C	-801	-169	-1,421	-36	-466	-66	-10,845
Stockdale Highway – *between Allen Road and H Street*							
Base Year (2008)	1,078	221	2,227	47	636	88	16,830
No Build	249	52	460	11	80	11	2,311
Alternative A	169	35	318	8	56	8	1,651
Alternative B	163	34	307	7	54	7	1,596
Alternative C	162	34	304	7	53	7	1,582
Project increment (change from No Build)							
Alternative A	-80	-17	-142	-3	-24	-3	-660
Alternative B	-86	-18	-153	-4	-26	-4	-715
Alternative C	-87	-18	-156	-4	-27	-4	-729
Project increment (change from 2008)							
Alternative A	-909	-186	-1,909	-39	-580	-80	-15,179
Alternative B	-915	-187	-1,920	-40	-582	-81	-15,234
Alternative C	-916	-187	-1,923	-40	-583	-81	-15,248
California Avenue – *between Stockdale Highway and SR 99*							
Base Year (2008)	234	48	489	10	143	20	3,785
No Build	68	14	125	3	22	3	622
Alternative A	59	12	111	3	20	3	577
Alternative B	54	11	102	2	18	2	533
Alternative C	52	11	97	2	17	2	507
Project increment (change from No Build)							
Alternative A	-9	-2	-14	0	-2	0	-45
Alternative B	-14	-3	-23	-1	-4	-1	-89
Alternative C	-16	-3	-28	-1	-5	-1	-115
Project increment (change from 2008)							
Alternative A	-175	-36	-378	-7	-123	-17	-3,208
Alternative B	-180	-37	-387	-8	-125	-18	-3,252
Alternative C	-182	-37	-392	-8	-126	-18	-3,278

Table 4-8 Comparison of Mobile Source Toxics Emission of Project Alternatives Horizon Year 2038

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
***Westside Parkway** – between Allen Road and SR 99*							
Base Year (2008)	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
No Build	616	132	1,078	28	243	34	5,136
Alternative A	1,168	249	2,068	53	470	66	10,502
Alternative B	1,258	268	2,251	57	517	73	11,608
Alternative C	1,243	264	2,247	57	514	72	11,849
Project increment (change from No Build)							
Alternative A	**552**	**117**	**990**	**25**	**227**	**32**	**5366**
Alternative B	**642**	**136**	**1173**	**29**	**274**	**39**	**6472**
Alternative C	**627**	**132**	**1169**	**29**	**271**	**38**	**6713**
Project increment (change from 2008)							
Alternative A	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
Alternative B	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
Alternative C	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]	-- [b]
***SR 58 East** – between SR 99 and Cottonwood Road*							
Base Year (2008)	1,174	259	1,693	57	343	46	6,488
No Build	519	110	958	23	233	32	5,180
Alternative A	564	120	1,023	26	256	35	5,324
Alternative B	578	123	1,027	26	252	35	4,997
Alternative C	611	130	1,101	28	274	38	5,045
Project increment (change from No Build)							
Alternative A	**45**	**10**	**65**	**3**	**23**	**3**	**144**
Alternative B	**59**	**13**	**69**	**3**	**19**	**3**	-183
Alternative C	**92**	**20**	**143**	**5**	**41**	**6**	-135
Project increment (change from 2008)							
Alternative A	-610	-139	-670	-31	-87	-11	-1,164
Alternative B	-596	-136	-666	-31	-91	-11	-1,491
Alternative C	-563	-129	-592	-29	-69	-8	-1,443
***SR 99** – between Airport Drive and White Lane*							
Base Year (2008)	4,048	895	5,748	197	1014	141	20,814
No Build	1,366	281	2,892	59	603	86	15,233
Alternative A	1,262	260	2,656	54	592	84	15,090
Alternative B	1,250	258	2,612	54	589	84	14,845
Alternative C	1,258	266	2,337	57	502	71	12,862
Project increment (change from No Build)							
Alternative A	-104	-21	-236	-5	-11	-2	-143
Alternative B	-116	-23	-280	-5	-14	-2	-388
Alternative C	-108	-15	-555	-2	-101	-15	-2371
Project increment (change 2008)							
Alternative A	-2,786	-635	-3,092	-143	-422	-57	-5,724
Alternative B	-2,798	-637	-3,136	-143	-425	-57	-5,969
Alternative C	-2,790	-629	-3,411	-140	-512	-70	-7,952

Table 4-8 Comparison of Mobile Source Toxics Emission of Project Alternatives Horizon Year 2038

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
***Mohawk Street** – between California Avenue and Rosedale Highway*							
Base Year (2008)	126	26	246	6	76	10	1,867
No Build	75	16	135	3	25	3	691
Alternative A	60	13	107	3	21	3	561
Alternative B	77	16	135	4	25	3	650
Alternative C	77	16	138	3	26	4	714
Project increment (change from No Build)							
Alternative A	-15	-3	-28	0	-4	0	-130
Alternative B	**2**	0	0	1	0	0	-41
Alternative C	**2**	0	**3**	0	**1**	**1**	**23**
Project increment (change from 2008)							
Alternative A	-66	-13	-139	-3	-55	-7	-1,306
Alternative B	-49	-10	-111	-2	-51	-7	-1,217
Alternative C	-49	-10	-108	-3	-50	-6	-1,153
***Real Road** – between Stockdale Highway and California Avenue*							
Base Year (2008)	78	16	146	3	28	4	756
No Build	13	3	22	<1	4	<1	90
Alternative A	18	4	30	<1	5	<1	122
Alternative B	18	4	30	<1	5	<1	123
Alternative C	18	4	31	<1	5	<1	127
Project increment (change from No Build)							
Alternative A	**5**	**1**	**8**	0	**1**	0	**32**
Alternative B	**5**	**1**	**8**	0	**1**	0	**33**
Alternative C	**5**	**1**	**9**	0	**1**	0	**37**
Project increment (change from 2008)							
Alternative A	-60	-12	-116	0	-23	0	-634
Alternative B	-60	-12	-116	0	-23	0	-633
Alternative C	-60	-12	-115	0	-23	0	-629
***Total** – All studied roadways*							
Base Year (2008)	7,835	1,692	12,728	368	2845	395	66,533
No Build	3,274	680	6,596	143	1,371	192	35,266
Alternative A	3,596	751	7,073	159	1,557	218	38,981
Alternative B	3,693	772	7,224	163	1,598	224	39,495
Alternative C	3,716	782	7,013	166	1,531	214	37,833
Project increment (change from No Build)							
Alternative A	**322**	**71**	**477**	**16**	**186**	**26**	**3,715**
Alternative B	**419**	**92**	**628**	**20**	**227**	**32**	**4,229**
Alternative C	**442**	**102**	**417**	**23**	**160**	**22**	**2,567**
Project increment (change from 2008)							
Alternative A	-4,239	-941	-5,655	-209	-1,288	-177	-27,552
Alternative B	-4,142	-920	-5,504	-205	-1,247	-171	-27,038
Alternative C	-4,119	-910	-5,715	-202	-1,314	-181	-28,700

[a] *Diesel Particulate Matter (DPM) includes emissions of PM_{10} and total organic gases (TOG) from diesel-powered vehicles traveling along the roadway.*

[b] *Roadway segment(s) did not exist in 2008.*

[c] *Methodology and calculation worksheets are provided in Appendix D to this report.*

The results of calculation shown in this table are conservative. Actual emissions would likely be less for most roadways and also the

Table 4-8 Comparison of Mobile Source Toxics Emission of Project Alternatives Horizon Year 2038

Roadway Scenario/Alternative	Mobile Source Air Toxic Emissions (grams per day)						
	Benzene	1,3-Butadiene	Formaldehyde	Acrolein	Naphthalene	Polycyclic Organics	Diesel Particulate Matter (DPM)[a]
overall project because the number of roadway segments used in the calculations is fewer than that used in the particulate matter hot-spot analysis. In addition, the predicted truck volumes and speeds on each roadway used in the model were higher than the traffic model results due to the averaging methodology used.							

Source: Calculations performed by Parsons, 2012

Based on the results of the mobile source air toxics emissions within the studied roadway network, a significant decrease in mobile source air toxics emissions can be expected for the project alternatives as compared with the base year (2008) levels through future year levels. This is due to the improved pollution emission performance of a modernizing fleet, including diesel-fueled vehicles, which is a trend that is expected to continue throughout the planning horizon. This finding is consistent with the Federal Highway Administration-projected trend, shown in Figure 4-2.

The mobile source air toxics emissions from each build alternative would be less than the No-Build Alternative along several studied roadways. For most of the study area roadways, the three build alternatives are comparable in level of emissions, while Alternative A exhibits lower mobile source air toxics emissions than Alternatives B and C in the opening year and slightly lower emissions than Alternatives B and C in the horizon year. The mobile source air toxics emissions level of Alternatives B and C are in the same order of magnitude.

As discussed above, the study of mobile source air toxics, dose-response effects, and modeling tools are currently in a state where accurate information is incomplete or unavailable. This is relevant to making a viable prediction of any reasonably foreseeable adverse effects on the human environment. Studies are currently being conducted to clarify some of these unknowns; however, the information is not yet available.

4.1.3 Greenhouse Gases

Greenhouse gas emissions are addressed in Chapter 5 Climate Change.

4.2 Short-Term Construction Emissions

Construction-related emissions impacts would be temporary and short term and would only apply to the build alternatives. The impacts identified would be the same for all three build alternatives. This section addresses air quality impacts associated with project construction activities.

4.2.1 Criteria Pollutants

Construction of the project has the potential to create air quality impacts through the use of heavy-duty construction equipment within the construction site, and through vehicle trips generated from haul trucks and construction workers traveling to and from the project site. In addition, fugitive dust emissions would result from earthwork (e.g., grading, excavation) and on-site construction activities. Off-road (on-site) mobile source emissions, primarily nitrogen oxides and carbon monoxide, would result from the use of construction equipment such as excavators, bulldozers, and loaders. During the finishing phase, paving operations and the application of architectural coatings and other building materials would release reactive organic compounds and off-gassing products (paints and asphalt, for example). Construction emissions can vary substantially from day to day, depending on the level of activity; the specific mix of construction equipment; and, for dust, the prevailing weather conditions.

Methodology and Impact Criteria

Construction-related emissions of criteria pollutants were estimated using the *Road Construction Emission Model, Version 7.1.4* (2013). The model was developed for the Sacramento Metropolitan Air Quality Management District (SMAQMD) and approved by the CARB.

As described in Section 2.5 of this Air Quality Study Report, construction of projects within the San Joaquin Valley Air Basin are subject to the SJVAPCD Rule 9510, "Indirect Source Review". Section 2.2 of the rule states, "This rule shall apply to any transportation or transit project where construction exhaust emissions equal or exceed two (2.0) tons of NO_x or two (2.0) tons of PM_{10} per year, during the period of project construction." For PM_{10}, this rule focuses on emissions from engine exhaust, thereby complementing the fugitive dust emission controls included in Regulation VIII. Furthermore, the District recommends that projects that emit in excess of ten tons per year ROG, an ozone precursor, during construction be considered to have a significant air quality impact.

Compliance with Rule 9510 would result in reductions in emissions of NO_x and PM_{10} from some combination of on-site and off-site sources of these pollutants. Such sources typically also emit ROGs, so reductions in ROG emissions would be a byproduct of compliance with this rule. The effect of the project's construction-related emissions of ROG and NO_x would be evaluated in the context of compliance with this rule.

Construction Emissions

Construction-related emissions were estimated using the *Road Construction Emissions Model, Version 7.1.4* (SMAQMD, 2009). Table 4-9 summarizes the calculated mass daily emissions (in pounds per day) for each phase of construction and the annual emissions (in tons) during each

year of construction for comparison with the SJVAPCD limits on pollutant emission levels from projects construction activities. As shown, construction emissions of ROG and exhaust particulate matter (PM_{10} and $PM_{2.5}$) do not exceed the District's thresholds. The NOx emissions would potentially exceed the 2 tons per year threshold that is established by Rule 9510; therefore, these emissions need to be reduced to 20 percent of the state fleet average, as required by the Rule. The reductions need to be achieved either by on-site mitigation measures or through payment of an off-site mitigation fee as required by Rule 9510. Mitigations are discussed in Chapter 6.

Table 4-9 Estimate of Construction Emissions

Construction Stage (Duration)		Construction Daily Emissions (pounds/day)							
					PM_{10}		$PM_{2.5}$		
		ROG	CO	NO_x	Exhaust	Total	Exhaust	Total	CO_2
Site Clearing/Demolition *(2.5 months)*	Total	5.1	23.8	28.2	1.6	51.6	1.5	11.9	3,719
	Onsite	*4.8*	*21.0*	*27.9*	*1.6*	*51.6*	*1.4*	*11.8*	*3,120*
Grading/Excavation *(12 months)*	Total	15.9	77.1	314.5	9.6	59.6	7.3	17.7	55,395
	Onsite	*11.3*	*53.7*	*100.4*	*5.1*	*55.1*	*4.7*	*15.1*	*10,045*
Utilities/Sub-grade *(10.5 months)*	Total	9.7	49.7	75.0	4.2	54.2	3.8	14.2	9,073
	Onsite	*9.3*	*45.5*	*74.6*	*4.1*	*54.1*	*3.7*	*14.1*	*8,074*
Paving/ Finish Work *(5 months)*	Total	5.1	29.4	31.4	2.0	2.0	1.8	1.8	4,840
	Onsite	*4.8*	*26.1*	*31.0*	*1.9*	*1.9*	*1.8*	*1.8*	*3,991*
Maximum Daily	Total	15.9	77.1	314.5	9.6	59.6	7.3	17.7	55,395
	Onsite	*11.3*	*53.7*	*100.4*	*5.1*	*55.1*	*4.7*	*15.1*	*10,045*
Construction Year		**Construction Annual Emissions (tons/year)**							
Year 1	Total	1.88	8.71	33.64	1.04	7.64	0.80	2.18	5,344.25
	Onsite	1.32	6.19	**11.26**	0.58	7.18	0.53	1.90	1,030.15
Year 2	Total	1.45	7.31	16.49	0.70	7.30	0.60	1.97	2,242.05
	Onsite	1.28	6.23	**10.56**	0.56	7.16	0.52	1.89	1,016.04
Year 3	Total	0.38	2.16	2.55	0.16	0.71	0.14	0.26	332.04
	Onsite	0.36	1.94	**2.53**	0.15	0.70	0.14	0.25	279.71
SJVAPCD Significance Threshold (tons/year)		*10*	*-*	*2.0*	*2.0*	*-*	*-*	*-*	*-*

ROG – Reactive Organic Gases; CO – Carbon Monoxide; NOx – Nitrogen Oxides; PM_{10} – Particulate Matter less than 10 microns in diameter; $PM_{2.5}$ – Particulate Matter less than 2.5 microns in diameter; SJVAPCD – San Joaquin Valley Air Pollution Control District. Emissions were estimated using Road Construction Model, version 7.1.4 (SMAQMD, 2013).

- *Exceedances from threshold are shown in **bold**. Note that thresholds are set for onsite emissions from equipment exhaust gases.*
- *Annual CO_2 data are in metric tons.*
- *A copy of the model sheets is provided in Appendix F*

Source: Calculations performed by Parsons, 2013.

4.2.2 Air Toxics and Asbestos

The potential for air toxics emissions during construction would be related to diesel particulate matter emissions associated with heavy equipment operations. However, the health effects from carcinogenic air toxics at sensitive receptors would be considered less than significant, because

the risk posed by these pollutants is based on long-term (70-year lifetime) exposure. Given the construction schedule of 2.5 years the proposed project would not result in a long-term (that is, 70 years) substantial source of air toxics emissions. As such, potential impacts related to air toxics emissions during construction would not be substantial and no mitigation measures are required.

Asbestos

As described in Section 3.2.2 of this Air Quality Study Report, the project area is not among areas listed as containing naturally occurring asbestos (Governor's Office of Planning and Research 2000). Therefore, construction activities disturbing naturally occurring asbestos is low. Mitigation measures are not required.

As stated in the Initial Site Assessment prepared for this project (November, 2012), demolition activities could potentially expose workers and the public to hazardous wastes or materials, including asbestos. The construction contract would include a Health and Safety Contingency Plan for the contractor, which would address worker safety when working with potentially hazardous materials. No additional mitigation measures are required.

Odors

During project construction, objectionable odors would be mainly related to operation of diesel-powered equipment and to off-gas emissions during road-building activities, such as paving and asphalting. The SJVAPCD Rule 4601 (Architectural Coatings) limits the amount of reactive organic gas emissions from paving, asphalt, concrete curing, and cement coating operations. Construction of the project would be performed in compliance with the San Joaquin Valley Air Pollution Control District Rules. While construction equipment on site would generate some objectionable odors primarily arising from diesel exhaust, these emissions would generally be limited to the project site and would be temporary in nature. The majority of potential sensitive receptors are located at a sufficient distance from the project site, such that odors would not affect a substantial number of people. No mitigation measures would be required.

4.2.3 Valley Fever

Construction of the project would occur in an endemic area where the fungi *Coccidioides immitis* have been known to naturally occur. Coccidioidomycosis, also known as Valley Fever, is a common cause of pneumonia in the endemic areas in which the fungus occurs, such as Kern County. Because the spores of *Coccidioides immitis* can become airborne during soil disturbance, persons residing or traveling through Kern County are potentially susceptible to the disease. Temporary soil disturbance during construction grading activities could cause fungal

spores (if present) to become airborne, potentially putting construction personnel, residents, and wildlife at risk of contracting Valley Fever. However, there are a number of preventive and precautionary measures that can be undertaken to reduce exposure and which include the use of dust masks when conducting outdoor activities, such as field studies or performing construction activities in the winter months; avoiding sites favorable for *Coccidioides immitis* growth; seeking prompt medical treatment if flu-like or respiratory illness occurs during or within a few weeks following fieldwork or construction activities; a coccidioidin skin test to determine susceptibility to the disease; and by educating all members of the field party and construction crew about the possibilities and consequences of infection. Compliance with Avoidance and Minimization Measures SC-CI-2 would control dust during project construction. As a result, those measures would reduce the potential for contact with *Coccidioides immitis* spores, and as such, the potential for health impacts during construction of the project associated with Valley Fever would be minimized.

Chapter 5 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 greenhouse gas emissions reduction and climate change research and policy. These efforts are primarily concerned with the emissions of greenhouse gases related to human activity that include carbon dioxide, methane, nitrous oxide, tetrafluoromethane, hexafluoroethane, sulfur hexafluoride, HFC-23 (fluoroform), HFC-134a (s, s, s, 2 –tetrafluoroethane), and HFC-152a (difluoroethane).

There are typically two terms used when discussing the impacts of climate change. "Greenhouse Gas (GHG) Mitigation" is a term for reducing greenhouse gas 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)[3].

Transportation sources (passenger cars, light duty trucks, other trucks, buses and motorcycles) in the state of California make up the second largest source (after electricity generation) of greenhouse gas emitting sources. Conversely, the main source of greenhouse gas emissions in the United States is electricity generation followed by transportation. The dominant greenhouse gas emitted is carbon dioxide, mostly from fossil fuel combustion.

There are four primary strategies for reducing greenhouse gas emissions from transportation sources: 1) improve system and operation efficiencies, 2) reduce growth of vehicle miles traveled, 3) transition to lower greenhouse gas fuels, and 4) improve vehicle technologies. To be most effective all four should be pursued collectively. The following regulatory setting section outlines State and federal efforts to comprehensively reduce greenhouse gas emissions from transportation sources.

[3] http://climatechange.transportation.org/ghg_mitigation/

5.1 Regulatory Setting

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 greenhouse gas emissions and climate change at the state level.

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

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

Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006: AB 32 sets the same overall greenhouse gas emissions reduction goals as outlined in Executive Order S-3-05, while further mandating that the CARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases." Executive Order S-20-06 further directs state agencies to begin implementing AB 32, including the recommendations made by the state's Climate Action Team.

Executive Order S-01-07: Governor Schwarzenegger set forth the low carbon fuel standard for California. Under this executive order, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

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

Federal

Although climate change and greenhouse gas reduction is a concern at the federal level, currently there are no legislations or regulations that have been enacted specifically addressing greenhouse gas emissions reductions and climate change at the project level. 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 Executive Order 13514- *Federal Leadership in Environmental, Energy and Economic Performance*.

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

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

On December 7, 2009, the Environmental Protection Agency Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- **Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases--carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)--in the atmosphere threaten the public health and welfare of current and future generations.

- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

Although these findings did not themselves impose any requirements on industry or other entities, this action was a prerequisite to finalizing the EPA's *Proposed Greenhouse Gas Emission Standards for Light-Duty Vehicles*, which was published on September 15, 2009 (http://www.epa.gov/climatechange/endangerment.html). On May 7, 2010 the final *Light-Duty*

Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards was published in the Federal Register.

EPA and the National Highway Traffic Safety Administration are taking coordinated steps to enable the production of a new generation of clean vehicles with reduced greenhouse gas emissions and improved fuel efficiency from on-road vehicles and engines. These next steps include developing the first-ever greenhouse gas regulations for heavy-duty engines and vehicles, as well as additional light-duty vehicle greenhouse gas regulations. These steps were outlined by President Obama in a memorandum on May 21, 2010 (http://epa.gov/otaq/climate/regulations.htm).

The final combined EPA and National Highway Traffic Safety Administration standards that make up the first phase of this national program apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. The standards require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards will cut greenhouse gas 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 January 24, 2011, the EPA along with the U.S. Department of Transportation and the State of California announced a single timeframe for proposing fuel economy and greenhouse gas standards for model years 2017-2025 cars and light-trucks. Proposing the new standards in the same timeframe (September 1, 2011), signals continued collaboration that could lead to an extension of the current National Clean Car Program.

5.2 Project Analysis

5.2.1 Background

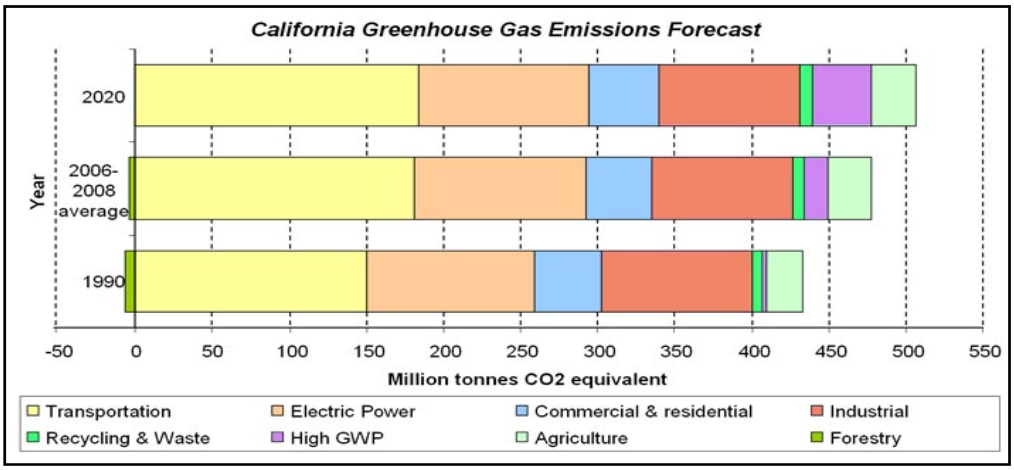
An individual project does not generate enough greenhouse gas emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may participate in a potential impact through its incremental contribution combined with the contributions of all other sources of greenhouse gas.[4] In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable." See CEQA Guidelines sections 15064(i)(1) and 15130. To make this determination the

[4] This approach is supported by the AEP: Recommendations by the *Association of Environmental Professionals on How to Analyze GHG Emissions and Global Climate Change in CEQA Documents* (March 5, 2007), as well as the SCAQMD (Chapter 6: The CEQA Guide, April 2011) and the US Forest Service (Climate Change Considerations in Project Level NEPA Analysis, July 13, 2009).

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 Assembly Bill 32 (AB 32) Scoping Plan contains the main strategies California will use to reduce greenhouse gas. As part of its supporting documentation for the Draft Scoping Plan, CARB released the greenhouse gas inventory for California (Forecast last updated: 28 October 2010). The forecast is an estimate of the emissions expected to occur in the year 2020 if none of the foreseeable measures included in the Scoping Plan were implemented. The base year used for forecasting emissions is the average of statewide emissions in the greenhouse gas inventory for 2006, 2007, and 2008. Figure 5-1 shows the total greenhouse gas emissions for California for 1990, 2006-2008 average, and projected 2020.

Figure 5-1 California Greenhouse Gas Forecast



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

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

5.2.2 Project Greenhouse Gas Emissions Analysis

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

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

carbon dioxide from mobile sources, such as automobiles, occur at stop-and-go speeds (0-25 miles per hour) and speeds over 55 miles per hour; the most severe emissions occur from 0-25 miles per hour (see Figure 5-2). Relieving congestion by enhancing operations and improving travel times in high congestion travel corridors will lead to an overall reduction in greenhouse gas emissions.

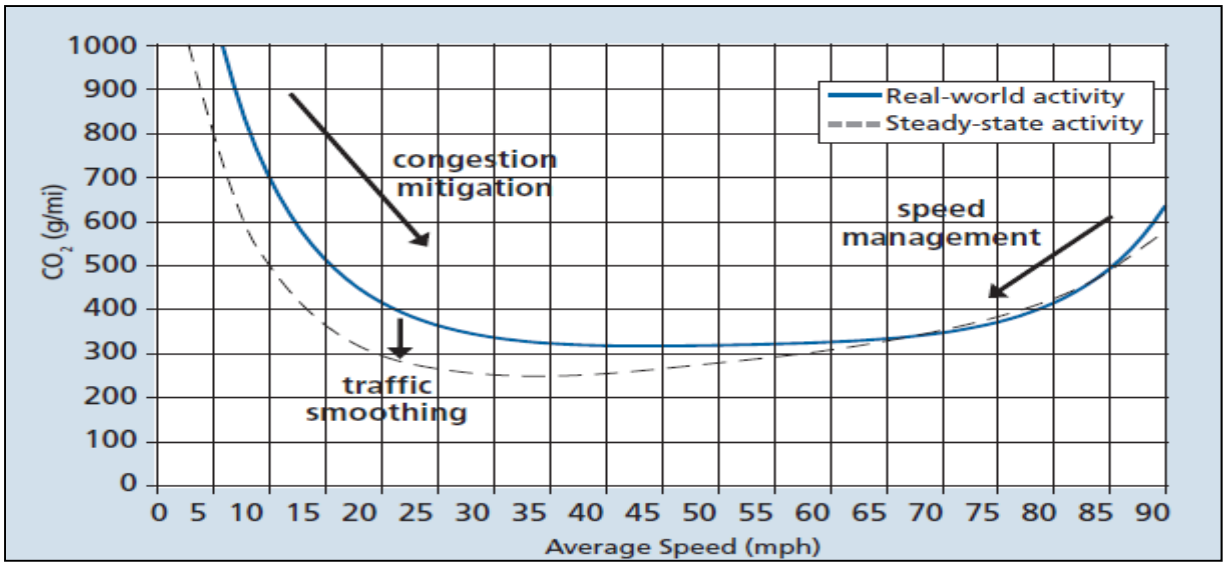


Figure 5-2 Possible Effect of Traffic Operations Strategies in Reducing On-road CO_2 Emissions

The purpose of the Centennial Corridor project is to improve route continuity along SR 58 within Metropolitan Bakersfield and Kern County from the existing SR 58/SR 99 freeway interchange to Interstate 5.

SR 58 is a critical link in the state transportation network and is used by interstate travelers, commuters, and a large number of trucks. SR 58 lacks continuity in central Bakersfield, which results in severe traffic congestion and reduced levels of service on adjoining highways and local streets. This route is offset by approximately 1-mile at SR 43 (known locally as Enos Lane) and by approximately 2 miles at SR 99. The merging of two major State Routes (58 and 99) into one alignment between the eastern and western legs of SR 58 degrades the traffic level of service on this segment of freeway. In addition, SR 99's close spacing for its two interchanges with SR 58 (east and west), in addition to an interchange at California Avenue, results in vehicles dangerously changing lanes, which adds to the congestion.

A stated project objective is to provide route continuity which would improve traffic operations; this is consistent with the objectives of the Climate Action Program.

Quantitative Analysis

Greenhouse gas emissions for transportation projects can be divided into those produced during construction and those produced during operations

Construction Emissions

Construction GHG emissions include emissions produced as a result of material processing, emissions produced by onsite construction equipment, and emissions arising from traffic delays due to construction. These emissions will be produced at different levels throughout the construction phase; their frequency and occurrence can be reduced through innovations in plans and specifications and by implementing better traffic management during construction phases. In addition, with innovations such as longer pavement lives, improved traffic management plans, and changes in materials, the greenhouse gas emissions produced during construction can be mitigated to some degree by longer intervals between maintenance and rehabilitation events. Chapter 6 of this report identifies measures included in the project or recommended to minimize construction emissions of air pollutants including greenhouse gases.

Operational Emissions

The project is a transportation facility; therefore, the greenhouse gas emissions would include direct GHG emissions from vehicle traffic along the proposed project corridor.

Project-related GHG emissions (No Build and proposed Build Alternatives), were calculated using the emission factors for on-road mobile sources using EMFAC2011 Model, annual VMT along the project roadways, and guidelines of the Governor's Office of Planning and Research (OPR) Technical Advisory document *CEQA and Climate Change: Addressing Climate Change Through CEQA Review* (OPR, 2008).

Climate change, as it relates to man-made greenhouse gas emissions, is by nature a global and cumulative impact. According to the Association of Environmental Professionals (AEP), in its paper titled *Alternative Approaches to Analyzing Greenhouse Gas Emissions and Global Climate Change in CEQA Documents* (AEP, 2007), "an individual project does not generate enough GHG emissions to significantly influence global climate change. Global climate change is a cumulative impact; a project participates in this potential impact through its incremental contribution combined with the cumulative increase of all other sources of greenhouse gas." The following greenhouse gas emissions estimate at the project-level is presented for the purpose of disclosing all project-related emissions.

Tables 5-1 through 5-3 summarize the annual operational GHG emissions, associated with vehicle traffic along the studied roadways, for Alternatives A, B, and C, respectively. The GHG

emissions are estimated for baseline year 2008 (existing conditions), opening year 2018, and horizon year 2038 for the No Build and Build Alternatives. Sources considered in the emission calculations are the same as those analyzed for criteria pollutants. CO_2 emissions are the primary GHG of concern, as vehicle operation does not result in appreciable amounts of other greenhouse gases.

Alternative A

Table 5-1 indicates that in each analyzed future year, annual operational emission of greenhouse gas expressed as carbon dioxide (CO_2) would increase relative to the 2008 baseline. This is due to the regional population and economic growth, and associated increase in the daily traffic. For future studied years the build alternative operational emissions of greenhouse gases, combined for all studied roadway segments, show a relatively small increase compared with the No Build scenario. This small increase (less than 4 percent for opening year 2018, and approximately 9 percent for design year 2038) is mainly due to the trip redistribution to the proposed new alignment which provides a connection between two highway segments (Westside Parkway and SR 58 East) and new freeway-to-freeway connectors as well as to the widening of a portion of SR 58 between SR 99 and Cottonwood Road. As Table 5-1 shows, the operational emissions of CO_2 along other studied roadways decrease with proposed Alternative A, compared with the No Build scenario.

It should be noted that while the CO_2 emission factor does assume certain reductions in vehicle emissions due to future vehicle models operating more efficiently, additional reductions in vehicle emissions would also occur in response to new and stricter legislated standards (such as AB1493), as they become implemented. 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.

The data in the bottom portion of Table 5-1 present estimates of operational emissions of greenhouse gases reflecting implementation of two important California rules/standards: AB 1493 (Pavley), and AB 32, which establish stricter standards to reduce greenhouse gas emissions from passenger cars and light duty trucks (see Section 5.1). These emissions were estimated using EMFAC 2011 Model which includes data for carbon dioxide emissions for the fleet mix with implementation of these new standards. As shown, with implementation of these standards, an average 21 percent reduction of vehicular emissions of greenhouse gases would be achieved in 2018 and an average 33 percent reduction would be anticipated in 2038.

Table 5-1 Annual Operational Carbon Dioxide Emissions from Operation of Build Alternative A (Metric tons/year)

Roadway Segment	Existing Baseline 2008 (A)	Opening Year - 2018					Horizon Year 2038				
		No Build (B)	Build (C)	Comparison to 2008 No Build (B-A)	Comparison to 2008 Build (C-A)	Build Vs No Build (C-B)	No Build (E)	Build (F)	Comparison to 2008 No Build (E-A)	Comparison to 2008 Build (F-A)	Build vs No Build (F-E)
Rosedale Highway - Allen Road to SR 99	34,626	43,942	32,558	9,316	-2,068	-11,384	51,634	41,657	17,008	7,031	-9,977
Stockdale Highway - Allen Road to H Street	34,144	25,965	19,606	-8,179	-14,538	-6,359	34,040	23,108	-104	-11,036	-10,932
California Avenue - Stockdale Highway to SR 99	7,460	8,157	7,681	697	221	-476	9,305	8,099	1,845	639	-1,206
Westside Parkway – Allen Road to SR 99	0 [a]	47,401	85,057	47,401	85,057	37,656	78,788	149,836	78,788	149,836	71,048
SR 58 – SR 99 to Cottonwood Road	32,817	52,065	53,549	19,248	20,732	1,484	67,325	72,895	34,508	40,078	5,570
SR 99 – Airport Drive to White Lane	112,911	151,284	141,742	38,373	28,831	-9,542	187,887	172,897	74,976	59,986	-14,990
Mohawk Street – California Avenue to Rosedale Highway	4,076	6,907	5,640	2,831	1,564	-1,267	10,167	8,070	6,091	3,994	-2,097
Real Road – Stockdale Highway to California Avenue	2,170	1,660	2,311	-510	141	651	1,831	2,427	-339	257	596
Freeway to Freeway Connectors [b]	6,644	8,360	10,701	1,716	4,057	2,341	10,779	12,765	4,135	6,121	1,986
Total – All studied roadways	234,849	345,741	358,845	110,892	123,996	13,104	451,757	491,754	216,908	256,905	39,997
	Carbon dioxide emissions with implementation of Pavley I [c] and Low Carbon Fuel Standard [d]										
Rosedale Highway - Allen Road to SR 99	34,626	35,820	26,587	1,194	-8,039	-9,233	36,287	29,483	1,661	-5,143	-6,804
Stockdale Highway - Allen Road to H Street	34,144	20,584	15,562	-13,560	-18,582	-5,022	22,772	15,512	-11,372	-18,632	-7,260
California Avenue - Stockdale Highway to SR 99	7,460	6,457	6,093	-1,003	-1,367	-364	6,219	5,436	-1,241	-2,024	-783
Westside Parkway – Allen Road to SR 99	0 [a]	37,999	68,207	37,999	68,207	30,208	53,861	102,636	53,861	102,636	48,775
SR 58 – SR 99 to Cottonwood Road	32,817	42,040	42,981	9,223	10,164	941	46,336	50,133	13,519	17,316	3,797
SR 99 – Airport Drive to White Lane	112,911	123,238	115,415	10,327	2,504	-7,823	130,904	120,876	17,993	7,965	-10,028
Mohawk Street – California Avenue to Rosedale Highway	4,076	5,473	4,469	1,397	393	-1,004	6,809	5,416	2,733	1,340	-1,393
Real Road – Stockdale Highway to California Avenue	2,170	1,302	1,813	-868	-357	511	1,203	1,596	-967	-574	393
Freeway to Freeway Connectors [b]	6,644	6,889	8,804	245	2,160	1,915	7,753	9,173	1,109	2,529	1,420
Total – All studied roadways	234,849	279,802	289,931	44,953	55,082	10,129	312,144	340,262	77,295	105,413	28,118
Emissions reduction due to Pavley I [b] and Low Carbon Fuel Standard [c]		18% to 22%					29% to 34%				

[a] *Roadway segment did not exist in 2008 and was constructed after Base Year 2008.*

[b] *Studied freeway-to-freeway connectors include: SR 99 northbound connectors to SR 58 eastbound and westbound, SR 99 southbound connectors to SR 58 eastbound and westbound, SR 58 westbound connectors to SR 99 northbound and southbound.*

[c] *Assembly Bill 1493, also known as Pavley I includes stricter standards to reduce greenhouse gas emissions from automobiles and light trucks, model years 2017-2025.*

[d] *California Assembly Bill AB 32 calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.*

Source: Calculations performed by Parsons, 2012

Alternative B

The annual operational emissions of greenhouse gas (mainly CO_2), associated with proposed Alternative B, estimated for opening year 2018, and horizon year 2038, are summarized in Table 5-2. Also provided in the table, are the operational emissions for the No Build scenario in 2018 and 2038, as well as the base year 2008.

The data in Table 5-2 show a very similar trend as the data for Alternative A (see Table 5-1). Project operational emissions of CO_2 in future analyzed years would increase relative to the 2008 baseline due to the increase in annual average daily traffic (AADT) and VMT associated with regional development and population growth. Comparison of operational emissions of greenhouse gases from Alternative B with the No Build scenario shows slight increases in total emissions in opening year 2018, and in horizon year 2038. This small increase is approximately 7 percent for 2018, and about 12 percent for 2038. Total greenhouse gas operational emissions are estimated to be only about 3 percent higher than those estimated for Alternative A.

Alternative C

The annual operational emissions of greenhouse gas emissions (mainly CO_2) associated with Alternative C, estimated for opening year 2018, and horizon year 2038, are summarized in Table 5-3. Also provided in the table, are the operational emissions for the No Build scenario in 2018, 2038, and base year 2008.

Similar to Alternatives A and B, the project operational emissions of CO_2 in future analyzed years would increase relative to the 2008 baseline due to increase in AADT and VMT associated with regional development and population growth. Comparison of operational emissions of greenhouse gases from Alternative C with Alternatives A and B shows that this alternative is similar to Alternative B and the total GHG emissions is less than 1 percent above the emission estimates for Alternative B and 3 to 4 percent higher than estimated emissions for Alternative A.

Although the project includes a new highway segment and widening of a portion of an existing highway, the redistribution of traffic because of the project is such that the resultant greenhouse gas emissions show an increase of between 4 to 12 percent when compared with the No Build scenario. It is therefore concluded that the project would have a minimal effect on greenhouse gas emission levels, while at the same time producing a beneficial effect on congestion relief.

5.3 Greenhouse Gas Reduction Strategies

5.3.1 AB 32 Compliance

Caltrans continues to be actively involved on the Governor's Climate Action Team as CARB Air works to implement the Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in Assembly Bill 32 (AB 32). Many of the strategies Caltrans is using to help meet the

Table 5-2 Annual Operational Carbon Dioxide Emissions from Operation of Build Alternative B (Metric tons/year)

Roadway Segment	Existing Baseline 2008 (A)	Opening Year - 2018					Horizon Year 2038				
		No Build (B)	Build (C)	Comparison to 2008 No Build (B-A)	Comparison to 2008 Build (C-A)	Build Vs No Build (C-B)	No Build (E)	Build (F)	Comparison to 2008 No Build (E-A)	Comparison to 2008 Build (F-A)	Build vs No Build (F-E)
Rosedale Highway - Allen Road to SR 99	34,626	43,942	31,873	9,316	-2,753	-12,069	51,634	41,407	17,008	6,781	-10,227
Stockdale Highway - Allen Road to H Street	34,144	25,965	18,767	-8,179	-15,377	-7,198	34,040	22,304	-104	-11,841	-11,736
California Avenue - Stockdale Highway to SR 99	7,460	8,157	7,181	697	-279	-976	9,305	7,440	1,845	-20	-1,865
Westside Parkway – Allen Road to SR 99	0 [a]	47,401	98,144	47,401	98,144	50,743	78,788	161,796	78,788	161,796	83,009
SR 58 – SR 99 to Cottonwood Road	32,817	52,065	53,568	19,248	20,751	1,504	67,325	74,349	34,508	41,532	7,024
SR 99 – Airport Drive to White Lane	112,911	151,284	140,168	38,373	27,257	-11,116	187,887	170,898	74,976	57,986	-16,989
Mohawk Street – California Avenue to Rosedale Highway	4,076	6,907	7,242	2,831	3,166	335	10,167	10,556	6,091	6,481	389
Real Road – Stockdale Highway to California Avenue	2,170	1,660	2,228	-510	58	568	1,831	2,434	-339	265	603
Freeway to Freeway Connectors [b]	6,644	8,360	10,596	1,716	3,952	2,236	10,779	12,754	4,135	6,109	1,974
Total – All studied roadways	234,849	345,741	369,768	110,892	134,919	24,027	451,757	503,939	216,908	269,090	52,182
	Carbon dioxide emissions with implementation of Pavley I [c] and Low Carbon Fuel Standard [d]										
Rosedale Highway - Allen Road to SR 99	34,626	35,820	26,033	1,194	-8,593	-9,787	36,287	29,317	1,661	-5,310	-6,970
Stockdale Highway - Allen Road to H Street	34,144	20,584	14,896	-13,560	-19,248	-5,688	22,772	14,974	-11,372	-19,170	-7,798
California Avenue - Stockdale Highway to SR 99	7,460	6,457	5,696	-1,003	-1,764	-761	6,219	4,995	-1,241	-2,465	-1,223
Westside Parkway – Allen Road to SR 99	0 [a]	37,999	78,838	37,999	78,838	40,839	53,861	111,043	53,861	111,043	57,182
SR 58 – SR 99 to Cottonwood Road	32,817	42,040	42,986	9,223	10,169	946	46,336	50,950	13,519	18,133	4,615
SR 99 – Airport Drive to White Lane	112,911	123,238	114,154	10,327	1,243	-9,084	130,904	119,445	17,993	6,533	-11,459
Mohawk Street – California Avenue to Rosedale Highway	4,076	5,473	5,739	1,397	1,663	266	6,809	7,027	2,733	2,952	219
Real Road – Stockdale Highway to California Avenue	2,170	1,302	1,748	-868	-422	446	1,203	1,601	-967	-569	398
Freeway to Freeway Connectors [b]	6,644	6,889	8,720	245	2,076	1,831	7,753	9,174	1,109	2,529	1,420
Total – All studied roadways	234,849	279,802	298,811	44,953	63,962	19,009	312,144	348,526	77,295	113,677	36,382
Emissions reduction due to Pavley I [b] and Low Carbon Fuel Standard [c]		18% to 22%					29% to 34%				

[a] *Roadway segment did not exist in 2008 and was constructed after Base Year 2008.*

[b] *Studied freeway-to-freeway connectors include: SR 99 northbound connectors to SR 58 eastbound and westbound, SR 99 southbound connectors to SR 58 eastbound and westbound, SR 58 westbound connectors to SR 99 northbound and southbound.*

[c] *Assembly Bill 1493, also known as Pavley I includes stricter standards to reduce greenhouse gas emissions from automobiles and light trucks, model years 2017-2025.*

[d] *California Assembly Bill AB 32 calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.*

Source: Calculations performed by Parsons, 2012

Table 5-3 Annual Operational Carbon Dioxide Emissions from Operation of Build Alternative C (Metric tons/year)

Roadway Segment	Existing Baseline 2008 (A)	Opening Year - 2018					Horizon Year 2038				
		No Build (B)	Build (C)	Comparison to 2008 No Build (B-A)	Comparison to 2008 Build (C-A)	Build Vs No Build (C-B)	No Build (E)	Build (F)	Comparison to 2008 No Build (E-A)	Comparison to 2008 Build (F-A)	Build vs No Build (F-E)
Rosedale Highway - Allen Road to SR 99	34,626	43,942	31,831	9,316	-2,796	-12,111	51,634	41,498	17,008	6,871	-10,136
Stockdale Highway - Allen Road to H Street	34,144	25,965	17,862	-8,179	-16,283	-8,103	34,040	22,116	-104	-12,028	-11,924
California Avenue - Stockdale Highway to SR 99	7,460	8,157	7,076	697	-384	-1,081	9,305	7,075	1,845	-385	-2,230
Westside Parkway – Allen Road to SR 99	0 [a]	47,401	96,631	47,401	96,631	49,230	78,788	160,289	78,788	160,289	81,501
SR 58 – SR 99 to Cottonwood Road	32,817	52,065	54,734	19,248	21,917	2,670	67,325	78,823	34,508	46,006	11,498
SR 99 – Airport Drive to White Lane	112,911	151,284	139,685	38,373	26,774	-11,599	187,887	168,023	74,976	55,111	-19,864
Mohawk Street – California Avenue to Rosedale Highway	4,076	6,907	8,879	2,831	4,804	1,972	10,167	10,421	6,091	6,345	254
Real Road – Stockdale Highway to California Avenue	2,170	1,660	2,259	-510	89	599	1,831	2,500	-339	330	669
Freeway to Freeway Connectors [b]	6,644	8,360	13,978	1,716	7,334	5,618	10,779	16,009	4,135	9,364	5,230
Total – All studied roadways	234,849	345,741	372,936	110,892	138,086	27,194	451,757	506,753	216,908	271,904	54,996
	Carbon dioxide emissions with implementation of Pavley I [c] and Low Carbon Fuel Standard [d]										
Rosedale Highway - Allen Road to SR 99	34,626	35,820	25,999	1,194	-8,627	-9,821	36,287	29,378	1,661	-5,248	-6,909
Stockdale Highway - Allen Road to H Street	34,144	20,584	14,178	-13,560	-19,966	-6,406	22,772	14,848	-11,372	-19,297	-7,925
California Avenue - Stockdale Highway to SR 99	7,460	6,457	5,613	-1,003	-1,847	-844	6,219	4,750	-1,241	-2,710	-1,469
Westside Parkway – Allen Road to SR 99	0 [a]	37,999	77,652	37,999	77,652	39,653	53,861	110,128	53,861	110,128	56,266
SR 58 – SR 99 to Cottonwood Road	32,817	42,040	44,096	9,223	11,279	2,057	46,336	54,152	13,519	21,334	7,816
SR 99 – Airport Drive to White Lane	112,911	123,238	113,642	10,327	731	-9,596	130,904	115,293	17,993	2,382	-15,611
Mohawk Street – California Avenue to Rosedale Highway	4,076	5,473	7,305	1,397	3,230	1,833	6,809	6,986	2,733	2,910	177
Real Road – Stockdale Highway to California Avenue	2,170	1,302	1,774	-868	-395	472	1,203	1,645	-967	-525	441
Freeway to Freeway Connectors [b]	6,644	6,889	11,360	245	4,716	4,471	7,753	11,214	1,109	4,570	3,461
Total – All studied roadways	234,849	279,802	301,620	44,953	66,771	21,818	312,144	348,393	77,295	113,544	36,249
Emissions reduction due to Pavley I [b] and Low Carbon Fuel Standard [c]		18% to 22%					29% to 34%				

[a] *Roadway segment did not exist in 2008 and was constructed after Base Year 2008.*

[b] *Studied freeway-to-freeway connectors include: SR 99 northbound connectors to SR 58 eastbound and westbound, SR 99 southbound connectors to SR 58 eastbound and westbound, SR 58 westbound connectors to SR 99 northbound and southbound.*

[c] *Assembly Bill 1493, also known as Pavley I includes stricter standards to reduce greenhouse gas emissions from automobiles and light trucks, model years 2017-2025.*

[d] *California Assembly Bill AB 32 calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020.*

Source: Calculations performed by Parsons, 2012

targets in the Bill come from the California Strategic Growth Plan, which is updated each year. 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 greenhouse gas 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 5-3: The Mobility Pyramid.

Figure 5-3 The Mobility Pyramid

Caltrans is supporting efforts to reduce vehicle miles traveled by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high density housing along transit corridors. Caltrans is working closely with local jurisdictions on planning activities; however, Caltrans does not have local land use planning authority. Caltrans is 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; Caltrans is doing this by supporting on-going research efforts at universities, by supporting legislative efforts to increase

fuel economy, and by its participation on the Climate Action Team. It is important to note, however, that the control of the fuel economy standards is held by the EPA and CARB. Lastly, the use of alternative fuels is also being considered; Caltrans is participating in funding for alternative fuel research at the University of California, Davis.

Table 5-4 summarizes Caltrans and statewide efforts that Caltrans is implementing in order to reduce greenhouse gas emissions. More detailed information about each strategy is included in the Climate Action Program at Caltrans (December 2006).

To the extent that it is applicable or feasible for the project and through coordination with the project development team, the following measures will also be included in the project to reduce the greenhouse gas emissions and potential climate change impacts from the project.

- Caltrans and the California Highway Patrol are working with regional agencies to implement intelligent transportation systems to help manage the efficiency of the existing highway system. Intelligent Transportation Systems (ITS) is commonly referred to as electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.
- Landscaping reduces surface warming, and through photosynthesis, decreases CO_2. The project proposes planting in the intersection slopes, drainage channels, and seeding in areas adjacent to frontage roads and planting a variety of different-sized plant material and scattered skyline trees where appropriate but not to obstruct the view of the mountains. Caltrans has committed to planting a minimum of 40 trees. These trees will help offset any potential CO_2 emissions increase. Based on a formula from the Canadian Tree Foundation[6], it is anticipated that the planted trees will offset between 7-10 tons of CO_2 per year.
- The project would incorporate the use of energy efficient lighting, such as LED traffic signals. LED bulbs — or balls, in the stoplight vernacular — cost $60 to $70 a piece but last five to six years, compared to the one-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.
- According to Caltrans Standard Specification Provisions, idling time for lane closure during construction is restricted to ten minutes in each direction; in addition, the contractor must comply with SJVAPCD's rules, ordinances, and regulations in regards to air quality restrictions including idling restrictions for trucks at the construction sites.

[6] Canadian Tree Foundation at http://www.tcf-fca.ca/publications/pdf/english_reduceco2.pdf. For rural areas the formula is: # of trees/360 x survival rate = tones of carbon/year removed for each of 80 years.

Table 5-4 Climate Change/Carbon Dioxide Reduction Strategies

Strategy	Program	Partnership		Method/Process	Estimated Carbon Dioxide Savings (million metric tons [MMT])	
		Lead	Agency		2010	2020
Smart Land Use	Intergovernmental Review	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 Transportation System Deployment	Strategic Growth Plan	Caltrans	Regions	State Intelligent Transportation System; Congestion Management Plan	0.07	2.17
Mainstream Energy & Greenhouse Gases 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, California Environmental Protection Agency, California Air Resource Board, California Energy Commission		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 (20% biodiesel fuel) B100 (100% biodiesel fuel)	0.0045	0.0065 0.45 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	3.6
Goods Movement	Office of Goods Movement	California Environmental Protection Agency, California Air Resource Board, Business, Transportation, and Housing, Metropolitan Planning Organizations		Goods Movement Action Plan	Not Estimated	Not Estimated
Total					2.72	18.18

5.3.2 Adaptation Strategies

Addressing climate change requires a two-pronged approach: mitigation and adaptation. The previous discussion addressed the primary cause of climate change, greenhouse gas, and the state's efforts to reduce these emissions. It covered the executive orders and legislation, strategies to reduce and mitigate the effects of these emissions, and analytical methods to analyze greenhouse gas for environmental documents.

"Adaptation strategies" refer to how Caltrans and others can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, 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; increased storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and, in extreme cases, may require a facility to 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 Oceanic 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 adaptation 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 Executive Order 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 (Resources Agency) was directed to coordinate with local, regional, state, and federal public and private entities to develop a state Climate Adaptation

Strategy. *The California Climate Adaptation Strategy* (December 2009)[7], 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 Executive Order S-13-08 that specifically asked the Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. Numerous other state agencies were involved in the creation of the Adaptation Strategy document, including 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 continues to be developed and collected, the state's adaptation strategy will be updated to reflect current findings.

The Resources Agency was also directed to request the National Academy of Science to prepare a Sea Level Rise Assessment Report by December 2010[8] to advise how California should plan for future sea level rise. The report is to include:

- Relative sea level rise projections for California, 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 (e.g., roads, public facilities, and beaches), natural areas, and coastal and marine ecosystems;
- A discussion of future research needs regarding sea level rise for California.

Prior to the release of the final Sea Level Rise Assessment Report, all state agencies that are planning to construct projects in areas vulnerable to future sea level rise were 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 regarding local uplift and subsidence, coastal erosion rates, predicted higher high-water levels, storm surge, and storm wave data.

[7] http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF
[8] The Sea Level Rise Assessment report is currently due to be completed in 2012 and will include information for Oregon and Washington State as well as California.

Until the final report from the National Academy of Sciences is released, interim guidance has been 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.

All projects that have filed a Notice of Preparation (NOP), and/or are programmed for construction funding from 2008 through 2013, or are routine maintenance projects as of the date of Executive Order S-13-08 may, but are not required to, consider these planning guidelines. The NOP was filed in 2008 for this project and the construction of the project is scheduled to commence in July of 2016.

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

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 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 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 Executive Order S-13-08 and is mobilizing to be able to respond to the National Academy of Science report on Sea Level Rise Assessment, which is due to be released in 2012.

The project would improve mobility by improving route continuity along SR 58 within Metropolitan Bakersfield and Kern County from the existing SR 58/SR 99 freeway interchange to I-5.

Chapter 6 Avoidance, Minimization, and/or Mitigation Measures

Minimization of construction emissions would be achieved through compliance with the requirements of existing SJVAPCD rules and regulations, as described below:

Standard Conditions

Criteria Pollutants

SC-CI-1 Caltrans shall incorporate requirements into the contract specifications requiring that the contractor comply with SJVAPCD Rule 9510 (Indirect Source Review). This rule applies to transportation or transit projects with construction exhaust emissions of at least 2 tons or more of NO_x or 2 tons or more of PM_{10} per year. These projects are required to reduce their construction exhaust emissions of NO_x and PM_{10}, by 20% and 45%, respectively, compared to statewide average for construction equipment. If, after implementation of all feasible onsite mitigation measures, the required emission reduction is not achieved, the rule provides a mechanism by which Caltrans can pay an offsite mitigation fee to the District. Methods of calculating the offsite emission reduction fee are provided in section 7.1.1 of Rule 9510 and the District Rule 3180 (Administrative Fees for ISR). District Rule 3180 establishes a 4 percent (4%) administration fee to cover the District's cost of operating an off-site emission reduction program.

Achieving a 20 percent NOx reduction in exhaust emissions compared to the statewide fleet average can be met by implementing one or more of the following measures.

- Operate equipment with engines newer than 1996;
- Retrofit the existing equipment with control devices (e.g., exhaust oxidation catalyst);
- Using cleaner fuels such as LNG, CNG, or aqueous diesel fuel, where feasible;
- Prohibit truck idling in excess of 10 minutes, whenever practical;
- Use only well-maintained equipment; utilize proper planning to reduce rework and multiple handling of earth materials;
- Pay a mitigation fee to the air District to obtain reductions through incentive and other programs.

SC-CI-2 Caltrans shall incorporate requirements into the contract specifications requiring that the contractor comply with the SJVAPCD Regulation VIII (Fugitive Inhalable Particulate Matter Prohibition) and implement applicable control measures included in the District's *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI), specifically those measures listed in Table 6-2 (Regulation VIII Control Measures) and Table 6-3 (Enhanced and Additional Control Measures) of the document. The applicable mitigation measures as listed in these tables include:

- All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.
- All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut & fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.
- With the demolition of buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition.
- When materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained.
- All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. (The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions.) (Use of blower devices is expressly forbidden.)
- Within urban areas, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of the site.
- Any construction site with 150 or more vehicle trips per day shall prevent carryout and track-out.
- The following *enhanced control measures* shall be implemented at construction sites with high emission of fugitive dust (Table 6-3 of GAMAQI guidelines):
    - Limit traffic speed on unpaved roads to 15 mph;

- Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.

- The following *additional* measures shall be implemented at large construction sites located near sensitive receptors:
  - Install wheel washers for all exiting trucks, or wash off tires of trucks and equipment leaving the site;
  - Install breaks at windward side(s) of construction areas;
  - Suspend excavation and grading activities when wind exceeds 20 mph;
  - Limit area subject to excavation, grading, and other earthwork activity at any one time.

Asbestos

SC-CI-3 Caltrans shall incorporate requirements into the contract specifications requiring that the contractor comply with the limitations of the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations as listed in the Code of Federal Regulations requiring notification and inspection for the construction activities that are involved with demolition, renovation, or removal of asbestos-containing materials. Prior to commencing any demolition or renovation of any building, Caltrans shall require the contractor to consult with the SJVAPCD's Compliance Division to determine inspection and compliance requirements

Implementation of the on-site mitigation measure of using newer engines (e.g., construction equipment that would meet the EPA Tier 2 or better engines standards) will reduce construction-related emissions of NOx by approximately 39% (based on SCAQMD estimate of off-road engine emission mitigation measures, Table II, revised May 25, 2010), which would satisfy the mitigation required by Rule 9510 and reduce the impact to a less-than-significant level.

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