Appendix C

Air Quality Technical Information

Appendix C.

Air Quality Technical Information

Carbon Monoxide Modeling

Dispersion Modeling

Predicting the ambient air quality impacts of pollutant emissions requires an assessment of the transport, dispersion, chemical transformation, and removal processes that affect pollutant emissions after their release from a source. Gaussian dispersion models are frequently used for such analyses. The term "Gaussian dispersion" refers to a general type of mathematical equation used to describe the horizontal and vertical distribution of pollutants downwind from an emission source.

Gaussian dispersion models treat pollutant emissions as being carried downwind in a defined plume, subject to horizontal and vertical mixing with the surrounding atmosphere. The plume spreads horizontally and vertically with a reduction in pollutant concentrations as it travels downwind. Mixing with the surrounding atmosphere is greatest at the edge of the plume, resulting in lower pollutant concentrations outward (horizontally and vertically) from the center of the plume. This decrease in concentration outward from the center of the plume is treated as following a Gaussian ("normal") statistical distribution. Horizontal and vertical mixing generally occur at different rates. Because turbulent motions in the atmosphere occur on a variety of spatial and time scales, vertical and horizontal mixing also vary with distance downwind from the emission source.

The CALINE4 Model

The ambient air quality effects of traffic emissions were evaluated using the CALINE4 dispersion model (Benson 1989). CALINE4 is a Gaussian dispersion model specifically designed to evaluate air quality impacts of roadway projects. Each roadway link analyzed in the model is treated as a sequence of short segments. Each segment of a roadway link is treated as a separate emission source producing a plume of pollutants which disperses downwind. Pollutant concentrations at any specific location are calculated using the total contribution

from overlapping pollution plumes originating from the sequence of roadway segments.

When winds are essentially parallel to a roadway link, pollution plumes from all roadway segments overlap. This produces high concentrations near the roadway (near the center of the overlapping pollution plumes), and low concentrations well away from the roadway (at the edges of the overlapping pollution plumes). When winds are at an angle to the roadway link, pollution plumes from distant roadway segments make essentially no contribution to the pollution concentration observed at a receptor location. Under such cross wind situations, pollutant concentrations near the highway are lower than under parallel wind conditions (fewer overlapping plume contributions), while pollutant concentrations away from the highway may be greater than would occur with parallel winds (near the center of at least some pollution plumes).

The CALINE4 model employs a "mixing cell" approach to estimating pollutant concentrations over the roadway itself. The size of the mixing cell over each roadway segment is based on the width of the traffic lanes of the highway (generally 12 feet per lane) plus an additional turbulence zone on either side (generally 10 feet on each side). Parking lanes and roadway shoulders are not counted as traffic lanes. The height of the mixing cell is calculated by the model.

Pollutants emitted along a highway link are treated as being well mixed within the mixing cell volume due to mechanical turbulence from moving vehicles and convective mixing due to the temperature of vehicle exhaust gases. Pollutant concentrations downwind from the mixing cell are calculated using horizontal and vertical dispersion rates which are a function of various meteorological and ground surface conditions.

Modeling Procedures

Roadway and Traffic Conditions

Traffic volumes and operating conditions used in the modeling were obtained from the traffic analysis prepared for this project. Free flow traffic speeds were adjusted to reflect congested speeds using methodology from the Highway Capacity Manual (Transportation Research Board 2000). CO modeling was conducted for the Swinford Street and Harbor Boulevard intersection for the 2008 PM peak hour project conditions.

Vehicle Emission Rates

Vehicle emission rates were determined using the California Air Resources Board's EMFAC7F (version 1.1) emission rate program. A cold start percentage of 10% was assumed along with a hot start percentage of 50%.

Receptor Locations

CO concentrations were estimated at 4 receptor locations at each of the proposed intersections. The receptors are placed at 100 feet away from the center of each roadway. Receptor heights were set at 5.9 feet.

Meteorological Conditions

Meteorological inputs to the CALINE4 model were determined using methodology recommended in Air Quality Technical Analysis Notes (California Department of Transportation 1988). The meteorological conditions used in the modeling represent a calm winter period. Worst case wind angles were modeled to determine a worst-case concentration for each receptor. The meteorological inputs include: 0.5 meter per second wind speed, ground-level temperature inversion (atmospheric stability class G), wind direction standard deviation equal to five degrees, and a mixing height of 1000 meters.

Background Concentrations and Eight-Hour Values

Background concentration of 5.5 ppm was added to the modeled 2008 1-hour values to account for sources of CO not included in the modeling. Eight-hour modeled values were calculated from the 1-hour values using a persistence factor of 0.7. Background concentration of 4.0 ppm was added to the modeled 2008 8-hour values. All background concentration data were taken from the SMAQMD's Air Quality Thresholds of Significance using the Long Beach modeling location.

References

Benson, P. E. 1989. CALINE4 – a dispersion model for predicting air pollution concentrations near roadways. California Department of Transportation. Sacramento, CA.

California Department of Transportation. 1998. Air Quality Technical Analysis Notes. Sacramento, CA.

Transportation Research Board. 2000. Highway Capacity Manual. Washington, D.C.

Appendix C. Air Quality

Construction Emissions **Page Number**

Operational Emissions

Demolition Equipment List and Schedule Assumptions
Start Date: April, 2004
Duration: 3 months
Work Schedule: 22 days per month
Building Volume to be Demolished: 100,000 cubic feet
Max Building Volume Demolished per day: 1500 cubic feet
On-Road VMT: 84 miles per day (heavy duty haul trucks)
Equipment List:
1 Crane @ 57 hp for 6 hours per day
1 Loader @ 199 hp for 6 hours per day
1 Tugboat @ 1172 hp for 2 hours per day
1 Workboat @ 323 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo demo.urb
Project Name: cabrillo demolition
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2001 version 2.08

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: April, 2004
Construction Duration: 3
Total Land Use Area to be Developed: 0 acres
Maximum Acreage Disturbed Per Day: 0 acres
Single Family Units: 0 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source *** 2004***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	6.30	-	6.30
Off-Road Diesel	9.71	84.09	64.41	-	4.04	4.04	0.00
On-Road Diesel	0.12	2.20	0.45	0.03	0.06	0.05	0.01
Worker Trips	0.11	0.13	2.56	0.00	0.01	0.00	0.01
Maximum lbs/day	9.94	86.42	67.42	0.03	10.41	4.09	6.32
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Max lbs/day all phases	9.94	86.42	67.42	0.03	10.41	4.09	6.32

Phase 1 Infrastructure Equipment List and Schedule Assumptions
Start Date: July, 2004
Duration: 12 months (excluding demolition)
Work Schedule: 22 days per month
Total Acreage: 47
Maximum Disturbed per Day: 12 acres
Dust Emission Factor 10 pounds per acre/day
5000 cubic yards material imported to site
Haul truck capacity = 20 cubic yards.
Round trip haul distance = 20 miles.

Off Road Heavy Duty Equipment List:

1 Crane @ 348 hp for 4 hours per day
1 Drill @ 154 hp for 6 hours per day
3 Crawler/Tractors @ 252 hp for 6 hours per day
1 Grader @ 321 hp for 6 hours per day
1 Roller @ 368 hp for 4 hours per day
10 Scrapers @ 527 hp for 6 hours per day
1 Loader @ 154 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo infra.urb
Project Name: cabrillio marina - Phase 1 infrastructure
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: July, 2004
Construction Duration: 12
Total Land Use Area to be Developed: 47 acres
Maximum Acreage Disturbed Per Day: 12 acres

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2004***							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	120.00	-	120.00
Off-Road Diesel	59.33	458.97	439.73	-	21.61	21.61	0.00
On-Road Diesel	0.03	0.62	0.10	0.01	0.01	0.01	0.00
Worker Trips	0.50	0.61	11.36	0.01	0.03	0.01	0.02
Maximum lbs/day	59.86	460.20	451.19	0.02	141.65	21.63	120.02
*** 2005***							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	120.00	-	120.00
Off-Road Diesel	59.33	432.17	459.22	-	19.41	19.41	0.00
On-Road Diesel	0.03	0.58	0.10	0.01	0.01	0.01	0.00
Worker Trips	0.49	0.60	11.21	0.01	0.03	0.01	0.02
Maximum lbs/day	59.85	433.35	470.53	0.02	139.45	19.43	120.02

Phase 1 Facilities Equipment List and Schedule Assumptions
Start Date: October, 2004
Duration: 15 months
Work Schedule: 22 days per month

Off Road Heavy Duty Equipment List:

Seawall
4 Cranes @ 57 hp for 4 hours per day
1 Loader @ 154 hp for 6 hours per day
1 Gradall @ 143 hp for 6 hours per day
1 Dragline @ 71 hp for 6 hours per day
1 Workboat @ 323 hp for 4 hours per day
1 Tugboat @ 1173 hp for 8 hours per day

Groin Construction
1 Crane @ 57 hp for 6 hours per day
1 Backhoe loader @ 154 hp for 6 hours per day
1 Dredge @ 352 hp for 6 hours per day
1 Tugboat @ 1173 hp for 8 hours per day
1 Workboat @ 323 hp for 6 hours per day
1 Crewboat @ 181 hp for 2 hours per day

Utilities
1 Backhoe @ 200 hp for 6 hours per day
1 Roller Compactor @ 368 hp for 4 hours per day
1 Loader @ 154 hp for 6 hours per day

Marina Slip Placement
7 Cranes @ 57 hp for 6 hours per day
1 Roller @ 368 hp for 4 hours per day
4 Loaders @ 166 hp for 6 hours per day
1 Generator @ 182 hp for 4 hours per day
2 Workboats @ 178 hp for 4 hours per day
2 Pile Drivers @ 45 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo p1 facilities.urb
Project Name: cabrillio marina - Phase 1 facilities
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: October, 2004
Construction Duration: 12
Total Land Use Area to be Developed: 51.42 acres
Maximum Acreage Disturbed Per Day: 12.9 acres

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2004***							
Building Construction							
Bldg Const Off-Road Diesel	42.78	367.02	286.65	-	17.57	17.57	0.00
Bldg Const Worker Trips	2.07	3.94	41.45	0.02	0.16	0.06	0.10
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	44.85	370.96	328.10	0.02	17.73	17.63	0.10
*** 2005***							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	42.78	351.89	297.82	-	16.31	16.31	0.00
Bldg Const Worker Trips	2.01	3.91	40.78	0.02	0.16	0.06	0.10
Arch Coatings Off-Gas	252.27	-	-	-	-	-	-
Arch Coatings Worker Trips	0.60	0.28	7.29	0.00	0.11	0.01	0.10
Asphalt Off-Gas	0.81	-	-	-	-	-	-
Asphalt Off-Road Diesel	8.64	56.62	71.70	-	2.47	2.47	0.00
Asphalt On-Road Diesel	0.19	3.09	0.72	0.05	0.09	0.09	0.00
Asphalt Worker Trips	0.04	0.02	0.46	0.00	0.01	0.00	0.01
Maximum lbs/day	307.29	415.73	418.32	0.07	19.13	18.92	0.21

Phase 2 Infrastructure Equipment List and Schedule Assumptions

Start Date: July, 2004
Duration: 12 months
Work Schedule: 22 days per month
Total Acreage: 47
Maximum Disturbed per Day: 12 acres
Dust Emission Factor 10 pounds per acre/day
5000 cubic yards material imported to site
Haul truck capacity = 20 cubic yards.
Round trip haul distance = 20 miles.

Off Road Heavy Duty Equipment List:

1 Crane @ 348 hp for 4 hours per day
1 Drill @ 154 hp for 6 hours per day
3 Crawler/Tractors @ 252 hp for 6 hours per day
1 Grader @ 321 hp for 6 hours per day
1 Roller @ 368 hp for 4 hours per day
10 Scrapers @ 527 hp for 6 hours per day
1 Loader @ 154 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo p2 infra.urb
Project Name: cabrillio marina - Phase 2 infrastructure
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: July, 2004
Construction Duration: 12
Total Land Use Area to be Developed: 47 acres
Maximum Acreage Disturbed Per Day: 12 acres

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2004***							
Site Grading Emissions							
Fugitive Dust	-	-	-	-	120.00	-	120.00
Off-Road Diesel	59.33	458.97	439.73	-	21.61	21.61	0.00
On-Road Diesel	0.03	0.62	0.10	0.01	0.01	0.01	0.00
Worker Trips	0.50	0.61	11.36	0.01	0.03	0.01	0.02
Maximum lbs/day	59.86	460.20	451.19	0.02	141.65	21.63	120.02
*** 2005***							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	120.00	-	120.00
Off-Road Diesel	59.33	432.17	459.22	-	19.41	19.41	0.00
On-Road Diesel	0.03	0.58	0.10	0.01	0.01	0.01	0.00
Worker Trips	0.49	0.60	11.21	0.01	0.03	0.01	0.02
Maximum lbs/day	59.85	433.35	470.53	0.02	139.45	19.43	120.02

Phase 2 Facilities Equipment List and Schedule Assumptions
Start Date: October, 2004
Duration: 18 months
Work Schedule: 22 days per month

Off Road Heavy Duty Equipment List:

Seawall
4 Cranes @ 57 hp for 4 hours per day
1 Loader @ 154 hp for 6 hours per day
1 Gradall @ 143 hp for 6 hours per day
1 Dragline @ 71 hp for 6 hours per day
1 Workboat @ 323 hp for 4 hours per day
1 Tugboat @ 1173 hp for 8 hours per day

Groin Construction
1 Crane @ 57 hp for 6 hours per day
1 Backhoe loader @ 154 hp for 6 hours per day
1 Dredge @ 352 hp for 6 hours per day
1 Tugboat @ 1173 hp for 8 hours per day
1 Workboat @ 323 hp for 6 hours per day
1 Crewboat @ 181 hp for 2 hours per day

Utilities
1 Backhoe @ 200 hp for 6 hours per day
1 Roller Compactor @ 368 hp for 4 hours per day
1 Loader @ 154 hp for 6 hours per day

Marina Slip Placement
7 Cranes @ 57 hp for 6 hours per day
1 Roller @ 368 hp for 4 hours per day
4 Loaders @ 166 hp for 6 hours per day
1 Generator @ 182 hp for 4 hours per day
2 Workboats @ 178 hp for 4 hours per day
2 Pile Drivers @ 45 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo p2 facilities.urb
Project Name: cabrillio marina - Phase 2 facilities
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: October, 2004
Construction Duration: 18
Total Land Use Area to be Developed: 51.42 acres
Maximum Acreage Disturbed Per Day: 12.9 acres

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2004***							
Building Construction							
Bldg Const Off-Road Diesel	42.78	367.02	286.65	-	17.57	17.57	0.00
Bldg Const Worker Trips	2.07	3.94	41.45	0.02	0.16	0.06	0.10
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	44.85	370.96	328.10	0.02	17.73	17.63	0.10
*** 2005***							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	42.78	351.89	297.82	-	16.31	16.31	0.00
Bldg Const Worker Trips	2.01	3.91	40.78	0.02	0.16	0.06	0.10
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	44.79	355.80	338.59	0.02	16.46	16.36	0.10
*** 2006***							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Bldg Const Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Arch Coatings Off-Gas	252.27	-	-	-	-	-	-
Arch Coatings Worker Trips	0.61	0.35	7.33	0.00	0.11	0.01	0.10
Asphalt Off-Gas	0.81	-	-	-	-	-	-
Asphalt Off-Road Diesel	8.64	55.36	71.98	-	2.27	2.27	0.00
Asphalt On-Road Diesel	0.18	3.58	0.67	0.05	0.08	0.08	0.00
Asphalt Worker Trips	0.04	0.02	0.46	0.00	0.01	0.00	0.01
Maximum lbs/day	262.55	59.31	80.44	0.05	2.47	2.36	0.11
Max lbs/day all phases	262.55	59.31	80.44	0.05	2.47	2.36	0.11

Phase 3 Infrastructure Equipment List and Schedule Assumptions

Start Date: October, 2004
Duration: 15 months
Work Schedule: 22 days per month
Total Acreage: 47
Maximum Disturbed per Day: 12 acres
Dust Emission Factor 10 pounds per acre/day
5000 cubic yards material imported to site
Haul truck capacity = 20 cubic yards.
Round trip haul distance = 20 miles.

Off Road Heavy Duty Equipment List:

1 Crane @ 348 hp for 4 hours per day
1 Drill @ 154 hp for 6 hours per day
3 Crawler/Tractors @ 252 hp for 6 hours per day
1 Grader 321 hp for 6 hours per day
1 Roller @ 368 hp for 4 hours per day
10 Scrapers @ 527 hp for 6 hours per day
1 Loader @ 154 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo p3 infra.urb
Project Name: cabrillio marina - Phase 3 infrastructure
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: October, 2004
Construction Duration: 15
Total Land Use Area to be Developed: 47 acres
Maximum Acreage Disturbed Per Day: 12 acres

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2004***							
Site Grading Emissions							
Fugitive Dust	-	-	-	-	120.00	-	120.00
Off-Road Diesel	59.33	458.97	439.73	-	21.61	21.61	0.00
On-Road Diesel	0.02	0.50	0.08	0.01	0.01	0.01	0.00
Worker Trips	0.47	0.90	9.50	0.00	0.03	0.01	0.02
Maximum lbs/day	59.82	460.37	449.31	0.01	141.65	21.63	120.02
*** 2005***							
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	120.00	-	120.00
Off-Road Diesel	59.33	432.17	459.22	-	19.41	19.41	0.00
On-Road Diesel	0.02	0.46	0.08	0.01	0.01	0.01	0.00
Worker Trips	0.46	0.90	9.34	0.00	0.03	0.01	0.02
Maximum lbs/day	59.81	433.53	468.64	0.01	139.45	19.43	120.02

Phase 3 Facilities Equipment List and Schedule Assumptions
Start Date: October, 2005
Duration: 12 months
Work Schedule: 22 days per month

Off Road Heavy Duty Equipment List:

Seawall
4 Cranes @ 57 hp for 4 hours per day
1 Loader @ 154 hp for 6 hours per day
1 Gradall @ 143 hp for 6 hours per day
1 Dragline @ 71 hp for 6 hours per day
1 Workboat @ 323 hp for 4 hours per day
1 Tugboat @ 1173 hp for 8 hours per day

Groin Construction
1 Crane @ 57 hp for 6 hours per day
1 Backhoe loader @ 154 hp for 6 hours per day
1 Dredge @ 352 hp for 6 hours per day
1 Tugboat @ 1173 hp for 8 hours per day
1 Workboat @ 323 hp for 6 hours per day
1 Crewboat @ 181 hp for 2 hours per day

Utilities
1 Backhoe @ 200 hp for 6 hours per day
1 Roller Compactor @ 368 hp for 4 hours per day
1 Loader @ 154 hp for 6 hours per day

Marina Slip Placement
7 Cranes @ 57 hp for 6 hours per day
1 Roller @ 368 hp for 4 hours per day
4 Loaders @ 166 hp for 6 hours per day
1 Generator @ 182 hp for 4 hours per day
2 Workboats @ 178 hp for 4 hours per day
2 Pile Drivers @ 45 hp for 6 hours per day

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo p3 facilities.urb
Project Name: cabrillio marina - Phase 3 facilities
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: October, 2005
Construction Duration: 12
Total Land Use Area to be Developed: 51.42 acres
Maximum Acreage Disturbed Per Day: 12.9 acres

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2005***							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	42.78	351.89	297.82	-	16.31	16.31	0.00
Bldg Const Worker Trips	1.87	3.52	37.71	0.02	0.16	0.06	0.10
Arch Coatings Off-Gas	0.00	-	-	-	-	-	-
Arch Coatings Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Off-Gas	0.00	-	-	-	-	-	-
Asphalt Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
Asphalt On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Asphalt Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	44.64	355.41	335.53	0.02	16.46	16.36	0.10
*** 2006***							
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	42.78	336.77	308.58	-	15.42	15.42	0.00
Bldg Const Worker Trips	1.83	3.51	37.32	0.02	0.16	0.06	0.10
Arch Coatings Off-Gas	252.27	-	-	-	-	-	-
Arch Coatings Worker Trips	0.56	0.27	6.92	0.00	0.11	0.01	0.10
Asphalt Off-Gas	0.81	-	-	-	-	-	-
Asphalt Off-Road Diesel	8.64	55.36	71.98	-	2.27	2.27	0.00
Asphalt On-Road Diesel	0.18	2.90	0.67	0.05	0.08	0.08	0.00
Asphalt Worker Trips	0.04	0.02	0.43	0.00	0.01	0.00	0.01
Maximum lbs/day	307.04	398.74	425.50	0.07	18.05	17.84	0.21

Appendix C: Air Quality

WEEKDAYS

Emissions Factors for 2-stroke engines (g/bhp-hr)

Engine Size (hp)	ROG	NOx	CO	PM	SOx
<2	275	0.7	369	7.1	0.13
2-15	198	1.1	320	7.1	0.13
15-25	129	1.6	276	7.1	0.13
25-50	117	1.1	208	7.1	0.13
50-120	107	1.7	213	7.1	0.13
120-175	106	1.1	244	7.1	0.13
175-250	107	1.1	215	7.1	0.13
250-500	109	1.1	210	7.1	0.13
Average Emissions	143.5	1.1875	256.875	7.1	0.13

Emission Factors for 4-stroke and diesel engines (g-bhp-hr)

Engine Type	ROG	NOx	CO	PM	SOx
4-stroke	9.1	5.4	151	0.07	0.08
diesel	2.6	11.3	4.7	0.34	0.1

Statewide Fleet Population for 2010

	Power	Sail
2-Stroke	348,606	4,780
4-Stroke	369,172	3,799
Diesel	12,237	7,619
Total	730,015	16,198

<40 Feet	Percent of fleet	
	Power	Sail
2-Stroke	15%	9%
4-Stroke	15%	11%
Diesel	70%	80%
Total	100%	100%

Existing

		Number of Boats			Horsepower/slip		Total Horsepower		
Length (feet)	Boat Lgth	Total	Sail	Power	Sail	Power	Total	Sail	Power
<20	20	0	0	0	10	150	0	0	0
<30	30	74	42	32	15	300	10,230	630	9,600
30-39	35	323	184	139	28	450	67,702	5,152	62,550
40-49	45	63	36	27	56	650	19,566	2,016	17,550
50-74	62.5	70	40	30	102	825	28,830	4,080	24,750
75-99	87	0	0	0	150	1,000	-	-	-
100-125	112.5	0	0	0	200	1,500	-	-	-
>125	150	0	0	0	300	2,000	-	-	-
Total		530	302	228			126,328	11,878	114,450

Proposed

		Number of Boats			Horsepower/slip		Total Horsepower		
Length (feet)	Boat Lgth	Total	Sail	Power	Sail	Power	Total	Sail	Power
<20	20	0	0	0	10	150	0	0	0
<30	30	59	34	25	15	300	8,010	510	7,500
30-39	35	83	47	36	28	450	17,516	1,316	16,200
40-49	45	432	246	186	56	650	134,676	13,776	120,900
50-74	62.5	90	51	39	102	825	37,377	5,202	32,175
75-99	87	6	3	3	150	1,000	3,450	450	3,000
100-125	112.5	2	1	1	200	1,500	1,700	200	1,500
>125	150	3	2	1	300	2,000	2,600	600	2,000
Total		675	384	291			205,329	22,054	183,275

Proposed/Dry Stack Storage

	Number of Boats		Horsepower/slip	Total Horsepower
Length (fee)	Boat Lgth	Power	Power	Power
<20	20	34	200	6800 (2 stroke)
<20	20	34	200	6800 (4 stroke)
<20	20	268	200	53600 (diesel)
<30	30	34	400	13600 (2 stroke)
<30	30	34	300	10200 (4 stroke)
<30	30	267	400	106800 (diesel)
<40	40	329	732	240828 (diesel)
Total		1000		438628

Appendix C: Air Quality

WEEKDAYS

Emissions from Existing Power Boat Slips (lbs/day)

Load Factor			40%		
% of Boats Operating			10%		
Hrs/Day of Operation			4		
Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	66.09	30.06	194.33	4.44	0.34
30-39	430.63	195.86	1,266.21	28.95	2.24
40-49	16.08	69.89	29.07	2.10	0.62
50-74	22.68	98.56	41.00	2.97	0.87
75-99	-	-	-	-	-
100-125	-	-	-	-	-
>125	-	-	-	-	-
Total	535.48	394.38	1,530.61	38.47	4.07

Emissions from Existing Sail Boat Slips (lbs/day)

Load Factor			10%		
% of Boats Operating			10%		
Hrs/Day of Operation			1		
Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	0.18	0.14	0.54	0.01	0.00
30-39	1.46	1.10	4.46	0.10	0.01
40-49	0.12	0.50	0.21	0.02	0.00
50-74	0.23	1.02	0.42	0.03	0.01
75-99	-	-	-	-	-
100-125	-	-	-	-	-
>125	-	-	-	-	-
Total	1.99	2.76	5.63	0.16	0.03

Emissions from Proposed Power Boat Slips (lbs/day)

Load Factor			40%		
% of Boats Operating			10%		
Hrs/Day of Operation			4		
Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	51.63	23.48	151.82	3.47	0.27
30-39	111.53	50.73	327.94	7.50	0.58
40-49	110.78	481.47	200.26	14.49	4.26
50-74	29.48	128.13	53.29	3.86	1.13
75-99	2.75	11.95	4.97	0.36	0.11
100-125	1.37	5.97	2.48	0.18	0.05
>125	1.83	7.96	3.31	0.24	0.07
Total	309.38	709.70	744.08	30.09	6.47

Emissions from Proposed Sail Boat Slips (lbs/day)

Load Factor			10%		
% of Boats Operating			10%		
Hrs/Day of Operation			1		
Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	0.14	0.11	0.44	0.01	0.00
30-39	0.37	0.28	1.14	0.03	0.00
40-49	0.79	3.43	1.43	0.10	0.03
50-74	0.30	1.29	0.54	0.04	0.01
75-99	0.03	0.11	0.05	0.00	0.00
100-125	0.01	0.05	0.02	0.00	0.00
>125	0.03	0.15	0.06	0.00	0.00
Total	1.68	5.43	3.67	0.19	0.05

Emissions from Proposed Dry Stack Boat Storage (lbs/day)

Load Factor			40%	New Boats	35%	65% from existing	
% of Boats Operating			5%				
Hrs/Day of Operation			4				
Length (fee)	ROG	NOx	CO	PM	SOx		
<20	45.71	0.46	88.07	2.98	0.05		
<20	3.82	2.26	63.33	0.03	0.03		
<20	24.56	106.73	44.39	3.21	0.94		
<30	91.43	0.92	176.14	5.96	0.11		
<30	8.59	3.40	94.99	0.04	0.05		
<30	17.13	74.43	30.96	2.24	0.66		
<40	38.62	167.84	69.81	5.05	1.49		
Total	229.85	356.04	567.69	6.83	3.34		

Total Emissions (10% operation, 4 hrs/day Power Boats, 1hr/day Sail Boats) (lbs/day)

	ROG	NOx	CO	PM	SOx
Proposed	216	427	525	15	4
Existing	214	158	613	15	2

Appendix C: Air Quality

WEEKENDS

Emissions Factors for 2-stroke engines (g/bhp-hr)

Engine Size (hp)	ROG	NOx	CO	PM	SOx
<2	275	0.7	369	7.1	0.13
2-15	198	1.1	320	7.1	0.13
15-25	129	1.6	276	7.1	0.13
25-50	117	1.1	208	7.1	0.13
50-120	107	1.7	213	7.1	0.13
120-175	106	1.1	244	7.1	0.13
175-250	107	1.1	215	7.1	0.13
250-500	109	1.1	210	7.1	0.13
Average Emission	143.5	1.1875	256.875	7.1	0.13

Emission Factors for 4-stroke and diesel engines (g-bhp-hr)

Engine Type	ROG	NOx	CO	PM	SOx
4-stroke	9.1	5.4	151	0.07	0.08
diesel	2.6	11.3	4.7	0.34	0.1

Statewide Fleet Population for 2010

	Power	Sail
2-Stroke	348,606	4,780
4-Stroke	369,172	3,799
Diesel	12,237	7,619
Total	730,015	16,198

<40 Feet	Percent of fleet	
	Power	Sail
2-Stroke	15%	9%
4-Stroke	15%	11%
Diesel	70%	80%
Total	100%	100%

Existing

		Number of Boats			Horsepower/slip		Total Horsepower		
Length (feet)	Boat Lgth	Total	Sail	Power	Sail	Power	Total	Sail	Power
<20	20	0	0	0	10	150	0	0	0
<30	30	74	42	32	15	300	10,230	630	9,600
30-39	35	323	184	139	28	450	67,702	5,152	62,550
40-49	45	63	36	27	56	650	19,566	2,016	17,550
50-74	62.5	70	40	30	102	825	28,830	4,080	24,750
75-99	87	0	0	0	150	1,000	-	-	-
100-125	112.5	0	0	0	200	1,500	-	-	-
>125	150	0	0	0	300	2,000	-	-	-
Total		530	302	228			126,328	11,878	114,450

Proposed

		Number of Boats			Horsepower/slip		Total Horsepower		
Length (feet)	Boat Lgth	Total	Sail	Power	Sail	Power	Total	Sail	Power
<20	20	0	0	0	10	150	0	0	0
<30	30	59	34	25	15	300	8,010	510	7,500
30-39	35	83	47	36	28	450	17,516	1,316	16,200
40-49	45	432	246	186	56	650	134,676	13,776	120,900
50-74	62.5	90	51	39	102	825	37,377	5,202	32,175
75-99	87	6	3	3	150	1,000	3,450	450	3,000
100-125	112.5	2	1	1	200	1,500	1,700	200	1,500
>125	150	3	2	1	300	2,000	2,600	600	2,000
Total		675	384	291			205,329	22,054	183,275

Proposed/Dry Stack Storage

	Number of Boats		Horsepower/slip	Total Horsepower	
Length (fee)	Boat Lgth	Power	Power	Power	
<20	20	34	200	6800	(2 stroke)
<20	20	34	200	6800	(4 stroke)
<20	20	268	200	53600	(diesel)
<30	30	34	400	13600	(2 stroke)
<30	30	34	300	10200	(4 stroke)
<30	30	267	400	106800	(diesel)
<40	40	329	732	240828	(diesel)
Total		1000		438628	

Appendix C: Air Quality

WEEKENDS

Emissions from Existing Power Boat Slips (lbs/day)

Load Factor	40%
% of Boats Operating	20%
Hrs/Day of Operation	4

Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	132.18	60.12	388.67	8.89	0.69
30-39	861.26	391.72	2,532.42	57.91	4.47
40-49	32.16	139.78	58.14	4.21	1.24
50-74	45.36	197.13	81.99	5.93	1.74
75-99	-	-	-	-	-
100-125	-	-	-	-	-
>125	-	-	-	-	-
Total	1,070.96	788.75	3,061.22	76.93	8.14

Emissions from Existing Sail Boat Slips (lbs/day)

Load Factor	10%
% of Boats Operating	20%
Hrs/Day of Operation	1

Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	0.36	0.27	1.09	0.03	0.00
30-39	2.93	2.21	8.91	0.21	0.02
40-49	0.23	1.00	0.42	0.03	0.01
50-74	0.47	2.03	0.84	0.06	0.02
75-99	-	-	-	-	-
100-125	-	-	-	-	-
>125	-	-	-	-	-
Total	3.98	5.51	11.26	0.33	0.05

Emissions from Proposed Power Boat Slips (lbs/day)

Load Factor	40%
% of Boats Operating	20%
Hrs/Day of Operation	4

Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	103.27	46.97	303.65	6.94	0.54
30-39	223.06	101.45	655.88	15.00	1.16
40-49	221.56	962.94	400.51	28.97	8.52
50-74	58.96	256.27	106.59	7.71	2.27
75-99	5.50	23.89	9.94	0.72	0.21
100-125	2.75	11.95	4.97	0.36	0.11
>125	3.67	15.93	6.63	0.48	0.14
Total	618.77	1,419.40	1,488.16	60.18	12.94

Emissions from Proposed Sail Boat Slips (lbs/day)

Load Factor	10%
% of Boats Operating	20%
Hrs/Day of Operation	1

Length (feet)	ROG	NOx	CO	PM	SOx
<20	0.00	0.00	0.00	0.00	0.00
<30	0.29	0.22	0.88	0.02	0.00
30-39	0.75	0.56	2.28	0.05	0.01
40-49	1.58	6.86	2.85	0.21	0.06
50-74	0.60	2.59	1.08	0.08	0.02
75-99	0.05	0.22	0.09	0.01	0.00
100-125	0.02	0.10	0.04	0.00	0.00
>125	0.07	0.30	0.12	0.01	0.00
Total	3.35	10.85	7.35	0.38	0.10

Emissions from Proposed Dry Stack Boat Storage (lbs/day)

Load Factor	40%	New Boats	35% 65% from existing
% of Boats Operating	30%		
Hrs/Day of Operation	4		

Length (fee)	ROG	NOx	CO	PM	SOx
<20	274.28	2.77	528.42	17.87	0.33
<20	22.90	13.59	379.96	0.18	0.20
<20	147.34	640.37	266.35	19.27	5.67
<30	548.55	5.54	1,056.85	35.73	0.65
<30	51.57	20.38	569.94	0.26	0.30
<30	102.75	446.58	185.75	13.44	3.95
<40	231.70	1,007.02	418.85	30.30	8.91
Total	1,379.10	2,136.25	3,406.12	40.96	20.02

Total Emissions (10% operation, 4 hrs/day Power Boats, 1hr/day Sail Boats) (lbs/day)

	ROG	NOx	CO	PM	SOx
Proposed	799	1,423	1,958	40	13
Existing	429	316	1,226	31	3

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo exist weekday.urb
Project Name: Cabrillo Existing Weekday Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.50	6.91	2.76	-	0.01
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.33	0.02	2.34	0.00	0.01
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	0.83	6.93	5.10	0.00	0.02

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Marina	22.35	17.89	191.88	0.14	9.17
Warehouse 6	0.91	0.48	5.14	0.00	0.25
Chilean Fruit Warehouse	5.50	3.39	37.46	0.03	1.78
Warehouse 9/10	4.70	2.95	32.74	0.02	1.55
TOTAL EMISSIONS (lbs/day)	33.46	24.71	267.23	0.20	12.75

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2002 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (11/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Marina	2.96 trips / slips	465.00	1,376.40
Warehouse 6	1.23 trips / 1000 sq. ft.	30.00	36.90
Chilean Fruit Warehouse	1.24 trips / 1000 sq. ft.	161.00	199.64
Warehouse 9/10	1.24 trips / 1000 sq. ft.	135.00	167.40

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	61.40	4.70	94.50	0.80
Light Truck < 3,750 lbs	9.30	11.00	88.90	0.10
Light Truck 3,751- 5,750	16.70	1.80	97.60	0.60
Med Truck 5,751- 8,500	7.20	12.50	79.20	8.30
Lite-Heavy 8,501-10,000	1.10	18.20	72.70	9.10
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.10	9.10	27.30	63.60
Heavy-Heavy 33,001-60,000	0.70	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	1.40	90.90	9.10	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	0.70	0.00	100.00	0.00

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
Marina				2.0	1.0	97.0

Warehouse 6	2.0	1.0	97.0
Chilean Fruit Warehouse	41.5	20.8	37.8
Warehouse 9/10	48.0	24.0	28.0

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev cabrillo exist weekend.urb
Project Name: Cabrillo Existing Weekend Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.50	6.91	2.76	-	0.01
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.33	0.02	2.34	0.00	0.01
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	0.83	6.93	5.10	0.00	0.02

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Marina	38.90	38.68	414.87	0.31	19.82
Warehouse 6	0.62	0.12	1.25	0.00	0.06
Chilean Fruit Warehouse	3.46	0.82	9.06	0.01	0.43
Warehouse 9/10	2.92	0.71	7.92	0.01	0.38
TOTAL EMISSIONS (lbs/day)	45.90	40.33	433.11	0.32	20.68

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2002 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (11/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Marina	6.40 trips / slips	465.00	2,976.00
Warehouse 6	0.30 trips / 1000 sq. ft.	30.00	9.00
Chilean Fruit Warehouse	0.30 trips / 1000 sq. ft.	161.00	48.30
Warehouse 9/10	0.30 trips / 1000 sq. ft.	135.00	40.50

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	61.40	4.70	94.50	0.80
Light Truck < 3,750 lbs	9.30	11.00	88.90	0.10
Light Truck 3,751- 5,750	16.70	1.80	97.60	0.60
Med Truck 5,751- 8,500	7.20	12.50	79.20	8.30
Lite-Heavy 8,501-10,000	1.10	18.20	72.70	9.10
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.10	9.10	27.30	63.60
Heavy-Heavy 33,001-60,000	0.70	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	1.40	90.90	9.10	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	0.70	0.00	100.00	0.00

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
Marina				2.0	1.0	97.0

Warehouse 6	2.0	1.0	97.0
Chilean Fruit Warehouse	41.5	20.8	37.8
Warehouse 9/10	48.0	24.0	28.0

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev Cabrillo proposed proj weekday.urb
Project Name: Port of LA - Proposed Project Weekday Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	1.38	19.03	7.61	-	0.03
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.99	0.07	7.01	0.00	0.02
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	2.37	19.10	14.62	0.00	0.05

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Westrec Activity Club	2.23	2.38	26.90	0.02	1.56
Marina Club	0.57	0.48	5.40	0.00	0.31
Resturant	2.50	2.78	31.45	0.02	1.83
Yacht Brokers	6.34	6.83	77.06	0.05	4.48
Resturant	4.24	4.68	52.86	0.04	3.07
Boat Mall	4.97	5.34	60.09	0.04	3.49
Boat Slips	28.12	20.33	228.67	0.16	13.30
Dry Stack Boat Storage	16.69	1.51	16.94	0.01	0.98
Marine Retail	11.27	12.17	136.90	0.09	7.96
Convenience market	0.83	0.87	9.73	0.01	0.57
Storage Building (Warehou	0.35	0.05	0.57	0.00	0.03
Boat Storage	5.75	0.69	8.12	0.01	0.47
TOTAL EMISSIONS (lbs/day)	83.86	58.12	654.68	0.45	38.06

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2006 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (11/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Westrec Activity Club	22.90 trips / 1000 sq. ft.	10.00	229.00
Marina Club	4.60 trips / 1000 sq. ft.	10.00	46.00
Resturant	52.20 trips / 1000 sq. ft.	5.00	261.00
Yacht Brokers	26.24 trips / 1000 sq. ft.	25.00	656.00
Resturant	45.00 trips / 1000 sq. ft.	10.00	450.00
Boat Mall	26.25 trips / 1000 sq. ft.	20.00	525.00
Boat Slips	2.96 trips / slip	675.00	1,998.00
Dry Stack Boat Storage	0.15 trips / boat use	1,000.00	148.00
Marine Retail	28.48 trips / 1000 sq. ft.	42.00	1,196.16
Convenience market	17.00 trips / 1000 sq. ft.	5.00	85.00
Storage Building (Warehou	0.25 trips / 1000 sq. ft.	20.00	5.00
Boat Storage	0.15 trips / spaces	335.00	49.92

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	61.40	4.70	94.50	0.80
Light Truck < 3,750 lbs	9.30	11.00	88.90	0.10
Light Truck 3,751- 5,750	16.70	1.80	97.60	0.60
Med Truck 5,751- 8,500	7.20	12.50	79.20	8.30
Lite-Heavy 8,501-10,000	1.10	18.20	72.70	9.10
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.10	9.10	27.30	63.60

Heavy-Heavy 33,001-60,000 lbs	0.70	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	1.40	90.90	9.10	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	0.70	0.00	100.00	0.00

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
Westrec Activity Club				5.0	2.5	92.5
Marina Club				5.0	2.5	92.5
Resturant				8.0	4.0	88.0
Yacht Brokers				5.0	2.5	92.5
Resturant				5.0	2.5	92.5
Boat Mall				2.0	1.0	97.0
Boat Slips				2.0	1.0	97.0
Dry Stack Boat Storage				2.0	1.0	97.0
Marine Retail				2.0	1.0	97.0
Convenience market				2.0	1.0	97.0
Storage Building (Warehouse)				2.0	1.0	97.0
Boat Storage				50.0	25.0	25.0

URBEMIS 2002 For Windows 7.2.4

File Name: C:\Program Files\URBEMIS 2002 For Windows\Projects2k\rev Cabrillo proposed proj weekend.urb
Project Name: Port of LA - Proposed Project Weekend Emissions
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

DETAIL REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	1.38	19.03	7.61	-	0.03
Wood Stoves - No summer emissions					
Fireplaces - No summer emissions					
Landscaping	0.99	0.07	7.01	0.00	0.02
Consumer Prdcts	0.00	-	-	-	-
TOTALS(lbs/day,unmitigated)	2.37	19.10	14.62	0.00	0.05

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Westrec Activity Club	1.39	1.42	15.98	0.01	0.93
Marina Club	0.40	0.28	3.17	0.00	0.18
Resturant	3.02	3.37	38.19	0.03	2.22
Yacht Brokers	3.73	3.83	43.23	0.03	2.51
Resturant	4.44	4.91	55.44	0.04	3.22
Boat Mall	2.92	2.99	33.65	0.02	1.96
Boat Slips	48.74	43.96	494.42	0.34	28.75
Dry Stack Boat Storage	32.42	19.54	219.74	0.15	12.78
Marine Retail	11.62	12.58	141.47	0.10	8.23
Convenience market	1.04	1.10	12.36	0.01	0.72
Storage Building (Warehou	0.35	0.05	0.57	0.00	0.03
Boat Storage	12.92	8.95	104.64	0.07	6.04
TOTAL EMISSIONS (lbs/day)	122.97	102.99	1,162.87	0.80	67.57

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2006 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (11/2002)

Summary of Land Uses:

Unit Type	Trip Rate	Size	Total Trips
Westrec Activity Club	13.60 trips / 1000 sq. ft.	10.00	136.00
Marina Club	2.70 trips / 1000 sq. ft.	10.00	27.00
Resturant	63.40 trips / 1000 sq. ft.	5.00	317.00
Yacht Brokers	14.72 trips / 1000 sq. ft.	25.00	368.00
Resturant	47.20 trips / 1000 sq. ft.	10.00	472.00
Boat Mall	14.70 trips / 1000 sq. ft.	20.00	294.00
Boat Slips	6.40 trips / slip	675.00	4,320.00
Dry Stack Boat Storage	1.92 trips / boat use	1,000.00	1,920.00
Marine Retail	29.43 trips / 1000 sq. ft.	42.00	1,236.06
Convenience market	21.60 trips / 1000 sq. ft.	5.00	108.00
Storage Building (Warehou	0.25 trips / 1000 sq. ft.	20.00	5.00
Boat Storage	1.92 trips / spaces	335.00	643.20

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	61.40	4.70	94.50	0.80
Light Truck < 3,750 lbs	9.30	11.00	88.90	0.10
Light Truck 3,751- 5,750	16.70	1.80	97.60	0.60
Med Truck 5,751- 8,500	7.20	12.50	79.20	8.30
Lite-Heavy 8,501-10,000	1.10	18.20	72.70	9.10
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.10	9.10	27.30	63.60
Heavy-Heavy 33,001-60,000	0.70	0.00	0.00	100.00
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00

Urban Bus	0.00	0.00	0.00	100.00
Motorcycle	1.40	90.90	9.10	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	0.70	0.00	100.00	0.00

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			
% of Trips - Commercial (by land use)						
Westrec Activity Club				5.0	2.5	92.5
Marina Club				5.0	2.5	92.5
Resturant				8.0	4.0	88.0
Yacht Brokers				5.0	2.5	92.5
Resturant				5.0	2.5	92.5
Boat Mall				2.0	1.0	97.0
Boat Slips				2.0	1.0	97.0
Dry Stack Boat Storage				2.0	1.0	97.0
Marine Retail				2.0	1.0	97.0
Convenience market				2.0	1.0	97.0
Storage Building (Warehouse)				2.0	1.0	97.0
Boat Storage				50.0	25.0	25.0

Coating Emissions (from previous Draft EIR)			
Coating Type	Usage (liters/day)	SCAQMD Rule 1106.1 – VOC limit (grams/liter)	Emissions (pounds/day)
Topcoats	10		0.00
Extreme High Gloss	10	490	10.79
High Gloss	10	420	9.25
Pretreatment Wash Primers	10	780	17.18
Finish Primers/Surfacer	10	420	9.25
High Build Primer Surfacer	10	340	7.49
Teak Primer	10	775	17.07
Antifoulant Coatings	10		0.00
Aluminum Substrate	10	560	12.33
Other Substrates	10	150	3.3
Clear Wood Finishes	10		0.00
Sealers	10	550	12.11
Varnishes	10	490	10.79
Others	10	420	9.25
Total			118.83

Carbon Monoxide Modeling

Dispersion Modeling

Predicting the ambient air quality impacts of pollutant emissions requires an assessment of the transport, dispersion, chemical transformation, and removal processes that affect pollutant emissions after their release from a source. Gaussian dispersion models are frequently used for such analyses. The term "Gaussian dispersion" refers to a general type of mathematical equation used to describe the horizontal and vertical distribution of pollutants downwind from an emission source.

Gaussian dispersion models treat pollutant emissions as being carried downwind in a defined plume, subject to horizontal and vertical mixing with the surrounding atmosphere. The plume spreads horizontally and vertically with a reduction in pollutant concentrations as it travels downwind. Mixing with the surrounding atmosphere is greatest at the edge of the plume, resulting in lower pollutant concentrations outward (horizontally and vertically) from the center of the plume. This decrease in concentration outward from the center of the plume is treated as following a Gaussian ("normal") statistical distribution. Horizontal and vertical mixing generally occur at different rates. Because turbulent motions in the atmosphere occur on a variety of spatial and time scales, vertical and horizontal mixing also vary with distance downwind from the emission source.

The CALINE4 Model

The ambient air quality effects of traffic emissions were evaluated using the CALINE4 dispersion model (Benson 1989). CALINE4 is a Gaussian dispersion model specifically designed to evaluate air quality impacts of roadway projects. Each roadway link analyzed in the model is treated as a sequence of short segments. Each segment of a roadway link is treated as a separate emission source producing a plume of pollutants which disperses downwind. Pollutant concentrations at any specific location are calculated using the total contribution from overlapping pollution plumes originating from the sequence of roadway segments.

When winds are essentially parallel to a roadway link, pollution plumes from all roadway segments overlap. This produces high concentrations near the roadway (near the center of the overlapping pollution plumes), and low concentrations well away from the roadway (at the edges of the overlapping pollution plumes). When winds are at an angle to the roadway link, pollution plumes from distant roadway segments make essentially no contribution to the pollution concentration observed at a receptor location. Under such cross-wind situations, pollutant concentrations near the highway are lower than under parallel wind conditions (fewer overlapping plume contributions), while pollutant concentrations away from the highway may be greater than would occur with parallel winds (near the center of at least some pollution plumes).

The CALINE4 model employs a "mixing cell" approach to estimating pollutant concentrations over the roadway itself. The size of the mixing cell over each roadway segment is based on the width of the traffic lanes of the highway (generally 12 feet per lane) plus an additional turbulence zone on either side (generally 10 feet on each side). Parking lanes and roadway shoulders are not counted as traffic lanes. The height of the mixing cell is calculated by the model.

Pollutants emitted along a highway link are treated as being well mixed within the mixing cell volume due to mechanical turbulence from moving vehicles and convective mixing due to the temperature of vehicle exhaust gases. Pollutant concentrations downwind from the mixing cell are calculated using horizontal and vertical dispersion rates which are a function of various meteorological and ground surface conditions.

Modeling Procedures

Roadway and Traffic Conditions. Traffic volumes and operating conditions used in the modeling were obtained from the traffic analysis prepared for this project. Free flow traffic speeds were adjusted to reflect congested speeds using methodology from the Highway Capacity Manual (Transportation Research Board 2000). CO modeling was conducted for the Swinford Street and Harbor Boulevard intersection for the 2008 PM peak hour project conditions.

Vehicle Emission Rates. Vehicle emission rates were determined using the California Air Resources Board's EMFAC7F (version 1.1) emission rate program. A cold start percentage of 10% was assumed along with a hot start percentage of 50%.

Receptor Locations. CO concentrations were estimated at 4 receptor locations at each of the proposed intersections. The receptors are placed at 100 feet away from the center of each roadway. Receptor heights were set at 5.9 feet.

Meteorological Conditions. Meteorological inputs to the CALINE4 model were determined using methodology recommended in Air Quality Technical Analysis Notes (California Department of Transportation 1988). The meteorological conditions used in the modeling represent a calm winter period. Worst case wind angles were modeled to determine a worst-case concentration for each receptor. The meteorological inputs include: 0.5 meter per second wind speed, ground-level temperature inversion (atmospheric stability class G), wind direction standard deviation equal to five degrees, and a mixing height of 1000 meters.

Background Concentrations and Eight-Hour Values. Background concentration of 5.5 ppm was added to the modeled 2008 1-hour values to account for sources of CO not included in the modeling. Eight-hour modeled values were calculated from the 1-hour values using a persistence factor of 0.7. Background concentration of 4.0 ppm was added to the modeled 2008 8-hour values. All background concentration data were taken from the SMAQMD's Air Quality Thresholds of Significance using the Long Beach modeling location.

Reference:

Benson, P. E. 1989. CALINE4 – a dispersion model for predicting air pollution concentrations near roadways. California Department of Transportation. Sacramento, CA.

California Department of Transportation. 1998. Air Quality Technical Analysis Notes. Sacramento, CA.

Transportation Research Board. 2000. *Highway Capacity Manual.* Washington, D.C.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: Cabrillo Marina Harbor/Swinford 2008
RUN: Hour 1 (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U=	.5 M/S	Z0=	100. CM	ALT=	0. (M)
BRG=	WORST CASE	VD=	.0 CM/S		
CLAS=	7 (G)	VS=	.0 CM/S		
MIXH=	1000. M	AMB=	.0 PPM		
SIGTH=	5. DEGREES	TEMP=	25.0 DEGREE (C)		

II. LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (M) X1	Y1	X2	Y2	* TYPE	VPH	EF (G/MI)	H (M)	W (M)
A. Link A	*	-90	0	0	0	* AG	2330	9.2	.0	14.4
B. Link B	*	0	0	90	0	* AG	95	10.1	.0	14.4
C. Link C	*	0	-90	0	0	* AG	3355	7.7	.0	20.4
D. Link D	*	0	0	0	90	* AG	1370	6.3	.0	20.4

III. RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (M) X	Y	Z
1. Recpt 1	*	-30	30	1.8
2. Recpt 2	*	30	30	1.8
3. Recpt 3	*	30	-30	1.8
4. Recpt 4	*	-30	-30	1.8

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	*	BRG (DEG)	*	PRED CONC (PPM)	*	CONC/LINK (PPM) A	B	C	D
1. Recpt 1	*	158.	*	1.7	*	.7	.0	1.0	.0
2. Recpt 2	*	248.	*	1.2	*	.9	.0	.0	.3
3. Recpt 3	*	292.	*	1.7	*	.9	.0	.8	.0
4. Recpt 4	*	38.	*	1.1	*	.6	.0	.2	.3