

APPENDIX I

Energy Calculations

Table 1. Summary of Energy Use During Construction

Fuel Type	Quantity
Diesel	
On-Site Construction Equipment	72,025 Gallons
Off-Site Motor Vehicles	30,673,463 Gallons
Total	30,745,488 Gallons
Gasoline	
On-Site Construction Equipment	0 Gallons
Off-Site Motor Vehicles	112,072,912 Gallons
Total	112,072,912 Gallons
Electricity	1,234 kWh

Table 2. Summary of Annual Energy Use During Operation

Source	Units	Project	Existing	Net Difference
Electricity				
High School	kWh/yr	2,812,950	3,500,595	-687,645
Retail	kWh/yr	0	14,309	-14,309
Residential	kWh/yr	0	146,289	-146,289
Church	kWh/yr	0	28,896	-28,896
Building Subtotal	kWh/yr	2,812,950	3,690,170	-877,220
Indoor Water Use	kWh/yr	92,663	168,620	-75,957
Outdoor Water Use	kWh/yr	238,631	330,274	-91,644
Water Subtotal	kWh/yr	331,293	498,895	-167,601
Electricity Total	kWh/yr	3,144,243	4,189,065	-1,044,821
Natural Gas				
High School	kBTU/yr	2,786,160	3,467,260	-681,100
Retail	kBTU/yr	0	19,114	-19,114
Residential	kBTU/yr	0	424,834	-424,834
Church	kBTU/yr	0	49,811	-49,811
Natural Gas Total	kBTU/yr	2,786,160	3,961,019	-1,174,859
Mobile				
Diesel	gallons	15,244	23,654	-8,410
Gasoline	gallons	78,675	141,802	-63,127

Table 3. Water by Land Use

Land Use	Units	Project			Existing			Net Difference		
		Indoor/Outdoor Use	Indoor Use	Outdoor Use	Indoor/Outdoor Use	Indoor Use	Outdoor Use	Indoor/Outdoor Use	Indoor Use	Outdoor Use
Residential		0/0	0	0	1.694/1.06796	1.694	1.06796	0.312739/0.231419	-0.312739	-0.231419
Retail		0/0	0	0	.099726/.0611224	0.099726	0.0611224	0.079797808/0.057393	-0.0797978	-0.0573939
High School	Mgal	7.11642/21.4789	7.11642	21.4789	11.0701/28.466	11.0701	28.466	4.2741/4.44733	-3.95368	-6.9871
Church	Mgal	0/0	0	0	0.0860444/.132582	0.0860444	0.132582	0.0688356 / 0.126373	-0.0688356	-0.126373
Sum						12.94987	29.7276644		-4.4150524	

Water and Wastewater Electricity Intensity (kWh/gallon)

Supply Water	0.009727
Treat Water	0.000111
Distribute Water	0.001272
Wastewater Treatment	0.001911

Source: CalEEMod User's Guide, Appendix D, Table 9.2 Los Angeles - South Coast Air District

Indoor Water Factor	0.013021 kWh/gallon (supply, treat, distribute, wastewater treatment)
Outdoor Water Factor	0.01111 kWh/gallon (supply, treat, and distribute)

Notes:

Electricity and Natural Gas for the Project is total operational usage. Net difference, takes total Project usage and subtracts existing uses. Electricity, natural gas, and mobile usage was calculated from CalEEMod in **Appendix C** of the EIR

Table 4. Off-road Equipment Fuel Usage During Construction

Phase Name	Off-road Equipment Type	Amount	Hours per Day	Horsepower	Load Factor	Number of Days	Diesel Fuel Usage
							(Gallons per Project)
Demolition	Concrete/Industrial Saws	1	8	81	0.73	50	1,183
Demolition	Excavators	3	8	158	0.38	50	3,602
Demolition	Rubber Tired Dozers	2	8	247	0.4	50	3,952
Site Preparation	Rubber Tired Dozers	3	8	247	0.4	30	3,557
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37	30	1,723
Grading	Excavators	2	8	158	0.38	30	1,441
Grading	Graders	1	8	187	0.41	30	920
Grading	Rubber Tired Dozers	1	8	247	0.4	30	1,186
Grading	Scrapers	2	8	367	0.48	30	4,228
Grading	Tractors/Loaders/Backhoes	2	8	97	0.37	30	861
Building Construction	Cranes	1	7	231	0.29	368	8,628
Building Construction	Forklifts	3	8	89	0.2	368	7,860
Building Construction	Generator Sets	1	8	84	0.74	368	9,150
Building Construction	Tractors/Loaders/Backhoes	3	7	97	0.37	368	13,868
Building Construction	Welders	1	8	46	0.45	368	3,047
Architectural Coating	Air Compressors	1	6	78	0.48	88	988
Paving	Pavers	2	8	130	0.42	55	2,402
Paving	Paving Equipment	2	8	132	0.36	55	2,091
Paving	Rollers	2	8	80	0.38	55	1,338
							72,025

Notes:

Equipment assumptions from CalEEMod.

Fuel usage estimate of 0.05 gallons per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3 E.

Table 5. On road Vehicle Fuel Usage During Construction

Phase Name	Days	Daily	Total			Trip Length (Miles)			Total Length (Miles)			Fuel Consumption (Gallons)	
		Worker Trips	Worker Trips	Vendor Trips	Haul Trips	Worker	Vendor	Hauling	Worker	Vendor	Hauling	Gasoline	Diesel
Demolition	59	15	885	0	4,637	15	7	20	13,010	0	92,740	275,801	75,455
Site Preparation	36	18	648	0	0	15	7	20	9,526	0	0	201,943	55,248
Grading	36	20	720	0	0	15	7	20	10,584	0	0	224,381	61,387
Building Construction	442	768	339,456	300	0	15	7	20	4,990,003	2,070	0	105,788,068	28,954,025
Paving	106	15	1,590	0	0	15	7	20	23,373	0	0	495,508	135,563
Architectural Coating	106	154	16,324	0	0	15	7	20	239,963	0	0	5,087,211	1,391,784
Total	785	990	359,623	300	4,637	n/a	n/a	n/a	5,286,458	2,070	92,740	112,072,912	30,673,463

Fuel Efficiency

Workers 21.2
 Vendor/Haul Trucks 5.8

Notes:

Fuel efficiency calculated in **Table 10, EMFAC2014 Results - Construction.**

Table 6. Water Usage for Control of Fugitive Dust During Construction

Phase Name	Days	Total Disturbed Acreage	Gallons for Project	Electricity (kWh)
Demolition	59	0	0	0
Site Preparation	36	0	0	0
Grading	36	42	126,840	1,234
Building Construction	442	0	0	0
Paving	106	0	0	0
Architectural Coating	106	0	0	0
Total	785	42	126,840	1,234

Notes:

Total disturbed acreage for demolition per Project description, Project Site area. Total disturbed acreage for site preparation through architectural coating per CalEEMod for proposed Project.

Construction Schedule

6 days per week
22 days per month

Water Usage

3,020 gallons per acre per day

Source: Air & Waste Management Association, Air Pollution Engineering Manual, 1992 Edition

Supply Water Electricity Intensity

0.009727 kWh/gallons (CalEEMod default for South Coast Air Basin)

Table 7. On road Vehicles - Operational

Scenario	Annual VMT	Fuel Consumption (gal)	
		Gasoline	Diesel
Future Project	1,817,552	78,675	15,244

Table 8. Fuel Consumption Summary

Fuel	Fuel Efficiency (MPG)	%Fleet
Gasoline	21.3	94.0%
Diesel	9.3	6.0%

Notes:

*Percent fleet based on VMT from EMFAC2014 as shown in **Table 9, EMFAC2014 Emissions Inventory-Operations**.*

Annual VMT obtained from the City of Pasadena Traffic Study for the proposed Project.

*Fuel efficiency based on calculations in **Table 9, EMFAC2014 Emissions Inventory-Operations**, from EMFAC2014.*

Table 9. EMFAC2014 Emissions Inventory - Operations

Fuel	VMT (miles/day)	Fuel Consumption (1,000 gal/day)	Fuel Efficiency (miles per gallon)	Fuel Percentage
GAS	215,042,233	9,572	19.6	94
DSL	16,641,783	2,030	7.5	6

Note: Fuel percentage based on VMT.
 Fuel efficiency calculated using fuel consumption and VMT from EMFAC2014.

EMFAC2014 (v1.0.7) Emissions Inventory

Region Type: Sub-Area

Region: Los Angeles (SC)

Calendar Year: 2021

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	Fuel_Consumption
Los Angele	2021	All Other Buses	Aggregated	Aggregated	DSL	3234.62641	215275.5236	0	25.37401
Los Angele	2021	LDA	Aggregated	Aggregated	DSL	35548.9463	1273104.695	221036.2	34.51625
Los Angele	2021	LDT1	Aggregated	Aggregated	DSL	417.554637	11498.94833	2180.7	0.442675
Los Angele	2021	LDT2	Aggregated	Aggregated	DSL	2462.56146	93369.82312	15854.98	3.332202
Los Angele	2021	LHD1	Aggregated	Aggregated	DSL	49231.7064	1878804.553	619272.9	90.97899
Los Angele	2021	LHD2	Aggregated	Aggregated	DSL	22828.1814	936157.6085	287149.8	49.59246
Los Angele	2021	MDV	Aggregated	Aggregated	DSL	14987.6562	565579.3023	96202.35	25.98924
Los Angele	2021	MH	Aggregated	Aggregated	DSL	4547.85937	41381.59908	454.7859	4.074947
Los Angele	2021	Motor Coach	Aggregated	Aggregated	DSL	825.158998	117409.8613	0	20.39945
Los Angele	2021	PTO	Aggregated	Aggregated	DSL	0	96906.19787	0	20.03631
Los Angele	2021	SBUS	Aggregated	Aggregated	DSL	2752.61775	104677.2891	0	14.46502
Los Angele	2021	T6 Ag	Aggregated	Aggregated	DSL	159.101998	2596.331899	0	0.318577
Los Angele	2021	T6 CAIRP heavy	Aggregated	Aggregated	DSL	125.743392	6708.9978	0	0.761501
Los Angele	2021	T6 CAIRP small	Aggregated	Aggregated	DSL	306.256169	20594.96741	0	2.350087
Los Angele	2021	T6 instate construc	Aggregated	Aggregated	DSL	1762.23037	131042.9692	0	15.30584
Los Angele	2021	T6 instate construc	Aggregated	Aggregated	DSL	5699.88234	346495.5036	0	40.10921
Los Angele	2021	T6 instate heavy	Aggregated	Aggregated	DSL	19745.5116	972570.4541	0	112.594
Los Angele	2021	T6 instate small	Aggregated	Aggregated	DSL	39084.7238	2475979.561	0	286.2678
Los Angele	2021	T6 OOS heavy	Aggregated	Aggregated	DSL	73.6532324	3844.003604	0	0.436848
Los Angele	2021	T6 OOS small	Aggregated	Aggregated	DSL	175.473275	11800.14234	0	1.346512
Los Angele	2021	T6 Public	Aggregated	Aggregated	DSL	4013.47254	66729.5598	0	7.914047
Los Angele	2021	T6 utility	Aggregated	Aggregated	DSL	842.36717	16062.63424	0	1.921079
Los Angele	2021	T7 Ag	Aggregated	Aggregated	DSL	123.351083	1962.159535	0	0.369015
Los Angele	2021	T7 CAIRP	Aggregated	Aggregated	DSL	4891.49453	1042692.688	0	173.9902
Los Angele	2021	T7 CAIRP construct	Aggregated	Aggregated	DSL	389.477519	92960.8838	0	15.49057
Los Angele	2021	T7 NNOOS	Aggregated	Aggregated	DSL	5024.40891	1292940.23	0	202.51
Los Angele	2021	T7 NOOS	Aggregated	Aggregated	DSL	1970.78142	411863.3043	0	70.16631
Los Angele	2021	T7 POLA	Aggregated	Aggregated	DSL	8585.06117	1335634.876	0	244.1215
Los Angele	2021	T7 Public	Aggregated	Aggregated	DSL	4819.22727	110448.3539	0	22.01193
Los Angele	2021	T7 Single	Aggregated	Aggregated	DSL	4877.69623	488038.9824	0	81.52213
Los Angele	2021	T7 single construct	Aggregated	Aggregated	DSL	2517.09447	240477.5752	0	39.46552
Los Angele	2021	T7 SWCV	Aggregated	Aggregated	DSL	4036.407	185904.7375	0	72.06185
Los Angele	2021	T7 tractor	Aggregated	Aggregated	DSL	11209.6198	1486941.132	0	239.5268
Los Angele	2021	T7 tractor construc	Aggregated	Aggregated	DSL	2006.29506	179293.806	0	29.68528
Los Angele	2021	T7 utility	Aggregated	Aggregated	DSL	366.578222	8383.302097	0	1.603529
Los Angele	2021	UBUS	Aggregated	Aggregated	DSL	3326.23894	375650.8931	13304.96	79.27886
Los Angele	2021	LDA	Aggregated	Aggregated	ELEC	110324.267	4938034.353	719082.4	0
Los Angele	2021	LDT1	Aggregated	Aggregated	ELEC	281.467625	8504.879528	1691.964	0
Los Angele	2021	LDA	Aggregated	Aggregated	GAS	3643620.31	122847633.7	22963428	4475.857
Los Angele	2021	LDT1	Aggregated	Aggregated	GAS	320844.904	10716600.67	1952238	463.7581
Los Angele	2021	LDT2	Aggregated	Aggregated	GAS	1341680.11	48208408.23	8502454	2329.832
Los Angele	2021	LHD1	Aggregated	Aggregated	GAS	65824.7331	1935649.361	980690.4	176.8783
Los Angele	2021	LHD2	Aggregated	Aggregated	GAS	14784.4119	523955.5915	220265.7	51.41584
Los Angele	2021	MCY	Aggregated	Aggregated	GAS	176369.237	1186809.363	352703.2	34.58679
Los Angele	2021	MDV	Aggregated	Aggregated	GAS	842356.001	28287641.1	5252190	1837.941
Los Angele	2021	MH	Aggregated	Aggregated	GAS	19520.424	166778.6038	1952.823	23.0341
Los Angele	2021	OBUS	Aggregated	Aggregated	GAS	5633.14063	255760.7537	112707.9	36.13748
Los Angele	2021	SBUS	Aggregated	Aggregated	GAS	1345.51223	51265.4848	5382.049	4.477406
Los Angele	2021	T6TS	Aggregated	Aggregated	GAS	12122.2099	627931.0316	242541.2	90.44175
Los Angele	2021	T7IS	Aggregated	Aggregated	GAS	510.866257	69949.08129	10221.41	14.83677
Los Angele	2021	UBUS	Aggregated	Aggregated	GAS	1449.22147	163849.7441	5796.886	32.63107

	VMT Sum	Fuel Sum
Diesel	16641783.45	2030.330574
Gas	215042232.7	9571.82759

Table 10. EMFAC2014 Results - Construction

Vehicle Class	Fuel	VMT (miles per day)	Fuel (1,000 gal per day)	Fuel Efficiency (miles per gallon)
LDA	GAS	122,392,950	4,998	24.49
LDT1	GAS	10,632,074	510	20.85
LDT2	GAS	45,356,165	2,473	18.34
Average (LDA, LDT1, LDT2)				21.23
T7 Tractor Construction	DSL	159,857	28	5.78

Construction Worker Fleet Mix

LDA	50%
LDT1	25%
LDT2	25%

Vendor and Delivery/Haul Truck Fleet Mix

HHDT	100%
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EMFAC2014 (v1.0.7) Emissions Inventory

Region Type: Sub-Area

Region: Los Angeles (SC)

Calendar Year: 2017

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	Fuel_Consumption
Los Angeles (SC)	2017	LDA	Aggregated	Aggregated	GAS	3540792	122392949.734	22263381	4998.486
Los Angeles (SC)	2017	LDA	Aggregated	Aggregated	DSL	26374.23	994749.749	161060.3	30.31063
Los Angeles (SC)	2017	LDA	Aggregated	Aggregated	ELEC	26092.85	1190347.080	169760.8	0
Los Angeles (SC)	2017	LDT1	Aggregated	Aggregated	GAS	314531.7	10632073.691	1905395	509.8685
Los Angeles (SC)	2017	LDT1	Aggregated	Aggregated	DSL	504.267	14237.565	2648.679	0.584656
Los Angeles (SC)	2017	LDT1	Aggregated	Aggregated	ELEC	351.7908	11005.398	2131.833	0
Los Angeles (SC)	2017	LDT2	Aggregated	Aggregated	GAS	1236493	45356165.193	7799820	2473.284
Los Angeles (SC)	2017	LDT2	Aggregated	Aggregated	DSL	1664.01	69102.781	10753.07	2.688849
Los Angeles (SC)	2017	T7 tractor consti	Aggregated	Aggregated	DSL	1945.285	159856.875	0	27.63723