

**Construction Equipment Energy Use**

Phase Name	Off Road Equipment Type	Off Road Equipment Unit Amount <sup>1</sup>	Usage Hours Per Day <sup>1</sup>	Horse Power (lbs/sec) <sup>1</sup>	Load Factor <sup>5</sup>	Total Operational Hours	BSFC <sup>2</sup>	Fuel Used (gallons) <sup>3</sup>	MBTU <sup>4</sup>
Grubbing/Land Clearing	Excavators	3	8	158	0.38	168	0.367	520.72	72.380623
Grubbing/Land Clearing	Crawler Tractors	2	8	212	0.43	112	0.367	527.08	73.264685
Grading/Excavation	Cranes	1	8	231	0.29	240	0.367	830.00	115.37018
Grading/Excavation	Crawler Tractors	2	8	212	0.43	480	0.367	2258.93	313.99151
Grading/Excavation	Excavators	4	8	158	0.38	960	0.367	2975.57	413.60356
Grading/Excavation	Graders	3	8	187	0.41	720	0.367	2849.81	396.12323
Grading/Excavation	Rollers	3	8	80	0.38	720	0.408	1256.20	174.61137
Grading/Excavation	Rubber Tired Loaders	2	8	97	0.37	480	0.408	988.70	137.42987
Grading/Excavation	Scrapers	3	8	367	0.48	720	0.367	6547.83	910.14827
Grading/Excavation	Tractors/Loaders/Backhoes	5	8	97	0.37	1200	0.408	2471.76	343.57468
Drainage/Utilities/Subgrade	Air Compressors	2	8	78	0.48	320	0.408	687.60	95.576752
Drainage/Utilities/Subgrade	Generator Sets	2	8	84	0.74	320	0.408	1141.60	158.68192
Drainage/Utilities/Subgrade	Graders	2	8	187	0.41	320	0.367	1266.58	176.05477
Drainage/Utilities/Subgrade	Plate Compactors	2	8	8	0.43	320	0.408	63.18	8.7816246
Drainage/Utilities/Subgrade	Pumps	2	8	84	0.74	320	0.408	1141.60	158.68192
Drainage/Utilities/Subgrade	Rough Terrain Forklifts	2	8	100	0.4	320	0.367	660.80	91.850668
Drainage/Utilities/Subgrade	Scrapers	2	8	367	0.48	320	0.367	2910.15	404.51034
Drainage/Utilities/Subgrade	Tractors/Loaders/Backhoes	4	8	97	0.37	640	0.408	1318.27	183.23983
Paving	Pavers	2	8	130	0.48	160	0.367	515.42	71.643521
Paving	Paving Equipment	2	8	132	0.36	160	0.367	392.51	54.559297
Paving	Rollers	3	8	80	0.38	240	0.408	418.73	58.203791
Paving	Tractors/Loaders/Backhoes	4	8	97	0.37	320	0.408	659.14	91.619915
<b>Total</b>								<b>32402.18</b>	<b>4503.9</b>

**Construction Phases**

Phase Number	Phase Name	Phase Start Date	Phase End Date	Num Days Week	Total Number of Days
1	Grubbing/Land Clearing	1/1/2023	1/10/2023	5	7
2	Grading/Excavation	1/11/2023	2/21/2023	5	30
3	Drainage/Utilities/Subgrade	2/22/2023	3/21/2023	5	20
4	Paving	3/22/2023	4/5/2023	5	10

**Notes**

- Roadway Construction Emissions Model Default Values Used
- BSFC - Brake Specific Fuel Consumption (pounds per horsepower-hour) – If less than 100 Horsepower = 0.408, if greater than 100 Horsepower = 0.367
- Fuel Used = Load Factor x Horsepower x Total Operational Hours x BSFC / Unit Conversion
- MBTU calculated for comparison purposes. Assumed 1 gallon of diesel = 0.139 MBTU
- CalEEMod Default Values Used

**Mobile Energy Use (Construction)**

**Worker Trips**

	Daily Worker Trips <sup>1</sup>	Worker Trip Length <sup>1</sup>	VMT/Day	MPG Factor <sup>3</sup>	Gallons of Gas/Day	# of Days <sup>1</sup>	Total Gallons of Gas	MBTU
Grubbing/Land Clearing	16	20	320	29.23	10.9	10	109.48	12.71
Grading/Excavation	60	20	1200	29.23	41.1	30	1231.61	142.98
Drainage/Utilities/Subgrade	48	20	960	29.23	32.8	300	9852.89	1143.82
Paving	30	20	600	29.23	20.5	20	410.54	47.66
<b>Total</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>360</b>	<b>11604.52</b>	<b>1347.17</b>

**Water Truck**

	Daily Vendor Trips <sup>1</sup>	Vendor Trip Length <sup>1</sup>	VMT/Day	MPG Factor <sup>3</sup>	Gallons of Diesel/Day	# of Days <sup>1</sup>	Total Gallons of Diesel	MBTU
Grubbing/Land Clearing	10	8	80	7.12	11.2	10	112.36	15.62
Grading/Excavation	10	8	80	7.12	11.2	50	561.80	78.09
Drainage/Utilities/Subgrade	5	8	40	7.12	5.6	35	196.63	27.33
Paving	5	8	40	7.12	5.6	17	95.51	13.28
<b>Total</b>							<b>966.29</b>	<b>134.31</b>

**Fleet Characteristics**

	Vehicle Class	Fleet Mix	2024 MPG Factor (EMFAC2017)	Average MPG Factor
Assumed Vehicle Fleet for Workers	LDA	33%	33.24	29.23
	LDT1	33%	28.07	
	LDT2	33%	26.38	

Notes

1. Road Construction Emissions Model Default values used
2. MBTU calculated for comparison purposes. Assumed 1 gallon of gasoline = 0.11609 MBTU
3. MPG Factor Based on EMFAC2017