

Appendix A

Air Quality/Greenhouse Gas
Emissions and Energy Calculations

Road Construction Emissions Model
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.

Input Type

Project Name
Construction Start Year
Project Type
Project Construction Time
Working Days per Month
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)
Project Length
Total Project Area
Maximum Area Disturbed/Day
Water Trucks Used?

Version 9.0.0

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.



Grand Ave Vision Phase 1
2021
2
3.50
22.00
1
0.40
0.53
0.25
1

Enter a Year between 2014 and 2040 (inclusive)

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

months
days (assume 22 if unknown)

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)

miles
acres
acres
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			
	Grading/Excavation			
	Drainage/Utilities/Sub-Grade			
	Paving			
Asphalt	Grubbing/Land Clearing	20.00		16.00
	Grading/Excavation			
	Drainage/Utilities/Sub-Grade			
	Paving	20.00	15.00	

Mitigation Options

On-road Fleet Emissions Mitigation

Off-road Equipment Emissions Mitigation

Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
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	Program	User Override of	Program
	Construction Months	Calculated Months	Phase Starting Date	Default Phase Starting Date
Grubbing/Land Clearing	1.00	0.35		1/1/2021
Grading/Excavation	0.25	1.40		2/1/2021
Drainage/Utilities/Sub-Grade	0.75	1.23		2/9/2021
Paving	1.50	0.53		3/4/2021
Totals (Months)		4		

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

Soil Hauling Emissions	User Override of	Program Estimate of	User Override of	Default Values	Calculated
	Miles/Round Trip	Miles/Round Trip	Truck Round Trips/Day	Round Trips/Day	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		0	0.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grading/Excavation (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Drainage/Utilities/Sub-Grade (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Paving (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	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	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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

Asphalt Hauling Emissions	User Override of	Program Estimate of	User Override of	Default Values	Calculated
	Miles/Round Trip	Miles/Round Trip	Truck Round Trips/Day	Round Trips/Day	Daily VMT
Miles/round trip: Grubbing/Land Clearing		30.00		1	30.00
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		1	30.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grading/Excavation (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Drainage/Utilities/Sub-Grade (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Paving (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	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	0.03	0.21	0.01	0.00	0.00	117.68	0.00	0.02	123.20
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	1.36
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	0.03	0.21	0.01	0.00	0.00	117.68	0.00	0.02	123.20
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	1.94	0.00	0.00	2.03
Total tons per construction project	0.00	0.00	0.01	0.00	0.00	0.00	3.24	0.00	0.00	3.39

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

Worker Commute Emissions	User Override of Worker		Default Values	
	Commute Default Values		Calculated Daily Trips	Calculated Daily VMT
Miles/ one-way trip		20		
One-way trips/day		2		
No. of employees: Grubbing/Land Clearing		5	10	200.00
No. of employees: Grading/Excavation		20	40	800.00
No. of employees: Drainage/Utilities/Sub-Grade		14	28	560.00
No. of employees: Paving		10	20	400.00

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Grading/Excavation (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Drainage/Utilities/Sub-Grade (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Paving (grams/mile)	0.02	1.10	0.10	0.05	0.02	0.00	339.80	0.00	0.01	342.28
Grubbing/Land Clearing (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Grading/Excavation (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Drainage/Utilities/Sub-Grade (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39
Paving (grams/trip)	1.18	2.95	0.34	0.00	0.00	0.00	72.81	0.08	0.04	85.39

Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.03	0.55	0.05	0.02	0.01	0.00	151.43	0.00	0.00	152.80
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	1.67	0.00	0.00	1.68
Pounds per day - Grading/Excavation	0.14	2.20	0.20	0.08	0.03	0.01	605.72	0.02	0.02	611.21
Tons per const. Period - Grading/Excavation	0.00	0.01	0.00	0.00	0.00	0.00	1.67	0.00	0.00	1.68
Pounds per day - Drainage/Utilities/Sub-Grade	0.10	1.54	0.14	0.06	0.02	0.00	424.00	0.01	0.01	427.85
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.00	0.00	0.00	0.00	3.50	0.00	0.00	3.53
Pounds per day - Paving	0.07	1.10	0.10	0.04	0.02	0.00	302.86	0.01	0.01	305.80
Tons per const. Period - Paving	0.00	0.02	0.00	0.00	0.00	0.00	5.00	0.00	0.00	5.04
Total tons per construction project	0.00	0.04	0.00	0.00	0.00	0.00	11.83	0.00	0.00	11.93

Note: Water Truck default values can be overridden in cells D153 through D156, H153 through H156, and F153 through F156.

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

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grading/Excavation (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Drainage/Utilities/Sub-Grade (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Paving (grams/mile)	0.04	0.42	3.06	0.11	0.05	0.02	1,779.29	0.00	0.28	1,862.69
Grubbing/Land Clearing (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Pounds per day - Grubbing/Land Clearing	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.73	0.00	0.00	1.81
Pounds per day - Grading/Excavation	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.45
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	1.36
Pounds per day - Paving	0.00	0.04	0.31	0.01	0.00	0.00	156.91	0.00	0.02	164.26
Tons per const. Period - Paving	0.00	0.00	0.01	0.00	0.00	0.00	2.59	0.00	0.00	2.71
Total tons per construction project	0.00	0.00	0.01	0.00	0.00	0.00	6.04	0.00	0.00	6.32

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		0.25	2.50	0.03	0.52	0.01
Fugitive Dust - Grading/Excavation		0.25	2.50	0.01	0.52	0.00
Fugitive Dust - Drainage/Utilities/Subgrade		0.25	2.50	0.02	0.52	0.00

Off-Road Equipment Emissions															
Grubbing/Land Clearing		Default Number of Vehicles	Mitigation Option Override of	Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Override of Default Number of Vehicles		Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			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		Model Default Tier	Crawler Tractors	0.55	2.44	6.97	0.26	0.24	0.01	760.36	0.25	0.01	768.56	
			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		Model Default Tier	Excavators	0.46	6.54	4.31	0.21	0.19	0.01	1,000.38	0.32	0.01	1,011.17	
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other General Industrial Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56	
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			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	
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
User-Defined Off-road Equipment					ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Number of Vehicles					pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
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	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	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	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					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	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	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	0.00	
Grubbing/Land Clearing					pounds per day	1.07	9.28	11.63	0.49	0.45	0.02	1,810.06	0.57	0.02	1,829.30
Grubbing/Land Clearing					tons per phase	0.01	0.10	0.13	0.01	0.00	0.00	19.91	0.01	0.00	20.12
Grading/Excavation															
Grading/Excavation		Default Number of Vehicles	Mitigation Option Override of	Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Override of Default Number of Vehicles		Program-estimate	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0		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		Model Default Tier	Crawler Tractors	0.55	2.44	6.97	0.26	0.24	0.01	760.36	0.25	0.01	768.56	
			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	
	3		Model Default Tier	Excavators	0.69	9.82	6.46	0.31	0.29	0.02	1,500.58	0.49	0.01	1,516.76	
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2		Model Default Tier	Graders	0.01	3.53	11.85	0.38	0.35	0.01	1,283.37	0.42	0.01	1,297.19	
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other General Industrial Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Other Material Handling Equipm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2		Model Default Tier	Rollers	0.38	3.76	3.85	0.24	0.22	0.01	508.18	0.16	0.00	513.65	
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1		Model Default Tier	Rubber Tired Loaders	0.34	1.60	3.86	0.13	0.12	0.01	65.23	0.20	0.01	61.176	
	2		Model Default Tier	Scrapers	1.86	14.01	21.41	0.83	0.77	0.03	2,935.83	0.95	0.03	2,967.48	
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56	
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	4		Model Default Tier	Tractors/Loaders/Backhoes	0.75	9.04	7.58	0.45	0.41	0.01	1,203.60	0.39	0.01	1,216.56	
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

			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	
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	48.31	0.01	0.00	0.00	49.56	
			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	
	3		Model Default Tier	Tractors/Loaders/Backhoes	0.56	6.78	5.69	0.34	0.31	0.01	902.70	0.29	0.01	0.00	912.42	
			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	0.00	
User-Defined Off-road Equipment																
<i>If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab</i>																
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	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	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	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	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	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	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	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	0.00
	Paving			pounds per day	1.44	16.29	14.43	0.81	0.74	0.02	2,309.71	0.74	0.02	2,334.31		
	Paving			tons per phase	0.02	0.27	0.24	0.01	0.01	0.00	38.11	0.01	0.00	38.52		
Total Emissions all Phases (tons per construction period) =>					0.08	0.73	0.81	0.04	0.04	0.00	124.02	0.04	0.00	125.25		

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

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/Day	Default Values Hours/Day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		221		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		231		8
Crawler Tractors		212		8
Crushing/Proc. Equipment		85		8
Excavators		158		8
Forklifts		82		8
Generator Sets		84		8
Graders		187		8
Off-Highway Tractors		124		8
Off-Highway Trucks		402		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		168		8
Pavers		130		8
Paving Equipment		132		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		80		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		247		8
Rubber Tired Loaders		203		8
Scrapers		367		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		283		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46		8

END OF DATA ENTRY SHEET

Construction Energy Use

Off-Road Construction Equipment Energy Use											
Phase	Equipment	Fuel	HP	Equipment Count	Hours/Day	Work Days	Gallons /HP-Hr	Gallons /Hour	Gallons /Day	Total Gallons	Total kBtu
Near-Term Construction (2021 to 2024)											
Grubbing/Land Clearing	Crawler Tractors	Diesel	212	1	8.0	22	0.0221662	4.69924	37.594	827.1	114,962
	Excavators	Diesel	158	2	8.0	22	0.0197641	3.12272	49.964	1,099.2	152,789
	Signal Boards	Diesel	6	1	8.0	22	0.0196533	0.11792	0.943	20.8	2,885
	Grubbing/Land Clearing Subtotal										1,947.0
Grading/Excavation	Crawler Tractors	Diesel	212	1	8.0	6	0.0221662	4.69924	37.594	225.6	31,353
	Excavators	Diesel	158	3	8.0	6	0.0197641	1.27230	74.945	449.7	62,504
	Graders	Diesel	187	2	8.0	6	0.0211523	3.95548	63.288	379.7	52,782
	Rollers	Diesel	80	2	8.0	6	0.0194120	1.55296	24.847	149.1	20,723
	Rubber Tired Loaders	Diesel	203	1	8.0	6	0.0186692	3.78985	30.319	181.9	25,286
	Scrapers	Diesel	367	2	8.0	6	0.0249847	9.16939	146.710	880.3	122,356
	Signal Boards	Diesel	6	1	8.0	6	0.0196533	0.11792	0.943	5.7	787
	Tractors/Loaders/Backhoes	Diesel	97	4	8.0	6	0.0191052	1.85320	59.303	355.8	49,458
	Grading/Excavation Subtotal										2,627.7
Drainage/Utilities/Sub-Grade	Air Compressors	Diesel	78	1	8.0	17	0.0151464	1.18142	9.451	160.7	22,334
	Generator Sets	Diesel	84	1	8.0	17	0.0151464	1.27230	10.178	173.0	24,052
	Graders	Diesel	187	1	8.0	17	0.0211523	3.95548	31.644	537.9	74,774
	Plate Compactors	Diesel	8	1	8.0	17	0.0196533	0.15723	1.258	21.4	2,972
	Pumps	Diesel	84	1	8.0	17	0.0151464	1.27230	10.178	173.0	24,052
	Rough Terrain Forklifts	Diesel	100	1	8.0	17	0.0208141	2.08141	16.651	283.1	39,347
	Scrapers	Diesel	367	2	8.0	17	0.0249847	9.16939	146.710	2,494.1	346,676
	Signal Boards	Diesel	6	1	8.0	17	0.0196533	0.11792	0.943	16.0	2,229
	Trenchers	Diesel	78	1	8.0	17	0.0260309	2.03041	16.243	276.1	38,383
	Drainage/Utilities/Sub-Grade Subtotal										4,135.4
Paving	Pavers	Diesel	130	1	8.0	33	0.0215252	2.79827	22.386	738.7	102,685
	Paving Equipment	Diesel	132	1	8.0	33	0.0183336	2.42003	19.360	638.9	88,806
	Rollers	Diesel	80	2	8.0	33	0.0194120	1.55296	24.847	820.0	113,975
	Signal Boards	Diesel	6	1	8.0	33	0.0196533	0.11792	0.943	31.1	4,327
	Tractors/Loaders/Backhoes	Diesel	97	3	8.0	33	0.0191052	1.85320	44.477	1,467.7	204,016
Paving Subtotal										3,696.5	513,808
Project Construction Off-Road Total										12,406.6	1,724,512

On-Road Construction Energy Use											
Phase	Trip Type (Fleet Mix)	Trips (1-way)	Distance (miles)	Work Days	Total VMT	gallons diesel/VMT	Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu	
Near-Term Construction (2021 to 2024)											
Grubbing/Land Clearing	Worker (LDA, LDT1, LDT2)	10	20	22	4,400	0.0001611	0.71	0.035181679	154.8	19,294	
	Hauling (HHDT)	1	15	22	330	0.1458163	48.1	-	-	6,689	
Grading/Excavation	Worker (LDA, LDT1, LDT2)	40	20	6	4,800	0.0001611	0.8	0.035181679	168.9	21,048	
Drainage/Utilities/Sub-Grade	Worker (LDA, LDT1, LDT2)	28	20	17	9,520	0.0001611	1.5	0.035181679	334.9	41,744	
	Worker (LDA, LDT1, LDT2)	20	20	33	13,200	0.0001611	2.1	0.035181679	464.4	57,881	
Paving	Worker (LDA, LDT1, LDT2)	1	15	33	495	0.1458163	72.2	-	-	10,033	
	Hauling (HHDT)	1	15	33	495	0.1458163	72.2	-	-	10,033	
Project Construction On-Road Total					32,745		125.4		1,123.0	156,688	

Water Truck Energy Use											
Location	Trip Type (Fleet Mix)	Trips (1-way)	Distance (miles)	Work Days	Total VMT	gallons diesel/VMT	Total diesel gallons	gallons gas/VMT	Total gasoline gallons	Total kBtu	
Near-Term Construction (2021 to 2024)											
On-site (10 mph)	HHDT	10	1	242	2,420	0.0698785	169.1	-	-	23,506	
Off-site (on-road average speed)	HHDT	10	3	242	7,260	0.1458163	1058.6	-	-	147,149	
Project Water Truck Total					9,680		1227.7		0.0	170,655	

Project Construction Energy By Phase				
Phase	Days	Gallons Diesel	Gallons Gas	kBtu
Grubbing/Land Clearing	22	2,107	155	312,132
Grading/Excavation	44	2,852	169	417,325
Drainage/Utilities/Sub-Grade	110	4,695	335	694,133
Paving	66	4,106	464	628,264
Project Construction Total		13,760	1,123	2,051,855

Project Construction Energy By Source				
Source	Gallons Diesel	Gallons Gas	kBtu	
Off-Road Construction Equipment	12,407	-	1,724,512	
On-Road Construction Traffic	125	1,123	156,688	
Water Trucks	1,228	-	170,655	
Project Construction Total		13,760	1,123	2,051,855

Notes:

1. Off-road equipment types, horsepower, count and hours from Road Construction Emissions Model Version 9.0.0. <http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools>.
2. Off-road fuel consumption factors from CARB OFFROAD2017- ORION Web Database, for Riverside county, aggregate model years for 2020. <https://www.arb.ca.gov/orion/>
3. On-road trip distances from SMAQMD Road Construction Emissions Model Version 9.0.0.
4. On-road fuel consumption factors weighted average for fleet mix from CARB EMFAC2107 Web Database, for Riverside county, aggregate model years for 2020, aggregate speeds. <https://www.arb.ca.gov/emfac/2017/>.

OFFROAD2017 (v1.0.1) Emissions Inventory

Region Type: County

Region: San Diego

Calendar Year: 2021

Scenario: All Adopted Rules - Exhaust

Vehicle Classification: OFFROAD2017 Equipment Types

Units: Emissions: tons/day, Fuel Consumption: gallons/year, Activity: hours/year, HP-Hours: HP-hours/year

Region	CalYr	VehClass	MdYr	HP_Bin	Fuel	Fuel_gpy	Total_Activity_hpy	Total_Population	Horsepower_Hours_hhpy	Gallons/hp-hour
SAN DIEGO	2021	ConstMin - Bore/Drill Rigs	Aggregated	300	Diesel	66888.29	12535.53	39.33	2591525.92	0.02581039
SAN DIEGO	2021	ConstMin - Crawler Tractors	Aggregated	300	Diesel	338472.40	73829.18	172.47	15269734.16	0.02216623
SAN DIEGO	2021	ConstMin - Excavators	Aggregated	175	Diesel	720267.94	249598.47	432.14	36443279.41	0.01976408
SAN DIEGO	2021	ConstMin - Graders	Aggregated	300	Diesel	928670.58	202564.07	272.93	43903999.68	0.02115230
SAN DIEGO	2021	ConstMin - Pavers	Aggregated	175	Diesel	95464.91	28116.97	74.69	4435037.83	0.02152516
SAN DIEGO	2021	ConstMin - Paving Equipment	Aggregated	175	Diesel	40602.92	15297.54	34.01	2214674.91	0.01833358
SAN DIEGO	2021	ConstMin - Rollers	Aggregated	100	Diesel	229914.51	135763.36	419.16	11843962.14	0.01941196
SAN DIEGO	2021	ConstMin - Rough Terrain Forklifts	Aggregated	100	Diesel	581193.81	290462.62	1050.10	27923141.73	0.02081405
SAN DIEGO	2021	ConstMin - Rubber Tired Loaders	Aggregated	300	Diesel	1776121.51	451941.84	429.60	95136490.27	0.01866919
SAN DIEGO	2021	ConstMin - Scrapers	Aggregated	600	Diesel	3273160.80	310550.92	662.82	131006547.30	0.02498471
SAN DIEGO	2021	ConstMin - Skid Steer Loaders	Aggregated	75	Diesel	581880.01	433336.18	1243.54	30533939.43	0.01905683
SAN DIEGO	2021	ConstMin - Sweepers/Scrubbers	Aggregated	75	Diesel	18508.92	10801.39	18.93	782581.16	0.02365112
SAN DIEGO	2021	ConstMin - Tractors/Loaders/Backhoes	Aggregated	100	Diesel	3521715.92	2217206.23	3618.93	184332817.79	0.01910520
SAN DIEGO	2021	ConstMin - Trenchers	Aggregated	100	Diesel	51561.40	23610.19	72.78	1980773.89	0.02603094
SAN DIEGO	2021	Industrial - Other General Industrial Equipment	Aggregated	25	Diesel	4.98	10.13	0.05	253.36	0.01965334
SAN DIEGO	2021	Portable Equipment - Non-Rental Compressor	Aggregated	100	Diesel	51789.62	39787.45	101.05	3419259.69	0.01514644
SAN DIEGO	2021	Portable Equipment - Non-Rental Generator	Aggregated	100	Diesel	216396.35	144712.32	110.16	14286942.15	0.01514644
SAN DIEGO	2021	Portable Equipment - Non-Rental Other Portable Equip	Aggregated	100	Diesel	77738.07	55917.41	182.32	5132430.66	0.01514644
SAN DIEGO	2021	Portable Equipment - Non-Rental Pump	Aggregated	100	Diesel	37589.65	26292.75	85.54	2481747.76	0.01514644

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: SAN DIEGO

Calendar Year: 2021

Season: Annual

Vehicle Classification: EMFAC2007 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

2020 Construction Fleet Fuel Consumption								
Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	VMT	Fuel Consumption (1000 Gal.)	Gallons/VMT
Worker (LDA, LDT1, LDT2)								
SAN DIEGO	2021	LDA	Aggregated	Aggregated	DSL	264687.76	5.321149244	
SAN DIEGO	2021	LDT1	Aggregated	Aggregated	DSL	1016.7365	0.040093804	
SAN DIEGO	2021	LDT2	Aggregated	Aggregated	DSL	51585.182	1.40092881	
					Diesel Total	317289.68	6.762171858	0.000161104
SAN DIEGO	2021	LDA	Aggregated	Aggregated	GAS	29235242	963.6714084	
SAN DIEGO	2021	LDT1	Aggregated	Aggregated	GAS	2948932.8	114.713676	
SAN DIEGO	2021	LDT2	Aggregated	Aggregated	GAS	9472449.7	398.3276907	
					Gas Total	41656625	1476.712775	0.035181679
					Total VMT	41973914		
Water Truck (HHDT)								
SAN DIEGO	2021	HHDT	Aggregated	Aggregated	DSL	3741870.8	545.6256403	0.145816268
SAN DIEGO	2021	HHDT	Aggregated	10	DSL	2197.0558	0.153526957	0.069878496
Hauling (HHDT)								
SAN DIEGO	2021	HHDT	Aggregated	Aggregated	DSL	3741870.8	545.6256403	0.145816268