3.3 AIR QUALITY

Introduction

This section describes the environmental setting and effects of the proposed project with regard to air quality. Existing air quality conditions within the Santa Clara-Alum Rock Corridor and applicable regulations pertaining to air quality are described. Potential adverse effects to air quality are described and mitigation measures are proposed, where warranted. Information in this section is based on the Santa Clara-Alum Rock Transit Corridor Air Quality Study prepared for the project.[1]

Existing Conditions

Topography, Meteorology, and Climate

The Santa Clara-Alum Rock Corridor is located in the southeastern portion of the San Francisco Bay Area Air Basin (SFBAAB) in Santa Clara Valley. The SFBAAB topography is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays. The only major break in California's Coast Range occurs in the Bay Area. The Coast Range splits into western and eastern ranges. Between the two ranges lies San Francisco Bay. The gap in the western coast range is known as the Golden Gate and the gap in the eastern coast range is the Carquinez Strait. These gaps allow air to pass into and out of the Bay Area and the Central Valley.

The Santa Clara Valley is bounded by the San Francisco Bay to the north and by mountains to the east, south, and west. Temperatures are warm on summer days and cool on summer nights, and winter temperatures are fairly mild. At this southeastern end of the valley, temperatures can be more than 10 degrees warmer on summer afternoons and more than 10 degrees cooler on winter nights than the rest of the valley.

Winds in the Santa Clara Valley are greatly influenced by the terrain, resulting in a prevailing flow that roughly parallels the valley's northwest/southeast axis. A north/northwesterly sea breeze flows through the valley during the afternoon and early evening, and a light south/southeasterly drainage flow occurs during the late evening and early morning. In the summer, the southern end of the valley sometimes becomes a "convergence zone," when air flowing from the Monterey Bay gets channeled northward into the southern end of the valley and meets with the prevailing north/northwesterly winds.

The air pollution potential of the Santa Clara Valley is high. High summer temperatures, stable air, and mountains surrounding the valley combine to promote ozone formation. In addition to the many local sources of pollution, ozone precursors from San Francisco, San Mateo, and Alameda Counties are carried by prevailing winds to the Santa Clara Valley. The valley tends to channel pollutants in a southeasterly direction. In addition, on summer days with low-level inversions, ozone can be

[1] PBS&J *Air Quality Study for the Santa Clara-Alum Rock Corridor*, April 2008.

recirculated by southerly drainage flows in the late evening and early morning and by the prevailing northwesterlies in the afternoon. A similar recirculation pattern occurs in the winter, affecting levels of carbon monoxide (CO) and particulate matter. This movement of the air up and down the valley increases the impact of the pollutants such as ozone, CO, and particulate matter significantly.

The Santa Clara-Alum Rock Corridor is characterized by a large number of mobile sources. The San Jose Convention Center, Center for the Performing Arts, Civic Auditorium, San Jose State University, San Jose Medical Center, and the Mexican Heritage Plaza (among others) are all located in or near the Corridor and attract vehicle trips. SR 87, I-280, I-680, and U.S. 101 also pass through or near the Corridor and contribute to air pollution in the Valley.

Local Air Quality Characteristics

The Bay Area Air Quality Management District (BAAQMD) monitors air quality conditions at stations throughout the SFBAAB. The nearest air quality monitoring station to the project site is San Jose—Jackson Street site. This monitoring station provided data on ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), CO, and NO_x. The most recent three years of available data are presented in Table 3.3-1.

Sensitive Receptors

Land uses such as schools, hospitals, residences, and convalescent homes are considered to be relatively sensitive to poor air quality because the young, the old, and the infirm are more susceptible to respiratory infections and other air-quality-related health problems than the general public.

There are a number of sensitive receptors along the entire project route. While Santa Clara Street and Alum Rock Avenue are largely commercial, residential uses (both single-family and multi-family) are also located along the study area. A number of residences are also found along San Fernando Street, as well as on secondary streets adjacent to the Corridor. Other possible sensitive receptors along the Corridor include medical offices located on the 600 block of East Santa Clara Street. A medical office also exists on the 1600 block of Alum Rock Avenue

Regulatory Framework

Air quality in the project area is regulated by the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD). These agencies develop rules or regulations to meet the goals or directives imposed on them through legislation. Although EPA regulations may not be superseded, both State and local regulations may be more stringent than the federal standards. In general, air quality evaluations are based on air quality standards developed by the federal and state governments. Emissions limitations are then imposed upon individual sources of air pollutants by local agencies. Mobile sources of air pollutants are largely controlled through federal and state agencies, while most stationary sources are regulated by the local air pollution control or air quality management districts.

Table 3.3-1
Ambient Air Quality (2004 to 2006) at San Jose Central Monitoring Station

Pollutant	2004	2005	2006
Ozone			
Max 1-hr ppm	0.09 ppm	0.113 ppm	0.118 ppm
0.09 ppm (exceeds CAAQS)	0	1	5
Highest 8-hour	0.068	0.080	0.087
>0.08 ppm (exceeds NAAQS)	0	0	1
>0.09 ppm (exceeds CAAQS)	NA	NA	NA
Carbon Monoxide			
Max 8-hour	2.96 ppm	3.11 ppm	2.92 ppm
>9 ppm (1-hour NAAQS)	0	0	0
>9 ppm (1-hour CAAQS)	0	0	0
Particulates (PM_{10})			
Highest 24-hour	55.4 $\mu g/m^3$	49.9 $\mu g/m^3$	68.9 $\mu g/m^3$
>150 $\mu g/m^3$ (24-hour NAAQS)	0	0	0
>50 $\mu g/m^3$ (24-hour CAAQS)	4	2	2
Particulates ($PM_{2.5}$)			
Highest 24-hour	51.5 $\mu g/m^3$	54.6 $\mu g/m^3$	64.4 $\mu g/m^3$
>150 $\mu g/m^3$ (24-hour NAAQS)	0	0	0
Nitrogen Dioxide (NO_2)			
Highest 24-hour	0.073 $\mu g/m^3$	0.074 $\mu g/m^3$	0.074 $\mu g/m^3$
>150 $\mu g/m^3$ (24-hour NAAQS)	0	0	0

Source: California Air Resources Board, *Aerometric Data Analysis & Management*, http://www.arb.ca.gov/adam/welcome.html, March 2008.

Notes:

N/A = Not Available

ppm = parts per million by volume

$\mu g/m^3$ = micrograms per cubic meter

NAAQS = National Ambient Air Quality Standards

CAAQS = California Ambient Air Quality Standards

Federal Regulatory Agencies

U.S. Environmental Protection Agency. The EPA is responsible for setting and enforcing the National Ambient Air Quality Standards (NAAQS) for atmospheric pollutants. It regulates emission sources that are under the exclusive authority of the federal government, such as aircraft, ships, and certain locomotives.

As part of its enforcement responsibilities, the EPA requires each state with federal nonattainment areas to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain the national standards. The SIP must integrate federal, state, and local plan components and regulations to identify specific measures to reduce pollution, using a combination of performance standards and market-based programs within the timeframe identified in the SIP.

State Regulatory Agencies

California Air Resources Board. CARB, a part of the California EPA, is responsible for the coordination and administration of both federal and State air pollution control programs within California. In this capacity, CARB conducts research, sets California Ambient Air Quality Standards, compiles emission inventories, develops suggested control measures, provides oversight of local programs, and prepares the SIP. CARB establishes emissions standards for motor vehicles sold in California, consumer products (e.g., hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions.

In 2005, in recognition of California's vulnerability to the effects of climate change, the Governor issued Executive Order S-3-05, which sets forth a series of target dates by which statewide emissions of greenhouse gas (GHG) would be progressively reduced. These target dates include reduction of GHG emissions to 2000 levels by 2010, reduction of GHG emissions to 1990 levels by 2020, and reduction of GHG emissions to 80 percent below 1990 levels by 2050.

In 2006, California passed the *California Global Warming Solutions Act of 2006* (Assembly Bill No. 32 or AB 32), which requires CARB to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions). AB 32 also establishes a timetable for CARB to adopt emission limits, rules, and regulations designed to achieve the intent of the Act, including early action greenhouse gas emissions reduction measures to be identified by June 2007. CARB has identified three groups of early action measures that will make a substantial contribution to the overall 2020 statewide GHG emission reduction goal of approximately 174 million metric tons of CO_2-equivalent gases.

Regional Regulatory Agencies

Bay Area Air Quality Management District. BAAQMD is the primary agency responsible for comprehensive air pollution control in the SFBAAB, including Santa Clara County. To that end, the BAAQMD, a regional agency, works directly with the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC), and local governments and cooperates actively with all federal and state government agencies. BAAQMD develops rules and regulations, establishes permitting requirements for stationary sources, inspects emissions sources, and enforces such measures through educational programs or fines, when necessary.

BAAQMD is directly responsible for reducing emissions from stationary (area and point) sources and for assuring that State controls on mobile sources are effectively implemented. It has responded to this requirement by preparing a sequence of *Ozone Attainment Plans* and *Clean Air Plans* that comply with the Federal Clean Air Act (FCAA) and the California Clean Air Act (CCAA) to accommodate growth, reduce the pollutant levels in the Bay Area, meet federal and State ambient air quality standards (AAQS), and minimize the fiscal impact that pollution control measures have on the local economy.

Although BAAQMD is responsible for regional air quality planning efforts, it does not have the authority to directly regulate the air quality issues associated with plans and new development projects within the Bay Area. Instead, BAAQMD has used its expertise and prepared the *BAAQMD CEQA Guidelines* to indirectly address these issues in accordance with the projections and programs of the Ozone Attainment Plan and Clean Air Plan. The purpose of the *BAAQMD CEQA Guidelines* is to assist Lead Agencies, as well as consultants, project proponents, and other interested parties, in evaluating potential air quality impacts of projects and plans proposed in the Bay Area. Specifically, the *BAAQMD CEQA Guidelines* explain the procedures that BAAQMD recommends be followed during environmental review processes required by CEQA. The *BAAQMD CEQA Guidelines* provide direction on how to evaluate potential air quality impacts, how to determine whether these impacts are significant, and how to mitigate these impacts. BAAQMD intends that by providing this guidance, the air quality impacts of plans and development proposals will be analyzed accurately and consistently throughout the Bay Area, and adverse impacts will be minimized.

Metropolitan Transportation Commission. The Metropolitan Transportation Commission (MTC) determines if federally funded roadway improvement and transit projects, and roadway improvement projects for which federal permits are required, are consistent with BAAQMD's local attainment plan for ozone as well as with the SIP for the FCAA. This determination is based upon traffic studies that model the effects of roadway and transportation improvement projects and upon assessed changes in area-wide emissions of ozone precursors that the projects may bring about. If foreseeable changes would not upset the SIP schedule for attainment, then the studied projects may be added to the Regional Transportation Plan (RTP), a listing of funded roadway projects that involve federal funding or require federal permits.

Attainment Status and Regional Air Quality Plans

Ambient Air Quality Standards. Based on the authority of the FCAA, as amended, and the CCAA, federal and state regulatory agencies set upper limits on airborne concentrations of ozone, CO, Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2), particulate matter, and lead. Particulate matter is regulated as inhalable particulate matter less than ten microns in diameter (PM_{10}) and fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Under the FCAA and the CCAA, the SFBAAB does not meet the federal eight-hour standard for ozone or the California ambient air quality standards (CAAQS) for ozone and PM_{10}.

The federal and State standards for these criteria pollutants are summarized in Table 3.3-2. Such upper limits or AAQS are designed to protect all segments of the population including those most susceptible to the pollutants' adverse effects (e.g., the very young, the elderly, people weak from illness or disease, or persons doing heavy work or exercise). The potential human health effects of these air pollutants are presented in Table 3.3-3.

Regional Air Quality Plans. Federal and State air quality laws require identification of areas not meeting the AAQS and implementation of regional air quality plans to eventually attain these standards (refer to Table 3.3-1).

Table 3.3-2
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	California Standard[a,c]	Federal Standard[b]	
			Primary[c,d]	Secondary[c,e]
Ozone	1-hour	0.09 ppm (180μg/m^3)	NA[f]	NA[f]
	8-hour	0.070 ppm (137 μg/m^3)	0.08 ppm (160 μg/m^3)	Same as Primary
Carbon Monoxide	1-hour	20.0 ppm (23 μg/m)	35 ppm (40 μg/m^3)	—
	8-hour	9.0 ppm (10 μg/m^3)	9.0 ppm (10 mg/m^3)	—
Nitrogen Dioxide	1-hour	0.18 ppm (338 μg/m^3)	—	—
	Annual Arith Mn	0.030 ppm (56 μg/m^3)	0.053 ppm (100 μg/m^3)	Same as Primary
PM_{10}	24-hour	50 μg/m^3	150 μg/m^3	Same as Primary
	Ann Geo Mn	20 μg/m^3	—	—
	Ann Arith Mn	—	50 μg/m^3	Same as Primary
$PM_{2.5}$	24-hour	—	35 μg/m^3	Same as Primary
	Ann Arith Mn	12μg/m^3	15 μg/m^3	Same as Primary
Sulfur Dioxide	1-hour	0.25 ppm (655 μg/m^3)	—	—
	3-hour	—	—	—
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	—
	Ann Arith Mn	—	0.03 ppm (80 μg/m^3)	—
Sulfates	24-hour	25 μg/m^3	—	—
Lead	30-day Avg	1.5 μg/m^3	—	—
	Calendar Qtr	—	1.5 μg/m^3	Same as Primary
Hydrogen Sulfide	1-hour	0.03 ppm (42 μg/m^3)	—	—
Visibility Reducing Particles[h]	8-hour observation	Extinction coefficient of 0.23 per kilometer[h]	—	—

Source: Bay Area Air Quality Management District, http://www.baaqmd.gov/pln/air_quality/ambient_air_quality.htm, 2008.

Notes:

— = no standard; ppm = parts per million; μg/m^3 = microgram per cubic meter; μg /m^3 = milligrams per cubic meter, Avg. = average, Ann = annual, Arith = arithmetic, Geo = geometric, Mn = mean, Qtr = quarter

a. California standards for ozone, CO, SO_2, NO_2, and PM_{10} and visibility reducing particles are values that are not to be 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. In addition, Section 70200.5 lists vinyl chloride under standards for hazardous substances.

b. The form of the national standards (i.e., how the standard is applied) varies from pollutant to pollutant. For further information, 40 CFR Part 50 includes the relevant form for each federal standard.

c. Concentration expressed first in units in which it as promulgated. Equivalent units given in parenthesis are based upon reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar); ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

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

Table 3.3-2
State and Federal Ambient Air Quality Standards

Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the United States Environmental Protection Agency (EPA).

e. Secondary Standards: The levels of air quality necessary, to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by EPA.

f. As of June 2005, the federal 1-hour standard was revoked by the EPA.

g. U.S. EPA lowered the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$ in 2006. The U.S. EPA is required to designate the attainment status of BAAQMD for the new standard by December of 2009.

h. Prevailing visibility is defined as the greatest visibility that is attained or surpassed around at least half of the horizon circle, but not necessarily in continuous sectors. Visibility standard expressed in terms of extinction due to particles when the relative humidity is less than 70 percent.

The FCAA, as amended, and the CCAA provide the legal framework for attaining and maintaining the ambient air quality standards. Both the federal and State acts require that the California Air Resources Board (CARB) designate as "nonattainment areas" portions of the State where federal or State ambient air quality standards are not met. Where a pollutant exceeds standards, air quality management plans must be formulated that demonstrate how the standards will be achieved. These laws also provide the basis for the implementing agencies to develop mobile and stationary source performance standards.

BAAQMD is primarily responsible for planning, implementing, and enforcing the federal and State ambient standards in the Bay Area. The EPA approval of the *1982 Bay Area Air Quality Plan* (referred to as the 1982 Plan), which indicates how the BAAQMD will implement federal air quality requirements, resulted in the 1982 Plan being incorporated into the SIP. The region's SIP is a compilation of plan components and air pollution control regulations that when taken together are designed to enable the region to attain and maintain the federal standards. Along with BAAQMD, MTC, and the ABAG also contribute to the SIP. BAAQMD updated the 1982 Plan and adopted the *Bay Area '91 Clean Air Plan* to implement the requirements of the CCAA of 1988. As required by the CCAA and subsequent 1992 amendments, BAAQMD also prepared the *1994 Clean Air Plan Update*, the *Bay Area '97 Clean Air Plan*, and the *Bay Area 2000 Clean Air Plan*. To meet the State ozone standard, BAAQMD adopted the *2000 Clean Air Plan* on December 20, 2000 and submitted it to CARB, as required by the CCAA. The *2000 Clean Air Plan* includes a control strategy review to ensure that the plan continues to include all feasible measures to reduce ozone. No State plan is required to meet State PM_{10} standards.

In 1998, the Bay Area was redesignated as nonattainment for the federal ozone standards. Under the EPA's direction, BAAQMD prepared and submitted the *Bay Area Ozone Attainment Plan* in June 1999, as a revision to the SIP. This attainment plan was partially rejected by EPA. The parts of the 1999 plan that were disapproved include ozone attainment assessment, consistency of regional transportation plans and programs with air quality attainment plans, and the Reasonably Available Control Measure demonstration. In response to EPA's disapproval of the 1999 plan, a *Bay Area 2001 Ozone Attainment Plan* (Final Plan) was prepared in June 2001 by BAAQMD, MTC, and ABAG. This 2001 Plan was initially rejected by CARB prior to its submittal to EPA, but addenda were added and

CARB approved the plan and submitted it to EPA. On February 14, 2002, EPA approved the Final Plan.

The most recent SIP that has been developed to comply with state and federal regulation by BAAQMD, the MTC and ABAG is the *Bay Area 2005 Ozone Strategy* (adopted January 4, 2006). The intent of *Bay Area 2005 Ozone Strategy* is to bring the SFBAAB into compliance with federal and state standards for ozone. The plan consists of adopted measures, emission inventories, contingency measures, and demonstration of emission reductions so that the region can attain ozone standards.

Table 3.3-3
Health Effects Summary of the Major Criteria Air Pollutants

Air Pollutant	Adverse Effects
Ozone	eye irritation respiratory function impairment
Carbon Monoxide	impairment of oxygen transport in the blood stream aggravation of cardiovascular disease impairment of central nervous system function fatigue, headache, confusion, dizziness can be fatal in the case of very high concentrations in enclosed places
Nitrogen Dioxide	risk of acute and chronic respiratory illness
Sulfur Dioxide	aggravation of chronic obstruction lung disease increased risk of acute and chronic respiratory illness
Lead	impairment of blood functions and nerve constriction behavioral and learning problems in children
Particulate Matter	may be inhaled and lodge in and irritate the lungs increased risk of chronic respiratory disease with long exposure altered lung function in children may produce acute illness with sulfur dioxide

Source: Bay Area Air Quality Management District, *CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans*, April 1996, revised December 1999.

Impact Assessment and Mitigation Measures

Approach and Methodology

In the following analysis, mobile source emissions of ROG, NO_x, CO, and PM_{10} were estimated utilizing the Emission Factors (EMFAC) model. EMFAC was developed by CARB and is used to calculate emissions rates from on-road motor vehicles from light-duty, heavy-duty trucks, and buses that operate on highways, freeways, and local roads in California. The model was adjusted to account for vehicle emissions in Santa Clara County. The most recent version of EMFAC was used for this analysis, which is EMFAC 2007.

BAAQMD recommends the use of CALINE4, a dispersion model for predicting localized CO concentrations, as the preferred method of estimating pollutant concentrations at sensitive receptors near congested roadways and intersections. For each intersection analyzed, CALINE4 adds roadway-specific CO emissions calculated from peak-hour turning volumes to the existing ambient CO air concentrations. For this analysis, CO concentrations were calculated based on a simplified CALINE4 screening procedure developed by BAAQMD. The simplified model is intended as a screening analysis in order to identify potential CO hotspots. This methodology assumes worst-case conditions and provides a screening of maximum, worst-case CO concentrations.

Standards of Significance

Based on significance criteria used by VTA, the proposed project would result in substantial adverse effects related to air quality if it would:

- conflict with or obstruct implementation of the federal or California CAA;
- violate federal or California air quality standards or contribute substantially to an existing or projected air quality violation;
- exceed BAAQMD's significance criteria;
- expose sensitive receptors to substantial pollutant concentrations;
- create objectionable odors affecting a substantial number of people; or
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is classified as nonattainment under an applicable federal or California ambient air quality standard.

With regard to the BAAQMD significance criteria above, thresholds are contained in the BAAQMD CEQA guidelines (1999). The proposed project is subject to these guidelines and would result in a significant impact on air quality if they would result in:

- net increase in pollutant emissions of 80 pounds per day or 15 tons per year of ROG, NO_X, or PM_{10}; or
- a net increase in CO emissions exceeding 550 pounds per day, reduction of roadway LOS of intersections operating at LOS E or F, reduction of intersection LOS to E or F, or increase in traffic volumes on nearby roadways by 10 percent or more, and violation of state CO concentration standards as determined by the modeling of CO emissions; or
- Construction-related emissions would be considered a significant impact unless feasible control mitigation measures are implemented to minimize particulate emissions.

For the Santa Clara-Alum Rock Corridor Project and in the context of the current attainment status of the SFBAAB, which is a designated CO "maintenance area" and an ozone non-attainment area, the project must be declared to have a significant adverse impact if: 1) it is found that the local effects of

the project on CO exposures are such as to bring about exceedances of the federal eight-hour standard [40 CFR 93.116]; or 2) the project is found to be inconsistent with the California SIP for ozone.

Environmental Analysis

In order to determine air quality impacts due to construction and operation of the proposed project, a level of significance is determined and reported. Conclusions of significance are defined as follows: significant (S), potentially significant (PS), less than significant (LTS), no impact (NI), and beneficial (B). If the mitigation measures would not diminish potentially significant or significant impacts to a less-than-significant level, the impacts are classified as "significant and unavoidable (SU)." For this section, AQ refers to Air Quality.

For the purposes of this analysis, the proposed project includes the implementation of BRT and Single Car LRT in the Santa Clara-Alum Rock Corridor in two phases. Phase 1 includes the implementation of BRT service and Phase 2 includes the implementation of Single Car LRT service. Potential air quality impacts associated with Phase 1 and Phase 2 of the proposed project, including project options, would be largely similar. Therefore, the analyses for the two project phases are discussed together. Areas in which the effects of the two phases differ are detailed within the discussion of each significance threshold.

Potential impacts associated with the extension of transit services in the Capitol Expressway Corridor were analyzed in the Capitol Expressway Light Rail Final Supplemental Environmental Impact Report (FSEIR) dated January 2007, which is incorporated herein by reference. Potential impacts of the proposed project not analyzed in the Capitol Expressway Light Rail FSEIR are described below, as necessary.

Operational Impacts

AQ-1. Implementation of the proposed project would not lead to a net increase in emissions of reactive organic gases, oxides of nitrogen, and particulate matter. Emissions would not exceed BAAQMD thresholds of significance or lead to further exceedances of federal or State standards. (LTS)

BRT buses would utilize existing infrastructure. According to the Santa Clara-Alum Rock Corridor Operating and Maintenance Statistics and Costs document (dated December 2007), with the implementation of BRT service, buses would travel approximately 476,100 miles annually, which would translate into approximately 1,304 miles per day. BRT emissions were calculated using the EMFAC2007 model emissions inventory for bus emissions for CO, NO_X, PM_{10}, and ROG. Table 3.3-4 indicates the results of the modeling. Modeling assumptions and EMFAC model outputs can be found in the Air Quality Study prepared for the project and included in Appendix E.

Single Car LRT vehicles would be run by electric power. Consequently, emissions from the operation of the cars themselves would be essentially zero for the pollutants CO, NO_X, PM_{10},

and ROG, and would not exceed BAAQMD significance thresholds for operational emissions. Likewise, because the LRT vehicles would be running on steel rails, emissions of PM_{10} produced by the operation of the LRT would also be essentially zero, and the BAAQMD PM_{10} threshold would not be exceeded by the operation of the project.

The emissions associated with the operation of BRT would not exceed the BAAQMD thresholds of significance. While CO, NO_X, PM_{10}, and ROG, emissions generated by the operation of BRT would already be less than significant, they would be even lower in future years. The VTA plans on incorporating zero-emission buses (ZEBs) into the VTA fleet. The EMFAC 2007 model does not account for the use of ZEBs; therefore the analysis provides a worst-case analysis of emissions generated by BRT buses. The use of ZEBs would further decrease CO, NO_X, PM_{10}, and ROG, emissions. In addition, some of the BRT and LRT riders would typically be driving a personal vehicle, so there would be a reduction in their air pollutant emissions by selecting a transit mode of travel. Therefore, the proposed project would have a less-than-significant impact relating to emissions of reactive organic gases, oxides of nitrogen, and particulate matter. In addition, the proposed project would not exceed federal or State emissions standards, resulting in a less-than-significant impact.

Table 3.3-4
Operational Project Emissions, BRT

Pollutant[a]	Project Emissions (pounds/day)	BAAQMD Thresholds (pounds/day)	Threshold Exceeded?
ROG	0.58	80	No
NO_X	17.86	80	No
PM_{10}	0.30	80	No
CO	42.28	550	No

Source: CARB, EMFAC 2007, modeled March 2008.

Notes:

The calculations and EMFAC Modeling runs can be found in the Air Quality Study.

a. Reactive Organic Gases (ROG), Nitrogen Oxides (NO_X) Particulate Matter less than 10 microns (PM_{10}), Carbon Monoxide (CO).

AQ-2. Implementation of the proposed project would not lead to significant increases in CO which could exceed federal or state standards. (LTS)

High concentrations of CO usually occur at congested intersections where traffic is slow or idling. CO impacts could be created if the proposed project would cause decreased levels of service at any intersection. BAAQMD specifies that localized CO concentration should be analyzed at intersections that would result in a reduction of roadway level of service (LOS) of intersections operating at LOS E or F; reduction of intersection LOS to E or F; or an increase in traffic volumes on nearby roadways by 10 percent or more. For this analysis, a simplified

CALINE 4 CO analysis was used to evaluate "worst-case" air quality conditions for Year 2030.

The traffic information for the CO analysis was obtained from the *Transportation Study for the Santa Clara-Alum Rock Corridor* (dated September 2007) and the *Addendum to the September 2007 Transportation Study for the Santa Clara-Alum Rock Corridor (dated June 2008)*. Under both Year 2012 and 2030 scenarios, the PM peak hour would include the highest traffic volumes and would have more intersections operating at a deficient LOS. Under Year 2012, the CO analysis accounts for only the development of BRT service. Under Year 2012, only three intersections would result in a deficient LOS D or worse. Table 3.3-5 includes the findings of the Year 2012 scenario.

Under Year 2030, five intersections were considered for BRT operations. Table 3.3-6 indicates which intersections would result in a deficient LOS D or worse with the implementation of BRT service. The intersections that were modeled resulted in the greatest increase in delay times with implementation of the project. The CO concentrations were based on a screening level analysis for localized hotspots. CO modeling output sheets can be found in the Air Quality Study.

As indicated in Table 3.3-5 and Table 3.3-6, CO emissions as a result of BRT service for both Year 2012 and 2030 would be well below both the one-hour and eight-hour standard of 20.0 ppm and 9.0 ppm. The implementation of BRT service would result in a less-than-significant impact in regards to CO.

Table 3.3-5
CO Concentrations Resulting from BRT Operations—Year 2012

Intersection	1-hr Standard (ppm)[a]	1-hr Emissions Year 2012 BRT Operations (ppm)	8-hr Standard (ppm)[a]	8-hr Emissions Year 2030 BRT Operations (ppm)
Santa Clara Street/ 24th Street	20.0	3.9	9.0	2.7
680 SB Ramp/ Alum Rock Avenue	20.0	3.7	9.0	2.6
680 NB Ramp/ Alum Rock Avenue	20.0	3.8	9.0	2.7

Notes:

Total concentrations are based on CALINE4 output including background ambient 1-hour CO concentrations of 2.7 ppm for year 2030 based on EMFAC 2007 Emissions.

a. The State one-hour standard is 20 ppm; the federal standard is 35 ppm. The more stringent State standard is reflected in the table. The State and federal eight-hour standard is 9 ppm.

Table 3.3-6
CO Concentrations Resulting from BRT Operations—Year 2030

Intersection	1-hr Standard (ppm)[a]	1-hr Emissions Year 2030 BRT Operations (ppm)	8-hr Standard (ppm)[a]	8-hr Emissions Year 2030 BRT Operations (ppm)
2nd Street/ Santa Clara Street	20.0	3.1	9.0	2.3
Santa Clara Street/ 28th Street	20.0	3.4	9.0	2.4
Alum Rock Avenue/ McCreery	20.0	3.2	9.0	2.3
680 SB Ramp/ Alum Rock Avenue	20.0	3.3	9.0	2.3
680 NB Ramp/ Alum Rock Avenue	20.0	3.3	9.0	2.3

Notes:

Total concentrations are based on CALINE4 output including background ambient one-hour CO concentrations of 2.7 ppm for year 2030 based on EMFAC 2007 Emissions.

The State one-hour standard is 20 ppm; the federal standard is 35 ppm. The more stringent State standard is reflected in the table. The State and federal eight-hour standard is 9 ppm.

CO impacts were also analyzed for Single Car LRT service. The implementation of Single Car LRT service would not generate CO emissions directly as it would operate using electricity. However, the addition of LRT service in the Corridor would increase delay times at surrounding intersections which could potentially increase CO levels within the surrounding areas. Table 3.3-7 includes an analysis of intersections that would operate at an LOS D or worse as a result of the implementation of Single Car LRT service. The results of the CO analysis indicate that the highest CO emissions would occur at the 10th Street/Santa Clara intersection with emissions at 3.4 ppm (one-hour) and 2.3 ppm (eight-hour). Similar to BRT operations CO analysis discussed above, CO emissions with the implementation of Single Car LRT service were analyzed for the PM peak hour.

As shown in Tables 3.3-5, 3.3-6, and 3.3-7, implementation of BRT or Single Car LRT service would not result in emissions that could violate federal or State standards for CO. Both BRT and Single Car LRT would generate relatively similar CO emissions. Therefore, the proposed project would result in a less-than-significant impact regarding CO.

Table 3.3-7
CO Concentrations resulting from Single Car LRT Operations—Year 2030

Intersection	1-hr Standard (ppm)[2]	1-hr Emissions Year 2030 LRT Operations (ppm)	8-hr Standard (ppm)[2]	8-hr Emissions Year 2030 LRT Operations (ppm)
Market Street/Santa Clara Street	20.0	3.3	9.0	2.3
10th Street/Santa Clara Street	20.0	3.4	9.0	2.4
Alum Rock Avenue/McCreery Avenue	20.0	3.2	9.0	2.3
I-650 SB Ramps/Alum Rock Avenue	20.0	3.3	9.0	2.3

Notes:

Total concentrations are based on CALINE4 output including background ambient one-hour CO concentrations of 2.7 ppm for year 2030 based on EMFAC 2007 Emissions.

a. The State one-hour standard is 20 ppm; the federal standard is 35 ppm. The more stringent State standard is reflected in the table. The State and federal eight-hour standard is 9 ppm.

AQ-3. Implementation of the proposed project would not expose sensitive receptors within the Santa Clara-Alum Rock Corridor to mobile source air toxics. (LTS)

Mobile source air toxics (MSATs) are air pollutants that cause adverse health effects. The U.S. EPA has focused most of its air toxics efforts to date on carcinogens, which are compounds that cause cancer. MSATs include several pollutants that EPA classifies as known or probable human carcinogens. Benzene, for instance, is a known human carcinogen, while formaldehyde, acetaldehyde, 1,3-butadiene and diesel particulate matter are probable human carcinogens.

The area of MSATs is a new and emerging issue and is a continuing area of research. Although much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques available for assessing project-specific health impacts from MSATs are limited. Given the emerging state of the science and of project-level analysis techniques, there are no established criteria for determining when MSAT emissions should be considered a significant issue. The Federal Highway Administration (FHWA) is currently preparing guidance as to how mobile-source health risks should factor into project-level decision making. In addition, EPA has not established regulatory concentration targets for the six relevant MSAT pollutants appropriate for use in the project development process.

As previously discussed, BRT service would include the use of ZEB buses. In addition, Single Car LRT service would operate LRT cars which would be run by electric power. Therefore, impacts associated with MSATs would be considered less than significant.