Appendix D

Energy Calculations

Cubberley Community Center Master Plan

12/19/2025

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

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529

Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT

Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Concrete/Industrial Saws	1	8	33	0.73	Demolition Phase - Phase I	555
Excavators	3	8	36	0.38	Demolition Phase - Phase I	945
Rubber Tired Dozers	2	8	367	0.4	Demolition Phase- Phase I	6,084
Excavators	1	8	36	0.38	Grading Phase - Phase I	315
Graders	1	8	148	0.41	Grading Phase - Phase I	1,257
Rubber Tired Dozers	1	8	367	0.29	Grading Phase - Phase I	2,205
Tractors/Loaders/Backhoes	3	8	84	0.37	Grading Phase - Phase I	2,148
Cranes	1	7	367	0.29	Building Construction Phase - Phase I	13,941
Forklifts	3	8	82	0.2	Building Construction Phase - Phase I	8,188
Generator Sets	1	8	14	0.74	Building Construction Phase - Phase I	1,724
Tractors/Loaders/Backhoes	3	7	84	0.37	Building Construction Phase - Phase I	13,577
Welders	1	8	46	0.45	Building Construction Phase - Phase I	3,445
Forklifts	2	8	82	0.2	Renovation Building Construction - Phase I	3,176
Pavers	2	8	81	0.42	Paving Phase - Phase I	1,567
Paving Equipment	2	8	89	0.36	Paving Phase - Phase I	1,476
Rollers	2	8	36	0.38	Paving Phase - Phase I	630
Air Compressors	1	6	37	0.48	Architectural Coating Phase - Phase I	307
Concrete/Industrial Saws	1	8	33	0.73	Demolition Phase - Phase II	396
Rubber Tired Dozers	1	8	367	0.4	Demolition Phase - Phase II	2,173
Tractors/Loaders/Backhoes	3	8	84	0.37	Demolition Phase - Phase II	1,534
Graders	1	8	148	0.41	Grading Phase - Phase II	282
Rubber Tired Dozers	1	8	367	0.4	Grading Phase - Phase II	683
Tractors/Loaders/Backhoes	2	7	84	0.37	Grading Phase - Phase II	281
Cranes	1	8	367	0.29	Building Construction Phase - Phase II	17,462
Forklifts	2	7	82	0.2	Building Construction Phase - Phase II	5,235
Generator Sets	1	8	14	0.74	Building Construction Phase - Phase II	1,890
Tractors/Loaders/Backhoes	1	6	84	0.37	Building Construction Phase - Phase II	4,252
Welders	3	8	46	0.45	Building Construction Phase - Phase II	11,327
Cement and Mortar Mixers	1	8	10	0.56	Paving Phase - Phase II	47
Pavers	1	8	81	0.42	Paving Phase - Phase II	288
Paving Equipment	1	8	89	0.36	Paving Phase - Phase II	271
Rollers	2	8	36	0.38	Paving Phase - Phase II	232
Tractors/Loaders/Backhoes	1	8	84	0.37	Paving Phase - Phase II	263
Air Compressors	1	6	37	0.48	Architectural Coating Phase - Phase II	113
Concrete/Industrial Saws	1	8	33	0.73	Demolition Phase - Phase III	396
Rubber Tired Dozers	1	8	367	0.4	Demolition Phase - Phase III	2,173
Tractors/Loaders/Backhoes	3	8	84	0.37	Demolition Phase - Phase III	1,534
Graders	1	8	148	0.41	Grading Phase - Phase III	282
Rubber Tired Dozers	1	8	367	0.4	Grading Phase - Phase III	683
Tractors/Loaders/Backhoes	2	7	84	0.37	Grading Phase - Phase III	281
Cranes	1	8	367	0.29	Building Construction Phase - Phase III	17,462
Forklifts	2	7	82	0.2	Building Construction Phase - Phase III	5,235
Generator Sets	1	8	14	0.74	Building Construction Phase - Phase III	1,890
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Rollers	2	8	36	0.38	Paving Phase - Phase III	232
Tractors/Loaders/Backhoes	1	8	84	0.37	Paving Phase - Phase III	263
Air Compressors	1	6	37	0.48	Architectural Coating Phase - Phase III	113
					Total Fuel Used	**155,001**
						(Gallons)

Construction Phase	Days of Operation
Demolition - Phase I	49
Grading - Phase I	49
New Building Construction - Phase I	354
Renovation Building Construction - Phase I	206
Paving - Phase I	49

Architectural Coating - Phase I	49
Demolition - Phase II	35
Grading - Phase II	11
Building Construction - Phase II	388
Paving - Phase II	18
Architectural Coating - Phase II	18
Demolition - Phase III	35
Grading - Phase III	11
Building Construction - Phase III	388
Paving - Phase III	18
Architectural Coating - Phase III	18
Total Days	**1696**

WORKER TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Demolition - Phase I	24.1	**15**	**12.95**	395
Grading - Phase I	24.1	**15**	**12.95**	395
New Building Construction - Phase I	24.1	**130.4**	**12.95**	24,805
Renovation Building Construction - Phase I	24.1	**130.4**	**12.95**	14,434
Paving - Phase I	24.1	**15**	**12.95**	395
Architectural Coating - Phase I	24.1	**52.2**	**12.95**	1,374
Demolition - Phase II	24.1	**12.5**	**11.7**	212
Grading - Phase II	24.1	**10.0**	**11.7**	53
Building Construction - Phase II	24.1	**40.3**	**11.7**	7,591
Paving - Phase II	24.1	**15.0**	**11.7**	131
Architectural Coating - Phase II	24.1	**8.1**	**11.7**	71
Demolition - Phase III	24.1	**12.5**	**11.7**	212
Grading - Phase III	24.1	**10.0**	**11.7**	53
Building Construction - Phase III	24.1	**48.2**	**11.7**	9,079
Paving - Phase III	24.1	**15.0**	**11.7**	131
Architectural Coating - Phase III	24.1	**9.6**	**11.7**	84
			Total Fuel Used	59,417

HAULING AND VENDOR TRIPS

HAULING TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)	
Demolition - Phase I	7.5	27	20.0	3504.48	
Demolition - Phase II	7.5	7	20.0	672.00	
Demolition - Phase III	7.5	11	20.0	1036.00	
			Total Fuel Used	**5,212.48**	19,497.71

VENDOR TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
New Building Construction - Phase I	7.5	54	6.9	10217.16
Renovation Building Construction - Phase I	7.5	54	6.9	2430.30
Building Construction - Phase II	7.5	16	8.4	861.62
Building Construction - Phase III	7.5	20	8.4	776.16
			Total Fuel Used	**14,285.23**

Total Gasoline Consumption (gallons)	**59,417**
Total Diesel Consumption (gallons)	**174,498**

Sources:

[1] United States Environmental Protection Agency. 2021. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES3.0.2* . September. Available at: https://www.epa.gov/system/files/documents/2021-08/420r21021.pdf.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2021. *National Transportation Statistics* . Available at: https://www.bts.gov/topics/national-transportation-statistics.

Cubberley Community Center Master Plan

Last Updated: 1/16/26

Populate one of the following tables (Leave the other blank):

Annual VMT		OR	Daily Vehicle Trips	
Annual VMT:	10,546,498		Daily Vehicle Trips:	
			Average Trip Distance:	

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Fleet Class	Fleet Mix
Light Duty Auto (LDA)	0.510480
Light Duty Truck 1 (LDT1)	0.033960
Light Duty Truck 2 (LDT2)	0.242110
Medium Duty Vehicle (MDV)	0.138300
Light Heavy Duty 1 (LHD1)	0.024760
Light Heavy Duty 2 (LHD2)	0.006318
Medium Heavy Duty (MHD)	0.009790
Heavy Heavy Duty (HHD)	0.008000
Other Bus (OBUS)	0.001058
Urban Bus (UBUS)	0.000390
Motorcycle (MCY)	0.021900
School Bus (SBUS)	0.000677
Motorhome (MH)	0.002195

Fuel Economy (MPG) [1]	
Passenger Vehicles	24.8
Light-Med Duty Trucks	18.1
Heavy Trucks/Other	7.9
Motorcycles	44

Fleet Mix

Vehicle Type	Percent	Fuel Type	Annual VMT: VMT	Vehicle Trips: VMT	Fuel Consumption (Gallons)
Passenger Vehicles	*51.05%*	*Gasoline*	5,383,776	0.00	217,088
Light-Medium Duty Trucks	*41.44%*	*Gasoline*	4,370,152	0.00	241,445
Heavy Trucks/Other	*5.32%*	*Diesel*	560,947	0.00	71,006
Motorcycle	*2.19%*	*Gasoline*	230,968	0.00	5,249

Total Gasoline Consumption (gallons)	**463,782**
Total Diesel Consumption (gallons)	**71,006**

Sources:

[1] United States Department of Transportation, Bureau of Transportation Statistics. 2024. National Transportation Statistics. Available at: https://www.bts.gov/topics/national-transportation-statistics.