APPENDIX H

ENERGY CALCULATIONS

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Construction Off-Road Equipment										
Phase	**Off-Road Equipment Type**	**Amount**	**Usage Hour/Day**	**Total Usage Days**	**Total Usage Hours/Equipment**	**Horsepower**	**Load Factor**	**Total Usage Hours/ Equipment**	**Horsepower-Hour**	**Fuel Usage (gallons)**
Demolition	Rubber Tired Dozers	2	8	30	480	367	0.4	480	70464	3607.7568
	Excavators	3	8	30	720	36	0.38	720	9849.6	504.29952
	Concrete/Industrial Saws	1	8	30	240	33	0.73	240	5781.6	296.01792
Site Preparation	Rubber Tired Dozers	3	8	15	360	367	0.4	360	52848	2705.8176
	Tractors/Loaders/Backhoes	4	8	15	480	84	0.37	480	14918.4	763.82208
Grading	Graders	1	8	30	240	148	0.41	240	14563.2	745.63584
	Excavators	1	8	30	240	36	0.38	240	3283.2	168.09984
	Tractors/Loaders/Backhoes	3	8	30	720	84	0.37	720	22377.6	1145.73312
	Rubber Tired Dozers	1	8	30	240	367	0.4	240	35232	1803.8784
Building Construction	Forklifts	3	8	280	6720	82	0.2	6720	110208	5642.6496
	Generator Sets	1	8	280	2240	14	0.74	2240	23206.4	1188.16768
	Cranes	1	7	280	1960	367	0.29	1960	208602.8	10680.46336
	Welders	1	8	280	2240	46	0.45	2240	46368	2374.0416
	Tractors/Loaders/Backhoes	3	7	280	5880	84	0.37	5880	182750.4	9356.82048
Paving	Pavers	2	8	30	480	81	0.42	480	16329.6	836.07552
	Paving Equipment	2	8	30	480	89	0.36	480	15379.2	787.41504
	Rollers	2	8	30	480	36	0.38	480	6566.4	336.19968
Architectural Coating	Air Compressors	1	6	30	180	37	0.48	180	3196.8	163.67616
									Total	**43106.57024** Diesel

Construction Truck and Worker Vehicle Fuel Efficiency				
		EMFAC 2021 Outputs		
Vehicle Type	Vehicle Class	Fuel Consumption (1,000 gallons/day)	VMT (miles/ day)	Fuel Efficency (miles/gallon)
Construction Truck	MHDT	70.7	603,035.4	8.5
	HHDT	293.5	1,811,002.3	6.2
	HHDT/MHDT	-	-	7.3
Construction Worker Vehicle	LDA	631.7	19,801,918.5	31.3
	LDT1	62.5	1,634,325.5	26.2
	LDT2	387.8	9,950,167.8	25.7
	Worker Mix	-	-	28.6

Notes:

[1] For construction trucks assumes 50 percent HHDT and 50 percent MHDT vehicles, consistent with assumptions in CalEEMod for hauling trucks. For construction worker vehicles assumes 50 percent LDA, 25 percent LDT1, and 25 percent LDT2 vehicles, consistent with assumptions in CalEEMod for worker vehicles.

[2] EMFAC2021 was run for Alameda County for the construction year 2026. Data was aggregated over all vehicle model years and speed bins.

[3] The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

Construction Vehicle Fuel Use - Diesel Vehicles						
Phase	Trip Type	Total Trips	Trip Length (miles)	Total VMT	Diesel Fuel Effiency (miles/gallon)	Fuel Usage (gallons/year)
Demolition	Hauling	3,780.0	20.0	75,600.0	6.2	12,252.4
Grading	Hauling	420.0	20.0	8,400.0	6.2	1,361.4
Building Construction	Vendor	7,280.0	8.4	61,152.0	7.3	8,320.8
					Total	**21,934.6**

Diesel

[1] Assumes 100 percent HHDT vehicles for haul trucks and 50 percent HHDT/50 percent MHDT vehicles for MHDT, consistent with assumptions in CalEEMod.

[2] EMFAC2021 was run for Alameda County for the construction year 2026. Data was aggregated over all vehicle model years and speed bins.

[3] The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

Construction Worker Vehicle Fuel Use - Gasoline Vehicles							
Phase	Total One-Way Trips/Day	Total Days	Total Trips	Trip Length (miles)	Total VMT	Gasoline Fuel Effiency (miles/gallon)	Fuel Usage (gallons/year)
Demolition	15	30	900	11.7	10,530	28.6	367.8
Site Preparation	18	15	540	11.7	6,318	28.6	220.7
Grading	15	30	900	11.7	10,530	28.6	367.8
Building Construction	83	280	46,480	11.7	543,816	28.6	18,996.8
Paving	15	30	900	11.7	10,530	28.6	367.8
Architectural Coating	17	30	1,020	11.7	11,934	28.6	416.9
						Total	**20,737.9**

Gas

Total Construction Gasoline Usage	**20,737.9**
Total Construction Diesel Usage	**65,041.2**

Operational Trips			
Vehicle Class	CalEEMod	Total Project Trips	Total Trips per Vehicle Class
LDA	52.19%	122	63.7
LDT1	4.07%	122	5.0
LDT2	22.71%	122	27.7
MDV	12.49%	122	15.2
LHD1	2.46%	122	3.0
LHD2	0.60%	122	0.7
MHD	1.43%	122	1.7
HHD	1.39%	122	1.7
OBUS	0.08%	122	0.1
UBUS	0.09%	122	0.1
MCY	2.25%	122	2.7
SBUS	0.05%	122	0.1
MH	0.21%	122	0.3

Operational Trips – Fuel Efficiency						
Fuel	Vehicle Class	EMFAC2021 Outputs1				
		Fleet Mix (%)2	Fuel Consumption (1,000 gallons/day)	VMT (miles/day)	Fuel Efficiency3 (miles/gallon)	
Gas	LDA	53%	631.7	19,801,918.5	31.3	16.6
	LDT1	4%	62.5	1,634,325.5	26.2	1.1
	LDT2	27%	387.8	9,950,167.8	25.7	6.8
	MDV	14%	245.2	5,084,190.81	20.7	2.8
	LHD1	2%	73.0	718,081.15	9.8	0.2
	MCY	0%	3.7	153,072.54	41.6	0.2
	MH	0%	3.9	17,192.04	4.4	0.0
	Fleet Mix	–	–	–	27.8	27.8
Diesel	LHD2	7%	12.5	170,008.14	13.6	0.9
	MHDT	23%	70.7	603,035.4	8.5	2.0
	HHDT	70%	293.5	1,811,002.3	6.2	4.3
	Fleet Mix	–	–	–	7.2	7.2

Notes:

[1] EMFAC2021 was run for Alameda County for the year 2026. Data was aggregated over all vehicle model years and speed bins.

[2] Fleet mix is based on assumptions made in CalEEMod for the proposed project.

[3] The fuel efficiency was calculated by dividing the VMT (miles/day) by the fuel consumption (gallons/day).

Operational Trips – Fuel Usage						
Land Use	Total Annual VMT2 (miles/year)	Fuel Type	Portion of Fleet3 (%)	VMT by Fuel Type (miles/year)	Fleet Mix Efficiency4 (miles/gallon)	Fuel Usage (gallons/ year)
Condo/Townhouse	351,841.00	Gas	97%	339,563.1	27.8	12,224.8
		Diesel	3%	11,997.8	7.2	1,664.7
					Total Gasoline/year	**12,224.8**
					Total Diesel/year	**1,664.7**

Notes:

[1] Calculated for year 2026 only. Future years will likely use less fuel due to more efficient cars.

[2] Total VMT is based on project's trip generation and trip lengths.

[3] Fleet distribution is based on EMFAC2021 output and CalEEMod assumptions.

[4] Fuel efficiency is based on fuel consumption and VMT data from EMFAC2021 for Alameda County and total VMT.

Proposed Project Electricity Usage	
Electricity by Land Use	**kWh/year**
Condo/Townhouse	491,566
Health Club	17,205
Parking Lot	11,448
Total	**520,219**

Proposed Project Natural Gas Usage			
Natural Gas by Land Use	**kBTU/year**	**BTU/year**	**therms/year**
Condo/Townhouse	3,360,828	3,360,828,000	33,615
Health Club	69,055	69,055,000	691
Parking Lot	-	-	-
Total	**3,360,828**	**3,360,828,000**	**33,615**