

Appendix E

Energy Modeling Worksheets

Ashby and North Berkeley BART Stations Transit-Oriented Development Zoning Standards Project

Last Updated: 3/3/2021

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

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529
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Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT							
Construction Equipment	#	Hours per		Load		Construction Phase	Fuel Used (gallons)
		Day	Horsepower	Factor	Factor		
Rubber Tired Dozers	3	8	247	0.4		Site Preparation Phase	1,253.39
Tractors/Loaders/Backhoes	4	8	97	0.37		Site Preparation Phase	674.90
Graders	1	8	187	0.41		Grading Phase	972.65
Excavators	2	8	158	0.38		Grading Phase	1,523.35
Rubber Tired Dozers	1	8	247	0.4		Grading Phase	1,253.39
Tractors/Loaders/Backhoes	2	8	97	0.37		Grading Phase	1,012.34
Scrapers	2	8	367	0.48		Grading Phase	4,469.59
Cranes	1	7	231	0.29		Building Construction Phase	7,436.15
Forklifts	3	8	89	0.2		Building Construction Phase	7,531.22
Generator Sets	1	8	84	0.74		Building Construction Phase	8,766.68
Tractors/Loaders/Backhoes	3	7	97	0.37		Building Construction Phase	13,287.00
Welders	1	8	46	0.45		Building Construction Phase	2,919.41
Air Compressors	1	6	78	0.48		Architectural Coating Phase	1,188.07
Pavers	2	8	130	0.42		Paving Phase	923.55
Paving Equipment	2	8	132	0.36		Paving Phase	803.80
Rollers	2	8	80	0.38		Paving Phase	571.66
Total Fuel Used							54,587.15 (Gallons)

Construction Phase	Days of Operation
Site Preparation Phase	10
Grading Phase	30
Building Construction Phase	300
Paving Phase	20
Architectural Coating Phase	90
Total Days	450

WORKER TRIPS					
Construction Phase	MPG [2]	Trips	Trip Length (miles)		Fuel Used (gallons)
			Miles	Miles	
Site Preparation Phase	24.4	18	10.8	10.8	79.67
Grading Phase	24.4	20	10.8	10.8	265.57
Building Construction Phase	24.4	1778	10.8	10.8	236095.08
Paving Phase	24.4	15	10.8	10.8	132.79
Architectural Coating Phase	24.4	356	10.8	10.8	14181.64
Fuel					250,754.75

HAULING AND VENDOR TRIPS					
Trip Class	MPG [2]	Trips	Trip Length (miles)		Fuel Used (gallons)
			Miles	Miles	
HAULING TRIPS					

Site Preparation Phase	7.5	0	20.0	0.00
Grading Phase	7.5	3333	20.0	8888.00
Building Construction Phase	7.5	0	20.0	0.00
Paving Phase	7.5	0	20.0	0.00
Architectural Coating Phase	7.5	0	20.0	0.00

Fuel	8,888.00
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VENDOR TRIPS

Site Preparation Phase	7.5	0	7.3	0.00
Grading Phase	7.5	0	7.3	0.00
Building Construction Phase	7.5	277	7.3	80884.00
Paving Phase	7.5	0	7.3	0.00
Architectural Coating Phase	7.5	0	7.3	0.00

Fuel	80,884.00
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Total Gasoline Consumption (gallons)	250,754.75
Total Diesel Consumption (gallons)	144,359.15

Sources:

[1] United States Environmental Protection Agency. 2018. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES2014b*. July 2018. Available at: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf>.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2019. *National Transportation Statistics 2019*. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.

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Last Updated: 6/2/2021

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

Annual VMT	OR	Daily Vehicle Trips
Annual VMT: 16,807,730		Daily Vehicle Trips: Average Trip Distance:

Fleet Class	Fleet Mix	Fuel Economy (MPG) [1]	
Light Duty Auto (LDA)	0.585795	Passenger Vehicles	24.4
Light Duty Truck 1 (LDT1)	0.036515	Light-Med Duty Trucks	17.9
Light Duty Truck 2 (LDT2)	0.193581	Heavy Trucks/Other	7.5
Medium Duty Vehicle (MDV)	0.106455	Motorcycles	44
Light Heavy Duty 1 (LHD1)	0.012789		
Light Heavy Duty 2 (LHD2)	0.005274		
Medium Heavy Duty (MHD)	0.019465		
Heavy Heavy Duty (HHD)	0.028415		
Other Bus (OBUS)	0.002699		
Urban Bus (UBUS)	0.001789		
Motorcycle (MCY)	0.005626		
School Bus (SBUS)	0.000921		
Motorhome (MH)	0.000676		

Fleet Mix

Vehicle Type	Percent	Fuel Type	Annual VMT:		Fuel Consumption (Gallons)
			VMT	Vehicle Trips: VMT	
Passenger Vehicles	58.58%	Gasoline	9845884	0.00	403519.84
Light-Medium Duty Trucks	33.66%	Gasoline	5656658	0.00	316014.43
Heavy Trucks/Other	7.20%	Diesel	1210627	0.00	161416.96
Motorcycle	0.56%	Gasoline	94560	0.00	2149.10

Total Gasoline Consumption (gallons)	721683.37
Total Diesel Consumption (gallons)	161416.96

Sources:

[1] United States Department of Transportation, Bureau of Transportation Statistics. 2019. National Transportation Statistics 2019. Available at: <https://www.bts.gov/topics/national-transportation-statistics>.