

Appendix D Vehicle Fuel/Energy Usage

Appendix

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Operation-Related Vehicle Fuel/Energy Usage

PROPOSED COMMUTE

Year	Gas		Diesel		CNG		Electricity	
	VMT	Gallons	VMT	Gallons	VMT	Gallons	VMT	kWh
Proposed Project	652,846	25,130	71,974	8,697	2,351	855	5,958	1,975
Total	652,846	25,130	71,974	8,697	2,351	855	5,958	1,975

Proposed Facilities

PROPOSED CONDITIONS

Vehicle type	Fleet percent	VMT	
		Place of	
		Worship	Place of Worship
LDA	55.00%	403,186	403,186
LDT1	3.71%	27,216	27,216
LDT2	17.96%	131,706	131,706
MDV	11.95%	87,577	87,577
LHD1	1.72%	12,631	12,631
LHD2	0.53%	3,861	3,861
MHD	1.79%	13,106	13,106
HHD	6.27%	45,944	45,944
OBUS	0.13%	988	988
UBUS	0.16%	1,178	1,178
MCY	0.60%	4,399	4,399
SBUS	0.08%	595	595
MH	0.10%	740	740
	100.00%	733,129	733,129

PROPOSED CONDITIONS

Vehicle type	Gas percent	Diesel percent	CNG percent	Electricity
				percent
LDA	98.03%	0.78%	0.00%	1.19%
LDT1	99.52%	0.03%	0.00%	0.44%
LDT2	98.86%	0.57%	0.00%	0.57%
MDV	97.65%	2.02%	0.00%	0.33%
LHD1	53.68%	46.32%	0.00%	0.00%
LHD2	35.19%	64.81%	0.00%	0.00%
MHD	7.55%	92.45%	0.00%	0.00%
HHD	0.03%	97.35%	2.62%	0.00%
OBUS	52.27%	47.73%	0.00%	0.00%
UBUS	2.72%	0.05%	97.23%	0.00%
MCY	100.00%	0.00%	0.00%	0.00%
SBUS	29.68%	70.32%	0.00%	0.00%
MH	72.99%	27.01%	0.00%	0.00%

PROPOSED CONDITIONS

Vehicle type	VMT	Gasoline		Diesel		CNG		Electricity		
		mpg	Gallons	mpg	Gallons	mpg	Gallons	m/kWh	kWh	
LDA	395,237	30.55	12,938	50.05	63	0	0	4,790	3.02	1,588
LDT1	27,087	25.91	1,045	24.21	8	0	0	121	3.02	40
LDT2	130,199	24.04	5,415	36.83	20	0	0	757	3.02	251
MDV	85,518	19.51	4,383	27.52	64	0	0	290	3.02	96
LHD1	6,781	10.43	650	20.73	282	0	0	0	0.00	0
LHD2	1,359	9.07	150	18.80	133	0	0	0	0.00	0
MHD	990	5.08	195	10.56	1,148	0	0	0	0.00	0
HHD	12	4.10	3	6.52	6,858	1,205	2.14	564	0	0.00
OBUS	517	5.04	103	8.85	53	0	0	0	0.00	0
UBUS	32	9.10	4	7.52	0	1,146	3.94	290	0	0.00
MCY	4,399	37.26	118	0.00	0	0	0	0	0.00	0
SBUS	177	8.97	20	7.61	55	0	0	0	0.00	0
MH	540	5.04	107	10.40	19	0	0	0	0.00	0
	652,846		25,130		71,974		2,351	855	5,958	1,975

Proposed Project + Events

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated Annual VMT	Mitigated Annual VMT
	Weekday	Saturday	Sunday		
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Place of Worship	264.14	149.33	726.15	669,324	669,324
Total	264.14	149.33	726.15	669,324	669,324

4.2 Trip Summary Information

Land Use	Average Daily Trip Rate			Unmitigated Annual VMT	Mitigated Annual VMT
	Weekday	Saturday	Sunday		
Place of Worship	29.92	29.92	29.92	83,805	83,805
Total	29.92	29.92	29.92	83,805	83,805

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.549952	0.037123	0.179649	0.119457	0.017229	0.005267	0.017877	0.062669	0.001348	0.001607	0.006000	0.000812	0.001010
Other Non-Asphalt Surfaces	0.549952	0.037123	0.179649	0.119457	0.017229	0.005267	0.017877	0.062669	0.001348	0.001607	0.006000	0.000812	0.001010
Parking Lot	0.549952	0.037123	0.179649	0.119457	0.017229	0.005267	0.017877	0.062669	0.001348	0.001607	0.006000	0.000812	0.001010
Place of Worship	0.549952	0.037123	0.179649	0.119457	0.017229	0.005267	0.017877	0.062669	0.001348	0.001607	0.006000	0.000812	0.001010

<< Equal to T6 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)

<< Equal to T7 (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)

<< Motor coach, all other buses, and OBUS (<https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3-technical-documentation-052015.pdf>)

Appendix C: Evidence Used to Define the Average Number of KWH Required to Displace a Gallong of Gasoline

Table A 3: Evidence from U.S. Department of Energy and U.S. Environmental Protection Agency's fuel economy website^[32]

Vehicle	Model year	Electric consumption	Gasoline fuel economy	Number of kWh that are equivalent to 1 gallon
Ford Fusion Energi & Ford C-Max Energi	2013	0.34 kWh per mile	43 mpg	14.6
Chevrolet Volt	2013	0.35 kWh per mile	37 mpg	12.9
Chevrolet Volt	2012	0.36 kWh per mile	37 mpg	13.3
Fisker Karma	2012	0.62 kWh per mile	20 mpg	12.4
Toyota Prius	2013	0.29 kWh per mile & 0.2 gal	50 mpg	13.1
Average for five models	-	-	-	13.3 +/- 0.8

Table A 5: Average power consumption per mile traveled over time for different PEV categories

Year range	2012- 2020	2020-2030	2030-2040	2040-2050	2050
Efficiency improvement per year	0.3%	0.8%	0.9%	0.9%	
Year	2012	2020	2030	2040	2050
Relative energy efficiency	1.000	0.976	0.901	0.823	0.752

https://www.fhwa.dot.gov/environment/climate_change/mitigation/publications_and_tools/ev_deployment/page08.cfm

0.34	14.6	2013	0.34
0.35	12.9	2014	0.34
0.36	13.3	2015	0.34
0.34	13.3	2016	0.34
		2017	0.34
		2018	0.34
		2019	0.34
		2020	0.33
		2021	0.33
		2022	0.33
		2023	0.33
		2024	0.32
		2025	0.32
		2026	0.32
		2027	0.32
		2028	0.31
		2029	0.31
		2030	0.31
		2031	0.31
		2032	0.30
		2033	0.30
		2034	0.30
		2035	0.29

EMFAC Fuel Usage: Year 2021

Vehicle type	Gasoline			Diesel			Natural Gas		Electricity	
	VMT/day	Gallons/day	Miles/gallon	VMT/day	Gallons/day	Miles/gallon	VMT/day	Gallons/day	Miles/gallon	VMT/day
All other buses	0	0	#DIV/0!	10,773	1,050	10.26	0	0	#DIV/0!	0
LDA	22,828,246	747,304	30.55	182,431	3,645	50.05	0	0	#DIV/0!	276,683
LDT1	1,984,927	76,604	25.91	619	26	24.21	0	0	#DIV/0!	8,864
LDT2	6,439,025	267,804	24.04	37,079	1,007	36.83	0	0	#DIV/0!	37,437
LHD1	494,488	47,415	10.43	426,664	20,579	20.73	0	0	#DIV/0!	0
LHD2	86,917	9,583	9.07	160,058	8,512	18.80	0	0	#DIV/0!	0
MCY	155,184	4,165	37.26	0	0	#DIV/0!	0	0	#DIV/0!	0
MDV	5,213,170	267,180	19.51	107,898	3,921	27.52	0	0	#DIV/0!	17,665
MH	31,646	6,273	5.04	11,711	1,126	10.40	0	0	#DIV/0!	0
Motor coach	0	0	#DIV/0!	6,443	994	6.48	0	0	#DIV/0!	0
OBUS	18,853	3,741	5.04	0	0	#DIV/0!	0	0	#DIV/0!	0
PTO	0	0	#DIV/0!	33,270	6,813	4.88	0	0	#DIV/0!	0
SBUS	10,088	1,125	8.97	23,906	3,142	7.61	0	0	#DIV/0!	0
T6	77,625	15,274	5.08	949,977	89,996	10.56	0	0	#DIV/0!	0
T7	456	111	4.10	1,717,332	263,332	6.52	46,285	21,659	2.14	0
UBUS	12,981	1,426	9.10	238	32	7.52	464,740	117,835	3.94	1
Total	37,353,607	1,448,006	25.80	3,668,400	404,174	9.08	511,026	139,495	3.66	340,650

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EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: Sub-Area

Region: San Bernardino (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	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	Fuel Consumption
San Bernardino (SC)	2021	All Other Buses	Aggregated	Aggregated	DSL	184.5023213	10772.7893	1549.819499	1.049648666
San Bernardino (SC)	2021	LDA	Aggregated	Aggregated	GAS	532075.3759	22828245.75	2507424.739	747.3043661
San Bernardino (SC)	2021	LDA	Aggregated	Aggregated	DSL	3935.252177	182431.1272	18919.14045	3.644771758
San Bernardino (SC)	2021	LDA	Aggregated	Aggregated	ELEC	6845.69282	276682.9796	34477.8172	0
San Bernardino (SC)	2021	LDT1	Aggregated	Aggregated	GAS	54966.81713	1984927.282	248504.6937	76.60356769
San Bernardino (SC)	2021	LDT1	Aggregated	Aggregated	DSL	32.852227819	619.2960178	108.5688123	0.025584706
San Bernardino (SC)	2021	LDT1	Aggregated	Aggregated	ELEC	212.150622	8863.54281	1078.817966	0
San Bernardino (SC)	2021	LDT2	Aggregated	Aggregated	GAS	169049.8885	6439024.718	786945.857	267.8042814
San Bernardino (SC)	2021	LDT2	Aggregated	Aggregated	DSL	830.8340023	37079.36685	4123.679558	1.006675986
San Bernardino (SC)	2021	LDT2	Aggregated	Aggregated	ELEC	1129.79365	37436.63844	5740.069313	0
San Bernardino (SC)	2021	LHD1	Aggregated	Aggregated	GAS	14611.26773	494487.9568	217686.1184	47.41452021
San Bernardino (SC)	2021	LHD1	Aggregated	Aggregated	DSL	11635.58812	426663.9841	146361.061	20.57906474

San Bernardino (SC	2021 LHD2	Aggregated	Aggregated	GAS	2597.418836	86917.15935	38697.6705	9.583243662
San Bernardino (SC	2021 LHD2	Aggregated	Aggregated	DSL	4361.281704	160058.2159	54859.43735	8.512311782
San Bernardino (SC	2021 MCY	Aggregated	Aggregated	GAS	23598.29419	155183.6193	47196.58839	4.164951211
San Bernardino (SC	2021 MDV	Aggregated	Aggregated	GAS	141997.0551	5213170.107	648026.7348	267.1803766
San Bernardino (SC	2021 MDV	Aggregated	Aggregated	DSL	2403.788841	107898.3469	11766.46953	3.920948159
San Bernardino (SC	2021 MDV	Aggregated	Aggregated	ELEC	518.5911582	17665.30162	2657.583984	0
San Bernardino (SC	2021 MH	Aggregated	Aggregated	GAS	3744.064613	31646.26624	374.5562239	6.273462423
San Bernardino (SC	2021 MH	Aggregated	Aggregated	DSL	1317.114019	11710.89647	131.7114019	1.125841906
San Bernardino (SC	2021 Motor Coach	Aggregated	Aggregated	DSL	49.55906978	6443.07904	723.5624187	0.994459344
San Bernardino (SC	2021 OBUS	Aggregated	Aggregated	GAS	412.1438526	18853.24741	8246.174203	3.7412403
San Bernardino (SC	2021 PTO	Aggregated	Aggregated	DSL	0	33269.9201	0	6.813011644
San Bernardino (SC	2021 SBUS	Aggregated	Aggregated	GAS	228.6354628	10088.17245	914.5418513	1.124726845
San Bernardino (SC	2021 SBUS	Aggregated	Aggregated	DSL	753.7377576	23906.34483	8698.029221	3.142052617
San Bernardino (SC	2021 T6 Ag	Aggregated	Aggregated	DSL	2.05	15.85487216	9.02	0.001934202
San Bernardino (SC	2021 T6 CAIRP heavy	Aggregated	Aggregated	DSL	55.70179037	10975.52994	813.2461394	0.951760335
San Bernardino (SC	2021 T6 CAIRP small	Aggregated	Aggregated	DSL	30.539422	1611.431512	445.8755612	0.148224707
San Bernardino (SC	2021 T6 instate construction heavy	Aggregated	Aggregated	DSL	610.8725713	41568.82947	2761.731144	4.129132087
San Bernardino (SC	2021 T6 instate construction small	Aggregated	Aggregated	DSL	1729.877441	89508.4138	7820.708654	8.739048047
San Bernardino (SC	2021 T6 instate heavy	Aggregated	Aggregated	DSL	2637.226783	355049.8604	30433.23144	32.51633954
San Bernardino (SC	2021 T6 instate small	Aggregated	Aggregated	DSL	8373.759994	430565.1657	96632.02935	41.25518104
San Bernardino (SC	2021 T6 OOS heavy	Aggregated	Aggregated	DSL	31.94612154	6347.946348	466.4133745	0.549305844
San Bernardino (SC	2021 T6 OOS small	Aggregated	Aggregated	DSL	16.9562541	880.6990198	247.5613099	0.081377616
San Bernardino (SC	2021 T6 Public	Aggregated	Aggregated	DSL	662.9397624	9966.820088	2010.917277	1.269357819
San Bernardino (SC	2021 T6 utility	Aggregated	Aggregated	DSL	207.1458592	3486.30352	2382.17738	0.354558747
San Bernardino (SC	2021 T6TS	Aggregated	Aggregated	GAS	1417.166829	77624.61365	28354.67391	15.27427206
San Bernardino (SC	2021 T7 CAIRP	Aggregated	Aggregated	DSL	1477.705609	262417.8137	21574.5019	37.93321358
San Bernardino (SC	2021 T7 CAIRP construction	Aggregated	Aggregated	DSL	165.2447645	29859.25131	747.0651556	4.06949522
San Bernardino (SC	2021 T7 NNOOS	Aggregated	Aggregated	DSL	1594.786036	319913.1084	23283.87612	44.38901429
San Bernardino (SC	2021 T7 NOOS	Aggregated	Aggregated	DSL	580.209417	103101.6279	8471.057489	15.26258792
San Bernardino (SC	2021 T7 POLA	Aggregated	Aggregated	DSL	2013.029451	253914.7366	15299.02383	45.38260674
San Bernardino (SC	2021 T7 Public	Aggregated	Aggregated	DSL	929.413064	18840.93478	2819.219625	3.325614644
San Bernardino (SC	2021 T7 Single	Aggregated	Aggregated	DSL	2354.790594	167553.9677	27173.95698	25.46423056
San Bernardino (SC	2021 T7 single construction	Aggregated	Aggregated	DSL	1053.505149	74075.31047	4762.855817	11.17665967
San Bernardino (SC	2021 T7 SWCV	Aggregated	Aggregated	DSL	472.818094	19318.58124	1843.990567	9.449474834
San Bernardino (SC	2021 T7 SWCV	Aggregated	Aggregated	NG	1134.840306	46285.16752	4425.877194	21.65930132
San Bernardino (SC	2021 T7 tractor	Aggregated	Aggregated	DSL	2987.906482	405190.6469	37946.41232	57.28103585
San Bernardino (SC	2021 T7 tractor construction	Aggregated	Aggregated	DSL	879.7392245	61105.60949	3977.26683	9.279923886
San Bernardino (SC	2021 T7 utility	Aggregated	Aggregated	DSL	100.547561	2039.967847	1156.296952	0.318093601
San Bernardino (SC	2021 T7IS	Aggregated	Aggregated	GAS	6.267730564	456.4383219	125.4047531	0.111327431
San Bernardino (SC	2021 UBUS	Aggregated	Aggregated	GAS	114.14327	12981.30659	456.5730801	1.426109308
San Bernardino (SC	2021 UBUS	Aggregated	Aggregated	DSL	2.896720367	238.2836669	11.58688147	0.031682285
San Bernardino (SC	2021 UBUS	Aggregated	Aggregated	ELEC	0.058469431	1.251702935	0.233877724	0
San Bernardino (SC	2021 UBUS	Aggregated	Aggregated	NG	208.0080836	27801.64336	832.0323345	7.244244702
LOS ANGELES	2020 UBUS	Aggregated	Aggregated	NG	4123.445337	436938.8565	16493.78135	110.5910737