

November 1, 2021

Ms. Julie Gilbert
Jericho Systems, Inc.

SUBJECT: MAGNOLIA AVENUE BRIDGE ENERGY ANALYSIS MEMORANDUM

Dear Ms. Julie Gilbert:

Urban Crossroads, Inc. is pleased to provide the following Energy Analysis Memorandum (Memorandum) for the Magnolia Avenue Bridge Project (Project) in the City of Corona, as shown on Exhibit A. The purpose of this energy evaluation is to determine if the Project would result in energy impacts under the California Environmental Quality Act.

PROJECT SUMMARY

The proposed Project alignment is located in the City of Corona, along Magnolia Avenue, beginning at approximately the intersection El Camino Avenue and ending approximately 1,000 feet east of All American Way where Magnolia Avenue curves north. Leeson Lane intersects Magnolia Avenue within its curve north. The eastbound lane of Leeson Lane intersects at the base of the curve, and the westbound lane of Leeson Lane intersects Magnolia Avenue approximately 141 feet north of the eastbound Leeson Lane/Magnolia Avenue intersection.

The City of Corona is proposing to widen the Magnolia Avenue Bridge over Temescal Wash Channel and Magnolia Avenue from El Camino Avenue to 1,000 feet east of the All American Way generally to increase the number of travel lanes and place sidewalk and curb and gutter. Improvements will include restriping for three, 12-foot-wide lanes in each direction, a 12-foot-wide median, 5-foot-wide shoulders, and 6-foot-wide sidewalks, curb, and gutter in locations that currently lack sidewalk, curb, and gutter. The total roadway width would be increased to approximately 100 feet, curb to curb, throughout the alignment, and right-of-way would be consistently approximately 112 feet wide throughout the alignment.

EXHIBIT A: LOCATION MAP

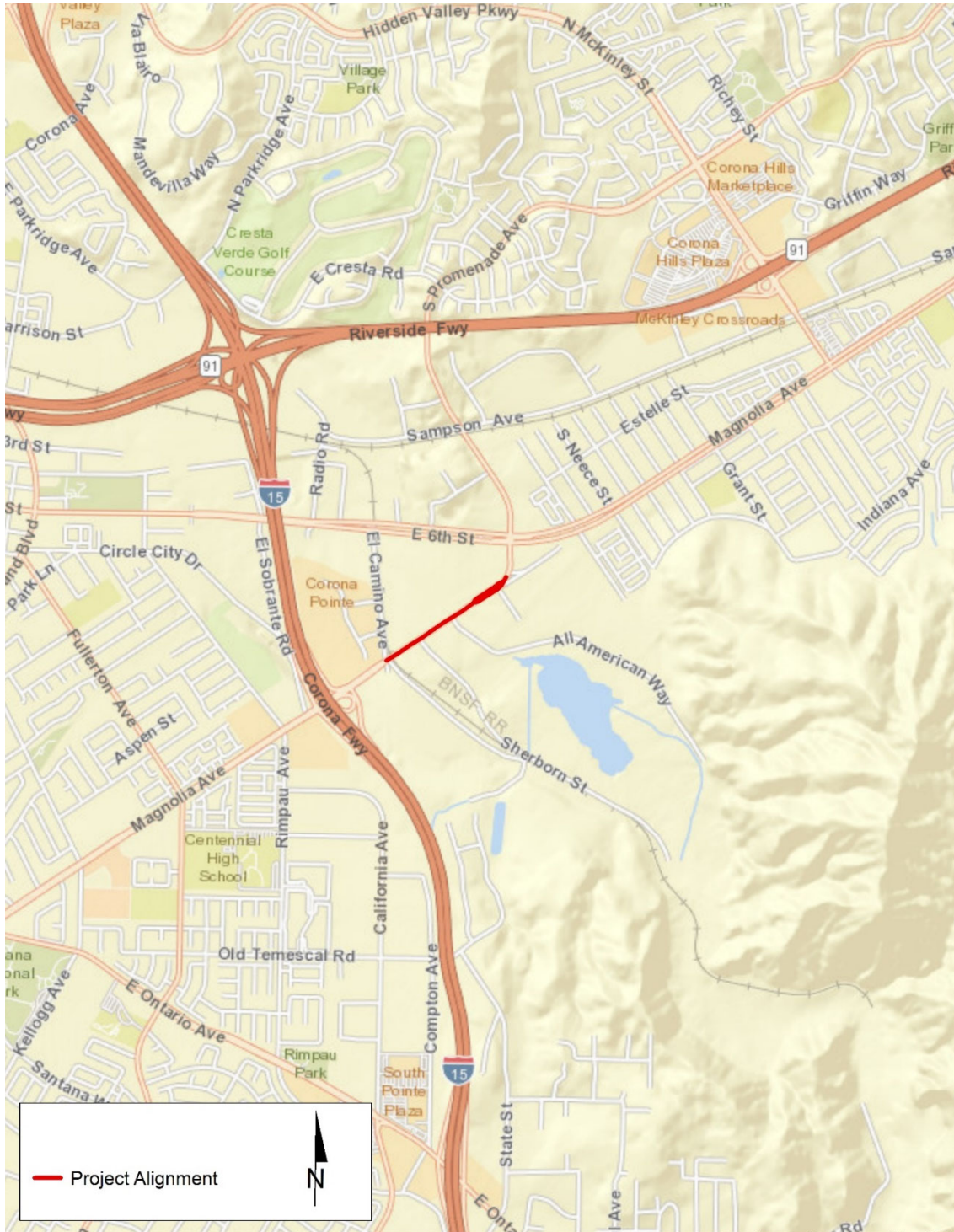


EXHIBIT B: LAND USE CONCEPT



LEGEND:

 Project Alignment

PROJECT ENERGY ANALYSIS

The focus within this evaluation is on the energy demand of the construction process, specifically the power cost from on-site electricity consumption during construction of the proposed Project.

CONSTRUCTION POWER COST

The total Project construction power costs is the summation of the products of the area (sf) by the construction duration and the typical power cost.

CONSTRUCTION DURATION

Construction is expected to require 24 months to construct, January 2024 through January 2026. The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per *CEQA Guidelines* (1). The duration of construction activity was based on the 2026 opening year.

PROJECT CONSTRUCTION POWER COST

Based on the *2020 National Construction Estimator*, Richard Pray (2021) (2), the typical power cost per 1,000 square feet of building construction per month is estimated to be \$2.38. The proposed Addendum Project consists of approximately 256,133 square feet (sf) of roadway surface and is anticipated to be completed within a 24-month period. Table 1 estimates the total power cost of the on-site electricity usage during the construction of the Addendum Project to be approximately \$14,630.31.

TABLE 1: ADDENDUM PROJECT CONSTRUCTION POWER COST

Land Use	Power Cost (per 1,000 SF of building per month of construction)	Total Size (1,000 SF)	Construction Duration (months)	Total Project Construction Power Cost
Roadway	\$2.38	256.133	24	\$14,630.31
TOTAL PROJECT CONSTRUCTION COST				\$14,630.31

Electricity will be provided to the Project by Southern California Edison (SCE). As shown in Table 2, using the total power cost (calculated in Table 1) and SCE’s July 26, 2019, general service rate schedule (GS-1) of \$0.13 per kWh of electricity (3), the total electricity usage from on-site Project construction related activities is estimated to be approximately 112,541kWh.

TABLE 2: ADDENDUM PROJECT CONSTRUCTION ELECTRICITY USAGE

Land Use	Cost per kWh	Total Project Construction Electricity Usage (kWh)
Roadway	\$0.13	112,541
TOTAL PROJECT CONSTRUCTION ELECTRICITY USAGE (kWh)		112,541

Project construction electricity use would represent a “single-event” energy demand and would not require on-going or permanent commitment of electricity resources for construction.

CONSTRUCTION EQUIPMENT FUEL ESTIMATES

Fuel consumption estimates are presented in Table 13. The aggregate fuel consumption rate for all equipment is estimated at 49.5 hp-hr-gal., obtained from California Air Resources Board (CARB) 2017 Offroad/Orion emissions model (4). For the purposes of this analysis, the calculations are based on all construction equipment being diesel-powered which is standard practice consistent with industry standards. Diesel fuel would be supplied by existing commercial fuel providers serving the City and region. As presented in Table 3, Addendum Project construction activities would consume an estimated 59,386 gallons of diesel fuel.

Project construction equipment fuel use would represent a “single-event” fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

CONSTRUCTION TRIPS AND VMT

The Project construction related VMT for workers and vendors for each construction phase is based on the construction emission modeling completed for the AQIA. The VMT is calculated by multiplying to number of trips by the trip length. The trips identified in Table 4 are based on the Road Construction Emissions Model (RCEM) standard settings (5).

TABLE 3: ADDENDUM PROJECT CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Duration (Days)	Equipment	HP Rating	Quantity	Usage Hours	Load Factor	HP-hrs/day	Total Fuel Consumption (gal. diesel fuel)
Grubbing/Land Clearing	53	Crawler Tractors	212	1	8	0.43	729	778
		Excavators	158	2	8	0.38	961	1,025
		Signal Boards	6	1	8	0.82	39	42
Grading/Excavation	238	Crawler Tractors	212	1	8	0.43	729	3,501
		Excavators	158	3	8	0.38	1,441	6,917
		Graders	187	2	8	0.41	1,227	5,888
		Rollers	80	2	8	0.38	486	2,335
		Rubber Tiered Dozers	100	1	8	0.4	320	1,536
		Scrapers	367	2	8	0.48	2,819	13,529
		Signal Boards	6	1	8	0.82	39	189
		Tractors/Loaders/Backhoes	97	4	8	0.37	1,148	5,513
Drainage/Utilities	158	Air Compressors	78	1	8	0.48	300	958
		Generator Sets	84	1	8	0.74	497	1,591
		Graders	187	1	8	0.41	613	1,963
		Plate Compactors	8	1	8	0.43	28	88
		Pumps	84	1	8	0.74	497	1,591
		Rough Terrain Forklifts	100	1	8	0.4	320	1,024
		Scrapers	367	1	8	0.48	1,409	4,510
		Signal Boards	6	1	8	0.82	39	126

TABLE 3: ADDENDUM PROJECT CONSTRUCTION EQUIPMENT FUEL CONSUMPTION ESTIMATES

Activity/Duration	Duration (Days)	Equipment	HP Rating	Quantity	Usage Hours	Load Factor	HP-hrs/day	Total Fuel Consumption (gal. diesel fuel)
		Tractors/Loaders/Backhoes	97	3	8	0.37	861	2,756
Paving	79	Pavers	130	1	8	0.42	437	699
		Paving Equipment	132	1	8	0.36	380	608
		Rollers	80	2	8	0.38	486	778
		Signal Boards	6	1	8	0.82	39	63
		Tractors/Loaders/Backhoes	97	3	8	0.37	861	1,378
CONSTRUCTION FUEL DEMAND (GALLONS DIESEL FUEL)								59,386

TABLE 4: CONSTRUCTION TRIPS AND VMT

Phase Name	Worker Trips/Day	Water Truck Trips/Day	Soil/Asphalt Hauling Trips/Day	Worker Trip Length	Water Truck Trip Length	Hauling Trip Length
Grubbing/Land Clearing	10	1	4	20	8	30
Grading/Excavation	40	1	0	20	8	30
Drainage/Utilities	28	1	0	20	8	30
Paving	20	1	3	20	8	30

Source: Road Construction Emissions Model, Appendix A

CONSTRUCTION WORKER FUEL ESTIMATES

Vehicle fuel efficiencies for worker vehicles (LDA, LDT1, and LDT2) were estimated using information generated within the 2017 version of the EMFAC (EMFAC2017) developed by CARB. EMFAC2017 is a mathematical model that was developed to calculate emission rates, fuel consumption, and VMT from motor vehicles that operate on highways, freeways, and local roads in California and is commonly used by the CARB to project changes in future emissions from on-road mobile sources (6). EMFAC2017 was run for the LDA, LDT1, and LDT2 vehicle class within the California sub-area for the 2024 calendar year. Data from EMFAC2017 is shown in Attachment A.

The construction worker trips are estimated to generate 322,574 VMT during the 24 months of construction (7). Based on EMFAC2017 emission inventory for the County of Riverside, 71% of all worker trips are from light-duty-auto vehicles (LDA), 7.2% are from light-duty-trucks (LDT1), and 21.8% are from light-duty-trucks (LDT2). The number of construction worker trips were based on RCEM output included as an Attachment A. Vehicles under the LDT1 category have a gross vehicle weight rating (GVWR) of less than 6,000 lbs. and equivalent test weight (ETW) of less than or equal to 3,750 lbs. and LDT2 are vehicles that have a GVWR of less than 6,000 lbs. and ETW between 3,751 lbs. and 5,750 lbs.

Based on EMFAC 2017, LDA are calculated to have a fuel efficiency of 34.87 miles per gallon (mpg) in 2024. Table 5 provides an estimated annual fuel consumption resulting from LDAs related to the Project construction worker trips. Based on Table 5, it is estimated that 6,544 gallons of fuel will be consumed related to construction worker trips during full construction of the Project.

TABLE 5: PROJECT CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES FOR LDA

Construction Activity	Duration (Days)	Worker LDA Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Grubbing/Land Clearing	53	7	20	7,507	34.87	215
Grading/Excavation	238	28	20	135,129	34.87	3,875
Drainage/Utilities	158	20	20	63,060	34.87	1,808
Paving	79	14	20	22,521	34.87	646
TOTAL CONSTRUCTION WORKER (LDA) FUEL CONSUMPTION						6,544

LDT1 are estimated to have fuel a efficiency of 29.26 mpg in 2024. Table 6 provides an estimated annual fuel consumption resulting from LDT1s related to the Project construction worker trips. Based on Table 6, it is estimated that 834 gallons of fuel will be consumed related to construction worker trips during full construction of the Project.

TABLE 6: PROJECT CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES FOR LDT1

Construction Activity	Duration (Days)	Worker LDT1 Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Grubbing/Land Clearing	53	1	20	2,301	29.26	79
Grading/Excavation	238	3	20	13,528	29.26	462
Drainage/Utilities	158	2	20	6,313	29.26	216
Paving	79	1	20	2,255	29.26	77
TOTAL CONSTRUCTION WORKER (LDT2) FUEL CONSUMPTION						834

LDT2 are estimated to have fuel a efficiency of 28.05 mpg in 2024. Table 7 provides an estimated annual fuel consumption resulting from LDT2s related to the Project construction worker trips. Based on Table 7, it is estimated that 2,494 gallons of fuel will be consumed related to construction worker trips during full construction of the Project.

TABLE 7: PROJECT CONSTRUCTION WORKER FUEL CONSUMPTION ESTIMATES FOR LDT2

Construction Activity	Duration (Days)	Worker LDT2 Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Grubbing/Land Clearing	53	2	20	2,301	28.05	82
Grading/Excavation	238	9	20	41,423	28.05	1,477
Drainage/Utilities	158	6	20	19,331	28.05	689
Paving	79	4	20	6,904	28.05	246
TOTAL CONSTRUCTION WORKER (LDT1) FUEL CONSUMPTION						2,494

All Project construction trips would represent a “single-event” fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

CONSTRUCTION VENDOR FUEL ESTIMATES

It is assumed that 100% of all water truck trips are Heavy-Heavy-Duty Trucks (HHDT), and 100% of all soil or asphalt hauling trucks trips are HHDTs. These assumptions are consistent with the RCENM utilized within the within the Air Quality Study Report (8). Vehicle fuel efficiencies for MHDTs and HHDTs were estimated using information generated within EMFAC2017. As generated by EMFAC2017, HHDTs are estimated to has fuel efficiencies of 7.54 mpg in 2024.

HHDTs are estimated to have a fuel efficiency of 7.54 mpg in 2024. Based on Table 8, fuel consumption from water truck trips will total approximately 104 gallons. Water truck trips (vehicles that water the site

to control dust during construction) are estimated to generate 784 VMT along area roadways for the Project over the duration of construction activity (7). Data from EMFAC2017 is shown in Attachment A.

TABLE 8: ADDENDUM PROJECT CONSTRUCTION WATER TRUCKS FUEL CONSUMPTION ESTIMATES (HHD TRUCKS)

Construction Activity	Duration (Days)	Water Trucks Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Grubbing/Land Clearing	10	1	8	80	7.54	11
Grading/Excavation	40	1	8	320	7.54	42
Drainage/Utilities	28	1	8	224	7.54	30
Paving	20	1	8	160	7.54	21
TOTAL CONSTRUCTION VENDOR (HHDT) FUEL CONSUMPTION						104

HHDTs are estimated to have a fuel efficiency of 7.54 mpg in 2024. Based on Table 9, fuel consumption from construction hauling trips (HHDTs) for soil and asphalt transport will total approximately 3,572 gallons.

TABLE 9: ADDENDUM PROJECT CONSTRUCTION SOIL AND ASPHALT HAULING TRUCKS FUEL CONSUMPTION ESTIMATES (HHD TRUCKS)

Construction Activity	Duration (Days)	Hauling Trips / Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Grubbing/Land Clearing	53	8	30	12,672	7.54	1,681
Paving	79	6	30	14,256	7.54	1,891
TOTAL CONSTRUCTION HAULING (HHDT) FUEL CONSUMPTION						3,572

As previously identified all Project construction trips, including vendor trips, would represent a “single-event” fuel demand and would not require on-going or permanent commitment of diesel fuel resources for this purpose.

CONSTRUCTION ENERGY EFFICIENCY/CONSERVATION MEASURES

Starting in 2014, CARB adopted the nation's first regulation aimed at cleaning up off-road construction equipment, such as bulldozers, graders, and backhoes. These requirements ensure fleets gradually turnover the oldest and dirtiest equipment to newer, cleaner models and prevent fleets from adding older, dirtier equipment. As such, the equipment used for Project construction would conform to CARB regulations and California emissions standards. It should also be noted that there are no unusual Project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities; or equipment that would not conform to current

emissions standards (and related fuel efficiencies). Equipment employed in construction of the Project would therefore not result in inefficient wasteful, or unnecessary consumption of fuel.

Construction contractors would be required to comply with applicable CARB regulation regarding retrofitting, repowering, or replacement of diesel off-road construction equipment. Additionally, CARB has adopted the Airborne Toxic Control Measure to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel particulate matter and other Toxic Air Contaminants. Compliance with anti-idling and emissions regulations would result in a more efficient use of construction-related energy and the minimization or elimination of wasteful or unnecessary consumption of energy. Idling restrictions and the use of newer engines and equipment would result in less fuel combustion and energy consumption.

Additional construction-source energy efficiencies would occur due to required California regulations and best available control measures (BACM). For example, CCR Title 13, Motor Vehicles, section 2449(d)(3) Idling, limits idling times of construction vehicles to no more than five minutes, thereby precluding unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. Section 2449(d)(3) requires that “grading plans shall reference the requirement that a sign shall be posted on-site stating that construction workers need to shut off engines at or before five minutes of idling.” In this manner, construction equipment operators are required to be informed that engines are to be turned off at or prior to five minutes of idling. Enforcement of idling limitations is realized through periodic site inspections conducted by City building officials, and/or in response to citizen complaints.

In general, the construction processes promote conservation and efficient use of energy by reducing raw materials demands, with related reduction in energy demands associated with raw materials extraction, transportation, processing and refinement. Use of materials in bulk reduces energy demands associated with preparation and transport of construction materials as well as the transport and disposal of construction waste and solid waste in general, with corollary reduced demands on area landfill capacities and energy consumed by waste transport and landfill operations.

ENERGY ANALYSIS

CONSTRUCTION ENERGY CONSUMPTION

The estimated power cost of on-site electricity usage during the construction of the Project is assumed to be approximately \$14,630. Additionally, based on the assumed power cost it is estimated that the total electricity usage during construction, after full Project build-out, is calculated to be approximately 112,541 kWh.

Construction equipment used by the Project would result in single event consumption of approximately 59,386 gallons of diesel fuel. Construction equipment use of fuel would not be atypical for the type of construction proposed because there are no aspects of the Project’s proposed construction process that

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are unusual or energy-intensive, and Project construction equipment would conform to the applicable CARB emissions standards, acting to promote equipment fuel efficiencies.

CCR Title 13, Title 13, Motor Vehicles, section 2449(d)(3) Idling, limits idling times of construction vehicles to no more than 5 minutes, thereby precluding unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. BACMs inform construction equipment operators of this requirement. Enforcement of idling limitations is realized through periodic site inspections conducted by City building officials, and/or in response to citizen complaints.

Construction worker trips for full construction of the Project would result in the estimated fuel consumption of 9,872 gallons of fuel. Additionally, fuel consumption from construction vendor, water trucks, and hauling trips (MHDTs and HHDTs) will total approximately 3,803 gallons. Diesel fuel would be supplied by City and regional commercial vendors. Indirectly, construction energy efficiencies and energy conservation would be achieved using bulk purchases, transport and use of construction materials. The 2020 IEPR released by the CEC has shown that fuel efficiencies are getting better within on and off-road vehicle engines due to more stringent government requirements (8). As supported by the preceding discussions, Project construction energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

If you have any questions, please contact me directly at (619) 778-1971.

Respectfully submitted,

URBAN CROSSROADS, INC.



William Maddux,
Senior Associate

REFERENCES

1. **State of California.** *2019 CEQA California Environmental Quality Act.* 2019.
2. **Pray, Richard.** *2021 National Construction Estimator.* Carlsbad : Craftsman Book Company, 2021.
3. **Southern California Edison.** Schedule GS-1 General Service. *Regulatory Information - Rates Pricing.* [Online] https://library.sce.com/content/dam/sce-doclib/public/regulatory/tariff/electric/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_GS-1.pdf.
4. **California Air Resources Board.** *2017 Offroad/Orion.* 2017.
5. **Sacramento Metropolitan Air Quality Management District.** *Road Construction Emission Model, version 9.0.*
6. **California Department of Transportation.** EMFAC Software. [Online] <http://www.dot.ca.gov/hq/env/air/pages/emfac.htm>.
7. **Urban Crossroads, Inc.** *Magnolia Avenue Air Quality Impact Analysis.* 2021.
8. —. *Air Quality Report Magnolia Avenue Bridge Project.* Corona : s.n., 2021.
9. **California Energy Commission Staff.** 2019 Integrated Energy Policy Report Update. [Online] 2019. [Cited: March 26, 2020.] https://ww2.energy.ca.gov/2019_energypolicy/.
10. **Urban Crossroads, Inc.** *Altitude Business Centre Phase 1 Traffic Impact Analysis.* December 2019.
11. **Pray, Richard.** *2020 National Construction Estimator.* Carlsbad : Craftsman Book Company, 2020.

ATTACHMENT A
CONSTRUCTION EMISSIONS MODEL OUTPUTS

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Magnolia Avenue															
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	0.88	9.61	9.27	50.40	0.40	50.00	10.74	0.34	10.40	0.03	2,546.30	0.58	0.11	2,594.74	
Grading/Excavation	4.44	43.26	43.96	51.85	1.85	50.00	12.06	1.66	10.40	0.10	9,543.34	2.86	0.12	9,649.60	
Drainage/Utilities/Sub-Grade	2.43	27.40	22.51	50.92	0.92	50.00	11.23	0.83	10.40	0.06	5,570.92	1.17	0.07	5,622.42	
Paving	1.11	17.05	11.23	0.53	0.53	0.00	0.45	0.45	0.00	0.03	3,058.75	0.74	0.10	3,107.91	
Maximum (pounds/day)	4.44	43.26	43.96	51.85	1.85	50.00	12.06	1.66	10.40	0.10	9,543.34	2.86	0.12	9,649.60	
Total (tons/construction project)	0.79	8.24	7.69	11.54	0.32	11.22	2.62	0.29	2.33	0.02	1,763.32	0.48	0.03	1,783.24	
Notes: Project Start Year -> 2024															
Project Length (months) -> 24															
Total Project Area (acres) -> 6															
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	75	0	120	0	200	40									
Grading/Excavation	0	0	0	0	800	40									
Drainage/Utilities/Sub-Grade	0	0	0	0	560	40									
Paving	0	50	0	90	400	40									
PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.															
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.															
CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1, 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.															

Total Emission Estimates by Phase for -> Magnolia Avenue														
Project Phases				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust					
(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	0.02	0.25	0.24	1.33	0.01	1.32	0.28	0.01	0.27	0.00	67.22	0.02	0.00	62.14
Grading/Excavation	0.53	5.14	5.22	6.16	0.22	5.94	1.43	0.20	1.24	0.01	1,133.75	0.34	0.01	1,039.98
Drainage/Utilities/Sub-Grade	0.19	2.17	1.78	4.03	0.07	3.96	0.89	0.07	0.82	0.00	441.22	0.09	0.01	403.97
Paving	0.04	0.67	0.44	0.02	0.02	0.00	0.02	0.02	0.00	0.00	121.13	0.03	0.00	111.65
Maximum (tons/phase)	0.53	5.14	5.22	6.16	0.22	5.94	1.43	0.20	1.24	0.01	1133.75	0.34	0.01	1,039.98
Total (tons/construction project)	0.79	8.24	7.69	11.54	0.32	11.22	2.62	0.29	2.33	0.02	1763.32	0.48	0.03	1,617.75
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.



Input Type

Project Name	Magnolia Avenue	
Construction Start Year	2024	Enter a Year between 2014 and 2040 (inclusive)
Project Type	2	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	24.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 <small>(for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)</small>	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the Lone formation (Scott Road, Rancho Murietta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murietta)
Project Length	0.40	miles
Total Project Area	5.88	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		75.00
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	50.00	

Mitigation Options

On-road Fleet Emissions Mitigation	No Mitigation
Off-road Equipment 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

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		2.40		1/1/2024
Grading/Excavation		10.80		3/14/2024
Drainage/Utilities/Sub-Grade		7.20		2/6/2025
Paving		3.60		9/13/2025
Totals (Months)		24		

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

Soil Hauling Emissions	User 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					
User Input										
Miles/round trip: Grubbing/Land Clearing		30.00		4	120.00					
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	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Grading/Excavation (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,701.70	0.00	0.27	1,781.46
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.46	0.12	0.05	0.02	1,682.27	0.00	0.26	1,761.12
Paving (grams/mile)	0.04	0.43	3.46	0.12	0.05	0.02	1,682.27	0.00	0.26	1,761.12
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.46	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	0.11	0.96	0.03	0.01	0.00	450.84	0.00	0.07	471.97
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.03	0.00	0.00	0.00	11.90	0.00	0.00	12.46
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	0.03	0.00	0.00	0.00	11.90	0.00	0.00	12.46

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

Asphalt Hauling Emissions	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					
User Input										
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		3	90.00					
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,704.13	0.00	0.27	1,784.00
Grading/Excavation (grams/mile)	0.04	0.43	3.49	0.12	0.05	0.02	1,701.70	0.00	0.27	1,781.46
Draining/Utilities/Sub-Grade (grams/mile)	0.04	0.43	3.46	0.12	0.05	0.02	1,682.27	0.00	0.26	1,761.12
Paving (grams/mile)	0.04	0.43	3.46	0.12	0.05	0.02	1,682.27	0.00	0.26	1,761.12
Grubbing/Land Clearing (grams/trip)	0.00	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation (grams/trip)	0.00	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Draining/Utilities/Sub-Grade (grams/trip)	0.00	0.00	4.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving (grams/trip)	0.00	0.00	4.46	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	0.01	0.08	0.72	0.02	0.01	0.00	333.79	0.00	0.05	349.43
Tons per const. Period - Paving	0.00	0.00	0.03	0.00	0.00	0.00	13.22	0.00	0.00	13.84
Total tons per construction project	0.00	0.00	0.03	0.00	0.00	0.00	13.22	0.00	0.00	13.84

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

Worker Commute Emissions		User Override of Worker									
User Input		Commute Default Values		Default Values		Calculated		Calculated			
				Daily Trips		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)	0.01	0.94	0.06	0.05	0.02	0.00	306.70	0.00	0.01	308.54	
Grading/Excavation (grams/mile)	0.01	0.83	0.06	0.05	0.02	0.00	305.49	0.00	0.01	307.32	
Draining/Utilities/Sub-Grade (grams/mile)	0.01	0.78	0.06	0.05	0.02	0.00	295.84	0.00	0.01	297.52	
Paving (grams/mile)	0.01	0.78	0.06	0.05	0.02	0.00	295.84	0.00	0.01	297.52	
Grubbing/Land Clearing (grams/trip)	0.98	2.66	0.27	0.00	0.00	0.00	65.99	0.07	0.03	76.61	
Grading/Excavation (grams/trip)	0.97	2.65	0.27	0.00	0.00	0.00	65.74	0.07	0.03	76.30	
Draining/Utilities/Sub-Grade (grams/trip)	0.93	2.56	0.25	0.00	0.00	0.00	63.73	0.06	0.03	73.77	
Paving (grams/trip)	0.93	2.56	0.25	0.00	0.00	0.00	63.73	0.06	0.03	73.77	
Emissions	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
Pounds per day - Grubbing/Land Clearing	0.03	0.43	0.03	0.02	0.01	0.00	136.69	0.00	0.00	137.73	
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	3.61	0.00	0.00	3.64	
Pounds per day - Grading/Excavation	0.11	1.70	0.13	0.08	0.03	0.01	544.60	0.01	0.01	548.74	
Tons per const. Period - Grading/Excavation	0.01	0.20	0.02	0.01	0.00	0.00	64.70	0.00	0.00	65.19	
Pounds per day - Drainage/Utilities/Sub-Grade	0.07	1.12	0.08	0.06	0.02	0.00	369.17	0.01	0.01	371.87	
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.01	0.09	0.01	0.00	0.00	0.00	29.24	0.00	0.00	29.45	
Pounds per day - Paving	0.05	0.80	0.06	0.04	0.02	0.00	263.69	0.01	0.01	265.62	
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	10.44	0.00	0.00	10.52	
Total tons per construction project	0.02	0.33	0.03	0.02	0.01	0.00	107.99	0.00	0.00	108.80	

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

Water Truck Emissions		User Override of		Program Estimate of		User Override of Truck		Default Values		Calculated		User Override of		Default Values		Calculated	
User Input		Default # Water Trucks		Number of Water Trucks		Round Trips/Vehicle/Day		Round Trips/Vehicle/Day		Trips/day		Miles/Round Trip		Miles/Round Trip		Daily VMT	
Grubbing/Land Clearing - Exhaust			1				5		5				8.00		40.00		
Grading/Excavation - Exhaust			1				5		5				8.00		40.00		
Drainage/Utilities/Subgrade			1				5		5				8.00		40.00		
Paving			1				5		5				8.00		40.00		
Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e							
Grubbing/Land Clearing (grams/mile)	0.04	3.49	0.12	0.05	0.02	0.00	1,704.13	0.00	0.27	1,784.00							
Grading/Excavation (grams/mile)	0.04	3.49	0.12	0.05	0.02	0.00	1,701.70	0.00	0.27	1,781.46							
Draining/Utilities/Sub-Grade (grams/mile)	0.04	3.46	0.12	0.05	0.02	0.00	1,682.27	0.00	0.26	1,761.12							
Paving (grams/mile)	0.04	3.46	0.12	0.05	0.02	0.00	1,682.27	0.00	0.26	1,761.12							
Grubbing/Land Clearing (grams/trip)	0.00	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
Grading/Excavation (grams/trip)	0.00	4.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
Draining/Utilities/Sub-Grade (grams/trip)	0.00	4.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
Paving (grams/trip)	0.00	4.46	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	0.36	0.01	0.00	0.00	0.00	150.28	0.00	0.02	157.32							
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	3.97	0.00	0.00	4.15							
Pounds per day - Grading/Excavation	0.00	0.36	0.01	0.00	0.00	0.00	150.06	0.00	0.02	157.10							
Tons per const. Period - Grading/Excavation	0.00	0.04	0.00	0.00	0.00	0.00	17.83	0.00	0.00	18.66							
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.35	0.01	0.00	0.00	0.00	148.35	0.00	0.02	155.30							
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.03	0.00	0.00	0.00	0.00	11.75	0.00	0.00	12.30							
Pounds per day - Paving	0.00	0.35	0.01	0.00	0.00	0.00	148.35	0.00	0.02	155.30							
Tons per const. Period - Paving	0.00	0.01	0.00	0.00	0.00	0.00	5.87	0.00	0.00	6.15							
Total tons per construction project	0.00	0.01	0.09	0.00	0.00	0.00	39.42	0.00	0.01	41.27							

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

Fugitive Dust		User Override of Max		Default		PM10		PM10		PM2.5		PM2.5	
		Acreage Disturbed/Day		Maximum Acreage/Day		pounds/day		tons/per period		pounds/day		tons/per period	
Fugitive Dust - Grubbing/Land Clearing			5.00			50.00	1.32	10.40			0.27		
Fugitive Dust - Grading/Excavation			5.00			50.00	5.94	10.40			1.24		
Fugitive Dust - Drainage/Utilities/Subgrade			5.00			50.00	3.96	10.40			0.82		

Off-Road Equipment Emissions													
Grubbing/Land Clearing	Default	Mitigation Option	Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
	Number of Vehicles	Override of											
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
			Model Default Tier	Air Compressors	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
			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
			Model Default Tier	Concrete/Industrial Saws	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
	1		Model Default Tier	Crawler Tractors	0.42	2.20	4.75	0.18	0.17	0.01	758.65	0.25	0.01
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2		Model Default Tier	Excavators	0.36	6.53	2.81	0.14	0.13	0.01	1,000.53	0.32	0.01
			Model Default Tier	Forklifts	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
			Model Default Tier	Graders	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
			Model Default Tier	Off-Highway Trucks	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
			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
			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
			Model Default Tier	Pavers	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
			Model Default Tier	Plate Compactors	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
			Model Default Tier	Pumps	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
			Model Default Tier	Rough Terrain Forklifts	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
			Model Default Tier	Rubber Tired Loaders	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
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	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
			Model Default Tier	Surfacing Equipment	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
			Model Default Tier	Tractors/Loaders/Backhoes	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
			Model Default Tier	Welders	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
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		N/A		0	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		N/A		0	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		N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing		pounds per day	0.84	9.03	7.91	0.34	0.31	0.02	1,808.50	0.57	0.02	1,827.72
	Grubbing/Land Clearing		tons per phase	0.02	0.24	0.21	0.01	0.01	0.00	47.74	0.02	0.00	48.25

Grading/Excavation	Mitigation Option		Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
	Default Number of Vehicles	Override of												
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	
		Model Default Tier	Air Compressors		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	
		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	
		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	Model Default Tier	Cranes		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1	Model Default Tier	Crawler Tractors		0.42	2.19	4.66	0.18	0.17	0.01	758.61	0.25	766.78	
		Model Default Tier	Crushing/Proc. Equipment		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	3	Model Default Tier	Excavators		0.54	9.79	4.15	0.20	0.19	0.02	1,500.82	0.49	1,517.00	
		Model Default Tier	Forklifts		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	
	2	Model Default Tier	Graders		0.70	3.30	8.16	0.26	0.24	0.01	1,280.96	0.41	1,294.76	
		Model Default Tier	Off-Highway Tractors		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
		Model Default Tier	Off-Highway Trucks		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	
		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	
		Model Default Tier	Other Material Handling Equipr		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	
		Model Default Tier	Paving Equipment		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	
		Model Default Tier	Pressure Washers		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	
	2	Model Default Tier	Rollers		0.29	3.70	3.03	0.16	0.15	0.01	508.27	0.16	513.75	
		Model Default Tier	Rough Terrain Forklifts		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	
	1	Model Default Tier	Rubber Tired Loaders		0.25	1.49	2.28	0.08	0.07	0.01	605.53	0.20	612.06	
	2	Model Default Tier	Scrapers		1.50	11.80	15.10	0.60	0.55	0.03	2,937.99	0.95	2,969.65	
	1	Model Default Tier	Signal Boards		0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	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	
		Model Default Tier	Surfacing Equipment		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	
	4	Model Default Tier	Tractors/Loaders/Backhoes		0.57	8.94	5.74	0.26	0.24	0.01	1,207.20	0.39	1,220.18	
		Model Default Tier	Trenchers		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	
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	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
	Grading/Excavation		pounds per day	4.32	41.52	43.47	1.76	1.62	0.09	8,848.68	2.85	0.08	8,943.76	
	Grading/Excavation		tons per phase	0.51	4.93	5.16	0.21	0.19	0.01	1,051.22	0.34	0.01	1,062.52	

Paving	Mitigation Option		Default	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e	
	Default Number of Vehicles	Override of												
Override of Default Number of Vehicles		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	
			Model Default Tier	Air Compressors	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	
			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	
			Model Default Tier	Concrete/Industrial Saws	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	
			Model Default Tier	Crawler Tractors	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	
			Model Default Tier	Excavators	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	
			Model Default Tier	Generator Sets	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	
			Model Default Tier	Off-Highway Tractors	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	
			Model Default Tier	Other Construction Equipment	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	
			Model Default Tier	Other Material Handling Equipr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1		Model Default Tier	Pavers	0.17	2.90	1.58	0.07	0.07	0.00	454.99	0.15	0.00	
	1		Model Default Tier	Paving Equipment	0.15	2.55	1.26	0.06	0.06	0.00	394.32	0.13	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	
			Model Default Tier	Pressure Washers	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	
	2		Model Default Tier	Rollers	0.27	3.69	2.89	0.15	0.13	0.01	508.12	0.16	513.66	
			Model Default Tier	Rough Terrain Forklifts	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	
			Model Default Tier	Rubber Tired Loaders	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	
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	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	
			Model Default Tier	Surfacing Equipment	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	
	3		Model Default Tier	Tractors/Loaders/Backhoes	0.40	6.69	4.01	0.16	0.15	0.01	906.17	0.29	915.91	
			Model Default Tier	Trenchers	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	
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
	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		N/A		0	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		N/A		0	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		N/A		0	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		N/A		0	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		N/A		0	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
		Paving		pounds per day	1.05	16.13	10.10	0.46	0.42	0.02	2,312.92	0.74	0.02	2,337.55
		Paving		tons per phase	0.04	0.64	0.40	0.02	0.02	0.00	91.59	0.03	0.00	92.57
Total Emissions all Phases (tons per construction period) =>					0.76	7.89	7.52	0.30	0.28	0.02	1,590.79	0.47	0.01	1,606.88

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		89		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		263		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		97		8
Trenchers		78		8
Welders		46		8

END OF DATA ENTRY SHEET