

Appendix H

Climate Change Calculations

CONSTRUCTION GHG EMISSIONS

Construction Modeling Assumptions

	CO ₂	CH ₄	N ₂ O	gas dependant	Source
lbs/gallon	22.2				EPA
gr/gallon			0.220		EPA
gr/lb				453.5929	CCAR
tons/metric ton				0.907185	CCAR
hrs/day				8	Stanford
lbs/ton				2000	CCAR
GWP	1	21	310		CCAR

Source

EPA - <http://www.epa.gov/oms/climate/420f05001.htm>
CCAR - Climate Change Action Registry General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions Version 3.1, January 2009.

Stanford Future Project Diesel Engine Use Projection

LPCH PARKING STRUCTURE

Mid 2009 to Late 2010 (Based on a mid-2009 approval to proceed)

	Mid 2009 to Late 2010 (Based on a mid-2009 approval to proceed)								CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	Hrs/day	DURATION (days)	DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
SHORING / EXCAVATION	Drill Rig	230	188	0.0090	0.004	1	8	15	0.75	11.29	0.00	0.0114	0.01	0.0764	11.37	10.32
	Crane	132	80.3	0.0115	0.002	1	8	15	0.32	4.82	0.00	0.0145	0.00	0.0326	4.87	4.42
	Concrete Truck	479*	272	0.0235	0.006	1	8	1	1.09	1.09	0.00	0.0020	0.01	0.0074	1.10	1.00
	Forklift	110	31.2	0.0060	0.001	1	8	15	0.12	1.87	0.00	0.0075	0.00	0.0127	1.89	1.72
	Boring Drill Rig	148	141	0.0095	0.003	1	8	40	0.56	22.57	0.00	0.0319	0.00	0.1529	22.76	20.64
	900 cfm compressor	540	232	0.0186	0.005	1	8	40	0.93	37.08	0.00	0.0625	0.01	0.2511	37.39	33.92
	Grout Mixer & pump	39	34.3	0.0128	0.001	1	8	40	0.14	5.49	0.00	0.0429	0.00	0.0372	5.57	5.06
	Dozer	160	129	0.0225	0.003	1	8	60	0.52	31.07	0.00	0.1136	0.00	0.2105	31.40	28.48
	Excavator	220	159	0.0138	0.003	2	8	60	1.27	76.17	0.00	0.1391	0.01	0.5159	76.82	69.69
	trucks	175	125	0.0166	0.010	3	8	60	1.50	90.06	0.00	0.2513	0.04	2.2543	92.57	83.98
	shotcrete pump	164	140	0.0163	0.003	1	8	25	0.56	14.01	0.00	0.0341	0.00	0.0949	14.14	12.83
	concrete trucks	479*	272	0.0235	0.006	1	8	19	1.09	20.70	0.00	0.0375	0.01	0.1402	20.88	18.94
FOUNDATIONS	Excavator	56	25	0.0113	0.001	1	8	60	0.10	6.00	0.00	0.0570	0.00	0.0406	6.10	5.53
	concrete pump	427	345	0.0237	0.008	1	8	12	1.38	16.57	0.00	0.0239	0.01	0.1122	16.71	15.16
	concrete trucks	479*	272	0.0235	0.006	1	8	15	1.09	16.34	0.00	0.0296	0.01	0.1107	16.48	14.95
	mobile hydro crane	210	112	0.0119	0.002	1	8	30	0.45	13.46	0.00	0.0299	0.00	0.0912	13.58	12.32
					0.000		8		0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
					0.000		8		0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
UTILITIES	backhoes	130	51.7	0.0090	0.001	2	8	10	0.41	4.14	0.00	0.0151	0.00	0.0280	4.18	3.79
	trucks	1	125	0.0166	0.003	1	8	0.5	0.50	0.25	0.00	0.0007	0.00	0.0017	0.25	0.23
SUPERSTRUCTURE					0.000		8		0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
					0.000		8		0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	concrete pump	427	345	0.0237	0.008	1	8	32	1.38	44.19	0.00	0.0638	0.01	0.2993	44.55	40.41
	concrete trucks	479*	272	0.0235	0.006	1	8	60	1.09	65.36	0.00	0.1183	0.01	0.4427	65.92	59.80
	forklift	125	31.2	0.0060	0.001	1	8	45	0.12	5.62	0.00	0.0226	0.00	0.0381	5.68	5.15
					0.000		8		0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
FINAL GRADE	forklift	125	31.2	0.0060	0.001	3	8	30	0.37	11.24	0.00	0.0452	0.00	0.0761	11.36	10.31
	excavator	40	25.0	0.0113	0.001	2	8	20	0.20	4.00	0.00	0.0380	0.00	0.0271	4.07	3.69
	skip loader	60	42.8	0.0061	0.001	2	8	20	0.34	6.84	0.00	0.0206	0.00	0.0463	6.91	6.27
	trucks	1	125	0.0166	0.003	1	8	2.5	0.50	1.25	0.00	0.0035	0.00	0.0085	1.26	1.15

*Large/Med fleet target, Year 2009

Total MT CO₂e

469.75

*Generic Offhighway truck hp

Stanford Future Project Diesel Engine Use Projection

LPCH EXPANSION

Late 2010 to 2014

Late 2010 to 2014								CO2 (tons)		CH4 (tons CO2e)		N2O (tons CO2e)		Tons CO2e	Metric tons
	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
SHORING / EXCAVATION	Drill Rig	230	188	0.0076	0.004	1	20	0.75	15.05	0.00	0.0127	0.01	0.1019	15.16	13.76
	Crane	132	50.1	0.0089	0.001	1	20	0.20	4.01	0.00	0.0149	0.00	0.0272	4.05	3.68
	Concrete Truck	479	272	0.0204	0.006	1	1.25	1.09	1.36	0.00	0.0021	0.01	0.0092	1.37	1.25
	Forklift	110	31.2	0.0044	0.001	1	20	0.12	2.50	0.00	0.0074	0.00	0.0169	2.52	2.29
	Boring Drill Rig	148	141	0.0068	0.003	1	40	0.56	22.57	0.00	0.0228	0.00	0.1529	22.75	20.64
	900 cfm compressor	540	232	0.0154	0.005	1	20	0.93	18.54	0.00	0.0259	0.01	0.1256	18.69	16.96
	Grout Mixer & pump	39	34.3	0.0104	0.001	1	20	0.14	2.75	0.00	0.0175	0.00	0.0186	2.78	2.52
	Dozer	160	129	0.0199	0.003	1	40	0.52	20.72	0.00	0.0670	0.00	0.1403	20.92	18.98
	Excavator	220	159	0.0117	0.003	2	40	1.27	50.78	0.00	0.0789	0.01	0.3439	51.20	46.45
	trucks	175	125	0.0138	0.003	3	40	1.50	60.04	0.00	0.1394	0.01	0.4067	60.59	54.96
	shotcrete pump	164	140	0.0135	0.003	1	25	0.56	14.01	0.00	0.0284	0.00	0.0949	14.14	12.82
	concrete trucks		272	0.0204	0.006	1	19	1.09	20.70	0.00	0.0326	0.01	0.1402	20.87	18.93
FOUNDATION					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	Excavator	56	25.0	0.0082	0.001	1	40	0.10	4.00	0.00	0.0277	0.00	0.0271	4.06	3.68
	concrete pump	427	345	0.0188	0.008	1	12	1.38	16.57	0.00	0.0190	0.01	0.1122	16.70	15.15
	concrete trucks	1	272	0.0204	0.006	1	25	1.09	27.23	0.00	0.0429	0.01	0.1844	27.46	24.91
UTILITIES	mobile hydro crane	210	112	0.0100	0.002	1	40	0.45	17.95	0.00	0.0334	0.00	0.1215	18.10	16.42
	backhoes	130	51.7	0.0069	0.001	3	40	0.62	24.83	0.00	0.0692	0.00	0.1682	25.07	22.74
	trucks	1	125	0.0138	0.003	1	2.5	0.50	1.25	0.00	0.0029	0.00	0.0085	1.26	1.15
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
SUPERSTRUCTURE	shotcrete pump	164	140	0.0135	0.003	1	40	0.56	22.42	0.00	0.0454	0.00	0.1518	22.62	20.52
	concrete trucks	1	272	0.0204	0.006	1	25	1.09	27.23	0.00	0.0429	0.01	0.1844	27.46	24.91
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	crane	331	180	0.0148	0.004	1	70	0.72	50.43	0.00	0.0867	0.00	0.3415	50.86	46.14
	forklift	125	31.2	0.0044	0.001	1	70	0.12	8.74	0.00	0.0259	0.00	0.0592	8.83	8.01
	generator	35	30.6	0.0087	0.001	3	70	0.37	25.72	0.00	0.1526	0.00	0.1742	26.05	23.63
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	concrete pump	427	345	0.0188	0.008	1	16	1.38	22.09	0.00	0.0253	0.01	0.1496	22.27	20.20
	concrete trucks	1	272	0.0204	0.006	1	30	1.09	32.68	0.00	0.0515	0.01	0.2213	32.95	29.89
	forklift	125	31.2	0.0044	0.001	1	64	0.12	7.99	0.00	0.0237	0.00	0.0541	8.07	7.32
	forklift	125	31.2	0.0044	0.001	3	180	0.37	67.45	0.00	0.2002	0.00	0.4568	68.10	61.78
	crane	450	180	0.0148	0.004	1	6	0.72	4.32	0.00	0.0074	0.00	0.0293	4.36	3.95
crane	331	180	0.0148	0.004	1	30	0.72	21.61	0.00	0.0372	0.00	0.1464	21.80	19.77	
FINAL GRADE	excavator	40	25.0	0.0082	0.001	2	40	0.20	8.01	0.00	0.0553	0.00	0.0542	8.12	7.36
	skip loader	60	25.5	0.0054	0.001	2	40	0.20	8.17	0.00	0.0361	0.00	0.0553	8.26	7.49
	trucks	1	125	0.0138	0.003	1	5	0.50	2.50	0.00	0.0058	0.00	0.0169	2.52	2.29

*Large/Med fleet target, Year 2012

Total MT CO₂e 580.56

Note: LPCH Clinic Building is no longer a separate building in the project (as was previously described in the Application). The 50,000 sf of Clinics Program has been absorbed into the Hospital Enclosure

Stanford Future Project Diesel Engine Use Projection

SHC PARKING STRUCTURE

Late 2009 to Mid 2011 (Based on a mid-2009 approval to proceed)

Late 2009 to Mid 2011 (Based on a mid-2009 approval to proceed)															Tons CO ₂ e	Metric tons
	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		TotEmis		
								DayEmis	Phase Total	Day	Phase Total	Day	Phase Total			
SHORING / EXCAVATION	Drill Rig	230	188	0.0086	0.004	1	20	0.75	15.05	0.00	0.0145	0.01	0.1019	15.16	13.76	
	Crane	132	80.3	0.0109	0.002	1	20	0.32	6.43	0.00	0.0184	0.00	0.0435	6.49	5.89	
	Concrete Truck	479*	272	0.0225	0.006	1	2.5	1.09	2.72	0.00	0.0047	0.01	0.0184	2.75	2.49	
	Forklift	110	31.2	0.0054	0.001	1	20	0.12	2.50	0.00	0.0091	0.00	0.0169	2.52	2.29	
	Boring Drill Rig	148	141	0.0084	0.003	1	100	0.56	56.43	0.00	0.0705	0.00	0.3822	56.88	51.60	
	900 cfm compressor	540	232	0.0175	0.005	1	50	0.93	46.35	0.00	0.0736	0.01	0.3139	46.74	42.40	
	Grout Mixer & pump	39	34.3	0.0121	0.001	1	50	0.14	6.87	0.00	0.0508	0.00	0.0465	6.96	6.32	
	Dozer	160	129	0.0216	0.003	1	100	0.52	51.79	0.00	0.1817	0.00	0.3508	52.32	47.47	
	Excavator	220	159	0.0131	0.003	2	100	1.27	126.95	0.00	0.2200	0.01	0.8598	128.03	116.14	
	trucks	175	125	0.0156	0.003	3	100	1.50	150.11	0.00	0.3937	0.01	1.0166	151.52	137.45	
	shotcrete pump	164	140	0.0154	0.003	1	40	0.56	22.42	0.00	0.0518	0.00	0.1518	22.62	20.52	
concrete trucks	1	272	0.0225	0.006	1	75	1.09	81.70	0.00	0.1417	0.01	0.5533	82.40	74.75		
FOUNDATIONS	Excavator	56	25.0	0.0102	0.001	1	40	0.10	4.00	0.00	0.0343	0.00	0.0271	4.06	3.69	
	concrete pump	427	345	0.0221	0.008	1	16	1.38	22.09	0.00	0.0297	0.01	0.1496	22.27	20.21	
	concrete trucks	1	272	0.0225	0.006	1	40	1.09	43.57	0.00	0.0756	0.01	0.2951	43.94	39.87	
	mobile hydro crane	210	112	0.0112	0.002	1	40	0.45	17.95	0.00	0.0377	0.00	0.1215	18.10	16.42	
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
UTILITIES	backhoes	130	64.9	0.0136	0.001	2	10	0.52	5.19	0.00	0.0229	0.00	0.0352	5.25	4.76	
	trucks	1	125	0.0156	0.003	1	0.5	0.50	0.25	0.00	0.0007	0.00	0.0017	0.25	0.23	
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
SUPERSTRUCTURE					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
	concrete pump	427	345	0.0221	0.008	1	40	1.38	55.23	0.00	0.0743	0.01	0.3741	55.68	50.51	
	concrete trucks	1	272	0.0225	0.006	1	75	1.09	81.70	0.00	0.1417	0.01	0.5533	82.40	74.75	
	forklift	125	31.2	0.0054	0.001	1	100	0.12	12.49	0.00	0.0456	0.00	0.0846	12.62	11.45	
	forklift	125	31.2	0.0054	0.001	3	40	0.37	14.99	0.00	0.0547	0.00	0.1015	15.14	13.74	
	crane	450	180	0.0164	0.004	1	2	0.72	1.44	0.00	0.0028	0.00	0.0098	1.45	1.32	
FINAL GRADE	excavator	40	25.0	0.0102	0.001	2	30	0.20	6.00	0.00	0.0515	0.00	0.0407	6.10	5.53	
	skip loader	60	25.5	0.0071	0.001	2	30	0.20	6.12	0.00	0.0357	0.00	0.0415	6.20	5.63	
	trucks	1	125	0.0156	0.003	1	4	0.50	2.00	0.00	0.0052	0.00	0.0136	2.02	1.83	

*Large/Med fleet target, Year 2010

Total MT CO₂e 771.01

Stanford Future Project Diesel Engine Use Projection

PARKING STRUCTURE 3 DEMOLITION

Mid 2011 to Late 2011								CO2 (tons)		CH4 (tons CO2e)		N2O (tons CO2e)		Tons CO2e	Metric tons
DEMO	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	Phase		Phase		Phase			
								DayEmis	Total	Day	Total	Day	Total	TotEmis	
	Excavator	300	234	0.0170	0.005	1	30	0.93	28.05	0.00	0.0429	0.01	0.1900	28.28	25.66
	Excavator	175	112	0.0124	0.002	1	30	0.45	13.47	0.00	0.0313	0.00	0.0912	13.59	12.33
	Bobcat	25	13.8	0.0021	0.000	1	30	0.06	1.66	0.00	0.0052	0.00	0.0112	1.67	1.52
trucks	175	125	0.0147	0.003	1	7.5	0.50	3.75	0.00	0.0093	0.00	0.0254	3.79	3.44	
*Large/Med fleet target, Year 2011														Total MT CO2e	42.94

Stanford Future Project Diesel Engine Use Projection

SHC REPLACEMENT HOSPITAL

Late 2011 to Late 2015

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								Phase		Phase		Phase		TotEmis	
								DayEmis	Total	Day	Total	Day	Total		
SHORING / EXCAVATION	Drill Rig	230	188	0.0076	0.004	1	30	0.75	22.57	0.00	0.0191	0.01	0.1529	22.74	20.63
	Crane	132	50.1	0.0089	0.001	1	30	0.20	6.02	0.00	0.0223	0.00	0.0408	6.08	5.52
	Concrete Truck	479	272	0.0204	0.006	1	2	1.09	2.18	0.00	0.0034	0.01	0.0148	2.20	1.99
	Forklift	110	31.2	0.0044	0.001	1	30	0.12	3.75	0.00	0.0111	0.00	0.0254	3.78	3.43
	Boring Drill Rig	148	141	0.0068	0.003	1	50	0.56	28.22	0.00	0.0284	0.00	0.1911	28.43	25.80
	900 cfm compressor	540	232	0.0154	0.005	1	25	0.93	23.17	0.00	0.0324	0.01	0.1570	23.36	21.20
	Grout Mixer & pump	39	34.3	0.0104	0.001	1	25	0.14	3.43	0.00	0.0219	0.00	0.0233	3.48	3.16
	Dozer	160	129	0.0199	0.003	1	50	0.52	25.90	0.00	0.0837	0.00	0.1754	26.15	23.73
	Excavator	220	159	0.0117	0.003	2	50	1.27	63.47	0.00	0.0986	0.01	0.4299	64.00	58.06
	trucks	175	125	0.0138	0.003	3	50	1.50	75.05	0.00	0.1743	0.01	0.5083	75.74	68.71
	shotcrete pump	164	140	0.0135	0.003	1	40	0.56	22.42	0.00	0.0454	0.00	0.1518	22.62	20.52
FOUNDATION	concrete trucks	1	272	0.0204	0.006	1	28	1.09	30.50	0.00	0.0480	0.01	0.2066	30.76	27.90
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	Excavator	56	25.0	0.0082	0.001	1	60	0.10	6.00	0.00	0.0415	0.00	0.0407	6.09	5.52
	concrete pump	427	345	0.0188	0.008	1	25	1.38	34.52	0.00	0.0396	0.01	0.2338	34.79	31.56
	concrete trucks	1	272	0.0204	0.006	1	31	1.09	33.77	0.00	0.0532	0.01	0.2287	34.05	30.89
UTILITIES	mobile hydro crane	210	112	0.0100	0.002	1	60	0.45	26.92	0.00	0.0502	0.00	0.1823	27.15	24.63
	backhoes	130	51.7	0.0069	0.001	3	40	0.62	24.83	0.00	0.0692	0.00	0.1682	25.07	22.74
	trucks	1	125	0.0138	0.003	1	2.5	0.50	1.25	0.00	0.0029	0.00	0.0085	1.26	1.15
SUPERSTRUCTURE					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	crane	331	180	0.0148	0.004	1	140	0.72	100.86	0.00	0.1735	0.00	0.6831	101.71	92.27
	forklift	125	31.2	0.0044	0.001	1	140	0.12	17.49	0.00	0.0519	0.00	0.1184	17.66	16.02
	generator	35	30.6	0.0087	0.001	3	140	0.37	51.45	0.00	0.3053	0.00	0.3484	52.10	47.26
	concrete pump	427	345	0.0188	0.008	1	30	1.38	41.42	0.00	0.0475	0.01	0.2806	41.75	37.88
	concrete trucks	1	272	0.0204	0.006	1	100	1.09	108.93	0.00	0.1715	0.01	0.7378	109.84	99.65
	forklift	125	31.2	0.0044	0.001	1	30	0.12	3.75	0.00	0.0111	0.00	0.0254	3.78	3.43
	forklift	125	31.2	0.0044	0.001	3	450	0.37	168.61	0.00	0.5004	0.00	1.1420	170.26	154.45
	crane	450	180	0.0148	0.004	1	10	0.72	7.20	0.00	0.0124	0.00	0.0488	7.27	6.59
	crane	331	180	0.0148	0.004	1	13	0.72	9.37	0.00	0.0161	0.00	0.0634	9.44	8.57
FINAL GRADE	excavator	40	25.0	0.0082	0.001	2	40	0.20	8.01	0.00	0.0553	0.00	0.0542	8.12	7.36
	skip loader	60	25.5	0.0054	0.001	2	40	0.20	8.17	0.00	0.0361	0.00	0.0553	8.26	7.49
	trucks	1	125	0.0138	0.003	1	2.5	0.50	1.25	0.00	0.0029	0.00	0.0085	1.26	1.15

*Large/Med fleet target, Average of Years 2012 (lbs/hr)

Total MT CO₂e 879.25

Stanford Future Project Diesel Engine Use Projection

CORE EXPANSION, BOSWELL, EAST, WEST, AND CORE PAVILLIONS DEMOLITION

Early 2017 to Late 2019								CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
DEMO	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
	Excavator	300	234	0.0128	0.005	2	80	1.87	149.59	0.00	0.1716	0.01	1.0131	150.78	136.78
	Excavator	175	112	0.0081	0.002	2	80	0.90	71.82	0.00	0.1086	0.01	0.4864	72.42	65.70
	Bobcat	25	13.8	0.0016	0.000	4	80	0.22	17.66	0.00	0.0435	0.00	0.1196	17.82	16.17
	trucks	175	125	0.0097	0.003	1	31	0.50	15.51	0.00	0.0252	0.00	0.1051	15.64	14.19
	*Large/Med fleet target, Year 2017								3	255					Total MT CO ₂ e
								0.0	0.6						

Stanford Future Project Diesel Engine Use Projection

SHC CLINICS PARKING STRUCTURE

Early 2017 to Late 2019															Tons CO ₂ e	Metric tons
	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		TotEmis		
								DayEmis	Phase Total	Day	Phase Total	Day	Phase Total			
SHORING / EXCAVATION	Drill Rig	230	188	0.0052	0.004	1	20	0.75	15.05	0.00	0.0088	0.01	0.1019	15.16	13.75	
	Crane	132	50.1	0.0062	0.001	1	20	0.20	4.01	0.00	0.0105	0.00	0.0272	4.05	3.67	
	Concrete Truck	479	272	0.0158	0.006	1	0.75	1.09	0.82	0.00	0.0010	0.01	0.0055	0.82	0.75	
	Forklift	110	31.2	0.0026	0.001	1	20	0.12	2.50	0.00	0.0044	0.00	0.0169	2.52	2.29	
	Boring Drill Rig	148	141	0.0047	0.003	1	100	0.56	56.43	0.00	0.0393	0.00	0.3822	56.85	51.58	
	900 cfm compressor	540	232	0.0119	0.005	1	50	0.93	46.35	0.00	0.0501	0.01	0.3139	46.71	42.38	
	Grout Mixer & pump	39	34.3	0.0061	0.001	1	50	0.14	6.87	0.00	0.0258	0.00	0.0465	6.94	6.30	
	Dozer	160	129	0.0159	0.003	1	100	0.52	51.79	0.00	0.1336	0.00	0.3508	52.28	47.42	
	Excavator	220	159	0.0090	0.003	2	100	1.27	126.95	0.00	0.1504	0.01	0.8598	127.96	116.08	
	trucks	1	125	0.0097	0.003	3	100	1.50	150.11	0.00	0.2436	0.01	1.0166	151.37	137.32	
	shotcrete pump	164	140	0.0085	0.003	1	40	0.56	22.42	0.00	0.0285	0.00	0.1518	22.60	20.50	
	concrete trucks	1	272	0.0158	0.006	1	38	1.09	41.39	0.00	0.0505	0.01	0.2804	41.73	37.85	
FOUNDATIO	Excavator	56	25.0	0.0047	0.001	1	40	0.10	4.00	0.00	0.0158	0.00	0.0271	4.05	3.67	
	concrete pump	427	345	0.0132	0.008	1	16	1.38	22.09	0.00	0.0178	0.01	0.1496	22.26	20.19	
	concrete trucks	1	272	0.0158	0.006	1	20	1.09	21.79	0.00	0.0266	0.01	0.1476	21.96	19.92	
	mobile hydro crane	210	112	0.0075	0.002	1	40	0.45	17.95	0.00	0.0252	0.00	0.1215	18.09	16.41	
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
UTILITIES	backhoes	130	51.7	0.0043	0.001	2	10	0.41	4.14	0.00	0.0072	0.00	0.0280	4.17	3.79	
	trucks	1	125	0.0097	0.003	1	0.25	0.50	0.13	0.00	0.0002	0.00	0.0008	0.13	0.11	
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
SUPERSTRUC					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
	concrete pump	427	345	0.0132	0.008	1	40	1.38	55.23	0.00	0.0445	0.01	0.3741	55.65	50.49	
	concrete trucks	1	272	0.0158	0.006	1	75	1.09	81.70	0.00	0.0997	0.01	0.5533	82.35	74.71	
	forklift	125	31.2	0.0026	0.001	1	100	0.12	12.49	0.00	0.0218	0.00	0.0846	12.60	11.43	
	forklift	125	31.2	0.0026	0.001	3	40	0.37	14.99	0.00	0.0261	0.00	0.1015	15.12	13.71	
	crane	450	180	0.0114	0.004	1	2	0.72	1.44	0.00	0.0019	0.00	0.0098	1.45	1.32	
FINAL GRADE	excavator	40	25.0	0.0047	0.001	2	30	0.20	6.00	0.00	0.0237	0.00	0.0407	6.07	5.51	
	skip loader	60	25.5	0.0026	0.001	2	30	0.20	6.12	0.00	0.0131	0.00	0.0415	6.18	5.61	
	trucks	1	125	0.0097	0.003	1	4	0.50	2.00	0.00	0.0032	0.00	0.0136	2.02	1.83	

*Large/Med fleet target, Year 2017

Total MT CO₂e 708.58

Stanford Future Project Diesel Engine Use Projection

SHC CLINICS

Late 2019 to Late 2021

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
SHORING / EXCAVATION	Drill Rig	230	188	0.0043	0.004	1	20	0.75	15.05	0.00	0.0072	0.01	0.1019	15.16	13.75
	Crane	132	50.1	0.0049	0.001	1	20	0.20	4.01	0.00	0.0082	0.00	0.0272	4.05	3.67
	Concrete Truck	479	272	0.0134	0.006	1	0.75	1.09	0.82	0.00	0.0008	0.01	0.0055	0.82	0.75
	Forklift	110	31.2	0.0020	0.001	1	20	0.12	2.50	0.00	0.0034	0.00	0.0169	2.52	2.28
	Boring Drill Rig	148	141	0.0036	0.003	1	40	0.56	22.57	0.00	0.0122	0.00	0.1529	22.74	20.63
	900 cfm compressor	540	232	0.0103	0.005	1	20	0.93	18.54	0.00	0.0174	0.01	0.1256	18.68	16.95
	Grout Mixer & pump	39	34.3	0.0042	0.001	1	20	0.14	2.75	0.00	0.0070	0.00	0.0186	2.77	2.52
	Dozer	160	129	0.0136	0.003	1	40	0.52	20.72	0.00	0.0458	0.00	0.1403	20.90	18.96
	Excavator	220	159	0.0075	0.003	2	40	1.27	50.78	0.00	0.0502	0.01	0.3439	51.17	46.42
	trucks	175	125	0.0076	0.003	3	40	1.50	60.04	0.00	0.0761	0.01	0.4067	60.52	54.91
	shotcrete pump	164	140	0.0064	0.003	1	25	0.56	14.01	0.00	0.0135	0.00	0.0949	14.12	12.81
FOUNDATION	concrete trucks		272	0.0134	0.006	1	19	1.09	20.70	0.00	0.0214	0.01	0.1402	20.86	18.92
	Excavator	56	25.0	0.0035	0.001	1	40	0.10	4.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	concrete pump	427	345	0.0112	0.008	1	12	1.38	16.57	0.00	0.0113	0.01	0.1122	16.69	15.14
	concrete trucks	1	272	0.0134	0.006	1	15	1.09	16.34	0.00	0.0169	0.01	0.1107	16.47	14.94
	mobile hydro crane	210	112	0.0064	0.002	1	40	0.45	17.95	0.00	0.0214	0.00	0.1215	18.09	16.41
UTILITIES	backhoes	130	51.7	0.0033	0.001	3	40	0.62	24.83	0.00	0.0333	0.00	0.1682	25.03	22.71
	trucks		272	0.0134	0.006	1	2.5	1.09	2.72	0.00	0.0028	0.01	0.0184	2.74	2.49
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
SUPERSTRUCTURE	shotcrete pump	164	140	0.0064	0.003	1	40	0.56	22.42	0.00	0.0216	0.00	0.1518	22.59	20.50
	concrete trucks		272	0.0134	0.006	1	25	1.09	27.23	0.00	0.0282	0.01	0.1844	27.45	24.90
	crane	331	180	0.0098	0.004	1	70	0.72	50.43	0.00	0.0577	0.00	0.3415	50.83	46.11
	forklift	125	31.2	0.0020	0.001	1	70	0.12	8.74	0.00	0.0120	0.00	0.0592	8.81	8.00
	generator	35	30.6	0.0034	0.001	3	70	0.37	25.72	0.00	0.0604	0.00	0.1742	25.96	23.55
	concrete pump	427	345	0.0112	0.008	1	16	1.38	22.09	0.00	0.0151	0.01	0.1496	22.26	20.19
	concrete trucks	1	272	0.0134	0.006	1	30	1.09	32.68	0.00	0.0338	0.01	0.2213	32.94	29.88
	forklift	125	31.2	0.0020	0.001	1	64	0.12	7.99	0.00	0.0109	0.00	0.0541	8.06	7.31
	forklift	125	31.2	0.0020	0.001	3	180	0.37	67.45	0.00	0.0923	0.00	0.4568	67.99	61.68
	crane	450	180	0.0098	0.004	1	6	0.72	4.32	0.00	0.0049	0.00	0.0293	4.36	3.95
	crane	331	180	0.0098	0.004	1	30	0.72	21.61	0.00	0.0247	0.00	0.1464	21.78	19.76
FINAL GRADE	excavator	40	25.0	0.0035	0.001	2	40	0.20	8.01	0.00	0.0233	0.00	0.0542	8.08	7.33
	skip loader	60	25.5	0.0021	0.001	2	40	0.20	8.17	0.00	0.0139	0.00	0.0553	8.24	7.47
	trucks	1	125	0.0076	0.003	1	5	0.50	2.50	0.00	0.0032	0.00	0.0169	2.52	2.29

*Large/Med fleet target, Year 2020

Total MT CO₂e 570.85

Stanford Future Project Diesel Engine Use Projection

FIM #1

Construction of FIM1 (Year 2010-2012) will require approximately 2 years, followed by demolition of Edwards Building (6 months).

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
FOUNDATION	Drill Rig	230	188	0.0086	0.004	1	10	0.75	7.52	0.00	0.0072	0.01	0.0510	7.58	6.88
	Crane	132	80.3	0.0109	0.002	1	10	0.32	3.21	0.00	0.0092	0.00	0.0218	3.24	2.94
	Concrete Truck	1	272	0.0225	0.006	1	0.25	1.09	0.27	0.00	0.0005	0.01	0.0018	0.27	0.25
	Forklift	110	31.2	0.0054	0.001	1	10	0.12	1.25	0.00	0.0046	0.00	0.0085	1.26	1.14
	Boring Drill Rig	148	141	0.0084	0.003	1	25	0.56	14.11	0.00	0.0176	0.00	0.0955	14.22	12.90
	900 cfm compressor	540	232	0.0175	0.005	1	12	0.93	11.12	0.00	0.0177	0.01	0.0753	11.22	10.18
	Grout Mixer & pump	39	34.3	0.0121	0.001	1	12	0.14	1.65	0.00	0.0122	0.00	0.0112	1.67	1.52
	Dozer	160	129	0.0216	0.003	1	25	0.52	12.95	0.00	0.0454	0.00	0.0877	13.08	11.87
	Excavator	220	159	0.0131	0.003	2	25	1.27	31.74	0.00	0.0550	0.01	0.2149	32.01	29.04
	trucks	1	125	0.0156	0.003	3	25	1.50	37.53	0.00	0.0984	0.01	0.2542	37.88	34.36
FOOTINGS	shotcrete pump	164	140	0.0154	0.003	1	15	0.56	8.41	0.00	0.0194	0.00	0.0569	8.48	7.70
	concrete trucks	1	272	0.0225	0.006	1	10	1.09	10.89	0.00	0.0189	0.01	0.0738	10.99	9.97
	Boring Drill Rig	148	141	0.0084	0.003	1	20	0.56	11.29	0.00	0.0141	0.00	0.0764	11.38	10.32
	Grout Mixer & pump	39	34.3	0.0121	0.001	1	20	0.14	2.75	0.00	0.0203	0.00	0.0186	2.79	2.53
	900 cfm compressor	540	232	0.0175	0.005	1	20	0.93	18.54	0.00	0.0295	0.01	0.1256	18.69	16.96
	Excavator	56	25.0	0.0102	0.001	1	20	0.10	2.00	0.00	0.0172	0.00	0.0136	2.03	1.84
	concrete pump	427	345	0.0221	0.008	1	8	1.38	11.05	0.00	0.0149	0.01	0.0748	11.14	10.10
	concrete trucks	1	272	0.0225	0.006	1	10	1.09	10.89	0.00	0.0189	0.01	0.0738	10.99	9.97
	mobile hydro crane	210	112	0.0112	0.002	1	20	0.45	8.97	0.00	0.0188	0.00	0.0608	9.05	8.21
	backhoes	130	64.9	0.0136	0.001	3	40	0.78	31.15	0.00	0.1372	0.01	0.2110	31.50	28.57
UTILITIES	trucks	1	125	0.0156	0.003	1	0.25	0.50	0.13	0.00	0.0003	0.00	0.0008	0.13	0.11
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
SUPERSTRUCTURE	shotcrete pump	164	140	0.0154	0.003	1	20	0.56	11.21	0.00	0.0259	0.00	0.0759	11.31	10.26
	concrete trucks	1	272	0.0225	0.006	1	13	1.09	14.16	0.00	0.0246	0.01	0.0959	14.28	12.96
	crane	331	180	0.0164	0.004	1	35	0.72	25.21	0.00	0.0483	0.00	0.1708	25.43	23.07
	forklift	125	31.2	0.0054	0.001	1	35	0.12	4.37	0.00	0.0160	0.00	0.0296	4.42	4.01
	generator	35			0.000	2	35	0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	concrete pump	427	345	0.0221	0.008	1	8	1.38	11.05	0.00	0.0149	0.01	0.0748	11.14	10.10
	concrete trucks	1	272	0.0225	0.006	1	10	1.09	10.89	0.00	0.0189	0.01	0.0738	10.99	9.97
	forklift	125	31.2	0.0054	0.001	1	32	0.12	4.00	0.00	0.0146	0.00	0.0271	4.04	3.66
	forklift	125	31.2	0.0054	0.001	3	90	0.37	33.72	0.00	0.1231	0.00	0.2284	34.07	30.91
	crane	450	180	0.0164	0.004	1	2	0.72	1.44	0.00	0.0028	0.00	0.0098	1.45	1.32
FINAL GRADE	crane	331	180	0.0164	0.004	1	13	0.72	9.37	0.00	0.0179	0.00	0.0634	9.45	8.57
	excavator	40	25.0	0.0102	0.001	2	20	0.20	4.00	0.00	0.0343	0.00	0.0271	4.06	3.69
	skip loader	60	25.5	0.0071	0.001	2	20	0.20	4.08	0.00	0.0238	0.00	0.0277	4.13	3.75
	concrete trucks	1	272	0.0225	0.006	1	10	1.09	10.89	0.00	0.0189	0.01	0.0738	10.99	9.97
*Large/Med fleet target, Year 2010 (grams/bhp-hr)														Total MT CO ₂ e	349.59

Note: The SoM project component consists of two main elements: Construction of FIM buildings and demolition of associated existing buildings.

Stanford Future Project Diesel Engine Use Projection

FIM #2

FIM 2 would be built (Year 2014-2016), followed by demolition of Lane and Alway Buildings (6 months).

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
FOUNDATION	Drill Rig	230	188	0.0066	0.004	1	10	0.75	7.52	0.00	0.0056	0.01	0.0510	7.58	6.88
	Crane	132	50.1	0.0078	0.001	1	10	0.20	2.01	0.00	0.0065	0.00	0.0136	2.03	1.84
	Concrete Truck	479	272	0.0186	0.006	1	0.25	1.09	0.27	0.00	0.0004	0.01	0.0018	0.27	0.25
	Forklift	110	31.2	0.0035	0.001	1	10	0.12	1.25	0.00	0.0030	0.00	0.0085	1.26	1.14
	Boring Drill Rig	148	141	0.0061	0.003	1	25	0.56	14.11	0.00	0.0127	0.00	0.0955	14.22	12.90
	900 cfm compressor	540	232	0.0139	0.005	1	12	0.93	11.12	0.00	0.0140	0.01	0.0753	11.21	10.17
	Grout Mixer & pump	39	34.3	0.0086	0.001	1	12	0.14	1.65	0.00	0.0086	0.00	0.0112	1.67	1.51
	Dozer	160	129	0.0183	0.003	1	25	0.52	12.95	0.00	0.0385	0.00	0.0877	13.07	11.86
	Excavator	220	159	0.0106	0.003	2	25	1.27	31.74	0.00	0.0447	0.01	0.2149	32.00	29.03
	trucks	175	125	0.0122	0.003	3	25	1.50	37.53	0.00	0.0770	0.01	0.2542	37.86	34.34
	shotcrete pump	164	140	0.0115	0.003	1	15	0.56	8.41	0.00	0.0145	0.00	0.0569	8.48	7.69
	concrete trucks	1	272	0.0186	0.006	1	10	1.09	10.89	0.00	0.0157	0.01	0.0738	10.98	9.96
FOOTINGS	Boring Drill Rig	148	141	0.0061	0.003	1	20	0.56	11.29	0.00	0.0102	0.00	0.0764	11.37	10.32
	Grout Mixer & pump	39	34.3	0.0086	0.001	1	20	0.14	2.75	0.00	0.0144	0.00	0.0186	2.78	2.52
	900 cfm compressor	540	232	0.0139	0.005	1	20	0.93	18.54	0.00	0.0234	0.01	0.1256	18.69	16.95
	Excavator	56	25.0	0.0066	0.001	1	20	0.10	2.00	0.00	0.0110	0.00	0.0136	2.03	1.84
	concrete pump	427	345	0.0164	0.008	1	8	1.38	11.05	0.00	0.0110	0.01	0.0748	11.13	10.10
	concrete trucks	1	272	0.0186	0.006	1	10	1.09	10.89	0.00	0.0157	0.01	0.0738	10.98	9.96
	mobile hydro crane	210	112	0.0088	0.002	1	20	0.45	8.97	0.00	0.0148	0.00	0.0608	9.05	8.21
UTILITIES	backhoes	130	51.7	0.0057	0.001	3	40	0.62	24.83	0.00	0.0577	0.00	0.1682	25.06	22.73
	trucks	1	125	0.0122	0.003	1	0.25	0.50	0.13	0.00	0.0003	0.00	0.0008	0.13	0.11
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
SUPERSTRUCTURE	shotcrete pump	164	140	0.0115	0.003	1	20	0.56	11.21	0.00	0.0193	0.00	0.0759	11.31	10.26
	concrete trucks	1	272	0.0186	0.006	1	13	1.09	14.16	0.00	0.0204	0.01	0.0959	14.28	12.95
	crane	331	180	0.0132	0.004	1	35	0.72	25.21	0.00	0.0389	0.00	0.1708	25.42	23.06
	forklift	125	31.2	0.0035	0.001	1	35	0.12	4.37	0.00	0.0103	0.00	0.0296	4.41	4.00
	generator	35	30.6	0.0071	0.001	2	35	0.24	8.57	0.00	0.0417	0.00	0.0581	8.67	7.87
	concrete pump	427	345	0.0164	0.008	1	8	1.38	11.05	0.00	0.0110	0.01	0.0748	11.13	10.10
	concrete trucks	1	272	0.0186	0.006	1	15	1.09	16.34	0.00	0.0235	0.01	0.1107	16.47	14.95
	forklift	125	31.2	0.0035	0.001	1	32	0.12	4.00	0.00	0.0095	0.00	0.0271	4.03	3.66
	forklift	125	31.2	0.0035	0.001	3	90	0.37	33.72	0.00	0.0798	0.00	0.2284	34.03	30.87
	crane	450	180	0.0132	0.004	1	2	0.72	1.44	0.00	0.0022	0.00	0.0098	1.45	1.32
	crane	331	180	0.0132	0.004	1	13	0.72	9.37	0.00	0.0145	0.00	0.0634	9.44	8.57
FINAL GRADE	excavator	40	25.0	0.0066	0.001	2	20	0.20	4.00	0.00	0.0221	0.00	0.0271	4.05	3.68
	skip loader	60	25.5	0.0040	0.001	2	20	0.20	4.08	0.00	0.0134	0.00	0.0277	4.12	3.74
	trucks	1	125	0.0122	0.003	1	2.5	0.50	1.25	0.00	0.0026	0.00	0.0085	1.26	1.14

*Large/Med fleet target, Year 2014 (grams/bhp-hr)

Total MT CO₂e 346.49

Stanford Future Project Diesel Engine Use Projection

FIM #3

FIM 3 would be built (Year 2018-2020), followed by demolition of Grant Building (6 months).

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis	
FOUNDATION	Drill Rig	230	188	0.0049	0.004	1	10	0.75	7.52	0.00	0.0041	0.01	0.0510	7.58	6.88
	Crane	132	50.1	0.0058	0.001	1	10	0.20	2.01	0.00	0.0048	0.00	0.0136	2.02	1.84
	Concrete Truck	479	272	0.0149	0.006	1	0.25	1.09	0.27	0.00	0.0003	0.01	0.0018	0.27	0.25
	Forklift	110	31.2	0.0024	0.001	1	10	0.12	1.25	0.00	0.0020	0.00	0.0085	1.26	1.14
	Boring Drill Rig	148	77.1	0.0028	0.002	1	25	0.31	7.71	0.00	0.0058	0.00	0.0522	7.77	7.05
	900 cfm compressor	540	232	0.0114	0.005	1	12	0.93	11.12	0.00	0.0115	0.01	0.0753	11.21	10.17
	Grout Mixer & pump	39	34.3	0.0054	0.001	1	12	0.14	1.65	0.00	0.0055	0.00	0.0112	1.66	1.51
	Dozer	160	129	0.0151	0.003	1	25	0.52	12.95	0.00	0.0318	0.00	0.0877	13.07	11.85
	Excavator	220	159	0.0084	0.003	2	25	1.27	31.74	0.00	0.0354	0.01	0.2149	31.99	29.02
	trucks	1	125	0.0089	0.003	3	25	1.50	37.53	0.00	0.0559	0.01	0.2542	37.84	34.32
	shotcrete pump	164	140	0.0076	0.003	1	15	0.56	8.41	0.00	0.0096	0.00	0.0569	8.47	7.69
	concrete trucks	1	272	0.0149	0.006	1	10	1.09	10.89	0.00	0.0126	0.01	0.0738	10.98	9.96
FOOTINGS	Boring Drill Rig	148	77.1	0.0028	0.002	1	20	0.31	6.17	0.00	0.0047	0.00	0.0418	6.22	5.64
	Grout Mixer & pump	39	34.3	0.0054	0.001	1	20	0.14	2.75	0.00	0.0091	0.00	0.0186	2.77	2.52
	900 cfm compressor	540	232	0.0114	0.005	1	20	0.93	18.54	0.00	0.0191	0.01	0.1256	18.68	16.95
	Excavator	56	25.0	0.0042	0.001	1	20	0.10	2.00	0.00	0.0071	0.00	0.0136	2.02	1.83
	concrete pump	427	345	0.0125	0.008	1	8	1.38	11.05	0.00	0.0084	0.01	0.0748	11.13	10.10
	concrete trucks	1	272	0.0149	0.006	1	10	1.09	10.89	0.00	0.0126	0.01	0.0738	10.98	9.96
	mobile hydro crane	210	112	0.0071	0.002	1	20	0.45	8.97	0.00	0.0119	0.00	0.0608	9.05	8.21
UTILITIES	backhoes	130	51.7	0.0039	0.001	3	40	0.62	24.83	0.00	0.0396	0.00	0.1682	25.04	22.71
	trucks	1	125	0.0089	0.003	1	0.25	0.50	0.13	0.00	0.0002	0.00	0.0008	0.13	0.11
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
SUPERSTRUCTURE	shotcrete pump	164	140	0.0076	0.003	1	20	0.56	11.21	0.00	0.0128	0.00	0.0759	11.30	10.25
	concrete trucks	1	272	0.0149	0.006	1	13	1.09	14.16	0.00	0.0163	0.01	0.0959	14.27	12.95
	crane	331	180	0.0108	0.004	1	35	0.72	25.21	0.00	0.0319	0.00	0.1708	25.42	23.06
	forklift	125	31.2	0.0024	0.001	1	35	0.12	4.37	0.00	0.0070	0.00	0.0296	4.41	4.00
	generator	35	30.6	0.0044	0.001	2	35	0.24	8.57	0.00	0.0261	0.00	0.0581	8.66	7.85
	concrete pump	427	345	0.0125	0.008	1	8	1.38	11.05	0.00	0.0084	0.01	0.0748	11.13	10.10
	concrete trucks	1	272	0.0149	0.006	1	15	1.09	16.34	0.00	0.0188	0.01	0.1107	16.47	14.94
	forklift	125	31.2	0.0024	0.001	1	32	0.12	4.00	0.00	0.0064	0.00	0.0271	4.03	3.66
	forklift	125	31.2	0.0024	0.001	3	90	0.37	33.72	0.00	0.0542	0.00	0.2284	34.01	30.85
	crane	450	180	0.0108	0.004	1	2	0.72	1.44	0.00	0.0018	0.00	0.0098	1.45	1.32
	crane	331	180	0.0108	0.004	1	13	0.72	9.37	0.00	0.0118	0.00	0.0634	9.44	8.56
FINAL GRADE	excavator	40	25.0	0.0042	0.001	2	20	0.20	4.00	0.00	0.0142	0.00	0.0271	4.04	3.67
	skip loader	60	25.5	0.0024	0.001	2	20	0.20	4.08	0.00	0.0080	0.00	0.0277	4.12	3.74
	trucks	1	125	0.0089	0.003	1	2.5	0.50	1.25	0.00	0.0019	0.00	0.0085	1.26	1.14

*Large/Med fleet target, Year 2018

Total MT CO₂e 335.79

Stanford Future Project Diesel Engine Use Projection

EDWARDS DEMOLITION

See Note Below for Durations

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								Phase		Phase		Phase		TotEmis	
								DayEmis	Total	Day	Total	Day	Total		
DEMO	Excavator	300	159	0.0117	0.003	1	40	0.63	25.39	0.00	0.0394	0.00	0.1720	25.60	23.22
	Excavator	175	112	0.0116	0.002	1	40	0.45	17.96	0.00	0.0391	0.00	0.1216	18.12	16.43
	Bobcat	25	25.5	0.0054	0.001	1	40	0.10	4.08	0.00	0.0181	0.00	0.0277	4.13	3.75
	trucks	1	125	0.0138	0.003	1	7.5	0.50	3.75	0.00	0.0087	0.00	0.0254	3.79	3.44
*Large/Med fleet target, Year 2012														Total MT CO ₂ e	46.84

Note: The SoM project component consists of two main elements: Construction of FIM buildings and demolition of associated existing buildings.
Construction of FIM1 (Year 2010-2012) will require approximately 2 years, followed by demolition of Edwards Building (6 months).

LANE & ALWAY DEMOLITION

See Note Below for Durations

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								Phase		Phase		Phase		TotEmis	
								DayEmis	Total	Day	Total	Day	Total		
DEMO	Excavator	300	234	0.0135	0.005	1	40	0.93	37.40	0.00	0.0453	0.01	0.2533	37.70	34.20
	Excavator	175	112	0.0088	0.002	1	40	0.45	17.96	0.00	0.0295	0.00	0.1216	18.11	16.43
	Bobcat	25	13.8	0.0017	0.000	1	40	0.06	2.21	0.00	0.0056	0.00	0.0149	2.23	2.02
	trucks	175	125	0.0105	0.003	1	7.5	0.50	3.75	0.00	0.0066	0.00	0.0254	3.78	3.43
*Large/Med fleet target, Year 2016														Total MT CO ₂ e	56.08

Then FIM 2 would be built (Year 2014-2016), followed by demolition of Lane and Alway Buildings (6 months).

GRANT DEMOLITION

See Note Below for Durations

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons
								Phase		Phase		Phase		TotEmis	
								DayEmis	Total	Day	Total	Day	Total		
DEMO	Excavator	300	234	0.0108	0.005	1	40	0.93	37.40	0.00	0.0363	0.01	0.2533	37.69	34.19
	Excavator	175	112	0.0063	0.002	1	40	0.45	17.96	0.00	0.0213	0.00	0.1216	18.10	16.42
	Bobcat	25	13.8	0.0015	0.000	1	40	0.06	2.21	0.00	0.0052	0.00	0.0149	2.23	2.02
	trucks	175	125	0.0076	0.003	1	7.5	0.50	3.75	0.00	0.0048	0.00	0.0254	3.78	3.43
*Large/Med fleet target, Year 2020														Total MT CO ₂ e	56.06

Then FIM 3 would be built (Year 2018-2020), followed by demolition of Grant Building (6 months).

Stanford Future Project Diesel Engine Use Projection

HOOVER PAVILLION PARKING STRUCTURE

2010 to 2012 (Based on a mid-2009 approval to proceed)

	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	lbs/hr (N2O)	Quantity	DURATION (days)	CO2 (tons)		CH4 (tons CO2e)		N2O (tons CO2e)		Tons CO2e	Metric tons
								Phase		Phase		Phase		TotEmis	
								DayEmis	Total	Day	Total	Day	Total		
SHORING / EXCAVATION	Drill Rig	230	188	0.0086	0.004	1	20	0.75	15.05	0.00	0.0145	0.01	0.01019	15.16	13.76
	Crane	132	80.3	0.0109	0.002	1	20	0.32	6.43	0.00	0.0184	0.00	0.0435	6.49	5.89
	Concrete Truck	1	272	0.0225	0.006	1	0.75	1.09	0.82	0.00	0.0014	0.01	0.0055	0.82	0.75
	Forklift	110	31.2	0.0054	0.001	1	20	0.12	2.50	0.00	0.0091	0.00	0.0169	2.52	2.29
	Boring Drill Rig	148	141	0.0084	0.003	1	100	0.56	56.43	0.00	0.0705	0.00	0.3822	56.88	51.60
	900 cfm compressor	540	232	0.0175	0.005	1	50	0.93	46.35	0.00	0.0736	0.01	0.3139	46.74	42.40
	Grout Mixer & pump	39	34.3	0.0121	0.001	1	50	0.14	6.87	0.00	0.0508	0.00	0.0465	6.96	6.32
	Dozer	160	129	0.0216	0.003	1	100	0.52	51.79	0.00	0.1817	0.00	0.3508	52.32	47.47
	Excavator	220	159	0.0131	0.003	2	100	1.27	126.95	0.00	0.2200	0.01	0.8598	128.03	116.14
	trucks	1	125	0.0156	0.003	3	100	1.50	150.11	0.00	0.3937	0.01	1.0166	151.52	137.45
	shotcrete pump	164	140	0.0154	0.003	1	40	0.56	22.42	0.00	0.0518	0.00	0.1518	22.62	20.52
	concrete trucks	1	272	0.0225	0.006	1	38	1.09	41.39	0.00	0.0718	0.01	0.2804	41.75	37.87
FOUNDATIONS	Excavator	56	25.0	0.0102	0.001	1	40	0.10	4.00	0.00	0.0343	0.00	0.0271	4.06	3.69
	concrete pump	427	345	0.0221	0.008	1	16	1.38	22.09	0.00	0.0297	0.01	0.1496	22.27	20.21
	concrete trucks	1	272	0.0225	0.006	1	20	1.09	21.79	0.00	0.0378	0.01	0.1476	21.97	19.93
	mobile hydro crane	210	112	0.0112	0.002	1	40	0.45	17.95	0.00	0.0377	0.00	0.1215	18.10	16.42
UTILITIES	backhoes	130	64.9	0.0136	0.001	3	10	0.78	7.79	0.00	0.0343	0.01	0.0527	7.87	7.14
	trucks	1	125	0.0156	0.003	1	0.25	0.50	0.13	0.00	0.0003	0.00	0.0008	0.13	0.11
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
SUPERSTRUCTURE					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00
	concrete pump	427	345	0.0221	0.008	1	30	1.38	41.42	0.00	0.0557	0.01	0.2806	41.76	37.88
	concrete trucks	1	272	0.0225	0.006	1	58	1.09	63.18	0.00	0.1096	0.01	0.4279	63.72	57.80
	forklift	125	31.2	0.0054	0.001	1	200	0.12	24.98	0.00	0.0912	0.00	0.1692	25.24	22.90
	forklift	125	31.2	0.0054	0.001	3	60	0.37	22.48	0.00	0.0820	0.00	0.1523	22.72	20.61
	crane	450	180	0.0164	0.004	1	2	0.72	1.44	0.00	0.0028	0.00	0.0098	1.45	1.32
FINAL GRADE	crane	331	180	0.0164	0.004	1	10	0.72	7.20	0.00	0.0138	0.00	0.0488	7.27	6.59
	excavator	40	25.0	0.0102	0.001	2	10	0.20	2.00	0.00	0.0172	0.00	0.0136	2.03	1.84
	skip loader	60	25.5	0.0071	0.001	2	10	0.20	2.04	0.00	0.0119	0.00	0.0138	2.07	1.88
	trucks	1	125	0.0156	0.003	1	0.75	0.50	0.38	0.00	0.0010	0.00	0.0025	0.38	0.34
*Large/Med fleet target, Year 2010														Total MT CO2e	701.14

Stanford Future Project Diesel Engine Use Projection

HOOVER PAVILLION MEDICAL OFFICE BUILDING

2010 to 2012 (Based on a mid-2009 approval to proceed)

2010 to 2012 (Based on a mid-2009 approval to proceed)								CO2 (tons)		CH4 (tons CO ₂ e)		N2O (tons CO ₂ e)		Tons CO ₂ e	Metric tons	
	EQUIPMENT	hp	lbs/hr (CO2)	lbs/hr (CH4)	Lbs/Hr (N2O)	Quantity	DURATION (days)	DayEmis	Phase Total	Day	Phase Total	Day	Phase Total	TotEmis		
FOUNDATIONS	Excavator	56	25.0	0.0102	0.001	1	10	0.10	1.00	0.00	0.0086	0.00	0.0068	1.02	0.92	
	concrete pump	427	345	0.0221	0.008	1	3	1.38	4.14	0.00	0.0056	0.01	0.0281	4.18	3.79	
	concrete trucks	1	272	0.0225	0.006	1	4	1.09	4.36	0.00	0.0076	0.01	0.0295	4.39	3.99	
	mobile hydro crane	210	112	0.0112	0.002	1	5	0.45	2.24	0.00	0.0047	0.00	0.0152	2.26	2.05	
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
UTILITIES	backhoes	130	64.9	0.0136	0.001	1	10	0.26	2.60	0.00	0.0114	0.00	0.0176	2.62	2.38	
	trucks	1	125	0.0156	0.003	1	1	0.50	0.50	0.00	0.0013	0.00	0.0034	0.51	0.46	
					0.000			0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
SUPERSTRUCTURE	crane	331	180	0.0164	0.004	1	15	0.72	10.81	0.00	0.0207	0.00	0.0732	10.90	9.89	
	forklift	125	31.2	0.0054	0.001	1	15	0.12	1.87	0.00	0.0068	0.00	0.0127	1.89	1.72	
	generator	35			0.000	2	15	0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.00	
	concrete pump	427	345	0.0221	0.008	1	4	1.38	5.52	0.00	0.0074	0.01	0.0374	5.57	5.05	
	concrete trucks	1	272	0.0225	0.006	1	8	1.09	8.71	0.00	0.0151	0.01	0.0590	8.79	7.97	
	forklift	125	31.2	0.0054	0.001	1	10	0.12	1.25	0.00	0.0046	0.00	0.0085	1.26	1.14	
	forklift	125	31.2	0.0054	0.001	3	30	0.37	11.24	0.00	0.0410	0.00	0.0761	11.36	10.30	
	crane	450	180	0.0164	0.004	1	2	0.72	1.44	0.00	0.0028	0.00	0.0098	1.45	1.32	
	crane	331	180	0.0164	0.004	1	10	0.72	7.20	0.00	0.0138	0.00	0.0488	7.27	6.59	
FINAL GRADE	excavator	40	25.0	0.0102	0.001	2	20	0.20	4.00	0.00	0.0343	0.00	0.0271	4.06	3.69	
	skip loader	60	25.5	0.0071	0.001	2	20	0.20	4.08	0.00	0.0238	0.00	0.0277	4.13	3.75	
	trucks	1	125	0.0156	0.003	1	2.5	0.50	1.25	0.00	0.0033	0.00	0.0085	1.26	1.15	
*Large/Med fleet target, Year 2010														Total MT CO ₂ e		66.16

OPERATIONAL GHG EMISSIONS

General Modeling Assumptions

General Modeling Assumptions:

2025 BAU Assumptions

520 lbs/MWh (CO ₂) 2025 BAU scenario	City of Palo Alto
449.32 lbs/MWh (CO ₂) 2025 Reduced Scenario	City of Palo Alto
2205 lbs/metric ton	CCAR
1000 kg/metric ton	CCAR
0.0037 lbs/MWh (N ₂ O)	CCAR
0.0067 lbs/MWh (CH ₄)	CCAR
296 GWP N ₂ O ¹	CCAR
23 GWP CH ₄ ¹	CCAR
0.0101 gr/mile N ₂ O	CCAR
0.0157 gr/mile CH ₄	CCAR
1,000,000 Btu/1000lbs	Stanford University CEF
12,000 Btu/ton-hr	Stanford University CEF
0.091 Metric tons CO ₂ /Million Btu	Stanford University CEF
0 MWh/MG potable water ²	CEC
1.9 MWh/MG waste water	CEC
7300 kWh/du/year	TSWG
490 total dwelling units	City of Palo Alto
4 lbs/dwelling unit/day	CWIMB
301.37 g/dweling unit/day	TSWG

Source

¹ GWP from the Third Annual Report was used to maintain consistency with Stanford reporting procedures.

² Water from the SFPUC is used to generate electricity that supplies the needs of the SFPUC regional and local water systems. The hydroelectric generation is considered a renewable resource and the generation offsets the electric consumption attributable to the use of potable water.

Sources

CCAR - Climate Change Action Registry General Reporting Protocol, Reporting Entity-Wide Greenhouse Gas Emissions Version 3.1, January 2009.

CEC - California Energy Commission "Refining Estimates of Water-Related Energy Use in California" December 2006 CEC-500-2006-118

TSWG - Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group #12; July 2009.

CWIMB - Estimated Solid Waste Generation Rates for Residential Developments -

<http://www.calrecycle.ca.gov/WASTECHAR/WasteGenRates/Residential.htm>

General Modeling Assumptions

Service Population Determination

	2015					2025				
	Existing	Proposed	Net change	PT Multiplier	Net Change	Proposed	Net change	PT Multiplier	Net Change	
SHC	5240	6274	1034	0.94653	979	6562	1322	0.94653	1251	
LPCH	1666	2609	943	0.90149	850	2655	989	0.90149	891	
Non-SUMC	151	257	106	0.94653	100	257	106	0.94653	100	
Beds at SHC	362	413	51	1	51	465	103	1	103	
Beds at LPCH	194	236	42	1	42	301	107	1	107	
Total Service Population	7613	9789			2022	10240			2453	
Village Concept Alternative									2453	Total

Reduced Intensity Alternative B

Operational activity is ~60% of SUMC Project

Village Concept Alternative

Constuction of pedestrian connectivity considered deminimus.

Residents are estimated at 2.2 people per household (AECOM Village Concempt Alternative Traffic Analysis, dated February 2010).

CO₂ emissions from Village Concept Alternative for VMT (URBEMIS 2007, dated March 2010): tons/year CO₂

43,841.43 tons/year CO₂ from comvined SUMC and employees living at the Village Concept housing w/o TDM.

265,681.99 VMT from URBEMIS

39,016.78 tons/year CO₂ from comvined SUMC and employees living at the Village Concept housing w TDM.

236,245.03 VMT from URBEMIS

46,337.53 tons/year CO₂ from comvined SUMC and employees and spouses living at the Village Concept housing w/o TDM.

280,235.18 VMT from URBEMIS

50,611.05 tons/year CO₂ from combined SUMC and spousal trips without TDM factored in.

306,097.86 VMT from URBEMIS

General Modeling Assumptions

Reductions:

- 20% beyond Title 24 (non SoM buildings) - Reduce Electric and NG by 20%
- 30% beyond Title 24 (SoM buildings) - Reduce electric by 30%
- TDM Including Go-Pass
- Participation in PaloAltoGreen Renewable Energy Program.
- Reduction in solid waste landfilled by 25%

Business As Usual Assumptions

BAU values for Electricity, Water, Sewer, Chilled water, and Steam were taken from data provided in the Application (Tab 6). They were calculated based on the values (kWh/day etc) as provided in the text of Tab 6 for a more accurate assessment as it appears the numbers provided in the table (table 6-1) were rounded. Table 6-1 values were included here for comparison purposes only.

The "calculated" consumption rates will be used to determine greenhouse gas emissions from each of the following categories. GHG emissions will be determined using standard protocol. BGSF = Building Square footage Right-sizing was taken into account by Stanford when the application was prepared.

		Electricity			
				KWh/day	
		BGSF	kWh/day/sq ft	calculated	Table 6-1
SCH	New Stanford Hospital	1,100,000.00	0.094	103,347.62	103,000.00
SCH	New SHC Clinics	429,000.00	0.042	18,187.03	18,000.00
SCH	Demo - Core, East, West, Boswell	-441,200.00	0.077	-34,160.00	-34,160.00
SCH	Demo - 1101 Welch	-40,100.00	0.042	-1,700.00	-1,700.00
SCH	Demo - Core Expansion	-223,800.00	0.096	-21,590.00	-21,590.00
SCH	Hoover New Medical Office	60,000.00	0.042	2,494.06	2,500.00
LPCH	New LPCH Hospital	471,300.00	0.094	44,302.20	44,300.00
LPCH	New LPCH Clinics	50,000.00	0.042	2,100.00	2,100.00
LPCH	Demo - 701 and 703 Welch	-79,800.00	0.063	-5,000.00	-5,000.00
SoM	New Foundation in Medicine Bldg	415,000.00	N/A	74,617.00	74,600.00
SoM	Demo - Grant, Always, Lane, Edwards	-415,000.00	0.080	-33,400.00	-33,400.00
				149,197.92	148,650.00

		Water			
				G/day	
		BGSF	G/day/sq ft	calculated	Table 6-1
SCH	New Stanford Hospital	1,100,000.00	0.200	220,000.00	224,000.00
SCH	New SHC Clinics	429,000.00	0.100	42,900.00	43,000.00
SCH	Demo - Core, East, West, Boswell	-441,200.00	0.200	-88,240.00	-88,000.00
SCH	Demo - 1101 Welch	-40,100.00	0.210	-8,421.00	-8,400.00
SCH	Demo - Core Expansion	-223,800.00	0.200	-44,760.00	-45,000.00
SCH	Hoover New Medical Office	60,000.00	0.100	6,000.00	6,000.00
LPCH	New LPCH Hospital	471,300.00	0.210	98,973.00	100,000.00
LPCH	New LPCH Clinics	50,000.00	0.100	5,000.00	5,000.00
LPCH	Demo - 701 and 703 Welch	-79,800.00	0.130	-10,374.00	-10,500.00
SoM	New Foundation in Medicine Bldg	415,000.00	0.080	34,200.00	34,200.00
SoM	Demo - Grant, Always, Lane, Edwards	-415,000.00	0.200	-83,000.00	-83,000.00
				172,278.00	177,300.00

*Table 6-1 numbers are consistent with WSA report. Water Supply is associated with hydroelectric generation which offsets emissions from water consumption.

Sewer

				G/day	
		BGSF	G/day/sq ft	calculated	Table 6-1
SCH	New Stanford Hospital	1,100,000.00	0.190	209,000.00	222,000.00
SCH	New SHC Clinics	429,000.00	0.095	40,755.00	40,000.00
SCH	Demo - Core, East, West, Boswell	-441,200.00	0.109	-48,000.00	-48,000.00
SCH	Demo - 1101 Welch	-40,100.00	0.200	-8,000.00	-8,000.00
SCH	Demo - Core Expansion	-223,800.00	0.112	-25,000.00	-25,000.00
SCH	Hoover New Medical Office	60,000.00	0.095	5,700.00	5,700.00
LPCH	New LPCH Hospital	471,300.00	0.200	94,024.35	95,000.00
LPCH	New LPCH Clinics	50,000.00	0.095	4,750.00	4,750.00
LPCH	Demo - 701 and 703 Welch	-79,800.00	0.125	-10,000.00	-10,000.00
SoM	New Foundation in Medicine Bldg	415,000.00	N/A	32,490.00	32,500.00
SoM	Demo - Grant, Always, Lane, Edwards	-415,000.00	0.111	-46,000.00	-46,000.00
				249,719.35	262,950.00

Chilled Water

		ton-hrs/day			
		BGSF	ton-hrs/day/sq ft	calculated	Table 6-1
SCH	New Stanford Hospital	1,100,000.00	0.033	36,164.38	36,000.00
SCH	New SHC Clinics	429,000.00	0.016	7,052.05	7,000.00
SCH	Demo - Core, East, West, Boswell	-441,200.00	0.023	-10,000.00	-10,000.00
SCH	Demo - 1101 Welch	-40,100.00	N/A	N/A	N/A
SCH	Demo - Core Expansion	-223,800.00	0.027	-6,000.00	-6,000.00
SCH	Hoover New Medical Office	60,000.00	0.016	986.30	1,000.00
LPCH	New LPCH Hospital	471,300.00	0.033	15,494.79	15,000.00
LPCH	New LPCH Clinics	50,000.00	0.016	821.92	1,000.00
LPCH	Demo - 701 and 703 Welch	-79,800.00	N/A	N/A	N/A
SoM	New Foundation in Medicine Bldg	415,000.00	0.033	13,643.84	14,000.00
SoM	Demo - Grant, Always, Lane, Edwards	-415,000.00	0.034	-14,000.00	-14,000.00
				44,163.29	44,000.00

		Steam			
				lbs/day	
		<i>BGSF</i>	<i>lbs/day/sq ft</i>	<i>calculated</i>	<i>Table 6-1</i>
SCH	New Stanford Hospital	1,100,000.00	0.548	602,739.73	603,000.00
SCH	New SHC Clinics	429,000.00	0.137	58,767.12	59,000.00
SCH	Demo - Core, East, West, Boswell	-441,200.00	0.419	-185,000.00	-185,000.00
SCH	Demo - 1101 Welch	-40,100.00	N/A	N/A	N/A
SCH	Demo - Core Expansion	-223,800.00	0.362	-81,000.00	-81,000.00
SCH	Hoover New Medical Office	60,000.00	0.137	8,219.18	8,000.00
LPCH	New LPCH Hospital	471,300.00	0.548	258,246.58	258,000.00
LPCH	New LPCH Clinics	50,000.00	0.137	6,849.32	7,000.00
LPCH	Demo - 701 and 703 Welch	-79,800.00	N/A	N/A	N/A
SoM	New Foundation in Medicine Bldg	415,000.00	0.548	227,397.26	227,000.00
SoM	Demo - Grant, Always, Lane, Edwards	-415,000.00	0.465	-193,000.00	-193,000.00
				703,219.18	703,000.00

Solid Waste:

Emissions of greenhouse gas emissions from the Palo Alto Climate Protection Plan is 24,832 tons CO₂e for an estimated 69,491 tons of waste generated in 2005.

Assuming 195,273 tons of generated waste in 2006 with 120,432 recycled (PBS&J Utility Section), the remaining waste landfilled would be 74,841 tons or an increase of 7.70% from waste generated in 2005. Based on the CPP estimates, GHG emissions from tons of waste landfilled in 2006 would be 26,744 tons.

Assuming a 20.81% increase from 2006 to 2025 (PBS&J Utility Section), landfilled waste in 2025 is anticipated to be 90,416.06 tons solid waste or 32,309.39 tons of GHG

Projected 2025 SUMC waste generation is 1,792 tons of non recyclable waste (for addition only) (PBS&J Utility Section) or 1.98 % of 2025 non-recyclable waste anticipated waste. Therefore BAU GHG emissions are estimated to be 1.98 % of the estimated 32,309.39 metric tons or 640 metric tons.

Since waste generation was determined from the PBS&J utility section, right-sizing as appropriate would have already been applied.

Fleet vehicle GHG emissions:

Provided by Catherine Palter at 456 tons CO₂e (via e-mail dated march 18, 2009).
Existing (stanford medical center 2007 inventory) has vehicle fleet at 356 tons CO₂e
Therefore total BAU for 2025 SUMC project would be 456 - 356 or 100 tons CO₂e.

Right-sizing would not be appropriate as fleet vehicle emissions are based on patients rather than square footage.

GHG Emissions provided by Stanford:

Source: *Stanford University Medical Center 2007 GHG Gas Inventory 12/09/2008 by Mazetti & Associates*

	Total 2025	Existing	2025 development	
Natural Gas	1,786	1,759	27	
Diesel (emergency generators)	162	139	23	
Medical Nitrous	236	137	99	
Helicopter fuel	922	721	201	(tons CO2e)

Right-sizing is inappropriate for assessing natural gas usage because in general natural gas usage is directly related to square footage rather than number of patients/beds (ie, amount of natural gase needed to heat the building).

Right-sizing is inappropriate for assessing generator fuel, medical nitrous, and helicopter fuel use because these were developed based on anticipated increase in use per anticipated increase in opearations.

Traffic:

Based on AECOM March 11, 2009 memo, VMT before TDM trip reductions were presented as 275,566 for the SUMC project.

VMT will be used to determine GHG emissions using standard protocol.

Right-sizing is inappropriate for assessing vehicle miles traveled as VMT is directly correlated to the facility level of operations.

2015 Assumptions

Values for Electricity, Water, Sewer, Chilled water, and Steam were taken from data provided in the Application (Tab 6). They were calculated based on the values (kWh/day etc) as provided in the text of Tab 6 for a more accurate assessment as it appears the numbers provided in the table (table 6-1) were rounded. Table 6-1 values were included here for comparison purposes only.

The "calculated" consumption rates will be used to determine greenhouse gas emissions from each of the following categories. GHG emissions will be determined using standard protocol. BGSF = Bulding Square footage Right-sizing was taken into account by Stanford when the application was prepared

Electricity

		KWh/day				
		BGSF	kWh/day/sq ft	calculated	Table 6-1	
SCH	New Stanford Hospital	1,100,000.00	0.094	103,347.62	103,000.00	
SCH	New SHC Clinics	0.00	0.042	0.00	0.00	not built
SCH	Demo - Core, East, West, Boswell	441,200.00	0.077	0.00	0.00	not demo'd (assumed still in operation)
SCH	Demo - 1101 Welch	-40,100.00	0.042	-1,700.00	-1,700.00	
SCH	Demo - Core Expansion	223,800.00	0.096	0.00	0.00	not demo'd (assumed still in operation)
SCH	Hoover New Medical Office	60,000.00	0.042	2,494.06	2,500.00	
LPCH	New LPCH Hospital	471,300.00	0.094	44,302.20	44,300.00	
LPCH	New LPCH Clinics	50,000.00	0.042	2,100.00	2,100.00	
LPCH	Demo - 701 and 703 Welch	-79,800.00	0.063	-5,000.00	-5,000.00	
SoM	New Foundation in Medicine Bldg	186,750.00	N/A	33,577.65	33,577.65	only FIM 1 built (45% of total load)
SoM	Demo - Grant, Always, Lane, Edwards	-66,400.00	0.080	-5,344.00	-5,344.00	only 16% demo'd - Edwards
				173,777.54	173,433.65	

Water

		G/day				
		BGSF	G/day/sq ft	calculated	Table 6-1	
SCH	New Stanford Hospital	1,100,000.00	0.213	234,245.00	224,000.00	
SCH	New SHC Clinics	0.00	0.100	0.00	0.00	not built
SCH	Demo - Core, East, West, Boswell	441,200.00	0.199	0.00	0.00	not demo'd (assumed still in operation)
SCH	Demo - 1101 Welch	-40,100.00	0.209	-8,400.00	-8,400.00	
SCH	Demo - Core Expansion	223,800.00	0.201	0.00	0.00	not demo'd (assumed still in operation)
SCH	Hoover New Medical Office	60,000.00	0.100	6,000.00	6,000.00	
LPCH	New LPCH Hospital	471,300.00	0.213	100,363.34	100,000.00	
LPCH	New LPCH Clinics	50,000.00	0.100	5,000.00	5,000.00	
LPCH	Demo - 701 and 703 Welch	-79,800.00	0.132	-10,500.00	-10,500.00	
SoM	New Foundation in Medicine Bldg	186,750.00	N/A	15,390.00	15,390.00	only FIM 1 built (45% of total load)
SoM	Demo - Grant, Always, Lane, Edwards	-66,400.00	0.200	-13,280.00	-13,280.00	only 16% demo'd - Edwards
				328,818.34	318,210.00	

2015 Assumptions

Sewer

				G/day		
		<i>BGSF</i>	<i>G/day/sq ft</i>	<i>calculated</i>	<i>Table 6-1</i>	
SCH	New Stanford Hospital	1,100,000.00	0.202	222,532.75	222,000.00	
SCH	New SHC Clinics	0.00	0.095	0.00	0.00	not built
SCH	Demo - Core, East, West, Boswell	441,200.00	0.109	0.00	0.00	not demo'd (assumed still in operation)
SCH	Demo - 1101 Welch	-40,100.00	0.200	-8,000.00	-8,000.00	
SCH	Demo - Core Expansion	223,800.00	0.112	0.00	0.00	not demo'd (assumed still in operation)
SCH	Hoover New Medical Office	60,000.00	0.095	5,700.00	5,700.00	
LPCH	New LPCH Hospital	471,300.00	0.202	95,345.17	95,000.00	
LPCH	New LPCH Clinics	50,000.00	0.095	4,750.00	4,750.00	
LPCH	Demo - 701 and 703 Welch	-79,800.00	0.125	-10,000.00	-10,000.00	
SoM	New Foundation in Medicine Bldg	186,750.00	N/A	6,579.23	6,579.23	only FIM 1 built (45% of total load)
SoM	Demo - Grant, Always, Lane, Edwards	-66,400.00	0.111	-7,360.00	-7,360.00	only 16% demo'd - Edwards
				309,547.14	308,669.23	

Chilled Water

				ton-hrs/day		
		<i>BGSF</i>	<i>ton-hrs/day/sq ft</i>	<i>calculated</i>	<i>Table 6-1</i>	
SCH	New Stanford Hospital	1,100,000.00	0.033	36,164.38	36,000.00	
SCH	New SHC Clinics	0.00	0.016	0.00	0.00	not built
SCH	Demo - Core, East, West, Boswell	441,200.00	0.000	0.00	0.00	not demo'd (assumed still in operation)
SCH	Demo - 1101 Welch	-40,100.00	N/A	N/A	N/A	
SCH	Demo - Core Expansion	223,800.00	0.000	0.00	0.00	not demo'd (assumed still in operation)
SCH	Hoover New Medical Office	60,000.00	0.016	986.30	1,000.00	
LPCH	New LPCH Hospital	471,300.00	0.033	15,494.79	15,000.00	
LPCH	New LPCH Clinics	50,000.00	0.016	821.92	1,000.00	
LPCH	Demo - 701 and 703 Welch	-79,800.00	N/A	N/A	N/A	
SoM	New Foundation in Medicine Bldg	186,750.00	0.033	6,139.73	14,000.00	only FIM 1 built (45% of total load)
SoM	Demo - Grant, Always, Lane, Edwards	-66,400.00	0.034	-2,240.00	-2,240.00	only 16% demo'd - Edwards
				57,367.12	64,760.00	

2015 Assumptions

		Steam				
				lbs/day		
		<i>BGSF</i>	<i>lbs/day/sq ft</i>	<i>calculated</i>	<i>Table 6-1</i>	
SCH	New Stanford Hospital	1,100,000.00	0.548	602,739.73	603,000.00	
SCH	New SHC Clinics	0.00	0.137	0.00	0.00	not built
SCH	Demo - Core, East, West, Boswell	441,200.00	0.419	185,000.00	185,000.00	not demo'd (assumed still in operation)
SCH	Demo - 1101 Welch	-40,100.00	N/A	N/A	N/A	
SCH	Demo - Core Expansion	223,800.00	0.362	81,000.00	81,000.00	not demo'd (assumed still in operation)
SCH	Hoover New Medical Office	60,000.00	0.137	8,219.18	8,000.00	
LPCH	New LPCH Hospital	471,300.00	0.548	258,246.58	258,000.00	
LPCH	New LPCH Clinics	50,000.00	0.137	6,849.32	7,000.00	
LPCH	Demo - 701 and 703 Welch	-79,800.00	N/A	N/A	N/A	
SoM	New Foundation in Medicine Bldg	186,750.00	0.548	102,328.77	102,150.00	only FIM 1 built (45% of total load)
SoM	Demo - Grant, Always, Lane, Edwards	-66,400.00	0.465	-30,880.00	-30,880.00	only 16% demo'd - Edwards
				1,213,503.56	1,213,270.00	

Solid Waste:

Emissions of greenhouse gas emissions from the Palo Alto Climate Protection Plan is 24,832 tons CO₂e for an estimated 69,491 tons of waste generated in 2005.

Assuming 195,273 tons of generated waste in 2006 with 120,432 recycled (PBS&J Utility Section), the remaining waste landfilled would be 74,841 tons or an increase of 7.70% from waste generated in 2005. Based on the CPP estimates, GHG emissions from tons of waste landfilled in 2006 would be 26,744 tons.

Assuming a 20.81% increase from 2006 to 2025 (PBS&J Utility Section), landfilled waste in 2025 is anticipated to be 90,416.06 tons solid waste or 32,309.39 tons of GHG

Projected 2025 SUMC waste generation is 1,792 tons of non recyclable waste (for addition only) (PBS&J Utility Section) or 1.98 % of 2025 non-recyclable waste anticipated waste. Therefore BAU GHG emissions are estimated to be 1.98 % of the estimated 32,309.39 metric tons or 640 metric tons.

Since waste generation was determined from the PBS&J utility section, right-sizing as appropriate would have already been applied.

Fleet vehicle GHG emissions:

Provided by Catherine Palter at 456 tons CO₂e (via e-mail dated march 18, 2009).

Existing (stanford medical center 2007 inventory) has vehicle fleet at 356 tons CO₂e

Therefore total BAU for 2025 SUMC project would be 456 - 356 or 100 tons CO₂e.

Right-sizing would not be appropriate as fleet vehicle emissions are based on patients rather than square footage.

GHG Emissions provided by Stanford:

Source: *Stanford University Medical Center 2007 GHG Gas Inventory 12/09/2008 by Mazetti & Associates.*

	Total 2025	Existing	2025 development	
Natural Gas	1,786	1,759	27	
Diesel (emergency generators)	162	139	23	
Medical Nitrous	236	137	99	
Helicopter fuel	922	721	201	(tons CO2e)

Right-sizing is inappropriate for assessing natural gas usage because in general natural gas usage is directly related to square footage rather than number of patients/beds (ie, amount of natural gas needed to heat the building).

Right-sizing is inappropriate for assessing generator fuel, medical nitrous, and helicopter fuel use because these were developed based on anticipated increase in use per anticipated increase in operations.

Traffic:

Based on AECOM March 11, 2009 memo, VMT before TDM trip reductions were presented as 275,566 for the SUMC project.

VMT will be used to determine GHG emissions using standard protocol.

Right-sizing is inappropriate for assessing vehicle miles traveled as VMT is directly correlated to the facility level of operations.

BAU CALCULATIONS

SUMC Transportation Emissions						
Source	VMT	Metric Tons CO2e				
		URBEMIS CO2 (tons)	CO2	N2O	CH4	Total
Existing	600,246	113,116	102,617	1.79	0.04	102,619
Village Concept Alternative w/spousal trips	280,235	46,338	42,037	0.84	0.02	42,038
Village Concept Alternative - employee & patient only	265,682	43,841	39,772	0.79	0.02	39,773
SUMC 2015	172,516	28,577	25,925	0.52	0.01	25,925
SUMC Project 2025	275,566	45,477	41,256	0.82	0.02	41,257

Source: URBEMIS 2007; AECOM Transportation, December 4,2008. Note: the VMT numbers vary slightly from the VMT in the AECOM memos due to rounding in the URBEMIS model.

SUMC Greenhouse Gas Emissions from Electricity Use								
Source	Electricity Use (MWh/year)	GHG Emissions (tons/year)			CO2 Equivalent Emissions (tons/year)			
		CO2	N2O	CH4	CO2	N2O	CH4	Total
Existing -SOM	12,191	2,875	0.020	0.037	2,875	6.1	0.9	2,882
Existing - Rest	63,182	14,900	0.106	0.192	14,900	31.4	4.4	14,936
SUMC Project 2015 - SoM	10,305	2,430	0.017	0.031	2,430	5.1	0.7	2,436
SuMC Project 2015 - Rest	51,173	12,068	0.086	0.155	12,068	25.4	3.6	12,097
SUMC Project 2025 - SoM	15,044	3,548	0.025	0.046	3,548	7.5	1.1	3,556
SuMC Project 2025 - Rest	39,413	9,295	0.066	0.120	9,295	19.6	2.8	9,317

Source: Calculated by PBS&J, 2009. Emissions factors from Climate Change Action Registry (CCAR), 2008. General Reporting Protocol, v.3.0, Appendix C, Tables C.2 and C.3 (converted to metric tons). Emission factor for CO2 of 520 lbs/MWh provided by the City.

SUMC Greenhouse Gas Emissions from Steam and Chilled Water Use				
Source	Steam (1000lbs)	Chilled water (ton-hrs)	Chilled Water (Million CO2)	Chilled Water (MT CO2)
Existing - SOM	70,445	5,110,000	131,765.00	11,990.62
Existing - Rest				28,050.00
SUMC Project 2015 - SoM	26,079	1,423,400	43,159.60	3,927.52
SuMC Project 2015 - Rest				11,124.60
SUMC Project 2025-SoM	12,555	(130,000)	10,995.00	1,000.55
SUMC Project 2025-Rest				18,541.00

Source: SoM emissions calculated by PBS&J, 2009 using steam and chilled water values obtained from Table 6-1 of Stanford's Revised Application Tab 5/2008. MT CO2 for non-SoM buildings taken from Musetti Report for 2008.

BAU CALCULATIONS

SUMC Solid Waste Emissions

	<i>Solid Waste Landfilled,</i>		<i>City's Waste</i>	
	<i>2005</i>	<i>2025</i>	<i>2015</i>	<i>2006</i>
waste generation (tons/year)	3,700	1,792	1,075	74,841
Percent of City's Waste	5%	2%	1.44%	100%
Emissions	1,324	640	465	26,774

Source: Calculated by PBS&J, 2009. Citywide waste totals and project totals from Section 3.13, Utilities. Emissions estimates are from City of Palo Alto, 2007. Climate Protection Plan.

SUMC Potable Water Contribution to Electricity

Source	MG/day	MWh/MG	MWh/yr	GHG Emissions (tons/yr)			CO2 Equivalent Emissions (tons/year)			
				CO2	N2O	CH4	CO2	N2O	CH4	Total
Existing- SoM	30.30	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00
Existing - Rest	101.85	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00
SUMC Projected 2015	120.02	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00
SUMC Projected 2025	64.71	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00

Sources: Integrated Water Resources Plan (IRP), MWD Report No. 1107, March 1996. Emission factor for CO2 of 520 lbs/MWh provided by the City. lbs/MWh provided by the City. Water from the SFPUC is used to generate electricity that supplies the needs of the SFPUC regional and local water systems. The hydroelectric generation is considered a renewable resource and the generation offsets the electric consumption attributable to the use of potable water.

SUMC Waste Water Contribution to Electricity

Source	MG/yr	MWh/MG	MWh/yr	GHG Emissions (tons/yr)			CO2 Equivalent Emissions (tons/year)			
				CO2	N2O	CH4	CO2	N2O	CH4	Total
Existing- SoM	16.79	1.9	31.90	7.52	0.000054	0.000097	7.52	0.01584	0.00223	7.54
Existing - Rest	96.58	1.9	183.50	43.27	0.000308	0.000558	43.27	0.09114	0.01282	43.38
SUMC Projected 2015	112.98	1.9	214.67	50.63	0.000360	0.000652	50.63	0.10662	0.01500	50.75
SUMC Projected 2025	95.98	1.9	182.36	43.00	0.000306	0.000554	43.00	0.09057	0.01274	41.11

Sources: California Energy Commission "Refining Estimates of Water-Related Energy Use in California" December 2006 CEC-500-2006-118; Stanford University Medical Center Utilities Renewal and Replacement Project and Utilities Services (table 6-1) May 2008. Emission factor for CO2 of 520 lbs/MWh provided by the City. MWh/MG value determined from CEC: California's Water-Energy Relationship, November 2005.

BAU CALCULATIONS

Total Emissions - Existing		
	Fuel	Emissions (metric tons CO2e)
Natural Gas (therms)	331,429	1,759
Diesel (gallons)	13,707	139
Medical N2O (ft3)	8,815	137
Fleet Vehicles (gallons)	41,864	356
Helicopter Fuels (gallons)	75,297	721
Electricity (MWh)	75,588	17,869
Steam and Chilled Water (MBTU)	131,765	40,041
Transportation (VMT)	600,246	102,619
Solid Waste (Tons)	3,700	1,324
Total		164,964

Net Emissions - SUMC Project 2025		
	Fuel	Emissions (metric tons CO2e)
Natural Gas	5,137	27
Diesel	2,232	23
Medical N2O	6,127	99
Fleet Vehicles	13,845	100
Helicopter Fuels	21,083	201
Electricity	54,640	12,914
Steam and Chilled Water	10,995	19,542
Transportation	275,566	41,257
Solid Waste	1,792	640
Total		74,803

31% % increase over Existing

30.50 CO₂e/SP/yr

8 % increase from over city

BAU CALCULATIONS

Net Emissions - Reduced Intensity Alternative B

	Fuel	Emissions (metric tons CO2e)
Natural Gas	3,082	16
Diesel	1,339	14
Medical N2O	3,676	59
Fleet Vehicles	8,307	60
Helicopter Fuels	12,650	121
Electricity	32,784	14,584
Steam and Chilled Water	43,160	15,052
Transportation	172,516	25,925
Solid Waste	1,075	465
Total		56,296

25% % increase over Existing

27.84 CO₂e/SP/yr

6 % increase from over city

75% of SUMC emissions

Net Emissions - Village Concept Alternative

	Fuel	With Spousal trip Emissions (metric tons CO2e)	Fuel	W/O Spousal trip Emissions (metric tons CO2e)
Natural Gas & other Onsite Fuels	5,137	27	5,137	27
Diesel	2,232	23	2,232	23
Medical N2O	6,127	99	6,127	99
Fleet Vehicles	13,845	100	13,845	100
Helicopter Fuels	21,083	201	21,083	201
Electricity	54,640	12,914	54,640	12,914
Steam and Chilled Water	10,995	19,542	10,995	19,542
Transportation	280,235	42,038	265,682	39,773
Solid Waste	1,792	640	1,792	640
Total		75,584		73,320

31%

30.82

8

31% % increase over Existing

29.89 CO₂e/SP/yr

8 % increase from over city

Reduced and Mitigated Calculations

SUMC Transportation Emissions						
Source	VMT	Metric Tons CO2e				
		URBEMIS CO2 (tons)	CO2	N2O	CH4	Total
Village Concept Alternative - With Spousal Trips	280,235	46,338	42,037	0.84	0.02	42,038
Village Concept Alternative - W/o Spousal Trips	265,682	43,841	39,772	0.79	0.02	39,773
Village Concept Alternative - W/o Spousal Trips & TDM	236,245	39,017	35,395	0.71	0.01	35,396
SUMC 2015	172,516	28,577	25,925	0.52	0.01	25,925
SUMC 2015 with TDM	149,158	24,735	22,439	0.45	0.01	22,440
SUMC Projected 2025 - w/ Spousal Trips - w/o Go Pass	306,098	50,611	45,914	0.92	0.02	45,915
SUMC Project 2025 - w/o Go Pass	275,566	45,477	41,256	0.82	0.02	41,257
SUMC Project 2025 - Go Pass	238,355	39,378	35,723	0.71	0.01	35,724

Source: URBEMIS 2007; Note: the VMT numbers vary slightly from the VMT in the AECOM memos due to rounding in the URBEMIS model.

SUMC Greenhouse Gas Emissions from Electricity Use										
Source	Electricity Use GHG Emissions (tons/year)			CO2 Equivalent Emissions (tons/year)				Total	% Reduction	Reduced Total
	(MWh/year)	CO2	N2O	CH4	CO2	N2O	CH4			
Village Concept Alternative (Residential Only)	0	0	0.000	0.000	0	0.0	0.0	0	30	0
SUMC Project 2015 - SoM	10,305	2,100	0.017	0.031	2,100	5.1	0.7	2,106	30	1,474
SuMC Project 2015 - Rest	51,173	10,428	0.086	0.155	10,428	25.4	3.6	10,457	20	8,365
SUMC Project 2025 - SoM	15,044	3,066	0.025	0.046	3,066	7.5	1.1	3,074	30	2,152
SuMC Project 2025 - Rest	39,413	8,031	0.066	0.120	8,031	19.6	2.8	8,054	20	6,443

- Assumes 20% reduction in energy usage for new buildings that are not associated with the SoM.

- Assumes 30% reduction in energy usage for buildings associated with the SoM (accounted for already in calculations as new buildings are not SoM buildings.)

Source: Calculated by PBS&J, 2009. Emissions factors from Climate Change Action Registry (CCAR), 2008. General Reporting Protocol, v.3.0, Appendix C, Tables C.2 and C.3 (converted to metric tons). Emission factor for CO2 of 449.32 lbs/MWh provided by the City.

SUMC Greenhouse Gas Emissions from Steam and Chilled Water Use				
Source	Steam	Chilled	Steam and	Steam and
	(1000lbs)	water (ton- hrs)	Chilled Water (Million Btu)	Chilled Water (MT CO2)
Existing - SOM	70,445	5,110,000	131,765.00	11,990.62
Existing - Rest				28,050.00
SUMC Project 2015 - SoM	26,079	1,423,400	43,159.60	3,927.52
SuMC Project 2015 - Rest				11,124.60
SUMC Project 2025-SoM	12,555	(130,000)	10,995.00	1,000.55
SUMC Project 2025-Rest				18,541.00

Source: SoM emissions calculated by PBS&J, 2009 using steam and chilled water values obtained from Table 6-1 of Stanford's Revised Application Tab 5/2008. MT CO2 for non-SoM buildings taken from Musetti Report for 2008.

Reduced and Mitigated Calculations

SUMC Solid Waste Emissions					
	<i>Solid Waste Landfilled, 2005</i>	<i>2025</i>	<i>2015</i>	<i>Village Concept Alternative Residential</i>	<i>City's Waste 2006</i>
Existing	3,700	1,792	1,075	0	74,841
Percent of City's Waste	5%	2%	1.44%	0.00%	100%
Emissions	1,324	640	465	0	26,774
% Reduction	-	25	25	75	
Reduced Emissions	-	480	349	0	

- Assumes 25% reduction in waste by 2025.

- Climate Protection Plan assumes 75% reduction in solid waste from residential units.

Source: Calculated by PBS&J, 2009. Citywide waste totals and project totals from Section 3.13, Utilities. Emissions estimates are from City of Palo Alto, 2007. Climate Protection Plan.

SUMC Potable Water Contribution to Electricity										
Source	MG/day	MWh/MG	MWh/yr	GHG Emissions (tons/yr)			CO2 Equivalent Emissions (tons/year)			
				CO2	N2O	CH4	CO2	N2O	CH4	Total
Village Concept Alternative (Residential Only)	0.00	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00
SUMC Projected 2015	120.02	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00
SUMC Projected 2025	64.71	0	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00

- No reduction applied.

Sources: Integrated Water Resources Plan (IRP), MWD Report No. 1107, March 1996. Emission factor for CO2 of 449.32 lbs/MWh provided by the City. lbs/MWh provided by the City. MWh/MG value determined from CEC: California's Water-Energy Relationship, November 2005. Reductions taken from April 28th 2009 letter from Stanford. Water from the SFPUC is used to generate electricity that supplies the needs of the SFPUC regional and local water systems. The hydroelectric generation is considered a renewable resource and the generation offsets the electric consumption attributable to the use of potable water.

SUMC Waste Water Contribution to Electricity										
Source	MG/yr	MWh/MG	MWh/yr	GHG Emissions (tons/yr)			CO2 Equivalent Emissions (tons/year)			
				CO2	N2O	CH4	CO2	N2O	CH4	Total
Village Concept Alternative (Residential Only)	0.00	1.9	0.00	0.00	-	0.000000	0.00	0.00000	0.00000	0.00
SUMC Projected 2015	112.66	1.9	214.06	43.62	0.000359	0.000650	43.62	0.10632	0.01496	43.74
SUMC Projected 2025	95.98	1.9	182.36	37.16	0.000306	0.000554	37.16	0.09057	0.01274	37.26

- Assumes 25% reduction in water usage.

Sources: California Energy Commission "Refining Estimates of Water-Related Energy Use in California" December 2006 CEC-500-2006-118; Pacific Institute Waste Not Want Not The Potential for Urban Water Conservation in California. November 2003; Integrated Water Resources Plan (IRP), MWD Report No. 1107, March 1996. Emission factor for CO2 of 449.32 lbs/MWh provided by the City. Reductions in water usage result in an approximately 56% reduction from BAU. Therefore, reductions in sewer generation are also assumed to result in a 56% reduction from BAU.

Reduced and Mitigated Calculations

Total Emissions - Existing (Copied from BAU calculation page)		
	Units Consumed	Emissions (metric tons CO2e)
Natural Gas (therms)	331,429	1,759
Diesel (gallons)	13,707	139
Medical N2O (ft3)	8,815	137
Fleet Vehicles (gallons)	41,864	356
Helicopter Fuels (gallons)	75,297	721
Electricity (MWh)	75,588	17,869
Steam and Chilled Water	131,765	40,041
Transportation	600,246	102,619
Solid Waste	3,700	1,324
Total		164,964

21.67 CO2e/SP/yr
20.78 % of 2005 Palo Alto Inventory

Net Emissions - SUMC Project 2025	Design Features		Design Feature + Spousal Trip		Mitigated W/o TDM		Mitigation w/ TDM	
	Units Consumed	Emissions (metric tons CO2e)	Units Consumed	Emissions (metric tons CO2e)	Units Consumed	Emissions (metric tons CO2e)	Units Consumed	Emissions (metric tons CO2e)
Natural Gas	4,110	22	4,110	22	4,110	22	4,110	22
Diesel	2,232	23	2,232	23	2,232	23	2,232	23
Medical N2O	6,127	99	6,127	99	6,127	99	6,127	99
Fleet Vehicles	13,845	100	13,845	100	13,845	100	13,845	100
Helicopter Fuels	21,083	201	21,083	201	21,083	201	21,083	201
Electricity	54,640	8,632	54,640	8,632	54,640	-	54,640	-
Steam and Chilled Water	10,995	19,542	10,995	19,542	10,995	19,542	10,995	19,542
Transportation	275,566	41,257	306,098	45,915	275,566	41,257	238,355	35,724
Solid Waste	1,792	480	1,792	480	1,792	1,792	1,792	480
Total		70,355		75,013		63,035		56,190
		5.95						24.88 % reduction
		29.90						25.41 % increase over Existing
		28.69				25.70		22.91 CO2e/SP/yr
		8.86						7.08 % over community

Participation in Palo Alto Green

w/ Go Pass

Reduced and Mitigated Calculations

Net Emissions - Reduced Intensity Alternative B		Design Features		Mitigation	
		Emissions (metric tons CO2e)		Emissions (metric tons CO2e)	
	Units Consumed		Units Consumed		
Natural Gas	2,466	13	2,466	13	
Diesel	1,339	14	1,339	14	
Medical N2O	3,676	59	3,676	59	
Fleet Vehicles	8,307	60	8,307	60	
Helicopter Fuels	12,650	121	12,650	121	
Electricity	61,692	9,883	61,692	-	Participation in Palo Alto Green
Steam and Chilled Water	43,159.60	15,052	43,160	15,052	
Transportation	172,516	25,925	149,158	22,440	with TDM
Solid Waste	1,075	349	1075.2	349	
Total		51,476		38,107	
		8.56		32.31	% reduction
		23.78		18.77	% increase over Existing
		27%		32.18%	% reduction from SUMC project
		25.46		18.84	CO₂e/SP/yr

Net Emissions - Village Concept Alternative		With Spousal Trips no TDM		No Spousal Trips no TDM		No Spousal Trips & TDM	
		Emissions (metric tons CO2e)		Emissions (metric tons CO2e)		Emissions (metric tons CO2e)	
	Units Consumed		Units Consumed		Units Consumed		
Natural Gas (therms)	4,110	22	4,110	22	4,110	22	
Diesel (gallons)	2,232	23	2,232	23	2,232	23	
Medical N2O (ft3)	6,127	99	6,127	99	6,127	99	
Fleet Vehicles (gallons)	13,845	100	13,845	100	13,845	100	
Helicopter Fuels (gallons)	21,083	201	21,083	201	21,083	201	
Electricity (MWh)	54,640	-	54,640	-	54,640	-	Participation in Palo Alto Green
Steam and Chilled Water	10,995	19,542	10,995	19,542	10,995	19,542	
Transportation	280,235	42,038	265,682	39,773	236,245	35,396	
Solid Waste	1,792	480	1,792	480	1,792	480	
Total		62,504		60,240		55,863	
		17.31		17.84		23.81	% reduction
		27.48		26.75		25.30	% increase over Existing
		25.48		24.56		22.78	CO₂e/SP/yr
		1.25		-2.46		-0.59	% change from SUMC

URBEMIS OUTPUT

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\21478\Application Data\Urbemis\Version9a\Projects\SUMC- 2025 Revised 3-2010 New VMT.urb924

Project Name: Palo Alto - SUMC 2025 - Revised March 2010 New VMT

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	1.04	1.07	1.18	0.00	0.00	0.00	1,280.01

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	15.97	18.74	189.00	0.45	86.06	16.17	45,476.73

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	17.01	19.81	190.18	0.45	86.06	16.17	46,756.74

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
Natural Gas	0.08	1.07	0.90	0.00	0.00	0.00	1,279.50
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscape	0.02	0.00	0.28	0.00	0.00	0.00	0.51
Consumer Products	0.00						
Architectural Coatings	0.94						
TOTALS (tons/year, unmitigated)	1.04	1.07	1.18	0.00	0.00	0.00	1,280.01

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM25</u>	<u>CO2</u>
Medical office building	1.02	1.23	12.36	0.03	5.66	1.06	2,985.45
Hospital	14.95	17.51	176.64	0.42	80.40	15.11	42,491.28
TOTALS (tons/year, unmitigated)	15.97	18.74	189.00	0.45	86.06	16.17	45,476.73

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

<u>Summary of Land Uses</u>						
Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Medical office building		30.89	1000 sq ft	21.40	661.05	18,112.66
Hospital		10.99	1000 sq ft	854.97	9,396.12	257,453.68
					10,057.17	275,566.34

<u>Vehicle Fleet Mix</u>				
Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.0	0.0	100.0	0.0
Light Truck < 3750 lbs	12.6	0.0	99.2	0.8
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	34.4	65.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

	<u>Travel Conditions</u>					
	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	27.4	27.4	27.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\21478\Application Data\Urbemis\Version9a\Projects\SUMC- 2025 Revised 3-2010 - TDM reduction New VMT.urb924

Project Name: Palo Alto - SUMC 2025 with TDM - Revised Mar 2010 New VMT

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	1.04	1.07	1.18	0.00	0.00	0.00	1,280.01

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	13.97	16.30	164.74	0.40	74.44	13.99	39,377.86

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
TOTALS (tons/year, unmitigated)	15.01	17.37	165.92	0.40	74.44	13.99	40,657.87

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Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM2.5</u>	<u>CO2</u>
Natural Gas	0.08	1.07	0.90	0.00	0.00	0.00	1,279.50
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscape	0.02	0.00	0.28	0.00	0.00	0.00	0.51
Consumer Products	0.00						
Architectural Coatings	0.94						
TOTALS (tons/year, unmitigated)	1.04	1.07	1.18	0.00	0.00	0.00	1,280.01

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

<u>Source</u>	<u>ROG</u>	<u>NOX</u>	<u>CO</u>	<u>SO2</u>	<u>PM10</u>	<u>PM25</u>	<u>CO2</u>
Medical office building	0.89	1.07	10.76	0.03	4.89	0.92	2,584.58
Hospital	13.08	15.23	153.98	0.37	69.55	13.07	36,793.28
TOTALS (tons/year, unmitigated)	13.97	16.30	164.74	0.40	74.44	13.99	39,377.86

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

<u>Summary of Land Uses</u>						
Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Medical office building		30.89	1000 sq ft	21.40	661.05	15,666.79
Hospital		10.99	1000 sq ft	854.97	9,396.12	222,688.05
					10,057.17	238,354.84

<u>Vehicle Fleet Mix</u>				
Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.0	0.0	100.0	0.0
Light Truck < 3750 lbs	12.6	0.0	99.2	0.8
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	34.4	65.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

	<u>Travel Conditions</u>					
	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	23.7	23.7	23.7
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D4135700 - Stanford Hospital\Modeling\Urbemis\VCA - Spousal Trips no TDM.urb924

Project Name: Palo Alto - SUMC - Village Concept Alternative and Spousal trips - No TDM

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

<u>Source</u>	CO2
Apartments mid rise	5,028.37
Medical office building	2,995.15
Hospital	42,587.53
TOTALS (tons/year, unmitigated)	50,611.05

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments mid rise	12.89	5.70	dwelling units	490.00	2,793.00	29,885.10
Medical office building		30.89	1000 sq ft	21.40	661.05	18,171.82

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Hospital		10.99	1000 sq ft	854.97	9,396.12	258,040.94
					12,850.17	306,097.86

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.0	0.0	100.0	0.0
Light Truck < 3750 lbs	12.6	0.0	99.2	0.8
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	34.4	65.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential				Commercial	
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.7	10.7	10.7	27.4	27.4	27.5
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Operational Changes to Defaults

Home-based work urban trip length changed from 10.8 miles to 10.7 miles

Home-based shop urban trip length changed from 7.3 miles to 10.7 miles

Home-based other urban trip length changed from 7.5 miles to 10.7 miles

Commercial-based commute urban trip length changed from 9.5 miles to 27.4 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 27.4 miles

Commercial-based customer urban trip length changed from 7.35 miles to 27.5 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D4135700 - Stanford Hospital\Modeling\Urbemis\RIAb - with TDM.urb924

Project Name: Palo Alto - SUMC 2015 - Revised March 2010 - With TDM

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

<u>Source</u>	CO2
Medical office building	2,594.49
Hospital	22,140.41
TOTALS (tons/year, unmitigated)	24,734.90

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Medical office building		30.89	1000 sq ft	21.40	661.05	15,666.79
Hospital		10.98	1000 sq ft	512.98	5,632.52	133,490.73
					6,293.57	149,157.52

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	53.8	0.2	99.6	0.2
Light Truck < 3750 lbs	12.7	0.8	96.8	2.4
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	50.0	50.0	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	26.0	0.0	25.9	23.7	23.7	23.7
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			

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Travel Conditions

	Residential			Commute	Commercial	
	Home-Work	Home-Shop	Home-Other		Non-Work	Customer
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Operational Changes to Defaults

Home-based work urban trip length changed from 10.8 miles to 26 miles

Home-based shop urban trip length changed from 7.3 miles to 0 miles

Home-based other urban trip length changed from 7.5 miles to 25.9 miles

Commercial-based commute urban trip length changed from 9.5 miles to 23.7 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 23.7 miles

Commercial-based customer urban trip length changed from 7.35 miles to 23.7 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D4135700 - Stanford Hospital\Modeling\Urbemis\RIAb - without TDM.urb924

Project Name: Palo Alto - SUMC 2015 - Revised March 2010 - without TDM

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

<u>Source</u>	CO2
Medical office building	2,997.26
Hospital	25,580.58
TOTALS (tons/year, unmitigated)	28,577.84

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Medical office building		30.89	1000 sq ft	21.40	661.05	18,114.97
Hospital		10.98	1000 sq ft	512.98	5,632.52	154,401.45
					6,293.57	172,516.42

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	53.8	0.2	99.6	0.2
Light Truck < 3750 lbs	12.7	0.8	96.8	2.4
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.4	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	50.0	50.0	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	26.0	0.0	25.9	27.4	27.5	27.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			

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Travel Conditions

	Residential			Commute	Commercial	
	Home-Work	Home-Shop	Home-Other		Non-Work	Customer
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Operational Changes to Defaults

Home-based work urban trip length changed from 10.8 miles to 26 miles

Home-based shop urban trip length changed from 7.3 miles to 0 miles

Home-based other urban trip length changed from 7.5 miles to 25.9 miles

Commercial-based commute urban trip length changed from 9.5 miles to 27.4 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 27.5 miles

Commercial-based customer urban trip length changed from 7.35 miles to 27.4 miles

Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D4135700 - Stanford Hospital\Modeling\Urbemis\VCA - no TDM - no res.urb924

Project Name: Palo Alto - SUMC - Village Concept Alternative - No TDM

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

<u>Source</u>	CO2
Medical office building	2,985.50
Hospital	40,855.93
TOTALS (tons/year, unmitigated)	43,841.43

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Medical office building		30.46	1000 sq ft	21.40	651.84	18,114.42
Hospital		10.43	1000 sq ft	854.97	8,917.34	247,567.57
					9,569.18	265,681.99

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.0	0.0	100.0	0.0
Light Truck < 3750 lbs	12.6	0.0	99.2	0.8
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	34.4	65.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.7	10.7	10.7	27.7	27.7	27.8
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			

Travel Conditions

	Residential			Commute	Commercial	
	Home-Work	Home-Shop	Home-Other		Non-Work	Customer
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Operational Changes to Defaults

Home-based work urban trip length changed from 10.8 miles to 10.7 miles

Home-based shop urban trip length changed from 7.3 miles to 10.7 miles

Home-based other urban trip length changed from 7.5 miles to 10.7 miles

Commercial-based commute urban trip length changed from 9.5 miles to 27.7 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 27.7 miles

Commercial-based customer urban trip length changed from 7.35 miles to 27.8 miles

Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D4135700 - Stanford Hospital\Modeling\Urbemis\VCA - with TDM - no res.urb924

Project Name: Palo Alto - SUMC - Village Concept Alternative - with TDM

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

<u>Source</u>	CO2
Medical office building	2,655.06
Hospital	36,361.72
TOTALS (tons/year, unmitigated)	39,016.78

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Medical office building		30.46	1000 sq ft	21.40	651.84	16,098.27
Hospital		10.43	1000 sq ft	854.97	8,917.34	220,146.76
					9,569.18	236,245.03

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.0	0.0	100.0	0.0
Light Truck < 3750 lbs	12.6	0.0	99.2	0.8
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	34.4	65.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.7	10.7	10.7	24.7	24.6	24.7
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			

Travel Conditions

	Residential			Commute	Commercial	
	Home-Work	Home-Shop	Home-Other		Non-Work	Customer
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Operational Changes to Defaults

Home-based work urban trip length changed from 10.8 miles to 10.7 miles

Home-based shop urban trip length changed from 7.3 miles to 10.7 miles

Home-based other urban trip length changed from 7.5 miles to 10.7 miles

Commercial-based commute urban trip length changed from 9.5 miles to 24.7 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 24.6 miles

Commercial-based customer urban trip length changed from 7.35 miles to 24.7 miles

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Urbemis 2007 Version 9.2.4

Detail Report for Annual Operational Unmitigated Emissions (Tons/Year)

File Name: R:\General Air Quality Info\Projects\0D4135700 - Stanford Hospital\Modeling\Urbemis\VCA - Spousal Trips no TDM.urb924

Project Name: Palo Alto - SUMC - Village Concept Alternative and Spousal trips - No TDM

Project Location: Bay Area Air District

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

<u>Source</u>	CO2
Apartments mid rise	5,928.19
Medical office building	2,896.50
Hospital	37,512.84
TOTALS (tons/year, unmitigated)	46,337.53

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2025 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments mid rise	12.89	6.72	dwelling units	490.00	3,292.80	35,232.96
Medical office building		27.48	1000 sq ft	21.40	588.07	17,581.29

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Hospital		8.90	1000 sq ft	854.97	7,609.23	227,420.93
					11,490.10	280,235.18

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.0	0.0	100.0	0.0
Light Truck < 3750 lbs	12.6	0.0	99.2	0.8
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.6	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.9	0.0	77.8	22.2
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	0.3	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	3.2	34.4	65.6	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential				Commercial	
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.7	10.7	10.7	29.9	29.8	29.9
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	40.0	0.0	60.0			
% of Trips - Commercial (by land use)						
Medical office building				7.0	3.5	89.5
Hospital				25.0	12.5	62.5

Operational Changes to Defaults

Home-based work urban trip length changed from 10.8 miles to 10.7 miles

Home-based shop urban trip length changed from 7.3 miles to 10.7 miles

Home-based other urban trip length changed from 7.5 miles to 10.7 miles

Commercial-based commute urban trip length changed from 9.5 miles to 29.9 miles

Commercial-based non-work urban trip length changed from 7.35 miles to 29.8 miles

Commercial-based customer urban trip length changed from 7.35 miles to 29.9 miles