

## **Appendix Q3. Construction and Operational Energy Consumption Calculations**

# Appendix Q3 - Construction Energy Usage Calculations for Alternative 2

## Energy Use Summary

Construction Phase (gallons/construction period)	Gasoline	Diesel
Construction Vehicles	20,346	181,123
Worker Trips	35,540	94
Vendor Trips	292	3
Haul Trucks	19	34,086
<b>Total</b>	<b>56,197</b>	<b>215,307</b>

Operations Phase (gallons/year)	Gasoline	Diesel	Natural Gas (kBTU/yr)	Electricity (kWh/yr)
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
<b>All Land Uses</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## Offroad Construction Equipment Energy Use

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per	Hours Per Day	Horsepower	Load Factor	Horsepower Category	Num Days	Year	Fuel Consumption Rate (gal/hour)	Fuel Type	Total Fuel Consumption (gal/construction period)
Linear, Grubbing & Land Clearing	Signal Boards	Electric	Average	1	8	6	0.82	25	78	2027	0.6	Gasoline	294
Linear, Grubbing & Land Clearing	Crawler Tractors	Diesel	Average	2	8	87	0.43	175	78	2027	3.3	Diesel	1,778
Linear, Grubbing & Land Clearing	Excavators	Diesel	Average	4	8	36	0.38	175	78	2027	2.9	Diesel	2,738
Linear, Grading & Excavation	Excavators	Diesel	Average	7	8	36	0.38	175	313	2027	2.9	Diesel	19,228
Linear, Grading & Excavation	Crawler Tractors	Diesel	Average	3	8	87	0.43	175	313	2027	3.3	Diesel	10,699
Linear, Grading & Excavation	Graders	Diesel	Average	4	8	148	0.41	175	313	2027	3.2	Diesel	12,940
Linear, Grading & Excavation	Rollers	Diesel	Average	5	8	36	0.38	100	313	2027	1.7	Diesel	8,061
Linear, Grading & Excavation	Signal Boards	Electric	Average	1	8	6	0.82	25	313	2027	0.6	Gasoline	1,178
Linear, Grading & Excavation	Tractors/Loaders/Backhoes	Diesel	Average	6	8	84	0.37	100	313	2027	1.6	Diesel	8,873
Linear, Grading & Excavation	Rubber Tired Loaders	Diesel	Average	4	8	150	0.36	300	313	2027	3.9	Diesel	14,150
Linear, Grading & Excavation	Scrapers	Diesel	Average	6	8	423	0.48	300	313	2027	5.6	Diesel	40,269
Linear, Grading & Excavation	Cranes	Diesel	Average	1	8	367	0.29	300	313	2027	3.3	Diesel	2,365
Linear, Drainage, Utilities, & Sub-(-) Scrapers	Scrapers	Diesel	Average	5	8	423	0.48	300	274	2027	5.6	Diesel	29,376
Linear, Drainage, Utilities, & Sub-(-) Rough Terrain Forklifts	Rough Terrain Forklifts	Diesel	Average	2	8	96	0.4	100	274	2027	0.9	Diesel	1,503
Linear, Drainage, Utilities, & Sub-(-) Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	Average	5	8	84	0.37	100	274	2027	1.6	Diesel	6,473
Linear, Drainage, Utilities, & Sub-(-) Signal Boards	Signal Boards	Electric	Average	1	8	6	0.82	25	274	2027	0.6	Gasoline	1,031
Linear, Drainage, Utilities, & Sub-(-) Graders	Graders	Diesel	Average	3	8	148	0.41	175	274	2027	3.2	Diesel	8,496
Linear, Drainage, Utilities, & Sub-(-) Plate Compactors	Plate Compactors	Diesel	Average	2	8	8	0.43	25	274	2027	0.3	Gasoline	590
Linear, Drainage, Utilities, & Sub-(-) Pumps	Pumps	Diesel	Average	2	8	11	0.74	100	274	2027	1.3	Diesel	4,350
Linear, Drainage, Utilities, & Sub-(-) Air Compressors	Air Compressors	Diesel	Average	2	8	37	0.48	100	274	2027	1.3	Diesel	2,786
Linear, Drainage, Utilities, & Sub-(-) Generator Sets	Generator Sets	Diesel	Average	2	8	14	0.74	100	274	2027	5.2	Gasoline	16,812
Linear, Paving	Rollers	Diesel	Average	3	8	36	0.38	100	117	2027	1.7	Diesel	1,808
Linear, Paving	Paving Equipment	Diesel	Average	2	8	89	0.36	100	117	2027	1.6	Diesel	1,100
Linear, Paving	Pavers	Diesel	Average	2	8	81	0.42	100	117	2027	1.7	Diesel	1,365
Linear, Paving	Tractors/Loaders/Backhoes	Diesel	Average	5	8	84	0.37	100	117	2027	1.6	Diesel	2,764
Linear, Paving	Signal Boards	Electric	Average	1	8	6	0.82	25	117	2027	0.6	Gasoline	440
<b>Total</b>												<b>20,346</b>	
<b>Total</b>												<b>181,123</b>	
<b>Gasoline</b>												<b>201,469</b>	
<b>Diesel</b>													

## Onroad Construction Energy Use

Year 2027

Vehicle Types	MPG by Fuel Type					Population by Fuel Type					
	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	Gasoline	Diesel	Electricity	Natural Gas	Plug-in Hybrid	Total
LDA	31.2	42.8	0.4	0.000	28.2	5,292,952	11,343	382,326	0	181,958	5,868,579
LDT1	25.8	24.4	0.4	0.000	28.0	483,651	72	2,326	0	1,792	487,841
LDT2	25.7	33.8	0.4	0.000	27.9	2,709,858	9,470	33,328	0	34,035	2,786,692
LHDT1	14.5	20.8	0.6	0.000	0.0	204,178	117,263	7,096	0	0	328,537
LHDT2	12.6	17.6	0.6	0.000	0.0	31,368	53,302	1,836	0	0	86,507
MCY	41.9	0.0	0.0	0.000	0.0	260,940	0	0	0	0	260,940
MDV	20.9	25.0	0.4	0.000	27.6	1,663,072	20,728	35,494	0	21,257	1,740,551
MH	4.9	10.1	0.0	0.000	0.0	27,304	12,674	0	0	0	39,978
MHDT	5.3	9.0	1.0	8.4	0.0	23,815	123,435	3,276	1,803	0	152,329
HHDT	4.3	6.3	1.8	6.2	0.0	42	109,786	1,963	11,674	0	123,465
OBUS	5.2	7.2	1.1	9.1	0.0	4,955	3,276	80	555	0	8,866
SBUS	9.0	7.4	1.2	4.3	0.0	2,999	3,087	135	3,603	0	9,824
UBUS	7.2	6.8	2.1	3.2	0.0	893	11	349	4,859	0	6,112
						10,706,026	464,448	468,211	22,494	239,042	11,900,221

### Daily Trips

Phase Name	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length
Linear, Grubbing & Land Clea	18	0	31	18.5	10.2	20
Linear, Grading & Excavation	93	2	31	18.5	10.2	20
Linear, Drainage, Utilities, & I	60	0	0	18.5	10.2	20
Linear, Paving	33	0	0	18.5	10.2	20

### Total Trips

Linear, Grubbing & Land Clea	1404	0	2418	18.5	10.2	20
Linear, Grading & Excavation	29109	626	9703	18.5	10.2	20
Linear, Drainage, Utilities, & I	16440	0	0	18.5	10.2	20
Linear, Paving	3861	0	0	18.5	10.2	20

### Total

Gasoline Consumption			Diesel Consumption		
Worker	Vendor	Haul	Worker	Vendor	Haul
982	0	4	3	0	6,800
20,359	292	15	54	3	27,286
11,498	0	0	31	0	0
2,700	0	0	7	0	0
<b>35,540</b>	<b>292</b>	<b>19</b>	<b>94</b>	<b>3</b>	<b>34,086</b>

