AIR QUALITY REPORT

I-280/Wolfe Road Interchange Improvement Project

Santa Clara County

District 04-SCL-280-PM 8.1/8.6

Project EA 1K300 – ID 0416000226

Prepared by

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November 2019

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SANTA CLARA COUNTY, CALIFORNIA

CALIFORNIA DEPARTMENT OF TRANSPORTATION DISTRICT 4

District 04-SCI-280-PM 8.1/8.6

Project EA 1K300 - 0416000226

Approved by: _____ Date: 11.21.19

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Acronyms and Abbreviations

Term	Definition
°F	Degrees Fahrenheit
AADT	Average annual daily traffic
AB	Assembly bill
ABAG	Association of Bay Area Governments
ADT	Average daily traffic
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
ATM	Active Traffic Management
BACM	Best available control measures
BAAQMD	Bay Area Air Quality Management District
BMP	Best Management Practice
CAAQS	California Ambient Air Quality Standards
Cal/EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAP	Climate Action Program
CCAA	California Clean Air Act
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
County	Santa Clara County
CY	Cubic Yard
DEIR	Draft Environmental Impact Report
DPM	Diesel Particulate Matter
EO	Executive Order
FCAA	Federal Clean Air Act

Term	Definition
FHWA	Federal Highway Administration
FMS	Fund Management System
ft	Feet
FTA	Federal Transit Administration
FTIP	Federal Transportation Improvement Program
GHG	Greenhouse gas
HOV	High-Occupancy Vehicle
H_2S	Hydrogen sulfide
H_2CO	Formaldehyde
I-280	Interstate 280
IPCC	International Panel on Climate Change
LOS	Level of service
mi	Miles
mph	Miles per hour
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxics
MT	Metric Ton
MTC	Metropolitan Transportation Commission
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NATA	National Air Toxics Assessment
NEPA	National Environmental Policy Act
NHTSA	National Highway Traffic Safety Administration
NO_2	Nitrogen dioxide
NOA	Naturally occurring asbestos
NO_x	Nitrogen oxide
O_3	Ozone
Pb	Lead
PM	Particulate matter
PM_{10}	Particulate matter less than 10 microns in diameter

Term	Definition
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter
POAQC	Project of Air Quality Concern
PPB	Parts per billion
PPM	Parts per million
PVC	Polyvinyl chloride
Protocol	Transportation Project-Level Carbon Monoxide Protocol
RCEM	Road Construction Emissions Model
ROGs	Reactive organic gases
RTP	Regional Transportation Plan
SB	Senate Bill
SCS	Sustainable Community Strategies
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SO_4	Sulfate
TACs	Toxic air contaminants
TDM	Transportation Demand Management
TMP	Transportation Management Plan
TIP	Transportation Improvement Program
USC	United States Code
USDOT	United States Department of Transportation
U.S. EPA	United States Environmental Protection Agency
VMT	Vehicle miles traveled
VTA	Valley Transportation Authority
VOCs	Volatile organic compounds

1. Proposed Project Description

1.1 Introduction

The California Department of Transportation (Caltrans), in cooperation with the Santa Clara Valley Transportation Authority (VTA) and the City of Cupertino, proposes to make roadway improvements to the Interstate 280 (I-280)/Wolfe Road Interchange in the City of Cupertino, Santa Clara County, California. The project is located between postmiles 8.1 and 8.6 on I-280. The purpose of the I-280/Wolfe Road Interchange Improvement Project is to improve traffic operations and facilities for multimodal forms of transportation, including bicycle, pedestrian, and high occupancy vehicle (HOV) uses, at the I-280/Wolfe Road Interchange. Caltrans is the lead agency under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

1.2 Location and Background

The project is located in Santa Clara County, which is in the San Francisco Bay Area Air Basin and falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD) and the Metropolitan Transportation Commission (MTC). This project is included in the MTC Regional Transportation Plan (RTP ID 17-07-0026) and Plan Bay Area 2040. It is also included in MTC's 2019 Transportation Improvement Program (Project TIP ID SCL190011). The estimated total cost of this project is approximately $97 million. Figure 1 shows the project construction limits and surrounding area.

Figure 1 – Map of Project Limits and Surrounding Area

1.3 Purpose and Need

The purpose of the proposed project is to improve traffic operations and facilities for multimodal[1] forms of transportation, including bicycle, pedestrian, and high occupancy vehicle uses, at the Interstate 280 (I-280)/Wolfe Road Interchange in the City of Cupertino.

Wolfe Road is a key connector between job locations and housing, commercial, and retail developments. The existing interchange at I-280 is congested with significant delays, which are projected to worsen due to planned growth in the area. Sidewalks and bike lanes are narrow and cross high-speed, at-grade ramp connections, which discourages use by pedestrians and bicyclists. The interchange configuration is not consistent with Caltrans' Complete Streets design guidelines or the City General Plan vision for a walkable, bikeable community.

1.4 Baseline and Forecasted Conditions for No-Build and Project Alternatives

The proposed alternatives include the No-Build Alternative and three Build Alternatives. Each of these alternatives are discussed below, along with a summary of existing traffic conditions.

1.4.1 Existing Roadways and Traffic Conditions

The existing roadways and traffic conditions are detailed in the I-280/Wolfe Road Interchange Improvement Draft Traffic Operations and Analysis Report prepared by Fehr & Peers (March 2019). Table 1 shows the summary of traffic volumes for the existing year (2017), opening year (2025), and the design year (2045) for the No Build, and Alternatives A, B and C.[2] The table includes Peak Hour totals and average daily traffic (ADT) for different segments within the study area for the existing year. Note that No Build, Alternative A, and Alterative B have the same traffic volumes for the existing, opening, and design years. Additionally, Alternative C has different segments than the No Build Alternative, Alternative A, and Alternative B due to its design as a diverging diamond interchange. Figure 1 above shows the project construction limits that were based on given plans. Figures 2 and 3 show the locations of the segments listed in Table 1 for the No Build and three build alternatives against a map of the existing I-280/Wolfe Road interchange.

[1] The term "multimodal" is used in transportation planning to refer to alternative methods of travel beyond solely providing for traditional single-occupancy automobile usage. Such methods include, but are not limited to, carpools, vanpools, buses, light rail transit, heavy rail, bicycles, and pedestrian facilities.

[2] Consistent with the Caltrans Project Design Manual, year 2045 was chosen as the design year as it is 20 years after the planned opening year (2025) of the proposed project.

Table 1 - Summary of Existing (2017) Traffic Conditions

Location ID	Segment	No Build, Alternative A, and Alternative B	
		Existing Peak Total	Existing ADT
1	Northbound Wolfe Road to I-280 Southbound	1,142	8,507
2	Northbound Wolfe to I-280 Northbound	965	6,343
3	Northbound I-280 Off Ramp to Wolfe Road	2,006	15,065
4	Southbound Wolfe Road to I-280 Northbound	1,010	6,077
5	Southbound Wolfe Road to I-280 Southbound	872	7,170
6	Southbound I-280 Off Ramp to Wolfe Road	1,515	9,904
7	Northbound Wolfe Crossing Bridge	3,000	19,235
8	Southbound Wolfe Crossing Bridge	3,085	19,499
Location ID	**Segment**	**Alternative C**	
		Existing Peak Total	**Existing ADT**
9	Northbound I-280 Off Ramp to Wolfe Road	2,006	15,065
10	Wolfe Road On-Ramp to I-280 Northbound	1,975	12,419
11	Southbound I-280 Off Ramp to Wolfe Road	1,515	9,904
12	Wolfe On-Ramp to I-280 Southbound	2,014	15,676
13	Northbound Wolfe Road Crossing Bridge	3,000	19,235
14	Southbound Wolfe Road Crossing Bridge	3,085	19,499

Source Illingworth & Rodkin 2019. *FEHR & PEERS*, 2019

Figure 2 - Map of Segment Locations for the No Build Alternative, Build Alternative A, and Build Alternative B

Figure 3 - Map of the Segment Locations for Build Alterative C

1.4.2 No-Build Alternative

Under the No Build Alternative, none of the project features described under the three build alternatives would be constructed. The I-280/Wolfe Road Interchange would continue to operate in its current configuration. Under the No Build Alternative, there would be no improvement for multimodal forms of transportation. Consequently, the No-Build Alternative represents future travel conditions in the study area without the I-280/Wolfe Road Interchange Improvement Project and is the baseline against which the three Build Alternatives are assessed. Opening year of the project is represented by traffic volumes for the year 2025. The future traffic demand and volume on the roadway is represented by the design year in 2045.

1.4.3 Build Alternative A

Alternative A would modify the existing I-280/Wolfe Road Interchange by constructing the following improvements:

- The existing Wolfe Road bridge structure over I-280 would be widened from 63 feet to approximately 185 feet. The overcrossing would be widened from two through lanes northbound and two through lanes southbound, to three through lanes and two right-turn pockets northbound and three through lanes and two right-turn pockets southbound. The new right-turn pockets on the overcrossing would lead to loop freeway on-ramps that modify or replace the existing ones.
- The existing collector-distributor roads[3] that currently connect to the northbound and southbound loop on-ramps and merge with the northbound and southbound at-grade entrances to I-280 would be removed so that the new northbound and southbound loop on-ramps connect directly to the freeway. Retaining walls would be constructed beneath the Wolfe Road overcrossing structure at both the northbound and southbound loop on-ramps.
- The diagonal on-ramp to northbound I-280 would be realigned, squared up[4], and widened from one mixed-flow lane[5] to two mixed-flow lanes and one HOV lane with a new ramp meter.
- The diagonal on-ramp to southbound I-280 would be realigned, squared up, and widened from one mixed-flow lane and one HOV lane to two mixed-flow lanes and one HOV lane with a new ramp meter.
- The loop on-ramp to northbound I-280 would be realigned, squared up, and widened from one mixed-flow lane and one HOV lane to two mixed-flow lanes and one HOV lane with a new ramp meter.

[3] A collector-distributor road is typically constructed on the freeway system where there is a relatively short distance between adjacent ramps. The collector-distributor road facilitates traffic operations and safety by separating merging and weaving traffic from through traffic.

[4] Squaring up refers to realigning the on-ramp connection to the local street to create a sharper angle of approximately 90-degrees, with the intent to slow vehicles at pedestrian crosswalks.

[5] A "mixed-flow lane" is a lane that is open to all traffic irrespective of the number of occupants in the vehicle.

- The loop on-ramp to southbound I-280 would be realigned, squared up, and widened from one mixed-flow lane and one HOV lane to two mixed-flow lanes and one HOV lane with a new ramp meter.
- The existing two-lane off-ramp from northbound I-280 that widens to four lanes would be realigned and squared up. A new traffic signal would be installed at the off-ramp intersection with Wolfe Road.
- The existing two-lane off-ramp from southbound I-280 that widens to four lanes would be realigned, squared up, and widened to five lanes. A new traffic signal would be installed at the off-ramp intersection with Wolfe Road.
- Both the north and south Wolfe Road approaches to the I-280 overcrossing would be raised by up to six feet to reduce the existing six percent grade to four percent. This increase in profile would necessitate the construction of retaining walls along the east and west sides of Wolfe Road both north and south of the interchange.
- The height of Wolfe Road at the existing Perimeter Road undercrossing structure would be raised by placing approximately three feet of fill and roadway pavement over it so that the roadway elevation would conform to the proposed raised Wolfe Road profile.
- The existing concrete box culvert that carries the Junipero Serra Channel through the interchange along the south side of I-280 would be extended or modified to accommodate the realigned on-ramp by constructing retaining walls or wingwalls within the channel east of Wolfe Road.
- Existing soundwalls along the north side of I-280, west of Wolfe Road, which would be removed to accommodate the proposed improvements, would be replaced. In addition, new soundwalls may be constructed at other locations if warranted per the requirements of Caltrans' Traffic Noise Abatement Protocol (TNAP).
- Class II or IV bicycle lanes[6] and 10-foot wide sidewalks would be added on both northbound and southbound Wolfe Road within the project limits. Provide bicycle and pedestrian connection from Wolfe Road to Perimeter Road and/or the planned Junipero Serra Trail.
- Provide a bicycle and pedestrian connection from Wolfe Road to Perimeter Road and/or the planned Junipero Serra Trail.

1.4.4 Build Alternative B

Similar to Alternative A, Alternative B would modify the existing I-280/Wolfe Road Interchange with the same partial cloverleaf configuration. The key difference, however, would be that Alternative B would replace the existing Wolfe Road bridge structure over I-280, whereas Alternative A would simply widen the structure. Under Alternative B, the existing Wolfe Road bridge structure over I-280 would be removed and replaced with a new overcrossing structure approximately 390 feet in length and 180 feet in width. The new structure would accommodate three through lanes and two right-turn pockets

[6] The Highway Design Manual defines a Class II bicycle lane as striped lane for one-way bicycle travel on a street or highway. A Class IV bicycle lane is an on-street bicycle lane that is physically separated from the adjacent traffic lane.

northbound and three through lanes and two right-turn pockets southbound. The new overcrossing would be a concrete box girder structure, which is the same type as the existing overcrossing.

All of the other improvements described above for Alternative A would be constructed under Alternative B, with the following exceptions:

- Under Alternative B, both the north and south Wolfe Road approaches to the replacement I-280 overcrossing would be raised by up to ten feet to reduce the existing six percent grade to four percent. Thus, when compared to Alternative A, the Wolfe Road approaches would be four feet higher under Alternative B.

- Under Alternative B, approximately six feet of fill and pavement would be added on the existing Perimeter Road undercrossing structure, which may require replacement of the undercrossing structure. In contrast, under Alternative A, only three feet of fill and pavement would be added on the Perimeter Road undercrossing, which may not require the replacement of the structure.

1.4.5 Build Alternative C

This alternative would modify the existing I-280 Wolfe Road Interchange by constructing the following improvements:

- The existing Wolfe Road bridge structure over I-280 would be removed and replaced with a new overcrossing structure having a width and length of approximately 154 feet and 280 feet, respectively. The new overcrossing would be a concrete box girder structure, which is the same type as the existing overcrossing. On the west side of the structure, there would be two northbound through lanes, one northbound through-left lane, and one northbound free flow left-turn lane. On the east side of the structure, there would be two southbound through lanes, one southbound through-left lane, and one southbound free flow left-turn lane.
- The existing intersections with Wolfe Road and the I-280 ramps would be replaced with two "cross-over intersections" where northbound and southbound traffic on Wolfe Road cross over at a new traffic signal at the ramp termini.
- Both the northbound and southbound loop on-ramps and the collector-distributor roads would be removed.
- The diagonal on-ramp to northbound I-280 would be realigned, squared up, and widened from one mixed-flow lane to two mixed-flow lanes and one HOV lane with a new ramp meter.
- The diagonal on-ramp to southbound I-280 would be realigned, squared up, and widened from one mixed-flow lane and one HOV lane to two mixed-flow lanes and one HOV lane with a new ramp meter.
- The existing two-lane off-ramp from northbound I-280 that widens to four lanes would be realigned and squared up to connect to Wolfe Road at the new "cross-over intersection" with two right-turn lanes and two left-turn lanes. A new traffic signal would be installed at the "cross-over intersection."

- The existing two-lane off-ramp from southbound I-280 that widens to four lanes would be realigned, squared up, and widened to five lanes to connect to Wolfe Road at the new "cross-over intersection" with three right-turn lanes and two left-turn lanes. A new traffic signal would be installed at the "cross-over intersection".
- Both the north and south Wolfe Road approaches to the I-280 overcrossing would be raised by up to ten feet to reduce the existing six percent grade to four percent. This increase would also accommodate falsework clearances required to build the new overcrossing structure. Retaining walls would be constructed along the east and west sides of Wolfe Road both north and south of the interchange.
- Approximately six feet of fill and pavement would be added on the existing Perimeter Road undercrossing structure, which may require replacement of the undercrossing structure.
- The existing concrete box culvert that carries the Junipero Serra Channel through the interchange along the south side of I-280 would be extended or modified by constructing retaining walls or wingwalls within the top of bank east of Wolfe Road.
- Existing soundwalls along the north side of I-280, west of Wolfe Road, which would be removed to accommodate the proposed improvements, would be replaced. In addition, new soundwalls may be constructed at other locations if warranted per the requirements of Caltrans' TNAP.
- Class II bicycle lanes or Class IV separated bikeways and 10-foot wide sidewalks would be added on both northbound and southbound Wolfe Road.
- A bicycle and pedestrian connection from Wolfe Road to Perimeter Road and/or the planned Junipero Serra Trail.

Summary of future conditions for the no build and three build alternatives are shown in Table 2 below. Table 2 shows the future conditions for the opening year in 2025 and the design year in the year 2045. The segments listed in Table 2 are the same segments shown in Figures 2 and 3 above. Figures 4, 5, and 6 show Build Alternatives A, B, and C, respectively.

Table 2 - Summary of Future Traffic Conditions for the Opening Year (2025) and Design Year (2045)

Location ID	Segment	No Build, Alternative A, and Alternative B			
		2025 Peak Total	2025 Estimated ADT	2045 Peak Total	2045 Estimated ADT
1	Northbound Wolfe Road to I-280 Southbound	1,210	9,020	1,800	13,410
2	Northbound Wolfe Road to I-280 Northbound	1,180	7,760	1,780	11,710
3	Northbound I-280 Off Ramp to Wolfe Road	3,070	23,050	3,510	26,360
4	Southbound Wolfe Road to I-280 Northbound	1,450	8,720	1,660	9,990
5	Southbound Wolfe Road to I-280 Southbound	1,420	11,680	1,580	12,990
6	Southbound I-280 Off Ramp to Wolfe Road	2,250	14,710	2,670	17,450
7	Northbound Wolfe Road Crossing Bridge	4,980	31,930	6,210	39,810
8	Southbound Wolfe Road Crossing Bridge	5,040	31,850	6,130	38,740
Location ID	**Segment**	**Alternative C**			
		2025 Peak Total	**2025 Estimated ADT**	**2045 Peak Total**	**2045 Estimated ADT**
9	Northbound I-280 Off Ramp to Wolfe Road	3,070	23,050	3,510	26,360
10	Wolfe On Ramp to I-280 Northbound	2,630	16,480	3,440	21,700
11	Southbound I-280 Off Ramp to Wolfe Road	2,250	14,710	2,670	17,450
12	Wolfe On Ramp to I-280 Southbound	2,630	20,700	3,380	26,400
13	Northbound Wolfe Road Crossing Bridge	4,980	31,930	6,210	39,810
14	Southbound Wolfe Road Crossing Bridge	5,040	31,850	6,130	38,740

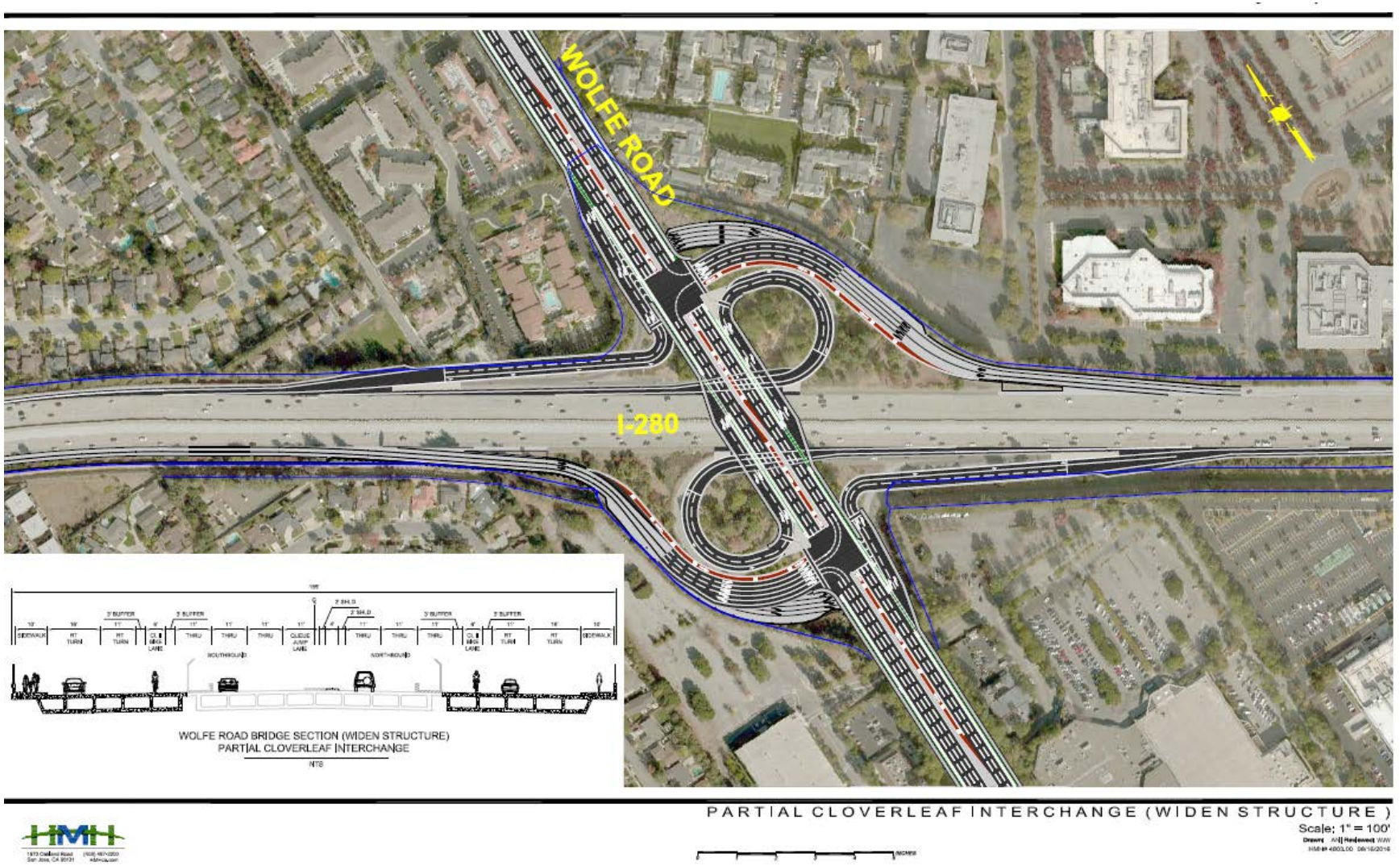

Figure 4 – Map of Alternative A: Partial Cloverleaf Interchange (Widen Structure)

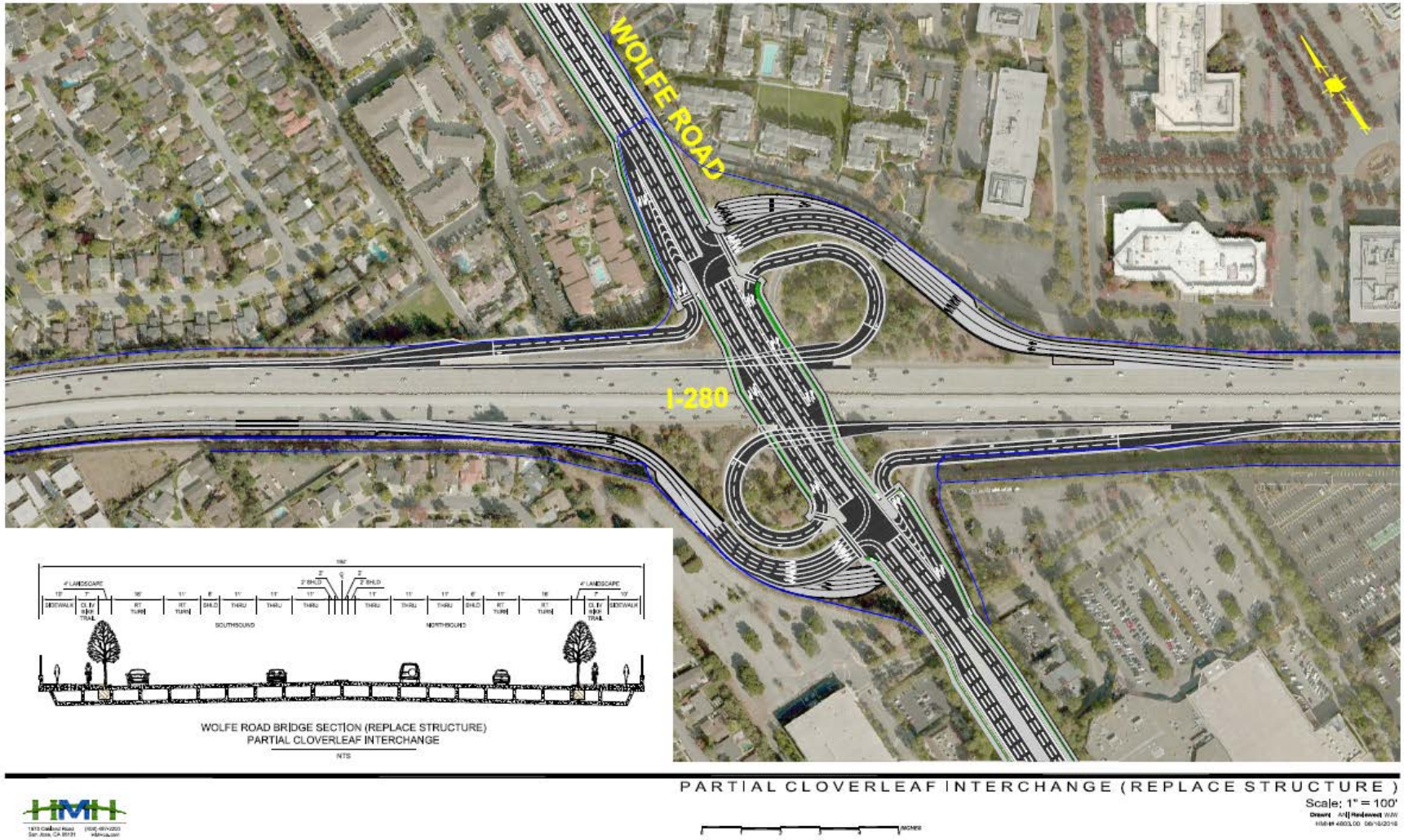

Figure 5 – Map of Alternative B: Partial Cloverleaf Interchange (Replace Structure)

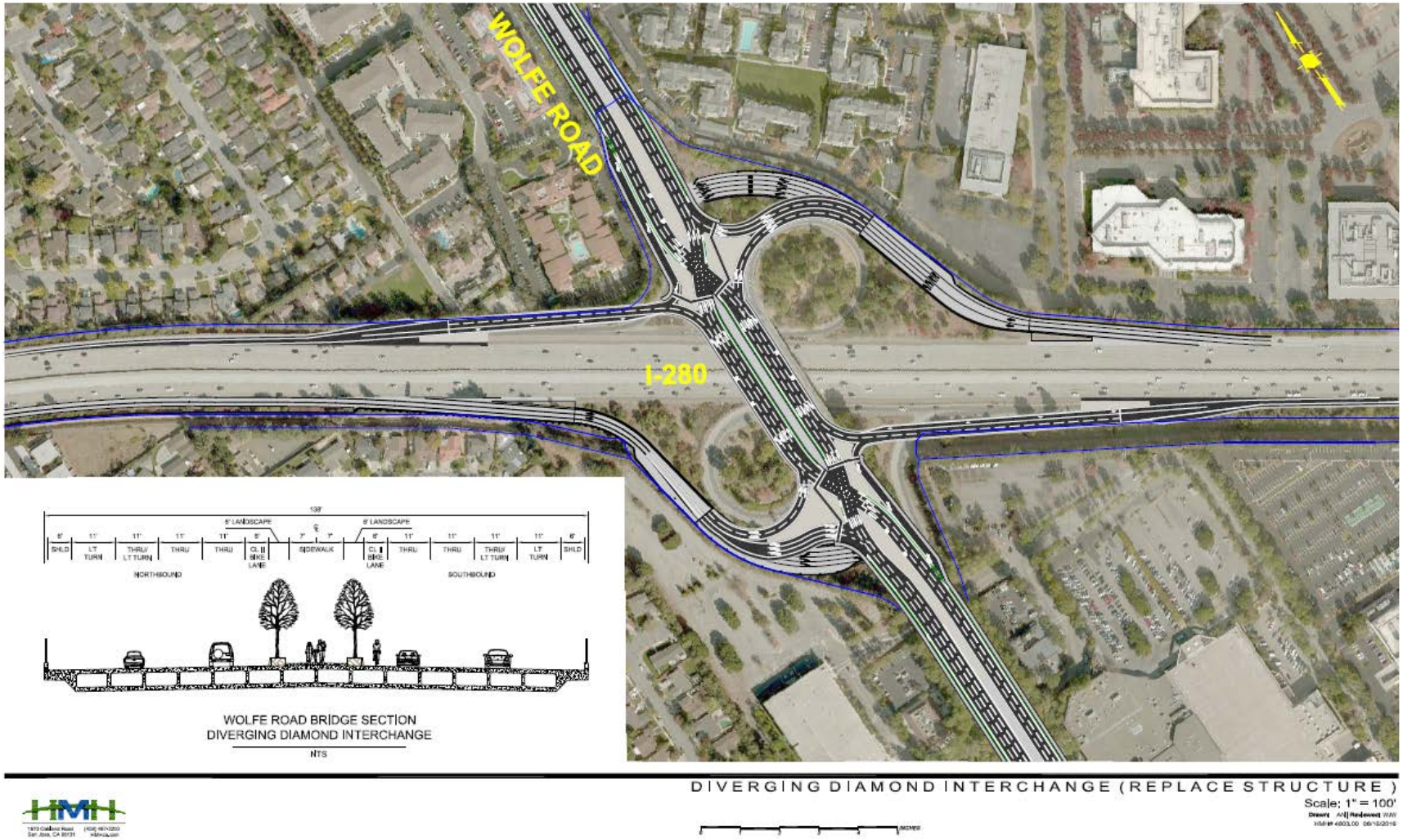

Figure 6 – Map of Alternative C: Diverging Diamond Interchange (Replace Structure)

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1.4.6 Comparison of Existing/Baseline and Build Alternatives

Under the No Build Alternative, no improvements would be made to Wolfe Road or the I-280/Wolfe Road Interchange. Current traffic conditions would stay the same. Based on the ADT information provided by Fehr and Peers, Alternatives A and B would have the same future traffic volumes as the No Build Alternative and these alternatives would not change traffic volumes during the opening year (2025) or design year (2045). Alternative C would have similar traffic volumes compared to the No Build condition except for the on-ramps to I-280 northbound and southbound. This alternative would result in a higher ADT for the years 2025 and 2045.

1.5 Construction Activities and Schedule

Figures 1, 2, and 3 show how the existing I-280/Wolfe Road Interchange would be modified and constructed in Alternatives A, B, and C. The project construction footprint based on the construction plans was estimated to be 14.5 acres in size for Alternatives A and B and 13.4 acres in size for Alternative C.

Construction activities would include, but are not limited to, demolition, earthwork, paving, pile driving, concrete/rebar/formwork, utility trenching, and roadway striping.

Construction access would be provided primarily from Wolfe Road and I-280. The City of Cupertino established local truck routes, which would be used whenever feasible for transportation of construction materials and equipment. Depending on the final roadway alignment, the project could require a temporary road or detour while construction occurs at the Wolfe Road and I-280 Interchange.

Construction of the project may require temporary roadway closures and detouring at Wolfe Road and the I-280 on-ramps and off-ramps, which would be planned for in a Transportation Management Plan (TMP). The plan would include press releases to notify and inform motorists, business community groups, local entities, emergency services, and elected officials of upcoming road closures and detours.

Construction is planned to last 2 years and is anticipated to be built in six stages based on the construction a data sheet provided. No construction activities will last more than five years at any individual site. Emissions from construction-related activities are thus considered temporary as defined in 40 CFR 93.123(c)(5) and are not required to be included in particulate matter (PM) hot-spot analyses to meet conformity requirements.

2. Regulatory Setting

Many statutes, regulations, plans, and policies exist at the federal, state, and local levels to address air quality issues related to transportation and other sources. The proposed project is subject to air quality regulations at each of these levels. This section introduces the pollutants governed by these regulations and describes the regulation and policies that are relevant to the proposed project.

2.1 Pollutant-Specific Overview

Air pollutants are governed by multiple federal and state standards to regulate and mitigate health impacts. At the federal level, there are six criteria pollutants for which National Ambient Air Quality Standards (NAAQS) have been established: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter (PM) with an aerodynamic diameter of 10 micrometers (PM_{10}), fine particulate matter with an aerodynamic diameter of 2.5 micrometers ($PM_{2.5}$), and lead (Pb). The U.S. EPA has also identified nine priority mobile source air toxics: 1,3-butadiene[7], acetaldehyde, acrolein, benzene, diesel particulate matter (DPM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. In California, sulfate (SO_4), visibility reducing particles, hydrogen sulfide, and vinyl chloride are also regulated.

2.1.1 Criteria Pollutants

The Clean Air Act requires the U.S. EPA to set NAAQS for six criteria air contaminants: O_3, PM, CO, NO_2, Pb, and SO_2. It also permits states to adopt additional or more protective air quality standards if needed. California has set standards for certain pollutants. Table 3 documents the current state and federal ambient air quality, summarizes the sources and health effects of the criteria pollutants, and lists the State and Federal attainment status.

[7] 1-3-butadiene is an organic compound that is a found in the emissions from motor vehicles.

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

Pollutant	Averaging Time	State[1] Standard	Federal[2] Standard	Principal Health and Atmospheric Effects	Typical Sources	State Project Area Attainment Status	Federal Project Area Attainment Status
Ozone (O_3)[3]	1 hour	0.09 ppm[4]	---	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute.	Low-altitude ozone is almost entirely formed from reactive organic gases/volatile organic compounds (ROG or VOC) and nitrogen oxides (NOx) in the presence of sunlight and heat. Common precursor emitters include motor vehicles and other internal combustion engines, solvent evaporation, boilers, furnaces, and industrial processes.	Nonattainment	---
	8 hours	0.070 ppm	0.070 ppm (4^{th} highest in 3 years)			Nonattainment	Nonattainment (Marginal)
Carbon Monoxide (CO)[5]	1 hour	20 ppm	35 ppm	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical ozone. Colorless, odorless.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.	Attainment	Attainment/ Maintenance
	8 hours	9.0 ppm	9 ppm			Attainment	Attainment/ Maintenance
	8 hours (Lake Tahoe)	6 ppm	---			Attainment	---
Respirable Particulate Matter (PM_{10})[6]	24 hours	50 µg/m^3[7]	150 µg/m^3 (expected number of days above standard < or equal to 1)	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many toxic & other aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke & vehicle exhaust; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources.	Nonattainment	Unclassifiable/ Attainment
	Annual	20 µg/m^3	---[6]			Nonattainment	---
Fine Particulate Matter ($PM_{2.5}$)[8]	24 hours	---	35 µg/m^3[6]	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many toxic & other aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical and photochemical reactions involving other pollutants including NOx, sulfur oxides (SOx), ammonia, and ROG.	---	Nonattainment (Moderate)
	Annual	12 µg/m^3	12.0 µg/m^3			Nonattainment	Nonattainment (Moderate)

Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm	0.100 ppm[1]	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain & nitrate contamination of stormwater. Part of the "NOx" group of ozone precursors.	Motor vehicles and other mobile or portable engines, especially diesel; refineries; industrial operations.	Attainment	Unclassifiable/ Attainment
	Annual	0.030 ppm	0.053 ppm			Attainment	Unclassifiable/ Attainment
Sulfur Dioxide (SO_2)[2]	1 hour	0.25 ppm	0.075 ppm (99th percentile over 3 years)	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.	Attainment	Unclassifiable/ Attainment
	3 hours	---	0.5 ppm[3]			---	Unclassifiable/ Attainment
	24 hours	0.04 ppm	0.14 ppm (for certain areas)			Attainment	Unclassifiable/ Attainment
	Annual	---	0.030 ppm (for certain areas)			---	Unclassifiable/ Attainment
Lead (Pb)[4]	Monthly	1.5 µg/m^3	---	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant.	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from older gasoline use may exist in soils along major roads.	Attainment	---
	Calendar Quarter	---	1.5 µg/m^3 (for certain areas)			---	Unclassifiable/ Attainment
	Rolling 3-month average	---	0.15 µg/m^3[5]			---	Unclassifiable/ Attainment
Sulfates	24 hours	25 µg/m^3	---	Premature mortality and respiratory effects. Contributes to acid rain. Some toxic air contaminants attach to sulfate aerosol particles.	Industrial processes, refineries and oil fields, mines, natural sources like volcanic areas, salt-covered dry lakes, and large sulfide rock areas.	Attainment	N/A
Hydrogen Sulfide (H_2S)	1 hour	0.03 ppm	---	Colorless, flammable, poisonous. Respiratory irritant. Neurological damage and premature death. Headache, nausea. Strong odor.	Industrial processes such as: refineries and oil fields, asphalt plants, livestock operations, sewage treatment plants, and mines. Some natural sources like volcanic areas and hot springs.	Unclassified	N/A
Visibility Reducing Particles (VRP)[6]	8 hours	Visibility of 10 miles or more (Tahoe: 30 miles) at relative humidity less than 70%	---	Reduces visibility. Produces haze. NOTE: not directly related to the Regional Haze program under the Federal Clean Air Act, which is oriented primarily toward visibility issues in National Parks and other "Class I" areas. However, some issues and measurement methods are similar.	See particulate matter above. May be related more to aerosols than to solid particles.	Unclassified	N/A

Vinyl Chloride**Error! Bookmark not defined.Error! Bookmark not defined.**	24 hours	0.01 ppm	---	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes	No Information Available	N/A

Adapted from the California ARB Air Quality Standards chart (http://www.arb.ca.gov/research/aaqs/aaqs2.pdf).

Greenhouse Gases and Climate Change: Greenhouse gases do not have concentration standards for that purpose. Conformity requirements do not apply to greenhouse gases.

[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] Federal 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 µg/m3 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.

[1] On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm. Transportation conformity applies in newly designated nonattainment areas for the 2015 national 8-hour ozone primary and secondary standards on and after August 4th, 2019 (see Transportation Conformity Guidance for 2015 Ozone NAAQS Nonattainment Areas).

[1] ppm = parts per million

[1] Transportation conformity requirements for CO no longer apply after June 1, 2018 for the following California Carbon Monoxide Maintenance Areas (see U.S. EPA CO Maintenance Letter).

[1] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m3 to 12 µg/m3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m3, as was the annual secondary standard of 15 µg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

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

[1] The 65 $\mu g/m^3$ $PM_{2.5}$ (24-hr) NAAQS was not revoked when the 35 $\mu g/m^3$ NAAQS was promulgated in 2006. The 15 $\mu g/m^3$ annual $PM_{2.5}$ standard was not revoked when the 12 $\mu g/m^3$ standard was promulgated in 2012. Therefore, for areas designated nonattainment or nonattainment/maintenance for the 1997 and or 2006 $PM_{2.5}$ NAAQS, conformity requirements still apply until the NAAQS are fully revoked.

[1] Final 1-hour NO_2 NAAQS published in the Federal Register on 2/9/2010, effective 3/9/2010. Initial area designation for California (2012) was attainment/unclassifiable throughout. Project-level hot spot analysis requirements do not currently exist. Near-road monitoring starting in 2013 may cause re-designation to nonattainment in some areas after 2016.

[1] 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 75ppb. 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.

[1] Secondary standard, the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant rather than health. Conformity and environmental analysis address both primary and secondary NAAQS.

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

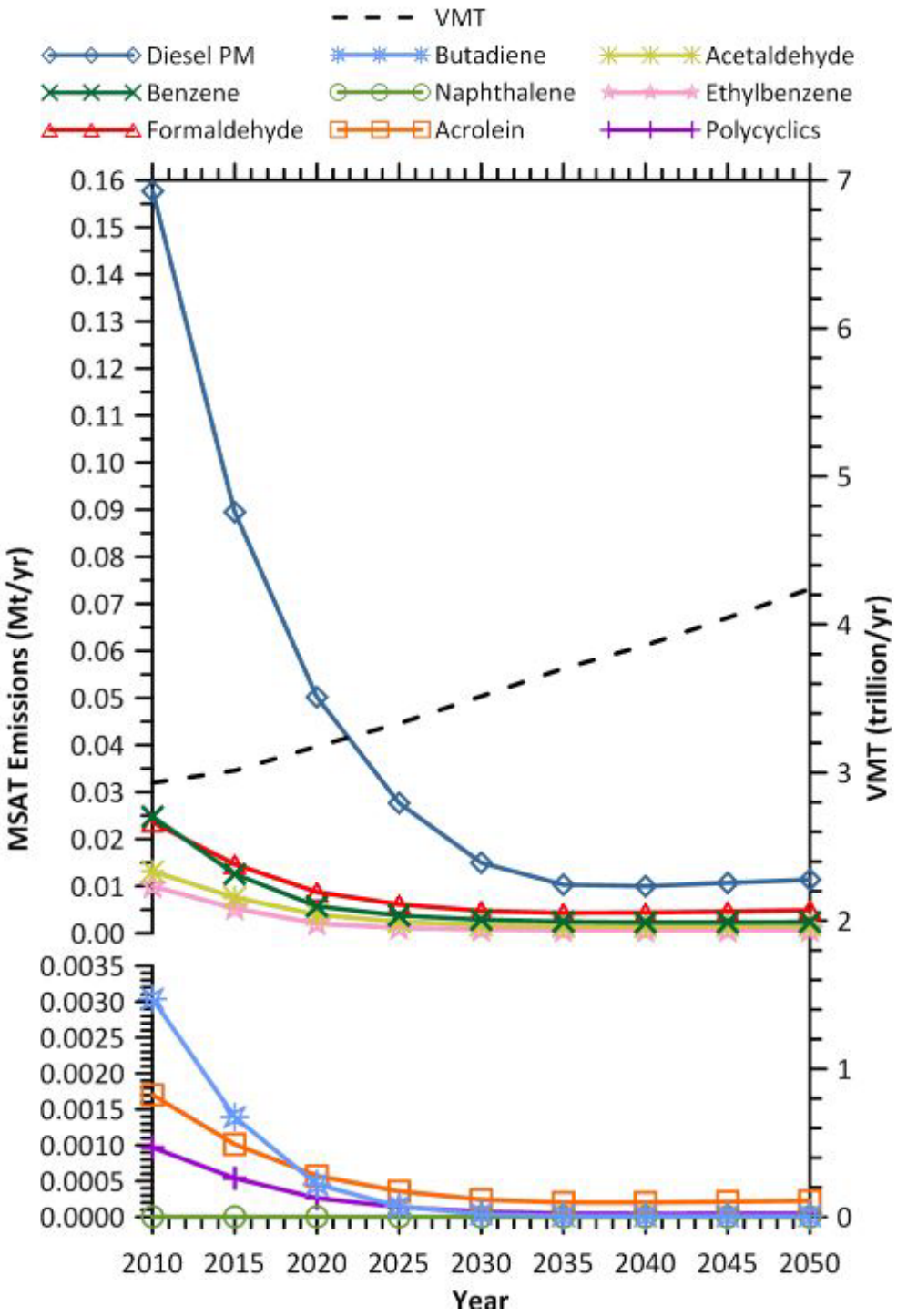
[1] Lead NAAQS are not considered in Transportation Conformity analysis.

[1] 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.

2.1.2 Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. EPA regulate 188 air toxics, also known as hazardous air pollutants. The U.S. EPA assessed this expansive list in its 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 part of U.S. EPA's Integrated Risk Information System (IRIS) (https://www.epa.gov/iris). In addition, the U.S. EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-hazard contributors from the 2011 National Air Toxics Assessment (NATA) (https://www.epa.gov/national-air-toxics-assessment). These are *1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter, ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter*. While the FHWA considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future U.S. EPA rules.

The 2007 U.S. EPA rule mentioned above requires controls that will dramatically decrease Mobile Source Air Toxics (MSAT) emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using U.S. EPA's MOVES2014a model, even if vehicle activity (vehicle-miles traveled, VMT) increases by 45% from 2010 to 2050 as forecast, a combined reduction of 91% in the total annual emission rate for the priority MSATs is projected for the same time period, as shown in Figure 7.



Note: *Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors*

Source: https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/

Figure 7 - Projected National MSAT Trends, 2010-2050

2.1.3 Greenhouse Gases

The term greenhouse gas (GHG) is used to describe atmospheric gases that absorb solar radiation and subsequently emit radiation in the thermal infrared region of the energy spectrum, trapping heat in the Earth's atmosphere. These gases include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and water vapor, among others. A growing body of research attributes long-term changes in temperature, precipitation, and other elements of Earth's climate to large increases in GHG emissions since the mid-nineteenth century, particularly from human activity related to fossil fuel combustion. Anthropogenic GHG emissions of particular interest include CO2, CH4, N2O, and fluorinated gases.

GHGs differ in how much heat each traps in the atmosphere (global warming potential, or GWP). CO2 is the most important GHG, so amounts of other gases are expressed relative to CO2, using a metric called "carbon dioxide equivalent" (CO2e). The global warming potential of CO2 is assigned a value of 1, and the warming potential of other gases is assessed as multiples of CO2. For example, the 2007 International Panel on Climate Change Fourth Assessment Report calculates the GWP of CH4 as 25 and the GWP of N2O as 298, over a 100-year time horizon. Generally, estimates of all GHGs are summed to obtain total emissions for a project or given time period, usually expressed in metric tons (MTCO2e), or million metric tons (MMTCO2e).

As evidence has mounted for the relationship of climate changes to rising GHGs, federal and state governments have established numerous policies and goals targeted to improving energy efficiency and fuel economy, and reducing GHG emissions. Nationally, electricity generation is the largest source of GHG emissions, followed by transportation. In California, however, transportation is the largest contributor to GHGs.

At the federal level, the National Environmental Policy Act (NEPA) (42 United States Code [USC] Part 4332) requires federal agencies to assess the environmental effects of their proposed actions prior to making a decision on the action or project.

To date, no national standards have been established for nationwide mobile-source GHG reduction targets, nor have any regulations or legislation been enacted specifically to address climate change and GHG emissions reduction at the project level. However, the U.S. EPA and the National Highway Traffic Safety Administration (NHTSA) issued the first corporate fuel economy (CAFE) standards in 2010, requiring cars and light-duty vehicles to achieve certain fuel economy targets by 2016, with the intention of gradually increasing the targets and the range of vehicles to which they would apply.

California has enacted aggressive GHG reduction targets, starting with Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006. AB 32 is California's signature climate change legislation. It set the goal of reducing statewide GHG emissions to 1990 levels by 2020, and required the ARB to develop a Scoping Plan that describes the approach California will take to achieve that goal and to update it every 5 years. In 2015, Governor Jerry Brown enhanced the overall adaptation planning effort with Executive Order (EO) B-30-15, establishing an interim GHG reduction goal of 40% below

1990 levels by 2030, and requiring state agencies to factor climate change into all planning and investment decisions.

Senate Bill (SB) 375, the Sustainable Communities and Climate Protection Act of 2008, furthered state climate action goals by mandating coordinated transportation and land use planning through preparation of sustainable communities strategies (SCS). The ARB sets GHG emissions reduction targets for passenger vehicles for each region. Each regional metropolitan planning organization must include in its regional transportation plan an SCS proposing actions toward achieving the regional emissions reduction targets.

With these and other State Senate and Assembly bills and executive orders, California advances an innovative and proactive approach to dealing with GHG emissions and climate change.

2.1.4 Asbestos

Asbestos is a term used for several types of naturally occurring fibrous minerals that are a human health hazard when airborne. The most common type of asbestos is chrysotile, but other types such as tremolite and actinolite, are also found in California. Asbestos is classified as a known human carcinogen by state, federal, and international agencies and was identified as a toxic air contaminant by the ARB in 1986. All types of asbestos are hazardous and may cause lung disease and cancer.

Asbestos can be released from serpentine and ultramafic rocks when the rock is broken or crushed. At the point of release, the asbestos fibers may become airborne, causing air quality and human health hazards. These rocks are commonly used for unpaved gravel roads, landscaping, fill projects, and other improvement projects in some localities. Asbestos may be released to the atmosphere due to vehicular traffic on unpaved roads, during grading for development projects, and at quarry operations. All of these activities may have the effect of releasing potentially harmful asbestos into the air. Natural weathering and erosion processes can act on asbestos-bearing rock and make it easier for asbestos fibers to become airborne if such rock is disturbed.

Serpentine may contain chrysotile asbestos, especially near fault zones. Ultramafic rock, a rock closely related to serpentinite, may also contain asbestos minerals. Asbestos can also be associated with other rock types in California, though much less frequently than serpentinite and/or ultramafic rock. Serpentinite and/or ultramafic rock are known to be present in 44 of California's 58 counties. These rocks are particularly abundant in counties of the Sierra Nevada foothills, the Klamath Mountains, and Coast Ranges. The California Department of Conservation, Division of Mines and Geology developed a map showing the general location of ultramafic rock in the state[8]. The California Department of Conservation, Division of Mines and Geology has developed a map showing the general location of ultramafic rock in the state. The project site is not located in any areas identified as containing natural occurring asbestos.

[8] https://www.conservation.ca.gov/cgs/minerals/mineral-hazards/asbestos

2.2 Regulations

2.2.1 Federal and California Clean Air Act

The Federal Clean Air Act (FCAA), as amended, is the primary federal law that governs air quality while the CCAA is its companion state law. These laws and related regulations by the U.S. EPA and California Air Resource Board (ARB) set standards for the concentration of pollutants in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and state ambient air quality standards establish six transportation-related criteria pollutants that are linked to potential health concerns: CO, NO_2, O_3, PM, which is broken down for regulatory purposes into particles of 10 micrometers or smaller (PM_{10}) and particles of 2.5 micrometers and smaller ($PM_{2.5}$), and SO_2. In addition, national and state standards exist for lead, and state standards exist for visibility reducing particles, SO_4, hydrogen sulfide, and vinyl chloride. The NAAQS and state standards are set at levels that protect public health with a margin of safety and are subject to periodic review and revision. Both state and federal regulatory schemes also cover toxic air contaminants (air toxics); some criteria pollutants are also air toxics or may include certain air toxics in their general definition.

2.2.2 Transportation Conformity

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

Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. The U.S. EPA regulations at 40 CFR 93 govern the conformity process. Conformity requirements do not apply in unclassifiable/attainment areas for NAAQS and do not apply for state standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS for CO, NO_2, O_3, $PM_{10,}$ $PM_{2.5}$, and in some areas (although not in California), SO_2. California has attainment or maintenance areas for all of these transportation-related "criteria pollutants" except SO_2, and also has a nonattainment area for lead; however, lead is not currently required by the FCAA to be covered in transportation conformity analyses. Regional conformity is based on emission analyses of Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all transportation projects planned for a region over a period of at least 20 years (for the RTP), and 4 years (for the FTIP). RTP and FTIP conformity uses travel

demand and emission models to determine whether or not the implementation of those projects would conform to emission budgets or other tests at various analysis years showing that requirements of the Clean Air Act and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), FHWA, and FTA make the determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the Clean Air Act. Otherwise, the projects in the RTP and/or FTIP must be modified until conformity is attained. If the design concept, scope, and "open-to-traffic" schedule of a proposed transportation project are the same as described in the RTP and the TIP, then the proposed project meets regional conformity requirements for purposes of project-level analysis.

Project-level conformity is achieved by demonstrating that the project comes from a conforming RTP and TIP and the project has a design concept and scope[9] that has not changed significantly from those in the RTP and TIP. If the design concept and scope have changed substantially from that used in the RTP Conformity analysis, RTP and TIP amendments may be needed. Project-level conformity also needs to demonstrate that project analyses have used the latest planning assumptions and U.S. EPA-approved emissions models and the project complies with any control measures in the SIP in PM areas. Furthermore, additional analyses (known as hot-spot analyses) may be required for projects located in CO and PM nonattainment or maintenance areas to examine localized air quality impacts.

2.2.3 National Environmental Policy Act

NEPA requires that policies and regulations administered by the federal government are consistent with its environmental protection goals. NEPA also requires that federal agencies use an interdisciplinary approach to planning and decision-making for any actions that could impact the environment. It requires environmental review of federal actions including the creation of Environmental Documents that describe the environmental effects of a proposed project (including a section on air quality impacts).

2.2.4 California Environmental Quality Act

CEQA[10] is a statute that requires State and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. CEQA documents address CCAA requirements for transportation projects. While state standards are often more strict than federal standards, the State has no conformity process.

[9] "Design concept" means the type of facility that is proposed, such as a freeway or arterial highway. "Design scope" refers to those aspects of the project that would clearly affect capacity and thus any regional emissions analysis, such as the number of lanes and the length of the project.

[10] For general information about CEQA, see: http://resources.ca.gov/ceqa/more/faq.html.

2.2.5 Local

The U.S. EPA has delegated responsibility to air districts to establish local rules to protect air quality. Caltrans' Standard Specification 14-9.02 (Caltrans, 2015) requires compliance with all applicable air quality laws and regulations including local and air district ordinances and rules, as described below.

Plan Bay Area

SB 375 requires the Bay Area regional planning agencies to include a SCS in their regional transportation plan updates to describe how the GHG emissions reductions set by CARB would be met through land-use and transportation planning. In 2010, the MTC approved a set of "*Bay Area Principles for Establishing Regional Greenhouse Gas Reduction Targets*" (Resolution 3970) that proposed per-capita GHG emission reductions of 7 percent from 1990 by 2020 and 15 percent by 2035. Subsequently, MTC, along with the Association of Bay Area Governments (ABAG), developed the SCS plans to meet state targets for reducing greenhouse gas emissions from light-duty vehicles. Plan Bay Area 2040 is the update to this plan, which includes implementation of transportation projects and Climate Initiatives Program that, together, would result in emissions from light-duty vehicles that meet the region's GHG reduction targets, per SB 375.[11] The proposed project is part of the Plan Bay Area 2040 transportation network.

The U.S. EPA has delegated responsibility to air districts to establish local rules to protect air quality. Caltrans' Standard Specification 14-9.02 (Caltrans, 2015) requires compliance with all applicable air quality laws and regulations including local and air district ordinances and rules.

Bay Area 2017 Clean Air Plan

The Bay Area 2017 Clean Air Plan (CAP) is a multi-pollutant plan prepared by the BAAQMD that addresses GHG emissions along with other air emissions in the San Francisco Bay Area Air Basin. One of the key objectives in the CAP is climate protection. The 2017 CAP includes emission control measures in five categories: Stationary Source Measures, Mobile Source Measures, Transportation Control Measures, Land Use and Local Impact Measures, and Energy and Climate Measures. Consistency of a project with current control measures is one measure of its consistency with the CAP. The current CAP also includes performance objectives, consistent with the State's climate protection goals under SB 32, designed to reduce emissions of GHGs to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

[11] MTC and ABAG. 2017. *Plan Bay Area 2040 Draft EIR SCH# 2016052041*. April.

BAAQMD Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in the updated CEQA Guidelines (updated 2011 and recently in May 2017). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 4. These thresholds are given for informational purposes and are not used in this analysis to determine significance.

Table 4 - Air Quality Significance Thresholds

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	Average Daily Emissions (lbs./day)	Annual Average Emissions (tons/year)
ROG	54	54	10
NO_x	54	54	10
PM_{10}	82 (Exhaust)	82	15
$PM_{2.5}$	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Greenhouse Gas Emissions			
Land Use Projects – direct and indirect emissions	Compliance with a Qualified GHG Reduction Strategy OR 1,100 metric tons annually or 4.6 metric tons per capita (for 2020) 660 metric tons annually or 2.8 metric tons per capita (for 2030)*		
Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM_{10} = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, $PM_{2.5}$ = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less. GHG = greenhouse gases. *BAAQMD does not have a recommended post-2020 GHG threshold.			

Source: Bay Area Air Quality Management District, 2017

3. Affected Environment

The topography of a region can substantially impact air flow and resulting pollutant concentrations. California is divided into 15 air basins with similar topography and meteorology to better manage air quality throughout the state. Each air basin has a local air district that is responsible for identifying and implementing air quality strategies to comply with ambient air quality standards.

The I-280/Wolfe Road Interchange Improvement Project is located in the City of Cupertino in Santa Clara County, an area within the San Francisco Bay Area Air Basin, which includes Alameda, Contra Costa, Marin, San Francisco, San Mateo and Santa Clara counties, the western portion of Solano County and the southern portion of Sonoma County. Air quality regulation in San Francisco Bay Area Air Basin is administered by the Bay Area Air Quality Management District. Current and forecasted population for Santa Clara County is 1,954,286 individuals per the population and housing estimates from the State of California Department of Finance. The county's economy is largely driven by professional, scientific, and technical services, manufacturing, and health care.

3.1 Climate, Meteorology, and Topography

Meteorology (weather) and terrain can influence air quality. Certain weather parameters are highly correlated to air quality, including temperature, the amount of sunlight, and the type of winds at the surface and above the surface. Winds can transport O_3 and O_3 precursors from one region to another, contributing to air quality problems downwind of source regions. Furthermore, mountains can act as a barrier that prevents O_3 from dispersing.

The project site is in the San Francisco Bay Area Air Basin and is under the jurisdiction of BAAQMD. The Santa Clara Valley is bounded by mountain ranges to the northeast (Diablo Range) and southwest (Santa Cruz Mountains). The San Francisco Bay is north of Santa Clara Valley. During the summer, mostly clear skies result in warm daytime temperatures and cool nights in the Santa Clara Valley (average 68°Fahrenheit in July). Winter temperatures are mild, except for very cool but generally frost-less mornings (average 49°Fahrenheit in January). Further inland where the moderating effect of the bay is not as strong, temperature extremes are greater. Wind patterns are influenced by local terrain, with a northwesterly sea breeze typically developing during the daytime. Winds are usually stronger in the spring and summer. Winds also prevail normally from a northwest direction in the Santa Clara Valley as seen in Figure 8. Rainfall amounts are modest, ranging from 13 inches in the lowlands to 20 inches in the hills.

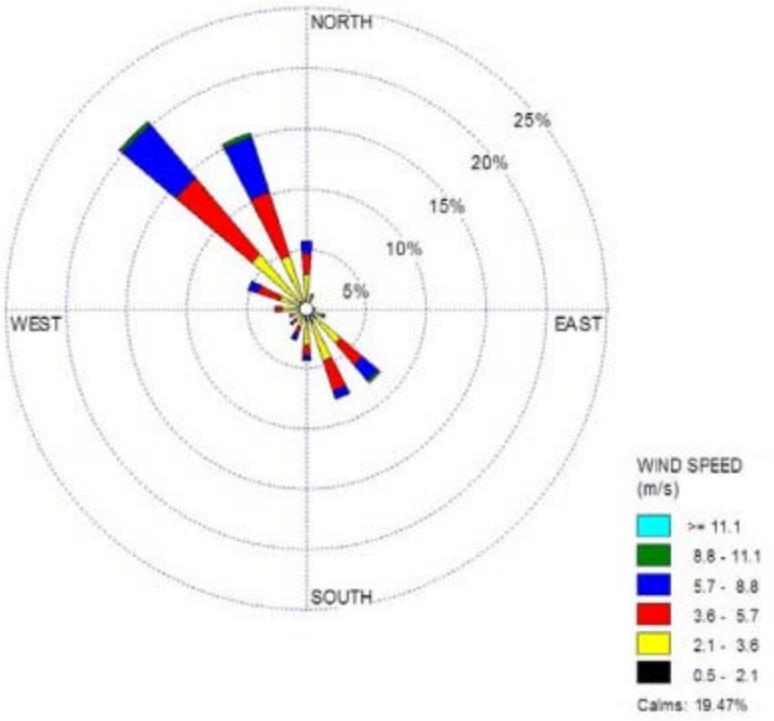


Figure 8 - Predominant Wind Patterns from San José International Airport

Source https://www.arb.ca.gov/ch/communities/ra/westoakland/documents/appendixf_final.pdf

3.2 Existing Air Quality

This section summarizes existing air quality conditions near the proposed project area. The closest air monitoring station that actively monitors meteorological conditions and air pollutants is in City of San Jose approximately 9 miles northeast of the project site (158 Jackson Street). There are air monitoring stations in the City of Cupertino however, there are no data for years past 2013. Figure 9 shows the location of the monitoring site compared to the project location. Data from the monitoring site includes attainment statuses for criteria pollutants, describes local ambient concentrations of criteria pollutants for the past 5 years, and discusses MSAT and GHG emissions.

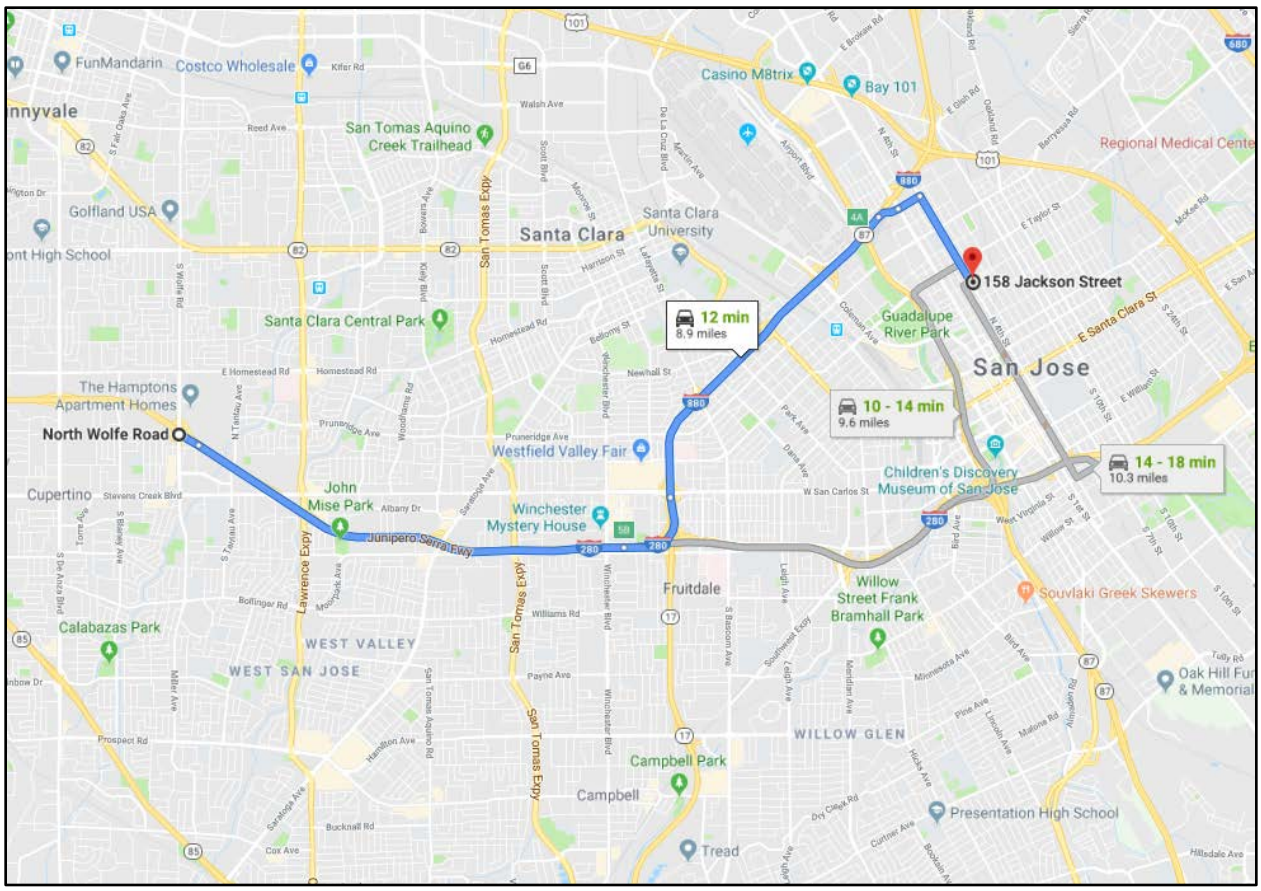


Figure 9 - Map of Air Quality Monitoring Station Located Near the Project.
Source Google Maps, 2019

3.2.1 Criteria Pollutants and Attainment Status

Table 5 lists air quality trends in data collected at the San Jose Station for the past 5 years. Applicable SIP documentation is also provided in Table 6.

Table 5 - Air Quality Concentrations for the Past 5 Years Measured at the San Jose Station

Pollutant	Standard	2013	2014	2015	2016	2017
Ozone						
Max 1-hr concentration		93 ppb	89 ppb	94 ppb	87 ppb	121 ppb
No. days exceeded: State	90 ppb	0	0	0	0	3
Max 8-hr concentration		79 ppb	66 ppb	81 ppb	66 ppb	98 ppb
No. days exceeded: State	70 ppb	1	0	2	0	4
Federal	70 ppb	1	0	2	0	4
Carbon Monoxide						
Max 1-hr concentration		3.1 ppm	2.4 ppm	2.4 ppm	2.0 ppm	2.1 ppm
No. days exceeded: State	20 ppm	0	0	0	0	0
Federal	35 ppm	0	0	0	0	0
Max 8-hr concentration		2.5 ppm	1.9 ppm	1.8 ppm	1.4 ppm	1.8 ppm
No. days exceeded: State	9.0 ppm	0	0	0	0	0
Federal	9 ppm	0	0	0	0	0
PM_{10}						
Max 24-hr concentration		58 µg/m^3	55 µg/m^3	58 µg/m^3	41 µg/m^3	70 µg/m^3
No. days exceeded: State	50 µg/m^3	15	3	3	0	19
Federal	150 µg/m^3	0	0	0	0	0
Max annual concentration		22.3 µg/m^3	19.9 µg/m^3	22.0 µg/m^3	18.5 µg/m^3	21.6 µg/m^3
No. days exceeded: State	20 µg/m^3	-	-	-	-	-
$PM_{2.5}$						
Max 24-hr concentration		57.7 µg/m^3	60.4 µg/m^3	49.4 µg/m^3	22.6 µg/m^3	49.7 µg/m^3
No. days exceeded: Federal	35 µg/m^3	6	2	2	0	6
Annual Concentration		12.4 µg/m^3	8.4 µg/m^3	10.0 µg/m^3	8.4 µg/m^3	9.5 µg/m^3
No. days exceeded: State	12 µg/m^3	-	-	-	-	-
Federal	12.0 µg/m^3	-	-	-	-	-
Nitrogen Dioxide						
Max 1-hr concentration		59 ppb	58 ppb	49 ppb	51 ppb	68 ppb
No. days exceeded: State	180 ppb	0	0	0	0	0
Federal	100 ppb	0	0	0	0	0
Annual Concentration		15 ppb	13 ppb	13 ppb	11 ppb	12 ppb
No. days exceeded: State	30 ppb	-	-	-	-	-
Federal	53 ppb	-	-	-	-	-

Source: Bay Area Air Quality Management District, 2019 & California Air Resources Air Quality Trend Summaries, 2019

Table 6 - Status of SIPs Relevant to the Project Area.

Name/Description	Status
O_3	Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard (2001)
$PM_{2.5}$	No SIP required. Bay Area Winter Emissions Inventory for Primary $PM_{2.5}$ & PM Precursors: Year 2010 (2012)
CO	No Conformity requirements. 2004 Revision to the California State Implementation Plan for Carbon Monoxide (2004)

3.2.2 Mobile Source Air Toxics

There are no rail yards, transit terminals, or other nearby facilities serving on- or off-road motor vehicles that may be considered priority MSAT pollutant sources in the project area. Ambient MSAT data, which are available from ARB's website (http://www.arb.ca.gov/adam/toxics/toxics.html), do not include any monitoring data near the project site.

3.2.3 Greenhouse Gas and Climate Change

Carbon dioxide, as part of the carbon cycle, is an important compound for plant and animal life, but also accounted for 84% of California's total GHG emissions in 2015. Transportation, primarily on-road travel, is the single largest source of CO_2 emissions in the State. The project is located within the City of Cupertino's Climate Action Plan (CAP) in Santa Clara County. The CAP was adopted by the City in January 2015. It is also included in the Plan Bay Area Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). The base year used for the existing conditions in the RTP/SCS was 2010, with the exception of GHG emissions, where 2005 was the base year for one criterion to demonstrate compliance with SB 375. The design year (future conditions) for the RTP/SCS is 2040, when it is assumed that Plan Bay Area will be fully implemented. Plan Bay Area covers an approximately 25-year planning period, and the year 2040 represents the last year of the plan when projects/programs are anticipated to be fully implemented.

3.3 Sensitive Receptors

The BAAQMD defines sensitive receptors to include residential dwellings, including apartments, houses, and condominiums; schools, colleges, and universities; daycare centers and hospitals, and senior-care facilities. Based on research showing that the zone of greatest concern near roadways is within 500 feet (or 150 meters), sensitive receptors within 500 feet (or 150 meters) of the project footprint have been identified and included in Table 7 (CARB 2005). An expanded buffer distance of 1,000 was used in this analysis due to the short distance between the sensitive receptors and the project.

Most of the surrounding area is developed with residential and commercial uses. The majority of residential or potentially sensitive receptors are located within 90-230 feet from the project site. Receptors greater than 500 feet from the project would not be affected by localized air pollution from the project as much as those located within 500 feet of the project. Figure 10 shows the locations of sensitive receptors relative to the project site.

Table 7 - Sensitive Receptors Located Within 1,000 feet of the Project Site.

Identifying Number	Receptor	Address	Description	Distance Between Receptor and Project (feet)*
1	The Hamptons Apartment Homes	19500 Pruneridge Ave, Cupertino, CA 95014	Multi-family Residential Buildings	115
2	Arioso Apartments	19608 Pruneridge Ave, Cupertino, CA 95014	Multi-family Residential Buildings	440
3	Mine Court	10630, 10632, 10633, 10631 Mine Court	Single-Family Residences	150
4	Parkview Court and Shetland Place	19701-19725 Parkview Court & 848, 846, 840, 832 Shetland Place	Single-Family Residences	300
5	Suburban Neighborhood	Drake Drive, Auburn Drive, Merritt Drive, Norwich Avenue, Denison Avenue, & Colby Avenue	Single-Family Residences	90

*The distance of the closest sensitive receptor was reported.

Figure 10 - Map of Sensitive Receptors Located Near the Proposed Project

3.4 Conformity Status

3.4.1 Regional Conformity

The project is included in the regional emissions analysis conducted by MTC for the current RTP, Plan Bay Area 2040 (ABAG and MTC 2017a, RTP ID 17-07-0026). The regional emissions analysis found that significant projects in the San Francisco Bay Area will conform to the SIP for attaining and/or maintaining the NAAQS as provided in Section 176(c) of the Clean Air Act. FHWA and FTA determined that the RTP conforms to the SIP on August 23, 2017. The project is also included in the MTC's financially constrained 2019 TIP (TIP ID SCL 190011).

The TIP gives priority to eligible Transportation Control Measures (TCMs) identified in the SIP and provides sufficient funds to provide for their implementation. The 2019 TIP was evaluated to demonstrate air quality conformity to the SIP. The project's design concept, scope, and open-to-traffic

date assumptions are generally consistent with the regional emissions analysis performed for the current RTP and TIP. Therefore, the project will not interfere with the timely implementation of any TCMs identified in the SIP. Information from relevant pages of the RTP, TIP and fund management system (FMS) are included in Appendix A.

3.4.2 Project-Level Conformity

The San Francisco Bay Area Air Basin was designated as a federal attainment area for CO, and the project is in a federal nonattainment area for O_3 and $PM_{2.5}$[12]. The area is still considered maintenance for the CO NAAQS; however, the CO SIP conformity requirements ended in June 2018. (See Appendix D).

The San Francisco Bay Area Air Basin is currently designated as a federal nonattainment area for O_3. Since O_3 impacts are regional in nature, projects that are included in an RTP and TIP have already undergone regional conformity analysis and do not require further analysis for a project-level conformity determination. This project is included in a conforming RTP and TIP, and therefore emissions of O_3 precursors from project-related traffic are not anticipated to cause or contribute to, or worsen, any O_3 violations.

In addition, the BAAQMD adopted the 2017 Clean Air Plan (CAP) to plan for and achieve compliance with the federal and state O_3 standards (BAAQMD 2017). The three Build Alternatives would not interfere with the control measures described in the 2017 CAP. Furthermore, the three Build Alternatives would provide transportation benefits that reduce pollutant emissions, including O_3 precursors, by improving traffic operations and efficiency.

40 CFR 93.123(c)(5) states that: "CO, PM_{10}, and $PM_{2.5}$ hot-spot analyses are not required to consider construction-related activities which cause temporary increases in emissions. Each site which is affected by construction-related activities shall be considered separately, using established 'Guideline' methods. Temporary increases are defined as those which occur only during the construction phase and last five years or less at any individual site." Since construction of the project is expected to last less than five years, an evaluation of CO, PM_{10}, and $PM_{2.5}$ emissions during project construction is not required for a project-level conformity determination.

3.4.3 Interagency Consultation

VTA, as the project sponsor, initiated consultation with the Air Quality Conformity Task Force by submitting a Project Assessment Form for $PM_{2.5}$ Interagency Consultation. On October 24, 2019, the Task Force considered projected future traffic conditions, with and without the project, and whether the project meets the specific regulatory definition of a project of air quality concern (POAQC) set forth

[12] On March 21, 2018, U.S. EPA informed the California Air Resources Board that the transportation conformity requirements for CO ended on June 1, 2018, as the region has the region has been designated maintenance for 20 years. The region is now designated "Attainment."

in 40 CFR Part 93. As documented in Appendix B, the Task Force determined that the project is not a POAQC.

3.5 NEPA Analysis/Requirement

Caltrans, as assigned by the FHWA, is the lead agency under NEPA. The analysis addresses federal criteria pollutants (O_3, PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, and lead), MSATs and asbestos. The project is in the MTC non-attainment/maintenance area for air quality and is listed in MTC's 2019 TIP (TIP ID SCL190011) and the RTP (RTP number 17-07-0026). The future No Build scenario emissions were compared to the future Build scenario emissions. Nonattainment pollutants include O_3 and $PM_{2.5}$, the region is "Attainment/Maintenance" for CO[13].

3.6 CEQA Analysis/Requirement

Caltrans is the lead agency under CEQA. For CEQA, the analysis addresses pollutants for which California has established air quality standards (O_3, PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2, Pb, visibility-reducing particles, SO_4, H_2S, and vinyl chloride), as well as GHGs, MSATs, and asbestos. Similar to NEPA, analysis/documentation requirements for CEQA vary by pollutant (see the table in Section 2.5.5) Caltrans is the lead agency and does not require a separate CEQA analysis.

[13] Adams, Elizabeth J., United States Environmental Protection Agency, Received by Aljabiry, Muhaned, Chief Office of Federal Transportation Management Program California Department of Transportation, March 21, 2018.

4. Environmental Consequences

This section describes the methods, impact criteria, and results of air quality analyses of the proposed project. Analyses in this report were conducted using methodology and assumptions that are consistent with the requirements of NEPA, CEQA, the CAAAs of 1990, and the CCAA of 1988. The analyses also use guidelines and procedures provided in applicable air quality analysis protocols, such as the Transportation Project-Level Carbon Monoxide Protocol (CO Protocol) (Garza et al., 1997), Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in PM_{10} and $PM_{2.5}$ Nonattainment and Maintenance Areas (U.S. EPA, 2015), and the FHWA Updated Interim Guidance on Air Toxics Analysis in NEPA Documents (FHWA, 2016).

4.1 Impact Criteria

Project-related emissions would have an adverse environmental impact if they result in pollutant emissions levels that either create or worsen a violation of an ambient air quality standard or contribute to an existing air quality violation.

The NAAQS were used to evaluate air quality impacts from a Caltrans (NEPA) perspective. The CT-EMFAC 2014 (Version 6.0), Caltrans's Ethylbenzene tool, and the Sacramento Metropolitan Air Quality Management District's Road Construction Emissions Model (RCEM), Version 9.0 were used to calculate the emissions from the project. A construction data sheet was provided with details about the construction schedule, equipment inventories, and equipment usage. Earthwork volumes were also provided for each alternative (See Appendix C).

4.2 Short-Term Effects (Construction Emissions)

4.2.1 Construction Equipment, Traffic Congestion, and Fugitive Dust

Site preparation and roadway construction would involve clearing, cut-and-fill activities, grading, and paving roadway surfaces. During construction, short-term degradation of air quality is expected from the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities related to construction. Emissions from construction equipment powered by gasoline and diesel engines are also anticipated and would include CO, NOx, VOCs, directly emitted PM_{10} and $PM_{2.5}$, and toxic air contaminants (TACs) such as diesel exhaust particulate matter. Construction activities are expected to increase traffic congestion in the area, resulting in increased emissions from

traffic during the delays. These emissions would be temporary and limited to the immediate area surrounding the construction site.

Under the transportation conformity regulations (40 CFR 93.123(c)(5)), construction-related activities that cause temporary increases in emissions are not required in a hot-spot analysis. These temporary increases in emissions are those that occur only during the construction phase and last five years or less at any individual site. They typically fall into two main categories:

- *Fugitive Dust*: A major emission from construction due to ground disturbance. All air districts and the California Health and Safety Code (Sections 41700-41701) prohibit "visible emissions" exceeding three minutes in one hour – this applies not only to dust but also to engine exhaust. In general, this is interpreted as visible emissions crossing the right-of-way line.

  Sources of fugitive dust include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site may deposit mud on local streets, which could be an additional source of airborne dust after it dries. PM_{10} emissions may vary from day to day, depending on the nature and magnitude of construction activity and local weather conditions. PM_{10} emissions depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site.

- *Construction equipment emissions*: Diesel exhaust particulate matter is a California-identified toxic air contaminant, and localized issues may exist if diesel-powered construction equipment is operated near sensitive receptors.

Construction emissions were estimated for the project (Alternatives A, B, and C) using detailed equipment inventories and project construction scheduling combined with emissions factors from RCEM. Note that Alternatives A, B, and C would have the same construction schedule and equipment list. However, the earthwork volumes differ between the three alternatives with Alternative A importing 50,000 cubic yards (CY) of soil and Alternatives B and C importing 100,000 CY of soil. For all three models, construction was predicted to begin March 2023 and last 24 months. Based on the construction schedule, there would be a total of 523 workdays. The project length was estimated to be 1.5 miles and the total project area disturbed would be 20 acres per the provided construction data sheet. The short-term construction-related emissions for Alternatives A, B, and C are presented in Tables 8 and 9. Alternatives B and C have the same computed emissions since the inputs for both alternatives were the same. Therefore, only one table was provided for the construction emissions from Alternatives B and C. The results of the construction emission calculations are included in Appendix B. The emissions presented are based on the best information available at the time of calculations. The emissions represent the daily construction emissions that would be generated by each alternative. Tables 8 and 9 show the emissions per project phase in pounds per day (lbs./day) and in total tons emitted over the entire construction period (tons/construction project). The Carbon Dioxide equivalent

(CO_2e) are represented in metric tons to express the impact of various GHGs as one singular number. The BAAQMD thresholds of significance for constructions emissions were also included in Tables 8 and 9 for informational purposes only. Additionally, Appendix C includes the RCEM outputs for Alternatives A, B, and C.

Table 8 - Construction Emissions for Alternative A

	ROG (lbs/day)	NO_x (lbs/day)	Exhaust PM_{10} (lbs/day)	Exhaust $PM_{2.5}$ (lbs/day)	CO (lbs/day)	CO_{2e} (Metric tons/Phase)
Land Clearing/ Grubbing	2.63	26.48	1.19	1.08	20.06	264
Grading/Excavation	1.49	17.94	0.77	0.56	13.58	309
Drainage/Utilities/Sub-Grade	1.31	12.09	0.70	0.60	15.37	305
Paving	0.70	7.37	0.39	0.32	9.70	66
Maximum Daily (Pounds/Day)	6.12	63.88	3.05	2.57	58.71	15,859
Project Total Tons (Tons/Construction Project)	**0.42**	**4.31**	**0.21**	**0.18**	**4.08**	**944**
Daily Average (Pounds/Day)[1]	***1.61***	***16.47***	***0.81***	***0.68***	-	-
BAAQMD Significance Thresholds*	*54 lbs/day*	*54 lbs/day*	*82 lbs/day*	*54 lbs/day*	-	-

[1]Based on a total of 523 workdays. For informational purposes only
Source: Illingworth & Rodkin, Inc, 2019 using RCEM

Table 9 - Construction Emissions for Alternatives B & C

	ROG (lbs/day)	NO_x (lbs/day)	Exhaust PM_{10} (lbs/day)	Exhaust $PM_{2.5}$ (lbs/day)	CO (lbs/day)	CO_{2e} (Metric tons/Phase)
Land Clearing/ Grubbing	2.63	26.90	1.21	1.09	20.11	279
Grading/Excavation	1.53	22.28	0.92	0.63	14.14	433
Drainage/Utilities/Sub-Grade	1.31	12.09	0.70	0.60	15.37	305
Paving	0.70	7.37	0.39	0.32	9.70	66
Maximum Daily (Pounds/Day)	6.17	68.65	3.22	2.64	59.33	18,590
Project Total Tons (Tons/Construction Project)	**0.42**	**4.57**	**0.22**	**0.18**	**4.12**	**1,082**
Daily Average (Pounds/Day)[1]	***1.62***	***17.49***	***0.84***	***0.70***	-	-
BAAQMD Significance Thresholds*	*54 lbs/day*	*54 lbs/day*	*82 lbs/day*	*54 lbs/day*	-	-

1Based on a total of 523 workdays. For informational purposes only
Source: Illingworth & Rodkin, Inc, 2019 using RCEM

Implementation of the following measures, some of which may also be required for other purposes such as storm water pollution control, will reduce air quality impacts resulting from construction activities. Please note that although these measures are anticipated to reduce construction-related emissions, these reductions cannot be quantified at this time.

- The construction contractor must comply with the Caltrans' Standard Specifications in Section 14-9 (2015).
    - Section 14-9-02 specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.
- Water or a dust palliative will be applied to the site and equipment as often as necessary to control fugitive dust emissions.
- Trucks will be washed as they leave the right-of-way as necessary to control fugitive dust emissions.
- Construction equipment and vehicles will be properly tuned and maintained. All construction equipment will use low sulfur fuel as required by CA Code of Regulations Title 17, Section 93114.
- A dust control plan will be developed documenting sprinkling, temporary paving, speed limits, and timely re-vegetation of disturbed slopes as needed to minimize construction impacts to existing communities.
- Equipment and materials storage sites will be located as far away from residential and park uses as practicable. Construction areas will be kept clean and orderly.
- Construction activities involving the extended idling of diesel equipment or vehicles will be prohibited, to the extent feasible, at portions of the construction area near sensitive receptors.
- Track-out reduction measures, such as gravel pads at project access points to minimize dust and mud deposits on roads affected by construction traffic, will be used.
- All transported loads of soils and wet materials will be covered before transport, or adequate freeboard (space from the top of the material to the top of the truck) will be provided to minimize emission of dust during transportation.
- Dust and mud that are deposited on paved, public roads due to construction activity and traffic will be promptly and regularly removed to reduce PM emissions.
- To the extent feasible, construction traffic will be scheduled and routed to reduce congestion and related air quality impacts caused by idling vehicles along local roads during peak travel times.
- Mulch will be installed or vegetation planted as soon in slopes and non-traffic areas as practical after grading to reduce windblown PM in the area.

4.3 Long-Term Effects (Operational Emissions)

Operational emissions take into account long-term changes in emissions due to project operation (excluding the construction phase). The operational emissions analysis compares forecasted emissions for existing/baseline, No-Build, and the three Build Alternatives. The CT-EMFAC 2014 model (Version 6.0) was used with project traffic data to analyze air pollutant emissions associated with the project. Table 10 shows the project emissions from the proposed roadway improvements.

Alternatives A and B show slightly lower emissions in the design year (2045) over Alternative C with the implementation of the project due to improvement in traffic flow on the roadway network. Traffic volumes are the same between the No-build Alternative and Alternative A and B. Alternative C has slightly different traffic volumes due to the diverging diamond interchange design.

In the project area, PM_{10} and $PM_{2.5}$ emissions would increase slightly in future years due to the increase in vehicle miles traveled (VMT) over the existing condition; however, the emissions are below any significance thresholds. Emissions of CO and NO_x would decrease. Note that the growth in VMT is due to the increased traffic that would occur under all alternatives, including the No-Build Alternative.

The proposed Build Alternatives would not worsen the flow or operations of the I-280/Wolfe Road Interchange. The level of service, or LOS, for the majority will remain the same or slightly improve for the Build Alternatives and No Build scenarios in 2025 and 2045. Furthermore, the proposed project is to improve traffic operations and facilities for multimodal forms of transportation, including bicycle pedestrian, and HOV uses, at the I-280 and Wolfe Road Interchange. The data in Table 10 demonstrate the effect of these improvements on emissions; in both 2025 and 2045, emissions are lower under each of the three build alternatives when compared to the No Build Alternative. See Appendix E for CT-EMFAC (Version 6.0) input calculations and outputs.

Table 10 - Summary of Comparative Emissions Analysis in the Project Vicinity

Scenario/ Analysis Year	CO (pounds/day)	PM_{10} (pounds/day)	$PM_{2.5}$ (pounds/day)	NOx (pounds/day)
Baseline 2017	60.45	2.62	1.15	17.26
No-Build 2025	61.78	3.89	1.68	14.20
Build Alternatives A and B 2025	59.79	3.87	1.66	13.45
Build Alternative C 2025	58.81	3.87	1.66	13.08
No-Build 2045	52.56	4.63	1.93	12.50
Build Alternatives A and B 2045	49.84	4.61	1.91	11.44
Build Alternative C 2045	50.98	4.62	1.92	11.89

Source: Illingworth & Rodkin, 2019

4.3.1 CO Analysis

The CO Protocol was developed for project-level conformity (hot-spot) analysis and was approved for use by the U.S. EPA in 1997. It provides qualitative and quantitative screening procedures, as well as quantitative (modeling) analysis methods to assess project-level CO impacts. The qualitative screening step is designed to avoid the use of detailed modeling for projects that clearly cannot cause a violation, or worsen an existing violation, of the CO standards. Although the protocol was designed to address federal standards, it has been recommended for use by several air pollution control districts in their CEQA analysis guidance documents and should also be valid for California standards because the key criterion (8-hour concentration) is similar: 9 ppm for the federal standard and 9.0 ppm for the state standard.

The transportation conformity requirements for CO ceased to apply in June 1, 2018 (see Appendix D). The project is not anticipated to increase the percentage of vehicles operating in cold start mode; increase traffic volume; or worsen traffic flow. Additionally, the project is located in an area designated "Attainment" for CO under both the NAAQS and CAAQS. Therefore, based on the CO Protocol Carbon Monoxide Screening Analysis, no further analysis is necessary to demonstrate that the project would not cause or contribute to a violation of an ambient air quality standards for CO.

4.3.2 PM Analysis

Emissions Analysis

PM emissions were estimated for No Build and Build Alternatives for the opening year 2025 and design year 2045. While PM emissions increase over existing conditions, due to increased VMT, the project build alternative emissions are lower in the opening year and the design year than the No-Build Alternative. Table 11 shows modeling results from CT-EMFAC for the project.

Table 11 - Summary of Comparative Emissions Analysis in the Project Vicinity

Scenario/ Analysis Year	PM_{10} (pounds/day)	$PM_{2.5}$ (pounds/day)
Existing 2017	2.62	1.15
No-Build 2025	3.89	1.68
Build Alternatives A and B 2025	3.87	1.66
Build Alternative C 2025	3.87	1.66
No-Build 2045	4.63	1.93
Build Alternatives A and B 2045	4.61	1.91
Build Alternative C 2045	4.62	1.92

Hot-Spot Analysis

In November 2015, the U.S. EPA released an updated version of Transportation Conformity Guidance for Quantitative Hot-Spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas (Guidance) for quantifying the local air quality impacts of transportation projects and comparing them to the PM NAAQS (75 FR 79370). The U.S. EPA originally released the quantitative guidance in December 2010 and released a revised version in November 2013 to reflect the approval of EMFAC 2011 and U.S. EPA's 2012 PM NAAQS final rule. The November 2015 version reflects MOVES2014 and its subsequent minor revisions such as MOVES2014a, to revise design value calculations to be more consistent with other U.S. EPA programs, and to reflect guidance implementation and experience in the field. Note that EMFAC, not MOVES, should be used for project hot-spot analysis in California. The Guidance requires a hot-spot analysis to be completed for a project of air quality concern (POAQC). The final rule in 40 CFR 93.123(b)(1) defines a POAQC as:

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

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

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

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

(v) Projects in or affecting locations, areas, or categories of sites which are identified in the $PM_{2.5}$ and PM_{10} applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

Since the project is not a POAQC, a $PM_{2.5}$ and PM_{10} hot spot analysis is not required. In addition, the area is not a Nonattainment or Maintenance area for PM_{10}.

4.3.3 Mobile Source Air Toxics Analysis

FHWA released updated guidance in October 2016 (FHWA, 2016) for determining when and how to address MSAT impacts in the NEPA process for transportation projects. FHWA 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 Alternative for projects with higher potential MSAT effects.

Projects with no impacts generally include those that:

a) qualify as a categorical exclusion under 23 CFR 771.117,

b) qualify as exempt under the FCAA conformity rule under 40 CFR 93.126, and

c) are not exempt but have no meaningful impacts on traffic volumes or vehicle mix.

Projects that have low potential MSAT effects are those that serve to improve highway, transit, or freight operations or movement without adding substantial new capacity or creating a facility that is likely to substantially increase emissions. Most projects fall into this category, including this project. Examples of these types of projects are minor widening projects; new interchanges; replacing a signalized intersection on a surface street; and projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT).

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

Projects with high potential MSAT effects include those that:

- 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 AADT is projected to be in the range of 140,000 to 150,000, or greater, by the design year; and are 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).

A review of the proposed project scope, traffic data, and settings, this project is anticipated to have low potential for MSAT effects. Therefore, based on a comparison of the Alternatives with the different categories in the updated guidance, the project is deemed to meet the criteria for Category 2 MSAT analysis. In accordance with the FHWA Guidance, the project only requires a qualitative analysis.

This qualitative assessment considers the expected effect of the project on traffic volumes, vehicle mix, or routing of traffic and the associated changes in MSAT for the project alternatives, including no-build, based on VMT, vehicle mix, and speed. Because the emission effects of these projects typically are low, we expect there would be no appreciable difference in overall MSAT emissions among the various alternatives.

For each alternative, the amount of MSATs emitted would be proportional to the VMT or volumes, assuming that other variables such as fleet mix remain the same. As shown in Tables12, VMT within the project area remain unchanged between the Build and No-Build alternatives. Also, regardless of the alternative chosen, emissions would likely be lower than present levels in the horizon year as a result of U.S. EPA's national control programs that are projected to reduce annual MSAT emissions by over 90% between 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the U.S. EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Table 12 - Summary of Daily VMT used in MSAT Emissions Analysis

Traffic, VMT	Baseline (Existing Conditions) 2017	No-Build 2025	Build Alternative 2025	No-Build 2045	Build Alternative 2045
Alternatives A and B	22,031	33,293	33,293	40,910	40,910
Alternative C	22,031	33,293	33,293	40,910	40,910

Additionally, it should be noted that current scientific techniques, tools, and data are not sufficient to accurately estimate human health impacts from transportation projects in a way that would be useful to decision-makers. See Appendix C from the MSAT interim guidance below.

APPENDIX C – Council on Environmental Quality (CEQ) Provisions Covering Incomplete or Unavailable Information (40 CFR 1502.22)

Sec. 1502.22 Incomplete or Unavailable Information

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

(a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

(b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

1. a statement that such information is incomplete or unavailable;
2. a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;
3. a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and
4. the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts that have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

(c) The amended regulation will be applicable to all environmental impact statements for which a Notice to Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

Incomplete or Unavailable Information for Project Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in mobile source air toxic (MSAT) emissions associated with a proposed set of highway alternatives. The outcome of such C-2 an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, https://www.epa.gov/iris/). Each report contains assessments of non- cancerous and cancerous effects for individual compounds

and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxics-critical-reviewliterature-exposure-and-health-effects) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

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

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of C-3 occupational exposure data to the general population, a concern expressed by HEI (Special Report 16, https://www.healtheffects.org/publication/mobile-source-air-toxicscritical-review-literature-exposure-and-health-effects). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk (https://www.epa.gov/iris)."

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks

less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (https://www.cadc.uscourts.gov/internet/opinions.nsf/284E23FFE079CD59852578000050C9DA/$file/07-1053-1120274.pdf.)

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

4.3.4 Greenhouse Gas Emissions Analysis

GHG emissions associated with development of the proposed project would occur over the short-term from construction activities, consisting primarily of emissions from equipment exhaust and worker and vendor trips. Long-term operational emissions associated with vehicular traffic on the new roadway would continue and be slightly altered by the project. GHG emission impacts for the proposed project are discussed below and were analyzed using the methodology recommended in the BAAQMD CEQA Air Quality Guidelines.[14]

Existing Conditions

Under existing conditions, there are no improvements to Wolfe Road or the I-280/Wolfe Road Interchange and the potential for a direct change in GHG emissions is nonexistent. Indirect emissions are generated from the burning of fuel required for site maintenance (e.g., infrequent disking and/or mowing to control fire hazards, etc.).

Construction Greenhouse Gas Emissions (Temporary Emissions)

GHG emissions for transportation projects can be divided into those produced during construction and those produced during operations. Currently, neither Caltrans, VTA, the City of Cupertino, nor BAAQMD have adopted GHG significance thresholds that apply to construction projects. However, the City does have a Construction and Demolition Debris Diversion Ordinance, which would require applicable construction to divert 60-percent of construction waste. For informational purposes, GHG emissions from project roadway construction are estimated to be 944 metric tons (MT) of CO_2e for Alternative A and 1,082 MT of CO_2e for Alternative B and C.

Operational Greenhouse Gas Emissions (Ongoing Emissions)

GHG (e.g., carbon dioxide, methane, and nitrogen dioxide) from operation of the project will include fuel burned while traveling on the new improved roadway. There are no thresholds identified for evaluating the effect of roadway projects on GHG emissions since these types of projects do not generate emissions on their own.

As previously discussed for air quality, there is a process that air quality for transportation projects is considered looking at the entire transportation sector of emissions. This is done through the SIP conformity process, where transportation projects are evaluated at the regional level. Most public transportation projects are included in the TIP. Projects included in the TIP are also assumed to be part of the Bay Area Plan 2040 plan that includes the region's SCS. MTC and ABAG identified GHG reduction targets that are included in the SCS. The proposed project, being part of the 2019 TIP is part of the Plan Bay Area 2040 transportation network, and therefore, is consistent with the SCS.

[14] BAAQMD, 2017. *Op cit.*

To analyze the effects of the project regarding GHG emissions, the emissions were computed using the CT-EMFAC 2014 (Version 6.0) model results, which were based on the traffic data provided by Fehrs and Peers. Delay information from the 2025 peak-hour intersection analysis was also applied to the model. The carbon dioxide equivalent (CO_2e) for each alternative and scenario was calculated by multiplying the total emissions (tons/day) of CO_2 and CH_4 by their global warming potentials (GWP) then summing the emission and changing the units into annual metric tons of CO_2e.[15] The GWP for CO_2 is one as it is the reference gas, while the GWP for CH_4 is 25 per CARB, which uses the IPCC's fourth assessment report.

Table 13 shows the metric tons of GHG emissions from the roadway system with and without the project. In the years 2025 and 2045, the Alternatives A, B, and C would emit less GHG emissions than the No Build scenario. Project emissions are not considered to cause significant impacts because the net difference annual emissions are below the threshold and the project is consistent with qualified GHG emission reduction strategies. GHG emissions associated with the project are predicted to change slightly and likely decrease. Regardless of the change, the project would not increase emissions above any significance threshold.

Table 13. Annual Operational GHG Emissions (CO_2e Metric Tons)

Measure	2017 Existing	2025 No-Build	2025 Build		2045 No-Build	2045 Build	
Based on ADT CT-EMFAC Analysis							
			Alt A & B	Alt C		Alt A & B	Alt C
GHG emissions	3,047	4,721	4,547	4,460	5,350	5,061	5,182
Change Over Existing		+1,674	+1,528	+1,413		+2,014	+2,135
Difference between Build and No Build			-174	-261		-289	-168

Source: EMFAC2014, Illingworth & Rodkin, 2019

[1] ADT values from Fehr & Peers

[15] Per the EPA, GWP is a measure of how much energy the emission of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (https://www.epa.gov/ghgemissions/understanding-global-warming-potentials#Learn%20why).

4.4 Cumulative/Regional/Indirect Effects

Effects of the project that would occur at a later date or are fairly distant from the project are referred to as indirect effects. Cumulative impacts are those effects that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. Cumulative impacts are inclusive of the indirect effects. As summarized below, the potential for indirect effects or cumulative impacts to air quality that may be attributable to this project is not expected to be considerable.

The analysis of project impacts to regional air quality, as performed by MTC as part of the RTP and RTIP conformity process, is a cumulative analysis. The proposed project would conform to the assumptions in the conformity analyses for the 2040 RTP and 2019 RTIP, which are long-range planning documents that include the combination of roadway projects throughout the region. The Draft Environmental Impact Report (DEIR) for Plan Bay Area 2040 identified a significant impact related to a net increase of emissions of criteria pollutants from on-road mobile and land use sources compared to existing conditions, that include emissions of ROG, NOX, CO, PM_{10}, and $PM_{2.5}$, as the air basin is in non-attainment for O_3, PM_{10}, and $PM_{2.5}$ standards. Mitigation Measures 2.2-3 (a-d) in the Plan Bay Area DEIR would reduce this impact to a less-than-significant level. The Project would not conflict with implementation of these mitigation measures.

Furthermore, an analysis of project emissions was conducted that employed traffic projections, speed, and fleet mix information to compute an emission "burden" using CT-EMFAC. That analysis, presented in Section 4.3, shows the Build Alternatives to have lower emissions than the Existing or No-Build scenarios.

The CO and MSAT quantitative assessments can be considered indirect effects analyses because they look at air quality impacts attributable to the project that occur at a later time in the future. Those assessments indicate the potential for indirect effects associated with the project is not expected to be considerable. They demonstrate that in the future: 1) air quality impacts from CO will not cause or contribute to violations of the CO NAAQS; and 2) As described in Section 4.3.3, MSAT emissions are expected to have a low-potential effect, based on FHWA guidance, where emissions of the project are likely to be the same or lower than the No-Build conditions and lower than Existing conditions.

5. Minimization Measures

Feasible short-term and long-term measures that can eliminate or substantially reduce projects impacts are listed below. These measures when incorporated into the project can mitigate adverse impacts caused by the project. The project applicant must be responsible for implementing these mitigation measures.

5.1 Short-Term (Construction)

5.1.1 Best Management Practices

In addition to the measures described in section 4.2.1, the following BAAQMD best management practices should be implemented. These measures control dust and exhaust during any construction period that involves ground disturbance. Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality impacts associated with grading and new construction.

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
8. Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

5.2 Long-Term (Operational)

The project would have emissions less than the BAAQMD thresholds for O_3 (i.e., O_3 precursors) and particulate matter (PM_{10} and $PM_{2.5}$). Therefore, the project would not contribute substantially to existing or projected violations of those standards. Roadways and intersections affected by the project would have traffic volumes less than the BAAQMD screening criteria and, thus, would not cause a violation of an ambient air quality standard or have a considerable contribution to cumulative violations of these standards.[16] Therefore, there are no avoidance and or minimization measures required or recommended to reduce operational air quality impacts or GHG emissions from the operation of the project. Conclusion

[16] For a land-use project type, the BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less-than-significant impact to localized carbon monoxide concentrations if the project would not increase traffic at affected intersections with more than 44,000 vehicles per hour.

6. Conclusions

The I-280/Wolfe Road Interchange Improvement Project aims to improve the traffic operations and facilities for multimodal forms of transportation. A No Build and three Build Alternative (A, B, and C) are proposed. Alternative A would consist of a particle cloverleaf interchange design and the Wolfe Road overcrossing would be replaced. Alternative B would also be a partial cloverleaf interchange design, but the Wolfe Road overcrossing would be replaced. Alternative C would be a diverging diamond interchange design and the Wolfe Road overcrossing would also be replaced. This project is included in the 2019 TIP (SCL190011), MTC Regional Transportation Plan (17-07-0026), the Plan Bay Area 2040 transportation network, and the City of Cupertino General Plan: Community Vision 2015-2040 (M-9.3.1 Wolfe Road Overcrossing). The air quality technical report calculated and analysis the air quality and GHG impacts of both alternatives.

The short-term air quality impacts from construction were based on three RCEM models that estimated emissions from the roadway and structure construction work. The total ROG, NO_x, PM_{10} exhaust, and $PM_{2.5}$ exhaust over the entire construction period would be less than their respective BAAQMD significance thresholds. In the case that the project does have an impact, minimization measures were provided that would reduce or eliminate the impact.

The long-term air quality impacts from the operation of the roadway were based on calculations done with CT-EMFAC using traffic data provided by Fehr and Peers. The operational emissions were calculated for the No Build and Build Alternatives A, B and C for the existing period (2017), the opening year (2025), and the design year (2045). The CO, PM_{10}, $PM_{2.5}$, ROG and NO_x emissions (pounds/day) between the three alternatives were compared. In each scenario, the Build Alternatives would have less emissions than the No Build Alternative due to improving the flow of traffic and reducing the delay time. Overall, the I-280/Wolfe Road interchange improvement project would improve traffic conditions and not cause or contribution to a violation of ambient air quality standards.

7. References

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8. Appendices

Appendix A – RTP, TIP, and FMS Listings for the Project and

The project is included in the regional emissions analysis conducted by MTC for the current RTP, Plan Bay Area 2040 (ABAG and MTC 2017a, RTP ID 17-07-0026). The regional emissions analysis found that significant projects in the San Francisco Bay Area will conform to the SIP for attaining and/or maintaining the NAAQS as provided in Section 176(c) of the Clean Air Act. FHWA and FTA determined that the RTP conforms to the SIP on August 23, 2017. The project is also included in the MTC's financially constrained 2019 TIP (MTC 2018, TIP ID SCL 190011). The TIP gives priority to eligible Transportation Control Measures (TCMs) identified in the SIP and provides sufficient funds to provide for their implementation. FHWA and FTA determined that the TIP conforms to the SIP on December 17, 2019. The project's design concept, scope, and open-to-traffic date assumptions are generally consistent with the regional emissions analysis performed for the current RTP and TIP. Therefore, the project will not interfere with the timely implementation of any TCMs identified in the SIP.

TIP ID: **SCL190011** County: Santa Clara System: State RTP ID: 17-07-0026 CTIPS 2060000652
Sponsor: Santa Clara Valley Transportation Authority (VTA) Implementing Agency: Santa Clara Valley Transportation
Project Name: I-280/Wolfe Road Interchange Improvement
Description: Cupertino: I-280/Wolfe Road Interchange: Modify to relieve congestion and improve local circulation.
Air Quality Exempt Code: NON-EXEMPT
Route: 280 Post Mile From: 8.1 Post Mile To: 8.6 Toll

All funding in thousands of dollars

Phase	Fund Source	Prior Years	FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22	Future Years	Total Programmed
ENV	OTHER LOCAL	$ 1,160						$ 1,160
ENV	SALESTAX-MEASURE	$ 3,300						$ 3,300
PE	OTHER LOCAL	$ 800						$ 800
PSE	OTHER LOCAL			$ 10,000				$ 10,000
ROW	SALESTAX-MEASURE			$ 15,000				$ 15,000
CON	SALESTAX-MEASURE					$ 66,740		$ 66,740
Total Programmed Funding:		$ 5,260		$ 25,000		$ 66,740		$ 97,000

METROPOLITAN TRANSPORTATION COMMISSION (HTTP://WWW.MTC.CA.GOV)

Data

Basic Information

What is this project/program?	I-280/Wolfe Road Interchange Improvements
What would this project/program do?	Modify I-280/Wolfe Road Interchange to relieve congestion and improve local circulation.
RTPID:	17-07-0026
County:	Santa Clara
Agency:	Santa Clara Valley Transportation Authority (VTA)
Mode:	Auto
System:	Street/Highway Facility

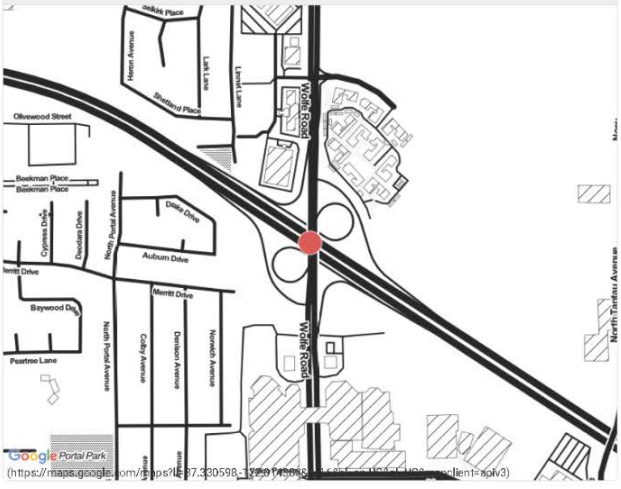
Cost and Funding (in Year-of-Expenditure)

How much does this project/program cost?	$97 (millions)
How much of this project/program is covered in the Plan period?	$97 (millions)
How much of the project/program was included in previous plans?	$0 (millions)

Schedule

By when is this project/program anticipated to open?	2024

Location



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FMS Log in Version 4.1.31

Project Manager | Report Manager | Help | Privacy Policy

VIEW PROJECT: I-280/Wolfe Road Interchange Improvement

Project Search | Project Detail | Funding | Air Quality | Project Documents | Contacts | Delivery Milestones | Location | Screening Criteria | Comments | RTP Information | Group Listing

Alternate ID Information

TIP ID	SCL190011	FMS ID	6888.00
CTIPS ID	20600006527	RTP ID	17-07-0026
Version	1	TIP Revision No	2019-00
Revision Type	Amendment	RTP Page No	
RTP Cycle	PLANBAYAREA2040	RTP Project Cost	$97
RTP Title	I-280/Wolfe Road Interchange Improvements		
Regional Approval Date	09/26/2018	State Approval Date	11/02/2018
Federal Approval Date	12/17/2018	Final Approval Date	12/17/2018

Status Information

Created	03/26/2018	Last updated	05/22/2018	Status	ACTIVE
Current version	No	Locked	No		
Completed	No	Modified		Review Level	PR

General Information

Project Name	I-280/Wolfe Road Interchange Improvement		
Sponsor	VTA	Implementing Agency	VTA
Project Type	LOCAL I/C	Purpose	SYSTMGMT
Mode	AUTO:80% | BIKE/PED:15% | BUS:5%		
Submode	AUTO:80% | BICYCLE:10% | BUS:5% | PEDESTRIAN:5%		
Primary Mode	AUTO:80%		
Primary Submode	AUTO:80%		
Transportation System	STATE HWY		
Description	Cupertino: I-280/Wolfe Road Interchange: Modify to relieve congestion and improve local circulation.		
Expanded Description	Cupertino: I-280 at Wolfe Rd interchange: Widen existing and/or construct a new overcrossing structure, modify existing on-ramps and and off-ramps, modify existing local street intersections and upgrade bicycle and pedestrian facilities, construction auxiliary lanes, retaining walls, and soundwalls as needed.		
Reason for Revision	2019 TIP Update - New project		
Reason Type	1		
Description of Change	2019 TIP Update - New project		
Transportation problem to be addressed	Relieve traffic operations and improve local circulation.		

Primary Location Information

Location	Cupertino		
Area			
County	Santa Clara		
Urbanized Area			
State Hwy	280		
Post Mile	From 8.1	To 8.6	

FMS Log in Version 4.1.31

Project Manager | Report Manager | Help | Privacy Policy

VIEW PROJECT: I-280/Wolfe Road Interchange Improvement

Project Search | Project Detail | Funding | Air Quality | Project Documents | Contacts | Delivery Milestones | Location | Screening Criteria | Comments | RTP Information | Group Listing

TIP ID	SCL190011	Status	ACTIVE	County	Santa Clara	Project name	I-280/Wolfe Road Interchange Improvement
FMS ID	6888.00	Version	1	Implementing Agency	VTA	Sponsor	VTA

Regional Conformity

Air Quality Code	Air Quality Description
Non-Exempt	NON-EXEMPT

AQCTF Regional Conformity Review

Air Basin	Air District
San Francisco Bay Area	Bay Area AQMD

TCM	TCM Number	VOC	NOX	CO	PM10	PM2.5	CO2

Conformity Analysis Year	Regionally Significant
2030	

** Based on RTP ID of the project

Project Conformity

Overview: The San Francisco Bay Area has been designated as non-attainment for the 24-hour PM2.5 standard. Beginning December 14, 2010, certain projects are required to complete a PM2.5 hot-spot analysis as part of the project-level conformity determination process. Project sponsors must engage in interagency consultation on the PM2.5 hot-spot analysis through MTC's Air Quality Conformity Task Force. The Conformity Task Force will (1) determine if a project meets the definition of a project of air quality concern and if the project requires undergoing a project-level PM2.5 hot-spot analysis, and (2) review the methods, assumptions and analysis of the PM2.5 hot-spot analysis. The EPA and either FHWA or FTA must concur with the recommendations from the Conformity Task Force. Upon completion of the interagency consultation, project sponsors must seek approval from FHWA or FTA on the PM2.5 hot-spot analysis.

Project Conformity Analysis Summary

Next Step	Responsible Party
Step 1 - Awaiting completion of project identification questions	Sponsor

Milestone	Status	Comments
Step 1 - Project Identification		
Sponsor Input	Pending	Pending completion of questions on Step 1 - Project Identification
System Determination	Pending	
Task Force Determination	Pending	
Step 2 - Interagency Consultation	TBD	
Sponsor Input		
Task Force Determination		
Step 3 - PM 2.5 Hot Spot Analysis	TBD	
Sponsor Input		
Task Force Review		

Appendix B - Interagency Consultation Documentation

Ho,Lani Lee

From: Fund Management System <fms@bayareametro.gov>
Sent: Tuesday, November 5, 2019 11:18 AM
To: Rensi, Marcella; Gonzalo, Gene
Cc: Fund Management System; Harold Brazil
Subject: FMS POAQC Project TIP ID SCL190011 (I-280/Wolfe Road Interchange Improvement) update: Project is a not a POAQC

Dear Project Sponsor

Based on the recent interagency consultation with the Air Quality Conformity Task force, Project TIP ID SCL190011 (FMS ID:6888.00) does not fit the definition of a project of air quality concern as defined by 40 CFR 93.123(b)(1) or 40 CFR 93.128 and therefore is not subject to PM2.5 project level conformity requirement. Please save this email as documentation confirming the project has undergone and completed the interagency consultation requirement for PM2.5 project level conformity. Note project sponsors are required to undergo a proactive public involvement process which provides opportunity for public review as outlined by 40 CFR 93.105(e). For projects that are not of air quality concern, a comment period is only required for project level conformity determinations if such a comment period would have been required under NEPA. For more information, please see FHWA PM2.5 Project Level Conformity Frequently Asked Questions (FAQ): http://www.fhwa.dot.gov/environment/air_quality/conformity/reference/faqs/pm25faqs.cfm

If you have any questions, please direct them to Harold Brazil at hbrazil@bayareametro.gov or by phone at 415-778-6747

Appendix C – Road Construction Emissions Model (Version 9.0) Calculations

The project engineers provided an estimated construction schedule, which included an equipment quantity and usage list and earthwork volumes. The same construction schedule and equipment list was applied to all three alternatives (i.e. A, B, and C). For the earthwork volumes, the following soil imports were provided for each alternative: 50,000 cy for Alternative A and 100,000 cy for Alternatives B and C. There would also be an estimated 500 cement truck round trips and an import of 8,000 cy of asphalt for all three alternatives. Additionally, bridge demolition export volume was estimated for Alternatives B and C since these Build Alternatives would replace the bridge structure. The bridge structure was estimated to be approximately 83,160 cubic feet, assuming that the bridge is approximately 330 feet long, 63 feet wide, and 4 feet tall. Note that for Alternative A a demolition volume was not provided or estimated; however, a grubbing/land clearing phase was included in the model. It is assumed that some activity would occur in this phase for Alternative A, so the grubbing/land clearing phase was included in the model.

Based on the schedule, construction would begin March 2023 and end in March 2025 (a two-year construction schedule). Phases that would occur during construction include grubbing/land clearing, grading/excavation, drainage/utilities/sub-grade, and paving. This appendix includes the provided construction data sheet and RCEM model outputs for each Build Alternative.

Project Name: Wolfe Rd / I-280 Interchange

Complete ALL Portions in Yellow

See Equipment Type TAB for type, horsepower and load factor

Project Size

0 Dwelling Units — 20 ACRES total project acres disturbed

0 s.f. residential

0 s.f. retail

0 s.f. office/commercial

0 s.f. other, specify:

0 s.f. parking garage — 0 spaces

0 s.f. parking lot — 0 spaces

Construction Hours 7:00 am to 4:00 pm

Pile Driving?

TBD, Structure foundation undetermined.

Qty	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	Annual Hours	Comments										
	Demolition	**Start Date:**	**3/1/2023**	**Total phase:**	**80**			**Overall Import/Export Volumes**		3.6								
		End Date:	**5/1/2023**															
1	Concrete/Industrial Saws	81	0.73	8	80	8	640	**Demolition Volume**										
1	Excavators	162	0.38	8	60	6	480	Square footage of buildings to be demolished										
1	Rubber-Tired Dozers	255	0.4	8	80	8	640	(*or* total tons to be hauled										
1	Tractors/Loaders/Backhoes	97	0.37	8	60	6	480	_?_ square feet *or*	A									
								_0_ Hauling volume (tons										
	Site Preperation	**Start Date:**	**3/1/2023**	**Total phase:**	**40**			Any pavement demolished and hauled? _0_ tons		1.8	Ttotal project			24	months			
		End Date:	**6/1/2023**											DURATION	CUM DURATION	ATEGORIES		
1	Graders	187	0.41	8	40	8	320					Prep	2 months	2	A			
1	Rubber-Tired Dozers	247	0.4	8	40	8	320					grading phase 1	2 months	4	B	C		
1	Tractors/Loaders/Backhoes	97	0.37	8	40	8	320					structure phase 1	6 months	10	E			
									B			structure demo	4 months	14	A			
	Grading / Excavation	**Start Date:**	**3/2/2023**	**Total phase:**	**60**					2.7		grading phase 2	1 months	15	B	C		
		End Date:	**5/1/2023**					**Soil Hauling Volume**				structure phase 2	6 months	21	E			
1	Excavators	162	0.38	8	60	8	480	Export volume = _0 CY_				final grading	3 months	24	G			
1	Graders	187	0.41	8	60	8	480	Import volume = _± 130,000 CY_										
1	Rubber Tired Dozers	255	0.4	8	60	8	480											
1	Tractors/Loaders/Backhoes	97	0.37	8	60	8	480		C									
	Other Equipment?																	
	Trenching/Foundation	**Start Date:**	**7/1/2023**	**Total phase:**	**60**					2.7								
		End Date:	**7/1/2024**															
1	Tractor/Loader/Backhoe	97	0.37	8	40	5	320											
1	Excavators	162	0.38	8	40	5	320											
	Other Equipment?																	
									D									
	Building - Exterior	**Start Date:**	**7/2/2023**	**Total phase:**	**240**			**Cement Trucks? _500 Total Round-Trips**		10.9								
		End Date:	**2/27/2024**															
1	Cranes	231	0.29	8	120	4	960	Electric? (Y/N) _N__ Otherwise assumed diesel										
1	Forklifts	89	0.2	8	80	3	640	Liquid Propane (LPG)? (Y/N) _N__ Otherwise Assumed diesel										
1	Generator Sets	84	0.74	8	120	4	960	Or temporary line power? (Y/N) _N__										
1	Tractors/Loaders/Backhoes	97	0.37	8	120	4	960	otherwise, assume diesel generator	E									
1	Welders	46	0.45	8	40	1	320											
	Other Equipment?																	
	Paving	**Start Date:**	**3/1/2023**	**Total phase:**	**120**					5.5								
		Start Date:	**3/1/2025**															
1	Cement and Mortar Mixers	9	0.56	8	80	5	640											
1	Pavers	130	0.42	8	80	5	640	**Asphalt? _8,000 cubic yards**										
1	Paving Equipment	132	0.36	8	120	8	960											
1	Rollers	80	0.38	8	120	8	960		G									
1	Tractors/Loaders/Backhoes	97	0.37	8	120	8	960											
	Other Equipment?																	

Equipment types listed in "Equipment Types" worksheet tab.
Equipment listed in this sheet is to provide an example of inputs
It is assumed that water trucks would be used during grading — 27
Add or subtract phases and equipment, as appropriate
Modify horepower or load factor, as appropriate

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Wolfe Rd/I-280 Interchange (Alternative A)				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust					
Project Phases (Pounds)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM2.5 (lbs/day)**	**PM2.5 (lbs/day)**	**PM2.5 (lbs/day)**	**SOx (lbs/day)**	**CO2 (lbs/day)**	**CH4 (lbs/day)**	**N2O (lbs/day)**	**CO2e (lbs/day)**
Grubbing/Land Clearing	2.63	20.06	26.48	21.19	1.19	20.00	5.24	1.08	4.16	0.05	4,368.53	1.13	0.06	4,416.10
Grading/Excavation	1.49	13.58	17.94	20.77	0.77	20.00	4.72	0.56	4.16	0.06	6,036.28	0.88	0.44	6,190.45
Drainage/Utilities/Sub-Grade	1.31	15.37	12.09	20.70	0.70	20.00	4.76	0.60	4.16	0.03	3,011.80	0.60	0.09	3,053.88
Paving	0.70	9.70	7.37	0.39	0.39	0.00	0.32	0.32	0.00	0.02	2,154.32	0.41	0.11	2,198.41
Maximum (pounds/day)	6.12	58.71	63.88	63.05	3.05	60.00	15.05	2.57	12.48	0.16	15,570.93	3.02	0.71	15,858.84
Total (tons/construction project)	0.42	4.08	4.31	4.83	0.21	4.62	1.14	0.18	0.96	0.01	1,022.71	0.20	0.04	1,040.41

Notes:

Project Start Year ->	2023
Project Length (months) ->	24
Total Project Area (acres) ->	20
Maximum Area Disturbed/Day (acres) ->	2
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	0	0	0	0	320	40
Grading/Excavation	417	0	630	0	1,200	40
Drainage/Utilities/Sub-Grade	0	40	0	60	800	40
Paving	0	66	0	120	400	40

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Wolfe Rd/I-280 Interchange (Alternative A)				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust					
Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	**ROG (tons/phase)**	**CO (tons/phase)**	**NOx (tons/phase)**	**PM10 (tons/phase)**	**PM10 (tons/phase)**	**PM10 (tons/phase)**	**PM2.5 (tons/phase)**	**PM2.5 (tons/phase)**	**PM2.5 (tons/phase)**	**SOx (tons/phase)**	**CO2 (tons/phase)**	**CH4 (tons/phase)**	**N2O (tons/phase)**	**CO2e (MT/phase)**
Grubbing/Land Clearing	0.17	1.32	1.75	1.40	0.08	1.32	0.35	0.07	0.27	0.00	288.32	0.07	0.00	264.41
Grading/Excavation	0.08	0.75	0.99	1.14	0.04	1.10	0.26	0.03	0.23	0.00	332.00	0.05	0.02	308.88
Drainage/Utilities/Sub-Grade	0.14	1.69	1.33	2.28	0.08	2.20	0.52	0.07	0.46	0.00	331.30	0.07	0.01	304.75
Paving	0.02	0.32	0.24	0.01	0.01	0.00	0.01	0.01	0.00	0.00	71.09	0.01	0.00	65.81
Maximum (tons/phase)	0.17	1.69	1.75	2.28	0.08	2.20	0.52	0.07	0.46	0.00	332.00	0.07	0.02	308.88
Total (tons/construction project)	0.42	4.08	4.31	4.83	0.21	4.62	1.14	0.18	0.96	0.01	1022.71	0.20	0.04	943.86

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 9.0.0**
Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

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

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Wolfe Rd/I-280 Interchange (Alternative A)	
Construction Start Year	2023	Enter a Year between 2014 and 2040 (inclusive)
Project Type	3	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway□ 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane□ 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	24.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the lone formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	1.50	miles
Total Project Area	20.00	acres
Maximum Area Disturbed/Day	2.00	acres
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00	416.66	
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00	40.00	
	Paving	20.00	66.00	

Mitigation Options

On-road Fleet Emissions Mitigation		Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer□
Off-road Equipment Emissions Mitigation	No Mitigation	Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/Businesses/CEQA-Land-Use-Planning/Mitigation). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

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

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing	6.00	2.40	3/1/2023	1/1/2023
Grading/Excavation	5.00	10.80	3/2/2023	7/3/2023
Drainage/Utilities/Sub-Grade	10.00	7.20	7/1/2023	12/3/2023
Paving	3.00	3.60	3/1/2023	10/3/2024
Totals (Months)	24			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		0	0.00
Miles/round trip: Grading/Excavation		30.00		21	630.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving		30.00		0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.04	0.56	4.35	0.15	0.07	0.02	2,381.97	0.00	0.37	2,493.59
Tons per const. Period - Grading/Excavation	0.00	0.03	0.24	0.01	0.00	0.00	131.01	0.00	0.02	137.15
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.03	0.24	0.01	0.00	0.00	131.01	0.00	0.02	137.15

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		0	0.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		2	60.00
Miles/round trip: Paving		30.00		4	120.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.05	0.42	0.01	0.01	0.00	225.72	0.00	0.04	236.30
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.05	0.00	0.00	0.00	24.83	0.00	0.00	25.99
Pounds per day - Paving	0.01	0.11	0.83	0.03	0.01	0.00	453.71	0.00	0.07	474.97
Tons per const. Period - Paving	0.00	0.00	0.03	0.00	0.00	0.00	14.97	0.00	0.00	15.67
Total tons per construction project	0.00	0.01	0.07	0.00	0.00	0.00	39.80	0.00	0.01	41.67

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions User Input	User Override of Worker Commute Default Values	Default Values		
Miles/ one-way trip		20		
One-way trips/day		2	Calculated Daily Trips	Calculated Daily VMT
No. of employees: Grubbing/Land Clearing		8	16	320.00
No. of employees: Grading/Excavation		30	60	1,200.00
No. of employees: Drainage/Utilities/Sub-Grade		20	40	800.00
No. of employees: Paving		10	20	400.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Grading/Excavation (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.88	0.07	0.05	0.02	0.00	313.29	0.00	0.01	315.24
Paving (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Grubbing/Land Clearing (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Grading/Excavation (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Draining/Utilities/Sub-Grade (grams/trip)	1.02	2.72	0.28	0.00	0.00	0.00	67.35	0.07	0.03	78.35
Paving (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50

Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.05	0.74	0.06	0.03	0.01	0.00	226.51	0.01	0.01	228.33
Tons per const. Period - Grubbing/Land Clearing	0.00	0.05	0.00	0.00	0.00	0.00	14.95	0.00	0.00	15.07
Pounds per day - Grading/Excavation	0.18	2.78	0.23	0.12	0.05	0.01	849.41	0.02	0.02	856.25
Tons per const. Period - Grading/Excavation	0.01	0.15	0.01	0.01	0.00	0.00	46.72	0.00	0.00	47.09
Pounds per day - Drainage/Utilities/Sub-Grade	0.12	1.80	0.15	0.08	0.03	0.01	558.50	0.01	0.01	562.90
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.20	0.02	0.01	0.00	0.00	61.43	0.00	0.00	61.92
Pounds per day - Paving	0.06	0.93	0.08	0.04	0.02	0.00	283.14	0.01	0.01	285.42
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	9.34	0.00	0.00	9.42
Total tons per construction project	0.03	0.43	0.04	0.02	0.01	0.00	132.45	0.00	0.00	133.50

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions	User Override of	Program Estimate of	User Override of Truck	Default Values	Calculated	User Override of	Default Values	Calculated
User Input	Default # Water Trucks	Number of Water Trucks	Round Trips/Vehicle/Day	Round Trips/Vehicle/Day	Trips/day	Miles/Round Trip	Miles/Round Trip	Daily VMT
Grubbing/Land Clearing - Exhaust		1		5	5		8.00	40.00
Grading/Excavation - Exhaust		1		5	5		8.00	40.00
Drainage/Utilities/Subgrade		1		5	5		8.00	40.00
Paving		1		5	5		8.00	40.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.02	0.00	0.00	0.00	9.98	0.00	0.00	10.45
Pounds per day - Grading/Excavation	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Grading/Excavation	0.00	0.00	0.02	0.00	0.00	0.00	8.32	0.00	0.00	8.71
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.31	0.01	0.00	0.00	150.48	0.00	0.02	157.54
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.03	0.00	0.00	0.00	16.55	0.00	0.00	17.33
Pounds per day - Paving	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	4.99	0.00	0.00	5.22
Total tons per construction project	0.00	0.01	0.08	0.00	0.00	0.00	39.84	0.00	0.01	41.71

Note: Fugitive dust default values can be overridden in cells D183 through D185.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		2.00	20.00	1.32	4.16	0.27
Fugitive Dust - Grading/Excavation		2.00	20.00	1.10	4.16	0.23
Fugitive Dust - Drainage/Utilities/Subgrade		2.00	20.00	2.20	4.16	0.46

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Concrete/Industrial Saws	0.33	3.66	2.58	0.13	0.13	0.01	592.67	0.03	0.00	594.72
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Excavators	0.19	3.26	1.55	0.08	0.07	0.01	500.11	0.16	0.00	505.50
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Graders	0.38	1.69	4.65	0.15	0.14	0.01	640.86	0.21	0.01	647.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Rubber Tired Dozers	1.37	6.21	14.25	0.64	0.59	0.02	1,654.00	0.53	0.01	1,671.82
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Tractors/Loaders/Backhoes	0.30	4.46	3.07	0.15	0.14	0.01	603.15	0.20	0.01	609.64
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing	pounds per day	2.58	19.28	26.11	1.15	1.07	0.04	3,990.78	1.13	0.04	4,029.44
Grubbing/Land Clearing	tons per phase	0.17	1.27	1.72	0.08	0.07	0.00	263.39	0.07	0.00	265.94

Grading/Excavation Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	4		Model Default Tier	Excavators	0.19	3.26	1.55	0.08	0.07	0.01	500.11	0.16	0.00	505.50
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Graders	0.38	1.69	4.65	0.15	0.14	0.01	640.86	0.21	0.01	647.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3		Model Default Tier	Rubber Tired Loaders	0.54	3.02	5.31	0.18	0.16	0.01	1,211.12	0.39	0.01	1,224.20
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.15	2.23	1.54	0.08	0.07	0.00	301.58	0.10	0.00	304.82
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment — If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation		pounds per day		1.26	10.20	13.05	0.48	0.44	0.03	2,653.66	0.86	0.02	2,682.28
Grading/Excavation		tons per phase		0.07	0.56	0.72	0.03	0.02	0.00	145.95	0.05	0.00	147.53

Drainage/Utilities/Subgrade

Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Cranes	0.17	0.91	1.85	0.08	0.07	0.00	279.41	0.09	0.00	282.42
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Excavators	0.19	3.26	1.49	0.07	0.07	0.01	500.17	0.16	0.00	505.56
1.00			Model Default Tier	Forklifts	0.04	0.43	0.35	0.02	0.02	0.00	55.51	0.02	0.00	56.11
	1		Model Default Tier	Generator Sets	0.15	1.83	1.32	0.06	0.06	0.00	311.52	0.01	0.00	312.55
0.00	2		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.30	4.47	3.00	0.14	0.13	0.01	603.31	0.20	0.01	609.80
1.00			Model Default Tier	Trenchers	0.34	2.59	3.20	0.22	0.20	0.00	327.18	0.11	0.00	330.71
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment — If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade		pounds per day		1.18	13.49	11.21	0.60	0.55	0.02	2,077.10	0.58	0.02	2,097.14
Drainage/Utilities/Sub-Grade		tons per phase		0.13	1.48	1.23	0.07	0.06	0.00	228.48	0.06	0.00	230.69

Paving

Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Cement and Mortar Mixers	0.04	0.19	0.23	0.01	0.01	0.00	31.57	0.00	0.00	31.73
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pavers	0.12	1.80	1.18	0.06	0.05	0.00	284.51	0.09	0.00	287.58
	1		Model Default Tier	Paving Equipment	0.17	2.56	1.60	0.08	0.07	0.00	394.47	0.13	0.00	398.72
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	1		Model Default Tier	Rollers	0.15	1.85	1.61	0.09	0.08	0.00	254.11	0.08	0.00	256.85
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.15	2.23	1.54	0.08	0.07	0.00	301.58	0.10	0.00	304.82
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Paving	pounds per day	0.63	8.63	6.16	0.31	0.28	0.01	1,266.24	0.40	0.01	1,279.70
Paving	tons per phase	0.02	0.28	0.20	0.01	0.01	0.00	41.79	0.01	0.00	42.23
Total Emissions all Phases (tons per construction period) =>		0.39	3.60	3.88	0.18	0.17	0.01	679.61	0.20	0.01	686.38

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		221		8
Cement and Mortar Mixers		9	5.00	8
Concrete/Industrial Saws		81		8
Cranes		231	4.00	8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		89	3.00	8
Generator Sets		84	4.00	8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130	5.00	8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46	1.00	8

END OF DATA ENTRY SHEET

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Wolfe Rd/I-280 Interchange (Alternative B)

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	2.63	20.11	26.90	21.21	1.21	20.00	5.25	1.09	4.16	0.05	4,595.38	1.13	0.10	4,653.58
Grading/Excavation	1.53	14.14	22.28	20.92	0.92	20.00	4.79	0.63	4.16	0.08	8,418.25	0.88	0.82	8,684.04
Drainage/Utilities/Sub-Grade	1.31	15.37	12.09	20.70	0.70	20.00	4.76	0.60	4.16	0.03	3,011.80	0.60	0.09	3,053.88
Paving	0.70	9.70	7.37	0.39	0.39	0.00	0.32	0.32	0.00	0.02	2,154.32	0.41	0.11	2,198.41
Maximum (pounds/day)	6.17	59.33	68.65	63.22	3.22	60.00	15.12	2.64	12.48	0.18	18,179.76	3.02	1.12	18,589.92
Total (tons/construction project)	0.42	4.12	4.57	4.84	0.22	4.62	1.14	0.18	0.96	0.01	1,168.69	0.20	0.07	1,193.23

Notes:

Project Start Year ->	2023
Project Length (months) ->	24
Total Project Area (acres) ->	20
Maximum Area Disturbed/Day (acres) ->	2
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	26	0	60	0	320	40
Grading/Excavation	833	0	1,260	0	1,200	40
Drainage/Utilities/Sub-Grade	0	40	0	60	800	40
Paving	0	66	0	120	400	40

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Wolfe Rd/I-280 Interchange (Alternative B)

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.17	1.33	1.78	1.40	0.08	1.32	0.35	0.07	0.27	0.00	303.30	0.07	0.01	278.63
Grading/Excavation	0.08	0.78	1.23	1.15	0.05	1.10	0.26	0.03	0.23	0.00	463.00	0.05	0.04	433.30
Drainage/Utilities/Sub-Grade	0.14	1.69	1.33	2.28	0.08	2.20	0.52	0.07	0.46	0.00	331.30	0.07	0.01	304.75
Paving	0.02	0.32	0.24	0.01	0.01	0.00	0.01	0.01	0.00	0.00	71.09	0.01	0.00	65.81
Maximum (tons/phase)	0.17	1.69	1.78	2.28	0.08	2.20	0.52	0.07	0.46	0.00	463.00	0.07	0.04	433.30
Total (tons/construction project)	0.42	4.12	4.57	4.84	0.22	4.62	1.14	0.18	0.96	0.01	1168.69	0.20	0.07	1,082.49

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 9.0.0**
Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

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

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Wolfe Rd/I-280 Interchange (Alternative B)	
Construction Start Year	2023	Enter a Year between 2014 and 2040 (inclusive)
Project Type	3	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway□ 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane□ 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	24.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the lone formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	1.50	miles
Total Project Area	20.00	acres
Maximum Area Disturbed/Day	2.00	acres
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Grubbing/Land Clearing	20.00		25.67
	Grading/Excavation	20.00	833.33	
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00	40.00	
	Paving	20.00	66.00	

Mitigation Options

On-road Fleet Emissions Mitigation		Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer□
Off-road Equipment Emissions Mitigation		Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/Businesses/CEQA-Land-Use-Planning/Mitigation). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

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

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing	6.00	2.40	3/1/2023	1/1/2023
Grading/Excavation	5.00	10.80	3/2/2023	7/3/2023
Drainage/Utilities/Sub-Grade	10.00	7.20	7/1/2023	12/3/2023
Paving	3.00	3.60	3/1/2023	10/3/2024
Totals (Months)	24			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		2	60.00
Miles/round trip: Grading/Excavation		30.00		42	1260.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving		30.00		0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.05	0.41	0.01	0.01	0.00	226.85	0.00	0.04	237.49
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.03	0.00	0.00	0.00	14.97	0.00	0.00	15.67
Pounds per day - Grading/Excavation	0.08	1.12	8.70	0.31	0.13	0.05	4,763.94	0.00	0.75	4,987.19
Tons per const. Period - Grading/Excavation	0.00	0.06	0.48	0.02	0.01	0.00	262.02	0.00	0.04	274.30
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.07	0.51	0.02	0.01	0.00	276.99	0.00	0.04	289.97

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		0	0.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		2	60.00
Miles/round trip: Paving		30.00		4	120.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.05	0.42	0.01	0.01	0.00	225.72	0.00	0.04	236.30
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.05	0.00	0.00	0.00	24.83	0.00	0.00	25.99
Pounds per day - Paving	0.01	0.11	0.83	0.03	0.01	0.00	453.71	0.00	0.07	474.97
Tons per const. Period - Paving	0.00	0.00	0.03	0.00	0.00	0.00	14.97	0.00	0.00	15.67
Total tons per construction project	0.00	0.01	0.07	0.00	0.00	0.00	39.80	0.00	0.01	41.67

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions User Input	User Override of Worker Commute Default Values	Default Values		
Miles/ one-way trip		20	Calculated Daily Trips	Calculated Daily VMT
One-way trips/day		2		
No. of employees: Grubbing/Land Clearing		8	16	320.00
No. of employees: Grading/Excavation		30	60	1,200.00
No. of employees: Drainage/Utilities/Sub-Grade		20	40	800.00
No. of employees: Paving		10	20	400.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Grading/Excavation (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.88	0.07	0.05	0.02	0.00	313.29	0.00	0.01	315.24
Paving (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Grubbing/Land Clearing (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Grading/Excavation (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Draining/Utilities/Sub-Grade (grams/trip)	1.02	2.72	0.28	0.00	0.00	0.00	67.35	0.07	0.03	78.35
Paving (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50

Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.05	0.74	0.06	0.03	0.01	0.00	226.51	0.01	0.01	228.33
Tons per const. Period - Grubbing/Land Clearing	0.00	0.05	0.00	0.00	0.00	0.00	14.95	0.00	0.00	15.07
Pounds per day - Grading/Excavation	0.18	2.78	0.23	0.12	0.05	0.01	849.41	0.02	0.02	856.25
Tons per const. Period - Grading/Excavation	0.01	0.15	0.01	0.01	0.00	0.00	46.72	0.00	0.00	47.09
Pounds per day - Drainage/Utilities/Sub-Grade	0.12	1.80	0.15	0.08	0.03	0.01	558.50	0.01	0.01	562.90
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.20	0.02	0.01	0.00	0.00	61.43	0.00	0.00	61.92
Pounds per day - Paving	0.06	0.93	0.08	0.04	0.02	0.00	283.14	0.01	0.01	285.42
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	9.34	0.00	0.00	9.42
Total tons per construction project	0.03	0.43	0.04	0.02	0.01	0.00	132.45	0.00	0.00	133.50

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions	User Override of	Program Estimate of	User Override of Truck	Default Values	Calculated	User Override of	Default Values	Calculated
User Input	Default # Water Trucks	Number of Water Trucks	Round Trips/Vehicle/Day	Round Trips/Vehicle/Day	Trips/day	Miles/Round Trip	Miles/Round Trip	Daily VMT
Grubbing/Land Clearing - Exhaust		1		5	5		8.00	40.00
Grading/Excavation - Exhaust		1		5	5		8.00	40.00
Drainage/Utilities/Subgrade		1		5	5		8.00	40.00
Paving		1		5	5		8.00	40.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.02	0.00	0.00	0.00	9.98	0.00	0.00	10.45
Pounds per day - Grading/Excavation	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Grading/Excavation	0.00	0.00	0.02	0.00	0.00	0.00	8.32	0.00	0.00	8.71
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.31	0.01	0.00	0.00	150.48	0.00	0.02	157.54
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.03	0.00	0.00	0.00	16.55	0.00	0.00	17.33
Pounds per day - Paving	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	4.99	0.00	0.00	5.22
Total tons per construction project	0.00	0.01	0.08	0.00	0.00	0.00	39.84	0.00	0.01	41.71

Note: Fugitive dust default values can be overridden in cells D183 through D185.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		2.00	20.00	1.32	4.16	0.27
Fugitive Dust - Grading/Excavation		2.00	20.00	1.10	4.16	0.23
Fugitive Dust - Drainage/Utilities/Subgrade		2.00	20.00	2.20	4.16	0.46

Off-Road Equipment Emissions

Grubbing/Land Clearing Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Concrete/Industrial Saws	0.33	3.66	2.58	0.13	0.13	0.01	592.67	0.03	0.00	594.72
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Excavators	0.19	3.26	1.55	0.08	0.07	0.01	500.11	0.16	0.00	505.50
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Graders	0.38	1.69	4.65	0.15	0.14	0.01	640.86	0.21	0.01	647.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Rubber Tired Dozers	1.37	6.21	14.25	0.64	0.59	0.02	1,654.00	0.53	0.01	1,671.82
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Tractors/Loaders/Backhoes	0.30	4.46	3.07	0.15	0.14	0.01	603.15	0.20	0.01	609.64
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Phase	Unit	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing	pounds per day	2.58	19.28	26.11	1.15	1.07	0.04	3,990.78	1.13	0.04	4,029.44
Grubbing/Land Clearing	tons per phase	0.17	1.27	1.72	0.08	0.07	0.00	263.39	0.07	0.00	265.94

Grading/Excavation Override of Default Number of Vehicles	Default Number of Vehicles *Program-estimate*	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	4		Model Default Tier	Excavators	0.19	3.26	1.55	0.08	0.07	0.01	500.11	0.16	0.00	505.50
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Graders	0.38	1.69	4.65	0.15	0.14	0.01	640.86	0.21	0.01	647.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3		Model Default Tier	Rubber Tired Loaders	0.54	3.02	5.31	0.18	0.16	0.01	1,211.12	0.39	0.01	1,224.20
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.15	2.23	1.54	0.08	0.07	0.00	301.58	0.10	0.00	304.82
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day	1.26	10.20	13.05	0.48	0.44	0.03	2,653.66	0.86	0.02	2,682.28
	Grading/Excavation	tons per phase	0.07	0.56	0.72	0.03	0.02	0.00	145.95	0.05	0.00	147.53

Drainage/Utilities/Subgrade	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Cranes	0.17	0.91	1.85	0.08	0.07	0.00	279.41	0.09	0.00	282.42
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Excavators	0.19	3.26	1.49	0.07	0.07	0.01	500.17	0.16	0.00	505.56
1.00			Model Default Tier	Forklifts	0.04	0.43	0.35	0.02	0.02	0.00	55.51	0.02	0.00	56.11
	1		Model Default Tier	Generator Sets	0.15	1.83	1.32	0.06	0.06	0.00	311.52	0.01	0.00	312.55
0.00	2		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.30	4.47	3.00	0.14	0.13	0.01	603.31	0.20	0.01	609.80
1.00			Model Default Tier	Trenchers	0.34	2.59	3.20	0.22	0.20	0.00	327.18	0.11	0.00	330.71
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage/Utilities/Sub-Grade	pounds per day	1.18	13.49	11.21	0.60	0.55	0.02	2,077.10	0.58	0.02	2,097.14
	Drainage/Utilities/Sub-Grade	tons per phase	0.13	1.48	1.23	0.07	0.06	0.00	228.48	0.06	0.00	230.69

Paving	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Cement and Mortar Mixers	0.04	0.19	0.23	0.01	0.01	0.00	31.57	0.00	0.00	31.73
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pavers	0.12	1.80	1.18	0.06	0.05	0.00	284.51	0.09	0.00	287.58
	1		Model Default Tier	Paving Equipment	0.17	2.56	1.60	0.08	0.07	0.00	394.47	0.13	0.00	398.72
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	1		Model Default Tier	Rollers	0.15	1.85	1.61	0.09	0.08	0.00	254.11	0.08	0.00	256.85
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

			Model Default Tier	Scrapers		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Tractors/Loaders/Backhoes		0.15	2.23	1.54	0.08	0.07	0.00	301.58	0.10	0.00	304.82
			Model Default Tier	Trenchers		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab					ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles			Equipment Tier	Type		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Paving			pounds per day		0.63	8.63	6.16	0.31	0.28	0.01	1,266.24	0.40	0.01	1,279.70
	Paving			tons per phase		0.02	0.28	0.20	0.01	0.01	0.00	41.79	0.01	0.00	42.23
Total Emissions all Phases (tons per construction period) =>						0.39	3.60	3.88	0.18	0.17	0.01	679.61	0.20	0.01	686.38

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		221		8
Cement and Mortar Mixers		9	5.00	8
Concrete/Industrial Saws		81		8
Cranes		231	4.00	8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		89	3.00	8
Generator Sets		84	4.00	8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130	5.00	8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46	1.00	8

END OF DATA ENTRY SHEET

The maximum pounds per day in row 11 is summed over overlapping phases, but the maximum tons per phase in row 34 is not summed over overlapping phases.

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Wolfe Rd/I-280 Interchange

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	2.63	20.11	26.90	21.21	1.21	20.00	5.25	1.09	4.16	0.05	4,595.38	1.13	0.10	4,653.58
Grading/Excavation	1.53	14.14	22.28	20.92	0.92	20.00	4.79	0.63	4.16	0.08	8,418.25	0.88	0.82	8,684.04
Drainage/Utilities/Sub-Grade	1.31	15.37	12.09	20.70	0.70	20.00	4.76	0.60	4.16	0.03	3,011.80	0.60	0.09	3,053.88
Paving	0.70	9.70	7.37	0.39	0.39	0.00	0.32	0.32	0.00	0.02	2,154.32	0.41	0.11	2,198.41
Maximum (pounds/day)	6.17	59.33	68.65	63.22	3.22	60.00	15.12	2.64	12.48	0.18	18,179.76	3.02	1.12	18,589.92
Total (tons/construction project)	0.42	4.12	4.57	4.84	0.22	4.62	1.14	0.18	0.96	0.01	1,168.69	0.20	0.07	1,193.23

Notes:

Project Start Year ->	2023
Project Length (months) ->	24
Total Project Area (acres) ->	20
Maximum Area Disturbed/Day (acres) ->	2
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	26	0	60	0	320	40
Grading/Excavation	833	0	1,260	0	1,200	40
Drainage/Utilities/Sub-Grade	0	40	0	60	800	40
Paving	0	66	0	120	400	40

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Wolfe Rd/I-280 Interchange

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.17	1.33	1.78	1.40	0.08	1.32	0.35	0.07	0.27	0.00	303.30	0.07	0.01	278.63
Grading/Excavation	0.08	0.78	1.23	1.15	0.05	1.10	0.26	0.03	0.23	0.00	463.00	0.05	0.04	433.30
Drainage/Utilities/Sub-Grade	0.14	1.69	1.33	2.28	0.08	2.20	0.52	0.07	0.46	0.00	331.30	0.07	0.01	304.75
Paving	0.02	0.32	0.24	0.01	0.01	0.00	0.01	0.01	0.00	0.00	71.09	0.01	0.00	65.81
Maximum (tons/phase)	0.17	1.69	1.78	2.28	0.08	2.20	0.52	0.07	0.46	0.00	463.00	0.07	0.04	433.30
Total (tons/construction project)	0.42	4.12	4.57	4.84	0.22	4.62	1.14	0.18	0.96	0.01	1168.69	0.20	0.07	1,082.49

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 9.0.0**
Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

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

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Wolfe Rd/I-280 Interchange	
Construction Start Year	2023	Enter a Year between 2014 and 2040 (inclusive)
Project Type	3	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway□ 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane□ 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	24.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the lone formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	1.50	miles
Total Project Area	20.00	acres
Maximum Area Disturbed/Day	2.00	acres
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Grubbing/Land Clearing	20.00		25.67
	Grading/Excavation	20.00	833.33	
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00	40.00	
	Paving	20.00	66.00	

Mitigation Options

On-road Fleet Emissions Mitigation		Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer□
Off-road Equipment Emissions Mitigation		Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/Businesses/CEQA-Land-Use-Planning/Mitigation). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

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

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing	6.00	2.40	3/1/2023	1/1/2023
Grading/Excavation	5.00	10.80	3/2/2023	7/3/2023
Drainage/Utilities/Sub-Grade	10.00	7.20	7/1/2023	12/3/2023
Paving	3.00	3.60	3/1/2023	10/3/2024
Totals (Months)	24			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		2	60.00
Miles/round trip: Grading/Excavation		30.00		42	1260.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving		30.00		0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.05	0.41	0.01	0.01	0.00	226.85	0.00	0.04	237.49
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.03	0.00	0.00	0.00	14.97	0.00	0.00	15.67
Pounds per day - Grading/Excavation	0.08	1.12	8.70	0.31	0.13	0.05	4,763.94	0.00	0.75	4,987.19
Tons per const. Period - Grading/Excavation	0.00	0.06	0.48	0.02	0.01	0.00	262.02	0.00	0.04	274.30
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.07	0.51	0.02	0.01	0.00	276.99	0.00	0.04	289.97

Note: Asphalt Hauling emission default values can be overridden in cells D91 through D94, and F91 through F94.

Asphalt Hauling Emissions User Input	User Override of Miles/Round Trip	Program Estimate of Miles/Round Trip	User Override of Truck Round Trips/Day	Default Values Round Trips/Day	Calculated Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		0	0.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		2	60.00
Miles/round trip: Paving		30.00		4	120.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.05	0.42	0.01	0.01	0.00	225.72	0.00	0.04	236.30
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.05	0.00	0.00	0.00	24.83	0.00	0.00	25.99
Pounds per day - Paving	0.01	0.11	0.83	0.03	0.01	0.00	453.71	0.00	0.07	474.97
Tons per const. Period - Paving	0.00	0.00	0.03	0.00	0.00	0.00	14.97	0.00	0.00	15.67
Total tons per construction project	0.00	0.01	0.07	0.00	0.00	0.00	39.80	0.00	0.01	41.67

Note: Worker commute default values can be overridden in cells D121 through D126.

Worker Commute Emissions User Input	User Override of Worker Commute Default Values	Default Values		
Miles/ one-way trip		20	Calculated Daily Trips	Calculated Daily VMT
One-way trips/day		2		
No. of employees: Grubbing/Land Clearing		8	16	320.00
No. of employees: Grading/Excavation		30	60	1,200.00
No. of employees: Drainage/Utilities/Sub-Grade		20	40	800.00
No. of employees: Paving		10	20	400.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Grading/Excavation (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.88	0.07	0.05	0.02	0.00	313.29	0.00	0.01	315.24
Paving (grams/mile)	0.02	0.91	0.07	0.05	0.02	0.00	317.66	0.00	0.01	319.68
Grubbing/Land Clearing (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Grading/Excavation (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50
Draining/Utilities/Sub-Grade (grams/trip)	1.02	2.72	0.28	0.00	0.00	0.00	67.35	0.07	0.03	78.35
Paving (grams/trip)	1.04	2.75	0.29	0.00	0.00	0.00	68.26	0.07	0.03	79.50

Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.05	0.74	0.06	0.03	0.01	0.00	226.51	0.01	0.01	228.33
Tons per const. Period - Grubbing/Land Clearing	0.00	0.05	0.00	0.00	0.00	0.00	14.95	0.00	0.00	15.07
Pounds per day - Grading/Excavation	0.18	2.78	0.23	0.12	0.05	0.01	849.41	0.02	0.02	856.25
Tons per const. Period - Grading/Excavation	0.01	0.15	0.01	0.01	0.00	0.00	46.72	0.00	0.00	47.09
Pounds per day - Drainage/Utilities/Sub-Grade	0.12	1.80	0.15	0.08	0.03	0.01	558.50	0.01	0.01	562.90
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.20	0.02	0.01	0.00	0.00	61.43	0.00	0.00	61.92
Pounds per day - Paving	0.06	0.93	0.08	0.04	0.02	0.00	283.14	0.01	0.01	285.42
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	9.34	0.00	0.00	9.42
Total tons per construction project	0.03	0.43	0.04	0.02	0.01	0.00	132.45	0.00	0.00	133.50

Note: Water Truck default values can be overridden in cells D153 through D156, I153 through I156, and F153 through F156.

Water Truck Emissions	User Override of	Program Estimate of	User Override of Truck	Default Values	Calculated	User Override of	Default Values	Calculated
User Input	Default # Water Trucks	Number of Water Trucks	Round Trips/Vehicle/Day	Round Trips/Vehicle/Day	Trips/day	Miles/Round Trip	Miles/Round Trip	Daily VMT
Grubbing/Land Clearing - Exhaust		1		5	5		8.00	40.00
Grading/Excavation - Exhaust		1		5	5		8.00	40.00
Drainage/Utilities/Subgrade		1		5	5		8.00	40.00
Paving		1		5	5		8.00	40.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grading/Excavation (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Draining/Utilities/Sub-Grade (grams/mile)	0.03	0.41	3.00	0.11	0.05	0.02	1,706.45	0.00	0.27	1,786.42
Paving (grams/mile)	0.03	0.40	2.98	0.11	0.05	0.02	1,714.99	0.00	0.27	1,795.36
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.02	0.00	0.00	0.00	9.98	0.00	0.00	10.45
Pounds per day - Grading/Excavation	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Grading/Excavation	0.00	0.00	0.02	0.00	0.00	0.00	8.32	0.00	0.00	8.71
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.31	0.01	0.00	0.00	150.48	0.00	0.02	157.54
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.03	0.00	0.00	0.00	16.55	0.00	0.00	17.33
Pounds per day - Paving	0.00	0.04	0.31	0.01	0.00	0.00	151.24	0.00	0.02	158.32
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	4.99	0.00	0.00	5.22
Total tons per construction project	0.00	0.01	0.08	0.00	0.00	0.00	39.84	0.00	0.01	41.71

Note: Fugitive dust default values can be overridden in cells D183 through D185.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		2.00	20.00	1.32	4.16	0.27
Fugitive Dust - Grading/Excavation		2.00	20.00	1.10	4.16	0.23
Fugitive Dust - Drainage/Utilities/Subgrade		2.00	20.00	2.20	4.16	0.46

Off-Road Equipment Emissions

Grubbing/Land Clearing	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Concrete/Industrial Saws	0.33	3.66	2.58	0.13	0.13	0.01	592.67	0.03	0.00	594.72
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Excavators	0.19	3.26	1.55	0.08	0.07	0.01	500.11	0.16	0.00	505.50
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Graders	0.38	1.69	4.65	0.15	0.14	0.01	640.86	0.21	0.01	647.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Rubber Tired Dozers	1.37	6.21	14.25	0.64	0.59	0.02	1,654.00	0.53	0.01	1,671.82
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Tractors/Loaders/Backhoes	0.30	4.46	3.07	0.15	0.14	0.01	603.15	0.20	0.01	609.64
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
			pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing	pounds per day	2.58	19.28	26.11	1.15	1.07	0.04	3,990.78	1.13	0.04	4,029.44
Grubbing/Land Clearing	tons per phase	0.17	1.27	1.72	0.08	0.07	0.00	263.39	0.07	0.00	265.94

Grading/Excavation	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	4		Model Default Tier	Excavators	0.19	3.26	1.55	0.08	0.07	0.01	500.11	0.16	0.00	505.50
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Graders	0.38	1.69	4.65	0.15	0.14	0.01	640.86	0.21	0.01	647.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3		Model Default Tier	Rubber Tired Loaders	0.54	3.02	5.31	0.18	0.16	0.01	1,211.12	0.39	0.01	1,224.20
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.15	2.23	1.54	0.08	0.07	0.00	301.58	0.10	0.00	304.82
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles	Equipment Tier	Type		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation	pounds per day		1.26	10.20	13.05	0.48	0.44	0.03	2,653.66	0.86	0.02	2,682.28
	Grading/Excavation	tons per phase		0.07	0.56	0.72	0.03	0.02	0.00	145.95	0.05	0.00	147.53

Drainage/Utilities/Subgrade	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Cranes	0.17	0.91	1.85	0.08	0.07	0.00	279.41	0.09	0.00	282.42
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Excavators	0.19	3.26	1.49	0.07	0.07	0.01	500.17	0.16	0.00	505.56
1.00			Model Default Tier	Forklifts	0.04	0.43	0.35	0.02	0.02	0.00	55.51	0.02	0.00	56.11
	1		Model Default Tier	Generator Sets	0.15	1.83	1.32	0.06	0.06	0.00	311.52	0.01	0.00	312.55
0.00	2		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.30	4.47	3.00	0.14	0.13	0.01	603.31	0.20	0.01	609.80
1.00			Model Default Tier	Trenchers	0.34	2.59	3.20	0.22	0.20	0.00	327.18	0.11	0.00	330.71
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles	Equipment Tier	Type		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage/Utilities/Sub-Grade	pounds per day		1.18	13.49	11.21	0.60	0.55	0.02	2,077.10	0.58	0.02	2,097.14
	Drainage/Utilities/Sub-Grade	tons per phase		0.13	1.48	1.23	0.07	0.06	0.00	228.48	0.06	0.00	230.69

Paving	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00			Model Default Tier	Cement and Mortar Mixers	0.04	0.19	0.23	0.01	0.01	0.00	31.57	0.00	0.00	31.73
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pavers	0.12	1.80	1.18	0.06	0.05	0.00	284.51	0.09	0.00	287.58
	1		Model Default Tier	Paving Equipment	0.17	2.56	1.60	0.08	0.07	0.00	394.47	0.13	0.00	398.72
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	1		Model Default Tier	Rollers	0.15	1.85	1.61	0.09	0.08	0.00	254.11	0.08	0.00	256.85
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

			Model Default Tier	Scrapers		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Signal Boards		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Skid Steer Loaders		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	2		Model Default Tier	Tractors/Loaders/Backhoes		0.15	2.23	1.54	0.08	0.07	0.00	301.58	0.10	0.00	304.82
			Model Default Tier	Trenchers		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab					ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles			Equipment Tier	Type		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Paving			pounds per day		0.63	8.63	6.16	0.31	0.28	0.01	1,266.24	0.40	0.01	1,279.70
	Paving			tons per phase		0.02	0.28	0.20	0.01	0.01	0.00	41.79	0.01	0.00	42.23
Total Emissions all Phases (tons per construction period) =>						0.39	3.60	3.88	0.18	0.17	0.01	679.61	0.20	0.01	686.38

Equipment default values for horsepower and hours/day can be overridden in cells D403 through D436 and F403 through F436.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		221		8
Cement and Mortar Mixers		9	5.00	8
Concrete/Industrial Saws		81		8
Cranes		231	4.00	8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		89	3.00	8
Generator Sets		84	4.00	8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130	5.00	8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46	1.00	8

END OF DATA ENTRY SHEET

Appendix D – CO EPA Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

MAR 21 2018

Muhaned Aljabiry, Chief
Office of Federal Transportation Management Program
California Department of Transportation
1120 N Street, Rm 4400, MS-82
Sacramento, CA 95814

Dear Mr. Aljabiry:

The U.S. Environmental Protection Agency (EPA) is providing this letter to document that the transportation conformity requirements under Clean Air Action (CAA) section 176(c) for the Carbon Monoxide (CO) maintenance areas included in the table below will end on June 1, 2018. This date marks 20 years from the redesignation of the areas to attainment for the CO National Ambient Air Quality Standard (NAAQS)[1].

California Carbon Monoxide Maintenance Areas

Bakersfield	Chico
Fresno	Modesto
Lake Tahoe North Shore	Lake Tahoe South Shore
Sacramento	San Diego
San Francisco-Oakland-San Jose	Stockton

Under 40 CFR 93.102(b)(4) of the EPA's regulations, transportation conformity applies to maintenance areas through the 20-year maintenance planning period, unless the maintenance plan specifies that the transportation conformity requirements apply for a longer time period. Pursuant to CAA's section 176(c)(5) and as explained in the preamble of the 1993 final rule, conformity applies to areas that are designated nonattainment or are subject to a maintenance plan approved under CAA section 175A. The section 175A maintenance planning period is 20 years, unless the applicable implementation plan specifies a longer maintenance period[2]. The EPA further clarified this conformity provision in its January 24, 2008 final rule[3].

The approved maintenance plan for these areas did not extend the maintenance plan period beyond 20 years from redesignation. Consequently, transportation conformity requirements for CO will cease to apply after June 1, 2018 (i.e., 20 years after the effective date of the EPA's approval of the first 10-year maintenance plan and redesignation of the areas to attainment for the CO NAAQS). As a result, these areas' Metropolitan Planning Organizations may reference this letter to indicate that as of June 1, 2018,

1 *See* 63 FR 15305 (March 31, 1998) (approval of redesignation request and first 10-year maintenance plan) and 70 FR 71776 (November 30, 2005) (approval of second 10-year maintenance plan)
2 *See* 58 FR 62188, 62206 (November 24, 1993)
3 *See* 73 FR 4420, at 4434-5 (January 24, 2008)

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transportation conformity requirements no longer apply for the CO NAAQS for Federal Highway Administration / Federal Transit Association projects as defined in 40 CFR 93.101. Even though the conformity obligation for CO has ended, the terms of the maintenance plans remain in effect and all measures and requirements contained in the plans apply until the state submits, and the EPA approves, a revision to the state plan[4]. Such a State Implementation Plan revision would have to comply with the anti-backsliding requirements of CAA section 110(l), and if applicable, CAA section 193, if the intent of the revision is to remove a control measure or to reduce its stringency.

If you have any questions about the transportation conformity requirements, please contact me at (415) 972-3183 or Karina O'Connor of my staff at (775) 434-8176.

Sincerely,

Elizabeth J. Adams

Elizabeth L. Adams
Acting Director, Air Division

cc: Rodeny Langstaff, Caltrans
Nesamani Kalandiyur, California Air Resources Board
Tasha Clemons, Federal Highway Administration
Stew Sonnenberg, Federal Highway Administration
Christina Leach, Federal Highway Administration
Ted Matley, Federal Transit Administration
Ahron Hakimi, Kern Council of Governments
Jon Clark, Butte County Association of Governments
Steve Heminger, Metropolitan Transportation Commission
James Corless, Sacramento Area Council of Governments
Kim Kawanda, San Diego Association of Governments
Tony Boren, Fresno Council of Governments
Rosa De Leon Park, Stanislaus Council of Governments
Andrew Chesley, San Joaquin Council of Governments
Joanne Marchetta, Tahoe Regional Planning Association

4 See *General Motors Corp. v. United States*, 496 U.S. 530 (1990)

Appendix E Operational Roadway CT-EMFAC Outputs

The traffic volumes for the I-280/Wolfe Road Interchange Improvement project for the years 2017, 2025, and 2045 were provided by Fehr and Peers.

Traffic conditions for the existing, No Build Alternative, and three Build Alternative were described in the I-280/Wolfe Road Interchange Improvements Draft Traffic Operations Analysis and Report prepared by Fehr and Peers in March 2019. This report detailed travel speed and delay information for the existing (i.e. 2017) and future conditions (i.e. 2025 and 2045). The AM and PM Peak Hour delays were used to estimate the Peak Hour Speed for all years and for all alternatives (i.e. No Build and Build).

The truck volumes were based on the 2016 annual average daily truck traffic information complied by the Caltrans Traffic Data Branch.

The CT-EMFAC 2014 (version 6.0) model was used to compute the operational emissions. This appendix includes the calculated CT-EMFAC output.

No Build, Build 1, and Build 2 Alternatives

Loc ID	Segment Name	Existing Count (2017)		Opening Year (2025)		Design Year (2045)	
		Existing Peak Total	Existing ADT	Peak Total	Estimated ADT	Peak Total	Estimated ADT
1	NB Wolfe to I-280 SB	1,142	8,507	1,210	9,020	1,800	13,410
2	NB Wolfe to I-280 NB	965	6,343	1,180	7,760	1,780	11,710
3	NB I-280 Off Ramp to Wolfe	2,006	15,065	3,070	23,050	3,510	26,360
4	SB Wolfe to I-280 NB	1,010	6,077	1,450	8,720	1,660	9,990
5	SB Wolfe to I-280 SB	872	7,170	1,420	11,680	1,580	12,990
6	SB I-280 Off Ramp to Wolfe	1,515	9,904	2,250	14,710	2,670	17,450
7	NB Wolfe crossing Bridge	3,000	19,235	4,980	31,930	6,210	39,810
8	SB Wolfe crossing Bridge	3,085	19,499	5,040	31,850	6,130	38,740

AM Peak (8:00AM-9:00AM), PM Peak (5:00PM-6:00PM)

Build 3 Alternative

Loc ID	Segment Name	Existing Count (2017)		Opening Year (2025)		Design Year (2045)	
		Existing Peak Total	Existing ADT	Peak Total	Estimated ADT	Peak Total	Estimated ADT
1	NB I-280 Off Ramp to Wolfe	2,006	15,065	3,070	23,050	3,510	26,360
2	Wolfe On Ramp to I-280 NB	1,975	12,419	2,630	16,480	3,440	21,700
3	SB I-280 Off Ramp to Wolfe	1,515	9,904	2,250	14,710	2,670	17,450
4	Wolfe On Ramp to I-280 SB	2,014	15,676	2,630	20,700	3,380	26,400
7	NB Wolfe crossing Bridge	3,000	19,235	4,980	31,930	6,210	39,810
8	SB Wolfe crossing Bridge	3,085	19,499	5,040	31,850	6,130	38,740

Total Emissions	Base Case	Opening Year No Build	Opening Year Build	Horizon Year No Build	Horizon Year Build
HC (tons/day)	2.671E-03	3.204E-03	3.074E-03	2.871E-03	2.691E-03
ROG (tons/day)	2.585E-03	2.984E-03	2.876E-03	2.638E-03	2.483E-03
TOG (tons/day)	2.927E-03	3.511E-03	3.366E-03	3.180E-03	2.978E-03
CO (tons/day)	3.023E-02	3.089E-02	2.990E-02	2.628E-02	2.492E-02
NOx (tons/day)	8.628E-03	7.099E-03	6.725E-03	6.252E-03	5.722E-03
CO2 (tons/day)	9.194E+00	1.425E+01	1.372E+01	1.614E+01	1.528E+01
CH4 (tons/day)	2.824E-04	4.443E-04	4.127E-04	4.506E-04	4.110E-04
PM10 (tons/day)	1.310E-03	1.946E-03	1.937E-03	2.314E-03	2.307E-03
PM2.5 (tons/day)	5.770E-04	8.401E-04	8.324E-04	9.629E-04	9.562E-04
Benzene (tons/day)	5.008E-05	6.289E-05	5.955E-05	6.373E-05	5.893E-05
Acrolein (tons/day)	1.651E-06	2.342E-06	2.169E-06	2.664E-06	2.413E-06
Acetaldehyde (tons/day)	2.356E-05	2.984E-05	2.794E-05	4.086E-05	3.744E-05
Formaldehyde (tons/day)	5.859E-05	7.570E-05	7.076E-05	9.864E-05	9.028E-05
Butadiene (tons/day)	7.455E-06	1.027E-05	9.560E-06	1.145E-05	1.045E-05
Naphthalene (tons/day)	3.092E-06	3.354E-06	3.265E-06	2.925E-06	2.783E-06
POM (tons/day)	1.478E-06	1.977E-06	1.839E-06	1.947E-06	1.775E-06
Diesel PM (tons/day)	6.578E-05	3.507E-05	3.273E-05	2.691E-05	2.465E-05
DEOG (tons/day)	2.469E-04	3.070E-04	2.876E-04	4.376E-04	4.013E-04

Scenario: Base Case
Geographic Area: Santa Clara (SF)
Analysis Year: 2017
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	2.2%	3.1%
Off-Peak:	5.6%	2.3%	3.3%

Running Exhaust (gram/veh-mile)

PK Emission Factors

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.340074	0.293090	0.386371	2.605242	0.870054	1197.488892	0.076529	0.019973	0.018715	0.009302	0.000419	0.007282	0.017481	0.001923	0.000271	0.000412	0.009185	0.080626
5 ~ 10 mph	0.227660	0.198710	0.260536	2.216508	0.730236	910.663635	0.050225	0.014450	0.013574	0.006232	0.000272	0.005449	0.012790	0.001267	0.000185	0.000286	0.007594	0.062119
10 ~ 15 mph	0.151516	0.131191	0.172253	1.904029	0.561428	703.643127	0.033602	0.010000	0.009400	0.004147	0.000186	0.003300	0.007893	0.000856	0.000121	0.000183	0.005416	0.036663
15 ~ 20 mph	0.105584	0.090465	0.119041	1.670196	0.455619	567.390076	0.023602	0.007142	0.006715	0.002890	0.000134	0.002015	0.004962	0.000608	0.000083	0.000121	0.003915	0.021469
20 ~ 25 mph	0.079632	0.068230	0.089660	1.494917	0.400042	477.351318	0.017712	0.005639	0.005307	0.002182	0.000102	0.001489	0.003684	0.000460	0.000063	0.000091	0.003244	0.015736
25 ~ 30 mph	0.063290	0.054265	0.071197	1.356503	0.367544	416.259430	0.013995	0.004727	0.004453	0.001735	0.000081	0.001168	0.002899	0.000367	0.000050	0.000073	0.002854	0.012275
30 ~ 35 mph	0.052650	0.045093	0.059104	1.245036	0.345806	376.334503	0.011600	0.004141	0.003905	0.001445	0.000068	0.000938	0.002348	0.000307	0.000041	0.000060	0.002599	0.009715
35 ~ 40 mph	0.045911	0.039231	0.051390	1.155726	0.331307	351.104675	0.010092	0.003806	0.003592	0.001260	0.000060	0.000776	0.001968	0.000269	0.000036	0.000052	0.002468	0.007865
40 ~ 45 mph	0.042047	0.035831	0.046918	1.085899	0.322300	337.957275	0.009228	0.003682	0.003477	0.001155	0.000056	0.000668	0.001723	0.000248	0.000033	0.000047	0.002457	0.006594
45 ~ 50 mph	0.040517	0.034443	0.045082	1.034627	0.317858	336.479523	0.008878	0.003746	0.003541	0.001114	0.000054	0.000606	0.001589	0.000241	0.000031	0.000045	0.002564	0.005809
50 ~ 55 mph	0.041127	0.034902	0.045657	1.002793	0.317510	345.992126	0.008994	0.003993	0.003776	0.001131	0.000056	0.000587	0.001558	0.000246	0.000032	0.000046	0.002789	0.005479
55 ~ 60 mph	0.044028	0.037332	0.048807	0.994009	0.322040	367.338501	0.009607	0.004277	0.004044	0.001209	0.000060	0.000602	0.001617	0.000264	0.000034	0.000049	0.002967	0.005483
60 ~ 65 mph	0.049525	0.041932	0.054813	1.014562	0.330609	403.372742	0.010801	0.004555	0.004305	0.001353	0.000068	0.000639	0.001744	0.000297	0.000038	0.000054	0.003047	0.005635
65 ~ 70 mph	0.053551	0.045310	0.059229	1.039387	0.336469	427.888275	0.011680	0.004798	0.004532	0.001353	0.000068	0.000639	0.001744	0.000297	0.000038	0.000054	0.003047	0.005635
>70 mph	0.053551	0.045310	0.059229	1.039387	0.336469	427.888275	0.011680	0.004798	0.004532	0.001353	0.000068	0.000639	0.001744	0.000297	0.000038	0.000054	0.003047	0.005635

OP Emission Factors

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.342635	0.296282	0.390140	2.610904	0.904892	1201.504883	0.076791	0.020349	0.019076	0.009373	0.000419	0.007587	0.018088	0.001928	0.000274	0.000419	0.009588	0.084819
5 ~ 10 mph	0.229694	0.201220	0.263507	2.220717	0.759086	914.781250	0.050442	0.014770	0.013882	0.006289	0.000272	0.005686	0.013261	0.001271	0.000188	0.000292	0.007933	0.065366
10 ~ 15 mph	0.152710	0.132667	0.174004	1.906239	0.582356	707.010620	0.033733	0.010235	0.009625	0.004180	0.000186	0.003442	0.008175	0.000858	0.000123	0.000187	0.005663	0.038610
15 ~ 20 mph	0.106279	0.091325	0.120066	1.671174	0.471623	570.396667	0.023682	0.007316	0.006882	0.002910	0.000134	0.002101	0.005131	0.000609	0.000084	0.000123	0.004098	0.022641
20 ~ 25 mph	0.080138	0.068858	0.090409	1.495267	0.413512	480.219757	0.017770	0.005786	0.005448	0.002196	0.000102	0.001552	0.003809	0.000461	0.000063	0.000093	0.003399	0.016600
25 ~ 30 mph	0.063679	0.054750	0.071774	1.356473	0.379633	419.023193	0.014039	0.004859	0.004580	0.001746	0.000081	0.001217	0.002996	0.000367	0.000050	0.000074	0.002993	0.012946
30 ~ 35 mph	0.052950	0.045468	0.059550	1.244754	0.356988	379.039429	0.011633	0.004264	0.004023	0.001453	0.000068	0.000976	0.002424	0.000307	0.000042	0.000061	0.002728	0.010244
35 ~ 40 mph	0.046144	0.039526	0.051740	1.155288	0.341863	353.727203	0.010117	0.003925	0.003706	0.001267	0.000060	0.000807	0.002029	0.000270	0.000036	0.000053	0.002593	0.008289
40 ~ 45 mph	0.042232	0.036069	0.047199	1.085378	0.332420	340.484528	0.009247	0.003803	0.003593	0.001160	0.000056	0.000694	0.001773	0.000249	0.000033	0.000048	0.002583	0.006945
45 ~ 50 mph	0.040670	0.034643	0.045317	1.034085	0.327683	338.937378	0.008893	0.003874	0.003663	0.001118	0.000054	0.000628	0.001632	0.000241	0.000032	0.000046	0.002697	0.006112
50 ~ 55 mph	0.041261	0.035079	0.045865	1.002282	0.327153	348.376373	0.009005	0.004134	0.003910	0.001135	0.000056	0.000607	0.001598	0.000246	0.000032	0.000047	0.002934	0.005759
55 ~ 60 mph	0.044155	0.037504	0.049009	0.993602	0.331656	369.632416	0.009617	0.004425	0.004187	0.001212	0.000060	0.000622	0.001656	0.000264	0.000034	0.000049	0.003120	0.005757
60 ~ 65 mph	0.049650	0.042104	0.055014	1.014308	0.340283	405.562561	0.010810	0.004704	0.004448	0.001357	0.000067	0.000659	0.001783	0.000297	0.000038	0.000054	0.003199	0.005908
65 ~ 70 mph	0.053674	0.045481	0.059428	1.039221	0.346170	429.995422	0.011689	0.004948	0.004676	0.001357	0.000067	0.000659	0.001783	0.000297	0.000038	0.000054	0.003199	0.005908
>70 mph	0.053674	0.045481	0.059428	1.039221	0.346170	429.995422	0.011689	0.004948	0.004676	0.001357	0.000067	0.000659	0.001783	0.000297	0.000038	0.000054	0.003199	0.005908

Idle Exhaust (gram/veh-idle hour)

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.994150	0.815173	1.102305	7.848496	2.865891	2996.732910	0.243343	0.044996	0.042076	0.026349	0.001418	0.013245	0.035701	0.005678	0.000694	0.001022	0.018373	0.127260
OP Emission Factors	1.005591	0.825194	1.115836	7.920270	2.983160	3006.382568	0.246139	0.045489	0.042550	0.026626	0.001434	0.013639	0.036565	0.005726	0.000701	0.001037	0.018950	0.132414

Running Loss (gram/veh-hour)

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	1.855085	1.983325	1.983325	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.019833	0.000000	0.000000	0.000000	0.000000	0.002777	0.000000	0.000000	0.000000
OP Emission Factors	1.856227	1.984546	1.984546	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.019845	0.000000	0.000000	0.000000	0.000000	0.002778	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008613	0.002153	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008652	0.002163	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040935	0.017543	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.041076	0.017604	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)

	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	1.285E-03	1.103E-03	1.444E-03	3.023E-02	8.628E-03	9.194E+00	2.824E-04	1.031E-04	9.727E-05	3.525E-05	1.651E-06	2.356E-05	5.859E-05	7.455E-06	1.016E-06	1.478E-06	6.578E-05	2.469E-04
Idling Exhaust	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Running Loss	1.387E-03	1.483E-03	1.483E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.076E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.100E-04	5.249E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.969E-04	4.273E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	2.671E-03	2.585E-03	2.927E-03	3.023E-02	8.628E-03	9.194E+00	2.824E-04	1.310E-03	5.770E-04	5.008E-05	1.651E-06	2.356E-05	5.859E-05	7.455E-06	3.092E-06	1.478E-06	6.578E-05	2.469E-04

Scenario: Opening Year No Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2025
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.8%	3.5%
Off-Peak:	5.6%	1.9%	3.7%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.186037	0.155280	0.208650	1.391707	0.704623	918.843689	0.044859	0.012280	0.011358	0.004894	0.000219	0.003466	0.008495	0.001020	0.000140	0.000209	0.001755	0.037289
5 ~ 10 mph	0.123390	0.103818	0.139294	1.200650	0.555651	701.962341	0.029645	0.008085	0.007489	0.003251	0.000141	0.002614	0.006232	0.000666	0.000095	0.000141	0.001447	0.029184
10 ~ 15 mph	0.082573	0.069361	0.092978	1.029474	0.373109	543.536011	0.019769	0.005497	0.005095	0.002177	0.000096	0.001671	0.004022	0.000449	0.000063	0.000092	0.001081	0.018390
15 ~ 20 mph	0.057888	0.048469	0.064927	0.901557	0.253122	439.593506	0.013816	0.003924	0.003639	0.001527	0.000068	0.001087	0.002660	0.000319	0.000044	0.000063	0.000826	0.011674
20 ~ 25 mph	0.043270	0.036207	0.048461	0.807475	0.181765	371.520447	0.010297	0.002983	0.002768	0.001143	0.000052	0.000791	0.001947	0.000239	0.000033	0.000047	0.000690	0.008405
25 ~ 30 mph	0.034033	0.028456	0.038053	0.732249	0.146480	325.370819	0.008072	0.002391	0.002221	0.000900	0.000041	0.000602	0.001495	0.000189	0.000026	0.000037	0.000601	0.006322
30 ~ 35 mph	0.028051	0.023413	0.031282	0.670261	0.126196	295.105774	0.006630	0.002009	0.001867	0.000743	0.000034	0.000469	0.001181	0.000157	0.000021	0.000030	0.000536	0.004816
35 ~ 40 mph	0.024259	0.020197	0.026962	0.619044	0.113721	275.808624	0.005714	0.001768	0.001644	0.000643	0.000030	0.000376	0.000964	0.000137	0.000018	0.000026	0.000490	0.003725
40 ~ 45 mph	0.022050	0.018303	0.024414	0.577076	0.105923	265.526093	0.005176	0.001630	0.001516	0.000585	0.000028	0.000311	0.000818	0.000126	0.000016	0.000023	0.000461	0.002941
45 ~ 50 mph	0.021098	0.017462	0.023274	0.543572	0.101267	263.956757	0.004936	0.001574	0.001464	0.000560	0.000027	0.000268	0.000727	0.000122	0.000016	0.000022	0.000447	0.002389
50 ~ 55 mph	0.021279	0.017564	0.023393	0.518455	0.098956	270.636139	0.004964	0.001595	0.001483	0.000566	0.000028	0.000247	0.000689	0.000124	0.000016	0.000022	0.000447	0.002071
55 ~ 60 mph	0.022739	0.018748	0.024953	0.503202	0.099761	286.321045	0.005290	0.001698	0.001579	0.000605	0.000030	0.000248	0.000706	0.000134	0.000017	0.000023	0.000462	0.001977
60 ~ 65 mph	0.025667	0.021157	0.028141	0.499556	0.103048	313.118500	0.005958	0.001898	0.001764	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
65 ~ 70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
>70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
OP Emission Factors																		
<=5 mph	0.186935	0.156319	0.209983	1.396867	0.736037	923.048279	0.045043	0.012297	0.011374	0.004919	0.000219	0.003589	0.008738	0.001021	0.000142	0.000210	0.001801	0.038991
5 ~ 10 mph	0.124149	0.104676	0.140399	1.204539	0.579918	706.076294	0.029804	0.008105	0.007508	0.003272	0.000141	0.002711	0.006425	0.000667	0.000096	0.000142	0.001485	0.030525
10 ~ 15 mph	0.083066	0.069912	0.093695	1.031623	0.388335	546.874084	0.019876	0.005516	0.005113	0.002190	0.000095	0.001734	0.004148	0.000450	0.000064	0.000093	0.001112	0.019267
15 ~ 20 mph	0.058210	0.048827	0.065397	0.902637	0.262415	442.566956	0.013890	0.003942	0.003656	0.001536	0.000068	0.001129	0.002744	0.000319	0.000045	0.000064	0.000852	0.012260
20 ~ 25 mph	0.043500	0.036462	0.048798	0.807970	0.187528	374.348206	0.010350	0.002999	0.002784	0.001149	0.000051	0.000822	0.002008	0.000240	0.000033	0.000047	0.000712	0.008830
25 ~ 30 mph	0.034201	0.028644	0.038301	0.732371	0.150583	328.090698	0.008111	0.002406	0.002235	0.000905	0.000041	0.000625	0.001540	0.000190	0.000026	0.000037	0.000621	0.006640
30 ~ 35 mph	0.028172	0.023550	0.031463	0.670129	0.129385	297.766296	0.006659	0.002023	0.001881	0.000746	0.000034	0.000487	0.001215	0.000158	0.000021	0.000030	0.000555	0.005057
35 ~ 40 mph	0.024345	0.020297	0.027093	0.618741	0.116359	278.390411	0.005734	0.001781	0.001657	0.000645	0.000030	0.000389	0.000990	0.000138	0.000018	0.000026	0.000507	0.003909
40 ~ 45 mph	0.022109	0.018375	0.024508	0.576663	0.108207	268.019806	0.005189	0.001643	0.001528	0.000586	0.000028	0.000321	0.000838	0.000126	0.000017	0.000023	0.000477	0.003084
45 ~ 50 mph	0.021137	0.017512	0.023339	0.543091	0.103315	266.388184	0.004945	0.001587	0.001476	0.000561	0.000027	0.000276	0.000743	0.000122	0.000016	0.000022	0.000462	0.002503
50 ~ 55 mph	0.021301	0.017598	0.023437	0.517937	0.100841	273.002899	0.004968	0.001606	0.001494	0.000567	0.000028	0.000254	0.000703	0.000124	0.000016	0.000022	0.000462	0.002167
55 ~ 60 mph	0.022753	0.018774	0.024986	0.502707	0.101598	288.614136	0.005293	0.001709	0.001590	0.000606	0.000030	0.000254	0.000719	0.000134	0.000017	0.000023	0.000477	0.002067
60 ~ 65 mph	0.025678	0.021181	0.028171	0.499124	0.104910	315.335419	0.005959	0.001910	0.001775	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
65 ~ 70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
>70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.566194	0.467422	0.630355	4.329027	1.628063	2291.506104	0.137528	0.036301	0.033759	0.014521	0.000752	0.008295	0.021512	0.003075	0.000390	0.000602	0.010175	0.084347
OP Emission Factors	0.574018	0.474388	0.639681	4.388872	1.698046	2301.656738	0.139383	0.036652	0.034098	0.014708	0.000762	0.008579	0.022127	0.003107	0.000395	0.000611	0.010609	0.088059

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	1.191724	1.274107	1.274107	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012741	0.000000	0.000000	0.000000	0.000000	0.001784	0.000000	0.000000	0.000000
OP Emission Factors	1.193129	1.275609	1.275609	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012756	0.000000	0.000000	0.000000	0.000000	0.001786	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008705	0.002176	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008745	0.002186	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040697	0.017442	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040837	0.017501	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	1.033E-03	8.635E-04	1.154E-03	2.459E-02	4.731E-03	1.091E+01	2.442E-04	7.416E-05	6.895E-05	2.736E-05	1.248E-06	1.777E-05	4.440E-05	5.793E-06	7.706E-07	1.101E-06	2.026E-05	1.843E-04
Idling Exhaust	8.237E-04	6.800E-04	9.170E-04	6.298E-03	2.368E-03	3.334E+00	2.001E-04	5.281E-05	4.911E-05	2.112E-05	1.094E-06	1.207E-05	3.130E-05	4.473E-06	5.674E-07	8.758E-07	1.480E-05	1.227E-04
Running Loss	1.347E-03	1.440E-03	1.440E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.440E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.016E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.207E-04	8.017E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.498E-03	6.419E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	3.204E-03	2.984E-03	3.511E-03	3.089E-02	7.099E-03	1.425E+01	4.443E-04	1.946E-03	8.401E-04	6.289E-05	2.342E-06	2.984E-05	7.570E-05	1.027E-05	3.354E-06	1.977E-06	3.507E-05	3.070E-04

Scenario: Opening Year Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2025
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.8%	3.5%
Off-Peak:	5.6%	1.9%	3.7%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.186037	0.155280	0.208650	1.391707	0.704623	918.843689	0.044859	0.012280	0.011358	0.004894	0.000219	0.003466	0.008495	0.001020	0.000140	0.000209	0.001755	0.037289
5 ~ 10 mph	0.123390	0.103818	0.139294	1.200650	0.555651	701.962341	0.029645	0.008085	0.007489	0.003251	0.000141	0.002614	0.006232	0.000666	0.000095	0.000141	0.001447	0.029184
10 ~ 15 mph	0.082573	0.069361	0.092978	1.029474	0.373109	543.536011	0.019769	0.005497	0.005095	0.002177	0.000096	0.001671	0.004022	0.000449	0.000063	0.000092	0.001081	0.018390
15 ~ 20 mph	0.057888	0.048469	0.064927	0.901557	0.253122	439.593506	0.013816	0.003924	0.003639	0.001527	0.000068	0.001087	0.002660	0.000319	0.000044	0.000063	0.000826	0.011674
20 ~ 25 mph	0.043270	0.036207	0.048461	0.807475	0.181765	371.520447	0.010297	0.002983	0.002768	0.001143	0.000052	0.000791	0.001947	0.000239	0.000033	0.000047	0.000690	0.008405
25 ~ 30 mph	0.034033	0.028456	0.038053	0.732249	0.146480	325.370819	0.008072	0.002391	0.002221	0.000900	0.000041	0.000602	0.001495	0.000189	0.000026	0.000037	0.000601	0.006322
30 ~ 35 mph	0.028051	0.023413	0.031282	0.670261	0.126196	295.105774	0.006630	0.002009	0.001867	0.000743	0.000034	0.000469	0.001181	0.000157	0.000021	0.000030	0.000536	0.004816
35 ~ 40 mph	0.024259	0.020197	0.026962	0.619044	0.113721	275.808624	0.005714	0.001768	0.001644	0.000643	0.000030	0.000376	0.000964	0.000137	0.000018	0.000026	0.000490	0.003725
40 ~ 45 mph	0.022050	0.018303	0.024414	0.577076	0.105923	265.526093	0.005176	0.001630	0.001516	0.000585	0.000028	0.000311	0.000818	0.000126	0.000016	0.000023	0.000461	0.002941
45 ~ 50 mph	0.021098	0.017462	0.023274	0.543572	0.101267	263.956757	0.004936	0.001574	0.001464	0.000560	0.000027	0.000268	0.000727	0.000122	0.000016	0.000022	0.000447	0.002389
50 ~ 55 mph	0.021279	0.017564	0.023393	0.518455	0.098956	270.636139	0.004964	0.001595	0.001483	0.000566	0.000028	0.000247	0.000689	0.000124	0.000016	0.000022	0.000447	0.002071
55 ~ 60 mph	0.022739	0.018748	0.024953	0.503202	0.099761	286.321045	0.005290	0.001698	0.001579	0.000605	0.000030	0.000248	0.000706	0.000134	0.000017	0.000023	0.000462	0.001977
60 ~ 65 mph	0.025667	0.021157	0.028141	0.499556	0.103048	313.118500	0.005958	0.001898	0.001764	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
65 ~ 70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
>70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
OP Emission Factors																		
<=5 mph	0.186935	0.156319	0.209983	1.396867	0.736037	923.048279	0.045043	0.012297	0.011374	0.004919	0.000219	0.003589	0.008738	0.001021	0.000142	0.000210	0.001801	0.038991
5 ~ 10 mph	0.124149	0.104676	0.140399	1.204539	0.579918	706.076294	0.029804	0.008105	0.007508	0.003272	0.000141	0.002711	0.006425	0.000667	0.000096	0.000142	0.001485	0.030525
10 ~ 15 mph	0.083066	0.069912	0.093695	1.031623	0.388335	546.874084	0.019876	0.005516	0.005113	0.002190	0.000095	0.001734	0.004148	0.000450	0.000064	0.000093	0.001112	0.019267
15 ~ 20 mph	0.058210	0.048827	0.065397	0.902637	0.262415	442.566956	0.013890	0.003942	0.003656	0.001536	0.000068	0.001129	0.002744	0.000319	0.000045	0.000064	0.000852	0.012260
20 ~ 25 mph	0.043500	0.036462	0.048798	0.807970	0.187528	374.348206	0.010350	0.002999	0.002784	0.001149	0.000051	0.000822	0.002008	0.000240	0.000033	0.000047	0.000712	0.008830
25 ~ 30 mph	0.034201	0.028644	0.038301	0.732371	0.150583	328.090698	0.008111	0.002406	0.002235	0.000905	0.000041	0.000625	0.001540	0.000190	0.000026	0.000037	0.000621	0.006640
30 ~ 35 mph	0.028172	0.023550	0.031463	0.670129	0.129385	297.766296	0.006659	0.002023	0.001881	0.000746	0.000034	0.000487	0.001215	0.000158	0.000021	0.000030	0.000555	0.005057
35 ~ 40 mph	0.024345	0.020297	0.027093	0.618741	0.116359	278.390411	0.005734	0.001781	0.001657	0.000645	0.000030	0.000389	0.000990	0.000138	0.000018	0.000026	0.000507	0.003909
40 ~ 45 mph	0.022109	0.018375	0.024508	0.576663	0.108207	268.019806	0.005189	0.001643	0.001528	0.000586	0.000028	0.000321	0.000838	0.000126	0.000017	0.000023	0.000477	0.003084
45 ~ 50 mph	0.021137	0.017512	0.023339	0.543091	0.103315	266.388184	0.004945	0.001587	0.001476	0.000561	0.000027	0.000276	0.000743	0.000122	0.000016	0.000022	0.000462	0.002503
50 ~ 55 mph	0.021301	0.017598	0.023437	0.517937	0.100841	273.002899	0.004968	0.001606	0.001494	0.000567	0.000028	0.000254	0.000703	0.000124	0.000016	0.000022	0.000462	0.002167
55 ~ 60 mph	0.022753	0.018774	0.024986	0.502707	0.101598	288.614136	0.005293	0.001709	0.001590	0.000606	0.000030	0.000254	0.000719	0.000134	0.000017	0.000023	0.000477	0.002067
60 ~ 65 mph	0.025678	0.021181	0.028171	0.499124	0.104910	315.335419	0.005959	0.001910	0.001775	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
65 ~ 70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
>70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.566194	0.467422	0.630355	4.329027	1.628063	2291.506104	0.137528	0.036301	0.033759	0.014521	0.000752	0.008295	0.021512	0.003075	0.000390	0.000602	0.010175	0.084347
OP Emission Factors	0.574018	0.474388	0.639681	4.388872	1.698046	2301.656738	0.139383	0.036652	0.034098	0.014708	0.000762	0.008579	0.022127	0.003107	0.000395	0.000611	0.010609	0.088059

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	1.191724	1.274107	1.274107	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012741	0.000000	0.000000	0.000000	0.000000	0.001784	0.000000	0.000000	0.000000
OP Emission Factors	1.193129	1.275609	1.275609	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012756	0.000000	0.000000	0.000000	0.000000	0.001786	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008705	0.002176	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008745	0.002186	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040697	0.017442	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040837	0.017501	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	1.033E-03	8.635E-04	1.154E-03	2.459E-02	4.731E-03	1.091E+01	2.442E-04	7.416E-05	6.895E-05	2.736E-05	1.248E-06	1.777E-05	4.440E-05	5.793E-06	7.706E-07	1.101E-06	2.026E-05	1.843E-04
Idling Exhaust	6.937E-04	5.727E-04	7.723E-04	5.304E-03	1.995E-03	2.808E+00	1.685E-04	4.448E-05	4.136E-05	1.779E-05	9.214E-07	1.016E-05	2.636E-05	3.768E-06	4.778E-07	7.376E-07	1.247E-05	1.033E-04
Running Loss	1.347E-03	1.440E-03	1.440E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.440E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.016E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.207E-04	8.017E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.498E-03	6.419E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	3.074E-03	2.876E-03	3.366E-03	2.990E-02	6.725E-03	1.372E+01	4.127E-04	1.937E-03	8.324E-04	5.955E-05	2.169E-06	2.794E-05	7.076E-05	9.560E-06	3.265E-06	1.839E-06	3.273E-05	2.876E-04

Scenario: Horizon Year No Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2045
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.5%	3.8%
Off-Peak:	5.6%	1.6%	4.0%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.131684	0.112703	0.148930	0.890524	0.679179	708.127869	0.030098	0.004584	0.004235	0.003575	0.000152	0.003111	0.007276	0.000733	0.000111	0.000131	0.000530	0.034752
5 ~ 10 mph	0.088346	0.076142	0.100718	0.757163	0.520813	545.013489	0.020296	0.003032	0.002806	0.002401	0.000098	0.002375	0.005429	0.000481	0.000076	0.000090	0.000481	0.027425
10 ~ 15 mph	0.058962	0.050716	0.067035	0.630534	0.323673	423.271515	0.013504	0.002106	0.001953	0.001604	0.000066	0.001525	0.003509	0.000324	0.000051	0.000059	0.000412	0.017425
15 ~ 20 mph	0.041154	0.035281	0.046586	0.540141	0.193271	343.494751	0.009385	0.001547	0.001436	0.001121	0.000047	0.000997	0.002321	0.000229	0.000035	0.000041	0.000361	0.011181
20 ~ 25 mph	0.030649	0.026245	0.034624	0.478380	0.116871	291.831055	0.006965	0.001198	0.001113	0.000836	0.000036	0.000719	0.001685	0.000172	0.000026	0.000030	0.000321	0.007991
25 ~ 30 mph	0.023992	0.020517	0.027037	0.430697	0.081975	256.996613	0.005428	0.000975	0.000908	0.000655	0.000028	0.000541	0.001277	0.000136	0.000020	0.000023	0.000292	0.005925
30 ~ 35 mph	0.019651	0.016764	0.022059	0.392198	0.063076	234.032700	0.004419	0.000830	0.000774	0.000537	0.000024	0.000414	0.000991	0.000113	0.000017	0.000019	0.000268	0.004428
35 ~ 40 mph	0.016869	0.014345	0.018843	0.360998	0.051858	219.124573	0.003767	0.000737	0.000687	0.000462	0.000021	0.000323	0.000789	0.000098	0.000014	0.000016	0.000249	0.003334
40 ~ 45 mph	0.015212	0.012888	0.016898	0.335966	0.044829	211.055405	0.003372	0.000679	0.000633	0.000417	0.000019	0.000258	0.000650	0.000090	0.000013	0.000014	0.000233	0.002530
45 ~ 50 mph	0.014445	0.012190	0.015954	0.316533	0.040333	209.385452	0.003178	0.000650	0.000606	0.000397	0.000019	0.000213	0.000556	0.000087	0.000012	0.000013	0.000220	0.001938
50 ~ 55 mph	0.014471	0.012166	0.015896	0.302665	0.037512	213.729233	0.003162	0.000647	0.000602	0.000399	0.000019	0.000188	0.000509	0.000088	0.000012	0.000013	0.000208	0.001569
55 ~ 60 mph	0.015427	0.012942	0.016894	0.295723	0.036898	224.891464	0.003357	0.000674	0.000628	0.000427	0.000021	0.000184	0.000513	0.000095	0.000013	0.000014	0.000204	0.001437
60 ~ 65 mph	0.017422	0.014599	0.019047	0.296923	0.037843	244.557770	0.003782	0.000738	0.000686	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
65 ~ 70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
>70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
OP Emission Factors																		
<=5 mph	0.132681	0.113827	0.150378	0.897009	0.710995	712.721985	0.030307	0.004601	0.004253	0.003602	0.000152	0.003238	0.007527	0.000734	0.000113	0.000133	0.000557	0.036498
5 ~ 10 mph	0.089176	0.077059	0.101905	0.762231	0.544939	549.362305	0.020473	0.003051	0.002824	0.002424	0.000098	0.002475	0.005627	0.000483	0.000077	0.000091	0.000505	0.028804
10 ~ 15 mph	0.059487	0.051284	0.067783	0.633553	0.338099	426.788177	0.013626	0.002124	0.001969	0.001618	0.000066	0.001589	0.003635	0.000325	0.000051	0.000060	0.000433	0.018305
15 ~ 20 mph	0.041487	0.035631	0.047059	0.541889	0.201308	346.599548	0.009472	0.001563	0.001451	0.001130	0.000047	0.001038	0.002403	0.000230	0.000036	0.000041	0.000379	0.011749
20 ~ 25 mph	0.030883	0.026491	0.034958	0.479469	0.121190	294.751373	0.007027	0.001212	0.001127	0.000842	0.000036	0.000749	0.001744	0.000172	0.000026	0.000031	0.000337	0.008397
25 ~ 30 mph	0.024162	0.020696	0.027279	0.431361	0.084639	259.792694	0.005473	0.000988	0.000920	0.000659	0.000028	0.000562	0.001320	0.000136	0.000021	0.000024	0.000307	0.006226
30 ~ 35 mph	0.019772	0.016893	0.022234	0.392558	0.064864	236.757797	0.004452	0.000843	0.000786	0.000541	0.000024	0.000430	0.001023	0.000113	0.000017	0.000019	0.000282	0.004653
35 ~ 40 mph	0.016954	0.014437	0.018968	0.361139	0.053133	221.761124	0.003790	0.000748	0.000698	0.000464	0.000021	0.000335	0.000814	0.000098	0.000014	0.000016	0.000262	0.003504
40 ~ 45 mph	0.015269	0.012952	0.016985	0.335946	0.045782	213.607559	0.003387	0.000690	0.000644	0.000419	0.000019	0.000267	0.000668	0.000090	0.000013	0.000014	0.000245	0.002659
45 ~ 50 mph	0.014480	0.012232	0.016012	0.316393	0.041071	211.877029	0.003187	0.000661	0.000616	0.000397	0.000019	0.000220	0.000570	0.000087	0.000012	0.000013	0.000231	0.002036
50 ~ 55 mph	0.014489	0.012191	0.015930	0.302431	0.038102	216.153809	0.003167	0.000656	0.000612	0.000399	0.000019	0.000194	0.000520	0.000088	0.000012	0.000013	0.000219	0.001649
55 ~ 60 mph	0.015435	0.012958	0.016916	0.295444	0.037430	227.246979	0.003360	0.000684	0.000637	0.000427	0.000021	0.000189	0.000523	0.000095	0.000013	0.000014	0.000215	0.001510
60 ~ 65 mph	0.017425	0.014611	0.019063	0.296622	0.038376	246.858658	0.003784	0.000747	0.000695	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
65 ~ 70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
>70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.363339	0.311653	0.408370	2.746363	1.068360	1755.812134	0.080027	0.014573	0.013572	0.009708	0.000506	0.006904	0.016871	0.002035	0.000286	0.000349	0.004572	0.073371
OP Emission Factors	0.368453	0.316740	0.414845	2.799717	1.118694	1766.813599	0.081004	0.014836	0.013825	0.009836	0.000513	0.007195	0.017476	0.002053	0.000290	0.000355	0.004867	0.077289

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.609235	0.651351	0.651351	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006514	0.000000	0.000000	0.000000	0.000000	0.000912	0.000000	0.000000	0.000000
OP Emission Factors	0.608515	0.650581	0.650581	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006506	0.000000	0.000000	0.000000	0.000000	0.000911	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008776	0.002194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008817	0.002204	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040545	0.017376	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040684	0.017436	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	8.908E-04	7.609E-04	1.001E-03	1.770E-02	2.913E-03	1.066E+01	2.005E-04	3.793E-05	3.536E-05	2.437E-05	1.082E-06	1.928E-05	4.591E-05	5.095E-06	7.666E-07	8.568E-07	1.262E-05	2.083E-04
Idling Exhaust	1.135E-03	9.739E-04	1.276E-03	8.583E-03	3.339E-03	5.487E+00	2.501E-04	4.554E-05	4.241E-05	3.034E-05	1.581E-06	2.158E-05	5.272E-05	6.360E-06	8.938E-07	1.091E-06	1.429E-05	2.293E-04
Running Loss	8.444E-04	9.028E-04	9.028E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.028E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.264E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.973E-04	9.932E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.834E-03	7.858E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	2.871E-03	2.638E-03	3.180E-03	2.628E-02	6.252E-03	1.614E+01	4.506E-04	2.314E-03	9.629E-04	6.373E-05	2.664E-06	4.086E-05	9.864E-05	1.145E-05	2.925E-06	1.947E-06	2.691E-05	4.376E-04

Scenario: Horizon Year Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2045
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.5%	3.8%
Off-Peak:	5.6%	1.6%	4.0%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.131684	0.112703	0.148930	0.890524	0.679179	708.127869	0.030098	0.004584	0.004235	0.003575	0.000152	0.003111	0.007276	0.000733	0.000111	0.000131	0.000530	0.034752
5 ~ 10 mph	0.088346	0.076142	0.100718	0.757163	0.520813	545.013489	0.020296	0.003032	0.002806	0.002401	0.000098	0.002375	0.005429	0.000481	0.000076	0.000090	0.000481	0.027425
10 ~ 15 mph	0.058962	0.050716	0.067035	0.630534	0.323673	423.271515	0.013504	0.002106	0.001953	0.001604	0.000066	0.001525	0.003509	0.000324	0.000051	0.000059	0.000412	0.017425
15 ~ 20 mph	0.041154	0.035281	0.046586	0.540141	0.193271	343.494751	0.009385	0.001547	0.001436	0.001121	0.000047	0.000997	0.002321	0.000229	0.000035	0.000041	0.000361	0.011181
20 ~ 25 mph	0.030649	0.026245	0.034624	0.478380	0.116871	291.831055	0.006965	0.001198	0.001113	0.000836	0.000036	0.000719	0.001685	0.000172	0.000026	0.000030	0.000321	0.007991
25 ~ 30 mph	0.023992	0.020517	0.027037	0.430697	0.081975	256.996613	0.005428	0.000975	0.000908	0.000655	0.000028	0.000541	0.001277	0.000136	0.000020	0.000023	0.000292	0.005925
30 ~ 35 mph	0.019651	0.016764	0.022059	0.392198	0.063076	234.032700	0.004419	0.000830	0.000774	0.000537	0.000024	0.000414	0.000991	0.000113	0.000017	0.000019	0.000268	0.004428
35 ~ 40 mph	0.016869	0.014345	0.018843	0.360998	0.051858	219.124573	0.003767	0.000737	0.000687	0.000462	0.000021	0.000323	0.000789	0.000098	0.000014	0.000016	0.000249	0.003334
40 ~ 45 mph	0.015212	0.012888	0.016898	0.335966	0.044829	211.055405	0.003372	0.000679	0.000633	0.000417	0.000019	0.000258	0.000650	0.000090	0.000013	0.000014	0.000233	0.002530
45 ~ 50 mph	0.014445	0.012190	0.015954	0.316533	0.040333	209.385452	0.003178	0.000650	0.000606	0.000397	0.000019	0.000213	0.000556	0.000087	0.000012	0.000013	0.000220	0.001938
50 ~ 55 mph	0.014471	0.012166	0.015896	0.302665	0.037512	213.729233	0.003162	0.000647	0.000602	0.000399	0.000019	0.000188	0.000509	0.000088	0.000012	0.000013	0.000208	0.001569
55 ~ 60 mph	0.015427	0.012942	0.016894	0.295723	0.036898	224.891464	0.003357	0.000674	0.000628	0.000427	0.000021	0.000184	0.000513	0.000095	0.000013	0.000014	0.000204	0.001437
60 ~ 65 mph	0.017422	0.014599	0.019047	0.296923	0.037843	244.557770	0.003782	0.000738	0.000686	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
65 ~ 70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
>70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
OP Emission Factors																		
<=5 mph	0.132681	0.113827	0.150378	0.897009	0.710995	712.721985	0.030307	0.004601	0.004253	0.003602	0.000152	0.003238	0.007527	0.000734	0.000113	0.000133	0.000557	0.036498
5 ~ 10 mph	0.089176	0.077059	0.101905	0.762231	0.544939	549.362305	0.020473	0.003051	0.002824	0.002424	0.000098	0.002475	0.005627	0.000483	0.000077	0.000091	0.000505	0.028804
10 ~ 15 mph	0.059487	0.051284	0.067783	0.633553	0.338099	426.788177	0.013626	0.002124	0.001969	0.001618	0.000066	0.001589	0.003635	0.000325	0.000051	0.000060	0.000433	0.018305
15 ~ 20 mph	0.041487	0.035631	0.047059	0.541889	0.201308	346.599548	0.009472	0.001563	0.001451	0.001130	0.000047	0.001038	0.002403	0.000230	0.000036	0.000041	0.000379	0.011749
20 ~ 25 mph	0.030883	0.026491	0.034958	0.479469	0.121190	294.751373	0.007027	0.001212	0.001127	0.000842	0.000036	0.000749	0.001744	0.000172	0.000026	0.000031	0.000337	0.008397
25 ~ 30 mph	0.024162	0.020696	0.027279	0.431361	0.084639	259.792694	0.005473	0.000988	0.000920	0.000659	0.000028	0.000562	0.001320	0.000136	0.000021	0.000024	0.000307	0.006226
30 ~ 35 mph	0.019772	0.016893	0.022234	0.392558	0.064864	236.757797	0.004452	0.000843	0.000786	0.000541	0.000024	0.000430	0.001023	0.000113	0.000017	0.000019	0.000282	0.004653
35 ~ 40 mph	0.016954	0.014437	0.018968	0.361139	0.053133	221.761124	0.003790	0.000748	0.000698	0.000464	0.000021	0.000335	0.000814	0.000098	0.000014	0.000016	0.000262	0.003504
40 ~ 45 mph	0.015269	0.012952	0.016985	0.335946	0.045782	213.607559	0.003387	0.000690	0.000644	0.000419	0.000019	0.000267	0.000668	0.000090	0.000013	0.000014	0.000245	0.002659
45 ~ 50 mph	0.014480	0.012232	0.016012	0.316393	0.041071	211.877029	0.003187	0.000661	0.000616	0.000397	0.000019	0.000220	0.000570	0.000087	0.000012	0.000013	0.000231	0.002036
50 ~ 55 mph	0.014489	0.012191	0.015930	0.302431	0.038102	216.153809	0.003167	0.000656	0.000612	0.000399	0.000019	0.000194	0.000520	0.000088	0.000012	0.000013	0.000219	0.001649
55 ~ 60 mph	0.015435	0.012958	0.016916	0.295444	0.037430	227.246979	0.003360	0.000684	0.000637	0.000427	0.000021	0.000189	0.000523	0.000095	0.000013	0.000014	0.000215	0.001510
60 ~ 65 mph	0.017425	0.014611	0.019063	0.296622	0.038376	246.858658	0.003784	0.000747	0.000695	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
65 ~ 70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
>70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.363339	0.311653	0.408370	2.746363	1.068360	1755.812134	0.080027	0.014573	0.013572	0.009708	0.000506	0.006904	0.016871	0.002035	0.000286	0.000349	0.004572	0.073371
OP Emission Factors	0.368453	0.316740	0.414845	2.799717	1.118694	1766.813599	0.081004	0.014836	0.013825	0.009836	0.000513	0.007195	0.017476	0.002053	0.000290	0.000355	0.004867	0.077289

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.609235	0.651351	0.651351	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006514	0.000000	0.000000	0.000000	0.000000	0.000912	0.000000	0.000000	0.000000
OP Emission Factors	0.608515	0.650581	0.650581	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006506	0.000000	0.000000	0.000000	0.000000	0.000911	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008776	0.002194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008817	0.002204	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040545	0.017376	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040684	0.017436	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	8.908E-04	7.609E-04	1.001E-03	1.770E-02	2.913E-03	1.066E+01	2.005E-04	3.793E-05	3.536E-05	2.437E-05	1.082E-06	1.928E-05	4.591E-05	5.095E-06	7.666E-07	8.568E-07	1.262E-05	2.083E-04
Idling Exhaust	9.555E-04	8.196E-04	1.074E-03	7.222E-03	2.810E-03	4.617E+00	2.105E-04	3.832E-05	3.569E-05	2.553E-05	1.331E-06	1.816E-05	4.437E-05	5.352E-06	7.521E-07	9.178E-07	1.202E-05	1.929E-04
Running Loss	8.444E-04	9.028E-04	9.028E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.028E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.264E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.973E-04	9.932E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.834E-03	7.858E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	2.691E-03	2.483E-03	2.978E-03	2.492E-02	5.722E-03	1.528E+01	4.110E-04	2.307E-03	9.562E-04	5.893E-05	2.413E-06	3.744E-05	9.028E-05	1.045E-05	2.783E-06	1.775E-06	2.465E-05	4.013E-04

Total Emissions	Base Case	Opening Year No Build	Opening Year Build	Horizon Year No Build	Horizon Year Build
HC (tons/day)	2.672E-03	3.204E-03	3.009E-03	2.871E-03	2.766E-03
ROG (tons/day)	2.586E-03	2.984E-03	2.823E-03	2.638E-03	2.548E-03
TOG (tons/day)	2.927E-03	3.511E-03	3.294E-03	3.181E-03	3.063E-03
CO (tons/day)	3.023E-02	3.089E-02	2.940E-02	2.628E-02	2.549E-02
NOx (tons/day)	8.629E-03	7.099E-03	6.540E-03	6.252E-03	5.943E-03
CO2 (tons/day)	9.195E+00	1.425E+01	1.346E+01	1.615E+01	1.564E+01
CH4 (tons/day)	2.824E-04	4.443E-04	3.971E-04	4.506E-04	4.275E-04
PM10 (tons/day)	1.310E-03	1.946E-03	1.933E-03	2.314E-03	2.310E-03
PM2.5 (tons/day)	5.770E-04	8.402E-04	8.286E-04	9.630E-04	9.590E-04
Benzene (tons/day)	5.008E-05	6.289E-05	5.790E-05	6.374E-05	6.093E-05
Acrolein (tons/day)	1.651E-06	2.342E-06	2.083E-06	2.664E-06	2.517E-06
Acetaldehyde (tons/day)	2.356E-05	2.984E-05	2.699E-05	4.086E-05	3.887E-05
Formaldehyde (tons/day)	5.859E-05	7.570E-05	6.831E-05	9.864E-05	9.377E-05
Butadiene (tons/day)	7.455E-06	1.027E-05	9.210E-06	1.146E-05	1.087E-05
Naphthalene (tons/day)	3.092E-06	3.354E-06	3.220E-06	2.925E-06	2.842E-06
POM (tons/day)	1.478E-06	1.977E-06	1.770E-06	1.947E-06	1.847E-06
Diesel PM (tons/day)	6.578E-05	3.507E-05	3.157E-05	2.691E-05	2.559E-05
DEOG (tons/day)	2.469E-04	3.070E-04	2.780E-04	4.376E-04	4.164E-04

Scenario: Base Case
Geographic Area: Santa Clara (SF)
Analysis Year: 2017
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	2.2%	3.1%
Off-Peak:	5.6%	2.3%	3.3%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.340074	0.293090	0.386371	2.605242	0.870054	1197.488892	0.076529	0.019973	0.018715	0.009302	0.000419	0.007282	0.017481	0.001923	0.000271	0.000412	0.009185	0.080626
5 ~ 10 mph	0.227660	0.198710	0.260536	2.216508	0.730236	910.663635	0.050225	0.014450	0.013574	0.006232	0.000272	0.005449	0.012790	0.001267	0.000185	0.000286	0.007594	0.062119
10 ~ 15 mph	0.151516	0.131191	0.172253	1.904029	0.561428	703.643127	0.033602	0.010000	0.009400	0.004147	0.000186	0.003300	0.007893	0.000856	0.000121	0.000183	0.005416	0.036663
15 ~ 20 mph	0.105584	0.090465	0.119041	1.670196	0.455619	567.390076	0.023602	0.007142	0.006715	0.002890	0.000134	0.002015	0.004962	0.000608	0.000083	0.000121	0.003915	0.021469
20 ~ 25 mph	0.079632	0.068230	0.089660	1.494917	0.400042	477.351318	0.017712	0.005639	0.005307	0.002182	0.000102	0.001489	0.003684	0.000460	0.000063	0.000091	0.003244	0.015736
25 ~ 30 mph	0.063290	0.054265	0.071197	1.356503	0.367544	416.259430	0.013995	0.004727	0.004453	0.001735	0.000081	0.001168	0.002899	0.000367	0.000050	0.000073	0.002854	0.012275
30 ~ 35 mph	0.052650	0.045093	0.059104	1.245036	0.345806	376.334503	0.011600	0.004141	0.003905	0.001445	0.000068	0.000938	0.002348	0.000307	0.000041	0.000060	0.002599	0.009715
35 ~ 40 mph	0.045911	0.039231	0.051390	1.155726	0.331307	351.104675	0.010092	0.003806	0.003592	0.001260	0.000060	0.000776	0.001968	0.000269	0.000036	0.000052	0.002468	0.007865
40 ~ 45 mph	0.042047	0.035831	0.046918	1.085899	0.322300	337.957275	0.009228	0.003682	0.003477	0.001155	0.000056	0.000668	0.001723	0.000248	0.000033	0.000047	0.002457	0.006594
45 ~ 50 mph	0.040517	0.034443	0.045082	1.034627	0.317858	336.479523	0.008878	0.003746	0.003541	0.001114	0.000054	0.000606	0.001589	0.000241	0.000031	0.000045	0.002564	0.005809
50 ~ 55 mph	0.041127	0.034902	0.045657	1.002793	0.317510	345.992126	0.008994	0.003993	0.003776	0.001131	0.000056	0.000587	0.001558	0.000246	0.000032	0.000046	0.002789	0.005479
55 ~ 60 mph	0.044028	0.037332	0.048807	0.994009	0.322040	367.338501	0.009607	0.004277	0.004044	0.001209	0.000060	0.000602	0.001617	0.000264	0.000034	0.000049	0.002967	0.005483
60 ~ 65 mph	0.049525	0.041932	0.054813	1.014562	0.330609	403.372742	0.010801	0.004555	0.004305	0.001353	0.000068	0.000639	0.001744	0.000297	0.000038	0.000054	0.003047	0.005635
65 ~ 70 mph	0.053551	0.045310	0.059229	1.039387	0.336469	427.888275	0.011680	0.004798	0.004532	0.001353	0.000068	0.000639	0.001744	0.000297	0.000038	0.000054	0.003047	0.005635
>70 mph	0.053551	0.045310	0.059229	1.039387	0.336469	427.888275	0.011680	0.004798	0.004532	0.001353	0.000068	0.000639	0.001744	0.000297	0.000038	0.000054	0.003047	0.005635
OP Emission Factors																		
<=5 mph	0.342635	0.296282	0.390140	2.610904	0.904892	1201.504883	0.076791	0.020349	0.019076	0.009373	0.000419	0.007587	0.018088	0.001928	0.000274	0.000419	0.009588	0.084819
5 ~ 10 mph	0.229694	0.201220	0.263507	2.220717	0.759086	914.781250	0.050442	0.014770	0.013882	0.006289	0.000272	0.005686	0.013261	0.001271	0.000188	0.000292	0.007933	0.065366
10 ~ 15 mph	0.152710	0.132667	0.174004	1.906239	0.582356	707.010620	0.033733	0.010235	0.009625	0.004180	0.000186	0.003442	0.008175	0.000858	0.000123	0.000187	0.005663	0.038610
15 ~ 20 mph	0.106279	0.091325	0.120066	1.671174	0.471623	570.396667	0.023682	0.007316	0.006882	0.002910	0.000134	0.002101	0.005131	0.000609	0.000084	0.000123	0.004098	0.022641
20 ~ 25 mph	0.080138	0.068858	0.090409	1.495267	0.413512	480.219757	0.017770	0.005786	0.005448	0.002196	0.000102	0.001552	0.003809	0.000461	0.000063	0.000093	0.003399	0.016600
25 ~ 30 mph	0.063679	0.054750	0.071774	1.356473	0.379633	419.023193	0.014039	0.004859	0.004580	0.001746	0.000081	0.001217	0.002996	0.000367	0.000050	0.000074	0.002993	0.012946
30 ~ 35 mph	0.052950	0.045468	0.059550	1.244754	0.356988	379.039429	0.011633	0.004264	0.004023	0.001453	0.000068	0.000976	0.002424	0.000307	0.000042	0.000061	0.002728	0.010244
35 ~ 40 mph	0.046144	0.039526	0.051740	1.155288	0.341863	353.727203	0.010117	0.003925	0.003706	0.001267	0.000060	0.000807	0.002029	0.000270	0.000036	0.000053	0.002593	0.008289
40 ~ 45 mph	0.042232	0.036069	0.047199	1.085378	0.332420	340.484528	0.009247	0.003803	0.003593	0.001160	0.000056	0.000694	0.001773	0.000249	0.000033	0.000048	0.002583	0.006945
45 ~ 50 mph	0.040670	0.034643	0.045317	1.034085	0.327683	338.937378	0.008893	0.003874	0.003663	0.001118	0.000054	0.000628	0.001632	0.000241	0.000032	0.000046	0.002697	0.006112
50 ~ 55 mph	0.041261	0.035079	0.045865	1.002282	0.327153	348.376373	0.009005	0.004134	0.003910	0.001135	0.000056	0.000607	0.001598	0.000246	0.000032	0.000047	0.002934	0.005759
55 ~ 60 mph	0.044155	0.037504	0.049009	0.993602	0.331656	369.632416	0.009617	0.004425	0.004187	0.001212	0.000060	0.000622	0.001656	0.000264	0.000034	0.000049	0.003120	0.005757
60 ~ 65 mph	0.049650	0.042104	0.055014	1.014308	0.340283	405.562561	0.010810	0.004704	0.004448	0.001357	0.000067	0.000659	0.001783	0.000297	0.000038	0.000054	0.003199	0.005908
65 ~ 70 mph	0.053674	0.045481	0.059428	1.039221	0.346170	429.995422	0.011689	0.004948	0.004676	0.001357	0.000067	0.000659	0.001783	0.000297	0.000038	0.000054	0.003199	0.005908
>70 mph	0.053674	0.045481	0.059428	1.039221	0.346170	429.995422	0.011689	0.004948	0.004676	0.001357	0.000067	0.000659	0.001783	0.000297	0.000038	0.000054	0.003199	0.005908

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.994150	0.815173	1.102305	7.848496	2.865891	2996.732910	0.243343	0.044996	0.042076	0.026349	0.001418	0.013245	0.035701	0.005678	0.000694	0.001022	0.018373	0.127260
OP Emission Factors	1.005591	0.825194	1.115836	7.920270	2.983160	3006.382568	0.246139	0.045489	0.042550	0.026626	0.001434	0.013639	0.036565	0.005726	0.000701	0.001037	0.018950	0.132414

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	1.855085	1.983325	1.983325	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.019833	0.000000	0.000000	0.000000	0.000000	0.002777	0.000000	0.000000	0.000000
OP Emission Factors	1.856227	1.984546	1.984546	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.019845	0.000000	0.000000	0.000000	0.000000	0.002778	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008613	0.002153	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008652	0.002163	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040935	0.017543	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.041076	0.017604	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	1.285E-03	1.103E-03	1.445E-03	3.023E-02	8.629E-03	9.195E+00	2.824E-04	1.031E-04	9.727E-05	3.526E-05	1.651E-06	2.356E-05	5.859E-05	7.455E-06	1.016E-06	1.478E-06	6.578E-05	2.469E-04
Idling Exhaust	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Running Loss	1.387E-03	1.483E-03	1.483E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.483E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.076E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.100E-04	5.249E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.970E-04	4.273E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	2.672E-03	2.586E-03	2.927E-03	3.023E-02	8.629E-03	9.195E+00	2.824E-04	1.310E-03	5.770E-04	5.008E-05	1.651E-06	2.356E-05	5.859E-05	7.455E-06	3.092E-06	1.478E-06	6.578E-05	2.469E-04

Scenario: Opening Year No Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2025
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.8%	3.5%
Off-Peak:	5.6%	1.9%	3.7%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.186037	0.155280	0.208650	1.391707	0.704623	918.843689	0.044859	0.012280	0.011358	0.004894	0.000219	0.003466	0.008495	0.001020	0.000140	0.000209	0.001755	0.037289
5 ~ 10 mph	0.123390	0.103818	0.139294	1.200650	0.555651	701.962341	0.029645	0.008085	0.007489	0.003251	0.000141	0.002614	0.006232	0.000666	0.000095	0.000141	0.001447	0.029184
10 ~ 15 mph	0.082573	0.069361	0.092978	1.029474	0.373109	543.536011	0.019769	0.005497	0.005095	0.002177	0.000096	0.001671	0.004022	0.000449	0.000063	0.000092	0.001081	0.018390
15 ~ 20 mph	0.057888	0.048469	0.064927	0.901557	0.253122	439.593506	0.013816	0.003924	0.003639	0.001527	0.000068	0.001087	0.002660	0.000319	0.000044	0.000063	0.000826	0.011674
20 ~ 25 mph	0.043270	0.036207	0.048461	0.807475	0.181765	371.520447	0.010297	0.002983	0.002768	0.001143	0.000052	0.000791	0.001947	0.000239	0.000033	0.000047	0.000690	0.008405
25 ~ 30 mph	0.034033	0.028456	0.038053	0.732249	0.146480	325.370819	0.008072	0.002391	0.002221	0.000900	0.000041	0.000602	0.001495	0.000189	0.000026	0.000037	0.000601	0.006322
30 ~ 35 mph	0.028051	0.023413	0.031282	0.670261	0.126196	295.105774	0.006630	0.002009	0.001867	0.000743	0.000034	0.000469	0.001181	0.000157	0.000021	0.000030	0.000536	0.004816
35 ~ 40 mph	0.024259	0.020197	0.026962	0.619044	0.113721	275.808624	0.005714	0.001768	0.001644	0.000643	0.000030	0.000376	0.000964	0.000137	0.000018	0.000026	0.000490	0.003725
40 ~ 45 mph	0.022050	0.018303	0.024414	0.577076	0.105923	265.526093	0.005176	0.001630	0.001516	0.000585	0.000028	0.000311	0.000818	0.000126	0.000016	0.000023	0.000461	0.002941
45 ~ 50 mph	0.021098	0.017462	0.023274	0.543572	0.101267	263.956757	0.004936	0.001574	0.001464	0.000560	0.000027	0.000268	0.000727	0.000122	0.000016	0.000022	0.000447	0.002389
50 ~ 55 mph	0.021279	0.017564	0.023393	0.518455	0.098956	270.636139	0.004964	0.001595	0.001483	0.000566	0.000028	0.000247	0.000689	0.000124	0.000016	0.000022	0.000447	0.002071
55 ~ 60 mph	0.022739	0.018748	0.024953	0.503202	0.099761	286.321045	0.005290	0.001698	0.001579	0.000605	0.000030	0.000248	0.000706	0.000134	0.000017	0.000023	0.000462	0.001977
60 ~ 65 mph	0.025667	0.021157	0.028141	0.499556	0.103048	313.118500	0.005958	0.001898	0.001764	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
65 ~ 70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
>70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
OP Emission Factors																		
<=5 mph	0.186935	0.156319	0.209983	1.396867	0.736037	923.048279	0.045043	0.012297	0.011374	0.004919	0.000219	0.003589	0.008738	0.001021	0.000142	0.000210	0.001801	0.038991
5 ~ 10 mph	0.124149	0.104676	0.140399	1.204539	0.579918	706.076294	0.029804	0.008105	0.007508	0.003272	0.000141	0.002711	0.006425	0.000667	0.000096	0.000142	0.001485	0.030525
10 ~ 15 mph	0.083066	0.069912	0.093695	1.031623	0.388335	546.874084	0.019876	0.005516	0.005113	0.002190	0.000095	0.001734	0.004148	0.000450	0.000064	0.000093	0.001112	0.019267
15 ~ 20 mph	0.058210	0.048827	0.065397	0.902637	0.262415	442.566956	0.013890	0.003942	0.003656	0.001536	0.000068	0.001129	0.002744	0.000319	0.000045	0.000064	0.000852	0.012260
20 ~ 25 mph	0.043500	0.036462	0.048798	0.807970	0.187528	374.348206	0.010350	0.002999	0.002784	0.001149	0.000051	0.000822	0.002008	0.000240	0.000033	0.000047	0.000712	0.008830
25 ~ 30 mph	0.034201	0.028644	0.038301	0.732371	0.150583	328.090698	0.008111	0.002406	0.002235	0.000905	0.000041	0.000625	0.001540	0.000190	0.000026	0.000037	0.000621	0.006640
30 ~ 35 mph	0.028172	0.023550	0.031463	0.670129	0.129385	297.766296	0.006659	0.002023	0.001881	0.000746	0.000034	0.000487	0.001215	0.000158	0.000021	0.000030	0.000555	0.005057
35 ~ 40 mph	0.024345	0.020297	0.027093	0.618741	0.116359	278.390411	0.005734	0.001781	0.001657	0.000645	0.000030	0.000389	0.000990	0.000138	0.000018	0.000026	0.000507	0.003909
40 ~ 45 mph	0.022109	0.018375	0.024508	0.576663	0.108207	268.019806	0.005189	0.001643	0.001528	0.000586	0.000028	0.000321	0.000838	0.000126	0.000017	0.000023	0.000477	0.003084
45 ~ 50 mph	0.021137	0.017512	0.023339	0.543091	0.103315	266.388184	0.004945	0.001587	0.001476	0.000561	0.000027	0.000276	0.000743	0.000122	0.000016	0.000022	0.000462	0.002503
50 ~ 55 mph	0.021301	0.017598	0.023437	0.517937	0.100841	273.002899	0.004968	0.001606	0.001494	0.000567	0.000028	0.000254	0.000703	0.000124	0.000016	0.000022	0.000462	0.002167
55 ~ 60 mph	0.022753	0.018774	0.024986	0.502707	0.101598	288.614136	0.005293	0.001709	0.001590	0.000606	0.000030	0.000254	0.000719	0.000134	0.000017	0.000023	0.000477	0.002067
60 ~ 65 mph	0.025678	0.021181	0.028171	0.499124	0.104910	315.335419	0.005959	0.001910	0.001775	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
65 ~ 70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
>70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.566194	0.467422	0.630355	4.329027	1.628063	2291.506104	0.137528	0.036301	0.033759	0.014521	0.000752	0.008295	0.021512	0.003075	0.000390	0.000602	0.010175	0.084347
OP Emission Factors	0.574018	0.474388	0.639681	4.388872	1.698046	2301.656738	0.139383	0.036652	0.034098	0.014708	0.000762	0.008579	0.022127	0.003107	0.000395	0.000611	0.010609	0.088059

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	1.191724	1.274107	1.274107	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012741	0.000000	0.000000	0.000000	0.000000	0.001784	0.000000	0.000000	0.000000
OP Emission Factors	1.193129	1.275609	1.275609	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012756	0.000000	0.000000	0.000000	0.000000	0.001786	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008705	0.002176	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008745	0.002186	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040697	0.017442	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040837	0.017501	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	1.033E-03	8.635E-04	1.154E-03	2.459E-02	4.731E-03	1.091E+01	2.442E-04	7.416E-05	6.895E-05	2.736E-05	1.248E-06	1.777E-05	4.440E-05	5.793E-06	7.707E-07	1.101E-06	2.026E-05	1.843E-04
Idling Exhaust	8.237E-04	6.800E-04	9.170E-04	6.298E-03	2.368E-03	3.334E+00	2.001E-04	5.281E-05	4.911E-05	2.112E-05	1.094E-06	1.207E-05	3.130E-05	4.473E-06	5.674E-07	8.758E-07	1.480E-05	1.227E-04
Running Loss	1.347E-03	1.440E-03	1.440E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.440E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.016E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.207E-04	8.017E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.498E-03	6.419E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	3.204E-03	2.984E-03	3.511E-03	3.089E-02	7.099E-03	1.425E+01	4.443E-04	1.946E-03	8.402E-04	6.289E-05	2.342E-06	2.984E-05	7.570E-05	1.027E-05	3.354E-06	1.977E-06	3.507E-05	3.070E-04

Scenario: Opening Year Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2025
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.8%	3.5%
Off-Peak:	5.6%	1.9%	3.7%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.186037	0.155280	0.208650	1.391707	0.704623	918.843689	0.044859	0.012280	0.011358	0.004894	0.000219	0.003466	0.008495	0.001020	0.000140	0.000209	0.001755	0.037289
5 ~ 10 mph	0.123390	0.103818	0.139294	1.200650	0.555651	701.962341	0.029645	0.008085	0.007489	0.003251	0.000141	0.002614	0.006232	0.000666	0.000095	0.000141	0.001447	0.029184
10 ~ 15 mph	0.082573	0.069361	0.092978	1.029474	0.373109	543.536011	0.019769	0.005497	0.005095	0.002177	0.000096	0.001671	0.004022	0.000449	0.000063	0.000092	0.001081	0.018390
15 ~ 20 mph	0.057888	0.048469	0.064927	0.901557	0.253122	439.593506	0.013816	0.003924	0.003639	0.001527	0.000068	0.001087	0.002660	0.000319	0.000044	0.000063	0.000826	0.011674
20 ~ 25 mph	0.043270	0.036207	0.048461	0.807475	0.181765	371.520447	0.010297	0.002983	0.002768	0.001143	0.000052	0.000791	0.001947	0.000239	0.000033	0.000047	0.000690	0.008405
25 ~ 30 mph	0.034033	0.028456	0.038053	0.732249	0.146480	325.370819	0.008072	0.002391	0.002221	0.000900	0.000041	0.000602	0.001495	0.000189	0.000026	0.000037	0.000601	0.006322
30 ~ 35 mph	0.028051	0.023413	0.031282	0.670261	0.126196	295.105774	0.006630	0.002009	0.001867	0.000743	0.000034	0.000469	0.001181	0.000157	0.000021	0.000030	0.000536	0.004816
35 ~ 40 mph	0.024259	0.020197	0.026962	0.619044	0.113721	275.808624	0.005714	0.001768	0.001644	0.000643	0.000030	0.000376	0.000964	0.000137	0.000018	0.000026	0.000490	0.003725
40 ~ 45 mph	0.022050	0.018303	0.024414	0.577076	0.105923	265.526093	0.005176	0.001630	0.001516	0.000585	0.000028	0.000311	0.000818	0.000126	0.000016	0.000023	0.000461	0.002941
45 ~ 50 mph	0.021098	0.017462	0.023274	0.543572	0.101267	263.956757	0.004936	0.001574	0.001464	0.000560	0.000027	0.000268	0.000727	0.000122	0.000016	0.000022	0.000447	0.002389
50 ~ 55 mph	0.021279	0.017564	0.023393	0.518455	0.098956	270.636139	0.004964	0.001595	0.001483	0.000566	0.000028	0.000247	0.000689	0.000124	0.000016	0.000022	0.000447	0.002071
55 ~ 60 mph	0.022739	0.018748	0.024953	0.503202	0.099761	286.321045	0.005290	0.001698	0.001579	0.000605	0.000030	0.000248	0.000706	0.000134	0.000017	0.000023	0.000462	0.001977
60 ~ 65 mph	0.025667	0.021157	0.028141	0.499556	0.103048	313.118500	0.005958	0.001898	0.001764	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
65 ~ 70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
>70 mph	0.027807	0.022921	0.030477	0.503013	0.105341	331.372131	0.006446	0.002059	0.001914	0.000681	0.000034	0.000265	0.000769	0.000151	0.000019	0.000026	0.000490	0.002030
OP Emission Factors																		
<=5 mph	0.186935	0.156319	0.209983	1.396867	0.736037	923.048279	0.045043	0.012297	0.011374	0.004919	0.000219	0.003589	0.008738	0.001021	0.000142	0.000210	0.001801	0.038991
5 ~ 10 mph	0.124149	0.104676	0.140399	1.204539	0.579918	706.076294	0.029804	0.008105	0.007508	0.003272	0.000141	0.002711	0.006425	0.000667	0.000096	0.000142	0.001485	0.030525
10 ~ 15 mph	0.083066	0.069912	0.093695	1.031623	0.388335	546.874084	0.019876	0.005516	0.005113	0.002190	0.000095	0.001734	0.004148	0.000450	0.000064	0.000093	0.001112	0.019267
15 ~ 20 mph	0.058210	0.048827	0.065397	0.902637	0.262415	442.566956	0.013890	0.003942	0.003656	0.001536	0.000068	0.001129	0.002744	0.000319	0.000045	0.000064	0.000852	0.012260
20 ~ 25 mph	0.043500	0.036462	0.048798	0.807970	0.187528	374.348206	0.010350	0.002999	0.002784	0.001149	0.000051	0.000822	0.002008	0.000240	0.000033	0.000047	0.000712	0.008830
25 ~ 30 mph	0.034201	0.028644	0.038301	0.732371	0.150583	328.090698	0.008111	0.002406	0.002235	0.000905	0.000041	0.000625	0.001540	0.000190	0.000026	0.000037	0.000621	0.006640
30 ~ 35 mph	0.028172	0.023550	0.031463	0.670129	0.129385	297.766296	0.006659	0.002023	0.001881	0.000746	0.000034	0.000487	0.001215	0.000158	0.000021	0.000030	0.000555	0.005057
35 ~ 40 mph	0.024345	0.020297	0.027093	0.618741	0.116359	278.390411	0.005734	0.001781	0.001657	0.000645	0.000030	0.000389	0.000990	0.000138	0.000018	0.000026	0.000507	0.003909
40 ~ 45 mph	0.022109	0.018375	0.024508	0.576663	0.108207	268.019806	0.005189	0.001643	0.001528	0.000586	0.000028	0.000321	0.000838	0.000126	0.000017	0.000023	0.000477	0.003084
45 ~ 50 mph	0.021137	0.017512	0.023339	0.543091	0.103315	266.388184	0.004945	0.001587	0.001476	0.000561	0.000027	0.000276	0.000743	0.000122	0.000016	0.000022	0.000462	0.002503
50 ~ 55 mph	0.021301	0.017598	0.023437	0.517937	0.100841	273.002899	0.004968	0.001606	0.001494	0.000567	0.000028	0.000254	0.000703	0.000124	0.000016	0.000022	0.000462	0.002167
55 ~ 60 mph	0.022753	0.018774	0.024986	0.502707	0.101598	288.614136	0.005293	0.001709	0.001590	0.000606	0.000030	0.000254	0.000719	0.000134	0.000017	0.000023	0.000477	0.002067
60 ~ 65 mph	0.025678	0.021181	0.028171	0.499124	0.104910	315.335419	0.005959	0.001910	0.001775	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
65 ~ 70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119
>70 mph	0.027814	0.022943	0.030504	0.502613	0.107215	333.526794	0.006447	0.002070	0.001925	0.000681	0.000034	0.000272	0.000781	0.000151	0.000019	0.000026	0.000504	0.002119

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.566194	0.467422	0.630355	4.329027	1.628063	2291.506104	0.137528	0.036301	0.033759	0.014521	0.000752	0.008295	0.021512	0.003075	0.000390	0.000602	0.010175	0.084347
OP Emission Factors	0.574018	0.474388	0.639681	4.388872	1.698046	2301.656738	0.139383	0.036652	0.034098	0.014708	0.000762	0.008579	0.022127	0.003107	0.000395	0.000611	0.010609	0.088059

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	1.191724	1.274107	1.274107	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012741	0.000000	0.000000	0.000000	0.000000	0.001784	0.000000	0.000000	0.000000
OP Emission Factors	1.193129	1.275609	1.275609	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.012756	0.000000	0.000000	0.000000	0.000000	0.001786	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008705	0.002176	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008745	0.002186	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040697	0.017442	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040837	0.017501	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	1.033E-03	8.635E-04	1.154E-03	2.459E-02	4.731E-03	1.091E+01	2.442E-04	7.416E-05	6.895E-05	2.736E-05	1.248E-06	1.777E-05	4.440E-05	5.793E-06	7.707E-07	1.101E-06	2.026E-05	1.843E-04
Idling Exhaust	6.292E-04	5.195E-04	7.005E-04	4.811E-03	1.809E-03	2.547E+00	1.528E-04	4.034E-05	3.752E-05	1.614E-05	8.357E-07	9.218E-06	2.391E-05	3.417E-06	4.334E-07	6.690E-07	1.131E-05	9.374E-05
Running Loss	1.347E-03	1.440E-03	1.440E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.440E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	2.016E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.207E-04	8.017E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.498E-03	6.419E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	3.009E-03	2.823E-03	3.294E-03	2.940E-02	6.540E-03	1.346E+01	3.971E-04	1.933E-03	8.286E-04	5.790E-05	2.083E-06	2.699E-05	6.831E-05	9.210E-06	3.220E-06	1.770E-06	3.157E-05	2.780E-04

Scenario: Horizon Year No Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2045
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.5%	3.8%
Off-Peak:	5.6%	1.6%	4.0%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.131684	0.112703	0.148930	0.890524	0.679179	708.127869	0.030098	0.004584	0.004235	0.003575	0.000152	0.003111	0.007276	0.000733	0.000111	0.000131	0.000530	0.034752
5 ~ 10 mph	0.088346	0.076142	0.100718	0.757163	0.520813	545.013489	0.020296	0.003032	0.002806	0.002401	0.000098	0.002375	0.005429	0.000481	0.000076	0.000090	0.000481	0.027425
10 ~ 15 mph	0.058962	0.050716	0.067035	0.630534	0.323673	423.271515	0.013504	0.002106	0.001953	0.001604	0.000066	0.001525	0.003509	0.000324	0.000051	0.000059	0.000412	0.017425
15 ~ 20 mph	0.041154	0.035281	0.046586	0.540141	0.193271	343.494751	0.009385	0.001547	0.001436	0.001121	0.000047	0.000997	0.002321	0.000229	0.000035	0.000041	0.000361	0.011181
20 ~ 25 mph	0.030649	0.026245	0.034624	0.478380	0.116871	291.831055	0.006965	0.001198	0.001113	0.000836	0.000036	0.000719	0.001685	0.000172	0.000026	0.000030	0.000321	0.007991
25 ~ 30 mph	0.023992	0.020517	0.027037	0.430697	0.081975	256.996613	0.005428	0.000975	0.000908	0.000655	0.000028	0.000541	0.001277	0.000136	0.000020	0.000023	0.000292	0.005925
30 ~ 35 mph	0.019651	0.016764	0.022059	0.392198	0.063076	234.032700	0.004419	0.000830	0.000774	0.000537	0.000024	0.000414	0.000991	0.000113	0.000017	0.000019	0.000268	0.004428
35 ~ 40 mph	0.016869	0.014345	0.018843	0.360998	0.051858	219.124573	0.003767	0.000737	0.000687	0.000462	0.000021	0.000323	0.000789	0.000098	0.000014	0.000016	0.000249	0.003334
40 ~ 45 mph	0.015212	0.012888	0.016898	0.335966	0.044829	211.055405	0.003372	0.000679	0.000633	0.000417	0.000019	0.000258	0.000650	0.000090	0.000013	0.000014	0.000233	0.002530
45 ~ 50 mph	0.014445	0.012190	0.015954	0.316533	0.040333	209.385452	0.003178	0.000650	0.000606	0.000397	0.000019	0.000213	0.000556	0.000087	0.000012	0.000013	0.000220	0.001938
50 ~ 55 mph	0.014471	0.012166	0.015896	0.302665	0.037512	213.729233	0.003162	0.000647	0.000602	0.000399	0.000019	0.000188	0.000509	0.000088	0.000012	0.000013	0.000208	0.001569
55 ~ 60 mph	0.015427	0.012942	0.016894	0.295723	0.036898	224.891464	0.003357	0.000674	0.000628	0.000427	0.000021	0.000184	0.000513	0.000095	0.000013	0.000014	0.000204	0.001437
60 ~ 65 mph	0.017422	0.014599	0.019047	0.296923	0.037843	244.557770	0.003782	0.000738	0.000686	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
65 ~ 70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
>70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
OP Emission Factors																		
<=5 mph	0.132681	0.113827	0.150378	0.897009	0.710995	712.721985	0.030307	0.004601	0.004253	0.003602	0.000152	0.003238	0.007527	0.000734	0.000113	0.000133	0.000557	0.036498
5 ~ 10 mph	0.089176	0.077059	0.101905	0.762231	0.544939	549.362305	0.020473	0.003051	0.002824	0.002424	0.000098	0.002475	0.005627	0.000483	0.000077	0.000091	0.000505	0.028804
10 ~ 15 mph	0.059487	0.051284	0.067783	0.633553	0.338099	426.788177	0.013626	0.002124	0.001969	0.001618	0.000066	0.001589	0.003635	0.000325	0.000051	0.000060	0.000433	0.018305
15 ~ 20 mph	0.041487	0.035631	0.047059	0.541889	0.201308	346.599548	0.009472	0.001563	0.001451	0.001130	0.000047	0.001038	0.002403	0.000230	0.000036	0.000041	0.000379	0.011749
20 ~ 25 mph	0.030883	0.026491	0.034958	0.479469	0.121190	294.751373	0.007027	0.001212	0.001127	0.000842	0.000036	0.000749	0.001744	0.000172	0.000026	0.000031	0.000337	0.008397
25 ~ 30 mph	0.024162	0.020696	0.027279	0.431361	0.084639	259.792694	0.005473	0.000988	0.000920	0.000659	0.000028	0.000562	0.001320	0.000136	0.000021	0.000024	0.000307	0.006226
30 ~ 35 mph	0.019772	0.016893	0.022234	0.392558	0.064864	236.757797	0.004452	0.000843	0.000786	0.000541	0.000024	0.000430	0.001023	0.000113	0.000017	0.000019	0.000282	0.004653
35 ~ 40 mph	0.016954	0.014437	0.018968	0.361139	0.053133	221.761124	0.003790	0.000748	0.000698	0.000464	0.000021	0.000335	0.000814	0.000098	0.000014	0.000016	0.000262	0.003504
40 ~ 45 mph	0.015269	0.012952	0.016985	0.335946	0.045782	213.607559	0.003387	0.000690	0.000644	0.000419	0.000019	0.000267	0.000668	0.000090	0.000013	0.000014	0.000245	0.002659
45 ~ 50 mph	0.014480	0.012232	0.016012	0.316393	0.041071	211.877029	0.003187	0.000661	0.000616	0.000397	0.000019	0.000220	0.000570	0.000087	0.000012	0.000013	0.000231	0.002036
50 ~ 55 mph	0.014489	0.012191	0.015930	0.302431	0.038102	216.153809	0.003167	0.000656	0.000612	0.000399	0.000019	0.000194	0.000520	0.000088	0.000012	0.000013	0.000219	0.001649
55 ~ 60 mph	0.015435	0.012958	0.016916	0.295444	0.037430	227.246979	0.003360	0.000684	0.000637	0.000427	0.000021	0.000189	0.000523	0.000095	0.000013	0.000014	0.000215	0.001510
60 ~ 65 mph	0.017425	0.014611	0.019063	0.296622	0.038376	246.858658	0.003784	0.000747	0.000695	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
65 ~ 70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
>70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.363339	0.311653	0.408370	2.746363	1.068360	1755.812134	0.080027	0.014573	0.013572	0.009708	0.000506	0.006904	0.016871	0.002035	0.000286	0.000349	0.004572	0.073371
OP Emission Factors	0.368453	0.316740	0.414845	2.799717	1.118694	1766.813599	0.081004	0.014836	0.013825	0.009836	0.000513	0.007195	0.017476	0.002053	0.000290	0.000355	0.004867	0.077289

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.609235	0.651351	0.651351	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006514	0.000000	0.000000	0.000000	0.000000	0.000912	0.000000	0.000000	0.000000
OP Emission Factors	0.608515	0.650581	0.650581	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006506	0.000000	0.000000	0.000000	0.000000	0.000911	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008776	0.002194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008817	0.002204	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040545	0.017376	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040684	0.017436	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	8.908E-04	7.609E-04	1.001E-03	1.770E-02	2.913E-03	1.066E+01	2.005E-04	3.793E-05	3.536E-05	2.437E-05	1.082E-06	1.928E-05	4.592E-05	5.096E-06	7.666E-07	8.568E-07	1.262E-05	2.083E-04
Idling Exhaust	1.135E-03	9.740E-04	1.276E-03	8.583E-03	3.339E-03	5.487E+00	2.501E-04	4.554E-05	4.241E-05	3.034E-05	1.581E-06	2.158E-05	5.272E-05	6.360E-06	8.938E-07	1.091E-06	1.429E-05	2.293E-04
Running Loss	8.445E-04	9.029E-04	9.029E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.029E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.264E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.973E-04	9.932E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.834E-03	7.859E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	2.871E-03	2.638E-03	3.181E-03	2.628E-02	6.252E-03	1.615E+01	4.506E-04	2.314E-03	9.630E-04	6.374E-05	2.664E-06	4.086E-05	9.864E-05	1.146E-05	2.925E-06	1.947E-06	2.691E-05	4.376E-04

Scenario: Horizon Year Build
Geographic Area: Santa Clara (SF)
Analysis Year: 2045
Season: Annual

	Truck %	Truck 1 %	Truck 2 %
Peak:	5.3%	1.5%	3.8%
Off-Peak:	5.6%	1.6%	4.0%

Running Exhaust (gram/veh-mile)

PK Emission Factors	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
<=5 mph	0.131684	0.112703	0.148930	0.890524	0.679179	708.127869	0.030098	0.004584	0.004235	0.003575	0.000152	0.003111	0.007276	0.000733	0.000111	0.000131	0.000530	0.034752
5 ~ 10 mph	0.088346	0.076142	0.100718	0.757163	0.520813	545.013489	0.020296	0.003032	0.002806	0.002401	0.000098	0.002375	0.005429	0.000481	0.000076	0.000090	0.000481	0.027425
10 ~ 15 mph	0.058962	0.050716	0.067035	0.630534	0.323673	423.271515	0.013504	0.002106	0.001953	0.001604	0.000066	0.001525	0.003509	0.000324	0.000051	0.000059	0.000412	0.017425
15 ~ 20 mph	0.041154	0.035281	0.046586	0.540141	0.193271	343.494751	0.009385	0.001547	0.001436	0.001121	0.000047	0.000997	0.002321	0.000229	0.000035	0.000041	0.000361	0.011181
20 ~ 25 mph	0.030649	0.026245	0.034624	0.478380	0.116871	291.831055	0.006965	0.001198	0.001113	0.000836	0.000036	0.000719	0.001685	0.000172	0.000026	0.000030	0.000321	0.007991
25 ~ 30 mph	0.023992	0.020517	0.027037	0.430697	0.081975	256.996613	0.005428	0.000975	0.000908	0.000655	0.000028	0.000541	0.001277	0.000136	0.000020	0.000023	0.000292	0.005925
30 ~ 35 mph	0.019651	0.016764	0.022059	0.392198	0.063076	234.032700	0.004419	0.000830	0.000774	0.000537	0.000024	0.000414	0.000991	0.000113	0.000017	0.000019	0.000268	0.004428
35 ~ 40 mph	0.016869	0.014345	0.018843	0.360998	0.051858	219.124573	0.003767	0.000737	0.000687	0.000462	0.000021	0.000323	0.000789	0.000098	0.000014	0.000016	0.000249	0.003334
40 ~ 45 mph	0.015212	0.012888	0.016898	0.335966	0.044829	211.055405	0.003372	0.000679	0.000633	0.000417	0.000019	0.000258	0.000650	0.000090	0.000013	0.000014	0.000233	0.002530
45 ~ 50 mph	0.014445	0.012190	0.015954	0.316533	0.040333	209.385452	0.003178	0.000650	0.000606	0.000397	0.000019	0.000213	0.000556	0.000087	0.000012	0.000013	0.000220	0.001938
50 ~ 55 mph	0.014471	0.012166	0.015896	0.302665	0.037512	213.729233	0.003162	0.000647	0.000602	0.000399	0.000019	0.000188	0.000509	0.000088	0.000012	0.000013	0.000208	0.001569
55 ~ 60 mph	0.015427	0.012942	0.016894	0.295723	0.036898	224.891464	0.003357	0.000674	0.000628	0.000427	0.000021	0.000184	0.000513	0.000095	0.000013	0.000014	0.000204	0.001437
60 ~ 65 mph	0.017422	0.014599	0.019047	0.296923	0.037843	244.557770	0.003782	0.000738	0.000686	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
65 ~ 70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
>70 mph	0.018860	0.015794	0.020600	0.301138	0.038478	257.968140	0.004090	0.000785	0.000730	0.000481	0.000024	0.000195	0.000554	0.000108	0.000014	0.000016	0.000205	0.001438
OP Emission Factors																		
<=5 mph	0.132681	0.113827	0.150378	0.897009	0.710995	712.721985	0.030307	0.004601	0.004253	0.003602	0.000152	0.003238	0.007527	0.000734	0.000113	0.000133	0.000557	0.036498
5 ~ 10 mph	0.089176	0.077059	0.101905	0.762231	0.544939	549.362305	0.020473	0.003051	0.002824	0.002424	0.000098	0.002475	0.005627	0.000483	0.000077	0.000091	0.000505	0.028804
10 ~ 15 mph	0.059487	0.051284	0.067783	0.633553	0.338099	426.788177	0.013626	0.002124	0.001969	0.001618	0.000066	0.001589	0.003635	0.000325	0.000051	0.000060	0.000433	0.018305
15 ~ 20 mph	0.041487	0.035631	0.047059	0.541889	0.201308	346.599548	0.009472	0.001563	0.001451	0.001130	0.000047	0.001038	0.002403	0.000230	0.000036	0.000041	0.000379	0.011749
20 ~ 25 mph	0.030883	0.026491	0.034958	0.479469	0.121190	294.751373	0.007027	0.001212	0.001127	0.000842	0.000036	0.000749	0.001744	0.000172	0.000026	0.000031	0.000337	0.008397
25 ~ 30 mph	0.024162	0.020696	0.027279	0.431361	0.084639	259.792694	0.005473	0.000988	0.000920	0.000659	0.000028	0.000562	0.001320	0.000136	0.000021	0.000024	0.000307	0.006226
30 ~ 35 mph	0.019772	0.016893	0.022234	0.392558	0.064864	236.757797	0.004452	0.000843	0.000786	0.000541	0.000024	0.000430	0.001023	0.000113	0.000017	0.000019	0.000282	0.004653
35 ~ 40 mph	0.016954	0.014437	0.018968	0.361139	0.053133	221.761124	0.003790	0.000748	0.000698	0.000464	0.000021	0.000335	0.000814	0.000098	0.000014	0.000016	0.000262	0.003504
40 ~ 45 mph	0.015269	0.012952	0.016985	0.335946	0.045782	213.607559	0.003387	0.000690	0.000644	0.000419	0.000019	0.000267	0.000668	0.000090	0.000013	0.000014	0.000245	0.002659
45 ~ 50 mph	0.014480	0.012232	0.016012	0.316393	0.041071	211.877029	0.003187	0.000661	0.000616	0.000397	0.000019	0.000220	0.000570	0.000087	0.000012	0.000013	0.000231	0.002036
50 ~ 55 mph	0.014489	0.012191	0.015930	0.302431	0.038102	216.153809	0.003167	0.000656	0.000612	0.000399	0.000019	0.000194	0.000520	0.000088	0.000012	0.000013	0.000219	0.001649
55 ~ 60 mph	0.015435	0.012958	0.016916	0.295444	0.037430	227.246979	0.003360	0.000684	0.000637	0.000427	0.000021	0.000189	0.000523	0.000095	0.000013	0.000014	0.000215	0.001510
60 ~ 65 mph	0.017425	0.014611	0.019063	0.296622	0.038376	246.858658	0.003784	0.000747	0.000695	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
65 ~ 70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511
>70 mph	0.018859	0.015802	0.020612	0.300815	0.039011	260.222351	0.004091	0.000794	0.000738	0.000481	0.000024	0.000200	0.000564	0.000108	0.000014	0.000016	0.000215	0.001511

Idle Exhaust (gram/veh-idle hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.363339	0.311653	0.408370	2.746363	1.068360	1755.812134	0.080027	0.014573	0.013572	0.009708	0.000506	0.006904	0.016871	0.002035	0.000286	0.000349	0.004572	0.073371
OP Emission Factors	0.368453	0.316740	0.414845	2.799717	1.118694	1766.813599	0.081004	0.014836	0.013825	0.009836	0.000513	0.007195	0.017476	0.002053	0.000290	0.000355	0.004867	0.077289

Running Loss (gram/veh-hour)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.609235	0.651351	0.651351	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006514	0.000000	0.000000	0.000000	0.000000	0.000912	0.000000	0.000000	0.000000
OP Emission Factors	0.608515	0.650581	0.650581	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.006506	0.000000	0.000000	0.000000	0.000000	0.000911	0.000000	0.000000	0.000000

Tire Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008776	0.002194	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.008817	0.002204	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Brake Wear (gram/veh-mile)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
PK Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040545	0.017376	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
OP Emission Factors	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.040684	0.017436	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Project Emissions (tons/day)	HC	ROG	TOG	CO	NOx	CO2	CH4	PM10	PM2.5	Benzene	Acrolein	Acetaldehyde	Formaldehyde	Butadiene	Naphthalene	POM	Diesel PM	DEOG
Running Exhaust	8.908E-04	7.609E-04	1.001E-03	1.770E-02	2.913E-03	1.066E+01	2.005E-04	3.793E-05	3.536E-05	2.437E-05	1.082E-06	1.928E-05	4.592E-05	5.096E-06	7.666E-07	8.568E-07	1.262E-05	2.083E-04
Idling Exhaust	1.031E-03	8.840E-04	1.158E-03	7.790E-03	3.030E-03	4.980E+00	2.270E-04	4.134E-05	3.850E-05	2.754E-05	1.435E-06	1.958E-05	4.785E-05	5.772E-06	8.112E-07	9.899E-07	1.297E-05	2.081E-04
Running Loss	8.445E-04	9.029E-04	9.029E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	9.029E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.264E-06	0.000E+00	0.000E+00	0.000E+00
Tire Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	3.973E-04	9.932E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Brake Wear	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	1.834E-03	7.859E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Project Total	2.766E-03	2.548E-03	3.063E-03	2.549E-02	5.943E-03	1.564E+01	4.275E-04	2.310E-03	9.590E-04	6.093E-05	2.517E-06	3.887E-05	9.377E-05	1.087E-05	2.842E-06	1.847E-06	2.559E-05	4.164E-04