APPENDIX C

Air Quality and Noise Calculations

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CALCULATION OF METHANE AND N2O EMISSIONS

Vehicles:

From URBEMIS 2007:

Vehicle Emissions = 17801 metric tons/year of CO2

From Table 6 California Greenouse Gas Emisssions and Sink Summary:

in 2004 transportation fossil fuel combustion was	188	MMT CO2	
Mobile source combustion	0.6	MMT CH4	as eCO2
Mobile Source Combustion	11.8	MMT N2O	as eCO2

So for Mobile sources…	CH4 emission =	0.32	percent of CO2 Emissions	as eCO2
	N2O emissions =	6.28	percent of CO2 Emissions	as eCO2
	CH4 emissions =	56.96	metric tons CH4/year	as eCO2
	N2O emissions =	1117.90	metric tons N2O/year	as eCO2

Space Heating:

From URBEMIS 2007:

Natural Gas = 1028 metric tons/year of CO2

From Table 6 California Greenouse Gas Emisssions and Sink Summary:

in 2004 residential fossil fuel combustion was	27.9	MMT CO2	
Stationary source combustion	1.3	MMT CH4	as eCO2
Stationary Source Combustion	0.2	MMT N2O	as eCO2

So for Stationary sources…	CH4 emission =	4.66	percent of CO2 Emissions	as eCO2
	N2O emissions =	0.72	percent of CO2 Emissions	as eCO2
	CH4 emissions =	47.90	metric tons CH4/year	as eCO2
	N2O emissions =	7.40	metric tons N2O/year	as eCO2

Landscape Maintainance:

From URBEMIS 2007:

Landscape Emissions 2 metric tons/year of CO2

From Table 6 California Greenouse Gas Emisssions and Sink Summary

in 2004 transportation fossil fuel combustion was	188	MMT CO2	
Mobile source combustion	0.6	MMT CH4	as eCO2
Mobile Source Combustion	11.8	MMT N2O	as eCO2

So for Mobile sources…	CH4 emission =	0.32	percent of CO2 Emissions	as eCO2
	N2O emissions =	6.28	percent of CO2 Emissions	as eCO2
	CH4 emissions =	0.01	metric tons CH4/year	as eCO2
	N2O emissions =	0.13	metric tons N2O/year	as eCO2

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Summary Report for Annual Emissions (Tons/Year)

File Name: C:\MATT\Eureka\November 2007\Eureka - November, 2007.urb9

Project Name: Marina Center Mixed Use Development Project

Project Location: Mendocino County APCD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009 TOTALS (tons/year unmitigated)	7.67	12.58	11.66	0.01	0.17	0.54	0.71	0.04	0.49	0.54	1,547.72

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	1.24	0.95	1.73	0.00	0.00	0.00	1,131.47

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	38.77	66.60	444.42	0.18	37.97	7.63	19,561.29

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	40.01	67.55	446.15	0.18	37.97	7.63	20,692.76

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

File Name: C:\MATT\Eureka\November 2007\Eureka - November, 2007.urb9

Project Name: Marina Center Mixed Use Development Project

Project Location: Mendocino County APCD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2009	7.67	12.58	11.66	0.01	0.17	0.54	0.71	0.04	0.49	0.54	1,547.72
Fine Grading 01/05/2009-03/02/2009	0.66	8.42	3.06	0.01	0.15	0.32	0.47	0.03	0.29	0.33	890.24
Fine Grading Dust	0.00	0.00	0.00	0.00	0.13	0.00	0.13	0.03	0.00	0.03	0.00
Fine Grading Off Road Diesel	0.41	3.66	1.61	0.00	0.00	0.16	0.16	0.00	0.15	0.15	339.99
Fine Grading On Road Diesel	0.25	4.74	1.30	0.01	0.02	0.15	0.17	0.01	0.14	0.15	543.51
Fine Grading Worker Trips	0.01	0.01	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.74
Asphalt 03/02/2009-04/15/2009	0.08	0.44	0.28	0.00	0.00	0.03	0.04	0.00	0.03	0.03	35.38
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.07	0.40	0.21	0.00	0.00	0.03	0.03	0.00	0.03	0.03	28.78
Paving On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.71
Paving Worker Trips	0.00	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.90
Building 04/06/2009-11/20/2009	0.78	3.71	8.17	0.00	0.02	0.19	0.21	0.01	0.17	0.18	615.81
Building Off Road Diesel	0.43	2.06	1.30	0.00	0.00	0.14	0.14	0.00	0.13	0.13	192.99
Building Vendor Trips	0.08	1.04	0.83	0.00	0.01	0.03	0.04	0.00	0.03	0.03	147.58
Building Worker Trips	0.27	0.61	6.05	0.00	0.02	0.01	0.03	0.01	0.01	0.01	275.23
Coating 11/23/2009-12/23/2009	6.15	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.29
Architectural Coating	6.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.01	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.29

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Phase Assumptions

Phase: Fine Grading 1/5/2009 - 3/2/2009 - Default Fine Site Grading Description
Total Acres Disturbed: 43
Maximum Daily Acreage Disturbed: 6.22
Fugitive Dust Level of Detail: Medium
Onsite Scraper Use: 0 hr/day; Offsite Haulage: 0 hrs/day
On Road Truck Travel (VMT): 6585.37
Off-Road Equipment:
1 Excavators (168 hp) operating at a 0.57 load factor for 10 hours per day
2 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 10 hours per day
2 Plate Compactors (10 hp) operating at a 0.43 load factor for 10 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
4 Scrapers (313 hp) operating at a 0.72 load factor for 10 hours per day
3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 10 hours per day
2 Water Trucks (189 hp) operating at a 0.5 load factor for 10 hours per day

Phase: Paving 3/2/2009 - 4/15/2009 - Default Paving Description
Acres to be Paved: 6.22
Off-Road Equipment:
4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 10 hours per day
1 Pavers (100 hp) operating at a 0.62 load factor for 10 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 10 hours per day
1 Rollers (95 hp) operating at a 0.56 load factor for 10 hours per day

Phase: Building Construction 4/6/2009 - 11/20/2009 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 10 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 10 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 10 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 10 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 10 hours per day

Phase: Architectural Coating 11/23/2009 - 12/23/2009 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

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Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

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

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Detail Report for Annual Area Source Unmitigated Emissions (Tons/Year)

File Name: C:\MATT\Eureka\November 2007\Eureka - November, 2007.urb9

Project Name: Marina Center Mixed Use Development Project

Project Location: Mendocino County APCD

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

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.07	0.94	0.76	0.00	0.00	0.00	1,129.70
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscape	0.08	0.01	0.97	0.00	0.00	0.00	1.77
Consumer Products	0.48						
Architectural Coatings	0.61						
TOTALS (tons/year, unmitigated)	1.24	0.95	1.73	0.00	0.00	0.00	1,131.47

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 35% to 0%

Percentage of residences with wood fireplaces changed from 10% to 0%

Percentage of residences with natural gas fireplaces changed from 55% to 0%

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

File Name: C:\MATT\Eureka\November 2007\Eureka - November, 2007.urb9

Project Name: Marina Center Mixed Use Development Project

Project Location: Mendocino County APCD

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)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Apartments mid rise	1.13	1.89	12.90	0.01	1.08	0.22	560.74
Quality resturant	2.32	4.01	26.68	0.01	2.28	0.46	1,175.64
Home improvement superstore	8.82	15.13	100.49	0.04	8.62	1.73	4,431.75
Strip mall	16.63	28.69	190.53	0.08	16.35	3.28	8,402.82
Office park	4.09	6.96	47.09	0.02	3.98	0.80	2,062.29
Industrial park	4.82	8.27	55.77	0.02	4.72	0.95	2,444.73
Museum	0.96	1.65	10.96	0.00	0.94	0.19	483.32
TOTALS (tons/year, unmitigated)	38.77	66.60	444.42	0.18	37.97	7.63	19,561.29

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2010 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

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Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Apartments mid rise	1.42	7.35	dwelling units	54.00	396.90	3,393.38
Quality resturant		76.40	1000 sq ft	12.50	955.00	7,183.51
Home improvement superstore		23.97	1000 sq ft	153.00	3,667.41	27,113.16
Strip mall		43.46	1000 sq ft	160.00	6,953.60	51,407.96
Office park		14.35	1000 sq ft	104.00	1,492.40	12,509.30
Industrial park		25.73	1000 sq ft	70.00	1,801.10	14,845.12
Museum		33.33	1000 sq ft	12.00	399.96	2,956.90
					15,666.37	119,409.33

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	35.4	2.0	96.9	1.1
Light Truck < 3750 lbs	26.8	3.4	87.3	9.3
Light Truck 3751-5750 lbs	18.1	1.7	97.2	1.1
Med Truck 5751-8500 lbs	6.1	1.6	96.8	1.6
Lite-Heavy Truck 8501-10,000 lbs	2.0	0.0	60.0	40.0
Lite-Heavy Truck 10,001-14,000 lbs	1.3	0.0	46.2	53.8
Med-Heavy Truck 14,001-33,000 lbs	1.3	7.7	23.1	69.2
Heavy-Heavy Truck 33,001-60,000 lbs	1.6	0.0	6.2	93.8
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	5.6	66.1	33.9	0.0

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
School Bus	0.1	0.0	0.0	100.0
Motor Home	1.5	6.7	86.6	6.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
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	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Quality resturant				8.0	4.0	88.0
Home improvement superstore				2.0	1.0	97.0
Strip mall				2.0	1.0	97.0
Office park				48.0	24.0	28.0
Industrial park				41.5	20.8	37.8
Museum				2.0	1.0	97.0

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 60 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

Traffic Noise Level Estimates **9-Nov-07** rev 10/24/99 3-4 meters per lane

15m= 49 FEET

ROAD SEGMENT 4th St. between C St. and Broadway	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Medium Truck Auto	%	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
2010 without Project - east of Broadway PM	1,285	88	1,131	8	103	4	51	22	35	22	35	22	35	59.0	61.0	66.0	67.8	36	64.0	62.1
2010 with Project - east of Broadway PM	1,518	88	1,336	8	121	4	61	22	35	22	35	22	35	59.8	61.7	66.7	68.5	36	64.7	62.8
2025 without Project - east of Broadway PM	1,362	88	1,199	8	109	4	54	22	35	22	35	22	35	59.3	61.3	66.3	68.1	36	64.3	62.4
2025 with Project - east of Broadway PM	1,595	88	1,404	8	128	4	64	22	35	22	35	22	35	60.0	61.9	66.9	68.8	36	64.9	63.0
																	Calculated	Receptor	Adjusted	Adjusted

ROAD SEGMENT 5th St. between C St. and Broadway	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Medium Truck Auto	%	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
2010 without Project - east of Broadway PM	1,203	88	1,059	8	96	4	48	22	35	22	35	22	35	58.7	60.7	65.7	67.5	36	63.7	61.8
2010 with Project - east of Broadway PM	1,528	88	1,345	8	122	4	61	22	35	22	35	22	35	59.8	61.8	66.8	68.6	36	64.8	62.9
2025 without Project - east of Broadway PM	1,336	88	1,176	8	107	4	53	22	35	22	35	22	35	59.2	61.2	66.2	68.0	36	64.2	62.3
2025 with Project - east of Broadway PM	1,661	88	1,462	8	133	4	66	22	35	22	35	22	35	60.1	62.1	67.1	68.9	36	65.1	63.2

ROAD SEGMENT Broadway between 4th St. and 5th St.	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Medium Truck Auto	%	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
2010 without Project - south of Fourth Street PM	1,295	88	1,140	8	104	4	52	13	21	13	21	13	21	52.5	57.5	63.9	65.1	36	61.3	59.4
2010 with Project - south of Fourth Street PM	1,630	88	1,434	8	130	4	65	13	21	13	21	13	21	53.5	58.5	64.9	66.1	36	62.3	60.4
2025 without Project - south of Fourth Street PM	1,407	88	1,238	8	113	4	56	13	21	13	21	13	21	52.8	57.8	64.3	65.4	36	61.6	59.7
2025 with Project - south of Fourth Street PM	1,742	88	1,533	8	139	4	70	13	21	13	21	13	21	53.8	58.8	65.2	66.4	36	62.5	60.6

ROAD SEGMENT Broadway between 6th St. and Washington	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Medium Truck Auto	%	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
2010 without Project - south of 6th Street PM	2,830	88	2,490	8	226	4	113	13	21	13	21	13	21	55.9	60.9	67.3	68.5	36	64.7	62.8
2010 with Project - south of 6th Street PM	3,297	88	2,901	8	264	4	132	13	21	13	21	13	21	56.5	61.5	68.0	69.1	36	65.3	63.4
2025 without Project - south of 6th Street PM	3,140	88	2,763	8	251	4	126	13	21	13	21	13	21	56.3	61.3	67.8	68.9	36	65.1	63.2
2025 with Project - south of 6th Street PM	3,607	88	3,174	8	289	4	144	13	21	13	21	13	21	56.9	61.9	68.4	69.5	36	65.7	63.8

ROAD SEGMENT Broadway between Washington and 14th	# VEHICLES	Auto %	Medium Truck Auto	%	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT	roadway center)	Center (m.)	(dBA) 3 dBA Atten	(dBA) 4.5 dBA Atten
2010 without Project - north of 14th Street PM	2,763	88	2,431	8	221	4	111	15	24	15	24	15	24	57.6	61.7	67.8	69.1	36	65.3	63.4
2010 with Project - north of 14th Street PM	3,201	88	2,817	8	256	4	128	15	24	15	24	15	24	58.2	62.4	68.4	69.7	36	65.9	64.0
2025 without Project - north of 14th Street PM	3,360	88	2,957	8	269	4	134	15	24	15	24	15	24	58.4	62.6	68.6	69.9	36	66.1	64.2
2025 with Project - north of 14th Street PM	3,798	88	3,342	8	304	4	152	15	24	15	24	15	24	59.0	63.1	69.2	70.5	36	66.7	64.8

ROAD SEGMENT Waterfront Drive south of Project Driveway	# VEHICLES	Auto %	Medium Truck Auto	%	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT	roadway center)	Center (m.)	(dBA) 3 dBA Atten	(dBA) 4.5 dBA Atten
2010 without Project - south of driveway PM	155	88	136	8	12	4	6	25	40	25	40	25	40	51.4	52.7	57.3	59.4	36	55.6	53.7
2010 with Project - south of driveway PM	492	88	433	8	39	4	20	25	40	25	40	25	40	56.5	57.7	62.3	64.4	36	60.6	58.7
2025 without Project - south of driveway PM	437	88	385	8	35	4	17	25	40	25	40	25	40	55.9	57.2	61.8	63.9	36	60.1	58.2
2025 with Project - south of driveway PM	774	88	681	8	62	4	31	25	40	25	40	25	40	58.4	59.7	64.3	66.4	36	62.6	60.7

Trip breakdown for Noise Model

4th Street (#1 - #18)

	Westbound	
	east of #1	
2010 w/o Project	1,285	Figure 9
2010 with Project	1,515	Figure 10
Project (check)	*230*	
2025 w/o Project	1,365	
2025 with Project	1,595	Figure 15

5th Street (#2 - #23)

	Eastbound	
	east of #2	
2010 w/o Project	1,203	Figure 9
2010 with Project	1,476	Figure 10
Project (check)	*273*	
2025 w/o Project	1,322	
2025 with Project	1,595	Figure 15

Broadway (#1 - #2)

	Two-Way Total	
	south of #1	
2010 w/o Project	1,295	Figure 9
2010 with Project	1,601	Figure 10
Project (check)	*306*	
2025 w/o Project	1,436	
2025 with Project	1,742	Figure 15

Broadway (#3 - #5)

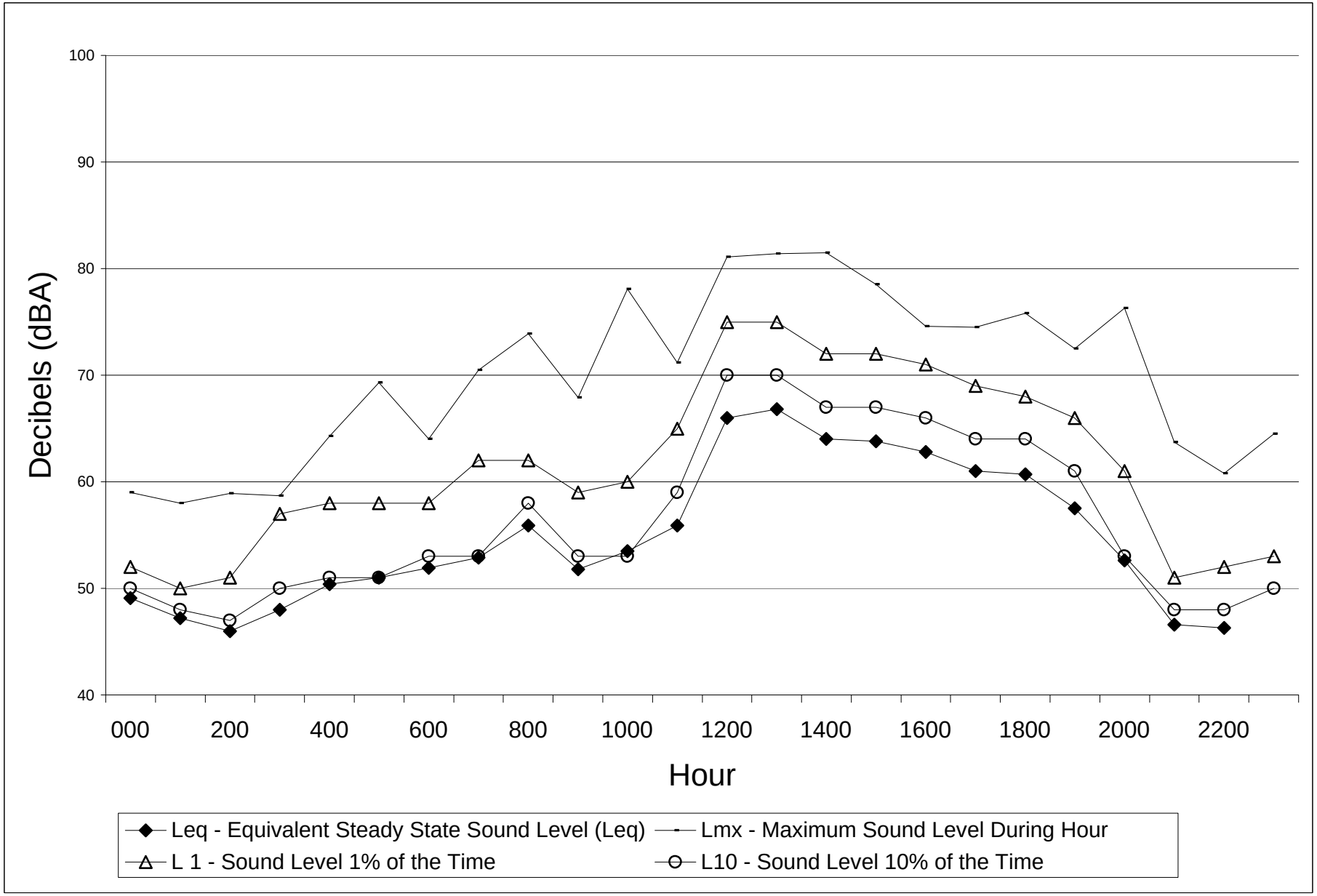
	Two-Way Total	
	south of #3	
2010 w/o Project	2,830	Figure 9
2010 with Project	3,262	Figure 10
Project (check)	*432*	
2025 w/o Project	3,175	
2025 with Project	3,607	Figure 15

Broadway (#5 - #6)

	Two-Way Total	
	north of #6	
2010 w/o Project	2,763	Figure 9
2010 with Project	3,177	Figure 10
Project (check)	*414*	
2025 w/o Project	3,384	
2025 with Project	3,798	Figure 15

Waterfront Drive (#4)

	Two-Way Total	
	south of #4	
2010 w/o Project	155	Figure 9
2010 with Project	584	Figure 10
Project (check)	*429*	
2025 w/o Project	345	
2025 with Project	774	Figure 15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1400
1600
1800
2000
2200
Hour
Leq - Equivalent Steady State Sound Level (Leq)
Lmx - Maximum Sound Level During Hour
L 1 - Sound Level 1% of the Time
L10 - Sound Level 10% of the Time