APPENDIX 3.2

Greenhouse Gas Emission Calculations

Rose Bowl Event Expansion Project
Mobile Emissions
Greenhouse Gases
June 2012

Proposed Project

Event Time	Vehicle Type	Traffic Volume (trips per event)	Emissions per Event (pounds CO_2e)	Events per Year	Emissions per Year (MT CO_2e)
Weekday	Passenger	55,378	819,490.00	2	744.99
	Delivery	35	144.70	2	0.13
Weekend	Passenger	51,266	731,949.00	11	3,659.75
	Delivery	35	144.70	11	0.72
					4,405.59

Alternative 2

Event Time	Vehicle Type	Traffic Volume (trips per event)	Emissions per Event (pounds CO_2e)	Events per Year	Emissions per Year (MT CO_2e)
Weekday	Passenger	39,834	589,482.35	2	535.89
	Delivery	35	144.70	2	0.13
Weekend	Passenger	37,184	530,902.22	11	2,654.51
	Delivery	35	144.70	11	0.72
					3,191.26

Rose Bowl Event Expansion Project
Electricity Emissions
Greenhouse Gases
June 2012

Reported Annual Usage (kWh)	CO_2 Emissions Factor (lbs/MWh)	CH_4 Emissions Factor (lbs/MWh)	N_2O Emissions Factor (lbs/MWh)	Emissions per Year (MT CO_2e)	Emissions per Event - Existing (MT CO_2e)	Total Emissions - New (MT CO_2e)
2,382,080	1,664.14	0.029	0.010	1,805.89	150.49	**1,956.38**

California Air Resources Board, *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories*, Version 1.1, (2010) 209.
The CO_2 factor is for Pasadena Water and Power, based on 2006 report.

Rose Bowl Event Expansion Project
Natural Gas Emissions
Greenhouse Gases
June 2012

Avg Monthly Use No Event (therms)	Avg Monthly Use Oct-Dec (therms)	Avg Use Per Event (therms)	Avg Use Per Event (MMBtu)	CO2 Emissions Factor (kg/MMBtu)	CH4 Emissions Factor (kg/MMBtu)	N2O Emissions Factor (kg/MMBtu)	Emissions per Event (MT CO_2e)	Total Emissions - New (MT CO_2e)
300	650	350	35	53.46	0.005	0.0001	1.88	**24.39**

Conversion Factors:
100,000 Btu/therm 1,050 Btu/Scf

California Air Resources Board, *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories* , Version 1.1, (2010)
The CO_2 factor is for Pasadena Water and Power, based on 2006 report.

Rose Bowl Event Expansion Project
Water and Wastewater Emissions
Greenhouse Gases
June 2012

Use	Average Monthly Usage Oct - Dec (100 cubic feet)	Volume (MG/year)	Electricity Use Factor (MWh/MG)	Annual Power Usage (MWh)	CO_2 Emissions Factor (lbs/MWh)	CH_4 Emissions Factor[1] (lbs/MWh)	N_2O Emissions Factor[1] (lbs/MWh)	Emissions per Year (MT CO_2e)
Water	557	54.17	11.11	601.79	1,664.14	0.029	0.010	456.22
Wastewater	557	54.17	1.91	103.51	1,664.14	0.029	0.010	78.47
								534.70

[1] California Air Resources Board, *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories* , Version 1.1, (2010) 209.
The CO_2 factor is for Pasadena Water and Power, based on 2006 report.

Rose Bowl Event Expansion Project
Solid Waste Emissions
Greenhouse Gases
June 2012

Solid Waste GHG Emissions

Land Use	Solid Waste Generation[1] (Tons/yr)	CO_2e Emission Factor[2] (MT CO_2e/MT waste)	Annual CO_2e Emissions (MT CO_2e/yr)
Proposed Project Rose Bowl Events	195.00	0.11	19.46
Net Total Emissions			**19.46**

Sources:
1. Estimate of 15 tons per football event at the Rose Bowl provided by client.

2. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Greenhouse Gas Emission Factors for Management of Selected Materials in Municipal Solid Waste (EPA-530-R-98-013)* , (1998). The factor is based on mixed municipal solid waste as disposed in landfills without landfill gas recovery.

Where:

CO_2e	Carbon dioxide equivalent
MT	Metric ton
yr	Year