3.8 AIR QUALITY

This section summarizes the *SR-22/West Orange County Connection Air Quality Technical* (January 2001) and the *Air Quality Technical Report Reduced Build Alternative Addendum* (January 2001). For a more detailed analysis, these documents are available at Caltrans and OCTA under a separate cover.

3.8.1 Relevant Pollutants

"Air pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. The U.S. EPA has identified six criteria air pollutants as being of national concern and these pollutants are briefly described below.

A. CARBON MONOXIDE

Carbon monoxide (CO) is a colorless, odorless gas that is generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles. Relatively high concentrations of CO are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. CO chemically combines with the hemoglobin in red blood cells to decrease the blood's oxygen carrying capacity. Prolonged exposure can cause headaches, drowsiness, or equilibrium loss.

B. SULFUR OXIDES

Sulfur oxides (SO_x) constitute a class of compounds of which sulfur dioxide (SO_2) and sulfur trioxide (SO_3) are important. The SO_x health effects include respiratory illness, respiratory tract damage, and bronchio-constriction. Relatively little SO_x is emitted from motor vehicles.

C. NITROGEN OXIDES

Nitrogen oxides (NO_x) constitute a compounds class that include nitrogen dioxide (NO_2) and nitric oxide (NO), which motor vehicles emit. Although NO_2 and NO can irritate the eyes and nose and impair the respiratory system, NO_x is a concern primarily because of its ozone formation role.

D. OZONE

Ozone (O_3), a photochemical oxidant, is a major cause of lung and eye irritation in an urban environment. It is formed through reactions involving hydrocarbons (HC) and NO_x that take place in the atmosphere when sunlight is present. Relatively high O_3 concentrations are normally found only in the summer.

E. PARTICULATE MATTER

Particulate matter (PM) includes liquid and solid particles of a wide range of sizes and composition. Of particular concern are those particles that are smaller than or equal to ten microns (PM_{10}) and 2.5 microns ($PM_{2.5}$). The data collected through many nationwide studies indicates that most of the PM_{10} is a product of fugitive dust, wind erosion, and agricultural and forestry sources, while a small portion is the product of fuel combustion processes. In the case of $PM_{2.5}$, the combustion of fossil fuels accounts for a significant portion of this pollutant. The main health effect of airborne particulate matter is on the respiratory system.

F. LEAD

Lead (Pb) is a stable element that persists and accumulates in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources have significantly decreased as a result of the federally mandated switch to lead-free gasoline.

3.8.2 Air Quality Regulations and Planning

A. NATIONAL AMBIENT AIR QUALITY STANDARDS

Air quality is regulated at the federal level under the Clean Air Act (CAA) and the Final Conformity Rule (40 CFR Parts 51 and 93). The CAA authorizes the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for air pollutants of nationwide concern. It also requires each state to submit a State Improvement Plan (SIP) detailing its strategies for attaining the standards. Air quality is regulated at the state level under the California Clean Air Act of 1988 (AB 2595). The California Clean Air Act requires all districts that are designated as nonattainment for any pollutant to "adopt and enforce rules and regulations to achieve and maintain the state and federal ambient air quality standards in all areas affected by emission sources under their jurisdiction."

As required by the Clean Air Act Amendments of 1970 (P.L. 91-064, December 31, 1970) and the Clean Air Act Amendment of 1977 (P.L. 95-95, August 7, 1977), EPA has established NAAQS for the following air pollutants: CO, O_3, NO_2, PM_{10}, SO_x, and Pb. The California Clean Air Act of 1988 has also established standards for these pollutants. Both the state and federal standards are shown in Table 3.8-1.

The Table 3.8-1 has utilized the accepted industry terms. The "primary" standards have been established to protect the public health with an adequate safety margin. The "secondary" standards are intended to protect the nation's welfare and account for air-pollutant effects on soil, water, visibility, vegetation, and other general welfare aspects.

B. ATTAINMENT STATUS OF STUDY AREA

Section 107 of the 1977 Clean Air Act Amendment requires that the EPA publish a list of all geographic areas in compliance with the NAAQS, plus those not attaining the NAAQS. Areas not in NAAQS compliance are deemed nonattainment areas. Areas that have insufficient data to make a determination are deemed unclassified, and are treated as being attainment areas until proven otherwise. An area's designation is based on the data collected by the state monitoring network on a pollutant-by-pollutant basis.

The study area is located in the South Coast Air Basin, which includes Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The South Coast Air Basin does not attain state and federal Ambient Air Quality Standards (AAQS) for four of the six criteria air pollutants. The basin is in compliance with federal SO_2 and Pb standards, but ambient CO, O_3, and PM_{10} levels exceed the federal standards. NO_2 levels have been below the federal standard, but the basin is the only area that has not been reclassified to attainment status for this criteria pollutant. The South Coast Air Quality Management District (SCAQMD) has requested redesignation of the federal attainment status for NO_2 in the basin. The state AAQS are more stringent than the federal AAQS and, therefore, are exceeded by the same criteria pollutants that exceed the federal standards.

C. CONFORMANCE WITH AIR QUALITY STANDARDS

Under the Clean Air Act Amendments of 1990 (CAAA), the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and the Transportation Equity Act for the 21st Century (TEA-21),

proposed transportation projects must be derived from a long-range transportation plan (LRP) or Regional Transportation Plan (RTP) that conforms with the state air quality plans as outlined in the SIP. The SIP sets forth the state's strategies for achieving air quality standards. Projects must also be included in a Transportation Improvement Program (TIP) that conforms with the SIP, and localized impacts from proposed projects must conform to state air quality plans in nonattainment and maintenance areas.

Southern California Association of Governments (SCAG), as the federally designated Metropolitan Planning Organization (MPO) for most of Southern California, is required to adopt and periodically update a long-range transportation plan and develop an RTP and TIP for Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial Counties.

Table 3.8-1
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	0.12 ppm (235 µg/m^3)	Same as Primary Standard	Ethylene Chemi-lumi-nescence
	8 Hours	-		0.08 ppm (157 µg/m^3)		
Respirable Particulate Matter (PM_{10})	Annual Geometric Mean	30 µg/m^3	Size Selective Inlet Sampler CARB Method P (8/22/85)	-	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	24 Hours	50 µg/m^3		150 µg/m^3		
	Annual Arithmetic Mean	-		50 µg/m^3		
Fine Particulate Matter ($PM_{2.5}$)	24 Hours	No Separate State Standard		65 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetic Analysis
	Annual Arithmetic Mean			15 µg/m^3		
Carbon Monoxide (CO)	8 Hours	9.0 ppm (10 mg/m^3)	Non-dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)-		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	-	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemilumi-nescence
	1 Hour	0.25 ppm (470 µg/m^3)		-		
Lead (Pb)	30-day average	1.5 µg/m^3	AIHL Method 54 (12/74) Atomic Absorption	-	-	High-volume Sampler & Atomic Absorption
	Calendar Quarter	-		1.5 µg/m^3	Same as Primary	
Sulfur Dioxide (SO_2)	3 Hours	-	Fluorescence	-	0.5 ppm (1,300 µg/m^3)	Pararosoaniline
	24 Hours	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	-	
	Annual Arithmetic Mean	-		0.03 ppm (80 µg/m^3)	-	
Visibility Reducing Particles	8 Hour (10 am to 6 pm, PST)	In sufficient amount to produce an 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 the relative humidity is less than 70 percent. Method: ARB Method V (8/18/89)		No Federal Standards		
Sulfates	24 Hours	25 µg/m^3	Turbidimetric Barium Sulfate AIHL Method 61 (2/76)			
Hydrogren Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Cadmium hydroxide STRactan			

ppm	*µg/m^3*	*mg/m^3*	*mm*	*° C*
parts per million	*micrograms/square mete*	*milligrams/square meter*	*millimeter*	*degrees Celcius*

1. *State standards for O_3, CO, SO_2 (1- and 24-hour), NO_2, PM_{10}, & visibility-reducing particles not to be exceeded. All others not to be equaled or exceeded. State AAQS listed in Table of Standards, Section 70200, Title 17, CCR. Section 70200.5 lists vinyl chloride (chloroethene) under "AAQS for Hazardous Substances." In 1978, CARB adopted vinyl chloride standard of 0.010 ppm (26 µg/m^3) (24-hour average), measured by gas chromatography. Standard notes that vinyl chloride is "known human and animal carcinogen" & that "low-level" effects are undefined, but are potentially serious. Level not threshold level & does not necessarily protect against harm. Level specified is lowest level at which violation can be reliably detected by method specified. Ambient concentrations =/> standard constitute endangerment to public health. In 1990, CARB identified vinyl chloride as Toxic Air Contaminant & determined there was not sufficient available scientific evidence to support identification of threshold exposure level. This allows implementation of health-protective control measures at levels < 0.010-ppm ambient concentration specified in 1978 standard.*
2. *National standards (other than O_3, PM_{10}, and those based on annual averages or annual arithmetic mean) not to be exceeded more than once a year. O_3 standard attained when 4th highest 8-hour concentration in a year, averaged over 3 years, =/< standard. For PM_{10}, 24-hour standard attained when 98% of daily concentrations, averaged over 3 years, =/< standard. Contact EPA for further clarification & current federal policies.*
3. *Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses based upon a reference temperature of 25^o C & a reference pressure of 760 mm of mercury (1,013.2 millibar). Most measurements corrected to 25^o C & 760 mm; ppm in this table refers to ppm volume, or micromoles of pollutant per mole of gas.*
4. *Any equivalent procedure that can be shown to the satisfaction of CARB to give equivalent results at or near the level of air quality standard may be used.*
5. *Levels necessary, with adequate margin of safety to protect public health.*
6. *Levels necessary to protect public welfare from any known or anticipated adverse effects of pollutant.*
7. *Reference method as described by EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by EPA.*

The SCAG Regional Council found the 1998 RTP[1] to conform to the SIP and adopted the 1998 RTP for the six-county SCAG region on April 16, 1998. The RTP, known as CommunityLink 21, is a performance-based plan aimed at providing a long-range, coordinated approach to transportation improvements from 1998 through 2020. The RTP is revised and adopted every three years to update policy direction, based on changing transportation infrastructure, financial, technological and environmental conditions. The RTP describes a financially constrained series of proposed transportation policies, programs, and projects that meet the mobility goals and demonstrate that the SCAG region can meet air quality conformity in 2010 and 2020. The actual strategies each responsible agency employs will depend on several issues, including: policies, programs, and projects adopted at the local level; restrictions on federal, state, and local transportation funds; the results of feasibility studies for particular corridors; and further environmental review of proposed projects.

Please note there was no discussion of asbestos for the proposed project study area because it is not located within a locality where naturally occurring asbestos would be present. Although asbestos could exists within older buildings/structures, since the proposed project study area is generally in a setting where there are few structures/buildings within State right-of-way, asbestos will not be discussed.

3.8.3 Ambient Air Quality in the Study Area

A. LOCAL METEOROLOGY

The surrounding atmosphere is an important element in assessing an area's ambient air quality. The study area is located in the South Coast Air Basin, a 17,000-square-kilometer (6,800-square-mile) area bounded by the Pacific Ocean to the southwest, with the San Gabriel, San Bernardino, and San Jacinto Mountains forming the remainder of the perimeter.

Southern California's topography and climate combine to make the basin an area of high air pollution potential. During the summer months, a warm air mass frequently descends over the cool, moist, marine layer produced by the interaction between the ocean's surface and the lowest layer of the atmosphere. The warm upper layer forms a cap over the cool marine layer and inhibits the pollutants in the marine layer from dispersing upward. In addition, light winds during the summer further limit ventilation. The region experiences more days of sunlight than any other major urban area in the nation except Phoenix. Sunlight is a critical element in the photochemical reactions that produce ozone. Southern California's usually mild climatological pattern is interrupted infrequently by periods of hot weather, winter storms, or Santa Ana winds. HC and NO_x emissions from automotive sources, when exposed to sunlight, are the major components of photochemical smog.

B. LOCAL MONITORED AIR QUALITY

The South Coast Air Basin air pollutant levels are measured at monitoring stations that the SCAQMD and the California Air Resources Board (CARB) maintain. The two monitoring stations nearest the project study area are located in Anaheim and Costa Mesa. The last three years of monitored data for these locations is summarized in Table 3.8-2 to illustrate the study areas general air quality trends.

[1] Available at OCTA.

Table 3.8-2
AIR QUALITY SUMMARY FOR STUDY AREA MONITORING STATIONS

Air Pollutant	Standard/ Exceedance	Anaheim Harbor Boulevard			Costa Mesa Mesa Verde Drive		
		1997	1998	1999	1997	1998	1999
Carbon Monoxide (CO)	Max. 1-hour Concentration (ppm)	NA	NA	NA	NA	NA	NA
	Max.8-hour Concentration (ppm)	5.98	5.26	5.34	5.90	7.09	6.41
	# Days>Federal 1-hour Std. of >35 ppm	NA	NA	NA	NA	NA	NA
	# Days>Federal 8-hour Std. of >9 ppm	0	0	0	0	0	0
	# Days>California 1-hour Std. of >20 ppm	NA	NA	NA	NA	NA	NA
	# Days>California 8-hour Std. of >9.0 ppm	0	0	0	0	0	0
Ozone (O_3)	Max. 1-hour Concentration (ppm)	0.098	0.140	0.098	0.087	0.123	0.098
	Max. 8-hour Concentration (ppm)	0.087	0.104	0.076	0.077	0.085	0.075
	# Days>Federal 1-hour Std. of >0.12 ppm	0	2	0	0	0	0
	# Days>Federal 8-hour Std. Of >0.08 ppm	1	4	0	0	1	0
	# Days>California 1-hour Std. Of >0.09 ppm	1	10	1	0	5	1
Nitrogen Dioxide (NO_2)	Max. 1-hour Concentration (ppm)	0.130	0.135	0.117	0.119	0.122	0.123
	Annual Arithmetic Mean (ppm)	0.033	0.033	NA	0.019	0.019	0.020
	% AAM Exceeded (Federal)	NA	NA	NA	NA	NA	NA
	# Days>California 1-hour Std. of >0.25 ppm	0	0	0	0	0	0
Sulfur Dioxide (SO_2)	Max. 24-hour Concentration (ppm)	NM	NM	NM	0.015	0.007	0.005
	Annual Arithmetic Mean (ppm)	NM	NM	NM	0.001	0.001	0.002
	# Days>Federal 24-hour Std. of >0.14 ppm	NM	NM	NM	0	0	0
	# Days>California 24-hour Std. of >0.04 ppm	NM	NM	NM	0	0	0
Suspended Particulates (PM_{10})	Year Coverage*	98%	100%	77%	NM	NM	NM
	Max. 24-hour Concentration ($\mu g/m^3$)	91	81	122	NM	NM	NM
	#Days>Fed. 24-hour Std. of>150 $\mu g/m^3$	0	0	0	NM	NM	NM
	#Days>California 24-hour Std. of>50 $\mu g/m^3$	11	12	15	NM	NM	NM
	State Annual Average ($\mu g/m^3$)	36	33	43	NM	NM	NM
Lead	Maximum Monthly Concentration ($\mu g/m^3$)	NM	NM	NM	NM	NM	NM
	# Months Exceeding Federal Std.	NM	NM	NM	NM	NM	NM
	# Months Exceeding State Std.	NM	NM	NM	NM	NM	NM
Sulfates	Max. 24-hour Concentration ($\mu g/m^3$)	NM	NM	NM	NM	NM	NM
	#Samples>California 24-hour Std.>=25 $\mu g/m^3$	NM	NM	NM	NM	NM	NM

Source: California Air Resources Board, 1997, 1998, 1999.
* Year Coverage indicates how extensive monitoring was during the time of year when high pollutant concentrations were expected.
NM: Pollutant not monitored
NA: Not available