

Appendix 4.4

Energy

Construction Fuel Consumption Calculations

Eastvale Homestead

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors [1]:

HP: 0 to 100	0.0588	HP: >100	0.0529
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Equipment Fuel Consumption

PhaseName	OffRoadEquipmentType	Amount	Hours	HorsePower	LoadFactor	Fuel (gallons)
Demolition	Rubber Tired Dozers	2	8	247	0.4	4178.0
Demolition	Excavators	3	8	158	0.38	3808.4
Demolition	Concrete/Industrial Saws	1	8	81	0.73	1389.9
Site Preparation	Rubber Tired Dozers	3	8	247	0.4	3760.2
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37	2024.7
Grading	Excavators	2	8	158	0.38	3808.4
Grading	Graders	1	8	187	0.41	2431.6
Grading	Rubber Tired Dozers	1	8	247	0.4	3133.5
Grading	Scrapers	2	8	367	0.48	11174.0
Grading	Tractors/Loaders/Backhoes	2	8	97	0.37	2530.9
Building Construction	Cranes	1	8	231	0.29	9914.9
Building Construction	Forklifts	3	8	89	0.2	8786.4
Building Construction	Generator Sets	1	8	84	0.74	10227.8
Building Construction	Tractors/Loaders/Backhoes	3	8	97	0.37	17716.0
Building Construction	Welders	1	8	46	0.45	3406.0
Paving	Pavers	2	8	130	0.42	2539.8
Paving	Paving Equipment	2	8	132	0.36	2210.4
Paving	Rollers	2	8	80	0.38	1572.1
Architectural Coating	Air Compressors	1	8	78	0.48	1760.1

Total Equipment Fuel Consumption	96372.9 gallons
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Equipment Fuel Consumption Notes:

- Fuel demand rate for construction equipment is derived from: total hours of operation; equipment horsepower, equipment load factor, and equipment fuel usage per hour of operation, as provided from the CalEEMod outputs (Urban Crossroads 2019a) and from compression-ignition engine brake-specific fuel consumption factors for engines (U.S. EPA 2018). Fuel consumed for construction equipment is assumed to be diesel.

- Fuel demand rate for hauling and vendor trips (cut material imports) is derived from hauling and vendor trip number, hauling and vendor trip length, and hauling and vendor vehicle class from “Trips and VMT” Table contained in Section 3.0, Construction Detail, of the CalEEMod results (see Urban Crossroads 2019a; Appendix 4.2). The fuel economy for hauling and vendor trip vehicles is derived from the United States Department of Transportation (U.S. DOT 2018). Fuel consumed for hauling trucks is assumed to be diesel.

Trip Fuel Consumption

PhaseName	Trip Type	Working Days	Trips/day	Trip Length (mi)	MPG[2]	Fuel (gal)
Site Preparation	WorkerTripNumber	30	18	14.7	24	330.8
Site Preparation	VendorTripNumber	30	0	6.9	7.4	0.0
Site Preparation	HaulingTripNumber	30	0	20	7.4	0.0
Grading	WorkerTripNumber	75	20	14.7	24	918.8
Grading	VendorTripNumber	75	0	6.9	7.4	0.0
Grading	HaulingTripNumber	75	55	20	7.4	11148.6
Building Construction	WorkerTripNumber	350	832	14.7	24	178360.0
Building Construction	VendorTripNumber	350	325	6.9	7.4	106064.2
Building Construction	HaulingTripNumber	350	0	20	7.4	0.0
Architectural Coating	WorkerTripNumber	100	15	14.7	24	918.8
Architectural Coating	VendorTripNumber	100	0	6.9	7.4	0.0
Architectural Coating	HaulingTripNumber	100	0	20	7.4	0.0
Total Worker Trip Fuel Consumption (gallons)					180528.3	
Total Vendor/Haul Trip Fuel Consumption (gallons)					117212.8	

Notes: Fuel consumed for worker trips is assumed to be gasoline.

Sources:

[1] United States Environmental Protection Agency. 2018. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES2014b*. July 2018. Available at: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf>.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2018. *National Transportation Statistics 2018*. Available at: <https://www.bts.gov/sites/bts.dot.gov/files/docs/browse-statistical-products-and-data/national-transportation-statistics/223001/ntsentire2018q4.pdf>. Table 4-13: Single-Unit 2-Axle 6-Tire or More Truck Fuel Consumption and Travel; Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles. Light duty vehicles include short wheel base includes passenger cars, light trucks, vans and sport utility vehicles with a wheelbase (WB) equal to or less than 121 inches.

tblOffRoadEquipment

PhaseName	Days
Demolition	50
Site Preparation	30
Grading	75
Building Construction	350
Architectural Coating	100
Paving	55

PhaseName	WorkerTri	VendorTri	HaulingTr	WorkerTri	VendorTri	HaulingTri	TripLength
Demolition	15	0	227	14.7	6.9	20	
Site Preparation	18	0	0	14.7	6.9	20	
Grading	20	0	4125	14.7	6.9	20	
Building Construction	832	325	0	14.7	6.9	20	
Architectural Coating	15	0	0	14.7	6.9	20	
Paving	166	0	0	14.7	6.9	20	

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