

Appendix C

Air Quality



Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\pasadena.urb924

Project Name: Pasadena Art College of Design

Project Location: South Coast AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2008 TOTALS (tons/year unmitigated)	0.38	2.47	1.75	0.00	1.14	0.14	1.29	0.24	0.13	0.37	257.31
2008 TOTALS (tons/year mitigated)	0.38	2.47	1.75	0.00	1.14	0.14	1.29	0.24	0.13	0.37	257.31
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009 TOTALS (tons/year unmitigated)	1.27	0.78	0.84	0.00	0.00	0.06	0.06	0.00	0.05	0.05	111.15
2009 TOTALS (tons/year mitigated)	1.16	0.78	0.84	0.00	0.00	0.06	0.06	0.00	0.05	0.05	111.15
Percent Reduction	8.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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)	0.17	0.16	0.71	0.00	0.00	0.00	178.40

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)	2.44	2.90	22.29	0.02	3.19	0.63	1,851.41

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)	2.61	3.06	23.00	0.02	3.19	0.63	2,029.81

Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\pasadena.urb924

Project Name: Pasadena Art College of Design

Project Location: South Coast AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10 Total</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5 Total</u>	<u>CO2</u>
Time Slice 3/24/2008-6/20/2008 Active Days: 65	3.72	32.98	16.69	0.01	24.02	1.63	25.65	5.02	1.50	6.52	2,942.42
Mass Grading 03/24/2008-06/20/2008	3.72	32.98	16.69	0.01	24.02	1.63	25.65	5.02	1.50	6.52	2,942.42
Mass Grading Dust	0.00	0.00	0.00	0.00	24.00	0.00	24.00	5.01	0.00	5.01	0.00
Mass Grading Off Road Diesel	3.31	28.00	13.56	0.00	0.00	1.41	1.41	0.00	1.30	1.30	2,247.32
Mass Grading On Road Diesel	0.37	4.90	1.92	0.01	0.02	0.21	0.23	0.01	0.20	0.20	570.62
Mass Grading Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49
Time Slice 6/23/2008-8/1/2008 Active Days: 30	3.35	28.07	14.77	0.00	24.01	1.41	25.42	5.01	1.30	6.32	2,371.80
Fine Grading 06/23/2008-08/01/2008	3.35	28.07	14.77	0.00	24.01	1.41	25.42	5.01	1.30	6.32	2,371.80
Fine Grading Dust	0.00	0.00	0.00	0.00	24.00	0.00	24.00	5.01	0.00	5.01	0.00
Fine Grading Off Road Diesel	3.31	28.00	13.56	0.00	0.00	1.41	1.41	0.00	1.30	1.30	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.21	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.49

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Time Slice 8/18/2008-8/29/2008	3.50	19.47	12.44	0.00	0.02	1.61	1.63	0.01	1.48	1.49	1,703.58
Active Days: 10											
Asphalt 08/18/2008-08/29/2008	3.50	19.47	12.44	0.00	0.02	1.61	1.63	0.01	1.48	1.49	1,703.58
Paving Off-Gas	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	2.99	17.76	9.40	0.00	0.00	1.54	1.54	0.00	1.41	1.41	1,272.04
Paving On Road Diesel	0.12	1.57	0.61	0.00	0.01	0.07	0.07	0.00	0.06	0.06	182.57
Paving Worker Trips	0.08	0.15	2.43	0.00	0.01	0.01	0.02	0.00	0.01	0.01	248.97
Time Slice 9/1/2008-12/31/2008	<u>4.46</u>	20.04	<u>21.01</u>	<u>0.01</u>	0.05	1.41	1.46	0.02	1.30	1.31	2,672.34
Active Days: 88											
Building 09/01/2008-04/24/2009	4.46	20.04	21.01	0.01	0.05	1.41	1.46	0.02	1.30	1.31	2,672.34
Building Off Road Diesel	4.07	18.22	11.80	0.00	0.00	1.33	1.33	0.00	1.22	1.22	1,621.20
Building Vendor Trips	0.11	1.32	1.07	0.00	0.01	0.06	0.07	0.00	0.05	0.06	214.99
Building Worker Trips	0.27	0.50	8.14	0.01	0.04	0.02	0.06	0.01	0.02	0.03	836.15
Time Slice 1/1/2009-3/20/2009	4.22	19.04	20.07	0.01	0.05	1.35	1.40	0.02	1.24	1.26	2,671.98
Active Days: 57											
Building 09/01/2008-04/24/2009	4.22	19.04	20.07	0.01	0.05	1.35	1.40	0.02	1.24	1.26	2,671.98
Building Off Road Diesel	3.87	17.35	11.50	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,621.20
Building Vendor Trips	0.11	1.24	1.00	0.00	0.01	0.05	0.06	0.00	0.05	0.05	215.01
Building Worker Trips	0.24	0.45	7.57	0.01	0.04	0.02	0.06	0.01	0.02	0.03	835.78
Time Slice 3/23/2009-4/24/2009	<u>53.12</u>	<u>19.08</u>	<u>20.71</u>	<u>0.01</u>	<u>0.05</u>	<u>1.35</u>	<u>1.40</u>	<u>0.02</u>	<u>1.24</u>	<u>1.26</u>	<u>2,742.95</u>
Active Days: 25											
Building 09/01/2008-04/24/2009	4.22	19.04	20.07	0.01	0.05	1.35	1.40	0.02	1.24	1.26	2,671.98
Building Off Road Diesel	3.87	17.35	11.50	0.00	0.00	1.28	1.28	0.00	1.17	1.17	1,621.20
Building Vendor Trips	0.11	1.24	1.00	0.00	0.01	0.05	0.06	0.00	0.05	0.05	215.01
Building Worker Trips	0.24	0.45	7.57	0.01	0.04	0.02	0.06	0.01	0.02	0.03	835.78
Coating 03/22/2009-05/22/2009	48.89	0.04	0.64	0.00	0.00	0.00	0.01	0.00	0.00	0.00	70.97
Architectural Coating	48.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.02	0.04	0.64	0.00	0.00	0.00	0.01	0.00	0.00	0.00	70.97

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Time Slice 4/27/2009-5/22/2009	48.89	0.04	0.64	0.00	0.00	0.00	0.01	0.00	0.00	0.00	70.97
Active Days: 20											
Coating 03/22/2009-05/22/2009	48.89	0.04	0.64	0.00	0.00	0.00	0.01	0.00	0.00	0.00	70.97
Architectural Coating	48.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.02	0.04	0.64	0.00	0.00	0.00	0.01	0.00	0.00	0.00	70.97

Phase Assumptions

Phase: Fine Grading 6/23/2008 - 8/1/2008 - Default Fine Site Grading/Excavation Description

Total Acres Disturbed: 0.5
Maximum Daily Acreage Disturbed: 1.2
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:

- 1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
- 1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
- 1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 3/24/2008 - 6/20/2008 - Default Mass Site Grading/Excavation Description

Total Acres Disturbed: 0.5
Maximum Daily Acreage Disturbed: 1.2
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 134.63
Off-Road Equipment:

- 1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
- 1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
- 1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 8/18/2008 - 8/29/2008 - Default Paving Description

Acres to be Paved: 1.2
Off-Road Equipment:

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- 4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day
- 1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day
- 1 Paving Equipment (104 hp) operating at a 0.53 load factor for 8 hours per day
- 1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 9/1/2008 - 4/24/2009 - Default Building Construction Description

Off-Road Equipment:

- 1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day
- 2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day
- 1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
- 1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
- 3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 3/22/2009 - 5/22/2009 - Default Architectural Coating Description

- Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100
- Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50
- Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250
- Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100
- Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
- Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\pasadena.urb924

Project Name: Pasadena Art College of Design

Project Location: South Coast AQMD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	<u>ROG</u>	<u>NOx</u>	<u>CO</u>	<u>SO2</u>	<u>PM10 Dust</u>	<u>PM10 Exhaust</u>	<u>PM10</u>	<u>PM2.5 Dust</u>	<u>PM2.5 Exhaust</u>	<u>PM2.5</u>	<u>CO2</u>
2008 TOTALS (lbs/day unmitigated)	4.46	32.98	21.01	0.01	24.02	1.63	25.65	5.02	1.50	6.52	2,942.42
2008 TOTALS (lbs/day mitigated)	4.46	32.98	21.01	0.01	24.02	1.63	25.65	5.02	1.50	6.52	2,942.42
2009 TOTALS (lbs/day unmitigated)	53.12	19.08	20.71	0.01	0.05	1.35	1.40	0.02	1.24	1.26	2,742.95
2009 TOTALS (lbs/day mitigated)	48.23	19.08	20.71	0.01	0.05	1.35	1.40	0.02	1.24	1.26	2,742.95

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 (lbs/day, unmitigated)	0.93	0.85	3.89	0.00	0.01	0.01	977.58

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 (lbs/day, unmitigated)	13.56	14.91	122.83	0.11	17.48	3.46	10,460.98

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 (lbs/day, unmitigated)	14.49	15.76	126.72	0.11	17.49	3.47	11,438.56

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
 JUNE 1989 VERSION
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JOB: Pasadena art school
 RUN: Hour 1
 POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 1.0 M/S Z0= 100. CM ALT= 0. (M)
 BRG= .0 DEGREES VD= .0 CM/S
 CLAS= 7 (G) VS= .0 CM/S
 MIXH= 1000. M AMB= 2.8 PPM
 SIGTH= 5. DEGREES TEMP= 21.0 DEGREE (C)

II. LINK VARIABLES

LINK DESCRIPTION	* X1	* Y1	* X2	* Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	4	85	4	4	AG	2046	5.0	1.0	10.0
B. Link B	-85	4	4	4	AG	0	5.0	1.0	10.0
C. Link C	85	4	5	4	AG	747	5.0	1.0	10.0
D. Link D	4	-175	4	3	AG	891	5.0	1.0	10.0
E. Link E	4	-175	-910	-175	AG	891	5.0	1.0	10.0
F. Link F	4	-175	85	-175	AG	747	5.0	1.0	10.0
G. Link G	4	-175	4	-260	AG	2563	5.0	1.0	10.0
H. Link H	-910	-90	-910	-175	AG	1065	5.0	1.0	10.0
I. Link I	-995	-175	-910	-175	AG	1629	5.0	1.0	10.0
J. Link J	-910	-260	-910	-175	AG	0	5.0	1.0	10.0

III. RECEPTOR LOCATIONS

RECEPTOR	* X	* Y	* Z
1. Recpt 1	-18	10	1.8
2. Recpt 2	-13	18	1.8
3. Recpt 3	-20	-215	1.8
4. Recpt 4	-975	-230	1.8

□□

Pasadena CL4 revised 3_25_08.txt

JOB: Pasadena art school
 RUN: Hour 1
 POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

RECEPTOR	* PRED * * CONC * * (PPM) *	CONC/LINK (PPM)										
		A	B	C	D	E	F	G	H	I	J	
1. Recpt 1	* 2.8 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
2. Recpt 2	* 2.8 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
3. Recpt 3	* 2.9 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
4. Recpt 4	* 2.9 *	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

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Greenhouse Gas (GHG) Emissions Calculations

Project Name: Pasadena
 ESA Proj. Number: D207278

Greenhouse Gas (GHG) Emissions from Area Sources and Vehicles

	Annual Emissions		
	pounds (lbs.)	Tons	Metric Tons
URBEMIS2007 Area Emissions	356,000	178	161
URBEMIS2007 Vehicle Emissions	3,702,000	1,851	1,679
Total Emissions (area sources + vehicles)	4,058,000	2,029	1,841

Indirect Greenhouse Gas (GHG) Emissions from Project use of Electricity (Power Plant Emissions)

Estimated Project Annual Electrical Use: 1,044,224 kWh (kilowatt hours)/year
 1,044 mWh (megawatt hours)/year

Indirect GHG gases	Emission Factor lb/mWh	Annual		CO2 Equivalent Factor	Annual
		Project Electricity mWh	GHGs metric tons		CO2 Equivalent Emissions (metric tons)
Carbon Dioxide (CO2)	804.54	1,044	381	1	381
Nitrous Oxide (N2O)	0.0037	1,044	0.0	296	1
Methane (CH4)	0.0067	1,044	0.0	23	0
Total Indirect GHG Emissions from Project Electricity Use=					382

Total Annual Greenhouse Gas (GHG) Emission from Project Operations -- All Sources (CO2 equivalent Metric Tons)

Area Sources	161	7.3%
Vehicles	1,679	75.6%
Electrical Use	382	17.2%
Total=	2,222	100.0%

Notes and References:

Total Emissions from Indirect Electricity Use
 Formula and Emission Factor from The California Climate Action Registry Report Protocol 2006

Pg. 32 (CCARRP) gives Equations

Pg. 35 (CCARRP) gives CO2 output emission rate (lbs/mWh)
 804.54 (lbs/mWh)

Pg. 85 (CCARRP) gives CO2 equivalency factors

Pg. 87 (CCARRP) gives Methane and Nitrous Oxide electricity emission factors (lbs/mWh)
 Methane - 0.0067 (lbs/mWh)
 Nitrous Oxide - 0.0037 (lbs/mWh)

lbs/metric ton = 2204.62

Percentage of 25,000 8.9%
 Percentage of 174 Million 0.001%

Construction CO2	Tons from URBEMIS 257	Metric Tons 233
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Annual kWh Calculations for Project Emissions of Electricity Used by the project

Project Name: Pasadena
ESA Proj. Number: D207278

Total GHG Emissions From Commercial Electricity Use
Average monthly consumption (kWh)

College/University* (kWh/sq ft/Year)	square footage**	kWhhours per year
11.55	90,409	1,044,224

*Electricity Usage Rates from Table A9-11-A South Coast AQMD CEQA Air Quality Handbook 1993 - Usage Rate is Average for SCE and LADWP

**Design Research Center 48,183 sf, Tyler Addition 42,226 sf.
