

A P P E N D I X B

A I R Q U A L I T Y A P P E N D I X



CO EWP Petaluma

East Washington Place, Petaluma
CARBON MONOXIDE ANALYSIS

PM Peak Hour
 Assumes worst case of all intersections based on total volume, LOS and project traffic contribution

Total 8-Hour CO Concentration

1-Hour CO Contribution

Traffic Volume

Intersection	Traffic Volume			1-Hour CO Contribution			Total 8-Hour CO Concentration		
	Exist	Exist + Proj 2008	2010 w/Project Cumulative	Exist	Exist + Proj	2010 w/Project Cumulative	Exist	Exist + Proj	2010 w/Project Cumulative
Link: Intersection 1 - E. Washington St and N. McDowell Blvd									
E. Washington (4-lane)*	3440	3501	3747	5.1	4.9	4.1	6.4	6.1	5.5
N. McDowell (4-lane)	2880	2908	3294	1.2	1.0	0.8			
			3364			1.3			3.1
Link: Intersection 4 - E. Washington St and Ellis/Kennilworth									
E. Washington (4-lane)*	2720	2940	3092	4.0	4.2	3.4	4.9	5.2	4.6
Ellis/Kennilworth (2-lane)	245	961	1260	0.1	0.4	0.4			
* Indicates primary roadway (due to higher volume)			1005			0.1			2.8

Emission Factors (EMFAC2002 - 5mph)

LOS E or F (5mph)	2005 (5mph)	2010 (5mph)	2015 (5mph)	2020 (5mph)
		12.4 g/mi	7.8 g/mi	4.8 g/mi
			2.9 g/mi	
V				

Dispersion Factors

Primary	Edge
2 Ln	14.0
4 Ln	11.9
6 Ln	9.5
Secondary	
2 Ln	3.7
4 Ln	3.3
6 Ln	2.8

Background CO Levels -

1-Hour	8-Hour
5	2

Santa Rosa (BAAQMD)

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\EWP Petaluma08.urb
Project Name: East Washington Place Project
Project Location: San Francisco Bay Area
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	6.44	3.14	3.91	0.00	0.01
TOTALS (lbs/day, mitigated)	6.44	3.14	3.91	0.00	0.01

OPERATIONAL (VEHICLE) EMISSION ESTIMATES	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	64.43	78.26	776.75	0.52	78.70
TOTALS (lbs/day, mitigated)	58.56	70.65	701.12	0.47	71.04

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	70.87	81.41	780.66	0.52	78.71
TOTALS (lbs/day, mitigated)	65.00	73.80	705.03	0.47	71.05

URBEMIS 2002 For Windows 8.7.0

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Project Name: East Washington Place Project
Project Location: San Francisco Bay 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	0.23	3.14	2.53	0	0.01
Hearth - No summer emissions					
Landscaping	0.21	0.01	1.38	0.00	0.00
Consumer Prdcts	1.28	-	-	-	-
Architectural Coatings	4.72	-	-	-	-
TOTALS (lbs/day, unmitigated)	6.44	3.14	3.91	0.00	0.01

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Condo/townhouse general	1.90	1.91	19.92	0.01	1.99
Regnl shop. center	62.53	76.35	756.84	0.50	76.70
TOTAL EMISSIONS (lbs/day)	64.43	78.26	776.75	0.52	78.70

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

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Condo/townhouse general	2.13	5.25 trips/dwelling unit	34.00	178.50
Regnl shop. center		32.90 trips/1000 sq. ft.	298.10	9,807.49
Sum of Total Trips				9,985.99
Total Vehicle Miles Traveled				51,681.12

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.8	4.6	6.1	11.8	5.0	5.0
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip Speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	27.3	21.2	51.5			
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

The Trip Rate and/or Acreage values for Condominium/townhouse general have changed from the defaults 6.9/2.13 to 5.25/2.13

Changes made to the default values for Area

The area source mitigation measure option switch changed from off to on.
The wood stove percentage changed from 35 to 0.
The wood fireplace percentage changed from 10 to 0.
The natural gas fireplace percentage changed from 55 to 100.
The landscape year changed from 2005 to 2008.
The consumer product persons per residential unit changed from 2.861 to 2.2.

Changes made to the default values for Operations

The pass by trips option switch changed from on to off.
The mitigation option switch changed from off to on.
The operational emission year changed from 2005 to 2008.
The Res and Non-Res Mix of Uses Mitigation changed from off to on.
The Res and Non-Res Local-Serving Retail Mitigation changed from off to on.
The Res and Non-Res Transit Service Mitigation changed from off to on.
The Res and Non-Res Ped/Bike Mitigation changed from off to on.

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\EWP Petaluma09.urb
Project Name: East Washington Place Project
Project Location: San Francisco Bay Area
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	11.65	3.87	4.22	0.00	0.01
TOTALS (lbs/day, mitigated)	11.65	3.87	4.22	0.00	0.01

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	64.59	76.94	770.79	0.55	84.25
TOTALS (lbs/day, mitigated)	58.50	69.07	691.76	0.50	75.62

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	76.24	80.81	775.01	0.55	84.27
TOTALS (lbs/day, mitigated)	70.15	72.94	695.98	0.50	75.63

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\EWP Petaluma09.urb
Project Name: East Washington Place Project
Project Location: San Francisco Bay 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	0.28	3.86	2.84	0	0.01
Hearth - No summer emissions					
Landscaping	0.21	0.01	1.38	0.00	0.00
Consumer Prdcts	4.89	-	-	-	-
Architectural Coatings	6.27	-	-	-	-
TOTALS (lbs/day, unmitigated)	11.65	3.87	4.22	0.00	0.01

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Condo/townhouse general	6.72	6.71	70.49	0.05	7.62
Regnl shop. center	57.87	70.22	700.30	0.50	76.63
TOTAL EMISSIONS (lbs/day)	64.59	76.94	770.79	0.55	84.25

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

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2009 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Condo/townhouse general	8.13	5.25 trips/dwelling unit	130.00	682.50
Regnl shop. center		32.90 trips/1000 sq. ft.	298.10	9,807.49
Sum of Total Trips				10,489.99
Total Vehicle Miles Traveled				55,379.52

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.90	1.30	98.40	0.30
Light Truck < 3,750 lbs	15.10	2.60	95.40	2.00
Light Truck 3,751- 5,750	16.10	1.20	98.10	0.70
Med Truck 5,751- 8,500	7.30	1.40	95.90	2.70
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.60	75.00	25.00	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.40	7.10	85.70	7.20

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.8	4.6	6.1	11.8	5.0	5.0
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip Speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	27.3	21.2	51.5			
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

The Trip Rate and/or Acreage values for Condominium/townhouse general have changed from the defaults 6.9/8.13 to 5.25/8.13

Changes made to the default values for Area

The area source mitigation measure option switch changed from off to on.
The wood stove percentage changed from 35 to 0.
The wood fireplace percentage changed from 10 to 0.
The natural gas fireplace percentage changed from 55 to 100.
The landscape year changed from 2005 to 2008.
The consumer product persons per residential unit changed from 2.861 to 2.2.

Changes made to the default values for Operations

The pass by trips option switch changed from on to off.
The mitigation option switch changed from off to on.
The operational emission year changed from 2005 to 2009.
The Res and Non-Res Mix of Uses Mitigation changed from off to on.
The Res and Non-Res Local-Serving Retail Mitigation changed from off to on.
The Res and Non-Res Transit Service Mitigation changed from off to on.
The Res and Non-Res Ped/Bike Mitigation changed from off to on.

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\EWP Petaluma10.urb
Project Name: East Washington Place Project
Project Location: San Francisco Bay Area
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

AREA SOURCE EMISSION ESTIMATES	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	16.92	4.60	4.53	0.00	0.01
TOTALS (lbs/day, mitigated)	16.92	4.60	4.53	0.00	0.01

OPERATIONAL (VEHICLE) EMISSION ESTIMATES	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	64.00	74.81	755.26	0.59	89.89
TOTALS (lbs/day, mitigated)	57.81	66.84	674.38	0.53	80.27

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day, unmitigated)	80.92	79.41	759.79	0.59	89.90
TOTALS (lbs/day, mitigated)	74.72	71.44	678.91	0.53	80.29

URBEMIS 2002 For Windows 8.7.0

File Name: C:\Program Files\URBEMIS 2002 Version 8.7\Projects2k2\EWP Petaluma10.urb
Project Name: East Washington Place Project
Project Location: San Francisco Bay 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	0.34	4.59	3.15	0	0.01
Hearth - No summer emissions					
Landscaping	0.21	0.01	1.38	0.00	0.00
Consumer Prdcts	8.54	-	-	-	-
Architectural Coatings	7.83	-	-	-	-
TOTALS (lbs/day, unmitigated)	16.92	4.60	4.53	0.00	0.01

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Condo/townhouse general	10.83	10.69	112.95	0.09	13.30
Regnl shop. center	53.18	64.12	642.32	0.50	76.59
TOTAL EMISSIONS (lbs/day)	64.00	74.81	755.26	0.59	89.89

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

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2010 Temperature (F): 85 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Condo/townhouse general	14.19	5.25 trips/dwelling unit	227.00	1,191.75
Regnl shop. center		32.90 trips/1000 sq. ft.	298.10	9,807.49
Sum of Total Trips				10,999.24
Total Vehicle Miles Traveled				59,116.45

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.70	1.10	98.70	0.20
Light Truck < 3,750 lbs	15.20	2.00	96.00	2.00
Light Truck 3,751- 5,750	16.20	1.20	98.10	0.70
Med Truck 5,751- 8,500	7.30	1.40	95.90	2.70
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.30	0.00	66.70	33.30
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.60	68.80	31.20	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.40	7.10	85.70	7.20

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.8	4.6	6.1	11.8	5.0	5.0
Rural Trip Length (miles)	15.0	10.0	10.0	15.0	10.0	10.0
Trip Speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	27.3	21.2	51.5			
% of Trips - Commercial (by land use)						
Regnl shop. center				2.0	1.0	97.0

Changes made to the default values for Land Use Trip Percentages

The Trip Rate and/or Acreage values for Condominium/townhouse general have changed from the defaults 6.9/14.19 to 5.25/14.19

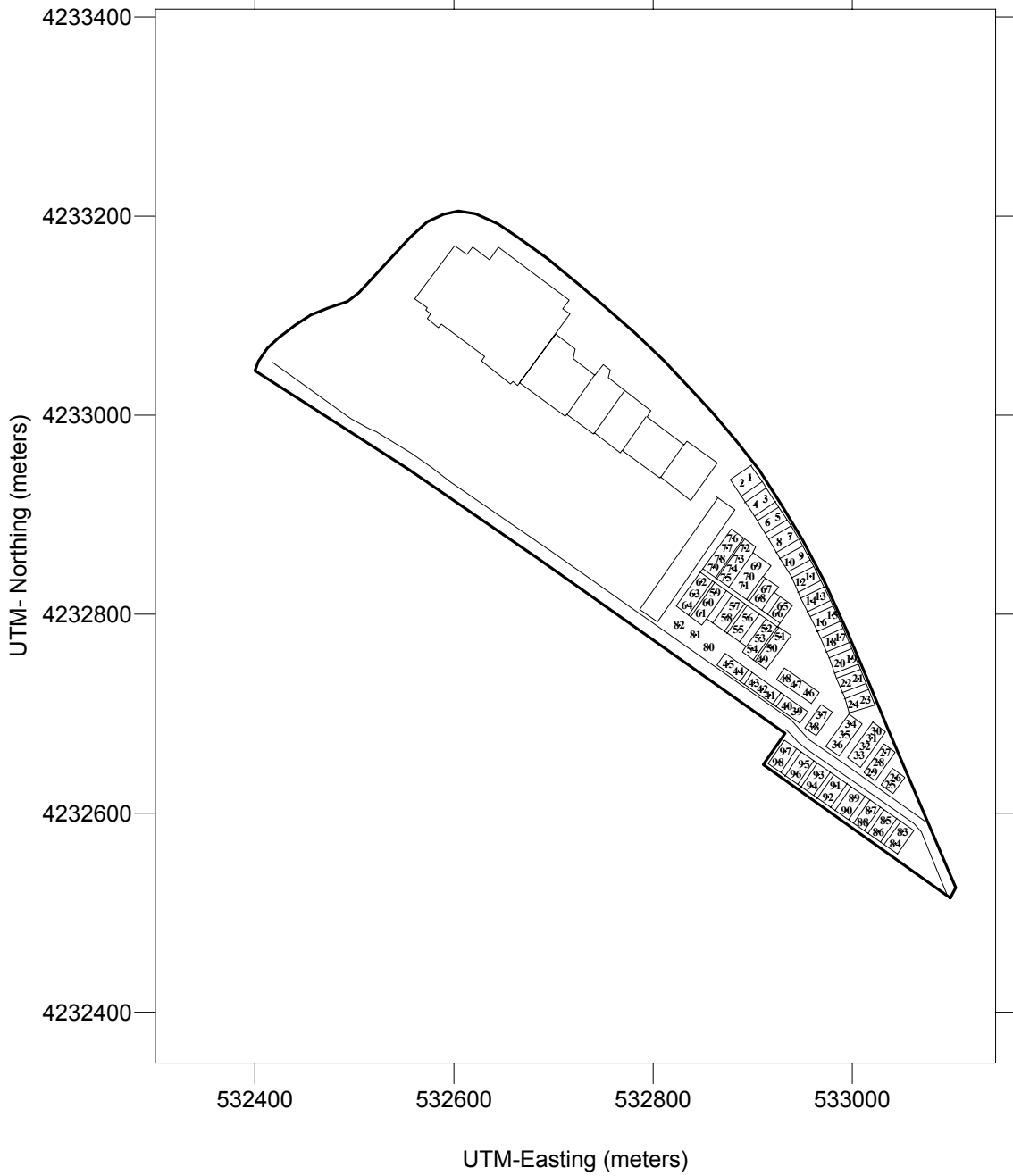
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The Res and Non-Res Ped/Bike Mitigation changed from off to on.

East Washington Place
Receptors Used For CAL3QHCR Modeling



East Washington Place, Petaluma - DPM Risk Summary by Receptor
70-Year Cumulative Risk Based on 2010 and 2025 DPM Emissions

Emission Year = 2010		2010					2025					Emission Year = 2025		70-Year Risk		70-Year Time-Weighted Risk									
Met Year =	Average	2010	2010	2010	2010	2010	2025	2025	2025	2025	2025	2025	2025	Average	(per million)	(per million)	(per million)								
Rec #	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	Annual Concentration x 100	Rec #	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	(ug/m ³)	Annual Concentration x 100	70-Year Risk	70-Year Risk
3	6.06	7.77	7.93	8.79	7.45	7.60	3.17	4.07	4.14	4.58	3.89	3.97	24.21	3	3.17	4.07	4.14	4.58	3.89	3.97	12.65	15.13			
1	6.08	7.75	7.9	8.77	7.43	7.59	3.17	4.05	4.12	4.56	3.88	3.96	24.17	1	3.17	4.05	4.12	4.56	3.88	3.96	12.60	15.08			
5	6.01	7.73	7.9	8.73	7.4	7.55	3.13	4.04	4.12	4.54	3.86	3.94	24.07	5	3.13	4.04	4.12	4.54	3.86	3.94	12.55	15.02			
7	5.94	7.66	7.84	8.64	7.33	7.48	3.1	4.01	4.09	4.5	3.83	3.91	23.84	7	3.1	4.01	4.09	4.5	3.83	3.91	12.44	14.89			
9	5.81	7.54	7.71	8.49	7.2	7.35	3.03	3.94	4.02	4.41	3.75	3.83	23.42	9	3.03	3.94	4.02	4.41	3.75	3.83	12.20	14.61			
15	5.63	7.36	7.56	8.26	7.01	7.16	2.94	3.85	3.95	4.31	3.66	3.74	22.82	15	2.94	3.85	3.95	4.31	3.66	3.74	11.92	14.26			
11	5.56	7.25	7.43	8.14	6.9	7.06	2.9	3.79	3.87	4.24	3.6	3.68	22.48	11	2.9	3.79	3.87	4.24	3.6	3.68	11.72	14.03			
13	5.45	7.12	7.31	7.99	6.77	6.93	2.85	3.72	3.81	4.16	3.54	3.62	22.07	13	2.85	3.72	3.81	4.16	3.54	3.62	11.52	13.78			
19	5.35	7.05	7.25	7.88	6.69	6.84	2.8	3.69	3.78	4.11	3.49	3.57	21.80	19	2.8	3.69	3.78	4.11	3.49	3.57	11.39	13.62			
17	5.28	6.93	7.12	7.77	6.59	6.74	2.75	3.62	3.71	4.04	3.43	3.51	21.47	17	2.75	3.62	3.71	4.04	3.43	3.51	11.18	13.39			
21	5.1	6.73	6.93	7.52	6.37	6.53	2.66	3.52	3.61	3.91	3.32	3.40	20.80	21	2.66	3.52	3.61	3.91	3.32	3.40	10.85	12.98			
2	5.11	6.52	6.65	7.37	6.24	6.38	2.66	3.4	3.46	3.82	3.25	3.32	20.32	2	2.66	3.4	3.46	3.82	3.25	3.32	10.57	12.66			
23	4.92	6.51	6.7	7.26	6.15	6.31	2.56	3.4	3.49	3.77	3.2	3.28	20.10	23	2.56	3.4	3.49	3.77	3.2	3.28	10.46	12.53			
4	4.93	6.32	6.46	7.15	6.05	6.18	2.56	3.3	3.36	3.71	3.15	3.22	19.70	4	2.56	3.3	3.36	3.71	3.15	3.22	10.25	12.27			
6	4.87	6.27	6.4	7.07	5.99	6.12	2.53	3.26	3.32	3.66	3.11	3.18	19.50	6	2.53	3.26	3.32	3.66	3.11	3.18	10.12	12.13			
8	4.77	6.17	6.31	6.95	5.89	6.02	2.48	3.22	3.28	3.6	3.06	3.13	19.17	8	2.48	3.22	3.28	3.6	3.06	3.13	9.97	11.94			
30	4.64	6.16	6.35	6.86	5.81	5.96	2.41	3.21	3.3	3.56	3.02	3.10	19.00	30	2.41	3.21	3.3	3.56	3.02	3.10	9.88	11.83			
27	4.61	6.13	6.32	6.83	5.78	5.93	2.4	3.2	3.29	3.54	3.01	3.09	18.91	27	2.4	3.2	3.29	3.54	3.01	3.09	9.84	11.78			
26	4.53	6.04	6.22	6.72	5.69	5.84	2.35	3.14	3.23	3.48	2.95	3.03	18.61	26	2.35	3.14	3.23	3.48	2.95	3.03	9.65	11.57			
10	4.58	5.95	6.09	6.7	5.67	5.80	2.38	3.1	3.16	3.46	2.94	3.01	18.47	10	2.38	3.1	3.16	3.46	2.94	3.01	9.58	11.49			
12	4.54	5.92	6.06	6.65	5.62	5.76	2.36	3.08	3.15	3.45	2.92	2.99	18.34	12	2.36	3.08	3.15	3.45	2.92	2.99	9.53	11.42			
14	4.5	5.88	6.03	6.6	5.58	5.72	2.34	3.06	3.14	3.42	2.9	2.97	18.22	14	2.34	3.06	3.14	3.42	2.9	2.97	9.47	11.34			
16	4.41	5.79	5.93	6.48	5.48	5.62	2.29	3.01	3.08	3.35	2.84	2.91	17.90	16	2.29	3.01	3.08	3.35	2.84	2.91	9.28	11.13			
18	4.36	5.73	5.88	6.41	5.42	5.56	2.26	2.98	3.05	3.32	2.81	2.88	17.71	18	2.26	2.98	3.05	3.32	2.81	2.88	9.19	11.02			
20	4.25	5.61	5.76	6.27	5.3	5.44	2.21	2.92	3	3.25	2.75	2.83	17.33	20	2.21	2.92	3	3.25	2.75	2.83	9.00	10.79			
31	4.09	5.43	5.59	6.05	5.11	5.25	2.12	2.83	2.9	3.13	2.65	2.73	16.74	31	2.12	2.83	2.9	3.13	2.65	2.73	8.69	10.41			
22	4.06	5.37	5.52	5.99	5.06	5.20	2.11	2.8	2.87	3.1	2.63	2.70	16.57	22	2.11	2.8	2.87	3.1	2.63	2.70	8.61	10.31			
25	3.96	5.28	5.44	5.86	4.96	5.10	2.05	2.74	2.82	3.03	2.57	2.64	16.25	25	2.05	2.74	2.82	3.03	2.57	2.64	8.42	10.10			
24	3.92	5.19	5.34	5.78	4.88	5.02	2.03	2.7	2.76	2.99	2.53	2.60	16.00	24	2.03	2.7	2.76	2.99	2.53	2.60	8.29	9.94			
28	3.86	5.15	5.3	5.72	4.83	4.97	2	2.67	2.75	2.96	2.5	2.58	15.84	28	2	2.67	2.75	2.96	2.5	2.58	8.21	9.84			
83	3.53	4.73	4.87	5.25	4.43	4.56	1.83	2.45	2.52	2.71	2.29	2.36	14.53	83	1.83	2.45	2.52	2.71	2.29	2.36	7.52	9.02			
32	3.54	4.72	4.85	5.24	4.42	4.55	1.83	2.45	2.51	2.71	2.29	2.36	14.51	32	1.83	2.45	2.51	2.71	2.29	2.36	7.51	9.01			
34	3.38	4.5	4.62	5	4.22	4.34	1.75	2.33	2.39	2.58	2.18	2.25	13.84	34	1.75	2.33	2.39	2.58	2.18	2.25	7.16	8.59			
29	3.32	4.44	4.56	4.93	4.15	4.28	1.71	2.3	2.36	2.54	2.14	2.21	13.64	29	1.71	2.3	2.36	2.54	2.14	2.21	7.04	8.45			
72	3.24	4.2	4.29	4.74	3.99	4.09	1.67	2.16	2.21	2.43	2.06	2.11	13.04	72	1.67	2.16	2.21	2.43	2.06	2.11	6.71	8.07			
65	3.2	4.19	4.28	4.7	3.96	4.07	1.65	2.16	2.21	2.42	2.04	2.10	12.95	65	1.65	2.16	2.21	2.42	2.04	2.10	6.68	8.02			
33	3.14	4.2	4.31	4.66	3.92	4.05	1.62	2.17	2.23	2.4	2.02	2.09	12.89	33	1.62	2.17	2.23	2.4	2.02	2.09	6.65	7.99			
69	3.2	4.16	4.25	4.68	3.95	4.05	1.64	2.14	2.18	2.4	2.03	2.08	12.90	69	1.64	2.14	2.18	2.4	2.03	2.08	6.62	7.97			

85	3.04	4.08	4.19	4.52	3.8	3.93	12.51	85	1.57	2.11	2.16	2.32	1.96	2.02	6.45	7.75
76	3.12	4.04	4.12	4.55	3.84	3.93	12.53	76	1.6	2.08	2.12	2.33	1.98	2.02	6.44	7.75
84	3.03	4.06	4.18	4.5	3.79	3.91	12.46	84	1.56	2.1	2.16	2.32	1.95	2.02	6.43	7.72
67	3.07	4	4.09	4.5	3.79	3.89	12.39	67	1.58	2.07	2.11	2.31	1.95	2.00	6.38	7.67
35	3	4	4.1	4.44	3.74	3.86	12.29	35	1.54	2.07	2.12	2.29	1.93	1.99	6.34	7.61
66	2.96	3.88	3.96	4.35	3.66	3.76	11.99	66	1.52	2	2.04	2.23	1.88	1.93	6.16	7.41
73	2.93	3.8	3.88	4.28	3.61	3.70	11.79	73	1.5	1.95	1.99	2.19	1.85	1.90	6.04	7.27
70	2.87	3.75	3.82	4.21	3.55	3.64	11.60	70	1.47	1.92	1.96	2.16	1.82	1.87	5.95	7.16
77	2.85	3.69	3.77	4.17	3.51	3.60	11.46	77	1.46	1.9	1.93	2.13	1.8	1.84	5.87	7.07
68	2.8	3.66	3.74	4.11	3.46	3.55	11.32	68	1.44	1.89	1.93	2.11	1.78	1.83	5.83	7.01
87	2.73	3.67	3.77	4.07	3.42	3.53	11.25	87	1.4	1.89	1.94	2.09	1.75	1.81	5.78	6.95
86	2.68	3.6	3.69	3.98	3.35	3.46	11.02	86	1.37	1.85	1.9	2.04	1.72	1.78	5.66	6.81
51	2.71	3.57	3.65	3.99	3.36	3.46	11.01	51	1.39	1.84	1.87	2.05	1.72	1.77	5.65	6.80
36	2.68	3.58	3.67	3.98	3.34	3.45	10.99	36	1.38	1.85	1.89	2.04	1.71	1.77	5.65	6.80
37	2.67	3.55	3.64	3.95	3.32	3.43	10.92	37	1.37	1.83	1.87	2.02	1.7	1.76	5.60	6.74
46	2.63	3.5	3.58	3.9	3.27	3.38	10.76	46	1.35	1.8	1.84	2	1.68	1.73	5.52	6.65
71	2.66	3.47	3.54	3.9	3.28	3.37	10.74	71	1.36	1.78	1.82	2	1.68	1.73	5.51	6.63
74	2.67	3.47	3.54	3.91	3.29	3.38	10.76	74	1.36	1.78	1.81	2	1.68	1.73	5.50	6.63
78	2.58	3.36	3.43	3.79	3.19	3.27	10.42	78	1.32	1.72	1.75	1.93	1.63	1.67	5.32	6.41
52	2.56	3.37	3.43	3.77	3.17	3.26	10.39	52	1.31	1.73	1.76	1.93	1.62	1.67	5.32	6.41
89	2.48	3.33	3.41	3.69	3.1	3.20	10.20	89	1.27	1.71	1.75	1.88	1.58	1.64	5.22	6.29
47	2.48	3.29	3.36	3.67	3.08	3.18	10.12	47	1.27	1.69	1.73	1.88	1.58	1.63	5.19	6.25
88	2.42	3.26	3.34	3.61	3.03	3.13	9.98	88	1.24	1.67	1.71	1.84	1.55	1.60	5.10	6.15
75	2.46	3.22	3.28	3.62	3.05	3.13	9.96	75	1.26	1.64	1.67	1.85	1.56	1.60	5.08	6.13
50	2.44	3.22	3.29	3.6	3.02	3.11	9.92	50	1.25	1.65	1.69	1.84	1.55	1.60	5.08	6.12
38	2.39	3.19	3.26	3.54	2.97	3.07	9.78	38	1.22	1.64	1.67	1.81	1.52	1.57	5.01	6.03
48	2.36	3.14	3.21	3.5	2.94	3.03	9.65	48	1.21	1.61	1.64	1.79	1.5	1.55	4.94	5.95
79	2.39	3.12	3.18	3.52	2.96	3.03	9.67	79	1.22	1.59	1.62	1.79	1.51	1.55	4.93	5.94
56	2.37	3.11	3.17	3.49	2.93	3.01	9.60	56	1.21	1.6	1.63	1.78	1.5	1.54	4.92	5.92
53	2.36	3.11	3.17	3.48	2.92	3.01	9.58	53	1.2	1.59	1.62	1.78	1.49	1.54	4.89	5.90
57	2.29	3.01	3.06	3.37	2.84	2.91	9.28	57	1.17	1.54	1.57	1.72	1.45	1.49	4.75	5.72
91	2.25	3.02	3.09	3.35	2.8	2.90	9.25	91	1.15	1.55	1.58	1.71	1.43	1.48	4.73	5.70
39	2.25	3	3.06	3.34	2.8	2.89	9.21	39	1.15	1.54	1.57	1.71	1.43	1.48	4.72	5.68
90	2.23	3.01	3.08	3.33	2.79	2.89	9.20	90	1.14	1.54	1.57	1.69	1.42	1.47	4.69	5.66
49	2.2	2.91	2.97	3.25	2.73	2.81	8.96	49	1.12	1.49	1.52	1.66	1.4	1.44	4.58	5.52
59	2.18	2.86	2.91	3.21	2.7	2.77	8.83	59	1.11	1.46	1.48	1.64	1.38	1.41	4.51	5.43
40	2.15	2.87	2.93	3.19	2.68	2.76	8.81	40	1.1	1.47	1.5	1.63	1.37	1.41	4.51	5.43
54	2.15	2.85	2.9	3.19	2.67	2.75	8.77	54	1.1	1.46	1.49	1.63	1.37	1.41	4.49	5.41
55	2.14	2.82	2.87	3.16	2.65	2.73	8.69	55	1.09	1.44	1.47	1.61	1.35	1.39	4.43	5.35
62	2.12	2.77	2.82	3.12	2.62	2.69	8.57	62	1.08	1.41	1.44	1.59	1.34	1.37	4.37	5.27
93	2.08	2.79	2.85	3.09	2.59	2.68	8.54	93	1.06	1.43	1.46	1.57	1.32	1.37	4.36	5.25
58	2.1	2.77	2.81	3.1	2.61	2.68	8.53	58	1.07	1.42	1.44	1.58	1.33	1.37	4.36	5.25
92	2.05	2.77	2.83	3.06	2.56	2.65	8.46	92	1.05	1.41	1.44	1.56	1.3	1.35	4.31	5.20
41	2.02	2.7	2.74	3	2.51	2.59	8.26	41	1.03	1.38	1.41	1.53	1.28	1.33	4.22	5.09
60	2.02	2.66	2.7	2.99	2.51	2.58	8.21	60	1.03	1.36	1.38	1.52	1.28	1.31	4.19	5.05
42	1.97	2.63	2.68	2.93	2.46	2.53	8.07	42	1.01	1.35	1.37	1.5	1.25	1.30	4.13	4.97
95	1.96	2.63	2.69	2.92	2.44	2.53	8.05	95	1	1.35	1.37	1.49	1.25	1.29	4.12	4.96
63	1.95	2.57	2.61	2.89	2.42	2.49	7.93	63	0.99	1.31	1.33	1.47	1.23	1.27	4.03	4.87

94	1.92	2.59	2.64	2.86	2.39	2.48	7.90	94	0.98	1.32	1.35	1.46	1.22	1.27	4.03	4.86
43	1.93	2.57	2.61	2.86	2.4	2.47	7.88	43	0.98	1.31	1.34	1.46	1.23	1.26	4.03	4.85
61	1.88	2.48	2.52	2.79	2.34	2.40	7.65	61	0.96	1.27	1.28	1.42	1.19	1.22	3.90	4.70
44	1.84	2.45	2.49	2.74	2.29	2.36	7.53	44	0.94	1.26	1.28	1.4	1.17	1.21	3.86	4.64
97	1.83	2.46	2.51	2.74	2.29	2.37	7.54	97	0.94	1.26	1.28	1.39	1.16	1.21	3.84	4.63
96	1.81	2.44	2.48	2.7	2.26	2.34	7.45	96	0.92	1.25	1.27	1.38	1.15	1.19	3.80	4.59
64	1.81	2.39	2.43	2.69	2.26	2.32	7.38	64	0.92	1.22	1.24	1.37	1.15	1.18	3.76	4.54
45	1.8	2.39	2.43	2.67	2.24	2.31	7.35	45	0.91	1.22	1.24	1.36	1.14	1.17	3.74	4.51
80	1.73	2.3	2.33	2.57	2.16	2.22	7.07	80	0.88	1.17	1.19	1.31	1.1	1.13	3.60	4.34
98	1.7	2.29	2.33	2.54	2.12	2.20	7.00	98	0.87	1.17	1.19	1.29	1.08	1.12	3.57	4.30
81	1.7	2.26	2.29	2.53	2.12	2.18	6.95	81	0.86	1.15	1.16	1.29	1.08	1.11	3.53	4.26
82	1.63	2.17	2.2	2.43	2.04	2.09	6.67	82	0.83	1.1	1.12	1.23	1.04	1.06	3.39	4.09

DPM Unit Risk Factor = 318.6

Hwy-101 DPM Risk Modeling Parameters for Proposed East Washington Place Using Cal3qhcr

Roadway Information

Number of Lanes (2010) = 4 (2 northbound, 2 southbound)
 Number of Lanes (2025) = 6 (3 northbound, 3 southbound)
 Lane Width = 12 feet

Daily Traffic Volume

	2010 Vech/Day	2010 % Diesel	2010 No. Diesel	2020 Vech/Day	2020 % Diesel	2020 No. Diesel
LDA	56,663	0.20%	113	66,379	0.00%	0
LDT	38,072	1.20%	459	49,888	0.00%	0.0
MDT	2,030	7.27%	148	2,491	2.83%	70
HDT	3,335	93.02%	3102	4,093	93.33%	3820
Total	100,100	3.82%	3,821	122,850	3.17%	3,890

CAL3QHC Link/Source Information

Num of Links = 20 (9 northbound & 11 southbound)
 Link Length = variable
 Link Width- North (2010) = 44 feet 13.4 meters
 Link Width- North (2025) = 56 feet 17.1 meters
 Source Height North = 9.8 feet 3 meters
 Link Width South (2010) = 44 feet 13.4 meters
 Link Width South (2025) = 56 feet 17.1 meters
 Source Height South = 9.8 feet 3 meters

DPM Emission Factors

Model EMFAC2002
 County Sonoma (SF)

2010 Average Emission Factors

Diesel Vehicles/hour = 159.2

Speed (mph)	DPM EF (g/mi)				Veh. Weighted Average
	LDA	LDT	MDT	HDT	
55	-	-	-	0.146	0.1181
60	-	-	0.03225	-	0.0012
65	0.091	0.0455	-	-	0.0082
					0.12751 <--Total

2025 Average Emission Factors

Diesel Vehicles/hour = 162.1

Speed (mph)	DPM EF (g/mi)				Veh. Weighted Average
	LDA	LDT	MDT	HDT	
55	-	-	-	0.062	0.0607
60	-	-	0.017	-	0.0003
65	0.049	0.038	-	-	0.0000
					0.06104 <--Total

Receptor Information

Number of Receptors = 98
 Receptor Height = 5.9 feet (1.8 meters)
 Receptor distances = variable

Meteorological Conditions

Petaluma Airport 1991-1994 & 1997 Hourly Met Data
 Land Use Classification = Urban
 Stability class = variable
 Wind speed = variable
 Wind direction = variable
 Surface roughness = 100 cm

Residential Cancer Risk Calculation Method

$$\text{Inhalation Dose} = C_{\text{air}} \times \text{DBR} \times A \times \text{EF} \times \text{ED} \times 10^{-6} / \text{AT}$$

Where: C_{air} = concentration in air ($\mu\text{g}/\text{m}^3$)

DBR = daily breathing rate (L/kg body weight-day)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

AT = Averaging time period over which exposure is averaged.

10^{-6} = Conversion factor

$$\text{Cancer Risk (per million)} = \text{CPF} \times \text{Inhalation Dose} \times 1.0\text{E}6$$

$$= \text{URF} \times C_{\text{air}}$$

Where: CPF = Cancer potency factor ($\text{mg}/\text{kg}\text{-day}$)⁻¹

URF = Unit risk factor (cancer risk per $\mu\text{g}/\text{m}^3$)

Residential Inhalation Dose Factors

Variable	Value ¹
C_{air}	varies by location
DBR	302 L/kg BW -day
A	1
EF	350 days/year
ED	70 years
AT	25,550 days for 70 yrs

¹ Default values recommended by OEHA& BAAQMD

Diesel Particulate Matter

Variable	Value ¹
CPF	$1.10\text{E}+00$ ($\text{mg}/\text{kg}\text{-day}$) ⁻¹
URF	318.55 Risk/10⁶ per $\mu\text{g}/\text{m}^3$

Highway 101 Traffic Data and Diesel PM Emission Factors For 2010

Vehicle Type	2004 CalTrans		2010		Avg. DPMEF (g/VMT)	Vehicle Speed (mph)	Total Vehicle Emissions (g/mi)
	Number Vehicles (vech/day)	Number Vehicles (vech/day)	Percent Diesel	Number Diesel			
LDA	51,512	56,663	0.20%	113	0.0910	65	10.29
LDT	34,611	38,072	1.20%	459	0.0455	65	20.87
MDT	1,845	2,030	7.27%	148	0.0323	60	4.76
HDT	3,032	3,335	93.02%	3102	0.1455	55	451.34
Total	91,000	100,100	-	3,821	-	-	487.26
Diesel Vech Avg DPM EF							
Mix Avg DPM EF							
Increase From 2004							
Vehicles/Direction							
Vehicles/Hour							
1.1							
50050							
1911							
2085.4							
79.6							
0.12751							
0.00487							

CalTrans 2004 Truck AADT Data			
Petaluma Average	Total	Total Truck	Truck by Axle
	91,000	4,877	3
1,845	616	158	2,258
5,364			

