Air Quality Report

INTERSTATE 80/ASHBY AVENUE (ROUTE 13) INTERCHANGE IMPROVEMENT PROJECT

(ASHBY AVENUE [SR-13]-SHELLMOUND STREET)

From 65th Street to Potter Street along I-80 and
W Frontage Road to Bay Street along Ashby Avenue in Alameda County

04-ALA-80/13-PM 4.58/13.90
EA 04-256200
Project ID 0418000225

Prepared by

Baseline Environmental Consulting
5900 Hollis Street, Suite D
Emeryville, CA 94608

Version Draft 2

August 2020

AIR QUALITY REPORT

ALAMEDA COUNTY, CALIFORNIA

CALIFORNIA DEPARTMENT OF TRANSPORTATION DISTRICT 4

E.A. 04-256200

PROJECT ID 0418000225

Reviewed by: Shilpa Mareddy Date: 10/28/2021

Shilpa Mareddy
Branch Chief Air & Noise
Office of Environmental Engineering
Division of Environmental Planning & Engineering
California Department of Transportation - District 04
111 Grand Avenue
Oakland, CA 94612

Prepared by: Patrick Sutton Date: 08-13-2020

Patrick Sutton
Environmental Engineer
Baseline Environmental Consulting
5900 Hollis Street, Suite D
Emeryville, CA 94608

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

ACRONYMS

AADT	Annual Average Daily Traffic
AB	Assembly Bill
ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
BAU	Business-as-Usual
BMP	Best Management Practice
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CAP	Bay Area Clean Air Plan
CAPP	Community Air Protection Program
CARB	California Air Resources Board
CARE	Community Air Risk Evaluation program
CCAA	California Clean Air Act
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CTC	County Transportation Commission
CTP	California Transportation Plan
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utility District
EO	Executive Order
FCAA	Federal Clean Air Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GHG	Greenhouse gas
GWP	Global warming potential
HEI	Health Effects Institute
HOV	High-Occupancy Vehicle
I-80	Interstate 80
Interchange	Interstate 80/Ashby Avenue interchange
IPCC	International Panel on Climate Change
IRIS	Integrated Risk Information System
ITS	Intelligent Transportation Systems
LOS	Level of service
$\mu g/m^3$	Microgram per cubic meter
mph	Miles per hour
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
MSAT	Mobile Source Air Toxics

MVP	Maintenance vehicle pullouts
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
O_3	Ozone
PM_{10}	Particulate matter with an aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
POAQC	Project of Air Quality Concern
POC	Pedestrian overcrossing
ppm	Parts per million
PS&E	Plans, Specifications, and Estimates
project	Interstate 80/Ashby Avenue Interchange Improvements Project
ROG	Reactive organic gases
RTP	Regional Transportation Plan
SAFE	Safer Affordable Fuel-Efficient
SB	Senate Bill
SFBAAB	San Francisco Bay Area Air Basin
SIP	State Implementation Plan
SO_2	Sulfur dioxide
TCM	Transportation Control Measure
TIP	Transportation Improvement Program
TMP	Transportation Management Plan
USEPA	United States Environmental Protection Agency
VMT	Vehicle miles traveled
ZEV	Zero emission vehicle

AIR QUALITY REPORT

Interstate 80/Ashby Avenue (Route 13) Interchange Improvement Project (Ashby Avenue [SR-13]-Shellmound Street)

Executive Summary

This Air Quality Report has been prepared for the proposed Interstate 80 (I-80)/Ashby Avenue (Route 13) Interchange Improvements Project (proposed project) to determine the project's conformity to federal air quality regulations and to support environmental review of the project under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The scope of services for this assessment included analyses of project conformity; short-term construction emissions of criteria air pollutants and greenhouse gases (GHGs); and long-term operational emissions of criteria air pollutants, mobile source air toxics (MSATs), and GHGs.

Project Description

The California Department of Transportation (Caltrans) District 4, in cooperation with the Alameda County Transportation Commission (Alameda CTC), proposes to improve traffic, pedestrian, and bicycle operations in the project vicinity. The I-80/Ashby Avenue Interchange (interchange) is located on I-80 between Post Miles 4.58 on I-80 and 13.90 on State Route (SR) 13 in the cities of Berkeley and Emeryville, Alameda County.

The interchange, constructed in the 1950's, does not provide access to or from westbound I-80 or Shellmound Street in the City of Emeryville. Additionally, the area including the interchange lacks connectivity for different modes of transportation (i.e., vehicular, bicycle and pedestrian users). The proposed project would replace the existing elevated interchange connector ramps with a new bridge over I-80, realign access to the West Frontage Road, and introduce a new bicycle and pedestrian pathway from 65th Street/Shellmound Street to the San Francisco Bay Trail. These improvements are intended to provide traffic congestion relief and enhanced mobility at this critical access point and important intersection of regional transportation routes. The project will also provide multimodal transportation options, while improving community connectedness, including connectivity to the existing San Francisco Bay Trail. Additionally, the proposed project would address a variety of local community and user goals.

Two Build Alternatives, "Build Alternative 1"and "Build Alternative 2" are being evaluated for the proposed project. The main differences between Build Alternatives 1 and 2 are related to the proposed connector ramp configurations at the I-80/Ashby Avenue interchange. Build Alternative 1 would reconfigure the I-80/Ashby Avenue connector ramps to a tight diamond configuration. In addition, Build Alternative 1 would implement one of the following three options to connect Ashby Avenue with West Frontage Road: a T-Intersection, S-Curve Ramp, or

C-Curve Ramp. From a traffic operations perspective, the T-intersection and S-Curve Ramp options are identical analysis scenarios (Option A and B, respectively), and different from the C-Curve Ramp option (Option C). Build Alternative 2 would reconfigure the I-80/Ashby Avenue connector ramps to a Single Point Diamond configuration and Ashby Avenue would connect to the realigned West Frontage Road using a simple T-Intersection.

Environmental Consequences

In accordance with the federal Transportation Conformity Regulations (40 CFR Section 93 Subpart A), a project-level conformity analysis was performed to determine the project's conformity to the State Implementation Plan (SIP) for attaining and/or maintaining the National Ambient Air Quality Standards. The project is included in the Metropolitan Transportation Commission's current Regional Transportation Plan (RTP), *Plan Bay Area 2040* (RTP ID 17-01-0037) and the 2019 Transportation Improvement Program (TIP) (TIP ID ALA170002). Based on the project's design concept, scope, and open-to-traffic date assumptions, the project would be consistent with the regional emissions analysis performed for the current RTP and TIP and would not interfere with the timely implementation of any Transportation Control Measures identified in the SIP. Therefore, the project was found to be in regional conformance with the SIP.

The project is located in a federal nonattainment area for ozone and $PM_{2.5}$ and, therefore, a project-level conformity analysis was required to evaluate these pollutants under 40 CFR 93. Because the project is included in a conforming RTP and TIP, emissions of ozone precursors from project-related traffic are not anticipated to cause or contribute to, or worsen, any violations of the federal air quality standards for ozone. Construction of the project is expected to last less than five years; therefore, an evaluation of localized hot-spot impacts from short-term $PM_{2.5}$ emissions during project construction was not required for a project-level conformity determination. On July 30th, 2020 the Bay Area Air Quality Conformity Task Force determined that the project is not a Project of Air Quality Concern. Therefore, $PM_{2.5}$ emissions during project operations would not be expected to cause or contribute to, or worsen, any violations of the federal air quality standards for $PM_{2.5}$ and an evaluation of localized hot-spots from long-term $PM_{2.5}$ emissions was not required for a project-level conformity determination. Based on these findings, the project was found to conform to the SIP.

The short-term construction emissions of criteria air pollutants for the Build Alternatives were evaluated to support environmental review of the project under CEQA. Construction emissions were estimated using the Sacramento Metropolitan Air Quality Management District's Roadway Construction Emissions Model (RCEM Version 9.0) with project-specific assumptions regarding the duration and scope of project construction. Based on the modeling results, emissions of criteria air pollutants and precursors from equipment and vehicle exhaust would be below the Bay Area Air Quality Management District's (BAAQMD's) recommended thresholds of significance for each Build Alternative. In addition, compliance with dust control measures described under the Caltrans' Special Provisions and Standard Specifications would ensure that fugitive dust emissions during construction would also meet the BAAQMD's recommended thresholds of significance. Based on these thresholds, construction of the Build

Alternatives would not be expected to cause or contribute to, or worsen, any state air quality violations.

The short-term construction emissions of GHGs for the Build Alternatives were quantified for informational purposes to support environmental review of the project under CEQA. Construction emissions of GHGs were estimated using RCEM Version 9.0. While project construction would result in a temporary increase in GHG emissions, it is anticipated that any increase in GHG emissions due to construction for the Build Alternatives would be offset by the long-term improvement in operational GHG emissions compared with the No-Build Alternative.

The long-term operational emissions of criteria air pollutants, MSATs, and GHGs for the project were evaluated to support environmental review of the project under CEQA and NEPA. Operational emissions were estimated using the Caltrans CT-EMFAC2017 model and adjusted in accordance with the California Air Resources Board's off-model adjustment factors for the United States Environmental Protection Agency's Safe

r Affordable Fuel-Efficient Vehicles Rule Part One. The Build Alternatives would not increase emissions of criteria air pollutants, MSATs, and GHGs compared to the No-Build Alternative, because the Build Alternatives improve traffic circulation and reduce regional vehicle miles travelled. Emissions of criteria air pollutants and MSATs for both the Build and No-Build Alternatives would decrease in the opening year (2025), horizon year (2040), and design year (2045) compared to the existing year (2018), because federal and state vehicle emissions and fuel economy standards would reduce pollutant emissions over time. Emissions of GHGs for both the Build and No-Build Alternatives would decrease in the opening year (2025), but increase in the horizon year (2040) and design year (2045) compared to the existing year (2018). This is because the long-term rate of increase in regional vehicle miles travelled appears to exceed the rate of GHG emission reductions expected under current federal and state fuel economy standards.

The Caltrans required dust control measures described in Section 10-5 of the Caltrans 2018 Standard Specifications will be implemented to minimize dust emissions during project construction. Implementation of additional dust or exhaust control measures will also be considered during development of the project's Plans, Specifications, and Estimates, such as exhaust controls to reduce emissions of criteria air pollutants during construction and energy efficient lighting to reduce emissions of GHGs during operation.

1. INTRODUCTION

The California Department of Transportation (Caltrans) District 4, in cooperation with the Alameda County Transportation Commission (Alameda CTC), proposes the Interstate 80 (I-80)/Ashby Avenue Interchange Improvements Project (proposed project) to improve traffic, pedestrian, and bicycle operations. The I-80/Ashby Avenue Interchange (interchange) is located on I-80 between Post Miles 4.58 on I-80 and 13.90 on State Route (SR) 13 in the cities of Berkeley and Emeryville, Alameda County. The proposed project would replace the existing elevated interchange connector ramps with a new bridge over I-80, realign access to the West Frontage Road, and introduce a new bicycle and pedestrian pathway from 65th Street/Shellmound Street to the San Francisco Bay Trail. The regional location of the project is depicted in **Figure 1** and the environmental study limits are depicted in **Figure 2**.

This Air Quality Report has been prepared to determine the project's conformity to federal air quality regulations and to support environmental review of the project under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Caltrans is the lead agency under NEPA. Caltrans is the lead agency under CEQA. The scope of services for this assessment included analyses of project conformity; short-term construction emissions of criteria air pollutants and greenhouse gases (GHGs); and long-term operational emissions of criteria air pollutants, mobile source air toxics (MSATs), and GHGs.

1.1 Location and Background

The Metropolitan Transportation Commission (MTC) is the regional transportation planning agency in the San Francisco Bay Area that includes the project area. MTC is responsible for updating the Regional Transportation Plan (RTP), which is a comprehensive blueprint for the development of mass transit, highway, freight, bicycle and pedestrian facilities. The project is included in the MTC's current RTP, *Plan Bay Area 2040* under reference number ID 17-01-0037. The project is also included in the MTC's 2017 Transportation Improvement Program (TIP) under reference number ID ALA170002. MTC adopted the 2019 TIP on September 26, 2018. FHWA approved and incorporated the TIP into the Federal Statewide Transportation Improvement Program on December 17, 2018. The RTP and TIP listings for the project are included in **Appendix A**.

Figure 1. Project Location

Figure 2. Environmental Study Limits

1.2 Purpose and Need

1.2.1 Purpose

The purpose of the project is to:

- Improve interchange access and circulation;
- Provide multimodal connectivity;
- Provide westbound I-80 connection to Shellmound Street;
- Provide bicycle and pedestrian connectivity and safety across I-80;
- Improve circulation at I-80/Powell Street and 7th Street; and
- Alleviate local surface street congestion.

1.2.2 Need

The interchange, constructed in the 1950's, does not provide access to or from westbound I-80 or Shellmound Street in the City of Emeryville. Additionally, the area including the interchange lacks connectivity for different modes of transportation (i.e., vehicular, bicycle and pedestrian users). For these reasons, the interchange suffers from the following key operational issues:

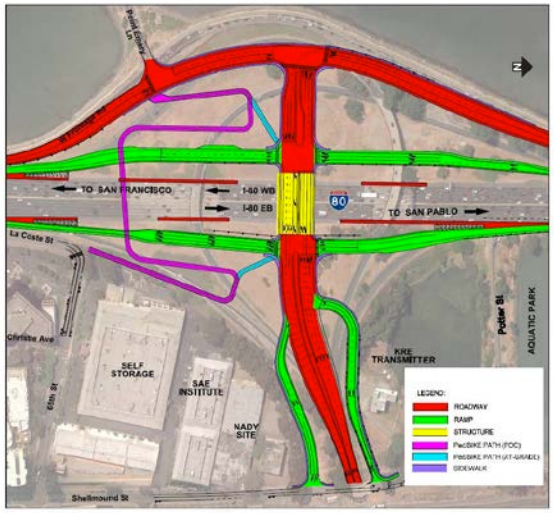
- The existing interchange provides no access to Shellmound Street to/from westbound I-80 and no access from Shellmound Street to Frontage Road;
- Access from westbound traffic to Emeryville is forced to use the Powell Street interchange; and
- There is no direct pedestrian and bicyclist access to the San Francisco Bay Trail from 65th Street/Shellmound Street area.

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

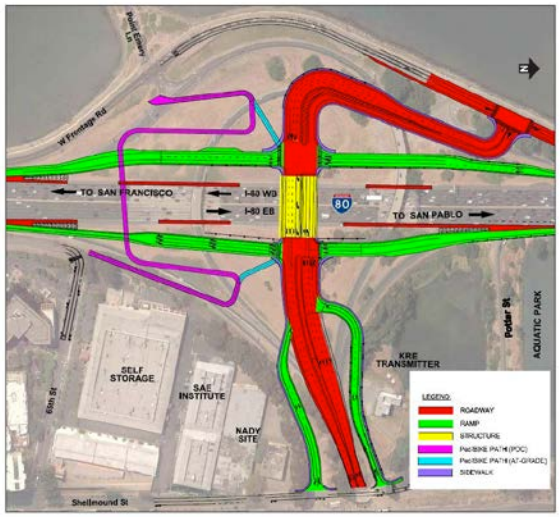
This section describes the proposed action and design alternatives developed to meet the identified purpose and need of the proposed project, while avoiding or minimizing impacts. Two Build Alternatives, "Build Alternative 1"and "Build Alternative 2" are being evaluated for the proposed project. The main differences between Build Alternatives 1 and 2 are related to the proposed connector ramp configurations at the I-80/Ashby Avenue interchange. Build Alternative 1 would reconfigure the I-80/Ashby Avenue connector ramps to a tight diamond configuration. In addition, Build Alternative 1 would implement one of the following three options to connect Ashby Avenue with West Frontage Road: a T-Intersection, S-Curve Ramp, or C-Curve Ramp. From a traffic operations perspective, the T-intersection and S-Curve Ramp options are identical analysis scenarios (Option A and B, respectively), and different from the C-Curve Ramp option (Option C). Build Alternative 2 would reconfigure the I-80/Ashby Avenue

connector ramps to a Single Point Diamond configuration and Ashby Avenue would connect to the realigned West Frontage Road using a simple T-Intersection. The details of each Build Alternative are described further below under the headings “Build Alternative 1”and “Build Alternative 2”. **Figure 3 and Figure 4** illustrate the general configurations of the proposed interchange improvements.

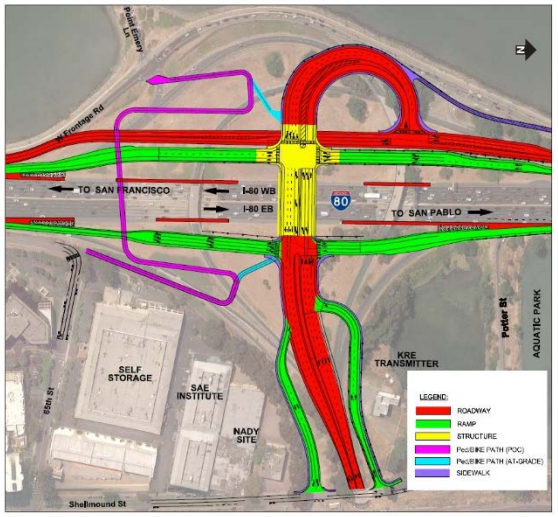
Figure 3. Build Alternative 1: Tight Diamond



Option A: T-Intersection

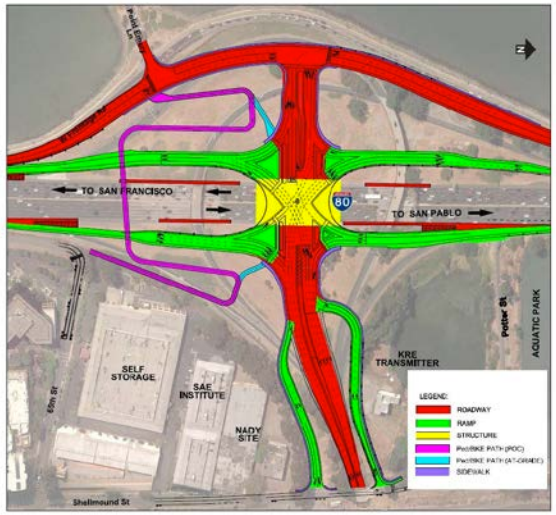


Option B: S-Curve Ramp



Option C: C-Curve Ramp

Figure 4. Build Alternative 2: Single Point Diamond



1.3.1 Existing Roadways and Traffic Conditions

To support environmental review of the project under CEQA, existing traffic conditions in the project vicinity were evaluated for the year 2018. Existing traffic conditions are summarized in **Table 1**.

Table 1. Summary of Existing Traffic Conditions

Scenario	Location	AADT		% Truck	Daily VMT	Average Speed During Peak Travel (mph)	Average Speed During Off-Peak Travel (mph)
		Total	Truck				
2018 Existing	Regional Study Area[A]	9,851,865	413,778	4.2	2,071,480	18.7	29.6

Notes: AADT = annual average daily traffic; VMT = vehicle miles travelled; mph = miles per hour

Source: Kittelson & Associates 2020.

[A] Regional Study Area included the I-80 interchange at Ashby Avenue in the City of Emeryville and the following I-80 mainline segments: I-80 between Powell Street and Ashby Avenue, and I-80 between Ashby Avenue and University Avenue.

No-Build Alternative

Under the No Build Alternative, the existing I-80/Ashby Avenue connector ramps would not be demolished and none of the proposed project features described under the Build Alternatives would be constructed. The existing transportation facilities within the project area would remain unchanged except for planned and programmed improvements. The No Build Alternative is the baseline for comparing environmental impacts under NEPA. To support environmental review of the project under NEPA, traffic conditions in the project vicinity were evaluated for the opening year (2025), horizon year (2040), and design year (2045), as shown in **Table 2**.

Table 2. Summary of Future No-Build Traffic Conditions

Scenario	Location	AADT		% Truck	Daily VMT	Average Speed During Peak Travel (mph)	Average Speed During Off-Peak Travel (mph)
		Total	Truck				
2025 No Build	Regional Study Area[A]	10,260,097	430,924	4.2	2,239,684	15.1	28.1
2040 No Build	Regional Study Area[A]	10,255,432	451,239	4.4	2,499,264	11.0	25.9
2045 No Build	Regional Study Area[A]	10,253,877	451,171	4.4	2,585,791	10.2	25.3

Notes: AADT = annual average daily traffic; VMT = vehicle miles travelled; mph = miles per hour

Source: Kittelson & Associates 2020.

[A] Regional Study Area included the I-80 interchange at Ashby Avenue in the City of Emeryville and the following I-80 mainline segments: I-80 between Powell Street and Ashby Avenue, and I-80 between Ashby Avenue and University Avenue.

1.3.2 Project Build Alternatives

The proposed improvements for each Build Alternative are described in detail below. Traffic conditions would be the same for each Build Alternative. To support environmental review of the project under CEQA and NEPA, traffic conditions in the project vicinity were evaluated for the opening year (2025), horizon year (2040), and design year (2045), as shown in **Table 3**.

The Build Alternatives would all result in reduced traffic congestion without the need for any additional improvements being made within or adjacent to the project study area to satisfy the project purpose. As such, the Build Alternatives are considered to have independent utility.

Table 3. Summary of Future Build Traffic Conditions for Both Alternatives

Scenario	Location	AADT		% Truck	Daily VMT	Average Speed During Peak Travel (mph)	Average Speed During Off-Peak Travel (mph)
		Total	Truck				
2025 Build	Regional Study Area[A]	12,461,878	523,398	4.2	2,235,317	14.7	28.0
2040 Build	Regional Study Area[A]	12,470,910	548,720	4.4	2,494,434	10.8	25.9
2045 Build	Regional Study Area[A]	12,473,921	548,853	4.4	2,580,806	10.1	25.3

Notes: AADT = annual average daily traffic; VMT = vehicle miles travelled; mph = miles per hour

Source: Kittelson & Associates 2020.

[A] Regional Study Area included the I-80 interchange at Ashby Avenue in the City of Emeryville and the following I-80 mainline segments: I-80 between Powell Street and Ashby Avenue, and I-80 between Ashby Avenue and University Avenue.

Build Alternative 1: Tight Diamond

Interchange Design

Build Alternative 1 (**Figure 3**) would demolish the existing I-80/Ashby Avenue connector ramps and replace them with a Tight Diamond interchange. The Tight Diamond form is a compressed diamond interchange used in urban and suburban areas where right-of-way is a constraint. This configuration has two closely-spaced signalized intersections at the crossing of the ramp terminals and side street. Typically, this design provides a minimal degree of separation between the signal-controlled intersections.

The bridge structure associated with Build Alternative 1 would be approximately 160 feet wide by 220 feet long and would resemble a tunnel due to the closed face on both abutments. The bridge would provide access to and from I-80, Ashby Avenue, Shellmound Street, Bay Street, and West Frontage Road. The overcrossing, which would accommodate 7 traffic lanes, would remove existing interference with truck traffic by raising vertical clearance above the existing 15 feet, 4 inches. Traffic within the interchange would be controlled by two traffic signals, one at the westbound on and off ramps and one at the eastbound on and off ramps. East of the eastbound on and off ramp locations there would be a traffic signal for the Bay Street

connector ramp. A traffic signal would be located at the intersection of the Ashby Avenue and West Frontage Road. Both eastbound and westbound on ramps would be metered.

East of I-80, Build Alternative 1 would realign the existing eastbound offramp parallel to the existing East Bay Municipal Utility District (EBMUD) 66-inch sanitary sewer main. The offramp would intersect Ashby Avenue. The existing connection from the eastbound offramp to Shellmound Street would also be modified. A new connection from Bay Street to Ashby Avenue would provide a connection to both the interchange and across the bridge to West Frontage Road on the west side of the interchange. This connection would require installation of retaining walls between 5 and 25 feet in height.[1] A new metered eastbound onramp would be constructed and would provide High Occupancy Vehicle (HOV) bypass, maintenance vehicle pullouts (MVP), and California Highway Patrol (CHP) enforcement areas. These proposed improvements would also allow direct ramp-to-ramp connection.

Proposed improvements near Bay Street would require the relocation of the existing transmitting tower associated with the historic KRE radio station building. The existing tower, which is supported by guy wires anchored around the tower, would be replaced with a new, self-supporting tower within the KRE property. Once erection of the new tower is complete, a signal switchover would be performed. The existing tower would not be demolished until erection of the new tower and signal switchover are complete to minimize interruption in radio transmission.

West Frontage Road Realignment

In addition to the proposed improvements described above, Build Alternative 1 would include one of the following three options for the Ashby Avenue connection to West Frontage Road.

Option A: T-Intersection

Under Option A, Ashby Avenue would connect to the realigned West Frontage Road using a simple T-Intersection (**Figure 3**). Partial realignment of West Frontage Road to the east would be required in order to meet geometric and safety specifications for the three-way intersection. This realignment would create greater separation between the realigned West Frontage Road and the San Francisco Bay Trail.

Option B: S-Curve Ramp

Option B would connect Ashby Avenue to the existing West Frontage Road via an S-Curve Ramp, depicted in **Figure 3**. No realignment of West Frontage Road would be required for Option B.

Option C: C-Curve Ramp with Full Frontage Road Realignment

Option C would require the complete realignment of West Frontage Road adjacent to and parallel with I-80. Ashby Avenue would connect with the fully realigned West Frontage Road below the eastbound offramp via a C-Curve ramp structure as shown in **Figure 3**.

[1] Retaining walls would either be a Caltrans Standard wall type or a Mechanically Stabilized Earth (MSE) system wall, depending upon the existing soil conditions.

Bicycle/Pedestrian Connections

At-grade sidewalks and signalized crossings on the east and west sides of I-80 at the ramps and adjacent to the Ashby Avenue would be included as part of the Tight Diamond bridge structure. Bicyclists and pedestrians would access this connection via 65th Street on the east side of the proposed project and West Frontage Road on the west. A separated pedestrian overcrossing structure (POC) would also be constructed south of the new interchange. This structure would include ADA compliant switchbacks on the east and west sides of I-80 approaching the separate POC structure. Like the proposed at-grade bicycle/pedestrian improvements, the structure would be publicly accessible from 65th Street to the east and West Frontage Road to the west.

Build Alternative 2: Single Point Diamond with T-Intersection

Interchange Design

Unlike Build Alternative 1, Build Alternative 2 would replace the existing I-80/Ashby Avenue connector ramps with a Single Point Dimond interchange. The Single Point Diamond interchange form essentially combines two separate diamond ramp intersections into one large intersection at a single point in the center of the interchange. This design allows concurrent left turns for greater capacity. This interchange form requires approximately the same right-of-way as the Tight Diamond form. However, the construction cost is substantially higher due to the structural requirements with higher-than-normal profiles and deeper structure depths. This form also requires a longer, more circuitous bicycle/pedestrian connection. However, the Single Point form can handle a greater capacity than the Tight Diamond if long signal times can be provided and left turning volumes are balanced. The Single Point Diamond interchange is shown in **Figure 4**.

The bridge structure associated with Build Alternative 2 would be approximately 300 feet wide by 170 feet long. Like the bridge described for Build Alternative 1, this bridge structure would resemble a tunnel due to the closed face on both abutments. The bridge would provide access to and from I-80, Ashby Avenue, Shellmound Street, Bay Street, and West Frontage Road. A single intersection would be constructed at the center of the bridge structure, which would accommodate seven traffic lanes and would feature splitter islands between lanes. Like Build Alternative 1, Build Alternative 2 would remove existing interference with truck traffic by raising the vertical clearance above the existing 15 feet, 4 inches.

Proposed improvements on the east side of I-80 would be identical to those described for Build Alternative 1. The intersection of Ashby Avenue and the I-80 westbound and eastbound ramps would be controlled by a single signal. East of the eastbound on and off ramp location, there would be a traffic signal for the Bay Street connector ramp. A traffic signal would be at the three-way intersection of Ashby Avenue and West Frontage Road. Both eastbound and westbound on ramps would be ramp metered.

West Frontage Road Realignment

Proposed improvements on the west side of the interchange would be identical to those described for Build Alternative 1, Option A, involving a partial realignment of West Frontage Road and a T-Intersection with Ashby Avenue.

Bicycle/Pedestrian Connections

As with Build Alternative 1, at-grade sidewalks and signalized crossings on the east and west sides of I-80 at the ramps and adjacent to the Ashby Avenue would be included as part of the Tight Diamond bridge structure. Bicyclists and pedestrians would access this connection via 65th Street on the east side of the proposed project and West Frontage Road on the west. A separate POC would also be constructed south of the new interchange. This structure would include ADA compliant switchbacks on the east and west sides of I-80 approaching the separate POC structure. Like the proposed at-grade bicycle/pedestrian improvements, the structure would be publicly accessible from 65th Street to the east and West Frontage Road to the west.

1.3.3 Comparison of Existing, No-Build, and Build Alternatives

As shown in **Tables 1, 2, and 3,** the existing regional VMT are expected to increase over time for both the Build and No-Build Alternatives. The existing regional AADT are expected to increase in the opening year (2025) for both the Build and No-Build Alternatives, and then decrease and increase over time for the No-Build Alternative and Build Alternatives, respectively. As shown in **Tables 2 and 3**, the estimated regional VMT would decrease but regional AADT would increase for the Build Alternatives compared to the No-Build Alternative during the opening year (2025), horizon year (2040), and design year (2045) scenarios. This is because the Build Alternatives will improve access and circulation at the I-80/Ashby Avenue interchange, which will increases the AADT, and provide more direct travel routes to and from the regional study area, which will decreases the VMT. These trends are summarized in **Table 4**.

Table 4. Summary of Long-Term Operational Impacts on Traffic Conditions of Existing, No-Build, and Build Alternatives.

Scenario	Location	Operational Impacts on Traffic Conditions
2018 Existing	Regional Study Area[A]	The interchange, constructed in the 1950's, does not provide access to or from westbound I-80 or Shellmound Street in the City of Emeryville. Additionally, the area including the interchange lacks connectivity for different modes of transportation (i.e., vehicular, bicycle and pedestrian users).
2025, 2040, and 2045 No Build	Regional Study Area[A]	As traffic volumes grow and capacity remains the same, the I-80 freeway mainline is expected to remain congested in the peak directions. Demands are expected to exceed the capacity at the ramp terminal intersections under the No Build Alternative.
2025, 2040, and 2045 Build	Regional Study Area[A]	The proposed improvements to the I-80/Ashby Avenue interchange would redistribute traffic within the local area because it provides new connections to and from Shellmound Street and I-80 Westbound. The Build Alternatives would decrease traffic demands for the Powell Street off-ramp and along Frontage Road and Ashby Avenue west of 7th Street. The traffic volume for Shellmound Street south of Ashby Avenue would increase, while traffic volumes would decrease on Bay Street and Potter Street near Aquatic Park. Compared to the No Build Alternative, the AADT will increase due to the improved interchange access and circulation, and the regional VMT will decrease because the proposed project would provide more direct travel routes to and from the regional study area.

Notes: AADT = annual average daily traffic; VMT = vehicle miles travelled

[A] Regional Study Area included the I-80 interchange at Ashby Avenue in the City of Emeryville and the following I-80 mainline segments: I-80 between Powell Street and Ashby Avenue, and I-80 between Ashby Avenue and University Avenue.

1.4 Construction Activities and Schedule

Construction would occur in the following three stages starting in Summer 2023 and is estimated to take approximately 30 months to complete. All Build Alternatives would follow the same construction staging sequence:

- **Stage 1 (approximately 18 months).** This stage would include the construction of the Ashby overcrossing structure, POC structure, and portions of the eastbound and westbound ramp segments while maintaining the existing connector ramps. The Bay Street ramp connector adjacent to KRE radio tower would also be constructed near the existing eastbound onramp from Ashby Ave. Stage 1 would include shifting a portion of the existing westbound onramp towards the west so the majority of the proposed westbound on ramp can be constructed. Nighttime and weekend closures are anticipated during false work erection over I-80. Lane shifts would include inside lane and left shoulder closures on both westbound and eastbound directions to construct the bridge and bicycle/pedestrian overcrossing for foundations in the median.

- **Stage 2 (approximately 9 months).** Stage 2 would include the construction of the remaining portions of both eastbound and westbound ramps and the bicycle/pedestrian overcrossing approaches. This stage would also include construction of remaining portion of Ashby Avenue, the Shellmound Street connector to Ashby Avenue, and the connector from Bay Street to Ashby. Demolition of a portion of the existing connector ramps would occur during this stage. Existing connector ramps and Ashby Avenue would be closed to accommodate construction activities. Traffic detours are anticipated to direct motorists to the nearest interchanges at Powell Street and University Avenue. Nighttime and weekend closures on I-80 are anticipated during existing bridge demolition and for the new foundations.

- **Stage 3 (approximately 3 months).** This stage would include the demolition of the remaining bridge structure, construction of the realigned West Frontage Road, connections to Ashby Avenue, and the remainder of the POC approach. Complete closure of West Frontage Road between the limits of University Avenue and Powell Street is needed during this stage to realign the road and connect it to Ashby Avenue. No impacts or disruption is anticipated to the San Francisco Bay Trail and Point Emery for bikes/pedestrians between Powell Street and University Avenue.

Construction work for the Build Alternatives would be done primarily during daylight hours from 7:00 a.m. to 6:00 p.m. However, night-time work and temporary closures may be necessary to avoid major disruption for tasks that could interfere with traffic or create safety hazards such as demolition of the existing connectors. Construction activities would include excavation, drilling, dewatering, pavement demolition, bridge demolition, mass grading,

concrete form work, pavement installation, storm system installation, landscaping and irrigation, sign installation, striping operations, and traffic control. Such activities would require the use of the following types of equipment: drilling rig, forklift, scissor lift, backhoe, track excavator, compactor, concrete pump, crane, bulldozer, grader, front-end loader, dump trucks, jackhammer, and vibratory roller. These activities may require lane and ramp closures with possible detours.

A Transportation Management Plan (TMP) would be developed as part of the project construction planning phase. The TMP would address potential impacts to circulation of all modes of travel (i.e., transit, bicycles, pedestrians, and vehicles). Roadway and/or pedestrian access to all occupied businesses and respective parking lots would be maintained during project construction. The TMP would include an evaluation of potential detour impacts and would also include measures to minimize, avoid, and/or mitigate impacts to alternate routes. The TMP would address coordination with local agencies for traffic through or near the construction zone. Staging areas would be located within the existing Caltrans right-of-way.

2. REGULATORY SETTING

Many statutes, regulations, plans, and policies have been adopted 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 air pollutants of concern governed by these regulations and describes the regulations and policies that are relevant to the proposed project.

2.1 Pollutant-Specific Overview

The California Air Resources Board (CARB) and United States Environmental Protection Agency (USEPA) focus on the following air pollutants as regional indicators of ambient air quality: Ozone, particulate matter (both PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead. Because these are the most prevalent air pollutants known to be harmful to human health, based on extensive criteria documents, they are referred to as criteria air pollutants. In California, sulfates, visibility reducing particles, hydrogen sulfide, and vinyl chloride are also regulated. **Table 5** summarizes the sources and health effects of the criteria air pollutants regulated in the state of California.

In the San Francisco Bay Area Air Basin (SFBAAB), the primary criteria air pollutants of concern associated with motor vehicles are ground-level ozone formed through reactions of oxides of nitrogen (NO_x) and reactive organic gases (ROG), PM_{10}, and $PM_{2.5}$. In addition to criteria air pollutants, local MSAT emissions are a concern for nearby receptors and GHG emissions are a regional concern for climate change. These primary air pollutants of concern are discussed further below.

2.1.1 Ozone

Motor vehicles do not emit ozone directly into the environment, but tailpipe emissions undergo complex chemical reactions in the presence of sunlight, which result in the formation of ozone. The primary chemicals involved in these reactions are NO_x and ROG, often referred to as ozone precursors. Ozone precursors may come from sources other than motor vehicles, but the largest anthropogenic source in the SFBAAB is motor vehicle exhaust. Ozone exposure causes eye irritation and damage to lung tissue in humans. Ozone also harms vegetation, reduces crop yields, and accelerates deterioration of paints, finishes, rubber products, plastics, and fabrics.

Table 5. State and Federal Criteria Air Pollutant Effects and Sources

Pollutant	Principal Health and Atmospheric Effects	Typical Sources
Ozone (O_3)	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.
Respirable Particulate Matter (PM_{10})	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 and 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.
Fine Particulate Matter ($PM_{2.5}$)	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many toxic and other aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical and photochemical reactions involving other pollutants including NOx, sulfur oxides (SOx), ammonia, and ROG.
Carbon Monoxide (CO)	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.
Nitrogen Dioxide (NO_2)	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.
Sulfur Dioxide (SO_2)	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.
Lead (Pb)	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.
Visibility-Reducing Particles (VRP)	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.
Sulfate	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.
Hydrogen Sulfide (H_2S)	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.
Vinyl Chloride	Neurological effects, liver damage, cancer. Also considered a toxic air contaminant.	Industrial processes.

2.1.2 Particulate Matter

PM_{10} and $PM_{2.5}$ consist of extremely small, suspended particles or droplets that are 10 microns and 2.5 microns or smaller in diameter, respectively. Some sources of particulate matter, like pollen, forest fires, and windblown dust, are naturally occurring. In populated areas, most PM_{10} is caused by road dust, combustion products, abrasion of tires and brakes, and construction activities. Most $PM_{2.5}$ is caused by combustion including motor vehicles and secondary $PM_{2.5}$ can also be formed in the atmosphere through condensation and chemical reactions of inorganic gases and ROG. See **Table 5** for other common sources of PM_{10} and $PM_{2.5}$ emissions.

Particulate matter exposure can affect breathing, aggravate existing respiratory and cardiovascular disease, alter the body's defense systems against foreign materials, and damage lung tissue, contributing to cancer and premature death. Individuals with chronic obstructive pulmonary or cardiovascular disease, asthmatics, the elderly, and children are most sensitive to the effects of particulate matter. As summarized in **Table 5**, most diesel exhaust particulate matter, which is a toxic air contaminant, is in the $PM_{2.5}$ size range.

2.1.3 Mobile Source Air Toxics

MSATs include a diverse group of air pollutants that can adversely affect human health. Unlike criteria air pollutants, which generally affect regional air quality, MSAT emissions are evaluated based on estimations of localized concentrations and risk assessments. The adverse health effects a person may experience following exposure to any chemical depend on several factors, including the amount (dose), duration, chemical form, and any simultaneous exposure to other chemicals.

The USEPA has 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 USEPA's Integrated Risk Information System (IRIS). Based on the USEPA's *2011 National-scale Air Toxics Assessment* (USEPA 2015), nine of these compounds are considered significant national and regional-scale cancer risk drivers or contributors and/or non-cancer hazard contributors. These are acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel particulate matter, ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While the FHWA considers these nine compounds the priority MSATs, the list is subject to change and may be adjusted in consideration of future USEPA rules.

In 1998, CARB identified diesel engine particulate matter as a toxic air contaminant. Mobile sources of toxic air contaminants (i.e., MSATs), such as trucks, buses, automobiles, trains, ships, and farm equipment, are the largest source of diesel particulate matter emissions. CARB estimates that about two-thirds of the known statewide cancer risk from outdoor air toxics is attributable to diesel particulate matter (CARB 2020a).

2.1.4 Greenhouse Gases

The term 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 (CO_2), methane (CH_4), nitrous oxide (N_2O), 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 CO_2, CH_4, N_2O, and fluorinated gases.

GHGs differ in how much heat each traps in the atmosphere (global warming potential, or GWP). CO_2 is the most important GHG, so amounts of other gases are expressed relative to CO_2, using a metric called "carbon dioxide equivalent" (CO_2e). The GWP of CO_2 is assigned a value of 1 CO_2e, and the warming potential of other gases is assessed as multiples of CO_2e. For example, the GWP of CH_4 is 25 CO_2e and the GWP of N_2O is 298 CO_2e (IPCC 2007). Generally, estimates of all GHGs are summed in terms of metric tons of CO_2e to obtain total emissions for a project or given time period.

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.

2.1.5 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 CARB 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 have been 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. Geologic mapping from the U.S. Geological

Survey does not show any areas of rock likely to contain ultramafic rock in the project vicinity (Van Gosen, B.S., and J.P. Clinkenbeard, 2011).

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 California Clean Air Act (CCAA) is its companion state law. The 1970 FCAA required the establishment of National Ambient Air Quality Standards (NAAQS) for the following criteria air pollutants: CO, ozone, PM_{10}, $PM_{2.5}$, NO_2, SO_2, and lead (**Table 6**). The NAAQS are divided into primary standards and secondary standards. Primary standards are designed to protect public health. Secondary standards are less restrictive than primary standards and are intended to protect the public from such effects as a reduction in visibility, damage to animals, crops, vegetation, and buildings. The FCAA and subsequent FCAA Amendments of 1977 and 1990 empowered the USEPA to designate areas as being in attainment or nonattainment for each criteria air pollutant. The FCAA, as amended, requires that states develop State Implementation Plans (SIPs) for areas that are in nonattainment of any of the NAAQS. The SIPs present strategies for the attainment of the NAAQS and also include comprehensive attainment plans for each nonattainment area.

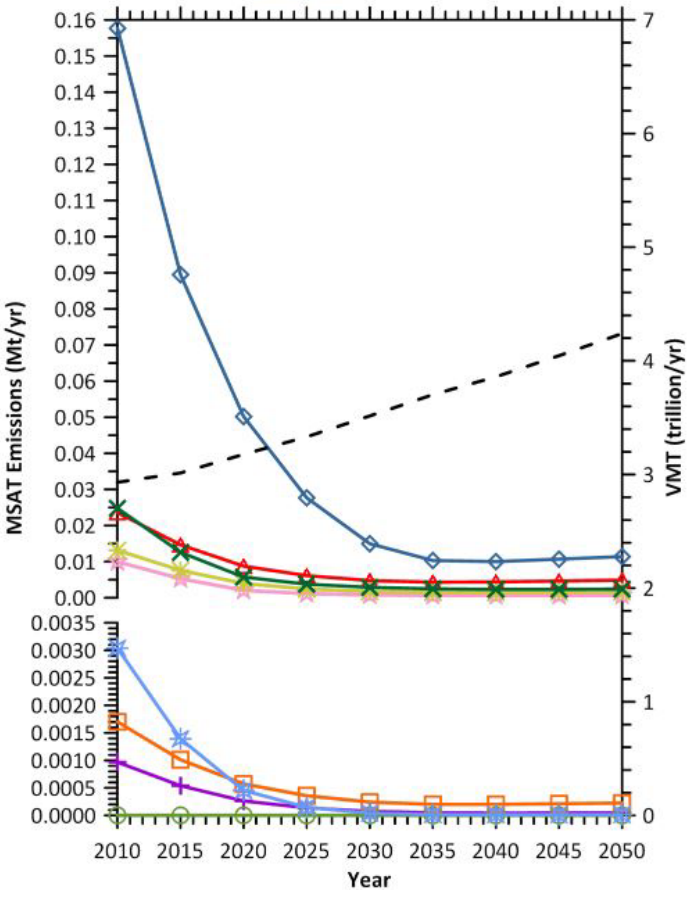
California has established the California Ambient Air Quality Standards (CAAQS) for criteria air pollutants, as well as for other pollutants (sulfates, visibility reducing particles, vinyl chloride, and hydrogen sulfide) for which there are no corresponding NAAQS (**Table 6**). The CAAQS and air basin designations are established by CARB. CARB is also responsible for implementing the strategies of the SIP, once it has been approved by the USEPA.

Controlling air toxic emissions became a national priority with the passage of the FCAA Amendments of 1990, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants. The USEPA has assessed this expansive list in their *Final Rule for Control of Hazardous Air Pollutants from Mobile Sources* (USEPA 2007) and identified a group of 93 compounds emitted from mobile sources that are part of the USEPA's IRIS. Unlike the criteria air pollutants, air toxics do not have NAAQS.

Under the FCAA, as amended, the USEPA has established federal emission standards for on-road vehicle engines that apply to cars, light-duty trucks, and heavy-duty trucks and buses. The federal emission standards establish a set of certification emission limits that manufacturers are required to meet as the standards are phased-in over a certain number of years. Under the CCAA, California has adopted its own vehicle emission standards, which are often more stringent than the federal rules. Federal and state vehicle emissions standards are expected to reduce criteria air pollutant, MSAT, and GHG emissions over time. For example, according to FHWA, if nation-wide vehicle activity increases by 45 percent from 2010 to 2050, a combined reduction of 91 percent in the total annual emission rate for the priority MSATs is projected for the same time period due to federal vehicle emission standards (see chart below).

On September 27, 2019, the USEPA and the National Highway Traffic Safety Administration published the "Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program." The SAFE Vehicle Rule Part One revokes California's authority to set its own GHG emissions standards and zero-emission vehicle mandates, which impacts some of the underlying assumptions in the CARB's EMFAC2017 model for estimating vehicle emissions. California expects Part Two of these regulations to be adopted in the Fall of 2019. As discussed under Section 4, below, CARB has prepared off-model adjustment factors that can be used to adjust the vehicle emissions output from EMFAC2017 to account for the impacts of this rule.

Projected National MSAT Vehicle Emission Trends 2010-2050



Notes: VMT = vehicle miles travelled; Mt = metric tons; yr =year
Source: FHWA 2016

Table 6. State and National Ambient Air Quality Standards

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (5/4/16)

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

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

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

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

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

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

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

8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

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

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

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

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

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

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

14. 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.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (5/4/16)**

2.2.2 Transportation Conformity Regulations

Under the FCAA Section 176(c), the U.S. Department of Transportation and other federal agencies are prohibited from funding, authorizing, or approving plans, programs or projects that do not conform to a SIP in areas that are in nonattainment or maintenance (i.e., former nonattainment within the last 20 years) of any of the NAAQS. "Transportation Conformity" applies to highway and transit projects and takes place on two levels: the regional level (i.e., 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 areas for the NAAQS, and only for the specific NAAQS that are or were violated. The USEPA regulations at 40 CFR 93 govern the conformity process. Conformity requirements do not apply in unclassifiable or attainment areas for NAAQS and do not apply at all for state standards regardless of the status of the area.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the NAAQS. Regional conformity is based on an air quality emissions analysis of the RTP and federal TIP that include all transportation projects planned for a region over a period of at least 20 years and 4 years, respectively. The conformity process for the RTP and TIP uses travel demand and emission models to determine whether or not implementation of planned transportation projects would conform to emission budgets, or other tests at various analysis years to show that requirements of the FCAA and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), FHWA, and Federal Transit Administration (FTA) make the determinations that the RTP and TIP are in conformity with the SIP for achieving the goals of the FCAA. Otherwise, the projects in the RTP and/or TIP 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 a 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 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 USEPA-approved emissions models, and the project complies with any control measures in the SIP for particulate matter. Furthermore, additional analyses may be required for projects located in CO, PM_{10}, and/or $PM_{2.5}$ nonattainment or maintenance areas to examine localized air quality impacts (also known as hot-spot analyses). Project-level conformity does include some specific procedural and documentation standards for projects that require a hot-spot analysis. In general, projects must not cause the hot-spot related standard to be violated, and must not cause any increase in the number and severity of

violations in nonattainment areas. If a known CO or particulate matter violation is located in the project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

On June 1, 2018, the CO requirements for transportation conformity in the Bay Area ended because the area has been redesignated as an attainment area of the NAAQS for 20 years. Even though the conformity obligation for CO has ended, the terms of the maintenance plan remain in effect and all measures and requirements contained in the plan apply until the state submits, and the USEPA approves, a revision to the SIP (USEPA 2018a).

2.2.3 Climate Change Regulations

Federal Climate Change Regulations

At the federal level, NEPA (42 United States Code 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 USEPA and the National Highway Traffic Safety Administration issued the first Corporate Average Fuel Economy standards in 2010, requiring cars and light-duty vehicles to achieve certain fuel economy targets by 2016 and 2025, with the intention of gradually increasing the targets and the range of vehicles to which they would apply.

State Climate Change Regulations

With the passage of several pieces of legislation including State Senate and Assembly bills and Executive Orders, California launched an innovative and proactive approach to dealing with GHG emissions and climate change.

> Assembly Bill (AB) 1493, Pavley, Vehicular Emissions: Greenhouse Gases, 2002: This bill requires the CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards were designed to apply to automobiles and light trucks beginning with the 2009-model year.
>
> Executive Order (EO) S-3-05 (June 1, 2005): The goal of this EO is to reduce California's GHG emissions to 1) year 2000 levels by 2010, 2) year 1990 levels by 2020, and 3) 80 percent below the year 1990 levels by 2050. In 2006, this goal was further reinforced with the passage of Assembly Bill 32.
>
> Assembly Bill 32 (AB 32), Núñez and Pavley, The Global Warming Solutions Act of 2006: AB 32 sets the same overall GHG emissions reduction goals as outlined in EO S-3-05, while further mandating that CARB create a scoping plan and implement rules to achieve "real, quantifiable, cost-effective reductions of greenhouse gases."

Executive Order S-20-06 (October 18, 2006): This order establishes the responsibilities and roles of the Secretary of the California Environmental Protection Agency and state agencies with regard to climate change.

Executive Order S-01-07 (January 18, 2007): This order set forth the low carbon fuel standard for California. Under this EO, the carbon intensity of California's transportation fuels is to be reduced by at least 10 percent by 2020.

Senate Bill 97 (SB 97) Chapter 185, 2007, Greenhouse Gas Emissions: This bill required the Governor's Office of Planning and Research to develop recommended amendments to the CEQA Guidelines for addressing GHG emissions. The amendments became effective on March 18, 2010.

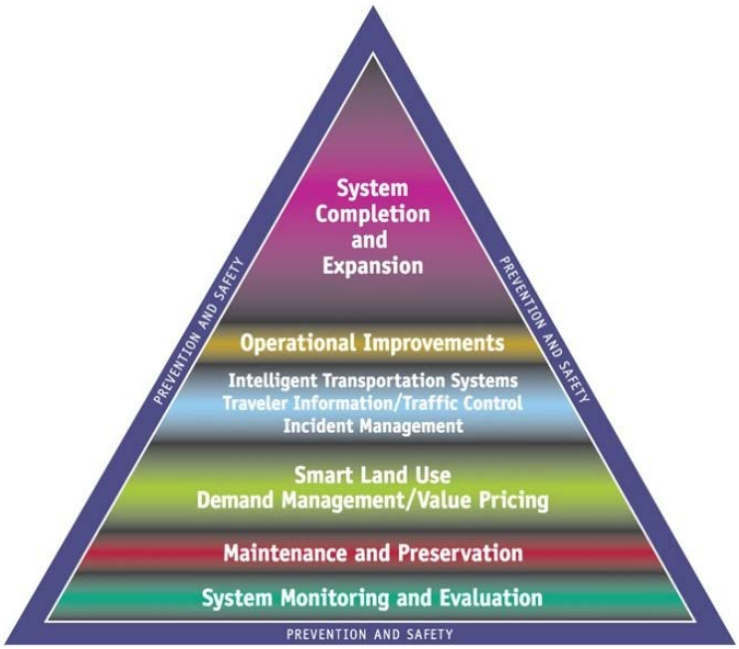
Senate Bill 375 (SB 375), Chapter 728, 2008, Sustainable Communities and Climate Protection: This bill requires the CARB to set regional emissions reduction targets from passenger vehicles. The MPO for each region must then develop a Sustainable Communities Strategy that integrates transportation, land-use, and housing policies to plan for the achievement of the emissions target for their region.

Senate Bill 391 (SB 391) Chapter 585, 2009 California Transportation Plan: This bill requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

Executive Order B-30-15 (April 29, 2015): This order set forth the GHG reduction target of 40 percent below 1990 levels by 2030 for California.

Senate Bill (SB 32), Chapter 249, 2016: This bill requires the state board to ensure the statewide GHG reduction target set forth in EO B-30-15. It also codifies the achievement of the reduction target to be in a manner that is transparent and benefits the State's most disadvantaged communities.

Caltrans continues to be involved on the Governor's Climate Action Team as the CARB works to implement Executive Orders S-3-05 and S-01-07 and help achieve the targets set forth in AB 32. Many of the strategies Caltrans is using to help meet the targets in AB 32 come from then-Governor Arnold Schwarzenegger's Strategic Growth Plan for California. The Strategic Growth Plan targeted a significant decrease in traffic congestion below 2008 levels and a corresponding reduction in GHG emissions, while accommodating growth in population and the economy. The Strategic Growth Plan relies on a complete systems approach to attain GHG reduction goals: system monitoring and evaluation, maintenance and preservation, smart land use and demand management, and operational improvements as shown in the chart below.



The Mobility Pyramid

Caltrans is supporting efforts to reduce VMT by planning and implementing smart land use strategies: job/housing proximity, developing transit-oriented communities, and high-density housing along transit corridors. Caltrans works closely with local jurisdictions on planning activities, but does not have local land use planning authority. Caltrans assists efforts to improve the energy efficiency of the transportation sector by increasing vehicle fuel economy in new cars, light and heavy-duty trucks; Caltrans is doing this by supporting ongoing research efforts at universities, by supporting legislative efforts to increase fuel economy, and by participating on the Climate Action Team. It is important to note, however, that control of fuel economy standards is held by the USEPA and CARB.

Caltrans is also working towards enhancing the State's transportation planning process to respond to future challenges. Similar to requirements for regional transportation plans under SB 375 (Steinberg 2008), SB 391(Liu 2009) requires the State's long-range transportation plan to meet California's climate change goals under AB 32.

Caltrans is supporting the transportation system's transition to zero emission vehicles (ZEVs) to help achieve the SB 32 target. California's 2017 Climate Change Scoping Plan, which is prepared by CARB and charts the path for meeting the statewide GHG emissions and air quality goals, calls for major increases in zero-emission vehicles on the roads. As a member of the governors Interagency Working Group on Zero-Emission Vehicles, Caltrans plays an important role in the efforts to increase ZEVs on the State's roadways. The department has accomplished significant milestones in expanding ZEV usage and infrastructure.

The *California Transportation Plan 2040* (CTP 2040) is a statewide, long-range transportation plan to meet future mobility needs and reduce GHG emissions (Caltrans 2016a). The CTP 2040 defines performance-based goals, policies, and strategies to achieve a collective vision for

California's future, statewide, integrated, multimodal transportation system. The purpose of the CTP 2040 is to provide a common policy framework that will guide transportation investments and decisions by all levels of government, the private sector, and other transportation stakeholders to achieve maximum feasible GHG emission reductions while meeting the State's transportation needs. **Table 7** summarizes 15 transportation GHG reduction strategies from the CTP 2040 to reduce regional VMT.

Climate Change Adaptation Strategies

Adaptation strategies refer to how Caltrans and other agencies can plan for the effects of climate change on the state's transportation infrastructure and strengthen or protect the facilities from damage. Climate change is expected to produce increased variability in precipitation, rising temperatures, rising sea levels, variability in storm surges and intensity, and the frequency and intensity of wildfires. These changes may affect the transportation infrastructure in various ways, such as damage to roadbeds from longer periods of intense heat; increasing storm damage from flooding and erosion; and inundation from rising sea levels. These effects will vary by location and may, in the most extreme cases, require that a facility be relocated or redesigned. There may also be economic and strategic ramifications as a result of these types of impacts to the transportation infrastructure.

On November 14, 2008, then-Governor Arnold Schwarzenegger signed EO S-13-08 which directed a number of state agencies to address California's vulnerability to sea level rise caused by climate change. This EO set in motion several agencies and actions to address the concern of sea level rise. In addition to addressing projected sea level rise, the California Natural Resources Agency was directed to coordinate with local, regional, state, and federal public and private entities to develop the *California Climate Adaptation Strategy* (California Natural Resources Agency 2009), which summarizes the best known science on climate change impacts to California, assesses California's vulnerability to the identified impacts, and then outlines solutions that can be implemented within and across state agencies to promote resiliency.

Climate change adaptation for transportation infrastructure involves long-term planning and risk management to address vulnerabilities in the transportation system from increased precipitation and flooding; the increased frequency and intensity of storms and wildfires; rising temperatures; and rising sea levels. Caltrans is an active participant in the efforts being conducted in response to EO S-13-08. In 2011, Caltrans released the *Guidance on Incorporating Sea Level Rise* document for use by Caltrans Planning staff and Project Development Teams (Caltrans 2011). The guidance provides initial criteria for consideration to determine whether or not sea level rise needs to be incorporated into project programming and design. In 2018, Caltrans prepared a *Climate Change Vulnerability Assessment* for the Caltrans District 4 State Highway System in the Bay Area (Caltrans 2018). The purpose of the assessment was to identify infrastructure that may be at risk, or other processes that may need to be changed, given possible future climatic conditions. Caltrans plans to resolve these vulnerabilities in subsequent planning and design.

Table 7. CTP 2040 Transportation GHG Reduction Strategies

Category/Strategy	Assumption	Estimated VMT Reduction from 2010 to 2040
Demand management		
Telecommute/Work at Home	2.1% increase in work at home rate	0.39%
Increased Carpoolers	5% increase in carpool vehicles	2.9%
Increased Car Sharing	Net 5% increase in adoption rates-short distance travel	1.1%
Mode shift		
Transit Service Improvements (Urban and Intercity-rail, bus and ferry)	Transit speeds increased by 50%; headways doubled, free transfers, reduced transfer wait times	6% (includes Transit Service Improvements and HSR fare reduction)
High-Speed Rail	Maximize incentives for High-Speed Rail Ridership	Included as part of transit service improvements
Bus Rapid Transit	Ridership change from converting Local Bus Routes to BRT	0.07%
Expand Bike	Doubled bicycle shares	0.41%
Expand Pedestrian	Double walk shares	0.43%
Carpool Lane Occupancy Requirements	Increase minimum 2+ occupancy to 3+	0.80%
Increased HOV Lanes	Added HOV lanes, Interregional connectors, Fill missing gaps (mixed flow lanes converted to HOV)	1.0%
Travel Cost		
Implement Expanded Pricing Policies	Utilize pricing and vehicle fees to fund infrastructure improvements, manage congestion and improve roadways	17%
Operational Efficiency		
Incident/Emergency Management	Implementation of Caltrans System Management and Operations Plan	1.0% (equivalent VMT savings)
Caltrans' (TMS) Master Plan	Implementation of TMS Master Plan	1.2% (equivalent VMT savings)
ITS/TSM	Implementation of ITS/TSM strategies	0.62%
Eco-driving	Reduced fuel consumption through changes in driving habits	0.23% (equivalent VMT savings)

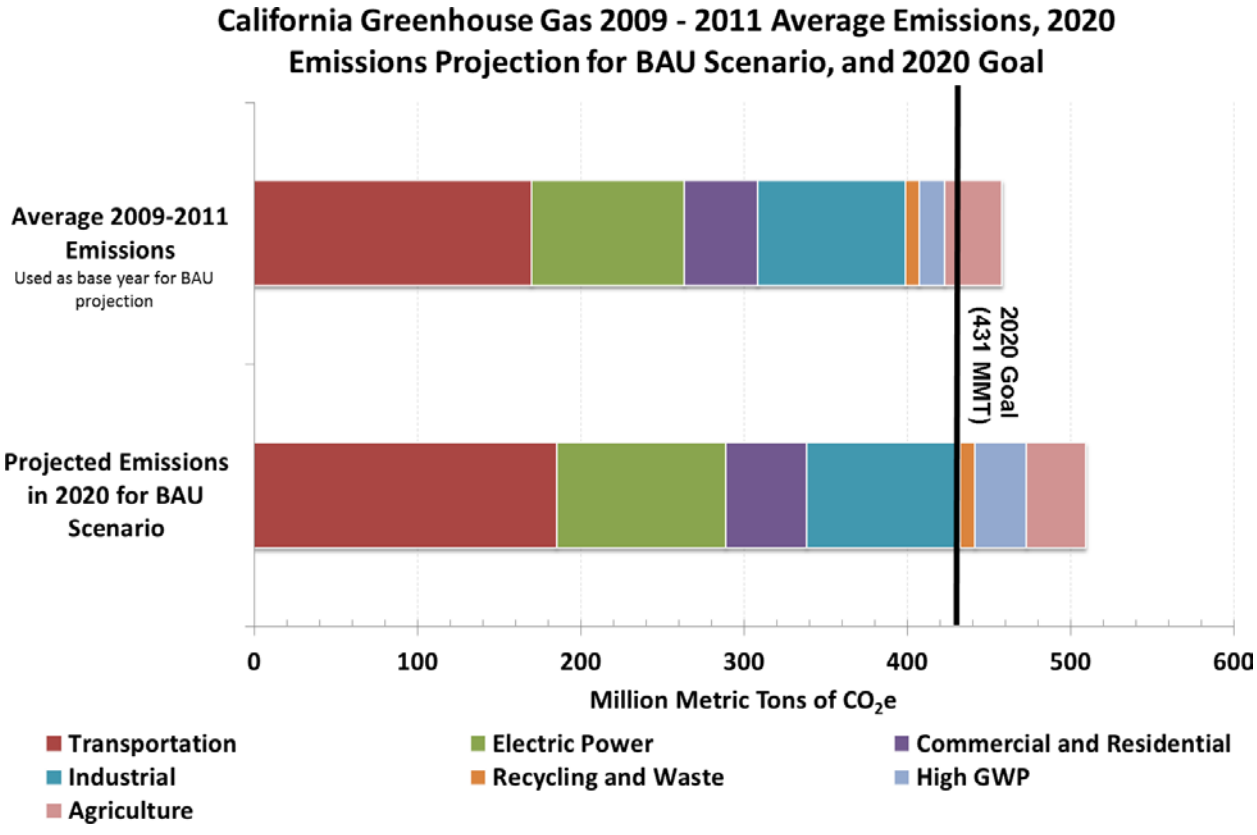
Source: Caltrans 2016a.

Notes: VMT = vehicle miles travelled; HOV = High-Occupancy Vehicle; TMS = Caltrans' Traffic Management System Master Plan Strategy; ITS = Intelligent Transportation Systems; TSM = Transportation System Management; HSR = High-speed rail; BRT = Bus rapid transit

Project-Level GHG Analysis

An individual project does not generate enough GHG emissions to significantly influence global climate change. Rather, global climate change is a cumulative impact. This means that a project may contribute to a potential impact through its incremental change in emissions when combined with the contributions of all other sources of GHG. In assessing cumulative impacts, it must be determined if a project's incremental effect is "cumulatively considerable" (CEQA Guidelines Sections 15064(h)(1) and 15130). To make this determination, the incremental impacts of the project must be compared with the effects of past, current, and probable future projects. To gather sufficient information on a global scale of all past, current, and future projects to make this determination is a difficult, if not impossible, task.

The AB 32 Scoping Plan mandated by AB 32 includes the main strategies California will use to reduce GHG emissions. As part of its supporting documentation for the Draft Scoping Plan, CARB released the GHG inventory for California. The most recent forecast (2014) represents a Business-as-Usual (BAU) scenario assuming none of the Scoping Plan measures are implemented. The bar graph below shows the 2020 BAU emissions relative to the base year average of 2009-2011 by sector. Half the BAU growth in 2020 comes from the Transportation and Electric Power sectors.



Source: CARB 2018

2.2.4 National Environmental Policy Act (NEPA)

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 and its alternatives (including a section on air quality impacts).

2.2.5 California Environmental Quality Act (CEQA)

CEQA 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.

2.2.6 Local Air Quality Regulations

The SFBAAB encompasses approximately 5,600 square miles and includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, Santa Clara, and San Mateo counties, and portions of Solano and Sonoma counties. The Bay Area Air Quality Management District (BAAQMD) and CARB have joint responsibility for developing and enforcing regulations needed to achieve and maintain NAAQS and CAAQS in the SFBAAB.

The BAAQMD is also responsible for preparation of plans for attaining and maintaining ambient air quality standards in the region, adoption and enforcement of rules and regulations concerning air pollutant sources, issuing permits for stationary sources of air pollutants, inspecting stationary sources, monitoring ambient air quality and meteorological conditions, awarding grants to reduce motor vehicle emissions, and conducting public education campaigns.

The BAAQMD developed the *2017 Bay Area Clean Air Plan* (CAP, BAAQMD 2017a) in cooperation with the MTC and the Association of Bay Area Governments (ABAG). Projections developed by MTC and ABAG, which estimate future population and transportation trends, are used to develop and evaluate strategies to bring the SFBAAB into compliance with NAAQS and CAAQS. The 2017 CAP addresses four categories of pollutants: ground-level ozone and its key precursors, ROG and NO_x; particulate matter, primarily $PM_{2.5}$; key air toxics such as diesel particulate matter and benzene; and key GHGs.

In 2003, the California Legislature enacted SB 656 to reduce public exposure to PM_{10} and $PM_{2.5}$. To comply with SB 656, BAAQMD reviewed the list of 103 potential particulate matter control measures prepared by CARB and developed a Particulate Matter Implementation Schedule which was adopted by BAAQMD on November 16, 2005. To fulfill federal air quality planning requirements, the BAAQMD adopted a $PM_{2.5}$ emissions inventory for the year 2010 on November 7, 2012. The BAAQMD transmitted the inventory to the CARB for inclusion in the SIP. In addition, to complement this SIP submittal, BAAQMD prepared a detailed informational report entitled *Understanding Particulate Matter: Protecting Public Health in the San Francisco*

Bay Area (BAAQMD 2012) as well as a concise summary of the particulate matter report. The particulate matter report will help to guide the BAAQMD's on-going efforts to analyze and reduce particulate matter in the SFBAAB in order to better protect public health.

3. AFFECTED ENVIRONMENT

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 project is located within the Southwestern Alameda County climatological subregion of the SFBAAB (BAAQMD 2017b), which is overseen by the BAAQMD. Air basins have natural characteristics that limit the ability of natural processes to either dilute or transport air pollutants. The major determinants of air pollution transport and dilution are climatic and topographic factors such as wind, atmospheric stability, terrain that influences air movement, and sunshine. The following discussion provides an overview of the environmental setting with regard to air quality in the SFBAAB.

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 ozone and ozone precursors from one region to another, contributing to air quality problems downwind of source regions. Solar energy can chemically transform pollutants in the air to create secondary photochemical pollutants such as ozone. Furthermore, mountains can act as a barrier that prevents ozone from dispersing.

The Bay Area has a Mediterranean climate characterized by wet winters and dry summers. During the summer, a high-pressure cell centered over the northeastern Pacific Ocean results in stable meteorological conditions and a steady northwesterly wind flow that keep storms from affecting the California coast. During the winter, the Pacific high-pressure cell weakens, resulting in increased precipitation and the occurrence of storms. The highest air pollutant concentrations in the Bay Area generally occur during inversions, when a surface layer of cooler air becomes trapped beneath a layer of warmer air. An inversion reduces the amount of vertical mixing and dilution of air pollutants in the cooler air near the surface.

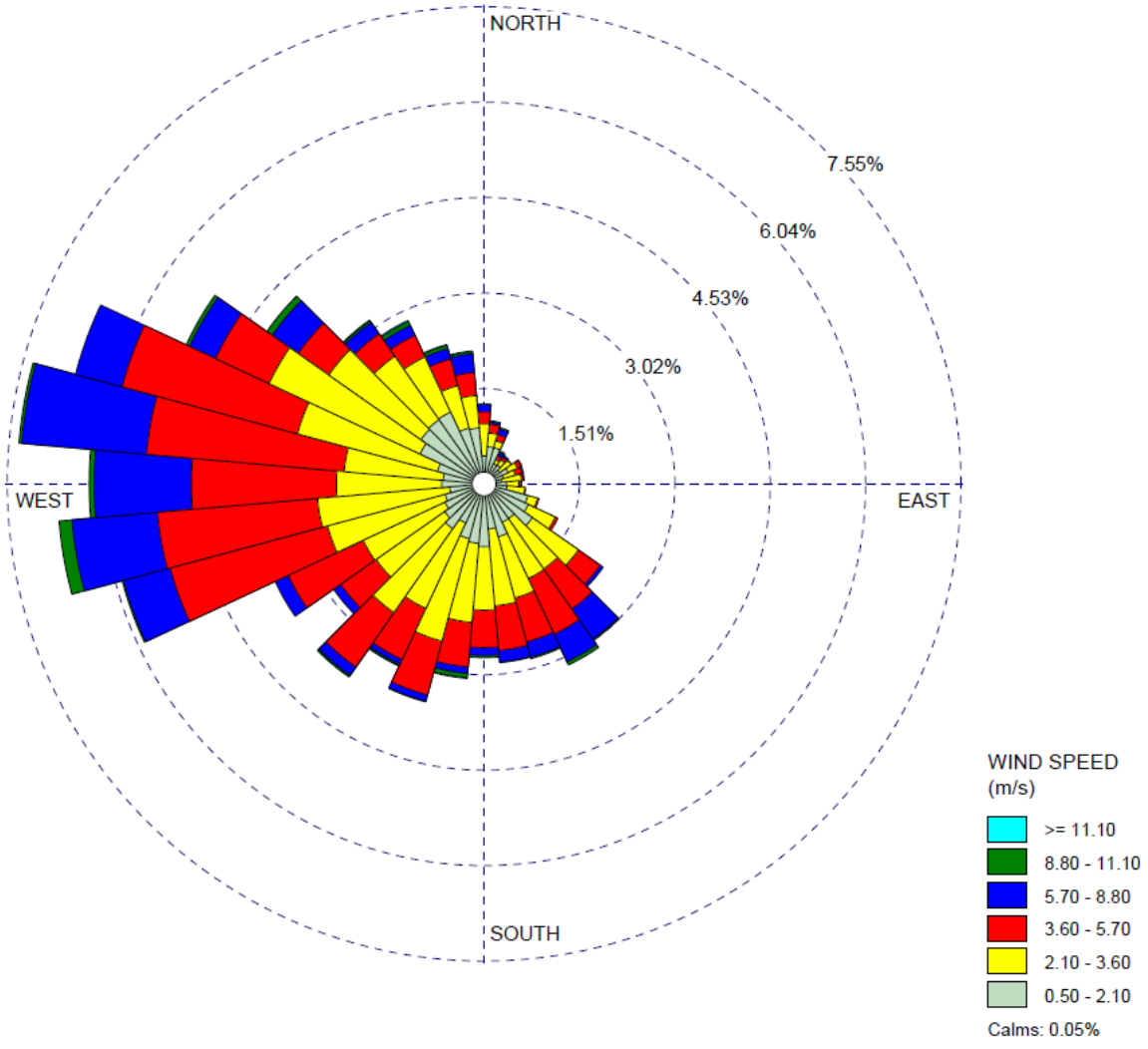
Southwestern Alameda County is indirectly affected by marine air flow. Marine air entering through the Golden Gate is blocked by the East Bay hills, forcing the air to diverge into northerly and southerly paths. The southern flow is directed down the bay, parallel to the hills, where it eventually passes over southwestern Alameda County. These sea breezes are strongest in the afternoon. The further from the ocean the marine air travels, the more the ocean's effect is diminished. Although the climate in this region is affected by sea breezes, it is affected less so than the regions closer to the Golden Gate. As shown in the chart below, the predominant wind direction near the project is from the west.

Air temperatures are moderated by the subregion's proximity to the Bay and to the sea breeze. Temperatures are slightly cooler in the winter and slightly warmer in the summer than East Bay cities to the north. During the summer months, average temperatures range from the mid-50s to mid-70s (degrees Fahrenheit). During the winter months, average temperatures range from

the low 40s to low 60s (degrees Fahrenheit). The annual average rainfall near the project ranges from about 20 to 39 inches (DWR 2020) and mainly occurs during the winter months.

Pollution potential is relatively high in southwestern Alameda County during the summer and fall. When high pressure dominates, low mixing depths and Bay and ocean wind patterns can concentrate and carry pollutants from other cities to this area, adding to the locally emitted pollutant mix. The polluted air is then pushed up against the East Bay hills. In the wintertime, the air pollution potential in southwestern Alameda County is moderate. Air pollution sources include light and heavy industry, and motor vehicles.

Predominant Wind Patterns near the Project



Source: BAAQMD Oakland Sewage Treatment Plant (STP) metrological data for 2000.

3.2 Existing Air Quality

This section summarizes existing air quality conditions near the proposed study limits. It includes attainment statuses for criteria air pollutants, describes local ambient concentrations of criteria pollutants for the past 5 years, and discusses MSAT and GHG emissions.

3.2.1 Criteria Pollutants and Attainment Status

The state and federal attainment status for all regulated pollutants in the SFBAAB are summarized in **Table 8**. The SFBAAB is currently designated a marginal nonattainment area for the 2008 and 2015 federal 8-hour ozone standard, moderate nonattainment for the 2006 federal 24-hour $PM_{2.5}$ standard, and nonattainment for the State ozone, PM_{10}, and $PM_{2.5}$ standards. The SFBAAB is classified as attainment or unclassifiable for the remaining NAAQS and CAAQS. Unclassifiable generally indicates that there is a lack of representative data to classify a basin.

Table 8. State and Federal Attainment Status in the San Francisco Bay Area Air Basin

Pollutant	State Attainment Status	Federal Attainment Status
Ozone (O_3)	Nonattainment	Nonattainment (Marginal)
Respirable Particulate Matter (PM_{10})	Nonattainment	Unclassifiable
Fine Particulate Matter ($PM_{2.5}$)	Nonattainment	Nonattainment (Moderate)
Carbon Monoxide (CO)	Attainment	Attainment (Maintenance)
Nitrogen Dioxide (NO_2)	Attainment	Unclassifiable/Attainment
Sulfur Dioxide (SO_2)	Attainment	Unclassifiable
Lead (Pb)	Attainment	Unclassifiable/Attainment
Visibility-Reducing Particles	Unclassified	NA
Sulfates	Attainment	NA
Hydrogen Sulfide	Unclassified	NA
Vinyl Chloride	Unclassified	NA

Notes: NA = not applicable
A more detailed summary of the state and federal attainment status is provided in **Table 6**.

The BAAQMD operates a network of air monitoring stations throughout the SFBAAB to monitor air pollutants such as ozone, PM_{10}, and $PM_{2.5}$. The nearest air monitoring station where ozone and $PM_{2.5}$ levels are consistently measured is the Oakland West station at the 1100 21st Street in Oakland, approximately 2.1 miles south of the project (**Figure 5**). The nearest station where PM_{10} levels are measured is the San Francisco-Arkansas Street station at 10 Arkansas Street in San Francisco, approximately 7.7 miles southwest of the project (**Figure 5**). These stations are considered representative conditions in the project vicinity as they are located within the closest proximities to the study limits and experience similar meteorological conditions. **Table 9** presents the most recent ambient air quality data recorded at the two stations from 2014 through 2018 for the criteria air pollutants that are in nonattainment. As **Table 9** shows, no exceedance of California and national standards of ozone was reported. Exceedances of the California standards for 24-hour PM_{10} occurred in 2017, which may have been attributed to wildfires in Northern California. The national standards for 24-hour PM_{10} were not exceeded in

all five years. Exceedances of the national standards for 24-hour $PM_{2.5}$ occurred in in 2013, 2014, 2015, and 2017.

Table 9. Air Quality Concentrations for the Past 5 Years Measured at the Oakland West and San Francisco-Arkansas Street Air Monitoring Stations

Pollutant	Standard	2014	2015	2016	2017	2018
Ozone (O_3)	Max 1-hour Concentration (ppm)	0.072	0.091	0.065	0.087	0.063
	No. days exceeded CAAQS (0.09 ppm)	0	0	0	0	0
	Max 8-hour Concentration (ppm)	0.059	0.065	0.053	0.069	0.050
	No. days exceeded CAAQS (0.070 ppm)	0	0	0	0	0
	No. days exceeded NAAQS (0.070 ppm)	0	0	0	0	0
Particulate Matter (PM_{10})	Max 24-hour Concentration ($\mu g/m^3$)	34.5	44.7	35.7	75.9	40.9
	No. days exceeded CAAQS (50 $\mu g/m^3$)	0	NA	NA	24.6	NA
	No. days exceeded NAAQS (150 $\mu g/m^3$)	0	0	0	0	0
	Annual Arithmetic Mean ($\mu g/m^3$)	8.6	9.8	8.8	11.0	10
	Exceeded CAAQS (20 $\mu g/m^3$)?	No	No	No	No	No
Particulate Matter ($PM_{2.5}$)	Max 24-hour Concentration ($\mu g/m^3$)	37.9	37.6	44.7	15.5	70.2
	No. days exceeded NAAQS (35 $\mu g/m^3$)	1	3.3	0	7.1	14.6
	Annual Arithmetic Mean ($\mu g/m^3$)	9.5	10.2	8.7	12.8	14.4
	Exceeded CAAQS (12 $\mu g/m^3$)?	No	No	No	Yes	No
	Exceeded NAAQS (12 $\mu g/m^3$)?	No	No	No	Yes	No

Source: CARB 2020b

Notes: CAAQS = California ambient air quality standards; $\mu g/m^3$ = micrograms per cubic meter; NAAQS = National ambient air quality standards; ppm = parts per million

State statistics are based on California-approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. When the measured state and national concentrations varied due to different sample methods, the highest concentration was reported in the summary table.

Figure 5. Map of Air Quality Monitoring Stations Located Near the Project

Note: Only the air monitoring stations closest to the proposed project where ozone, PM10, and PM2.5 were consistently monitored in recent years are identified.

Source: BAAQMD 2020b.

3.2.2 Mobile Source Air Toxics

The I-80 highway corridor, Ashby Avenue, 65th Street, San Pablo Avenue, and Stanford Avenue are the primary sources of MSATs in the project vicinity with traffic volumes that currently exceed 10,000 AADT. The existing and forecasted traffic conditions in the project area are summarized in **Tables 1, 2, and 3**. The Union Pacific Railroad also borders the proposed project to the east and travels in a north to south alignment parallel to the Bay.

3.2.3 Greenhouse Gas and Climate Change

Transportation, primarily on-road travel, is the single largest source of CO_2 emissions in the state. The proposed project is located in the cities of Berkeley and Emeryville in Alameda County, and is included in the MTC's current RTP, *Plan Bay Area 2040*. According to the City of Berkeley's (2009) *Climate Action Plan,* motor vehicles driven within the City's geographical boundaries emitted approximately 265,544 metric tons of CO_2e in 2005, which accounted for about 47% of the City's total GHG emissions that year. According to the City of Emeryville's (2016) *Climate Action Plan 2.0,* motor vehicles driven within the City's geographical boundaries emitted approximately 96,270 metric tons of CO_2e in 2014, which accounted for about 56 percent of the City's total GHG emissions that year.

3.3 Sensitive Receptors and Community Health Risks

Under the FCAA, ambient air quality must meet the standards for criteria air pollutants in all locations generally accessible to the public; however, some land uses are considered more sensitive to air pollution than others. Sensitive receptors are defined as facilities that house or attract children, the elderly, people with illnesses, people participating in outdoor sports, or others who are especially sensitive to the effects of air pollutants. Sensitive receptors include schools, parks, hospitals, and convalescent homes. Residential areas are also considered sensitive receptors because residents may include children, the elderly, and the infirm, and residents are often in their homes for extended periods of time.

No schools, hospitals and convalescent homes are located within 500 feet of the project. The southern edge of the Berkeley Aquatic Park falls within the project area. The area surrounding the project area to the north is mostly occupied by the Berkeley Aquatic Park. High-density residential buildings are adjacent to the southern edge of the project area in Emeryville.

The BAAQMD's Community Air Risk Evaluation (CARE) program identifies areas with high concentrations of air pollution and populations most vulnerable to air pollution's health impacts. According to the BAAQMD's CARE program, the project is within a 24-hour $PM_{2.5}$ exceedance area and a 2013 cumulative impact area. In response to AB 617, CARB established the Community Air Protection Program (CAPP) to reduce exposure in communities most impacted by air pollution. According to the CARB's CAPP, the project is not currently mapped in a community that is disproportionately impacted by emissions from existing transportation and stationary sources, and is not subject to community action plan to reduce local air pollution.

3.4 Regional Conformity Status

The project is listed in both the current RTP, *Plan Bay Area 2040* (MTC and ABAG 2017, RTP ID 17-01-0037) and the MTC's financially constrained 2019 TIP (MTC 2016, TIP ID ALA170002). However, in accordance to 40 CFR 93.127, the project is listed as an interchange reconfiguration project that is exempt from a regional conformity analysis.

4. ENVIRONMENTAL CONSEQUENCES

This section describes the methods and results of air quality analyses for the proposed project. Potential air quality impacts associated with the project's short-term construction and long-term operational emissions were analyzed in accordance with the Caltrans (2016b) *Environmental Handbook* using methodology and assumptions that are consistent with the requirements of the FCAA (as amended), CCAA, NEPA, and CEQA. The analysis of long-term operational emissions from the proposed project was based on data from the traffic analysis prepared for the project (Kittelson & Associates 2020).

In accordance with the federal Transportation Conformity Regulations (40 CFR Section 93 Subpart A), a project-level conformity analysis was performed to evaluate the project's long-term operational impacts related to emissions of criteria air pollutants and to determine the project's conformity to the SIP for attaining and/or maintaining the NAAQS. An analysis of the project's short-term construction and long-term operational emissions of criteria air pollutants was also included to support environmental review of the project under CEQA and NEPA. Project-related emissions will 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 (identified in **Table 6**) or contribute to an existing air quality violation.

In accordance with FHWA guidance, the project's potential air quality impacts related to long-term operational emissions of MSATs were evaluated to support environmental review of the project under CEQA and NEPA.

In accordance with Caltrans guidance, potential climate change impacts related to the project's long-term operational and short-term construction emissions of GHGs were also evaluated to support environmental review under CEQA.

4.1 Short-Term Effects (Construction Emissions)

4.1.1 Construction Emissions for Project-Level Conformity

For conformity purposes, 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." Because construction of the Build Alternatives is expected to last less than five years, temporary emissions of CO, PM_{10}, and $PM_{2.5}$ are not expected to cause or contribute to, or worsen, any federal air quality violations and an evaluation of these emissions is not required for a project-level conformity determination.

4.1.2 Construction Criteria Air Pollutant Emissions

Project construction activities would generate emissions of criteria air pollutants and precursors that could potentially affect regional air quality. According to the BAAQMD, the primary

pollutant emissions of concern during project construction would be ROG, NO_x, PM_{10}, and $PM_{2.5}$ from the exhaust of off-road construction equipment and on-road construction vehicles (worker vehicles and haul trucks). In addition, fugitive dust emissions of PM_{10} and $PM_{2.5}$ generated by soil disturbance activities, and fugitive ROG emissions would result from paving during construction. The BAAQMD considers construction activities to be typically short-term or temporary in duration; however, criteria air pollutant emissions from project construction were estimated to support CEQA review of the project.

Construction emissions for each build scenario were quantified using the Sacramento Metropolitan Air Quality Management District's Roadway Construction Emissions Model (RCEM Version 9.0). The proposed project would involve standard construction techniques and require large-scale construction equipment and labor-intensive activities. Project construction is anticipated to commence in Fall 2023 and would be completed in 30 or more months. Based on the type of construction and primary area of daily construction activities (about 5 acres), RCEM generated a default list of construction equipment for use during the following four phases: grubbing/land clearing, grading/excavation, drainage/utilities/sub-grade, and paving. The default construction equipment list was augmented based on project-specific equipment, such as drills rigs, cement mixers, concrete saws, and street sweepers. The duration of each construction phase was adjusted based on project-specific information. Three additional construction phases related to demolition, bridge improvements, and retaining walls were also analyzed based on project-specific information because default construction information is not available for these types of construction activities. The demolition included assumptions about truck trips for hauling demolition debris. The bridge improvements and retaining walls included assumptions about truck trips for concrete deliveries. Emission factors for the selected construction equipment for the proposed project were based on OFFROAD2011 and EMFAC2017. The estimated average daily emissions from construction of the proposed project are summarized in **Table 10** and detailed model outputs are included in **Appendix B**.

The BAAQMD's current CEQA Guidelines (BAAQMD 2017b) recommend thresholds of significance for project-level criteria air pollutant emissions to assist lead agencies in CEQA determinations. The BAAQMD's thresholds include levels at which construction emissions of ozone precursors (ROG and NO_x), PM_{10}, and $PM_{2.5}$ could cause significant air quality impacts. Since Caltrans has not established significance thresholds for criteria air pollutant emissions for CEQA purposes, the BAAQMD's recommended thresholds are included in **Table 10** for comparison only.

As shown in **Table 10**, the project's average daily emissions for each build scenario would be below the BAAQMD's recommended thresholds for ROG, NO_x, and Exhaust PM_{10} and $PM_{2.5}$. Since the average daily emissions of criteria pollutants and precursors from equipment and vehicle exhaust would be below the recommended thresholds, construction of the proposed project would not be expected to cause or contribute to, or worsen, any state air quality violations.

Table 10. Construction Criteria Air Pollutant Emissions (Average Pounds per Day)

Emissions Scenario	ROG	NO_x	Exhaust PM_{10}	Exhaust $PM_{2.5}$	Fugitive Dust PM_{10}	Fugitive Dust $PM_{2.5}$
Build Alternative 1	4.8	47	2.0	1.8	82	17
Build Alternative 2	4.9	48	2.1	1.8	83	4.9
BAAQMD CEQA Thresholds[A]	54	54	82	54	BMP	BMP

Notes: BMP = best management practices; NA= not available

Total emissions averaged over the shortest expected duration of construction (30 months) to conservatively estimate daily emissions.

Fugitive dust emissions include a 50 percent reduction from the use of watering trucks. However, additional reductions from implementation of dust-control measures listed under Section 5 cannot be readily quantified.

[A] The BAAQMD's thresholds have not been adopted by Caltrans and are only shown for informational purposes.

Neither Caltrans nor the BAAQMD has a quantitative threshold for fugitive dust emissions; however, the BAAQMD considers implementation of best management practices (BMPs) to control fugitive dust PM_{10} and $PM_{2.5}$ during construction sufficient to reduce potential impacts from dust to a less-than-significant level. Caltrans' Special Provisions and Standard Specifications will include requirements to minimize or eliminate dust during construction. Required dust control measures, including the application of water and dust palliatives, are described in Section 10-5 of the Caltrans 2018 Standard Specifications, to be amended as necessary by the project Special Provisions in the Plans, Specifications, and Estimates (PS&E) phase.

4.1.3 Construction Greenhouse Gas Emissions

Construction GHG emissions for transportation projects are typically produced by material processing equipment and on-site construction equipment. Emissions of CO_2e during project construction were quantified for each build scenario using RCEM Version 9.0 to support CEQA review of the project. The same model input parameters used for estimating criteria air pollutant emissions during construction were used for estimating CO_2e emissions (see Section 4.1.2).

The total CO_2e emissions and annual average CO_2e emissions estimated for construction of each build scenario are summarized in **Table 12** and detailed model outputs are included in **Appendix B**. Project construction would result in a temporary increase in GHG emissions that would be offset by the long-term improvement in operational GHG emissions compared with the No-Build Alternative (see Section 4.2.4). Furthermore, as described in Section 5, the project will implement measures to reduce construction emissions, such as maintenance of construction equipment and vehicles, limiting of construction vehicle idling time, and scheduling and routing of construction traffic to reduce engine emissions.

Table 11. Construction CO_2e Emissions

Emissions Scenario	CO_2e (Total Metric Tons)	CO_2e (Annual Average Metric Tons)
Build Alternative 1	3,551	1,420
Build Alternative 2	3,668	1,467

Note: Construction emissions for Build Alternative 1 represent the worst-case scenario for the three options.

4.2 Long-Term Effects (Operational Emissions)

4.2.1 Operational Emissions for Project-Level Conformity

The project is located in a federal nonattainment area for ozone and $PM_{2.5}$ and, therefore, a project-level conformity analysis of operational emissions is required to address these pollutants under 40 CFR 93.

$PM_{2.5}$ Emissions Analysis

A quantitative particulate matter hot-spot analysis is required for a transportation project that is in a federal nonattainment or maintenance area for $PM_{2.5}$ and is determined to be a Project of Air Quality Concern (POAQC) as defined in Title 40 CFR Part 93. The SFBAAB is currently designated as a federal nonattainment area for $PM_{2.5}$; therefore, a $PM_{2.5}$ hot-spot analysis is required if the project is determined to be a POAQC. The final rule in 40 CFR 93.123(b)(1) defines a POAQC as:

- New or expanded highway projects that have a significant number of or significant increase in diesel vehicles;
- 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;
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- 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.

On July 30th, 2020 the Bay Area Air Quality Conformity Task Force determined that the project is not a POAQC, and a detailed $PM_{2.5}$ hot-spot analysis is not required for a project-level conformity determination. Therefore, the project would not be expected to cause or contribute to, or worsen, any violations of the federal air quality standards for $PM_{2.5}$. The Project

Assessment Form for $PM_{2.5}$ Interagency Consultation and the Air Quality Conformity Task Force determination are included in **Appendix C**.

Ozone Emissions Analysis

The SFBAAB is currently designated as a federal nonattainment area for ozone. Because ozone 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. As described in Section 3.4, this project is included in a conforming RTP and TIP, and therefore emissions of ozone precursors from project-related traffic are not anticipated to cause or contribute to, or worsen, any violations of the federal air quality standards for ozone.

In addition, the BAAQMD adopted the 2017 CAP to plan for and achieve compliance with the federal and State ozone standards (see Section 2.2.6). This project will not interfere with the control measures described in the 2017 CAP. Furthermore, the project will provide transportation benefits that reduce pollutant emissions, including ozone precursors, by improving traffic operations and efficiency.

4.2.2 Operational Criteria Air Pollutant Emissions

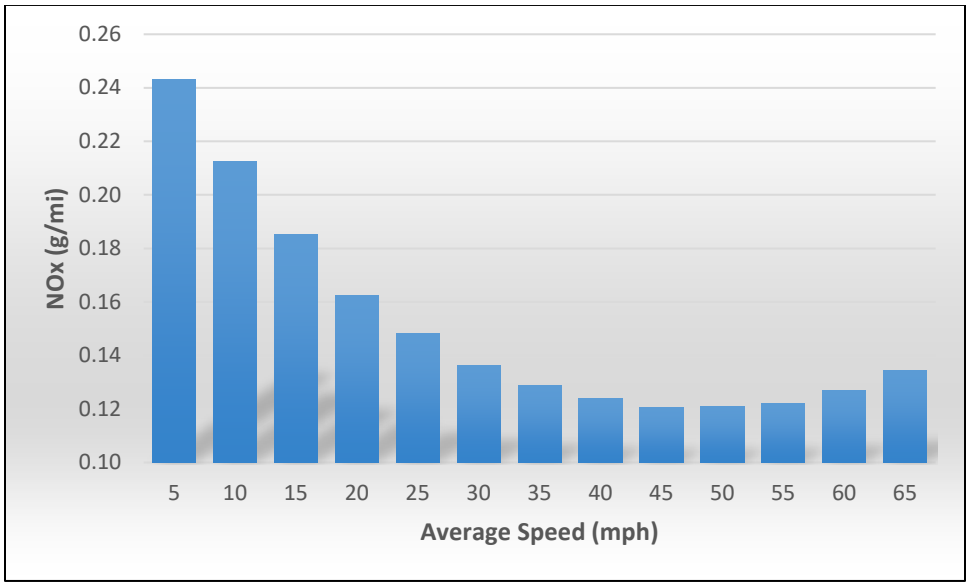
Project operations would generate emissions of criteria air pollutants and precursors that could potentially affect regional air quality. Operational emissions take into account long-term changes in emissions due to the project (excluding the construction phase). According to the BAAQMD, the primary criteria air pollutant emissions of concern during project operation would be ROG, NO_x, PM_{10}, and $PM_{2.5}$ from the exhaust of on-road vehicles. Criteria air pollutant emissions from project operations were estimated for the existing conditions (2018) and the No-Build and Build Alternatives during the opening year (2025), horizon year (2040), and design year (2045) to support NEPA and CEQA review of the project.

A quantitative analysis of daily emissions was performed for ROG, NO_x, and exhaust PM_{10} and $PM_{2.5}$ using the Caltrans CT-EMFAC2017 model to compare the potential effects of the project Build and No-Build Alternatives. CT-EMFAC2017 is an interpretation of the CARB's EMFAC2017 model that simplifies the process of getting composite emission factors. As described under Section 2.2.1, CARB has recently prepared off-model adjustment factors that can be used to adjust the vehicle emissions output from EMFAC2017 to account for required changes under the USEPA's SAFE Vehicle Rule Part One.

Average traffic speed and associated VMT for existing (2018), opening year (2025), horizon year (2040), and design year (2045) conditions in the regional study area affected by the project were provided by the project traffic consultant (Kittelson & Associates 2020). The average traffic speed and associated VMT would be the same for each Build Alternative. The default fleet mixes were adjusted to include the estimated percentage of trucks for each model run. The CARB off-model adjustment factors were applied to the CT-EMFAC2017 emissions outputs. The CT-EMFAC2017 original modeling results, CARB off-model adjustment factors, and post-adjustment modeling results are included in **Appendix D**.

One of the main strategies to reduce criteria pollutant emissions is to make transportation systems more efficient. This can be achieved by reducing VMT and/or improving the flow of traffic. As shown in the chart below, the highest levels of NO_x emissions from mobile sources generally occur at speeds from 0 to 30 miles per hour. Therefore, NO_x emissions can be reduced when a project relieves congestion by enhancing operations and improving travel times in high congestion travel corridors.

NO_x Emissions Factors Based on Vehicle Speed



Notes: g/mi = grams per mile; mph = mile per hour
Emission factors based on gasoline light-duty trucks for 2018.
Source: EMFAC2017.

As the project would improve local traffic circulation and reduce regional VMT, daily emissions of criteria air pollutants would generally decrease for the Build Alternatives compared to the No-Build Alternative. As shown in **Table 12**, the estimated daily ROG, NO_x, and exhaust PM_{10} and $PM_{2.5}$ emissions for the Build Alternatives during the opening year (2025), horizon year (2040), and design year (2045) scenarios would be approximately equal to or lower than the emissions for the No-Build Alternative, which is primarily attributed to the reduction in regional VMT under the Build Alternatives. Emissions for both the Build and No-Build Alternatives would also be lower in the opening year (2025), horizon year (2040), and design year (2045) compared to the existing year (2018), because federal and state vehicle emissions standards are expected to reduce pollutant emissions over time.

In conclusion, the modeling results show that the Build Alternatives would not result in an increase in criteria air pollutant emissions compared to the existing year conditions or the future No-Build Alternative. Therefore, emissions of criteria air pollutants from project-related traffic are not anticipated to cause or contribute to, or worsen, any air quality violations.

Table 12. Operational Criteria Air Pollutant Emissions (Pounds per Day)

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
ROG	539	434	434	378	377	365	365
NO_x	1,335	866	865	1,051	1,049	1,089	1,087
PM_{10} Exhaust	21	11	11	8	8	7	7
$PM_{2.5}$ Exhaust	20	10	10	7	7	7	7

Note: Emissions would be the same for each Build Alternative.

4.2.3 Mobile Source Air Toxics Analysis

Incomplete or Unavailable Information

According to 40 CFR 150.22, 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.

- 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.

- 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:

    - A statement that such information is incomplete or unavailable;

    - A statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;

    - A summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and

    - 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.

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.

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

The USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the FCAA and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain IRIS, which is a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects. Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's (2016) *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 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 occupational exposure data to the general population, a concern expressed by HEI. 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 particulate matter. The USEPA 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 have prevented the estimation of inhalation carcinogenic risk."

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the USEPA as provided by the FCAA 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 USEPA to determine an "acceptable" level of cancer 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 USEPA'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.

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.

Project-Level MSAT Analysis

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent the meaningful or reliable estimates of MSAT emissions and effects for this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSAT at the project level, it is possible to assess the levels of future MSAT emissions by comparing the project alternatives. The project's potential air quality impacts related to long-term operations emissions of MSAT were evaluated in accordance with the FHWA's (2016) *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. 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 alternatives 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. The large majority of projects fall into this category.

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 annual average daily traffic (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).

The project proposes to improve traffic operations in a populated area with nearby sensitive receptors (see Section 3.3). Traffic volumes along the I-80 mainline of the project exceed about 236,000 under the existing 2018 conditions. According to FHWA guidance, the project has a high potential for MSAT effects because it is located in proximity to populated areas and exceeds the FHWA's AADT threshold. Therefore, FHWA guidance recommends a quantitative analysis to forecast and compare local-specific emission trends of the priority MSAT for each alternative.

A quantitative analysis of daily emissions was performed for the nine priority MSAT using the Caltrans CT-EMFAC2017 model to compare the potential effects of the project Build and No-Build Alternatives. The CT-EMFAC2017 model extends the CARB's EMFAC2017 model to include the priority MSATs, which otherwise would require post-model speciation of total organic gases when the standard EMFAC2017 model is used. The CARB off-model adjustment factors were applied to the CT-EMFAC2017 emissions outputs to account for required changes under the USEPA's SAFE Vehicle Rule Part One.

Average traffic speed and associated VMT for existing (2018), opening year (2025), horizon year (2040), and design year (2045) conditions in the regional study area affected by the project were provided by the project traffic consultant (Kittelson & Associates 2020). The average traffic speed and associated VMT would be the same for each Build Alternative. The default fleet mixes were adjusted to include the estimated percentage of trucks for each model run. CARB off-model adjustment factors were applied to CT-EMFAC2017 emissions outputs. The CT-EMFAC2017 original modeling results, CARB off-model adjustment factors, and post-adjustment modeling results are included in **Appendix D**.

Similar to criteria air pollutants (see Section 4.2.2), one of the main strategies to reduce MSAT emissions is to make transportation systems more efficient. This can be achieved by reducing VMT and/or improving the flow of traffic. As the project would improve traffic circulation and reduce regional VMT, daily emissions of MSAT pollutants would generally decrease for the Build Alternatives compared to the No-Build Alternative.

As shown in **Table 13**, the estimated daily MSAT emissions for the Build Alternatives during the opening year (2025), horizon year (2040), and design year (2045) scenarios would be approximately equal to or lower than the emissions for the No-Build Alternative, which is primarily attributed to the reduction in regional VMT under the Build Alternatives. Emissions for both the Build and No-Build Alternatives would also be lower in the opening year (2025), horizon year (2040), and design year (2045) compared to the existing year (2018), because federal and state vehicle emissions standards are expected to reduce pollutant emissions over time. In conclusion, the modeling results show that the Build Alternatives would not result in an increase in MSAT emissions compared to the existing year conditions or the future No-Build Alternative.

Table 13. Operational MSAT Emissions (grams per day)

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
1,3-Butadiene	699	482	482	507	497	515	514
Acetaldehyde	1,946	648	647	804	789	827	825
Acrolein	151	109	109	113	113	115	114
Benzene	4,690	3,451	3,444	3,296	3,289	3,270	3,263
Diesel Particulate Matter	5,872	826	824	723	722	730	729
Ethylbenzene	3,612	3,068	3,062	2,696	2,691	2,612	2,607
Formaldehyde	4,996	2,061	2,057	2,375	2,370	2,428	2,423
Naphthalene	289	247	247	223	223	216	216
Polycyclic Organic Matter	142	77	77	72	72	72	72

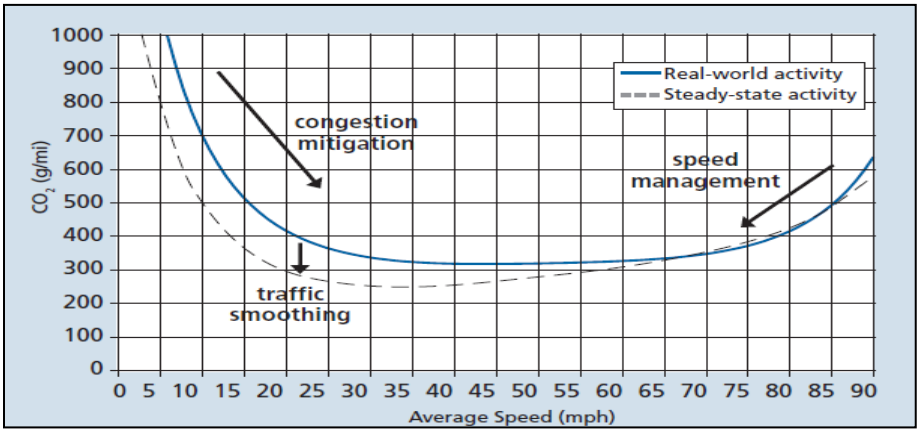
Notes: Emissions would be the same for each Build Alternative.

4.2.4 Greenhouse Gas Emissions Analysis

The project is included in the current RTP and TIP, which contain regional strategies for reducing GHG emissions from transportation sources. One of the main strategies to reduce GHG emissions is to make transportation systems more efficient. CO_2 emissions are the primary

GHG of concern along transportation corridors, because vehicle emissions do not result in appreciable amounts of other GHGs. As shown in the chart below, the highest levels of CO_2 emissions from mobile sources generally occur at speeds from 0 to 25 miles per hour and over 65 miles per hour. Therefore, CO_2 emissions can be reduced when a project relieves congestion by enhancing operations and improving travel times in high congestion travel corridors.

Average CO_2 Emissions Based on Vehicle Speed



Notes: g/mi = grams per mile; mph = mile per hour
Source: U.S. Department of Transportation, 2013.

The project would improve travel along the I-80 corridor within the study limits by reconfiguring the I-80/Ashby Avenue connector ramp configuration, providing multimodal transportation options, and increasing bicycle and pedestrian connectivity and safety. The project's long-term operational emissions of GHGs are evaluated further below.

A quantitative analysis of daily CO_2 emissions was performed using the Caltrans CT-EMFAC2017 model to compare the potential effects of the project Build and No-Build Alternatives. Traffic speed and VMT distributions for existing (2018), opening year (2025), horizon year (2040), and design year (2045) conditions in the regional study area affected by the project were provided by the project traffic consultant (Kittelson & Associates 2020). The traffic speed and VMT distributions would be the same for each Build Alternative. The default fleet mixes were adjusted to include the estimated percentage of trucks for each model run. The CT-EMFAC2017 modeling results are included in **Appendix D**.

As shown in **Table 14**, the estimated annual CO_2 emissions for the Build Alternatives during the opening year (2025), horizon year (2040), and design year (2045) scenarios would be lower than the emissions for the No-Build Alternative, which is primarily attributed to the reduction in regional VMT under the Build Alternatives. The estimated annual CO_2 emissions for the Build and No-Build Alternatives would be lower in the opening year (2025) compared to the existing year (2018) because federal and state fuel economy standards are expected to reduce GHG emissions over time; however, the CO_2 emissions for the Build and No-Build Alternatives would higher in the horizon year (2040) and design year (2045) compared to the existing year (2018). This is because regional VMT is expected to increase about 20 and 25 percent with or without the project by the horizon year (2040) and design year (2045), respectively, which appears to

exceed the rate of GHG emission reductions currently expected through federal and state regulatory programs.

Table 14. Operational CO_2 Emissions (metric tons per year)

	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
Daily VMT	2,071,480	2,239,684	2,235,317	2,499,264	2,494,434	2,585,791	2,580,806
CO_2	273,500	270,600	270,100	274,400	273,800	278,900	278,400

Note: Emissions would be the same for each Build Alternative.

5. MINIMIZATION MEASURES

Caltrans' Special Provisions and Standard Specifications will include requirements to minimize or eliminate dust during construction. Required dust control measures, including the application of water and dust palliatives, are described in Section 10-5 of the Caltrans 2018 Standard Specifications, to be amended as necessary by the project Special Provisions in the Plans, Specifications, and Estimates (PS&E) phase.

Per Caltrans 2018 Standard Specifications Section 10-5, dust control measures include:

- applying a dust palliative under section 18 "Dust Palliatives"
- applying temporary soil stabilization under section 13-5 "Water Pollution Control; Temporary Soil Stabilization"
- managing material stockpiles under Section 13-4.03C(3), "Water Pollution Control; Stockpile Management".

In addition, pollutant emissions from construction equipment exhaust can be controlled by the following, in accordance with Caltrans Standard Specifications Section 7-1.02C "Emissions Reduction":

- Keeping engines properly tuned.
- Limiting idling.

Caltrans is firmly committed to implementing statewide GHG reduction strategies from the Strategic Growth Plan to help meet statewide GHG reduction targets. In addition, the project will implement the following measures to reduce long-term operational GHG emissions:

- Caltrans and the California Highway Patrol are working with regional agencies to implement intelligent transportation systems (ITS) to help manage the efficiency of the existing highway system. ITS is commonly referred to as electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.
- The project will utilize energy efficient lighting, which will be defined during final design.

6. CONCLUSIONS

In accordance to 40 CFR 93.127, the project qualifies as an Interchange reconfiguration project and hence is exempt from regional conformity requirements. Separate listing of the project in the in the MTC's current RTP, *Plan Bay Area 2040* (RTP ID 17-01-0037) and the 2019 TIP (TIP ID ALA170002), and their regional conformity analyses, is not necessary. The project will not interfere with timely implementation of Transportation Control Measures identified in the applicable SIP and regional conformity analysis.

The project is located in a federal nonattainment area for ozone and $PM_{2.5}$ and, therefore, a project-level conformity analysis was required to evaluate these pollutants under 40 CFR 93. Because the project is included in a conforming RTP and TIP, emissions of ozone precursors from project-related traffic are not anticipated to cause or contribute to, or worsen, any violations of the federal air quality standards for ozone. Construction of the project is expected to last less than five years; therefore, an evaluation of localized hot-spot impacts from short-term $PM_{2.5}$ emissions during project construction was not required for a project-level conformity determination. On July 30th, 2020 the Bay Area Air Quality Conformity Task Force determined that the project is not a POAQC. Therefore, $PM_{2.5}$ emissions during project operations would not be expected to cause or contribute to, or worsen, any violations of the federal air quality standards for $PM_{2.5}$ and an evaluation of localized hot-spots from long-term $PM_{2.5}$ emissions was not required for a project-level conformity determination. Based on these findings, the project was found to conform to the SIP.

The short-term construction emissions of criteria air pollutants for the Build Alternatives were evaluated to support environmental review of the project under CEQA. Based on the modeling results, emissions of criteria air pollutants and precursors from equipment and vehicle exhaust would be below the BAAQMD's recommended thresholds of significance for each Build Alternative. In addition, compliance with dust control measures described under the Caltrans' Special Provisions and Standard Specifications would ensure that fugitive dust emissions during construction would also meet the BAAQMD's recommended thresholds of significance. Based on these thresholds, construction of the Build Alternatives would not be expected to cause or contribute to, or worsen, any state air quality violations.

The short-term construction emissions of GHGs for the Build Alternatives were quantified for informational purposes to support environmental review of the project under CEQA. While project construction would result in a temporary increase in GHG emissions, it is anticipated that any increase in GHG emissions due to construction for the Build Alternatives would be offset by the long-term improvement in operational GHG emissions compared with the No-Build Alternative.

The long-term operational emissions of criteria air pollutants, MSATs, and GHGs for the project were evaluated to support environmental review of the project under CEQA and NEPA. The Build Alternatives would not increase emissions of criteria air pollutants, MSATs, and GHGs compared to the No-Build Alternative, because the Build Alternatives would improve traffic circulation and reduce regional VMT. Emissions of criteria air pollutants and MSATs for both the

Build and No-Build Alternatives would decrease in the opening year (2025), horizon year (2040), and design year (2045) compared to the existing year (2018), because federal and state vehicle emissions and fuel economy standards would reduce pollutant emissions over time. Emissions of GHGs for both the Build and No-Build Alternatives would decrease in the opening year (2025), but increase in the horizon year (2040) and design year (2045) compared to the existing year (2018). This is because the long-term rate of regional VMT increase appears to exceed the rate of GHG emission reductions expected under current federal and state fuel economy standards.

The Caltrans' Special Provisions and Standard Specifications will include requirements to minimize or eliminate dust during construction. Required dust control measures, including the application of water and dust palliatives, are described in Section 10-5 of the Caltrans 2018 Standard Specifications, to be amended as necessary by the project Special Provisions in the PS&E phase. Implementation of additional measures will be considered during development of the project's Plans, Specifications, and Estimates, such as exhaust controls to reduce emissions of criteria air pollutants during construction and energy efficient lighting to reduce emissions of GHGs during operation.

7. REFERENCES

BAAQMD, 2020a. Air Quality Standards and Attainment Status. http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status. Last updated 1 May, 2017.

BAAQMD, 2020b. Interactive Data Maps; Weather Data Map Layer. https://www.baaqmd.gov/about-air-quality/interactive-data-maps. Accessed June 3.

BAAQMD, 2017a. 2017 Clean Air Plan. 19 April.

BAAQMD, 2017b. California Environmental Quality Act Air Quality Guidelines. Bay Area Air Quality Management District. Updated May 2017.

BAAQMD, 2012. Understanding Particulate Matter: Protecting Public Health in the San Francisco Bay Area. August.

California Natural Resources Agency, 2009. 2009 California Climate Adaptation Strategy.

Caltrans, 2018. Climate Change Vulnerability Assessment; District 4. January.

Caltrans, 2016a. California Transportation Plan (CTP) 2040; Integrating California's Transportation Future. June.

Caltrans, 2016b. Environmental Handbook. Volume I: Guidance for Compliance, Chapter 11 - Air Quality. http://www.dot.ca.gov/ser/envhand.htm. Last Updated 29 June.

Caltrans, 2011. Guidance on Incorporating Sea Level Rise; for use in the Planning and Development of Project Initiation Documents. 16 May.

CARB, 2020a. Overview: Diesel Exhaust and Health. California Air Resources Board. https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health. Accessed 29 January.

CARB, 2020b. iADAM: Air Quality Data Statistics; Trend Summaries. https://www.arb.ca.gov/adam/trends/trends1.php. Accessed 13 February.

CARB, 2018. 2020 Business-as-Usual (BAU) Emissions Projection 2014 Edition. https://www.arb.ca.gov/cc/inventory/data/bau.htm. Last Reviewed June 22.

City of Berkeley, 2009. Climate Action Plan. June.

City of Emeryville, 2016. Climate Action Plan 2.0. November.

DWR, 2020. California Data Exchanger Center. Oakland South (OSO); annual precipitation data query from 2015 to 2000. https://cdec.water.ca.gov/index.html. Accessed July 9.

FHWA, 2016. Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. October 16.

International Panel on Climate Change (IPCC), 2007. Fourth Assessment Report; Climate Change 2007, the Physical Science Basis. June.

Kittelson & Associates, 2020. Project-Specific Traffic Data provided to Baseline Environmental Consulting, March 30.

MTC and ABAG, 2017. Plan Bay Area 2040. Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area 2017–2040. Adopted July 26.

MTC, 2016. 2017 Transportation Improvement Program (TIP) For the Nine-County San Francisco Bay Area. MTC Resolution No. 4275. 28 September.

U.S. Department of Transportation, 2013. Intelligent Transportation Systems ePrimer Presentation; Module 11: Sustainable Transportation. https://www.pcb.its.dot.gov/eprimer/module11p.aspx. September.

USEPA, 2020a. Green Book; Current Nonattainment Counties for All Criteria Pollutants. https://www3.epa.gov/airquality/greenbook/ancl.html. Last updated 31 January, 2020.

USEPA, 2018a. Letter from Elizabeth I. Adams, USEPA (Acting Director, Air Division) to Muhaned Aljabiry, Caltrans (Chief, Office of Federal Transportation Management Program), regarding the transportation conformity requirements for carbon monoxide.

USEPA, 2015. Technical Support Document EPA's 2011 National-scale Air Toxics Assessment. December.

USEPA, 2007. Final Rule for Control of Hazardous Air Pollutants from Mobile Sources. Federal Register, Vol. 72, No. 37. 26 February.

Van Gosen, B.S., and J.P. Clinkenbeard, 2011. Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California: U.S. Geological Survey Open- File Report 2011-1188.

8. REPORT PREPARERS

This report was prepared for Caltrans and Alameda CTC by the following staff:

- Patrick Sutton, Baseline Environmental Consulting, Environmental Engineer
- Andrew Metzger, Circlepoint, Project Manager

APPENDICES
(IN PDF FORMAT)

A: **Regional Transportation Plan and Transportation Improvement Program Listings for the Project**

B: **RCEM Version 9.0 Results for Construction Criteria Air Pollutants and Greenhouse Gases**

C: **Bay Area Air Quality Conformity Task Force Meeting**

D: **CT-EMFAC2017 Results for Operational Criteria Air Pollutants, Mobil Source Air Toxics, and Greenhouse Gases**

APPENDIX A

Regional Transportation Plan and Transportation Improvement Program Listings for the Project

Data

Basic Information

What is this project/program?	Ashby I-80 Interchange with Bicycle and Pedestrian Ramps
What would this project/program do?	Reconstruct the Ashby Avenue interchange, including construction of a new bridge to replace existing bridges, a roundabout interchange, and bicycle/pedestrian access over the I-80 freeway at the Ashby-Shellmound interchange.
RTPID:	17-01-0037
County:	Alameda
Agency:	Emeryville
Mode:	Auto
System:	Street/Highway Facility

Cost and Funding (in Year-of-Expenditure)

How much does this project/program cost?	$60 (millions)
How much of this project/program is covered in the Plan period?	$60 (millions)
How much of the project/program was included in previous plans?	$0 (millions)

Schedule

By when is this project/program anticipated to open?	2022

Location

TIP Project Listings by County
2019 TIP: FY18/19 through FY21/22

Report sorted by: County, Sponsor, System, Purpose, TIP ID

County	Sponsor	System	Project Name	Project Descripion	Purpose	TIP ID	Current 4-Year TIP Funding	Total Funding (All Years)
Alameda	ACE	Transit	ACE Fixed Guideway (Capital Lease)	ACE: Along ACE Corridor: Capital Lease payments required to operate along Union Pacific corridor	Operations	ALA170048	$5,937,500	$7,800,000
Alameda	ACTC	Local Road	7th Street Grade Separation East	Oakland: 7th St and rail tracks between I880 and Maritime St in the Port of Oakland: Reconstruct the existing 7th St underpass on an adjacent alignment, rail tracks, and other rail infrastructure. No through	Maintenance/ Rehabilitation	ALA170085	$21,500,389	$252,000,000
Alameda	ACTC	Local Road	7th Street Grade Separation West	Oakland: Within the Port: Implement road and rail improvements, realign and grade separate 7th St and Maritime intersection, reconstruct and widen multi-use path; Between Joint Intermodal Terminal and	Maintenance/ Rehabilitation	ALA170086	$2,020,975	$165,000,000
Alameda	ACTC	Local Road	Alameda County Safe Routes to School	Alameda County: Countywide: SR2S Program including education & outreach in various K-12 schools, ridesharing, & project development.	System Management	ALA110033	$2,309,000	$20,389,665
Alameda	ACTC	Local Road	Freight Intelligent Transportation System (FITS)	Oakland: In the Port of Oakland and surrounding areas: Implement ITS improvements, signal systems, and other technologies to cost-effectively manage truck arrivals and improve incident response	System Management	ALA170087	$24,000,000	$30,600,000
Alameda	ACTC	Public Lands/ Trails	East Bay Greenway	Alameda County: Generally along the BART alignment from Lake Merritt BART station to South Hayward BART station: Install a trail facility consisting of Class I & Class IV bikeway facilities. Includes 2 road	Expansion	ALA150008	$0	$203,501,000
Alameda	ACTC	State Highway	SR 84 Expressway Widening	In Livermore: Widen Route 84 from Jack London Blvd. to Pigeon Pass.	Expansion	ALA050014	$0	$120,319,000
Alameda	ACTC	State Highway	I-880 North Safety Improvements	Oakland: I-880 between 23rd Ave to 29th Ave: Reconfigure Interchange, including new ramps.	Expansion	ALA050019	$0	$108,630,000
Alameda	ACTC	State Highway	I-80 Gilman Interchange Improvements	Berkeley: On Gilman Avenue at I-80: Reconfigure interchange providing dual roundabout at the entrance & exits from I-80 as well as the Eastshore Highway and West Frontage Rd and bike/ped	Expansion	ALA050079	$32,276,000	$56,000,000
Alameda	ACTC	State Highway	I-680 NB HOV/HOT Lane	Route I-680: from South of Auto Mall Parkway to State Route 84 in Alameda County: Construct NB HOV/HOT Lane.	Expansion	ALA130034	$0	$198,198,000
Alameda	ACTC	State Highway	Rte 84 Widening, south of Ruby Hill Dr to I-680	In Alameda County, on State Route 84 from south of Ruby Hill Drive to I-680, upgrade from 2-lane conventional highway to 4-lane expressway, make operational improvements to SR84/I-680 I/C and	Expansion	ALA150001	$40,114,000	$220,000,000
Alameda	ACTC	State Highway	I-880/Whipple Rd Industrial Pkwy SW I/C Imps	In Union City/Hayward: at I-880/Whipple Rd Interchange: Implement full interchange improvements including northbound off-ramp, surface street improvements and realignment, and bike/ped	Expansion	ALA170005	$56,000,000	$80,000,000
Alameda	ACTC	State Highway	I-580/680 Interchange HOV/HOT Widening	Alameda County: On I-580 between Hacienda Dr. and San Ramon/Foothill Road and on I-680 between Stoneridge Dr. and Amado: Widen to add one HOV/HOT lane for WB 580 to SB 680 and NB 680 to EB	Expansion	ALA170008	$8,000,000	$300,000,000
Alameda	ACTC	State Highway	Widen I-680 NB Imprv SB for EL: SR-84 to Alcosta	Alameda County: NB I-680 from SR-84 to Alcosta Blvd: Widen for express lanes; SB I-680 from SR-84 to Alcosta Blvd: express lane improvements. Project also references RTP ID 17-01-0014	Expansion	ALA170009	$12,500,000	$394,000,000
Alameda	ACTC	State Highway	I-880 NB HOV/HOT: North of Hacienda to Hegenberger	Alameda County: I-880 in the northbound direction from north of Hacienda Ave to Hegenberger Road: Widen to provide one HOV/express lane	Expansion	ALA170010	$5,000,000	$221,000,000
Alameda	ACTC	State Highway	East-West Connector in Fremont & Union City	In Fremont & Union City: From I-880 to Route 238 (Mission Blvd): Construct new 4-lane roadway and widen existing roadways. Project is phased.	Expansion	ALA978004	$46,623,196	$236,000,000
Alameda	ACTC	State Highway	Oakland/Alameda Access Project	Oakland and Alameda: Between Oak Street and Union Street: Reconfigure interchange and intersections to improve connections between I-880, the Posey and Webster tubes and the downtown Oakland	System Management	ALA070009	$1,500,000	$83,000,000
Alameda	ACTC	State Highway	I-80/Ashby Avenue Interchange Improvements	Alameda County: I-80/Ashby IC: Reconstruct the interchange including constructing new bridge, two roundabouts and bike/ped improvements	System Management	ALA170002	$5,500,000	$53,560,000
Alameda	Alameda	Local Road	Cross Alameda Trail (includes SRTS component)	City of Alameda: Between Webster St and Sherman St: Construct a new trail with an on-street portion.	Expansion	ALA150007	$0	$2,521,000
Alameda	Alameda	Local Road	Alameda City-Wide Pavement Rehabilitation	Alameda: Buena Vista Ave from Willow St to Park St and Kofman Pkwy from Tralee Ln to Aughinbaugh Way: Resurface and rehabilitate pavement	Maintenance/ Rehabilitation	ALA170074	$999,000	$1,059,000
Alameda	Alameda	Local Road	Clement Avenue Complete Streets	Alameda: On Clement Avenue between Broadway and Grand St: Complete street improvements including Class II bike lanes, curb extensions, flashing beacons, bus shelters, sidewalk/curb ramp	System Management	ALA170073	$5,670,000	$5,670,000
Alameda	Alameda	State Highway	Central Avenue Safety Improvements	Alameda: On Central Ave from Main St to Sherman St: Implement multimodal street improvements including reduction from 4 to 3 lanes, a center turn lane, bike lanes, a 2-way separated bikeway, 2 traffic	System Management	ALA170049	$11,657,000	$12,214,000
Alameda	Alameda County	Local Road	Alameda: Vasco Road Safety Improvements	Livermore: On Vasco Road from 1,000' South of Dalton Ave to CC County line; Realign roadway, provide standard shoulder widths, install median barriers and add truck-climbing lanes. (Total length of	Expansion	ALA030002	$600,000	$56,858,000
Alameda	Alameda County	Local Road	Estuary Bridges Seismic Retrofit and Repairs	Oakland: 3 Oakland Estuary bridges: Seismic retrofit and repairs	Maintenance/ Rehabilitation	ALA090022	$3,400,000	$4,900,000

APPENDIX B

RCEM Version 9.0 Results for Construction Criteria Air Pollutants and Greenhouse Gases

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	Build Alternative 1 (Default Construction Phases)	
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	20.00	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)	1	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	0.80	miles
Total Project Area	48.00	acres
Maximum Area Disturbed/Day	5.00	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	352.00	78.00
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	834.00	
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	334.00	

Mitigation Options

On-road Fleet Emissions Mitigation	No 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	1.00	2.00		1/1/2023
Grading/Excavation	12.00	8.00		2/1/2023
Drainage/Utilities/Sub-Grade	5.00	7.00		2/1/2024
Paving	2.00	3.00		7/3/2024
Totals (Months)		20		

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		22	660.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving		30.00		42	1260.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.53	0.12	0.05	0.02	1,724.76	0.00	0.27	1,805.60
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Paving (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
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	4.44	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	0.06	0.62	5.36	0.17	0.08	0.02	2,509.61	0.00	0.39	2,627.24
Tons per const. Period - Grading/Excavation	0.01	0.08	0.71	0.02	0.01	0.00	331.27	0.00	0.05	346.80
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	0.12	1.19	10.12	0.32	0.15	0.04	4,733.78	0.01	0.74	4,955.65
Tons per const. Period - Paving	0.00	0.03	0.22	0.01	0.00	0.00	104.14	0.00	0.02	109.02
Total tons per construction project	0.01	0.11	0.93	0.03	0.01	0.00	435.41	0.00	0.07	455.82

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		0	0.00
Miles/round trip: Paving		30.00		17	510.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.53	0.12	0.05	0.02	1,724.76	0.00	0.27	1,805.60
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Paving (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
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	4.44	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	0.00	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	0.05	0.48	4.10	0.13	0.06	0.02	1,916.05	0.00	0.30	2,005.86
Tons per const. Period - Paving	0.00	0.01	0.09	0.00	0.00	0.00	42.15	0.00	0.01	44.13
Total tons per construction project	0.00	0.01	0.09	0.00	0.00	0.00	42.15	0.00	0.01	44.13

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		7	14	280.00
No. of employees: Grading/Excavation		29	58	1,160.00
No. of employees: Drainage/Utilities/Sub-Grade		19	38	760.00
No. of employees: Paving	18	9	36	720.00

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	316.70	0.00	0.01	318.71
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.84	0.06	0.05	0.02	0.00	306.70	0.00	0.01	308.54
Paving (grams/mile)	0.01	0.84	0.06	0.05	0.02	0.00	306.70	0.00	0.01	308.54
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	2.74	0.29	0.00	0.00	0.00	68.06	0.07	0.03	79.25
Draining/Utilities/Sub-Grade (grams/trip)	0.98	2.66	0.27	0.00	0.00	0.00	65.99	0.07	0.03	76.61
Paving (grams/trip)	0.98	2.66	0.27	0.00	0.00	0.00	65.99	0.07	0.03	76.61

Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.04	0.65	0.05	0.03	0.01	0.00	198.20	0.00	0.00	199.79
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	2.18	0.00	0.00	2.20
Pounds per day - Grading/Excavation	0.17	2.67	0.22	0.12	0.05	0.01	818.62	0.02	0.02	825.18
Tons per const. Period - Grading/Excavation	0.02	0.35	0.03	0.02	0.01	0.00	108.06	0.00	0.00	108.92
Pounds per day - Drainage/Utilities/Sub-Grade	0.10	1.63	0.13	0.08	0.03	0.01	519.41	0.01	0.01	523.38
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.09	0.01	0.00	0.00	0.00	28.57	0.00	0.00	28.79
Pounds per day - Paving	0.10	1.54	0.12	0.07	0.03	0.00	492.07	0.01	0.01	495.84
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	10.83	0.00	0.00	10.91
Total tons per construction project	0.03	0.48	0.04	0.02	0.01	0.00	149.63	0.00	0.00	150.82

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

Water Truck Emissions User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated 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)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.53	0.12	0.05	0.02	1,724.76	0.00	0.27	1,805.60
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Paving (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
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	4.44	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	0.36	0.01	0.00	0.00	152.27	0.00	0.02	159.41
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.67	0.00	0.00	1.75
Pounds per day - Grading/Excavation	0.00	0.04	0.36	0.01	0.00	0.00	152.10	0.00	0.02	159.23
Tons per const. Period - Grading/Excavation	0.00	0.00	0.05	0.00	0.00	0.00	20.08	0.00	0.00	21.02
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.36	0.01	0.00	0.00	150.28	0.00	0.02	157.32
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.02	0.00	0.00	0.00	8.27	0.00	0.00	8.65
Pounds per day - Paving	0.00	0.04	0.36	0.01	0.00	0.00	150.28	0.00	0.02	157.32
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	3.31	0.00	0.00	3.46
Total tons per construction project	0.00	0.01	0.08	0.00	0.00	0.00	33.32	0.00	0.01	34.89

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		5.00	50.00	0.55	10.40	0.11
Fugitive Dust - Grading/Excavation		5.00	50.00	6.60	10.40	1.37
Fugitive Dust - Drainage/Utilities/Subgrade		5.00	50.00	2.75	10.40	0.57

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
0.00			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			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
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
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
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			Model Default Tier	Cranes	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	Crawler Tractors	0.33	1.68	3.84	0.15	0.14	0.01	568.70	0.18	0.01	574.84
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
2.00	2		Model Default Tier	Excavators	0.28	4.89	2.32	0.11	0.10	0.01	750.16	0.24	0.01	758.25
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
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
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
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
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
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
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
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
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
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			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
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			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			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			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
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
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			Model Default Tier	Scrapers	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	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
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
0.00			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			Model Default Tier	Trenchers	0.00	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	0.73	7.17	6.89	0.29	0.27	0.02	1,417.49	0.44	0.01	1,432.21
Grubbing/Land Clearing	tons per phase	0.01	0.08	0.08	0.00	0.00	0.00	15.59	0.00	0.00	15.75

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
0.00			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			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
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
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
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	1		Model Default Tier	Cranes	0.17	0.91	1.89	0.08	0.07	0.00	279.41	0.09	0.00	282.42
2.00	2		Model Default Tier	Crawler Tractors	0.66	3.36	7.64	0.30	0.27	0.01	1,137.46	0.37	0.01	1,149.72
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
4.00	4		Model Default Tier	Excavators	0.56	9.78	4.61	0.23	0.21	0.02	1,500.36	0.49	0.01	1,516.53
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
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
2.00	2		Model Default Tier	Graders	0.57	2.53	6.91	0.22	0.21	0.01	961.24	0.31	0.01	971.59
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
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
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
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
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
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
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			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
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			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.00	3		Model Default Tier	Rollers	0.34	4.17	3.61	0.20	0.18	0.01	571.75	0.18	0.01	577.91
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
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
3.00	3		Model Default Tier	Rubber Tired Loaders	0.61	3.39	5.91	0.20	0.18	0.01	1,362.50	0.44	0.01	1,377.22
4.00	4		Model Default Tier	Scrapers	2.35	18.37	24.70	0.97	0.89	0.05	4,410.12	1.43	0.04	4,457.64
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
1.00			Model Default Tier	Sweepers/Scrubbers	0.02	0.24	0.21	0.01	0.01	0.00	30.77	0.01	0.00	31.10
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.23	3.35	2.29	0.11	0.10	0.00	452.39	0.15	0.00	457.26
0.00			Model Default Tier	Trenchers	0.00	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	5.64	46.70	58.49	2.34	2.16	0.11	10,804.63	3.47	0.10	10,920.53
Grading/Excavation		tons per phase	0.74	6.16	7.72	0.31	0.28	0.01	1,426.21	0.46	0.01	1,441.51

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
0.00			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
1.00	1		Model Default Tier	Air Compressors	0.12	1.21	0.81	0.04	0.04	0.00	187.63	0.01	0.00	188.32
1.00			Model Default Tier	Bore/Drill Rigs	0.11	1.02	0.95	0.03	0.03	0.00	458.68	0.15	0.00	463.63
1.00			Model Default Tier	Cement and Mortar Mixers	0.03	0.15	0.18	0.01	0.01	0.00	25.26	0.00	0.00	25.39
1.00			Model Default Tier	Concrete/Industrial Saws	0.16	1.83	1.21	0.06	0.06	0.00	296.33	0.01	0.00	297.35
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
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
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
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
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
1.00	1		Model Default Tier	Generator Sets	0.29	3.66	2.54	0.11	0.11	0.01	623.04	0.03	0.00	625.06
2.00	2		Model Default Tier	Graders	0.53	2.48	6.23	0.20	0.19	0.01	960.76	0.31	0.01	971.11
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
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
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
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
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
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
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
1.00	1		Model Default Tier	Plate Compactors	0.03	0.16	0.19	0.01	0.01	0.00	25.86	0.00	0.00	25.99
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
1.00	1		Model Default Tier	Pumps	0.31	3.72	2.58	0.12	0.12	0.01	623.04	0.03	0.00	625.12
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
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
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
4.00	4		Model Default Tier	Scrapers	2.28	17.90	23.09	0.91	0.84	0.05	4,407.30	1.43	0.04	4,454.80
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
1.00			Model Default Tier	Sweepers/Scrubbers	0.02	0.24	0.20	0.01	0.01	0.00	30.77	0.01	0.00	31.10
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.22	3.35	2.17	0.10	0.09	0.00	452.65	0.15	0.00	457.52
0.00			Model Default Tier	Trenchers	0.00	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
Drainage/Utilities/Sub-Grade		pounds per day	4.20	36.33	40.88	1.62	1.52	0.09	8,189.94	2.13	0.07	8,264.52
Drainage/Utilities/Sub-Grade		tons per phase	0.23	2.00	2.25	0.09	0.08	0.00	450.45	0.12	0.00	454.55

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
0.00			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			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
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
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	0.16	1.83	1.21	0.06	0.06	0.00	296.33	0.01	0.00	297.35
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
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
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
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
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
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
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
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
5.00			Model Default Tier	Off-Highway Trucks	1.86	12.19	12.48	0.45	0.41	0.05	4,801.32	1.55	0.04	4,853.01
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
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
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
1.00	1		Model Default Tier	Pavers	0.18	2.89	1.74	0.08	0.07	0.00	455.16	0.15	0.00	460.07
1.00	1		Model Default Tier	Paving Equipment	0.16	2.57	1.50	0.07	0.07	0.00	394.47	0.13	0.00	398.72
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
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			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	0.11	1.39	1.14	0.06	0.06	0.00	190.61	0.06	0.00	192.66
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
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
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			Model Default Tier	Scrapers		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	Signal Boards		0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
1.00			Model Default Tier	Skid Steer Loaders		0.06	1.38	0.83	0.03	0.02	0.00	200.57	0.06	0.00	202.73
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
1.00			Model Default Tier	Sweepers/Scrubbers		0.02	0.24	0.20	0.01	0.01	0.00	30.77	0.01	0.00	31.10
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes		0.22	3.35	2.17	0.10	0.09	0.00	452.65	0.15	0.00	457.52
0.00			Model Default Tier	Trenchers		0.00	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		2.89	26.44	21.99	0.89	0.82	0.07	6,920.51	2.13	0.06	6,992.29
	Paving			tons per phase		0.06	0.58	0.48	0.02	0.02	0.00	152.25	0.05	0.00	153.83
Total Emissions all Phases (tons per construction period) =>						1.05	8.82	10.53	0.42	0.39	0.02	2,044.50	0.63	0.02	2,065.64

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	6.00	8
Air Compressors		78	4.00	8
Bore/Drill Rigs		221	4.00	8
Cement and Mortar Mixers		9	4.00	8
Concrete/Industrial Saws		81	4.00	8
Cranes		231	4.00	8
Crawler Tractors		212	6.00	8
Crushing/Proc. Equipment		85	8.00	8
Excavators		158	6.00	8
Forklifts		89	8.00	8
Generator Sets		84	8.00	8
Graders		187	6.00	8
Off-Highway Tractors		124	8.00	8
Off-Highway Trucks		402	6.00	8
Other Construction Equipment		172	8.00	8
Other General Industrial Equipment		88	8.00	8
Other Material Handling Equipment		168	8.00	8
Pavers		130	8.00	8
Paving Equipment		132	8.00	8
Plate Compactors		8	6.00	8
Pressure Washers		13	8.00	8
Pumps		84	8.00	8
Rollers		80	6.00	8
Rough Terrain Forklifts		100	4.00	8
Rubber Tired Dozers		247	8.00	8
Rubber Tired Loaders		203	6.00	8
Scrapers		367	6.00	8
Signal Boards		6	8.00	8
Skid Steer Loaders		65	8.00	8
Surfacing Equipment		263	8.00	8
Sweepers/Scrubbers		64	1.00	8
Tractors/Loaders/Backhoes		97	6.00	8
Trenchers		78	8.00	8
Welders		46	2.00	8

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Build Alternative 1 (Default Construction Phases)

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	0.78	7.86	7.30	50.33	0.33	50.00	10.69	0.29	10.40	0.02	1,767.96	0.44	0.04	1,791.41
Grading/Excavation	5.88	50.03	64.42	52.64	2.64	50.00	12.69	2.29	10.40	0.15	14,284.95	3.49	0.54	14,532.18
Drainage/Utilities/Sub-Grade	4.30	37.99	41.36	51.71	1.71	50.00	11.96	1.56	10.40	0.09	8,859.63	2.14	0.11	8,945.22
Paving	3.16	29.69	36.68	1.42	1.42	0.00	1.06	1.06	0.00	0.14	14,212.69	2.15	1.14	14,606.96
Maximum (pounds/day)	5.88	50.03	64.42	52.64	2.64	50.00	12.69	2.29	10.40	0.15	14,284.95	3.49	1.14	14,606.96
Total (tons/construction project)	1.09	9.43	11.67	10.38	0.48	9.90	2.47	0.41	2.06	0.03	2,705.02	0.63	0.10	2,751.29

Notes:

Project Start Year ->	2023
Project Length (months) ->	20
Total Project Area (acres) ->	48
Maximum Area Disturbed/Day (acres) ->	5
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	280	40
Grading/Excavation	430	0	660	0	1,160	40
Drainage/Utilities/Sub-Grade	0	0	0	0	760	40
Paving	834	334	1,260	510	720	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 -> Build Alternative 1 (Default Construction Phases)

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	0.01	0.09	0.08	0.55	0.00	0.55	0.12	0.00	0.11	0.00	19.45	0.00	0.00	17.88
Grading/Excavation	0.78	6.60	8.50	6.95	0.35	6.60	1.67	0.30	1.37	0.02	1,885.61	0.46	0.07	1,740.22
Drainage/Utilities/Sub-Grade	0.24	2.09	2.28	2.84	0.09	2.75	0.66	0.09	0.57	0.01	487.28	0.12	0.01	446.33
Paving	0.07	0.65	0.81	0.03	0.03	0.00	0.02	0.02	0.00	0.00	312.68	0.05	0.03	291.53
Maximum (tons/phase)	0.78	6.60	8.50	6.95	0.35	6.60	1.67	0.30	1.37	0.02	1885.61	0.46	0.07	1,740.22
Total (tons/construction project)	1.09	9.43	11.67	10.38	0.48	9.90	2.47	0.41	2.06	0.03	2705.02	0.63	0.10	2,495.96

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	Build Alternative 1 (Additional Construction Phases)	
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	25.00	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)	1	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	0.80	miles
Total Project Area	48.00	acres
Maximum Area Disturbed/Day	5.00	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		98.00
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00	12.00	
	Drainage/Utilities/Sub-Grade	20.00	23.00	
	Paving	20.00		

Mitigation Options

On-road Fleet Emissions Mitigation	No 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	4.00	2.50		1/1/2023
Grading/Excavation	15.00	10.00		5/3/2023
Drainage/Utilities/Sub-Grade	6.00	8.75		8/2/2024
Paving	0.00	3.75		2/1/2025
Totals (Months)		25		

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		5	150.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
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)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.52	0.12	0.05	0.02	1,716.12	0.00	0.27	1,796.56
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,700.36	0.00	0.27	1,780.05
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	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	0.01	0.14	1.22	0.04	0.02	0.01	571.02	0.00	0.09	597.79
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.05	0.00	0.00	0.00	25.12	0.00	0.00	26.30
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	0.00	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	0.01	0.05	0.00	0.00	0.00	25.12	0.00	0.00	26.30

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		1	30.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		2	60.00
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)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.52	0.12	0.05	0.02	1,716.12	0.00	0.27	1,796.56
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,700.36	0.00	0.27	1,780.05
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	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	0.03	0.24	0.01	0.00	0.00	113.50	0.00	0.02	118.82
Tons per const. Period - Grading/Excavation	0.00	0.00	0.04	0.00	0.00	0.00	18.73	0.00	0.00	19.61
Pounds per day - Drainage/Utilities/Sub-Grade	0.01	0.06	0.48	0.02	0.01	0.00	224.92	0.00	0.04	235.46
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.03	0.00	0.00	0.00	14.84	0.00	0.00	15.54
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	0.01	0.07	0.00	0.00	0.00	33.57	0.00	0.01	35.15

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	15	7	30	600.00
No. of employees: Grading/Excavation	30	29	60	1,200.00
No. of employees: Drainage/Utilities/Sub-Grade	20	19	40	800.00
No. of employees: Paving	0	9	0	0.00

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)	0.01	0.88	0.07	0.05	0.02	0.00	312.51	0.00	0.01	314.45
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.83	0.06	0.05	0.02	0.00	304.83	0.00	0.01	306.64
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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)	1.01	2.71	0.28	0.00	0.00	0.00	67.19	0.07	0.03	78.15
Draining/Utilities/Sub-Grade (grams/trip)	0.97	2.64	0.26	0.00	0.00	0.00	65.60	0.06	0.03	76.12
Paving (grams/trip)	0.00	0.00	0.00	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	0.09	1.39	0.12	0.06	0.03	0.00	424.71	0.01	0.01	428.13
Tons per const. Period - Grubbing/Land Clearing	0.00	0.06	0.01	0.00	0.00	0.00	18.69	0.00	0.00	18.84
Pounds per day - Grading/Excavation	0.17	2.68	0.22	0.12	0.05	0.01	835.66	0.02	0.02	842.23
Tons per const. Period - Grading/Excavation	0.03	0.44	0.04	0.02	0.01	0.00	137.88	0.00	0.00	138.97
Pounds per day - Drainage/Utilities/Sub-Grade	0.11	1.69	0.13	0.08	0.03	0.01	543.40	0.01	0.01	547.53
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.11	0.01	0.01	0.00	0.00	35.86	0.00	0.00	36.14
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	0.04	0.62	0.05	0.03	0.01	0.00	192.44	0.00	0.00	193.94

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

Water Truck Emissions User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated Daily VMT
Grubbing/Land Clearing - Exhaust	2	1		5	10		8.00	80.00
Grading/Excavation - Exhaust	1	1		5	5		8.00	40.00
Drainage/Utilities/Subgrade	0	1		5	0		8.00	0.00
Paving	0	1		5	0		8.00	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.52	0.12	0.05	0.02	1,716.12	0.00	0.27	1,796.56
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,700.36	0.00	0.27	1,780.05
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	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	0.01	0.08	0.72	0.02	0.01	0.00	304.54	0.00	0.05	318.82
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.03	0.00	0.00	0.00	13.40	0.00	0.00	14.03
Pounds per day - Grading/Excavation	0.00	0.04	0.36	0.01	0.00	0.00	151.34	0.00	0.02	158.43
Tons per const. Period - Grading/Excavation	0.00	0.01	0.06	0.00	0.00	0.00	24.97	0.00	0.00	26.14
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	0.01	0.09	0.00	0.00	0.00	38.37	0.00	0.01	40.17

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		5.00	50.00	2.20	10.40	0.46
Fugitive Dust - Grading/Excavation		5.00	50.00	8.25	10.40	1.72
Fugitive Dust - Drainage/Utilities/Subgrade		5.00	100.00	6.60	20.80	1.37

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
0.00			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
2.00			Model Default Tier	Air Compressors	0.26	2.41	1.74	0.09	0.09	0.00	375.26	0.02	0.00	376.67
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
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
2.00			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
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
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
4.00			Model Default Tier	Crushing/Proc. Equipment	1.80	17.31	11.94	0.62	0.62	0.03	2,658.12	0.16	0.02	2,668.06
2.00	2		Model Default Tier	Excavators	0.28	4.89	2.32	0.11	0.10	0.01	750.16	0.24	0.01	758.25
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
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
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
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
4.00			Model Default Tier	Off-Highway Trucks	1.51	9.87	10.70	0.39	0.36	0.04	3,839.67	1.24	0.03	3,881.00
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
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
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
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
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			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
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			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			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			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
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			Model Default Tier	Rubber Tired Loaders	0.41	2.26	3.98	0.13	0.12	0.01	908.34	0.29	0.01	918.15
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
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
1.00			Model Default Tier	Skid Steer Loaders	0.07	1.39	0.86	0.03	0.03	0.00	200.49	0.06	0.00	202.65
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
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			Model Default Tier	Tractors/Loaders/Backhoes	0.11	1.67	1.15	0.06	0.05	0.00	226.18	0.07	0.00	228.62
0.00			Model Default Tier	Trenchers	0.00	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		4.88	44.06	36.00	1.59	1.53	0.10	9,649.52	2.14	0.08	9,727.24
Grubbing/Land Clearing	tons per phase		0.21	1.94	1.58	0.07	0.07	0.00	424.58	0.09	0.00	428.00

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
1.00			Model Default Tier	Aerial Lifts	0.03	0.82	0.40	0.01	0.01	0.00	121.96	0.04	0.00	123.28
1.00			Model Default Tier	Air Compressors	0.12	1.21	0.84	0.04	0.04	0.00	187.63	0.01	0.00	188.33
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
2.00			Model Default Tier	Cement and Mortar Mixers	0.06	0.31	0.37	0.01	0.01	0.00	50.52	0.01	0.00	50.77
1.00			Model Default Tier	Concrete/Industrial Saws	0.16	1.83	1.25	0.06	0.06	0.00	296.33	0.01	0.00	297.36
1.00	1		Model Default Tier	Cranes	0.17	0.90	1.83	0.08	0.07	0.00	279.41	0.09	0.00	282.42
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
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	0.14	2.45	1.11	0.05	0.05	0.00	375.14	0.12	0.00	379.18
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
2.00			Model Default Tier	Generator Sets	0.59	7.33	5.27	0.24	0.24	0.01	1,246.07	0.05	0.01	1,250.18
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
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
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
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
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
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
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
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			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
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
1.00			Model Default Tier	Pumps	0.32	3.72	2.67	0.13	0.13	0.01	623.04	0.03	0.00	625.13
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
1.00			Model Default Tier	Rough Terrain Forklifts	0.05	1.14	0.69	0.02	0.02	0.00	166.89	0.05	0.00	168.68
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
0.00	3		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
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
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	0.22	3.35	2.24	0.11	0.10	0.00	452.50	0.15	0.00	457.37
0.00			Model Default Tier	Trenchers	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	Welders	0.06	0.42	0.35	0.01	0.01	0.00	51.87	0.01	0.00	52.14

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
	Grading/Excavation	pounds per day	2.04	24.08	17.75	0.79	0.77	0.04	3,949.98	0.58	0.03	3,973.96
	Grading/Excavation	tons per phase	0.34	3.97	2.93	0.13	0.13	0.01	651.75	0.10	0.01	655.70

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		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
1.00			Model Default Tier	Aerial Lifts	0.03	0.82	0.39	0.01	0.01	0.00	121.96	0.04	0.00	123.28
1.00	1		Model Default Tier	Air Compressors	0.12	1.21	0.80	0.04	0.04	0.00	187.63	0.01	0.00	188.32
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
2.00			Model Default Tier	Cement and Mortar Mixers	0.06	0.31	0.37	0.01	0.01	0.00	50.52	0.01	0.00	50.77
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	0.16	0.88	1.72	0.07	0.07	0.00	279.41	0.09	0.00	282.42
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
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	0.13	2.45	1.03	0.05	0.05	0.00	375.21	0.12	0.00	379.25
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
1.00	1		Model Default Tier	Generator Sets	0.28	3.66	2.52	0.11	0.11	0.01	623.04	0.02	0.00	625.05
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
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
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
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
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
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
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
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
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
1.00	1		Model Default Tier	Pumps	0.30	3.72	2.55	0.11	0.11	0.01	623.04	0.03	0.00	625.11
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
1.00	1		Model Default Tier	Rough Terrain Forklifts	0.05	1.14	0.67	0.02	0.02	0.00	166.87	0.05	0.00	168.67
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
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	2		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
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
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
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
0.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			Model Default Tier	Trenchers	0.00	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
	Drainage/Utilities/Sub-Grade	pounds per day	1.14	14.19	10.06	0.43	0.41	0.03	2,427.66	0.37	0.02	2,442.87
	Drainage/Utilities/Sub-Grade	tons per phase	0.08	0.94	0.66	0.03	0.03	0.00	160.23	0.02	0.00	161.23

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
0.00			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			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
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
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
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			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			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
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
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
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
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
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
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
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
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
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
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
0.00	1		Model Default Tier	Pavers	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	Paving Equipment	0.00	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
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			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	1		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			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
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
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			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	2		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
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
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
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
0.00	2		Model Default Tier	Tractors/Loaders/Backhoes		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			Model Default Tier	Trenchers		0.00	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		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Paving			tons per phase		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions all Phases (tons per construction period) =>						0.63	6.85	5.18	0.23	0.22	0.01	1,236.55	0.21	0.01	1,244.93

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	6.00	8
Air Compressors		78	4.00	8
Bore/Drill Rigs		221	4.00	8
Cement and Mortar Mixers		9	4.00	8
Concrete/Industrial Saws		81	4.00	8
Cranes		231	4.00	8
Crawler Tractors		212	6.00	8
Crushing/Proc. Equipment		85	8.00	8
Excavators		158	6.00	8
Forklifts		89	8.00	8
Generator Sets		84	8.00	8
Graders		187	6.00	8
Off-Highway Tractors		124	8.00	8
Off-Highway Trucks		402	6.00	8
Other Construction Equipment		172	8.00	8
Other General Industrial Equipment		88	8.00	8
Other Material Handling Equipment		168	8.00	8
Pavers		130	8.00	8
Paving Equipment		132	8.00	8
Plate Compactors		8	6.00	8
Pressure Washers		13	8.00	8
Pumps		84	8.00	8
Rollers		80	6.00	8
Rough Terrain Forklifts		100	4.00	8
Rubber Tired Dozers		247	8.00	8
Rubber Tired Loaders		203	6.00	8
Scrapers		367	6.00	8
Signal Boards		6	8.00	8
Skid Steer Loaders		65	8.00	8
Surfacing Equipment		263	8.00	8
Sweepers/Scrubbers		64	1.00	8
Tractors/Loaders/Backhoes		97	6.00	8
Trenchers		78	8.00	8
Welders		46	2.00	8

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Build Alternative 1 (Additional Construction Phases)				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	5.00	45.66	38.06	51.71	1.71	50.00	11.98	1.58	10.40	0.11	10,949.79	2.15	0.23	11,071.97
Grading/Excavation	2.22	26.83	18.56	50.93	0.93	50.00	11.23	0.83	10.40	0.05	5,050.47	0.60	0.09	5,093.45
Drainage/Utilities/Sub-Grade	1.25	15.94	10.67	100.52	0.52	100.00	21.25	0.45	20.80	0.03	3,195.99	0.38	0.07	3,225.86
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	5.00	45.66	38.06	100.52	1.71	100.00	21.25	1.58	20.80	0.11	10,949.79	2.15	0.23	11,071.97
Total (tons/construction project)	0.67	7.49	5.44	17.31	0.26	17.05	3.78	0.24	3.55	0.02	1,526.05	0.22	0.03	1,540.49

Notes:

Project Start Year ->	2023
Project Length (months) ->	25
Total Project Area (acres) ->	48
Maximum Area Disturbed/Day (acres) ->	5
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	98	0	150	0	600	80
Grading/Excavation	0	12	0	30	1,200	40
Drainage/Utilities/Sub-Grade	0	23	0	60	800	0
Paving	0	0	0	0	0	0

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 -> Build Alternative 1 (Additional Construction Phases)				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	0.22	2.01	1.67	2.28	0.08	2.20	0.53	0.07	0.46	0.00	481.79	0.09	0.01	441.95
Grading/Excavation	0.37	4.43	3.06	8.40	0.15	8.25	1.85	0.14	1.72	0.01	833.33	0.10	0.02	762.42
Drainage/Utilities/Sub-Grade	0.08	1.05	0.70	6.63	0.03	6.60	1.40	0.03	1.37	0.00	210.94	0.03	0.00	193.15
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.37	4.43	3.06	8.40	0.15	8.25	1.85	0.14	1.72	0.01	833.33	0.10	0.02	762.42
Total (tons/construction project)	0.67	7.49	5.44	17.31	0.26	17.05	3.78	0.24	3.55	0.02	1526.05	0.22	0.03	1,397.52

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	Build Alternative 2 (Default Construction Phases)	
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	20.00	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)	1	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	0.80	miles
Total Project Area	48.00	acres
Maximum Area Disturbed/Day	5.00	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	472.00	59.00
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	852.00	
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	368.00	

Mitigation Options

On-road Fleet Emissions Mitigation	No 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	1.00	2.00		1/1/2023
Grading/Excavation	12.00	8.00		2/1/2023
Drainage/Utilities/Sub-Grade	5.00	7.00		2/1/2024
Paving	2.00	3.00		7/3/2024
Totals (Months)		20		

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		27	810.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving		30.00		43	1290.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.53	0.12	0.05	0.02	1,724.76	0.00	0.27	1,805.60
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Paving (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
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	4.44	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	0.08	0.76	6.57	0.21	0.09	0.03	3,079.98	0.00	0.48	3,224.34
Tons per const. Period - Grading/Excavation	0.01	0.10	0.87	0.03	0.01	0.00	406.56	0.00	0.06	425.61
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	0.12	1.21	10.36	0.33	0.15	0.05	4,846.49	0.01	0.76	5,073.64
Tons per const. Period - Paving	0.00	0.03	0.23	0.01	0.00	0.00	106.62	0.00	0.02	111.62
Total tons per construction project	0.01	0.13	1.10	0.03	0.02	0.00	513.18	0.00	0.08	537.23

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		0	0.00
Miles/round trip: Paving		30.00		19	570.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.53	0.12	0.05	0.02	1,724.76	0.00	0.27	1,805.60
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Paving (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
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	4.44	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	0.00	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	0.05	0.54	4.58	0.14	0.07	0.02	2,141.47	0.00	0.34	2,241.84
Tons per const. Period - Paving	0.00	0.01	0.10	0.00	0.00	0.00	47.11	0.00	0.01	49.32
Total tons per construction project	0.00	0.01	0.10	0.00	0.00	0.00	47.11	0.00	0.01	49.32

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		7	14	280.00
No. of employees: Grading/Excavation		29	58	1,160.00
No. of employees: Drainage/Utilities/Sub-Grade		19	38	760.00
No. of employees: Paving	18	9	36	720.00

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	316.70	0.00	0.01	318.71
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.84	0.06	0.05	0.02	0.00	306.70	0.00	0.01	308.54
Paving (grams/mile)	0.01	0.84	0.06	0.05	0.02	0.00	306.70	0.00	0.01	308.54
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	2.74	0.29	0.00	0.00	0.00	68.06	0.07	0.03	79.25
Draining/Utilities/Sub-Grade (grams/trip)	0.98	2.66	0.27	0.00	0.00	0.00	65.99	0.07	0.03	76.61
Paving (grams/trip)	0.98	2.66	0.27	0.00	0.00	0.00	65.99	0.07	0.03	76.61

Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.04	0.65	0.05	0.03	0.01	0.00	198.20	0.00	0.00	199.79
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	2.18	0.00	0.00	2.20
Pounds per day - Grading/Excavation	0.17	2.67	0.22	0.12	0.05	0.01	818.62	0.02	0.02	825.18
Tons per const. Period - Grading/Excavation	0.02	0.35	0.03	0.02	0.01	0.00	108.06	0.00	0.00	108.92
Pounds per day - Drainage/Utilities/Sub-Grade	0.10	1.63	0.13	0.08	0.03	0.01	519.41	0.01	0.01	523.38
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.09	0.01	0.00	0.00	0.00	28.57	0.00	0.00	28.79
Pounds per day - Paving	0.10	1.54	0.12	0.07	0.03	0.00	492.07	0.01	0.01	495.84
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	10.83	0.00	0.00	10.91
Total tons per construction project	0.03	0.48	0.04	0.02	0.01	0.00	149.63	0.00	0.00	150.82

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

Water Truck Emissions User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated 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)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.53	0.12	0.05	0.02	1,724.76	0.00	0.27	1,805.60
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Paving (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
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	4.44	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	0.36	0.01	0.00	0.00	152.27	0.00	0.02	159.41
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.67	0.00	0.00	1.75
Pounds per day - Grading/Excavation	0.00	0.04	0.36	0.01	0.00	0.00	152.10	0.00	0.02	159.23
Tons per const. Period - Grading/Excavation	0.00	0.00	0.05	0.00	0.00	0.00	20.08	0.00	0.00	21.02
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.36	0.01	0.00	0.00	150.28	0.00	0.02	157.32
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.02	0.00	0.00	0.00	8.27	0.00	0.00	8.65
Pounds per day - Paving	0.00	0.04	0.36	0.01	0.00	0.00	150.28	0.00	0.02	157.32
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	3.31	0.00	0.00	3.46
Total tons per construction project	0.00	0.01	0.08	0.00	0.00	0.00	33.32	0.00	0.01	34.89

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		5.00	50.00	0.55	10.40	0.11
Fugitive Dust - Grading/Excavation		5.00	50.00	6.60	10.40	1.37
Fugitive Dust - Drainage/Utilities/Subgrade		5.00	50.00	2.75	10.40	0.57

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
0.00			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			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
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
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
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			Model Default Tier	Cranes	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	Crawler Tractors	0.33	1.68	3.84	0.15	0.14	0.01	568.70	0.18	0.01	574.84
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
2.00	2		Model Default Tier	Excavators	0.28	4.89	2.32	0.11	0.10	0.01	750.16	0.24	0.01	758.25
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
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
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
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
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
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
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
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
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
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			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
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			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			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			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
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
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			Model Default Tier	Scrapers	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	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
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
0.00			Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			Model Default Tier	Trenchers	0.00	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	0.73	7.17	6.89	0.29	0.27	0.02	1,417.49	0.44	0.01	1,432.21
Grubbing/Land Clearing	tons per phase	0.01	0.08	0.08	0.00	0.00	0.00	15.59	0.00	0.00	15.75

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
0.00			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			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
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
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
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	1		Model Default Tier	Cranes	0.17	0.91	1.89	0.08	0.07	0.00	279.41	0.09	0.00	282.42
2.00	2		Model Default Tier	Crawler Tractors	0.66	3.36	7.64	0.30	0.27	0.01	1,137.46	0.37	0.01	1,149.72
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
4.00	4		Model Default Tier	Excavators	0.56	9.78	4.61	0.23	0.21	0.02	1,500.36	0.49	0.01	1,516.53
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
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
2.00	2		Model Default Tier	Graders	0.57	2.53	6.91	0.22	0.21	0.01	961.24	0.31	0.01	971.59
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
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
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
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
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
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
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			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
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			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.00	3		Model Default Tier	Rollers	0.34	4.17	3.61	0.20	0.18	0.01	571.75	0.18	0.01	577.91
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
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
3.00	3		Model Default Tier	Rubber Tired Loaders	0.61	3.39	5.91	0.20	0.18	0.01	1,362.50	0.44	0.01	1,377.22
4.00	4		Model Default Tier	Scrapers	2.35	18.37	24.70	0.97	0.89	0.05	4,410.12	1.43	0.04	4,457.64
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
1.00			Model Default Tier	Sweepers/Scrubbers	0.02	0.24	0.21	0.01	0.01	0.00	30.77	0.01	0.00	31.10
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.23	3.35	2.29	0.11	0.10	0.00	452.39	0.15	0.00	457.26
0.00			Model Default Tier	Trenchers	0.00	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		5.64	46.70	58.49	2.34	2.16	0.11	10,804.63	3.47	0.10	10,920.53
Grading/Excavation		tons per phase		0.74	6.16	7.72	0.31	0.28	0.01	1,426.21	0.46	0.01	1,441.51

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		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			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
1.00	1		Model Default Tier	Air Compressors	0.12	1.21	0.81	0.04	0.04	0.00	187.63	0.01	0.00	188.32
1.00			Model Default Tier	Bore/Drill Rigs	0.11	1.02	0.95	0.03	0.03	0.00	458.68	0.15	0.00	463.63
1.00			Model Default Tier	Cement and Mortar Mixers	0.03	0.15	0.18	0.01	0.01	0.00	25.26	0.00	0.00	25.39
1.00			Model Default Tier	Concrete/Industrial Saws	0.16	1.83	1.21	0.06	0.06	0.00	296.33	0.01	0.00	297.35
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
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
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
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
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
1.00	1		Model Default Tier	Generator Sets	0.29	3.66	2.54	0.11	0.11	0.01	623.04	0.03	0.00	625.06
2.00	2		Model Default Tier	Graders	0.53	2.48	6.23	0.20	0.19	0.01	960.76	0.31	0.01	971.11
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
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
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
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
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
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
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
1.00	1		Model Default Tier	Plate Compactors	0.03	0.16	0.19	0.01	0.01	0.00	25.86	0.00	0.00	25.99
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
1.00	1		Model Default Tier	Pumps	0.31	3.72	2.58	0.12	0.12	0.01	623.04	0.03	0.00	625.12
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
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
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
4.00	4		Model Default Tier	Scrapers	2.28	17.90	23.09	0.91	0.84	0.05	4,407.30	1.43	0.04	4,454.80
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
1.00			Model Default Tier	Sweepers/Scrubbers	0.02	0.24	0.20	0.01	0.01	0.00	30.77	0.01	0.00	31.10
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.22	3.35	2.17	0.10	0.09	0.00	452.65	0.15	0.00	457.52
0.00			Model Default Tier	Trenchers	0.00	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
Drainage/Utilities/Sub-Grade		pounds per day		4.20	36.33	40.88	1.62	1.52	0.09	8,189.94	2.13	0.07	8,264.52
Drainage/Utilities/Sub-Grade		tons per phase		0.23	2.00	2.25	0.09	0.08	0.00	450.45	0.12	0.00	454.55

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
0.00			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			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
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
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	0.16	1.83	1.21	0.06	0.06	0.00	296.33	0.01	0.00	297.35
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
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
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
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
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
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
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
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
5.00			Model Default Tier	Off-Highway Trucks	1.86	12.19	12.48	0.45	0.41	0.05	4,801.32	1.55	0.04	4,853.01
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
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
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
1.00	1		Model Default Tier	Pavers	0.18	2.89	1.74	0.08	0.07	0.00	455.16	0.15	0.00	460.07
1.00	1		Model Default Tier	Paving Equipment	0.16	2.57	1.50	0.07	0.07	0.00	394.47	0.13	0.00	398.72
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
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			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	0.11	1.39	1.14	0.06	0.06	0.00	190.61	0.06	0.00	192.66
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
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
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			Model Default Tier	Scrapers		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	Signal Boards		0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
1.00			Model Default Tier	Skid Steer Loaders		0.06	1.38	0.83	0.03	0.02	0.00	200.57	0.06	0.00	202.73
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
1.00			Model Default Tier	Sweepers/Scrubbers		0.02	0.24	0.20	0.01	0.01	0.00	30.77	0.01	0.00	31.10
2.00	2		Model Default Tier	Tractors/Loaders/Backhoes		0.22	3.35	2.17	0.10	0.09	0.00	452.65	0.15	0.00	457.52
0.00			Model Default Tier	Trenchers		0.00	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		2.89	26.44	21.99	0.89	0.82	0.07	6,920.51	2.13	0.06	6,992.29
	Paving			tons per phase		0.06	0.58	0.48	0.02	0.02	0.00	152.25	0.05	0.00	153.83
Total Emissions all Phases (tons per construction period) =>						1.05	8.82	10.53	0.42	0.39	0.02	2,044.50	0.63	0.02	2,065.64

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	6.00	8
Air Compressors		78	4.00	8
Bore/Drill Rigs		221	4.00	8
Cement and Mortar Mixers		9	4.00	8
Concrete/Industrial Saws		81	4.00	8
Cranes		231	4.00	8
Crawler Tractors		212	6.00	8
Crushing/Proc. Equipment		85	8.00	8
Excavators		158	6.00	8
Forklifts		89	8.00	8
Generator Sets		84	8.00	8
Graders		187	6.00	8
Off-Highway Tractors		124	8.00	8
Off-Highway Trucks		402	6.00	8
Other Construction Equipment		172	8.00	8
Other General Industrial Equipment		88	8.00	8
Other Material Handling Equipment		168	8.00	8
Pavers		130	8.00	8
Paving Equipment		132	8.00	8
Plate Compactors		8	6.00	8
Pressure Washers		13	8.00	8
Pumps		84	8.00	8
Rollers		80	6.00	8
Rough Terrain Forklifts		100	4.00	8
Rubber Tired Dozers		247	8.00	8
Rubber Tired Loaders		203	6.00	8
Scrapers		367	6.00	8
Signal Boards		6	8.00	8
Skid Steer Loaders		65	8.00	8
Surfacing Equipment		263	8.00	8
Sweepers/Scrubbers		64	1.00	8
Tractors/Loaders/Backhoes		97	6.00	8
Trenchers		78	8.00	8
Welders		46	2.00	8

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Build Alternative 2 (Default Construction Phases)

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	0.78	7.86	7.30	50.33	0.33	50.00	10.69	0.29	10.40	0.02	1,767.96	0.44	0.04	1,791.41
Grading/Excavation	5.89	50.17	65.64	52.68	2.68	50.00	12.71	2.31	10.40	0.15	14,855.32	3.49	0.63	15,129.28
Drainage/Utilities/Sub-Grade	4.30	37.99	41.36	51.71	1.71	50.00	11.96	1.56	10.40	0.09	8,859.63	2.14	0.11	8,945.22
Paving	3.17	29.77	37.40	1.44	1.44	0.00	1.07	1.07	0.00	0.14	14,550.81	2.15	1.20	14,960.94
Maximum (pounds/day)	5.89	50.17	65.64	52.68	2.68	50.00	12.71	2.31	10.40	0.15	14,855.32	3.49	1.20	15,129.28
Total (tons/construction project)	1.09	9.45	11.84	10.38	0.48	9.90	2.48	0.42	2.06	0.03	2,787.75	0.63	0.12	2,837.90

Notes:

Project Start Year ->	2023
Project Length (months) ->	20
Total Project Area (acres) ->	48
Maximum Area Disturbed/Day (acres) ->	5
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	280	40
Grading/Excavation	531	0	810	0	1,160	40
Drainage/Utilities/Sub-Grade	0	0	0	0	760	40
Paving	852	368	1,290	570	720	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 -> Build Alternative 2 (Default Construction Phases)

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	0.01	0.09	0.08	0.55	0.00	0.55	0.12	0.00	0.11	0.00	19.45	0.00	0.00	17.88
Grading/Excavation	0.78	6.62	8.66	6.95	0.35	6.60	1.68	0.30	1.37	0.02	1,960.90	0.46	0.08	1,811.72
Drainage/Utilities/Sub-Grade	0.24	2.09	2.28	2.84	0.09	2.75	0.66	0.09	0.57	0.01	487.28	0.12	0.01	446.33
Paving	0.07	0.65	0.82	0.03	0.03	0.00	0.02	0.02	0.00	0.00	320.12	0.05	0.03	298.59
Maximum (tons/phase)	0.78	6.62	8.66	6.95	0.35	6.60	1.68	0.30	1.37	0.02	1960.90	0.46	0.08	1,811.72
Total (tons/construction project)	1.09	9.45	11.84	10.38	0.48	9.90	2.48	0.42	2.06	0.03	2787.75	0.63	0.12	2,574.52

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	Build Alternative 2 (Additional Construction Phases)	
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	26.00	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)	1	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	0.80	miles
Total Project Area	48.00	acres
Maximum Area Disturbed/Day	5.00	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		98.00
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00	16.00	
	Drainage/Utilities/Sub-Grade	20.00	27.00	
	Paving	20.00		

Mitigation Options

On-road Fleet Emissions Mitigation	No 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	4.00	2.60		1/1/2023
Grading/Excavation	16.00	10.40		5/3/2023
Drainage/Utilities/Sub-Grade	6.00	9.10		9/1/2024
Paving	0.00	3.90		3/3/2025
Totals (Months)	26			

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		5	150.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
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)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.52	0.12	0.05	0.02	1,715.37	0.00	0.27	1,795.77
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.48	0.12	0.05	0.02	1,696.76	0.00	0.27	1,776.29
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	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	0.01	0.14	1.22	0.04	0.02	0.01	571.02	0.00	0.09	597.79
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.05	0.00	0.00	0.00	25.12	0.00	0.00	26.30
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	0.00	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	0.01	0.05	0.00	0.00	0.00	25.12	0.00	0.00	26.30

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		1	30.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		2	60.00
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)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.52	0.12	0.05	0.02	1,715.37	0.00	0.27	1,795.77
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.48	0.12	0.05	0.02	1,696.76	0.00	0.27	1,776.29
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	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	0.03	0.24	0.01	0.00	0.00	113.45	0.00	0.02	118.77
Tons per const. Period - Grading/Excavation	0.00	0.00	0.04	0.00	0.00	0.00	19.97	0.00	0.00	20.90
Pounds per day - Drainage/Utilities/Sub-Grade	0.01	0.06	0.48	0.02	0.01	0.00	224.44	0.00	0.04	234.96
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.03	0.00	0.00	0.00	14.81	0.00	0.00	15.51
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	0.01	0.07	0.00	0.00	0.00	34.78	0.00	0.01	36.41

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	15	7	30	600.00
No. of employees: Grading/Excavation	30	29	60	1,200.00
No. of employees: Drainage/Utilities/Sub-Grade	20	19	40	800.00
No. of employees: Paving	0	9	0	0.00

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)	0.01	0.88	0.07	0.05	0.02	0.00	312.15	0.00	0.01	314.08
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.82	0.06	0.05	0.02	0.00	303.04	0.00	0.01	304.83
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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)	1.01	2.71	0.28	0.00	0.00	0.00	67.12	0.07	0.03	78.05
Draining/Utilities/Sub-Grade (grams/trip)	0.96	2.63	0.26	0.00	0.00	0.00	65.23	0.06	0.03	75.65
Paving (grams/trip)	0.00	0.00	0.00	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	0.09	1.39	0.12	0.06	0.03	0.00	424.71	0.01	0.01	428.13
Tons per const. Period - Grubbing/Land Clearing	0.00	0.06	0.01	0.00	0.00	0.00	18.69	0.00	0.00	18.84
Pounds per day - Grading/Excavation	0.17	2.67	0.22	0.12	0.05	0.01	834.69	0.02	0.02	841.24
Tons per const. Period - Grading/Excavation	0.03	0.47	0.04	0.02	0.01	0.00	146.90	0.00	0.00	148.06
Pounds per day - Drainage/Utilities/Sub-Grade	0.11	1.67	0.13	0.08	0.03	0.01	540.22	0.01	0.01	544.29
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.11	0.01	0.01	0.00	0.00	35.65	0.00	0.00	35.92
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	0.04	0.64	0.05	0.03	0.01	0.00	201.25	0.00	0.00	202.82

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

Water Truck Emissions User Input	User Override of Default # Water Trucks	Program Estimate of Number of Water Trucks	User Override of Truck Round Trips/Vehicle/Day	Default Values Round Trips/Vehicle/Day	Calculated Trips/day	User Override of Miles/Round Trip	Default Values Miles/Round Trip	Calculated Daily VMT
Grubbing/Land Clearing - Exhaust	2	1		5	10		8.00	80.00
Grading/Excavation - Exhaust	1	1		5	5		8.00	40.00
Drainage/Utilities/Subgrade	0	1		5	0		8.00	0.00
Paving	0	1		5	0		8.00	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.54	0.12	0.05	0.02	1,726.74	0.00	0.27	1,807.67
Grading/Excavation (grams/mile)	0.04	0.43	3.52	0.12	0.05	0.02	1,715.37	0.00	0.27	1,795.77
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.48	0.12	0.05	0.02	1,696.76	0.00	0.27	1,776.29
Paving (grams/mile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	0.00	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	0.01	0.08	0.72	0.02	0.01	0.00	304.54	0.00	0.05	318.82
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.03	0.00	0.00	0.00	13.40	0.00	0.00	14.03
Pounds per day - Grading/Excavation	0.00	0.04	0.36	0.01	0.00	0.00	151.27	0.00	0.02	158.36
Tons per const. Period - Grading/Excavation	0.00	0.01	0.06	0.00	0.00	0.00	26.62	0.00	0.00	27.87
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	0.01	0.09	0.00	0.00	0.00	40.02	0.00	0.01	41.90

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		5.00	50.00	2.20	10.40	0.46
Fugitive Dust - Grading/Excavation		5.00	50.00	8.80	10.40	1.83
Fugitive Dust - Drainage/Utilities/Subgrade		5.00	100.00	6.60	20.80	1.37

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
0.00			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
2.00			Model Default Tier	Air Compressors	0.26	2.41	1.74	0.09	0.09	0.00	375.26	0.02	0.00	376.67
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
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
2.00			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
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
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
4.00			Model Default Tier	Crushing/Proc. Equipment	1.80	17.31	11.94	0.62	0.62	0.03	2,658.12	0.16	0.02	2,668.06
2.00	2		Model Default Tier	Excavators	0.28	4.89	2.32	0.11	0.10	0.01	750.16	0.24	0.01	758.25
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
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
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
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
4.00			Model Default Tier	Off-Highway Trucks	1.51	9.87	10.70	0.39	0.36	0.04	3,839.67	1.24	0.03	3,881.00
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
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
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
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
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			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
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			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			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			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
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			Model Default Tier	Rubber Tired Loaders	0.41	2.26	3.98	0.13	0.12	0.01	908.34	0.29	0.01	918.15
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
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
1.00			Model Default Tier	Skid Steer Loaders	0.07	1.39	0.86	0.03	0.03	0.00	200.49	0.06	0.00	202.65
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
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			Model Default Tier	Tractors/Loaders/Backhoes	0.11	1.67	1.15	0.06	0.05	0.00	226.18	0.07	0.00	228.62
0.00			Model Default Tier	Trenchers	0.00	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	4.88	44.06	36.00	1.59	1.53	0.10	9,649.52	2.14	0.08	9,727.24
Grubbing/Land Clearing	tons per phase	0.21	1.94	1.58	0.07	0.07	0.00	424.58	0.09	0.00	428.00

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
1.00			Model Default Tier	Aerial Lifts	0.03	0.82	0.40	0.01	0.01	0.00	121.96	0.04	0.00	123.28
1.00			Model Default Tier	Air Compressors	0.12	1.21	0.84	0.04	0.04	0.00	187.63	0.01	0.00	188.33
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
2.00			Model Default Tier	Cement and Mortar Mixers	0.06	0.31	0.37	0.01	0.01	0.00	50.52	0.01	0.00	50.77
1.00			Model Default Tier	Concrete/Industrial Saws	0.16	1.83	1.25	0.06	0.06	0.00	296.33	0.01	0.00	297.36
1.00	1		Model Default Tier	Cranes	0.17	0.90	1.83	0.08	0.07	0.00	279.41	0.09	0.00	282.42
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
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	0.14	2.45	1.11	0.05	0.05	0.00	375.14	0.12	0.00	379.18
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
2.00			Model Default Tier	Generator Sets	0.59	7.33	5.26	0.24	0.24	0.01	1,246.07	0.05	0.01	1,250.18
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
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
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
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
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
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
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
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			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
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
1.00			Model Default Tier	Pumps	0.32	3.72	2.67	0.13	0.13	0.01	623.04	0.03	0.00	625.13
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
1.00			Model Default Tier	Rough Terrain Forklifts	0.05	1.14	0.69	0.02	0.02	0.00	166.88	0.05	0.00	168.68
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
0.00	3		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
2.00	2		Model Default Tier	Signal Boards	0.11	0.60	0.72	0.03	0.03	0.00	98.63	0.01	0.00	99.13
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
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
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	0.22	3.35	2.24	0.11	0.10	0.00	452.51	0.15	0.00	457.38
0.00			Model Default Tier	Trenchers	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	Welders	0.06	0.42	0.35	0.01	0.01	0.00	51.87	0.01	0.00	52.14

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		2.04	24.08	17.71	0.79	0.77	0.04	3,949.99	0.58	0.03	3,973.97
	Grading/Excavation	tons per phase		0.36	4.24	3.12	0.14	0.14	0.01	695.20	0.10	0.01	699.42

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
1.00			Model Default Tier	Aerial Lifts	0.03	0.82	0.39	0.01	0.01	0.00	121.96	0.04	0.00	123.28
1.00	1		Model Default Tier	Air Compressors	0.12	1.21	0.80	0.04	0.04	0.00	187.63	0.01	0.00	188.31
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
2.00			Model Default Tier	Cement and Mortar Mixers	0.06	0.31	0.37	0.01	0.01	0.00	50.52	0.01	0.00	50.77
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	0.16	0.88	1.70	0.07	0.07	0.00	279.41	0.09	0.00	282.42
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
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	0.13	2.45	1.01	0.05	0.05	0.00	375.22	0.12	0.00	379.26
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
1.00	1		Model Default Tier	Generator Sets	0.28	3.66	2.49	0.11	0.11	0.01	623.04	0.02	0.00	625.04
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
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
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
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
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
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
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
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
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
1.00	1		Model Default Tier	Pumps	0.30	3.72	2.53	0.11	0.11	0.01	623.04	0.03	0.00	625.10
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
1.00	1		Model Default Tier	Rough Terrain Forklifts	0.05	1.14	0.66	0.02	0.02	0.00	166.87	0.05	0.00	168.66
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
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	2		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
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
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
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
0.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			Model Default Tier	Trenchers	0.00	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
	Drainage/Utilities/Sub-Grade	pounds per day		1.13	14.19	9.94	0.42	0.41	0.03	2,427.67	0.37	0.02	2,442.85
	Drainage/Utilities/Sub-Grade	tons per phase		0.07	0.94	0.66	0.03	0.03	0.00	160.23	0.02	0.00	161.23

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
0.00			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			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
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
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
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			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			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
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
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
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
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
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
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
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
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
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
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
0.00	1		Model Default Tier	Pavers	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	Paving Equipment	0.00	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
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			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	1		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			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
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
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			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	2		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
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
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
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
0.00	2		Model Default Tier	Tractors/Loaders/Backhoes		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00			Model Default Tier	Trenchers		0.00	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		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Paving			tons per phase		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emissions all Phases (tons per construction period) =>						0.65	7.11	5.36	0.24	0.23	0.01	1,280.00	0.22	0.01	1,288.65

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	6.00	8
Air Compressors		78	4.00	8
Bore/Drill Rigs		221	4.00	8
Cement and Mortar Mixers		9	4.00	8
Concrete/Industrial Saws		81	4.00	8
Cranes		231	4.00	8
Crawler Tractors		212	6.00	8
Crushing/Proc. Equipment		85	8.00	8
Excavators		158	6.00	8
Forklifts		89	8.00	8
Generator Sets		84	8.00	8
Graders		187	6.00	8
Off-Highway Tractors		124	8.00	8
Off-Highway Trucks		402	6.00	8
Other Construction Equipment		172	8.00	8
Other General Industrial Equipment		88	8.00	8
Other Material Handling Equipment		168	8.00	8
Pavers		130	8.00	8
Paving Equipment		132	8.00	8
Plate Compactors		8	6.00	8
Pressure Washers		13	8.00	8
Pumps		84	8.00	8
Rollers		80	6.00	8
Rough Terrain Forklifts		100	4.00	8
Rubber Tired Dozers		247	8.00	8
Rubber Tired Loaders		203	6.00	8
Scrapers		367	6.00	8
Signal Boards		6	8.00	8
Skid Steer Loaders		65	8.00	8
Surfacing Equipment		263	8.00	8
Sweepers/Scrubbers		64	1.00	8
Tractors/Loaders/Backhoes		97	6.00	8
Trenchers		78	8.00	8
Welders		46	2.00	8

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Build Alternative 2 (Additional Construction Phases)				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	5.00	45.66	38.06	51.71	1.71	50.00	11.98	1.58	10.40	0.11	10,949.79	2.15	0.23	11,071.97
Grading/Excavation	2.22	26.82	18.53	50.93	0.93	50.00	11.23	0.83	10.40	0.05	5,049.40	0.60	0.09	5,092.34
Drainage/Utilities/Sub-Grade	1.24	15.92	10.55	100.51	0.51	100.00	21.25	0.45	20.80	0.03	3,192.34	0.38	0.07	3,222.11
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	5.00	45.66	38.06	100.51	1.71	100.00	21.25	1.58	20.80	0.11	10,949.79	2.15	0.23	11,071.97
Total (tons/construction project)	0.69	7.78	5.63	17.87	0.27	17.60	3.91	0.24	3.66	0.02	1,581.18	0.22	0.03	1,596.08

Notes:

Project Start Year ->	2023
Project Length (months) ->	26
Total Project Area (acres) ->	48
Maximum Area Disturbed/Day (acres) ->	5
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	98	0	150	0	600	80
Grading/Excavation	0	16	0	30	1,200	40
Drainage/Utilities/Sub-Grade	0	27	0	60	800	0
Paving	0	0	0	0	0	0

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 -> Build Alternative 2 (Additional Construction Phases)				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	0.22	2.01	1.67	2.28	0.08	2.20	0.53	0.07	0.46	0.00	481.79	0.09	0.01	441.95
Grading/Excavation	0.39	4.72	3.26	8.96	0.16	8.80	1.98	0.15	1.83	0.01	888.69	0.11	0.02	813.07
Drainage/Utilities/Sub-Grade	0.08	1.05	0.70	6.63	0.03	6.60	1.40	0.03	1.37	0.00	210.69	0.03	0.00	192.92
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.39	4.72	3.26	8.96	0.16	8.80	1.98	0.15	1.83	0.01	888.69	0.11	0.02	813.07
Total (tons/construction project)	0.69	7.78	5.63	17.87	0.27	17.60	3.91	0.24	3.66	0.02	1581.18	0.22	0.03	1,447.95

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.

APPENDIX C

Bay Area Air Quality Conformity Task Force Meeting

From:	Harold Brazil
To:	Fund Management System; vbhat@alamedactc.org
Cc:	Adam Crenshaw; Susan Chang; Andrew Metzger
Subject:	Re: FMS POAQC Project TIP ID ALA170002 (I-80/Ashby Avenue Interchange Improvements Project) update: Project is a not a POAQC
Date:	Thursday, July 30, 2020 2:53:09 PM

**** please note: this is a second email to correct the project name and TIP ID number [ALA170002] for the I-80/Ashby Avenue Interchange Improvements Project**

Dear Project Sponsor

Based on the recent interagency consultation with the Air Quality Conformity Task force, Project TIP ID ALA170002 (FMS ID: 6315.00) 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): https://www.fhwa.dot.gov/environment/air_quality/conformity/policy_and_guidance/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.

Application of Criteria for a Project of Air Quality Concern

Project Title: Interstate 80/Ashby Avenue Interchange Improvement
Project Summary for Air Quality Conformity Task Force Meeting: Thursday, June 25, 2020

Description

- The purpose of this project is to:
  - Improve interchange access and circulation;
  - Provide multimodal connectivity;
  - Provide westbound I-80 connection to Shellmound Street;
  - Provide bicycle and pedestrian connectivity across I-80;
  - Improve circulation at I-80/Powell Street and 7th Street; and
  - Alleviate local surface street congestion.
- The proposed project would reconstruct the Interstate 80 (I-80)/Ashby Avenue interchange to improve accessibility, traffic flow, and bicycle and pedestrian facilities.
- The project will provide safe access for pedestrians and bicyclists to connect across I-80 via at-grade sidewalks and a separated pedestrian overcrossing (POC) structure accessible from 65th Street to the east and West Frontage Road to the west.
- The project proposes the following two build alternatives for the I-80/Ashby Avenue Interchange:
  - Build Alternative 1 - Tight Diamond Interchange Configuration. This build alternative currently has three options regarding the Ashby Avenue connection to West Frontage Road.
    - Option A – T-Intersection connecting Ashby Avenue to a partially-realigned West Frontage Road.
    - Option B – S-Curve Ramp connecting Ashby Avenue to the existing West Frontage Road with no realignment required.
    - Option C – C-Curve Ramp connecting Ashby Avenue to a fully-realigned West Frontage Road that would run adjacent to and parallel with I-80.
  - Build Alternative 2 – Single Point Diamond Interchange Configuration. This build alternative would only connect to West Frontage Road via T-Intersection.

Background

- Technical studies are being prepared to support the CEQA/NEPA environmental document Initial Study/Environmental Assessment (IS/EA).
- A public scoping meeting was held on May 22, 2019.
- Seeking air quality conformity determination by June 25, 2020

Not a Project of Air Quality Concern (40 CFR 93.123(b)(1))

(i) New or expanded highway projects with significant number/increase in diesel vehicles?

- Not a new or expanded highway project
- Interchange replacement—no additional lanes on I-80
- No change in truck percentages on I-80
- The Build Alternatives would reduce $PM_{2.5}$ emissions from diesel vehicles by lowering the vehicle miles travelled in the regional study area compared to the No-Build Alternative.

(ii) Affects intersections at LOS D, E, or F with a significant number of diesel vehicles?

- The percentage of diesel trucks (4.2 to 4.4%) would remain the same in the regional study under the Build and No-Build Alternatives.
- The Build Alternatives would improve or maintain the LOS at the I-80/Ashby Avenue ramp and ramp terminal intersections in the project area.

(iii) New bus and rail terminals and transfer points?

- Not Applicable

(iv) Expanded bus and rail terminals and transfer points?

- Not Applicable

(v) Affects areas identified in PM_{10} or $PM_{2.5}$ implementation plan as site of violation?

- No state implementation plans for PM_{10} or $PM_{2.5}$.

RTP ID# *(required)* 17-01-0037

TIP ID# *(required)* ALA170002

Air Quality Conformity Task Force Consideration Date
Thursday, June 25, 2020

Project Description *(clearly describe project)*
The Alameda County Transportation Commission (Alameda CTC), in cooperation with the California Department of Transportation (Caltrans) and the cities of Berkeley and Emeryville, proposes to reconstruct the Interstate 80 (I-80)/Ashby Avenue interchange to improve accessibility, traffic flow, and bicycle and pedestrian facilities. These improvements are intended to provide traffic congestion relief and enhanced mobility at this critical access point and important intersection of regional transportation routes. The project will also provide multimodal transportation options, while improving community connectedness, including connectivity to the existing San Francisco Bay Trail. The location of the project is depicted in **Figure 1**.

The project proposes two build alternatives for the I-80/Ashby Avenue Interchange. The alternatives are "Build Alternative 1" and "Build Alternative 2". The main differences between Build Alternatives 1 and 2 are related to the proposed connector ramp configurations at the I-80/Ashby Avenue interchange. **Figure 2** illustrates the general configurations of the proposed interchange improvements.

Build Alternative 1 would reconfigure the I-80/Ashby Avenue connector ramps to a tight diamond configuration. In addition, Build Alternative 1 would include one of the following three options for the Ashby Avenue connection to West Frontage Road:

- Option A (T-Intersection): Ashby Avenue would connect to the realigned West Frontage Road using a simple T-Intersection. Partial realignment of West Frontage Road to the east would be required to meet geometric and safety specifications for the three-way intersection.
- Option B (S-Curve Ramp): This option would connect Ashby Avenue to the existing West Frontage Road via an S-Curve Ramp. No realignment of West Frontage Road would be required for this option. The intersection operations at West Frontage Road are the same as the T-Intersection option.
- Option C (C-Curve Ramp with Full Frontage Road Realignment): This option would realign West Frontage Road adjacent to and parallel with I-80. Ashby Avenue would connect with the realigned West Frontage Road via a C-Curve ramp structure.

From a traffic operations perspective, the T-intersection (Option A) and S-Curve (Option B) options are identical analysis scenarios, and different from the C-Curve Ramp (Option C).

Build Alternative 2 would reconfigure the I-80/Ashby Avenue connector ramps to Single Point Diamond configuration. Ashby Avenue would connect to the realigned West Frontage Road using a simple T-Intersection.

Type of Project:
Interchange improvements

County	*Narrative Location/Route & Postmiles*
Alameda	As depicted in **Figure 1**, the proposed project is located within Alameda County. The portion of the project area to the north of Ashby Avenue is within the City of Berkeley and the portion to the south is within the City of Emeryville. The approximately 85-acre project area extends from I-80 PM 4.58 to PM 13.90 from north to south. The San Francisco Bay borders the project area to the west. The project area is generally bordered by Shellmound Street and the Union Pacific Railroad (UPRR) tracks to the east. ***Caltrans District 04-ALA-80/13-PM 4.58/13.90*** ***EA# 04-256200*** ***Project ID 0418000225***

Lead Agency: Alameda County Transportation Commission

Contact Person	*Phone#*	*Fax#*	*Email*
Susan Chang	510.208.7491		schang@alamedactc.org

Federal Action for which Project-Level PM Conformity is Needed *(check appropriate box)*				
Categorical Exclusion (NEPA)	X **EA or Draft EIS**	**FONSI or Final EIS**	**PS&E or Construction**	*Other*

Scheduled Date of Federal Action: 2021

NEPA Delegation – Project Type *(check appropriate box)*		
X **Not an exempt project**	**Section 326 – Categorical Exclusion**	X **Section 327 – Non-Categorical Exclusion**

Current Programming Dates *(as appropriate)*

	PE/Environmental	**ENG**	**ROW**	**CON**
Start	2017	2020	2020	2022
End	2021	2022	2022	2025

Project Purpose and Need (Summary): *(please be brief)*

Project Purpose:
The purpose of the project is to:

- Improve interchange access and circulation;
- Provide multimodal connectivity;
- Provide westbound I-80 connection to Shellmound Street;
- Provide safe bicycle and pedestrian connectivity across I-80;
- Improve circulation at I-80/Powell Street and 7th Street; and
- Alleviate local surface street congestion.

Project Need:
The interchange, constructed in the 1950's, does not provide access to or from westbound I-80 or Shellmound Street in the City of Emeryville. Additionally, the area including the interchange lacks connectivity for different modes of transportation (i.e., vehicular, bicycle and pedestrian users). For these reasons, the interchange suffers from the following key operational issues:

- The existing interchange provides no access to Shellmound Street to/from westbound I 80 and no access from Shellmound Street to Frontage Road;
- Access from westbound traffic to Emeryville is forced to use the Powell Street interchange; and
- There is no direct pedestrian and bicyclist access to the San Francisco Bay Trail from 65th Street/Shellmound Street area.

Surrounding Land Use/Traffic Generators *(especially effect on diesel traffic)*

Land uses within the project area are generally transportation uses associated with the existing interchange or associated landscaping. No housing is located within the project area. However, the project area does contain portions of several distinguishing features and landmarks as described below.

- Point Emery: A small park with a surface parking lot featuring unobstructed views of the San Francisco Bay.
- San Francisco Bay Trail: The project area contains a small portion of this 500-mile trail that connects 47 cities across 9 counties all along the San Francisco Bay shoreline.
- Berkeley Aquatic Park: The southern edge of this park—which features a wide range of recreational opportunities including bird-watching, boating, and hiking—falls within the project area.
- KRE Radio Station: A historic radio station building located in the northeastern quadrant of the project area.

The area surrounding the project area to the north is mostly occupied by the Berkeley Aquatic Park. Areas to the south primarily comprise industrial and commercial businesses intermixed with residential neighborhoods including some high-density residential buildings, though the land is generally zoned as Mixed-Use with Residential and Industrial. East of the project area in Berkeley, nearby lands are zoned as Mixed Use-Light Industrial and Mixed-Use Residential. Other nearby land uses include a private college, storage facilities, commercial centers, and residential homes. Within 1.5 miles of the proposed project area, land use designations east of I-80 range from low to medium density residential, parks and recreation uses, retail spaces and commercial offices.

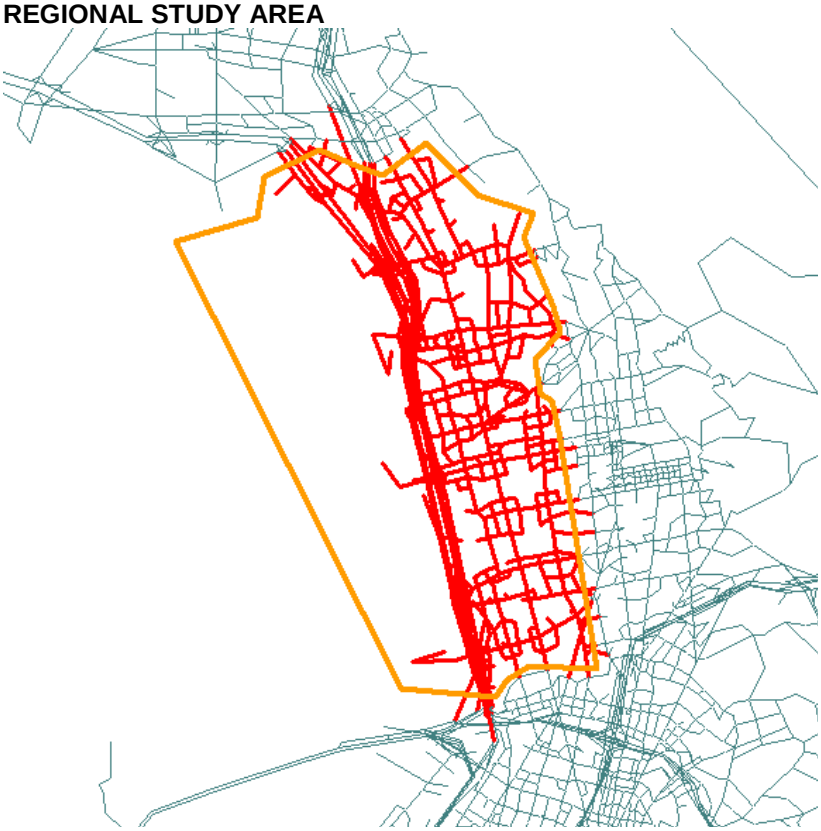
The project is not a new or expanded highway project and it will not add additional lanes on I-80 nor change the percentages of trucks in the regional study area. The project will alleviate local traffic congestion at the I-80/Ashby Avenue interchange, which will result in less truck traffic diverting onto the surrounding local street network to avoid congestion.

Brief summary of assumptions and methodology used for conducting analysis

Kittelson and Associates, Inc. (Kittelson) evaluated traffic operations primarily using continuously collected detector data for freeway operations, and analysis procedures from the Transportation Research Board's Highway Capacity Manual 6th Edition (HCM 6) for intersection operations. Kittelson conducted travel forecasting using the May 2018 version of the Alameda Countywide Travel Demand Model maintained by Alameda CTC. The model assumptions include land uses from Plan Bay Area 2040 as adopted in 2017 and network assumptions from the Countywide Transportation Plan and MTC Regional Transportation Plan (RTP), consistent with Plan Bay Area 2040. Kittelson evaluated traffic operations and developed traffic forecast for the existing year (2018), opening year (2025), horizon year (2040), and a design year (2045).

The regional study area considered in this analysis extended beyond the project limits to capture the effects of the proposed project on the surrounding transportation system as well as the effects of traffic in the surrounding area on the proposed project. As shown in the illustration below, the regional study area included the I-80 interchange at Ashby Avenue in the City of Emeryville and the following I-80 mainline segments: I-80 between Powell Street and Ashby Avenue, and I-80 between Ashby Avenue and University Avenue.

REGIONAL STUDY AREA



Source:
Kittelson & Associates, Inc. (April 28, 2020). *Draft Traffic Operation Analysis Report – Interstate 80/Ashby Avenue Interchange Improvements.*

Opening Year: If facility is a highway or street, Build and No Build LOS, AADT, % and # trucks, truck AADT of proposed facility

Table 1. Opening Year (2025) Peak Hour I-80 Freeway Operations

Location	Direction	Lanes	Peak Period	2025 No-Build Alternative			2025 Build Alternatives[3]		
				Volume[1]	Density[2]	LOS	Volume	Density	LOS
I-80 North of Ashby Avenue	EB	5	AM	7,134	22.5	C	7,150	22.5	C
			PM	11,872	119.3	F	11,798	118.6	F
	WB	5	AM	12,971	118.3	F	13,022	118.7	F
			PM	7,466	29.6	D	7,492	29.7	D
I-80 South of Ashby Avenue	EB	6	AM	7,740	21.2	C	7,749	21.2	C
			PM	11,311	167.8	F	11,575	171.7	F
	WB	6	AM	13,205	90.2	F	13,371	91.3	F
			PM	7,644	39.5	E	7,727	39.9	E

Source: Kittelson & Associates, Inc., 2020.
Notes: LOS = level of service; EB = eastbound; WB = westbound
[1] Volumes reported are passenger car equivalent per hour.
[2] Densities reported are passenger vehicles per mile per lane.
[3] Freeway mainline operations are the same for Build Alternatives 1 and 2.

Table 2. Opening Year (2025) AADT and VMT

Study Area	Measure	% Trucks	2025 No-Build Alternative		2025 Build Alternatives		% Change
			Total	Trucks	Total	Trucks	
I-80 North of Ashby	AADT	4.8	280,803	13,479	282,729	13,571	0.7%
I-80 South of Ashby	AADT	4.8	291,591	13,996	291,755	14,004	0.1%
Regional Study Area	AADT	4.2	10,810,956	454,060	10,809,302	453,991	0.0%
	VMT	4.2	2,239,684	94,067	2,235,317	93,883	-0.2%

Source: Kittelson & Associates, Inc., 2020.
Notes: AADT = Annual average daily traffic; VMT = vehicle miles traveled.

RTP Horizon Year / Design Year: If facility is a highway or street, Build and No Build LOS, AADT, % and # trucks, truck AADT of proposed facility

Table 3. Horizon Year (2040) AADT and VMT

Study Area	Measure	% Trucks	2040 No-Build Alternative		2040 Build Alternatives		% Change
			Total	Trucks	Total	Trucks	
Regional Study Area	AADT	4.4	12,458,867	548,190	12,470,910	548,720	0.1%
	VMT	4.4	2,499,264	109,968	2,494,434	109,755	-0.2%

Source: Kittelson & Associates, Inc., 2020.
Notes: AADT = Annual average daily traffic; VMT = vehicle miles traveled.

Table 4. Design Year (2045) Peak Hour I-80 Freeway Operations

Location	Direction	Lanes	Peak Period	2025 No-Build Alternative			2025 Build Alternatives[3]		
				Volume[1]	Density[2]	LOS	Volume	Density	LOS
I-80 North of Ashby Avenue	EB	5	AM	8,044	25.4	C	8,210	25.9	C
			PM	13,681	137.5	F	14,051	141.2	F
	WB	5	AM	14,728	134.3	F	15,077	137.5	F
			PM	9,254	36.7	E	9,679	38.4	E
I-80 South of Ashby Avenue	EB	6	AM	8,742	23.9	C	8,941	24.4	C
			PM	13,406	198.9	F	13,888	206.0	F
	WB	6	AM	15,095	103.1	F	15,495	105.8	F
			PM	9,355	48.4	F	9,747	50.4	F

Source: Kittelson & Associates, Inc., 2020.
Notes: LOS = level of service; EB = eastbound; WB = westbound
[1] Volumes reported are passenger car equivalent per hour.
[2] Densities reported are passenger vehicles per mile per lane.
[3] Freeway mainline operations are the same for Build Alternatives 1 and 2.

Table 5. Design Year (2045) AADT and VMT

Study Area	Measure	% Trucks	2045 No-Build Alternative		2045 Build Alternatives		% Change
			Total	Trucks	Total	Trucks	
I-80 North of Ashby	AADT	4.8	302,806	14,535	307,743	14,772	1.6%
I-80 South of Ashby	AADT	4.8	324,973	15,599	323,693	15,537	-0.4%
Regional Study Area	AADT	4.4	13,008,171	572,360	13,024,780	573,090	0.1%
	VMT	4.4	2,585,791	113,775	2,580,806	113,555	-0.2%

Source: Kittelson & Associates, Inc., 2020.
Notes: AADT = Annual average daily traffic; VMT = vehicle miles traveled.

Opening Year: If facility is an interchange(s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT

Table 6. Opening Year (2025) Levels of Service at Interchanges

#	Intersection	Peak Period	2025 No-Build Alternative		2025 Build Alternative 1		2025 Build Alternative 2	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Frontage Road & Ashby Avenue (Alt 1A & Alt 2)	AM	--	--	42.2	D	42.2	D
	Frontage Road & Ashby Avenue (Alt 1B)		--	--	6.3	A	--	--
2	I-80 WB Ramps & Ashby Avenue		--	--	29	C	29.2	C
3	I-80 EB Ramps & Ashby Avenue		--	--	17.1	B		
4	Shellmound Connectors & Ashby Avenue		--	--	12.4	B	13.4	B
5	Shellmound Connector WB & Shellmound Street		--	--	7.8	A	7.8	A
6	Shellmound Connector EB & Shellmound Street		--	--	12	B	12	B
7	7th Street & Ashby Avenue		61	E	58.4	E	58.4	E
8	Frontage Road & I-80 WB Off-Ramp		36.8	E	--	--	--	--
9	Frontage Road & I-80 WB On-Ramp		37.5	E	--	--	--	--
10	Shellmound Street & I-80 EB Off-Ramp		12.9	B	--	--	--	--
1	Frontage Road & Ashby Avenue (Alt 1A & Alt 2)	PM	--	--	33.1	C	33.1	C
	Frontage Road & Ashby Avenue (Alt 1B)		--	--	7.9	A		
2	I-80 WB Ramps & Ashby Avenue		--	--	26.6	C	23.1	C
3	I-80 EB Ramps & Ashby Avenue		--	--	13.9	B		
4	Shellmound Connectors & Ashby Avenue		--	--	17.7	B	22.1	C
5	Shellmound Connector WB & Shellmound Street		--	--	8.7	A	8.7	A
6	Shellmound Connector EB & Shellmound Street		--	--	13.8	B	13.8	B
7	7th Street & Ashby Avenue		124.9	F	73.9	E	73.9	E
8	Frontage Road & I-80 WB Off-Ramp		118.9	F	--	--	--	--
9	Frontage Road & I-80 WB On-Ramp		168.3	F	--	--	--	--
10	Shellmound Street & I-80 EB Off-Ramp		18.7	C	--	--	--	--

Source: Kittelson & Associates, Inc., 2020.
Notes: s/veh = seconds per vehicle; LOS = level of service; -- = not available

RTP Horizon Year / Design Year: If facility is an interchange (s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT

Table 7. Design Year (2045) Levels of Service at Interchanges

#	Intersection	Peak Period	2045 No-Build Alternative		2045 Build Alternative 1		2045 Build Alternative 2	
			Delay (s/veh)	LOS	Delay (s/veh)	LOS	Delay (s/veh)	LOS
1	Frontage Road & Ashby Avenue (Alt 1A & Alt 2)	AM	--	--	41.3	D	41.3	D
	Frontage Road & Ashby Avenue (Alt 1B)		--	--	14.4	B	--	--
2	I-80 WB Ramps & Ashby Avenue		--	--	42.7	D	41	D
3	I-80 EB Ramps & Ashby Avenue		--	--	28.4	C		
4	Shellmound Connectors & Ashby Avenue		--	--	21	C	28.6	C
5	Shellmound Connector WB & Shellmound Street		--	--	8.7	A	8.7	A
6	Shellmound Connector EB & Shellmound Street		--	--	16.7	C	16.7	C
7	7th Street & Ashby Avenue		146.2	F	149.5	F	149.5	F
8	Frontage Road & I-80 WB Off-Ramp		128.7	F	--	--	--	--
9	Frontage Road & I-80 WB On-Ramp		180.5	F	--	--	--	--
10	Shellmound Street & I-80 EB Off-Ramp		13.6	B	--	--	--	--
1	Frontage Road & Ashby Avenue (Alt 1A & Alt 2)	PM	--	--	35.9	D	33.1	C
	Frontage Road & Ashby Avenue (Alt 1B)		--	--	27.8	C		
2	I-80 WB Ramps & Ashby Avenue		--	--	44.2	D	35.2	D
3	I-80 EB Ramps & Ashby Avenue		--	--	21.8	C		
4	Shellmound Connectors & Ashby Avenue		--	--	19.3	B	28.5	C
5	Shellmound Connector WB & Shellmound Street		--	--	9.3	A	9.3	A
6	Shellmound Connector EB & Shellmound Street		--	--	17.7	C	17.7	C
7	7th Street & Ashby Avenue		236.7	F	174.6	F	174.6	F
8	Frontage Road & I-80 WB Off-Ramp		201.6	F	--	--	--	--
9	Frontage Road & I-80 WB On-Ramp		282.7	F	--	--	--	--
10	Shellmound Street & I-80 EB Off-Ramp		24.1	C	--	--	--	--

Source: Kittelson & Associates, Inc., 2020.

Notes: s/veh = seconds per vehicle; LOS = level of service; -- = not available

Describe potential traffic redistribution effects of congestion relief *(impact on other facilities)*

The proposed I-80 and Ashby Avenue Interchange would not create new traffic; rather it would redistribute traffic within the local area because it provides new connections to and from Shellmound Street and I-80 Westbound. The Build Alternatives would decrease traffic demands for the Powell Street off-ramp and along Frontage Road and Ashby Avenue west of 7th Street. The traffic volume for Shellmound Street south of Ashby Avenue would increase, while traffic volumes would decrease on Bay Street and Potter Street near Aquatic Park.

The City of Emeryville is planning to update the bicycle facilities along Shellmound Street by continuing the bicycle treatments already implemented south of 64th Street, north to the interchange. These additional bicycle treatments would reduce the level of traffic stress on Shellmound Street between 64th Street and the Ashby Avenue Interchange.

Comments/Explanation/Details (please be brief)

Under 40 CFR 93.123(b)(1), the following criteria are utilized to determine the potential for a proposed project to qualify as a Project of Air Quality Concern.

(i) *New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles*;

The project is not a new or expanded highway project and it will not add additional lanes on I-80 nor change the percentages of trucks in the regional study area. The project will alleviate local traffic congestion at the I-80/Ashby Avenue interchange and improve circulation, which will result in less truck traffic diverting onto the surrounding local street network to reach their destination. As a result, the project will provide better access to the regional study area while generally maintaining or improving the AADT (See Tables 2, 3, and 5) and LOS (see Tables 6 and 7), and reducing the regional vehicle miles traveled (VMT) (see Tables 2, 3, and 5). Because the project's reduction in regional VMT would result in a decrease in $PM_{2.5}$ emissions from diesel vehicles, the project would not be considered a Project of Air Quality Concern under this criterion.

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

Overall, the Build Alternatives would improve or maintain the LOS at the I-80/Ashby Avenue ramp and ramp terminal intersections in project area.

- The Build Alternatives will modify the I-80 ramp/Ashby Avenue and Frontage Road/Ashby Avenue intersections, which will operate within LOS standards (D or better) in 2045.
- The Build Alternatives will reconfigure the connection to Shellmound Street by creating an intersection at Ashby Avenue, which will operate within LOS standards (D or better) in 2045.
- The Build Alternatives would not modify the 7th Street and Ashby Avenue intersection, which will continue to operate at LOS F.

The percentage of diesel trucks (4.2 to 4.4%) would remain the same in the regional study for the Build and No-Build Alternatives. The LOS at the affected intersections in the study area would be not due to a significant increase in the volume of diesel trucks. Therefore, the proposed project would not be considered a Project of Air Quality Concern under this criterion.

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

The proposed project would not implement a new bus or retail terminal or transfer point. Therefore, the proposed project would not be considered a Project of Air Quality Concern under this criterion.

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

The proposed project does not involve expansion of a bus or rail terminal or transfer point. Therefore, the proposed project would not be considered a Project of Air Quality Concern under this criterion.

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

There is no state implementation plan for PM_{10} or $PM_{2.5}$. According to the Bay Area Air Quality Management District's Community Air Risk Evaluation (CARE) program, the project area is within a 24-hour $PM_{2.5}$ exceedance area and a 2013 cumulative impact area. However, the project is not mapped in a community that is disproportionately impacted by emissions from existing transportation and stationary sources. The project is not a first-year priority community under AB 617 and is not currently covered under a community action plan. Therefore, the proposed project would not be considered a Project of Air Quality Concern under this criterion.

Figure 1: Study Area

APPENDIX D

CT-EMFAC2017 Results for Operational Criteria Air Pollutants, Mobile Source Air Toxics, and Greenhouse Gases

Summary of Criteria Pollutant Emission Calculations from EMFAC2017

CT-EMFAC2017 Raw Results for Operations (tons/day)

General	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
ROG	2.70E-01	2.17E-01	2.17E-01	1.89E-01	1.89E-01	1.83E-01	1.82E-01
NO_x	6.68E-01	4.32E-01	4.32E-01	5.20E-01	5.19E-01	5.38E-01	5.37E-01
PM_{10} Running Exhaust	1.06E-02	5.40E-03	5.39E-03	3.79E-03	3.78E-03	3.57E-03	3.56E-03
$PM_{2.5}$ Running Exhaust	9.99E-03	5.00E-03	4.99E-03	3.51E-03	3.51E-03	3.31E-03	3.31E-03

Off-Model Adjustment Factors for Gasoline Light Duty Vehicle Emissions in EMFAC2017

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
ROG	NA	NA	NA	NA	NA	NA	NA
NO_x	NA	1.0018	1.0018	1.0109	1.0109	1.0124	1.0124
PM_{10} Exhaust	NA	1.0074	1.0074	1.0270	1.0270	1.0303	1.0303
$PM_{2.5}$ Exhaust	NA	1.0074	1.0074	1.0270	1.0270	1.0303	1.0303

Note: NA = not applicable

Source: California Air Resources Board

Operational Criteria Air Pollutant Emissions with Off-Model Adjustments (pounds per day)

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
ROG	539	434	434	378	377	365	365
NO_x	1,335	866	865	1,051	1,049	1,089	1,087
PM_{10} Exhaust	21	11	11	8	8	7	7
$PM_{2.5}$ Exhaust	20	10	10	7	7	7	7

Note: Traffic data for the design year (2045) was used to conservatively estimate emissions during the horizon year (2040).

Summary of MSAT Emission Calculations from EMFAC2017

CT-EMFAC2017 Raw Results for Operations (tons/day)

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
1,3-Butadiene	7.70E-04	5.31E-04	5.30E-04	5.49E-04	5.48E-04	5.55E-04	5.54E-04
Acetaldehyde	2.14E-03	7.13E-04	7.12E-04	8.72E-04	8.70E-04	8.91E-04	8.89E-04
Acrolein	1.66E-04	1.20E-04	1.20E-04	1.22E-04	1.22E-04	1.24E-04	1.23E-04
Benzene	5.17E-03	3.80E-03	3.79E-03	3.57E-03	3.56E-03	3.52E-03	3.52E-03
Diesel PM	6.47E-03	9.10E-04	9.09E-04	7.97E-04	7.96E-04	8.05E-04	8.03E-04
Ethylbenzene	3.98E-03	3.38E-03	3.37E-03	2.92E-03	2.92E-03	2.82E-03	2.81E-03
Formaldehyde	5.51E-03	2.27E-03	2.26E-03	2.57E-03	2.57E-03	2.62E-03	2.61E-03
Naphthalene	3.18E-04	2.72E-04	2.72E-04	2.42E-04	2.41E-04	2.33E-04	2.33E-04
Polycyclic Organic Matter	1.57E-04	8.47E-05	8.46E-05	7.80E-05	7.79E-05	7.76E-05	7.74E-05

Off-Model Adjustment Factors for Gasoline Light Duty Vehicle Emissions in EMFAC2017

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
TOG Evaporative	NA	1.0016	1.0016	1.0174	1.0174	1.0225	1.0225
Diesel PM	NA	1.0	1.0	1.0	1.0	1.0	1.0

Operational MSAT Emissions with Off-Model Adjustments (grams per day)

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
1,3-Butadiene	699	482	482	507	497	515	514
Acetaldehyde	1946	648	647	804	789	827	825
Acrolein	151	109	109	113	113	115	114
Benzene	4690	3451	3444	3296	3289	3270	3263
Diesel Particulate Matter	5872	826	824	723	722	730	729
Ethylbenzene	3612	3068	3062	2696	2691	2612	2607
Formaldehyde	4996	2061	2057	2375	2370	2428	2423
Naphthalene	289	247	247	223	223	216	216
Polycyclic Organic Matter	142	77	77	72	72	72	72

Summary of GHG Emission Calculations from EMFAC2017

CT-EMFAC2017 Raw Results for Operations (metric tons/day)

Greenhouse Gas	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
Carbon Dioxide	8.259E+02	8.172E+02	8.156E+02	8.286E+02	8.270E+02	8.423E+02	8.407E+02

Off-Model Adjustment Factors for Gasoline Light Duty Vehicle Emissions in EMFAC2017

Pollutant	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
Carbon Dioxide	NA	NA	NA	NA	NA	NA	NA

Operational CO2 Emissions (metric tons per year)

Greenhouse Gas	2018 Existing	2025 No Build	2025 Build	2040 No Build	2040 Build	2045 No Build	2045 Build
Carbon Dioxide	273,500	270,600	270,100	274,400	273,800	278,900	278,400

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2018 Base	Alameda (SF)	2018	Annual	All Links	Link1	Daily	24	1609.34	2071480	30	4.2			Freeway

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2025 No Build	Alameda (SF)	2025	Annual	All Links	Link1	Daily	24	1609.34	2239684	25	4.2			Freeway

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2025 Build	Alameda (SF)	2025	Annual	All Links	Link1	Daily	24	1609.34	2235317	25	4.2			Freeway

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2040 No Build	Alameda (SF)	2040	Annual	All Links	Link1	Daily	24	1609.34	2499264	20	4.4			Freeway

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2040 Build	Alameda (SF)	2040	Annual	All Links	Link1	Daily	24	1609.34	2494434	20	4.4			Freeway

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2045 No Build	Alameda (SF)	2045	Annual	All Links	Link1	Daily	24	1609.34	2585791	20	4.4			Freeway

Project	Scenario	Area	Year	Season	Link Description	Link ID	Time Period	# Hours	Length (m)	Volume (# veh)	Speed Bin (mph)	% Truck	% Truck 1	% Truck 2	Road Type
I-80 Ashby Interchange Project	2045 Build	Alameda (SF)	2045	Annual	All Links	Link1	Daily	24	1609.34	2580806	20	4.4			Freeway

Total Emissions

General	2040 No Build	2040 Build				Unit
$PM_{2.5}$	7.952E-02	7.937E-02				tons/day
PM_{10}	2.935E-01	2.929E-01				tons/day
NO_x	5.200E-01	5.190E-01				tons/day
CO	1.814E+00	1.810E+00				tons/day
HC	2.053E-01	2.049E-01				tons/day
TOG	2.208E-01	2.204E-01				tons/day
ROG	1.891E-01	1.887E-01				tons/day

MSATs						
1,3-Butadiene	5.493E-04	5.483E-04				tons/day
Acetaldehyde	8.716E-04	8.699E-04				tons/day
Acrolein	1.225E-04	1.222E-04				tons/day
Benzene	3.571E-03	3.564E-03				tons/day
Diesel PM	7.974E-04	7.959E-04				tons/day
Ethylbenzene	2.921E-03	2.916E-03				tons/day
Formaldehyde	2.573E-03	2.568E-03				tons/day
Naphthalene	2.418E-04	2.413E-04				tons/day
POM	7.803E-05	7.787E-05				tons/day
DEOG	5.434E-03	5.423E-03				tons/day

GHGs						
CO_2	8.286E+02	8.270E+02				tons/day
N_2O	3.302E-02	3.295E-02				tons/day
CH_4	4.303E-02	4.295E-02				tons/day
BC	8.393E-04	8.377E-04				tons/day
HFC	2.248E-04	2.244E-04				tons/day

PM by Process						
$PM_{2.5}$ Running Exhaust	3.513E-03	3.506E-03				tons/day
$PM_{2.5}$ Tire Wear	5.996E-03	5.985E-03				tons/day
$PM_{2.5}$ Brake Wear	4.639E-02	4.630E-02				tons/day
$PM_{2.5}$ Road Dust	2.362E-02	2.357E-02				tons/day
PM_{10} Running Exhaust	3.787E-03	3.780E-03				tons/day
PM_{10} Tire Wear	2.399E-02	2.394E-02				tons/day
PM_{10} Brake Wear	1.082E-01	1.080E-01				tons/day
PM_{10} Road Dust	1.575E-01	1.572E-01				tons/day

Total Emissions

General	2018 Base	2025 No Build	2025 Build	2045 No Build	2045 Build	Unit
$PM_{2.5}$	7.247E-02	7.262E-02	7.247E-02	8.198E-02	8.182E-02	tons/day
PM_{10}	2.483E-01	2.626E-01	2.620E-01	3.034E-01	3.028E-01	tons/day
NO_x	6.675E-01	4.324E-01	4.316E-01	5.377E-01	5.367E-01	tons/day
CO	3.226E+00	2.086E+00	2.082E+00	1.828E+00	1.824E+00	tons/day
HC	2.840E-01	2.299E-01	2.295E-01	1.992E-01	1.988E-01	tons/day
TOG	3.103E-01	2.472E-01	2.467E-01	2.143E-01	2.139E-01	tons/day
ROG	2.695E-01	2.172E-01	2.168E-01	1.827E-01	1.823E-01	tons/day

MSATs						
1,3-Butadiene	7.701E-04	5.310E-04	5.299E-04	5.554E-04	5.543E-04	tons/day
Acetaldehyde	2.145E-03	7.130E-04	7.116E-04	8.912E-04	8.895E-04	tons/day
Acrolein	1.662E-04	1.202E-04	1.200E-04	1.236E-04	1.234E-04	tons/day
Benzene	5.169E-03	3.798E-03	3.791E-03	3.525E-03	3.518E-03	tons/day
Diesel PM	6.472E-03	9.103E-04	9.085E-04	8.050E-04	8.035E-04	tons/day
Ethylbenzene	3.982E-03	3.377E-03	3.370E-03	2.816E-03	2.811E-03	tons/day
Formaldehyde	5.507E-03	2.268E-03	2.263E-03	2.618E-03	2.612E-03	tons/day
Naphthalene	3.185E-04	2.722E-04	2.717E-04	2.331E-04	2.327E-04	tons/day
POM	1.570E-04	8.473E-05	8.456E-05	7.756E-05	7.741E-05	tons/day
DEOG	2.178E-02	3.991E-03	3.983E-03	5.582E-03	5.571E-03	tons/day

GHGs						
CO_2	8.259E+02	8.172E+02	8.156E+02	8.423E+02	8.407E+02	tons/day
N_2O	3.918E-02	3.306E-02	3.299E-02	3.363E-02	3.357E-02	tons/day
CH_4	4.746E-02	4.283E-02	4.275E-02	4.223E-02	4.215E-02	tons/day
BC	2.229E-03	1.218E-03	1.216E-03	7.870E-04	7.855E-04	tons/day
HFC	2.364E-03	1.811E-03	1.807E-03	9.458E-05	9.440E-05	tons/day

PM by Process						
$PM_{2.5}$ Running Exhaust	9.991E-03	4.996E-03	4.987E-03	3.313E-03	3.306E-03	tons/day
$PM_{2.5}$ Tire Wear	4.935E-03	5.348E-03	5.337E-03	6.205E-03	6.193E-03	tons/day
$PM_{2.5}$ Brake Wear	3.823E-02	4.140E-02	4.132E-02	4.801E-02	4.792E-02	tons/day
$PM_{2.5}$ Road Dust	1.931E-02	2.088E-02	2.084E-02	2.445E-02	2.440E-02	tons/day
PM_{10} Running Exhaust	1.060E-02	5.396E-03	5.386E-03	3.569E-03	3.562E-03	tons/day
PM_{10} Tire Wear	1.974E-02	2.139E-02	2.135E-02	2.482E-02	2.477E-02	tons/day
PM_{10} Brake Wear	8.920E-02	9.659E-02	9.640E-02	1.120E-01	1.118E-01	tons/day
PM_{10} Road Dust	1.287E-01	1.392E-01	1.389E-01	1.630E-01	1.627E-01	tons/day