

Appendix 12
Alternatives Technical Data

Appendix 12-1
Alternatives – Transportation Technical Data

Reduced Intensity Alternative – Trip Generation

Mission Rock Mixed-Use Project
REVISED REDUCED INTENSITY ALTERNATIVE

LAND USES	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential 1,233,746 gsf 1,234 units	Office 966,089 gsf	General Retail 142,716 gsf	Quality Restaurant 84,363 gsf	Quick Service Restaurant 36,156 gsf	Subtotal SWL 337 2,463,070 gsf	Brewery / Distillery 190,500 gsf 75 employees	Brewery Retail Exhibition 11,000 gsf 500 visitors	Brewery Quality Restaurant 11,000 gsf	Mezzanine Retail 10,000 gsf	Mezzanine Office 7,875 gsf	Mezzanine Production 9,625 gsf	Subtotal Pier 48 240,000 gsf		

INTERNAL AND EXTERNAL TRIP GENERATION RATES	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Daily Trip Rate (per d.u. / per 1,000 gsf)	10.0	18.1	150.0	200.0	600.0	36.5	1.6	90.9	200.0	150.0	18.1		21.4	0.46	35.2
AM Peak Hour as % of daily	14.2%	8.9%	2.3%	1.5%	14.8%	8.1%	10.6%	0.0%	1.5%	2.3%	8.9%		2.2%	13.0%	7.8%
AM Peak Hour Trip Rate (per d.u. / per 1,000 gsf)	1.42	1.61	3.49	2.92	88.89	2.95	0.17	0.00	2.92	3.49	1.61		0.47	0.06	2.74
PM Peak Hour as % of daily	17.3%	8.5%	9.0%	13.5%	13.5%	12.0%	10.6%	15.0%	13.5%	9.0%	8.5%		12.2%	9.0%	12.0%
PM Peak Hour Trip Rate (per d.u. / per 1,000 gsf)	1.73	1.54	13.50	27.00	81.00	4.37	0.17	13.64	27.00	13.50	1.54		2.61	0.04	4.21
% Modal Share															
Auto	27%	37%	36%	36%	36%	35%	54%	36%	36%	36%	37%		37%	36%	35%
Transit	42%	35%	17%	27%	27%	28%	39%	26%	17%	17%	35%		21%	27%	28%
Walk/Other	31%	28%	47%	37%	37%	37%	7%	38%	47%	47%	28%		42%	37%	37%
Average Vehicle Occupancy Rate															
Weekday Daily	1.11	1.97	2.38	2.31	2.31	2.02	1.23	2.37	2.38	2.38	1.97		2.19	2.31	2.03
Weekday AM Peak Hour	1.11	1.63	1.54	1.54	2.31	1.70	1.35	0.00	1.54	1.54	1.63		1.48	2.31	1.70
Weekday PM Peak Hour	1.11	1.63	2.38	2.31	2.31	1.88	1.35	2.37	2.38	2.38	1.63		2.24	2.31	1.90

Mission Rock Mixed-Use Project
REVISED REDUCED INTENSITY ALTERNATIVE

EXTERNAL ONLY TRIPS AFTER ADJUSTMENT	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Weekday AM Peak Hour															
Auto Person Trips: All Origins	404	553	166	89	1,038	2,249	14	-	12	14	5		45	4	2,298
Inbound	135	506	166	89	540	1,434	11	-	12	14	4		41	2	1,478
Outbound	269	47	-	-	498	814	3	-	-	-	0		4	2	820
Transit Person Trips: All Origins	602	667	211	116	731	2,327	14	-	17	18	5		54	3	2,384
Inbound	201	610	211	116	380	1,518	10	-	17	18	5		50	2	1,570
Outbound	401	57	-	-	351	809	3	-	-	-	0		4	2	814
Walk/Other Person Trips: All Origins	399	174	22	17	931	1,543	2	-	3	3	1		10	4	1,557
Inbound	133	159	22	17	484	815	2	-	3	3	1		9	2	826
Outbound	266	15	-	-	447	728	1	-	-	-	0		1	2	730
Total Person Trips: All Origins	1,405	1,393	399	222	2,700	6,118	30	-	32	35	11		109	12	6,239
Inbound	468	1,274	399	222	1,404	3,767	23	-	32	35	10		101	6	3,874
Outbound	937	118	-	-	1,296	2,351	7	-	-	-	1		8	6	2,365
Total Vehicle Trips: All Origins	365	333	104	57	448	1,306	11	-	8	8	3		29	2	1,337
Inbound	122	315	104	57	238	835	7	-	8	8	3		25	1	861
Outbound	243	18	-	-	210	471	3	-	-	-	0		3	1	476
Weekday PM Peak Hour															
Auto Person Trips: All Origins	426	489	605	756	952	3,229	14	54	100	45	4		217	3	3,449
Inbound	284	42	290	363	457	1,436	3	27	48	22	0		100	1	1,538
Outbound	142	448	315	393	495	1,793	11	27	52	24	4		117	2	1,911
Transit Person Trips: All Origins	608	577	260	541	674	2,659	14	39	45	21	5		123	2	2,785
Inbound	405	49	125	260	323	1,162	3	19	22	10	0		55	1	1,218
Outbound	203	528	135	281	350	1,497	10	19	24	11	4		68	1	1,567
Walk/Other Person Trips: All Origins	354	123	676	707	864	2,724	2	58	122	55	1		238	3	2,965
Inbound	236	10	325	340	415	1,325	1	29	59	27	0		115	1	1,441
Outbound	118	112	352	368	449	1,399	2	29	63	29	1		124	2	1,524
Total Person Trips: All Origins	1,388	1,189	1,541	2,004	2,489	8,612	30	150	267	122	10		579	8	9,199
Inbound	925	101	740	962	1,195	3,923	7	75	128	58	1		270	4	4,197
Outbound	463	1,088	801	1,042	1,294	4,689	23	75	139	63	9		309	4	5,002
Total Vehicle Trips: All Origins	385	291	242	326	411	1,654	11	23	41	19	2		95	1	1,751
Inbound	256	23	114	153	193	740	3	11	19	9	0		43	1	783
Outbound	128	267	128	173	218	915	7	11	22	10	2		52	1	968

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EXTERNAL ONLY TRIPS AFTER ADJUSTMENT	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Weekday Daily															
Auto Person Trips															
Superdistrict 1	382	334	429	336	345	1,825	9	28	47	32	3		119	2	1,947
Superdistrict 2	87	786	440	754	970	3,037	18	45	45	31	6		145	5	3,187
Superdistrict 3	305	768	339	614	631	2,658	14	50	37	25	6		133	4	2,794
Superdistrict 4	87	627	250	513	660	2,137	13	30	26	17	5		91	3	2,231
East Bay	443	1,139	937	904	1,162	4,586	23	52	96	66	9		246	5	4,837
North Bay	68	601	501	598	768	2,536	10	36	52	35	5		137	4	2,677
South Bay	1,091	988	1,284	731	939	5,033	22	42	132	90	8		293	4	5,331
Outside of Bay Area	-	898	2,973	1,227	1,578	6,675	49	75	306	208	7		646	7	7,328
All Origins	2,463	6,141	7,153	5,677	7,053	28,487	158	358	740	505	50		1,811	34	30,333
Transit Person Trips															
Superdistrict 1	726	553	365	456	468	2,569	8	38	40	27	5		117	3	2,689
Superdistrict 2	165	1,145	550	858	1,103	3,821	21	49	57	39	9		175	5	4,001
Superdistrict 3	581	870	259	597	612	2,919	17	48	28	19	7		119	4	3,042
Superdistrict 4	165	640	262	412	530	2,009	14	23	27	18	5		87	3	2,099
East Bay	545	1,110	634	530	681	3,501	29	27	65	44	9		175	3	3,678
North Bay	34	228	205	96	124	687	6	5	21	14	2		48	1	735
South Bay	1,295	559	282	318	409	2,863	13	17	29	20	5		84	2	2,949
Outside of Bay Area	-	623	681	826	1,062	3,192	2	51	70	48	5		175	5	3,372
All Origins	3,512	5,728	3,237	4,093	4,989	21,559	110	257	337	229	47		981	25	22,565
Walk/Other Person Trips															
Superdistrict 1	771	1,656	1,592	1,808	1,856	7,683	12	154	174	118	14		472	11	8,166
Superdistrict 2	176	542	571	753	968	3,011	1	46	59	40	4		150	5	3,166
Superdistrict 3	617	327	465	371	381	2,161	2	32	51	35	3		122	2	2,285
Superdistrict 4	176	221	201	284	365	1,247	1	17	21	14	2		55	2	1,303
East Bay	102	392	882	499	642	2,516	2	30	91	62	3		188	3	2,707
North Bay	-	115	374	157	202	848	0	10	38	26	1		75	1	925
South Bay	205	136	201	182	233	956	0	11	21	14	1		47	1	1,005
Outside of Bay Area	-	943	4,376	1,361	1,750	8,430	0	84	450	307	8		848	8	9,286
All Origins	2,046	4,332	8,663	5,415	6,397	26,853	18	385	903	616	36		1,957	33	28,843
Total Person Trips															
Superdistrict 1	1,879	2,543	2,386	2,601	2,670	12,077	29	220	260	178	21		708	16	12,801
Superdistrict 2	428	2,473	1,562	2,365	3,041	9,868	40	140	161	109	20		470	14	10,353
Superdistrict 3	1,503	1,965	1,064	1,582	1,624	7,738	33	130	116	79	16		374	10	8,121
Superdistrict 4	428	1,488	712	1,209	1,555	5,393	27	70	73	50	12		233	7	5,633
East Bay	1,091	2,641	2,452	1,933	2,485	10,603	53	110	252	172	22		609	12	11,223
North Bay	102	944	1,080	851	1,094	4,071	17	50	111	76	8		261	5	4,337
South Bay	2,591	1,684	1,767	1,230	1,582	8,853	35	70	182	124	14		424	7	9,285
Outside of Bay Area	-	2,463	8,030	3,414	4,389	18,297	51	210	825	563	20		1,669	21	19,986
All Origins	8,021	16,201	19,053	15,185	18,440	76,899	286	1,000	1,980	1,350	133		4,749	92	81,740
Vehicle Trips															
Superdistrict 1	345	176	266	150	154	1,090	9	12	29	20	1		71	1	1,162
Superdistrict 2	78	474	273	374	481	1,682	16	22	28	19	4		89	2	1,773
Superdistrict 3	276	439	173	269	276	1,432	11	21	19	13	4		68	2	1,501
Superdistrict 4	78	365	165	270	348	1,226	9	15	17	12	3		56	2	1,284
East Bay	400	407	389	365	470	2,032	9	21	40	27	3		101	2	2,135
North Bay	62	328	225	314	404	1,332	7	19	23	16	3		67	2	1,402
South Bay	985	614	485	320	411	2,815	18	17	50	34	5		124	2	2,941
Outside of Bay Area	-	302	955	389	500	2,147	48	24	98	67	2		240	2	2,389
All Origins	2,224	3,104	2,932	2,452	3,044	13,755	128	151	304	207	25		816	15	14,586

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	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Weekday AM Peak Hour															
Auto Person Trips															
Superdistrict 1	84	20	3	3	49	158	1	-	1	1	0		2	0	161
Superdistrict 2	12	71	23	11	144	261	2	-	1	2	1		5	1	266
Superdistrict 3	67	66	11	11	89	244	2	-	2	2	1		7	0	251
Superdistrict 4	12	68	23	12	98	213	1	-	2	2	1		5	0	219
East Bay	63	128	44	22	172	429	3	-	3	3	1		10	1	439
North Bay	10	51	16	8	114	199	1	-	1	1	0		4	0	203
South Bay	155	118	41	20	139	474	2	-	3	3	1		9	1	484
Outside of Bay Area	-	31	4	2	234	271	3	-	0	0	0		4	1	276
All Origins	404	553	166	89	1,038	2,249	14	-	12	14	5		45	4	2,298
Transit Person Trips															
Superdistrict 1	160	46	8	8	66	287	1	-	1	2	0		5	0	291
Superdistrict 2	24	135	47	23	163	393	3	-	3	3	1		10	1	404
Superdistrict 3	128	87	15	15	86	331	2	-	3	3	1		9	0	341
Superdistrict 4	24	85	30	15	78	232	2	-	2	2	1		6	0	239
East Bay	78	172	64	31	101	446	4	-	4	4	1		14	0	460
North Bay	5	37	14	7	18	81	1	-	1	1	0		3	0	84
South Bay	184	80	29	14	61	368	2	-	2	2	1		6	0	374
Outside of Bay Area	-	25	4	2	157	189	0	-	0	0	0		1	1	191
All Origins	602	667	211	116	731	2,327	14	-	17	18	5		54	3	2,384
Walk/Other Person Trips															
Superdistrict 1	170	81	11	11	261	533	1	-	2	2	1		6	1	541
Superdistrict 2	25	17	2	1	143	188	0	-	0	0	0		0	1	189
Superdistrict 3	136	14	2	2	54	207	0	-	0	0	0		1	0	208
Superdistrict 4	25	10	2	1	54	92	0	-	0	0	0		0	0	93
East Bay	15	18	4	2	95	134	0	-	0	0	0		1	0	135
North Bay	-	4	1	0	30	35	0	-	0	0	0		0	0	35
South Bay	29	5	1	0	35	70	0	-	0	0	0		0	0	71
Outside of Bay Area	-	23	0	0	259	282	0	-	0	0	0		0	1	284
All Origins	399	174	22	17	931	1,543	2	-	3	3	1		10	4	1,557
Total Person Trips															
Superdistrict 1	414	147	21	21	376	978	3	-	4	4	1		13	2	993
Superdistrict 2	61	223	72	35	450	842	4	-	5	5	2		16	2	859
Superdistrict 3	331	167	28	28	228	782	4	-	5	6	1		17	1	800
Superdistrict 4	61	163	56	28	230	538	3	-	4	4	1		12	1	551
East Bay	155	318	112	55	368	1,009	6	-	7	8	3		24	2	1,034
North Bay	15	92	30	15	162	314	2	-	2	2	1		7	1	321
South Bay	369	203	71	35	234	913	4	-	5	5	2		15	1	929
Outside of Bay Area	-	79	9	4	650	742	3	-	1	1	1		5	3	750
All Origins	1,405	1,393	399	222	2,700	6,118	30	-	32	35	11		109	12	6,239
Vehicle Trips															
Superdistrict 1	76	14	2	2	22	116	1	-	0	0	0		2	0	118
Superdistrict 2	11	53	18	9	71	164	1	-	1	-	0		4	0	168
Superdistrict 3	61	48	9	9	39	164	1	-	2	2	0		5	0	170
Superdistrict 4	11	44	15	8	51	129	1	-	1	1	0		3	0	132
East Bay	57	40	13	7	70	186	1	-	1	1	0		3	0	189
North Bay	9	29	9	5	60	112	1	-	1	1	0		2	0	115
South Bay	140	92	34	17	61	343	2	-	2	2	1		7	0	350
Outside of Bay Area	-	14	3	1	74	92	3	-	0	0	0		3	0	96
All Origins	365	333	104	57	448	1,306	11	-	8	8	3		30	2	1,338

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EXTERNAL ONLY TRIPS AFTER ADJUSTMENT	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Weekday PM Peak Hour															
Auto Person Trips															
Superdistrict 1	66	10	17	42	47	181	1	4	6	3	0		14	0	196
Superdistrict 2	15	67	40	102	131	355	2	7	6	3	1		18	0	373
Superdistrict 3	53	33	13	76	85	261	2	8	5	2	0		17	0	278
Superdistrict 4	15	65	22	69	89	261	1	4	3	2	1		11	0	273
East Bay	77	122	84	122	157	562	3	8	13	6	1		30	0	593
North Bay	12	49	45	81	104	290	1	5	7	3	0		17	0	307
South Bay	189	113	116	99	127	643	2	6	18	8	1		36	0	679
Outside of Bay Area	-	30	268	166	213	676	3	11	41	19	0		74	1	751
All Origins	426	489	605	756	952	3,229	14	54	100	45	4		217	3	3,449
Transit Person Trips															
Superdistrict 1	126	23	14	57	63	283	1	6	5	2	0		15	0	298
Superdistrict 2	29	129	50	116	149	472	3	7	8	3	1		22	0	495
Superdistrict 3	100	44	10	74	83	311	2	7	4	2	0		15	0	327
Superdistrict 4	29	81	24	56	72	260	2	3	4	2	1		11	0	272
East Bay	94	164	57	72	92	479	4	4	9	4	1		22	0	501
North Bay	6	35	18	13	17	89	1	1	3	1	0		6	0	95
South Bay	224	76	25	43	55	424	2	3	4	2	1		11	0	434
Outside of Bay Area	-	24	61	111	143	340	0	8	9	4	0		22	0	362
All Origins	608	577	260	541	674	2,659	14	39	45	21	5		123	2	2,785
Walk/Other Person Trips															
Superdistrict 1	133	41	63	224	251	713	1	23	23	11	0		59	1	773
Superdistrict 2	30	16	51	102	131	331	0	7	8	4	0		19	0	350
Superdistrict 3	107	7	18	46	51	230	0	5	7	3	0		15	0	245
Superdistrict 4	30	10	18	38	49	146	0	3	3	1	0		7	0	153
East Bay	18	18	79	67	87	269	0	5	12	6	0		23	0	292
North Bay	-	4	34	21	27	86	0	1	5	2	0		9	0	95
South Bay	35	5	18	25	32	115	0	2	3	1	0		6	0	120
Outside of Bay Area	-	22	394	184	236	836	0	13	61	28	0		101	1	937
All Origins	354	123	676	707	864	2,724	2	58	122	55	1		238	3	2,965
Total Person Trips															
Superdistrict 1	325	74	95	323	360	1,177	3	33	35	16	1		88	1	1,267
Superdistrict 2	74	213	141	319	410	1,157	4	21	22	10	2		59	1	1,217
Superdistrict 3	260	84	42	196	219	802	4	20	16	7	1		47	1	850
Superdistrict 4	74	156	64	163	210	667	3	11	10	4	1		29	1	697
East Bay	189	304	221	261	336	1,310	6	17	34	15	2		75	1	1,386
North Bay	18	88	97	115	148	465	2	8	15	7	1		32	0	498
South Bay	448	194	159	166	214	1,181	4	11	25	11	2		52	1	1,233
Outside of Bay Area	-	75	723	461	593	1,851	3	32	111	51	1		197	2	2,050
All Origins	1,388	1,189	1,541	2,004	2,489	8,612	30	150	267	122	10		579	8	9,199
Vehicle Trips															
Superdistrict 1	60	7	11	19	21	117	1	2	4	2	0		8	0	125
Superdistrict 2	14	51	25	51	65	205	1	3	4	2	0		11	0	216
Superdistrict 3	48	24	7	33	37	149	1	3	3	1	0		8	0	158
Superdistrict 4	14	42	15	36	47	153	1	2	2	1	0		7	0	160
East Bay	69	38	35	49	63	255	1	3	5	2	0		12	0	268
North Bay	11	28	20	42	55	156	1	3	3	1	0		8	0	164
South Bay	170	87	44	43	56	400	2	3	7	3	1		15	0	415
Outside of Bay Area	-	13	86	53	68	219	3	4	13	6	0		26	0	245
All Origins	385	291	242	326	411	1,654	11	23	41	19	2		95	1	1,751

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EXTERNAL VEHICLE TRIPS AFTER ADJUSTMENT	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Weekday AM Peak Hour															
Inbound															
Superdistrict 1	25	13	2	2	11	54	0	-	0	0	0	-	1	0	55
Superdistrict 2	4	51	18	9	38	120	1	-	1	-	0	-	3	0	123
Superdistrict 3	20	46	9	9	21	105	1	-	2	2	0	-	5	0	110
Superdistrict 4	4	41	15	8	28	96	1	-	1	1	0	-	3	0	99
East Bay	19	37	13	7	37	112	1	-	1	1	0	-	3	0	115
North Bay	3	27	9	5	31	75	1	-	1	1	0	-	2	0	77
South Bay	47	89	34	17	35	221	2	-	2	2	1	-	7	0	228
Outside of Bay Area	-	11	3	1	37	52	1	-	0	0	0	-	2	0	54
All Origins	122	315	104	57	238	835	7	-	8	8	3	-	25	1	861
Outbound															
Superdistrict 1	51	1	-	-	10	62	0	-	-	-	0	-	0	0	62
Superdistrict 2	7	3	-	-	33	44	0	-	-	-	0	-	0	0	44
Superdistrict 3	40	2	-	-	18	60	0	-	-	-	0	-	0	0	60
Superdistrict 4	7	2	-	-	24	33	0	-	-	-	0	-	0	0	34
East Bay	38	3	-	-	33	74	0	-	-	-	0	-	0	0	74
North Bay	6	2	-	-	29	37	0	-	-	-	0	-	0	0	37
South Bay	93	2	-	-	26	122	0	-	-	-	0	-	0	0	122
Outside of Bay Area	-	3	-	-	37	40	1	-	-	-	0	-	1	0	41
All Origins	243	18	-	-	210	471	3	-	-	-	0	-	3	1	476
Total															
Superdistrict 1	76	14	2	2	22	116	1	-	0	0	0	-	2	0	118
Superdistrict 2	11	53	18	9	71	164	1	-	1	-	0	-	3	0	167
Superdistrict 3	61	48	9	9	39	164	1	-	2	2	0	-	5	0	170
Superdistrict 4	11	44	15	8	51	129	1	-	1	1	0	-	3	0	132
East Bay	57	40	13	7	70	186	1	-	1	1	0	-	3	0	189
North Bay	9	29	9	5	60	112	1	-	1	1	0	-	2	0	115
South Bay	140	92	34	17	61	343	2	-	2	2	1	-	7	0	350
Outside of Bay Area	-	14	3	1	74	92	3	-	0	0	0	-	3	0	96
All Origins	365	333	104	57	448	1,306	11	-	8	8	3	-	29	2	1,337
Weekday PM Peak Hour															
Inbound															
Superdistrict 1	40	1	5	9	10	64	0	1	2	1	0	-	4	0	68
Superdistrict 2	9	3	11	24	30	77	0	2	2	1	0	-	4	0	81
Superdistrict 3	32	1	3	15	17	68	0	2	1	0	0	-	3	0	71
Superdistrict 4	9	2	6	17	22	56	0	1	1	0	0	-	3	0	59
East Bay	46	3	16	23	30	119	0	2	3	1	0	-	6	0	125
North Bay	7	2	9	20	26	65	0	1	1	1	0	-	4	0	69
South Bay	114	2	19	19	24	177	0	1	3	1	0	-	6	0	183
Outside of Bay Area	-	10	43	27	34	114	1	2	7	3	0	-	13	0	127
All Origins	256	23	114	153	193	740	3	11	19	9	0	-	43	1	783
Outbound															
Superdistrict 1	20	6	5	10	11	52	0	1	2	1	0	-	4	0	57
Superdistrict 2	5	48	14	27	35	128	1	2	2	1	0	-	6	0	134
Superdistrict 3	16	23	4	18	20	82	1	2	1	1	0	-	5	0	87
Superdistrict 4	5	40	9	20	25	98	1	1	1	1	0	-	4	0	102
East Bay	23	35	19	26	33	136	1	2	3	1	0	-	7	0	143
North Bay	4	26	11	22	28	91	1	1	2	1	0	-	5	0	95
South Bay	57	85	24	25	32	223	2	1	4	2	1	-	9	0	232
Outside of Bay Area	-	3	43	26	33	105	1	2	7	3	0	-	13	0	118
All Origins	128	267	128	173	218	915	7	11	22	10	2	-	52	1	968
Total															
Superdistrict 1	60	7	11	19	21	117	1	2	4	2	0	-	8	0	125
Superdistrict 2	14	51	25	51	65	205	1	3	4	2	0	-	11	0	216
Superdistrict 3	48	24	7	33	37	149	1	3	3	1	0	-	8	0	158
Superdistrict 4	14	42	15	36	47	153	1	2	2	1	0	-	7	0	160
East Bay	69	38	35	49	63	255	1	3	5	2	0	-	12	0	268
North Bay	11	28	20	42	55	156	1	3	3	1	0	-	8	0	164
South Bay	170	87	44	43	56	400	2	3	7	3	1	-	15	0	415
Outside of Bay Area	-	13	86	53	68	219	3	4	13	6	0	-	26	0	245
All Origins	385	291	242	326	411	1,654	11	23	41	19	2	-	95	1	1,751

Mission Rock Mixed-Use Project
REVISED REDUCED INTENSITY ALTERNATIVE

PARKING DEMAND	SEAWALL LOT 337						PIER 48							China Basin Park Open Space	TOTAL DEVELOPMENT
	Residential	Office	General Retail	Quality Restaurant	Quick Service Restaurant	Subtotal SWL 337	Brewery / Distillery	Brewery Retail Exhibition	Brewery Quality Restaurant	Mezzanine Retail	Mezzanine Office	Mezzanine Production	Subtotal Pier 48		
Midday Period (Noon to 2 PM) Peak Parking Demand															
SHORT-TERM DEMAND															
Daily visitors vehicle trips		1,628	2,753	2,299	2,858	9,537		151	285	195	13		645	14	10,195
Turnover rate (vehicles per space)		5.5	5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5		5.4	5.5	5.5
Peak short-term demand (spaces)		148	251	209	260	868		14	26	18	2		60	2	930
% of peak demand during period (ULI)		100%	100%	75%	100%	94%		100%	100%	100%	100%		100%	100%	94%
Total short-term demand (spaces)		148	251	157	260	816		14	26	18	2		60	2	878
LONG-TERM DEMAND															
Residential Demand															
Peak parking demand (spaces per unit)	1.50														
Peak parking demand (spaces)	1,851					1,851							-		1,851
% of peak demand during period (SF Guidelines)	80%					80%							0%		80%
Subtotal long-term demand (spaces)	1,481					1,481							-		1,481
Employee Demand															
Average gsf per employee		276	350	350	240				350	350	276			10	
Number of daytime employees		3,500	408	241	151	4,300	75		31	29	29		164	1	4,464
% of employees who drive		39%	40%	40%	40%	40%	39%		40%	40%	39%		40%	40%	40%
Number of employees who drive		1,381	162	95	60	1,699	30		12	11	11		65	0	1,764
Average employee vehicle occupancy		1.56	1.60	1.57	1.59	1.57	1.56		1.59	1.59	1.56		1.47	1.57	1.56
Peak parking demand (spaces)		884	102	61	38	1,085	20		8	8	8		44	1	1,130
% of peak demand during period (ULI)		100%	100%	90%	100%	99%	100%		90%	100%	100%		100%	100%	99%
Subtotal long-term demand (spaces)		884	102	55	38	1,079	20		8	8	8		44	1	1,124
Total long-term demand (spaces)	1,481	884	102	55	38	2,560	20	-	8	8	8		44	1	2,605
TOTAL PARKING DEMAND (spaces)	1,481	1,032	353	212	298	3,376	20	14	34	26	10		104	3	3,483
Evening Period (7 PM to 9 PM) Peak Parking Demand - NO SF GIANTS GAME															
SHORT-TERM DEMAND															
Daily visitors vehicle trips		1,628	2,753	2,299	2,858	9,537		151	285	195	13		645	14	10,195
Turnover rate (vehicles per space)		5.5	5.5	5.5	5.5	5.5		5.5	5.5	5.5	5.5		5.4	5.5	5.5
Peak short-term demand (spaces)		148	251	209	260	868		14	26	18	2		60	2	930
% of peak demand during period (ULI)		5%	90%	100%	80%	75%		90%	100%	90%	5%		95%	50%	76%
Total short-term demand (spaces)		8	226	209	208	651		13	26	17	1		57	1	709
LONG-TERM DEMAND															
Residential Demand															
Peak parking demand (spaces per unit)	1.50														
Peak parking demand (spaces)	1,851					1,851							-		1,851
% of peak demand during period (SF Guidelines)	100%					100%							0%		100%
Subtotal long-term demand (spaces)	1,851					1,851							-		1,851
Employee Demand															
Average gsf per employee		276	350	350	240				350	350	276			10	
Number of daytime employees		3,500	408	241	151	4,300	75		31	29	29		164	1	4,464
% of employees who drive		39%	40%	40%	40%	40%	39%		40%	40%	39%		40%	40%	40%
Number of employees who drive		1,381	162	95	60	1,699	30		12	11	11		65	0	1,764
Average employee vehicle occupancy		1.56	1.60	1.57	1.59	1.57	1.56		1.59	1.59	1.56		1.47	1.57	1.56
Peak parking demand (spaces)		884	102	61	38	1,085	20		8	8	8		44	1	1,130
% of peak demand during period (ULI)		10%	100%	100%	90%	26%	100%		100%	100%	10%		84%	100%	29%
Subtotal long-term demand (spaces)		89	102	61	35	287	20		8	8	1		37	1	325
Total long-term demand (spaces)	1,851	89	102	61	35	2,138	20	-	8	8	1		37	1	2,176
TOTAL PARKING DEMAND (spaces)	1,851	97	328	270	243	2,789	20	13	34	25	2		94	2	2,885

Appendix 12-2
Alternatives – Air Quality Technical Data

APPENDIX 12-2: ALTERNATIVES - AIR QUALITY TECHNICAL DATA

INTRODUCTION

This Appendix presents the data used to calculate criteria air pollutant emissions and health risks, along with the modeling results, associated with the following alternatives:

1. Alternative B: Reduced Intensity Alternative
2. Alternative C: No Change To Pier 48 Alternative

The analysis is conducted consistent with the analysis in the Mission Rock Air Quality Technical Report.

ALTERNATIVE B: REDUCED INTENSITY ALTERNATIVE

ACTIVITY DATA

The table numbers below match the table numbers in the Air Quality Technical Report for comparison purposes.

TABLE 1. DWELLING UNITS AND BUILDING SQUARE FOOTAGES BY OPERATIONAL LAND USE TYPE

Land Use Type	Dwelling Units (residential) and Square Footage (nonresidential)			
	Area 1 ^a	Area 2 ^a	Area 3 ^a	Area 4 ^a
Residential (dwelling units)	205	233	448	348
Residential (square footage)	209,820	238,828	458,832	356,232
Commercial - office	143,698	568,102	126,175	130,814
Commercial – general/retail	38,723	38,520	27,758	32,758
Sit-down Restaurant	27,106	26,964	19,431	22,931
Quick Service Restaurant	11,617	11,556	8,327	9,827
Parking Structure	0	837,230	0	0
Underground Parking	0	0	0	0
China Basin Park	218,657	0	0	0
Mission Rock Square	0	0	0	0
Channel Plaza	0	0	0	21,551
Pier 48 - Brewery/ Distillery	190,500	0	0	0
Pier 48 - Brewery Retail / Exhibition	11,000	0	0	0
Pier 48 - Brewery Restaurant	11,000	0	0	0

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF

Notes:

- a. The project site has been divided into four areas, with four construction phases occurring per area. Each area would consist of two to three development blocks and associated area for streets and open space. Table 2 summarizes the proposed development for each area.

TABLE 2. PROPOSED DEVELOPMENT BY AREA AND OVERALL PROJECT PHASING

Area	Proposed Development	Years of Construction	Operational Date	Total Number of Work Days	Total Truck Trips
Area 1	Block A Block G China Basin Park Mission Rock Square Pier 48	2017–2020	3/31/2020	783	13,846
Area 2	Block B Block C Block D (including Garage)	2018–2021	4/1/2021	783	14,879
Area 3	Block E Block F Block K Parking Garage	2019–2022	4/1/2022	783	15,016
Area 4	Block H Block I Block J Channel Plaza	2020–2023	4/5/2023	785	10,228

Sources:

1. Mesikepp, Sam. Hathaway Dinwiddie Construction Company. August 31, 2016—email communication with ICF
2. Hall, Kristen. Urban Designer III, Associate. Perkins+Will. December 2, 2015—email communication with ICF.

Notes:

Total truck trips include excavation fill removal.

TABLE 3. CONSTRUCTION EQUIPMENT ACTIVITY

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/Day ^a	Horsepower	Average Hours/Day
Area 1 (Building A, G, K, China Basin Park, Mission Rock Square, Pier 48)					
Demo + Rough Grade	Loader/Diesel	Tractors/Loaders/Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	2	400	8
	Jet Grout Rig/Diesel	Bore/Drill	2	200	4

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Rigs				
	Jet Grout Pump/Diesel	Pumps	2	50	4
	Generator for Jet Grout Rig/Diesel	Generator Sets	1	400	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	2	330	2
	Water Truck/Diesel	n/a ^b	1	330	-
	Dump Truck/Diesel	n/a ^b	4	325	4
Infrastructure	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	2	250	4
	Trencher/Diesel	Trenchers	2	41	4
Foundations + Building	Excavator/Diesel	Excavators	2	385	1
	Dump Truck/Diesel	n/a ^b	2	325	1
	Crane/Diesel	Cranes	2	335	4
	Drill/Diesel	Bore/Drill Rigs	2	225	1
	Forklift/Diesel	Forklifts	2	210	2
	Concrete truck/Diesel	n/a ^b	2	325	2
	Water Truck/Diesel	n/a ^b	2	330	2
	Concrete pump/Diesel	Pumps	2	73	2
	Welder/Diesel	Welders	4	35	2
	Air compressor/Diesel	Air Compressors	2	150	5
	Air compressor/Diesel	Air Compressors	4	49	5
	High-lift forklift/Diesel	Forklifts	2	120	2
	Pile hammer/Diesel	Bore/Drill Rigs	2	130	2
	Carrydeck crane/Diesel	Cranes	1	110	4
	45-ton grove crane/Diesel	Cranes	1	215	4
	Boom truck crane/Diesel	Cranes	1	250	4
	CX80 excavator/Diesel	Excavators	1	53	1
	Rubber-tired loader/Diesel	Rubber Tired Loaders	1	260	1

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Temporary generators for welding, metal decking, miscellaneous trades/Diesel	Generator Sets	8	10	4
	<i>In-water equipment for Pier 48 seismic upgrade:</i>				
	<u>DB Alameda derrick barge</u>				
	Draw-works engine (crane)	Cranes	1	400	4
	Genset engine – main house	n/a ^c	1	400	4
	Deck air compressor	Air Compressors	1	49	4
	Anchor / spud winch – Engine A	Other Material Handling Eq.	1	117	4
	Anchor / spud winch – Engine B	Other Material Handling Eq.	1	117	4
	Deck generator	Generator Sets	1	274	8
	<u>Challenger crane barge</u>				
	Draw-works engine (crane)	Cranes	1	364	4
	Deck generator	Generator Sets	1	129	8
	Air compressor	Air Compressors	1	49	4
	Spud winch	Other Material Handling Eq.	1	120	4
	APE 200 vibratory hammer	Bore/Drill Rigs	1	595	4
	APE 600 vibratory hammer	Bore/Drill Rigs	1	1,200	2
	D36 impact hammer, 89000 lb-ft	Bore/Drill Rigs	1	125	4
	Work boat	n/a ^c	1	50	8
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Berm Machine/Diesel	Surfacing Equipment	1	44	1
	Dump truck/Diesel	n/a b	1	325	4
	Pickup/Diesel	n/a b	2	250	8
Area 2 (Buildings B, C & D)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	2	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	1	330	4
	Water Truck/Diesel	n/a b	1	330	4
Infrastructure	Dump Truck/Diesel	n/a b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Excavator/Diesel	Excavators	3	385	1
	Dump Truck/Diesel	n/a b	3	325	1
	Crane/Diesel	Cranes	1	335	4
	Crane/Electric	n/a ^d	2	150	4
	Drill/Diesel	Bore/Drill Rigs	1	225	1
	Forklift/Diesel	Forklifts	1	210	2
	Concrete truck/Diesel	n/a ^b	4	325	4
	Water Truck/Diesel	n/a ^b	4	330	4
	Concrete Pump/Diesel	Pumps	4	73	4
	Welder/Diesel	Welders	2	35	2
	Air compressor/Diesel	Air Compressors	2	150	5
	High-lift forklift/Diesel	Forklifts	2	120	2
	Pile hammer/Diesel	Bore/Drill Rigs	4	130	2

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Temporary generators for welding, metal decking, miscellaneous trades / Diesel	Generator Sets	8	10	4
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8
Area 3 (Buildings E, F, & K, Underground Parking)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	1	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	1	330	4
	Water Truck/Diesel	n/a ^b	1	330	4
Infrastructure	Dump Truck/Diesel	n/a ^b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Dump Truck/Diesel	n/a ^b	3	325	1
	Excavator	Excavators	3	385	1
	Crane/Diesel	Cranes	2	335	4
	Crane/Electric ^a	n/a ^d	1	150	4
	Drill/Diesel	Bore/Drill Rigs	3	225	1
	Forklift/Diesel	Forklifts	3	210	2
	Concrete truck/Diesel	n/a ^b	3	325	2
	Water Truck/Diesel	n/a ^b	3	330	2
	Concrete Pump/Diesel	Pumps	3	73	2
	Welder/Diesel	Welders	6	35	2
	Air compressor/Diesel	Air	3	150	5

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
Compressors					
	High-lift forklift/Diesel	Forklifts	3	120	2
	Pile hammer/Diesel	Bore/Drill	3	130	2
Rigs					
	Temporary generators for welding, metal decking, miscellaneous trades / Diesel	Generator Sets	6	10	4
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8
Area 4 (Buildings H, I & J, Channel Plaza)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	1	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	1	330	4
	Water Truck/Diesel	n/a ^b	1	330	4
Infrastructure	Dump Truck/Diesel	n/a ^b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Excavator/Diesel	Excavators	3	385	1
	Dump Truck/Diesel	n/a ^b	3	325	1
	Crane/Diesel	Cranes	3	335	4
	Drill/Diesel	Bore/Drill Rigs	1	225	1
	Forklift/Diesel	Forklifts	1	210	2
	Concrete truck/Diesel	n/a ^b	3	325	2
	Water Truck/Diesel	n/a ^b	3	330	2
	Concrete Pump/Diesel	Pumps	3	73	2

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Welder/Diesel	Welders	2	35	2
	Air compressor/Diesel	Air Compressors	2	150	5
	High-lift forklift/Diesel	Forklifts	2	120	2
	Pile Hammer/ Diesel	Bore/Drill Rigs	3	130	2
	Temporary generators for welding, metal decking, miscellaneous trades / Diesel	Generator Sets	5	10	4
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Berm Machine/Diesel	Surfacing Equipment	1	44	1
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8

Source:

Mesikepp, Sam. Hathaway Dinwiddie Construction Company. August 31, 2016—email communication with ICF.

Notes:

- All equipment assumed to operate each day throughout the entire phase duration.
- On-road trucks were modeled based on anticipated daily trips and estimated vehicle miles traveled. See Table 6 for a summary of on-road assumptions used in this analysis.
- In-water equipment was modeled outside of CalEEMod. See Table 5 for a summary of in-water assumptions used in this analysis.
- Electricity use results in indirect criteria pollutant, toxic air contaminant (TAC), and greenhouse gas (GHG) emissions at the applicable power plant, but the Air Quality Technical Report does not evaluate these offsite indirect emissions. Therefore, electric equipment was not included in the CalEEMod modeling or the impact analysis.

Abbreviations:

CalEEMod: **C**ALifornia Emissions Estimator **M**ODEl

Eq.: Equipment

TABLE 4. HAULING TRUCK TRIPS AND WORKER TRIPS

Area and Phase	Haul/ Vendor Trips ^a		Worker Trips ^b		Soil Moved (cubic yards)		
	Daily	Total ^c	Daily	Total ^c	Import	Export	Balance
Area 1 (Building A, G, China Basin Park, Mission Rock Square, Pier 48)							
Demo + Rough Grade	58	3,461	100	6,000	27,664	n/a	21,000
Infrastructure	5	1,731	80	20,800	-	-	n/a
Foundations + Buildings	10	6,923	490	284,200	-	5,075	n/a
Paving + Landscape	4	1,731	130	10,790	-	-	-
Area 2 (Buildings B, C & D)							
Demo + Rough Grade	50	2,976	60	3,600	13,570	n/a	33,228
Infrastructure	1	372	60	15,600	-	-	n/a
Foundations + Buildings	18	11,159	820	369,000	-	12,000	n/a
Paving + Landscape	2	372	80	17,040	-	-	-
Area 3 (Buildings E, F, & K, Underground Parking)							
Demo + Rough Grade	6	375	60	3,600	9,098	n/a	n/a
Infrastructure	1	375	60	15,600	-	-	n/a
Foundations + Buildings	29	13,891	590	295,000	-	4,325	n/a
Paving + Landscape	1	375	60	9,780	-	-	-
Area 4 (Buildings H, I & J, Channel Plaza)							
Demo + Rough Grade	4	256	50	3,000	10,156	n/a	n/a
Infrastructure	1	256	50	13,000	-	=	n/a
Foundations + Buildings	19	9,102	670	388,600	-	7,400	n/a
Paving + Landscape	2	614	80	6,800	-	-	-

Source:

Mesikepp, Sam. Hathaway Dinwiddie Construction Company. August 31, 2016—email communication with ICF

Notes:

- Represents one-way truck trips. The average one-way trip length is 20.6 miles, which is based on anticipated subcontractor delivery locations. Specifically, it was assumed that 15% of deliveries would originate from Brisbane and South San Francisco, 50% from the South Bay, 7.5% from the North Bay, 10% from the East Bay, and 2.5% from Southern California or the Pacific Northwest.
- Represents one-way worker trips. The average one-way trip length is 20.4 miles.
- Total trips account for variation in daily trips and represent total trips for each area and phase.

TABLE 5. ARCHITECTURAL COATING SQUARE FOOTAGE

Area	Residential Floor Area (ft ²)	Nonresidential Floor Area (ft ²) ^a	Building Surface Area Coated (ft ²)			
			Residential		Nonresidential	
			Interior ^b	Exterior ^c	Interior ^d	Exterior ^e
Area 1	209,820	433,644	424,886	141,629	650,466	216,822
Area 2	238,828	645,142	483,627	161,209	967,713	322,571
Area 3	458,832	181,691	929,135	309,712	272,537	90,846
Area 4	356,232	196,330	721,370	240,457	294,495	98,165

Sources:

1. ENVIRON International Corporation and the California Air Districts. 2013. CalEEMod User's Guide. Version 2013.2. Appendix A: Calculation Details for CalEEMod. Prepared for the California Air Pollution Control Officers Association. July. Available: <<http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixa.pdf?sfvrsn=2>>. Accessed: October 12, 2015.
2. Mesikepp, Sam. Hathaway Dinwiddie Construction Company. August 31, 2016—email communication with ICF.
3. Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF

Notes:

- a. Excludes parking components because they would not require architectural coatings.
- b. Residential interior coated area = total residential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for residential painting equals 2.7 times the floor square footage, and that 75% of the interior surface area is painted. Accordingly, the equation becomes total residential floor area * 2.7 * 75%. The default values are described on page A-16 of the CalEEMod User Guide.
- c. Residential exterior coated area = total residential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for residential painting equals 2.7 times the floor square footage, and that 25% of the exterior surface area is painted. Accordingly, the equation becomes total residential floor area * 2.7 * 25%.
- d. Nonresidential interior coated area = total nonresidential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for nonresidential painting equals 2.0 times the floor square footage, and that 75% of the interior surface area is painted. Accordingly, the equation becomes total nonresidential floor area * 2.0 * 75%.
- e. Nonresidential exterior coated area = total nonresidential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for nonresidential painting equals 2.0 times the floor square footage, and that 25% of the exterior surface area is painted. Accordingly, the equation becomes total nonresidential floor area * 2.0 * 25%.

Abbreviations:CalEEMod: CALifornia Emissions Estimator **MO**delft²: square feet

TABLE 6. CONSUMER PRODUCT SQUARE FOOTAGE

Year	Total Floor Area (ft ²) ^a
2020	643,464
2021	2,364,664
2022	3,005,187
2023	3,557,749
2024	3,557,749

Sources:

Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF.

Notes:

- a. Total floor area for consumer product use is based on the total square footage presented in Table 1 for all land use types except the following: Parking Structure, Underground Parking, China Basin Park, Mission Rock Square, Channel Plaza

Abbreviations:

ft²: square feet

TABLE 7. DAILY TRIP RATES BY LAND USE TYPE

Land Use Type	CalEEMod Land Use Type	Daily Auto Trip Rates ^a	Daily Truck Trip Rates ^b	Unit
Residential	Apartments High Rise	1.8	0.03	/DU
Commercial - office	General Office Building	3.0	0.21	/1,000sf
Commercial – general/retail	Strip Mall	22.1	0.22	/1,000sf
Sit-down Restaurant	High Turnover (Sit Down Restaurant)	23.0	3.60	/1,000sf
Quick Service Restaurant	Fast Food Restaurant w/o Drive Thru	73.5	3.60	/1,000sf
Parking Structure	Enclosed Parking Structure with Elevator	-	-	/1,000sf
Underground Parking	Enclosed Parking Structure with Elevator	-	-	/1,000sf
China Basin Park	Park	2.9	-	/acre
Mission Rock Square	Park	2.9	-	/acre
Channel Plaza	Park	2.9	-	/acre
Pier 48 - Brewery/ Distillery	Manufacturing	0.5	0.16	/1,000sf
Pier 48 - Brewery Retail / Exhibition	Strip Mall	22.1	-	/1,000sf
Pier 48 - Brewery Restaurant	High Turnover (Sit Down Restaurant)	23.0	-	/1,000sf

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 11, 2016—email communication with ICF

Notes:

- Represents daily automobile trips by residents and visitors to residential land uses. The daily trip rates were conservatively assumed 365 days per year. Emissions were modeled using CalEEMod.
- Represents daily truck trips visitor and deliveries to nonresidential (e.g., commercial, retail) land uses. Emissions were modeled using EMFAC2014 emission factors because CalEEMod cannot estimate emissions generated by a fleet mix of only model year 2010 or newer engines, which would be required by Measure AQ-1.2.

Abbreviations:CalEEMod = **C**ALifornia **E**missions **E**stimator **M**ODEl

DU = dwelling unit

sf: square foot

TABLE 8. DAILY TRIP LENGTHS (MILES) BY LAND USE TYPE

Land Use Type	CalEEMod Land Use Type	Automobiles	Vendor Trucks
Residential	Apartments High Rise	4.12	12.1
Commercial - office	General Office Building	6.88	12.1
Commercial – general/retail	Strip Mall	0.47	12.1
Sit-down Restaurant	High Turnover (Sit Down Restaurant)	0.49	12.1
Quick Service Restaurant	Fast Food Restaurant w/o Drive Thru	0.41	12.1
Parking Structure	Enclosed Parking Structure with Elevator	-	-
Underground Parking	Enclosed Parking Structure with Elevator	-	-
China Basin Park	Park	-	-
Mission Rock Square	Park	-	-
Channel Plaza	Park	-	-
Pier 48 - Brewery/ Distillery	Manufacturing	1.15	12.1
Pier 48 - Brewery Retail / Exhibition	Strip Mall	1.15	-
Pier 48 - Brewery Restaurant	High Turnover (Sit Down Restaurant)	1.15	-

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 11, 2016—email communication with ICF

TABLE 9. DAILY VEHICLE TRIPS BY LAND USE TYPE

Land Use Type	Daily Auto Trips	Daily Truck Trips
Residential	2,187	37
Commercial - office	2,901	203
Commercial – general/retail	2,903	29
Sit-down Restaurant	2,120	332
Quick Service Restaurant	2,902	142
Parking Structure	0	0
Underground Parking	0	0
China Basin Park	0	0
Mission Rock Square	0	0
Channel Plaza	0	0
Pier 48 - Brewery/ Distillery	90	30
Pier 48 - Brewery Retail / Exhibition	243	0
Pier 48 - Brewery Restaurant	253	0
Total	13,559	772

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 11, 2016—email communication with ICF

RESULTS TABLES

CONSTRUCTION IMPACTS

TABLE 10. AVERAGE DAILY CONSTRUCTION EMISSIONS BY CATEGORY FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	Off-road Equipment	1.8	19.1	0.8	0.8
	On-road Truck Travel	0.2	5.8	<0.1	<0.1
	On-road Truck Idling	<0.1	0.2	<0.1	<0.1
	Worker Commute	0.3	0.5	<0.1	<0.1
	Fugitive ROG	0.0	0.0	0.0	0.0
	<i>Total</i>	<i>2.2</i>	<i>25.5</i>	<i>0.9</i>	<i>0.8</i>
2018	Off-road Equipment	11.5	103.8	5.0	4.8
	On-road Truck Travel	0.3	8.6	<0.1	<0.1
	On-road Truck Idling	<0.1	0.3	<0.1	<0.1
	Worker Commute	2.0	3.6	<0.1	<0.1
	Fugitive ROG	12.7	0.0	0.0	0.0
	<i>Total</i>	<i>26.5</i>	<i>116.3</i>	<i>5.1</i>	<i>4.9</i>
2019	Off-road Equipment	13.2	116.4	5.6	5.4
	On-road Truck Travel	0.4	12.4	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	4.4	8.2	0.2	0.2
	Fugitive ROG	35.0	0.0	0.0	0.0
	<i>Total</i>	<i>53.0</i>	<i>137.3</i>	<i>5.9</i>	<i>5.6</i>
2020	Off-road Equipment	9.4	82.4	4.0	3.9
	On-road Truck Travel	0.5	16.1	<0.1	<0.1
	On-road Truck Idling	<0.1	0.5	<0.1	<0.1
	Worker Commute	4.4	8.0	0.2	0.2
	Fugitive ROG	36.4	0.0	0.0	0.0
	<i>Total</i>	<i>50.7</i>	<i>107.0</i>	<i>4.2</i>	<i>4.1</i>
2021	Off-road Equipment	5.1	44.1	2.0	1.9
	On-road Truck Travel	0.4	11.7	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	3.6	6.6	0.2	0.1
	Fugitive ROG	27.7	0.0	0.0	0.0
	<i>Total</i>	<i>36.8</i>	<i>62.8</i>	<i>2.2</i>	<i>2.1</i>
2022	Off-road Equipment	2.1	18.2	0.8	0.8

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
	On-road Truck Travel	0.1	4.2	<0.1	<0.1
	On-road Truck Idling	<0.1	0.1	<0.1	<0.1
	Worker Commute	1.8	3.3	<0.1	<0.1
	Fugitive ROG	12.2	0.0	0.0	0.0
	<i>Total</i>	<i>16.3</i>	<i>25.9</i>	<i>0.9</i>	<i>0.9</i>
2023	Off-road Equipment	0.5	4.1	0.2	0.2
	On-road Truck Travel	<0.1	1.4	<0.1	<0.1
	On-road Truck Idling	<0.1	<0.1	<0.1	<0.1
	Worker Commute	0.5	0.8	<0.1	<0.1
	Fugitive ROG	3.0	0.0	0.0	0.0
	<i>Total</i>	<i>4.0</i>	<i>6.4</i>	<i>0.2</i>	<i>0.2</i>
Significance Threshold		54	54	82	54

Source:

ENVIRON International Corporation and the California Air Districts. 2013. CalEEMod User's Guide. Version 2013.2. Appendix A: Calculation Details for CalEEMod. Prepared for the California Air Pollution Control Officers Association. July. Available: <<http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixa.pdf?sfvrsn=2>>. Accessed: October 12, 2015.

Notes:

a. Categories defined as follows:

Off-road Equipment = Operating emissions from heavy-duty equipment, such as bulldozer, cranes, and excavators. Refer to Table 3 for equipment activity assumptions. Emissions were modeled using CalEEMod.

On-road Truck Travel = Operating emissions from heavy-duty on-road trucks. Refer to Table 6 for vehicle activity assumptions. Emissions were modeled using emission factors from EMFAC2014.

On-road Truck Idling = Idling emissions from heavy-duty on-road trucks. The analysis assumed that each truck would idle 5 minutes while unloading soil or material on the project site. Emissions were modeled using idling emission factors from EMFAC2011-HD.

Worker Commute = Operating emission from employee vehicles. Refer to Table 6 vehicle activity assumptions. Emissions were modeled using CalEEMod.

Fugitive ROG = Fugitive ROG emissions from the asphalt paving and the application of architectural coatings. Refer to Section 3.2.1.6, *Asphalt Paving*, for a summary of paving assumptions and Table 8 for a summary of architectural coating assumptions. Paving emissions were modeled using emission factors from the CalEEMod User Guide, where ROG = acres paved * 2.62 pounds ROG/acre paved (ENVIRON 2013). Architectural coating emissions were modeled using CalEEMod.

Emissions over threshold levels are in **bold**

Abbreviations:

CalEEMod: CALifornia Emissions Estimator **MODEL**

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 11. SUMMARIZED AVERAGE DAILY CONSTRUCTION EMISSIONS BY ANALYSIS YEAR FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	2.2	25.5	0.9	0.8
2018	26.5	116.3	5.1	4.9
2019	53.0	137.3	5.9	5.6
2020	50.7	107.0	4.2	4.1
2021	36.8	62.8	2.2	2.1
2022	16.3	25.9	0.9	0.9
2023	4.0	6.4	0.2	0.2
2024	0.0	0.0	0.0	0.0
Significance Threshold	54	54	82	54

Source:

Refer to Table 10.

Notes:Emissions over threshold levels are in **bold**Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 12. MITIGATED AVERAGE DAILY CONSTRUCTION EMISSIONS BY CATEGORY FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	Off-road Equipment	0.4	7.0	<0.1	<0.1
	On-road Truck Travel	<0.1	2.0	<0.1	<0.1
	On-road Truck Idling	<0.1	0.2	<0.1	<0.1
	Worker Commute	0.3	0.5	<0.1	<0.1
	Fugitive ROG	0.0	0.0	0.0	0.0
	<i>Total</i>	<i>0.7</i>	<i>9.6</i>	<i><0.1</i>	<i><0.1</i>
2018	Off-road Equipment	3.0	50.4	0.8	0.8
	On-road Truck Travel	0.1	3.2	<0.1	<0.1
	On-road Truck Idling	<0.1	0.3	<0.1	<0.1
	Worker Commute	2.0	3.6	<0.1	<0.1
	Fugitive ROG	2.4	0.0	0.0	0.0
	<i>Total</i>	<i>7.6</i>	<i>57.5</i>	<i>0.9</i>	<i>0.9</i>
2019	Off-road Equipment	3.5	64.3	1.1	1.1
	On-road Truck Travel	0.2	4.9	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	4.4	8.2	0.2	0.2
	Fugitive ROG	6.7	0.0	0.0	0.0
	<i>Total</i>	<i>14.9</i>	<i>77.7</i>	<i>1.3</i>	<i>1.3</i>
2020	Off-road Equipment	2.8	48.9	0.9	0.9
	On-road Truck Travel	0.3	6.7	<0.1	<0.1
	On-road Truck Idling	<0.1	0.5	<0.1	<0.1
	Worker Commute	4.4	8.0	0.2	0.2
	Fugitive ROG	6.9	0.0	0.0	0.0
	<i>Total</i>	<i>14.4</i>	<i>64.2</i>	<i>1.1</i>	<i>1.1</i>
2021	Off-road Equipment	1.3	30.0	0.4	0.4
	On-road Truck Travel	0.2	5.2	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	3.6	6.6	0.2	0.1
	Fugitive ROG	5.3	0.0	0.0	0.0
	<i>Total</i>	<i>10.4</i>	<i>42.1</i>	<i>0.5</i>	<i>0.5</i>

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2022	Off-road Equipment	0.6	13.5	0.2	0.2
	On-road Truck Travel	<0.1	2.0	<0.1	<0.1
	On-road Truck Idling	<0.1	0.1	<0.1	<0.1
	Worker Commute	1.8	3.3	<0.1	<0.1
	Fugitive ROG	2.3	0.0	0.0	0.0
	<i>Total</i>	<i>4.9</i>	<i>18.9</i>	<i>0.2</i>	<i>0.2</i>
2023	Off-road Equipment	0.2	3.4	<0.1	<0.1
	On-road Truck Travel	<0.1	0.7	<0.1	<0.1
	On-road Truck Idling	<0.1	<0.1	<0.1	<0.1
	Worker Commute	0.5	0.8	<0.1	<0.1
	Fugitive ROG	0.6	0.0	0.0	0.0
	<i>Total</i>	<i>1.2</i>	<i>5.0</i>	<i><0.1</i>	<i><0.1</i>
Significance Threshold		54	54	82	54

Source:

ENVIRON International Corporation and the California Air Districts. 2013. CalEEMod User's Guide. Version 2013.2. Appendix A: Calculation Details for CalEEMod. Prepared for the California Air Pollution Control Officers Association. July. Available: <<http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixa.pdf?sfvrsn=2>>. Accessed: October 12, 2015.

Notes:

All table references below refer to tables in the memorandum *Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants*, October 28, 2016.

- Emissions over threshold levels are in **bold**
- Mitigated emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (Measure AQ-1.1), all haul trucks are model year 2010 or newer (Measure AQ-1.2), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-1.3), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Does not include effect of Mitigation Measure M-AQ-1.5, which requires NO_x offsets.
- Categories defined as follows:
 Off-road Equipment = Operating emissions from heavy-duty equipment, such as bulldozer, cranes, and excavators. Refer to Table 4 for equipment activity assumptions. Emissions were modeled using CalEEMod.
 On-road Truck Travel = Operating emissions from heavy-duty on-road trucks. Refer to Table 6 for vehicle activity assumptions. Emissions were modeled using emission factors from EMFAC2014.
 On-road Truck Idling = Idling emissions from heavy-duty on-road trucks. The analysis assumed that each truck would idle 5 minutes while unloading soil or material on the project site. Emissions were modeled using idling emission factors from EMFAC2011-HD.
 Worker Commute = Operating emission from employee vehicles. Refer to Table 6 vehicle activity assumptions. Emissions were modeled using CalEEMod.
 Fugitive ROG = Fugitive ROG emissions from the asphalt paving and the application of architectural coatings. Refer to Section 3.2.1.7 of the Air Quality Technical Report for a summary of paving assumptions and Table 8 for a summary of architectural coating assumptions. Paving emissions were modeled using emission factors from the CalEEMod User Guide, where ROG = acres paved * 2.62 pounds ROG/acre paved (ENVIRON 2013). Architectural coating emissions were modeled using CalEEMod.

Abbreviations:

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
ROG:	reactive organic gases				
NO _x :	nitrogen oxides				
PM10:	particulate matter less than or equal to 10 microns in diameter				
PM2.5:	particulate matter less than or equal to 2.5 microns in diameter				
lbs:	pounds				

TABLE 13. SUMMARIZED MITIGATED AVERAGE DAILY CONSTRUCTION EMISSIONS BY ANALYSIS YEAR FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	0.7	9.6	<0.1	<0.1
2018	7.6	57.5	0.9	0.9
2019	14.9	77.7	1.3	1.3
2020	14.4	64.2	1.1	1.1
2021	10.4	42.1	0.5	0.5
2022	4.9	18.9	0.2	0.2
2023	1.2	5.0	<0.1	<0.1
2024	7.6	0.0	0.0	0.0
Significance Threshold	54	54	82	54

Source:

Refer to Table 11.

Notes:

- Emissions over threshold levels are in **bold**
- Mitigated emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (Measure AQ-1.1), all haul trucks are model year 2010 or newer (Measure AQ-1.2), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-1.3), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Does not include effect of Mitigation Measure M-AQ-1.5, which requires NO_x offsets.

Abbreviations:

ROG: reactive organic gases
 NO_x: nitrogen oxides
 PM10: particulate matter less than or equal to 10 microns in diameter
 PM2.5: particulate matter less than or equal to 2.5 microns in diameter
 lbs: pounds

OPERATIONAL IMPACTS

TABLE 14. AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE REDUCED INTENSITY ALTERNATIVE

Category ^b	Average Daily Emissions (lbs/day)
-----------------------	-----------------------------------

Year		ROG	NOX	PM10 Total ^c	PM2.5 Total ^c
2020	Area	12.0	<0.1	<0.1	<0.1
	Energy	0.4	3.6	0.3	0.3
	Mobile	6.0	2.5	2.3	0.7
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.3	6.1	0.2	0.2
	Onroad Truck Travel	0.4	8.8	1.3	0.4
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>40.6</i>	<i>21.4</i>	<i>4.2</i>	<i>1.7</i>
2021	Area	41.1	0.2	0.1	0.1
	Energy	0.6	5.9	0.4	0.4
	Mobile	13.0	6.9	8.1	2.4
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.5	9.1	0.3	0.3
	Onroad Truck Travel	0.7	11.9	2.8	0.9
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>77.4</i>	<i>34.3</i>	<i>11.8</i>	<i>4.2</i>
2022	Area	53.6	0.4	0.2	0.2
	Energy	0.8	7.4	0.6	0.6
	Mobile	17.4	9.1	10.8	3.2
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.6	12.2	0.4	0.4
	Onroad Truck Travel	0.9	13.3	3.6	1.2
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>94.8</i>	<i>42.6</i>	<i>15.6</i>	<i>5.5</i>
2023	Area	64.3	0.6	0.3	0.3
	Energy	1.0	9.3	0.7	0.7
	Mobile	21.6	11.0	13.2	3.9
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.8	15.2	0.5	0.5
	Onroad Truck Travel	1.0	14.9	4.6	1.5
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>110.2</i>	<i>51.2</i>	<i>19.3</i>	<i>6.9</i>
2024	Area	64.3	0.6	0.3	0.3
	Energy	1.0	9.3	0.7	0.7
	Mobile	21.6	11.0	13.2	3.9
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.8	15.2	0.5	0.5
	Onroad Truck Travel	0.9	12.6	4.5	1.4

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NOX	PM10 Total ^c	PM2.5 Total ^c
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	110.0	48.9	19.2	6.8
	Significance Threshold	54	54	82	54

Sources:

1. California Air Resources Board. 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available: <<http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf>>.
2. Fehr & Peers. 2016. Screencheck Draft - Transportation Impact Study: Mission Rock (Seawall Lot 337/Pier 48). Prepared for the San Francisco Planning Department. July. San Francisco, CA.
3. United States Environmental Protection Agency. 1996. Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors. 9.12.1 Malt Beverages. Available: <<https://www3.epa.gov/ttnchie1/ap42/>>. Accessed: February 29, 2016.

Notes:

All table references below refer to tables in the memorandum *Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016*

- a. Emissions over threshold levels are in **bold**
- b. Categories defined as follows:

Area = Emissions from landscaping equipment, consumer products, and natural gas fireplaces. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.

Energy = Emissions from natural gas combustion for space heating and cooking. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.

Mobile = Operating emissions from daily resident and commercial truck trips. Refer to Table 10 for the daily vehicle trips by land use type. The trip rates were provided by the *Screencheck Draft- Transportation Impact Study* prepared by the transportation consultants, Fehr & Peers (2016). Emission from resident trips were estimated using CalEEMod; emissions from commercial truck trips were estimated using emission factors from EMFAC2014.

Brewery = Operating emissions from brewing activities. Refer to Table 15 for brewery activity data assumed in the modeling. Emissions were modeled using CalEEMod and emission factors from EMFAC2014.

Generators = Operating emissions from diesel-powered emergency generators. Refer to Table 13 for operating assumptions for the emergency generators. Emissions were modeled using CalEEMod.

On-road Truck Travel = Operating emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed 38 daily haul truck trips. Emissions were estimated using emission factors from EMFAC2014.

On-road Truck Idling = Idling emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed that each truck would idle 5 minutes while unloading materials at the brewery. Emissions were estimated using idling emission factors from EMFAC2011-HD.
- c. PM10 and PM2.5 include both exhaust and dust emissions.

Abbreviations:

ROG: reactive organic gases
 NO_x: nitrogen oxides
 PM10: particulate matter less than or equal to 10 microns in diameter
 PM2.5: particulate matter less than or equal to 2.5 microns in diameter
 lbs: pounds

TABLE 15. SUMMARIZED AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NOX	PM10 Total ^b	PM2.5 Total ^b
2017	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0
2019	0.0	0.0	0.0	0.0
2020	40.6	21.4	4.2	1.7
2021	77.4	34.3	11.8	4.2
2022	94.8	42.6	15.6	5.5
2023	110.2	51.2	19.3	6.9
2024 (full buildout)	110.0	48.9	19.2	6.8
Significance Threshold	54	54	82	54

Sources:

Refer to Table 14.

Notes:

- a. Emissions over threshold levels are in **bold**.
- b. PM10 and PM2.5 include both exhaust and dust emissions.

Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 16. MITIGATED AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Total ^c	PM2.5 Total ^c
2020	Area	10.3	<0.1	<0.1	<0.1
	Energy	0.4	3.4	0.3	0.3
	Mobile	4.8	2.0	1.9	0.6
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.3	6.1	<0.1	<0.1
	Onroad Truck Travel	0.4	8.8	1.3	0.4
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>37.7</i>	<i>20.7</i>	<i>3.5</i>	<i>1.3</i>
2021	Area	37.1	0.2	0.1	0.1
	Energy	0.6	5.4	0.4	0.4
	Mobile	10.4	5.5	6.5	1.9
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.5	9.1	<0.1	<0.1
	Onroad Truck Travel	0.7	11.7	2.8	0.9
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>70.8</i>	<i>32.2</i>	<i>9.9</i>	<i>3.4</i>
2022	Area	47.8	0.4	0.2	0.2
	Energy	0.8	6.8	0.5	0.5
	Mobile	13.9	7.2	8.6	2.6
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.6	12.2	<0.1	<0.1
	Onroad Truck Travel	0.9	13.0	3.6	1.2
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>85.4</i>	<i>40.0</i>	<i>13.0</i>	<i>4.5</i>
2023	Area	56.9	0.6	0.3	0.3
	Energy	0.9	8.5	0.6	0.6
	Mobile	17.3	8.8	10.6	3.2
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.8	15.2	<0.1	<0.1
	Onroad Truck Travel	1.0	14.7	4.5	1.5
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>98.4</i>	<i>48.0</i>	<i>16.1</i>	<i>5.6</i>

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Total ^c	PM2.5 Total ^c
2024	Area	56.9	0.6	0.3	0.3
	Energy	0.9	8.5	0.6	0.6
	Mobile	17.3	8.8	10.6	3.2
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.8	15.2	<0.1	<0.1
	Onroad Truck Travel	0.9	12.3	4.5	1.4
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	98.2	45.7	16.1	5.6
Significance Threshold		54	54	82	54

Sources:

1. California Air Resources Board. 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available: <<http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf>>.
2. Fehr & Peers. 2016. Screencheck Draft - Transportation Impact Study: Mission Rock (Seawall Lot 337/Pier 48). Prepared for the San Francisco Planning Department. July. San Francisco, CA.
3. United States Environmental Protection Agency. 1996. Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors. 9.12.1 Malt Beverages. Available: <<https://www3.epa.gov/ttnchie1/ap42/>>. Accessed: February 29, 2016.

Notes:

All table references below refer to tables in the memorandum *Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants*, October 28, 2016

- a. Mitigated emissions assume all emergency generators have model year 2008+ engines consistent with ARB California Airborne Toxics Control Measure (ATCM) emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-2.2), and auto vehicle trips are reduced by 20% (Measure AQ-2.3). Does not include effect of Mitigation Measure M-AQ-1.5, which requires ROG offsets.
- b. Categories defined as follows:
 Area = Emissions from landscaping equipment, consumer products, and natural gas fireplaces. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.
 Energy = Emissions from natural gas combustion for space heating and cooking. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.
 Mobile = Operating emissions from daily resident and commercial truck trips. Refer to Table 10 for the daily vehicle trips by land use type. The trip rates were provided by the *Screencheck Draft- Transportation Impact Study* prepared by the transportation consultants, Fehr & Peers (2016). Emission from resident trips were estimated using CalEEMod; emissions from commercial truck trips were estimated using emission factors from EMFAC2014.
 Brewery = Operating emissions from brewing activities. Refer to Table 15 for brewery activity data assumed in the modeling. Emissions were modeled using CalEEMod and emission factors from EMFAC2014.
 Generators = Operating emissions from diesel-powered emergency generators. Refer to Table 13 for operating assumptions for the emergency generators. Emissions were modeled using CalEEMod.
 On-road Truck Travel = Operating emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed 38 daily haul truck trips. Emissions were estimated using emission factors from EMFAC2014.
 On-road Truck Idling = Idling emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed that each truck would idle 5 minutes while unloading materials at the brewery. Emissions

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Total ^c	PM2.5 Total ^c
were estimated using idling emission factors from EMFAC2011-HD.					
c. PM10 and PM2.5 include both exhaust and dust emissions.					
<u>Abbreviations:</u>					
ROG:	reactive organic gases				
NO _x :	nitrogen oxides				
PM10:	particulate matter less than or equal to 10 microns in diameter				
PM2.5:	particulate matter less than or equal to 2.5 microns in diameter				
lbs:	pounds				
VDECS:	Verified Diesel Emissions Control Strategies				

TABLE 17. SUMMARIZED MITIGATED AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NO _x	PM10 Total ^b	PM2.5 Total ^b
2017	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0
2019	0.0	0.0	0.0	0.0
2020	37.7	20.7	3.5	1.3
2021	70.8	32.2	9.9	3.4
2022	85.4	40.0	13.0	4.5
2023	98.4	48.0	16.1	5.6
2024 (full buildout)	98.2	45.7	16.1	5.6
Significance Threshold	54	54	82	54

Sources:

Refer to Table 16.

Notes:

- a. Mitigated emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-2.2), and auto vehicle trips are reduced by 20% (Measure AQ-2.3). Does not include effect of Mitigation Measure M-AQ-1.5, which requires ROG offsets.
- b. PM10 and PM2.5 include both exhaust and dust emissions.

Abbreviations:

ROG:	reactive organic gases
NO _x :	nitrogen oxides
PM10:	particulate matter less than or equal to 10 microns in diameter
PM2.5:	particulate matter less than or equal to 2.5 microns in diameter
lbs:	pounds
VDECS:	Verified Diesel Emissions Control Strategies

COMBINED CONSTRUCTION AND OPERATIONAL IMPACTS**TABLE 18. SUMMARIZED AVERAGE DAILY CONSTRUCTION PLUS OPERATIONAL EMISSIONS FOR THE REDUCED INTENSITY ALTERNATIVE**

Year	Average Daily Emissions (lbs/day)							
	ROG	NO _x	PM10 Exhaust	PM10 Dust ^b	PM10 Total ^c	PM2.5 Exhaust	PM2.5 Dust ^b	PM2.5 Total ^c
2017	2.2	25.5	0.9	0.0	0.9	0.8	1.9	2.7
2018	26.5	116.3	5.1	0.0	5.1	4.9	4.8	9.7
2019	53.0	137.3	5.9	0.0	5.9	5.6	9.3	14.9
2020	91.3	128.4	4.9	3.5	8.4	4.7	12.1	16.9
2021	114.2	97.1	3.3	10.7	14.0	3.2	12.3	15.5
2022	111.1	68.5	2.4	14.1	16.5	2.4	8.4	10.7
2023	114.2	57.6	2.1	17.4	19.5	2.1	6.3	8.4
2024	110.0	48.9	1.9	17.4	19.2	1.8	5.0	6.8
Significance Threshold	54	54	82	82	82	54	54	54

Source:

Refer to Tables 11 and 15.

Notes:

All table references below refer to tables in the memorandum Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016.

- As shown in Tables 1 and 2, construction of Area 1 would occur between 2017 and 2020. It was conservatively assumed that structures would be fully occupied immediately following construction and operational emissions associated with Area 1 would begin in 2021. Accordingly, concurrent construction and operational activities would occur between 2021 and 2023, resulting in higher daily emissions than either component when analyzed separately. This table presents emissions for overlapping construction and operational activities to analyze maximum air quality impacts during concurrent activities.
- PM10 and PM2.5 dust only includes dust from operations; construction dust is not included as it is addressed by Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008).
- PM10 and PM2.5 total includes exhaust from both construction and operations and dust from operations only.

Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 19. SUMMARIZED MITIGATED AVERAGE DAILY CONSTRUCTION PLUS OPERATIONAL EMISSIONS FOR THE REDUCED INTENSITY ALTERNATIVE

Year	Average Daily Emissions (lbs/day)							
	ROG	NO _x	PM10 Exhaust	PM10 Dust ^c	PM10 Total ^d	PM2.5 Exhaust	PM2.5 Dust ^c	PM2.5 Total ^d
2017	0.7	9.6	<0.1	0.0	<0.1	<0.1	1.1	1.1
2018	7.6	57.5	0.9	0.0	0.9	0.9	3.4	4.3
2019	14.9	77.7	1.3	0.0	1.3	1.3	7.2	8.5
2020	52.1	84.8	1.6	3.1	4.6	1.5	9.1	10.6
2021	81.2	74.4	1.3	9.1	10.4	1.3	9.6	10.9
2022	90.2	58.9	1.3	12.0	13.3	1.3	6.9	8.2
2023	99.6	53.0	1.4	14.8	16.2	1.4	5.3	6.7
2024	98.2	45.7	1.3	14.8	16.1	1.3	4.3	5.6
Significance Threshold	54	54	82	82	82	54	54	54

Source:

Refer to Tables 13 and 17.

Notes:

All table references below refer to tables in the memorandum *Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016*.

- Mitigated emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (Measure AQ-1.1), all haul trucks are model year 2010 or newer (Measure AQ-1.2), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-1.3), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-2.2), and auto vehicle trips are reduced by 20% (Measure AQ-2.3). Does not include effect of Mitigation Measure M-AQ-1.5, which requires ROG and NO_x offsets.
- As shown in Tables 1 and 2, construction of Area 1 would occur between 2017 and 2020. It was conservatively assumed that structures would be fully occupied immediately following construction and operational emissions associated with Area 1 would begin in 2021. Accordingly, concurrent construction and operational activities would occur between 2021 and 2023, resulting in higher daily emissions than either component when analyzed separately. This table presents emissions for overlapping construction and operational activities to analyze maximum air quality impacts during concurrent activities.
- PM10 and PM2.5 dust only includes dust from operations; construction dust is not included as it is addressed by Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008).
- PM10 and PM2.5 total includes exhaust from both construction and operations and dust from operations only.

Abbreviations:

ROG:	reactive organic gases
NO _x :	nitrogen oxides
PM10:	particulate matter less than or equal to 10 microns in diameter
PM2.5:	particulate matter less than or equal to 2.5 microns in diameter
lbs:	pounds
VDECS:	Verified Diesel Emissions Control Strategies

TOXIC AIR CONTAMINANTS**PM_{2.5} ANALYSIS****TABLE 20. MAXIMUM ANNUAL AVERAGE PM_{2.5} EXHAUST EXPOSURE WITHIN STUDY AREA AT ONSITE AND OFFSITE RECEPTORS NOT LOCATED IN THE APEZ DURING EXISTING/FUTURE CONDITIONS BUT WOULD BE LOCATED IN THE APEZ DURING EXISTING/FUTURE PLUS PROPOSED PROJECT CONDITIONS FOR THE REDUCED INTENSITY ALTERNATIVE**

Receptor	Annual Average PM _{2.5} Concentration (µg/m ³) ^{a, b}			
	Onsite Receptors		Offsite Receptors	
	Reduced Intensity Alternative	Mitigated ^c	Reduced Intensity Alternative	Mitigated ^c
Construction				
<u>2014 Background Analysis</u>				
Total (Background + Project)	10.7	8.7	-	-
Background	8.4	8.4	-	-
Construction Contribution	2.3	0.3	-	-
Significance Threshold for Project Contribution	0.3	N/A ^d	-	-
Above Threshold?	Yes	N/A ^d	-	-
<u>2025 Background Analysis</u>				
Total (Background + Project)	10.7	8.7	-	-
Background	8.4	8.4	-	-
Construction Contribution	2.3	0.3	-	-
Significance Threshold for Project Contribution	0.3	N/A ^d	-	-
Above Threshold?	Yes	N/A ^d	-	-

Sources:

CalEEMod modeling, AERMOD modeling, EMFAC2014 modeling, and other off-model calculations discussed in the AQTR and presented in AQTR Appendix B.

Notes:

- Mitigated construction emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (MM AQ-1.1), all haul trucks are model year 2010 (Measure AQ-1.2), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.3). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1) and auto vehicle trips are reduced by 20% (Measure AQ-2.3).
- “-” means that a receptor does not meet the criteria for the table. For example, there may not be an onsite receptor that is currently in an APEZ or is placed into an APEZ with only the operational contribution from the proposed project.
- The mitigated values may represent different receptor locations than the Alternative B values because the highest mitigated values may occur at different locations due to the varying effectiveness of mitigation measures on each individual source of emissions.
- Because this receptor is not placed into an APEZ with the mitigated project contribution (i.e. the total background plus project annual average PM_{2.5} concentration is less than the APEZ threshold of 10.0 µg/m³), the project-level threshold does not apply.

Abbreviations:

µg/m ³ :	micrograms per cubic meter
PM _{2.5} :	particulate matter less than or equal to 2.5 microns in diameter
APEZ:	Air Pollutant Exposure Zone
VDECS:	Verified Diesel Emissions Control Strategies

Emissions over threshold levels are in **bold**

CANCER RISK ANALYSIS (DPM/TOG)

TABLE 21. MAXIMUM LIFETIME EXCESS CANCER RISK WITHIN STUDY AREA AT ONSITE AND OFFSITE RECEPTORS CURRENTLY LOCATED IN THE APEZ DURING EXISTING/FUTURE CONDITIONS FOR THE REDUCED INTENSITY ALTERNATIVE

Receptor	Lifetime Excess Cancer Risk (per million) ^{a, b}			
	Onsite Receptors		Offsite Receptors	
	Reduced Intensity Alternative	Mitigated ^c	Reduced Intensity Alternative	Mitigated ^c
Construction Plus Operation				
<u>2014 Background Analysis</u>				
Total (Background + Project)	-	-	129.9	111.4
Background	-	-	107.2	107.2
Construction Plus Operation Contribution	-	-	22.7	4.1
Significance Threshold for Project Contribution	-	-	7.0	7.0
Above Threshold?	-	-	Yes	No
<u>2025 Background Analysis</u>				
Total (Background + Project)	-	-	178.9	164.8
Background	-	-	161.6	161.6
Construction Plus Operation Contribution	-	-	17.3	3.2
Significance Threshold for Project Contribution	-	-	7.0	7.0
Above Threshold?	-	-	Yes	No

Sources:

CalEEMod modeling, AERMOD modeling, EMFAC2014 modeling, and other off-model calculations discussed in the AQTR and presented in AQTR Appendix B.

Notes:

- Mitigated construction emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (MM AQ-1.1), all haul trucks are model year 2010 (Measure AQ-1.2), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1) and auto vehicle trips are reduced by 20% (Measure AQ-2.3).
- "-" means that a receptor does not meet the criteria for the table. For example, there may not be an onsite receptor that is currently in an APEZ or is placed into an APEZ with only the operational contribution from the proposed project.
- The mitigated values may represent different receptor locations than the Alternative B values because the highest mitigated values may occur at different locations due to the varying effectiveness of mitigation measures on each

individual source of emissions.

Abbreviations:

APEZ: Air Pollutant Exposure Zone

VDECS: Verified Diesel Emissions Control Strategies

Emissions over threshold levels are in **bold**

TABLE 22. MAXIMUM LIFETIME EXCESS CANCER RISK WITHIN STUDY AREA AT ONSITE AND OFFSITE RECEPTORS NOT LOCATED IN THE APEZ DURING EXISTING/FUTURE CONDITIONS BUT WOULD BE LOCATED IN THE APEZ DURING EXISTING/FUTURE PLUS PROPOSED PROJECT CONDITIONS FOR THE REDUCED INTENSITY ALTERNATIVE

Receptor	Lifetime Excess Cancer Risk (per million) ^{a, b}			
	Onsite Receptors		Offsite Receptors	
	Reduced Intensity Alternative	Mitigated ^c	Reduced Intensity Alternative	Mitigated ^c
Construction Plus Operation				
<u>2014 Background Analysis</u>				
Total (Background + Project)	166.2	75.6	170.8	100.0
Background	53.0	53.0	67.0	87.7
Construction Plus Operation Contribution	113.2	22.7	103.8	12.3
Significance Threshold for Project Contribution	10.0	N/A ^d	10.0	10.0
Above Threshold?	Yes	N/A ^d	Yes	No
<u>2025 Background Analysis</u>				
Total (Background + Project)	151.1	60.5	148.6	103.2
Background	37.8	37.8	44.8	99.7
Construction Plus Operation Contribution	113.2	22.7	103.8	3.5
Significance Threshold for Project Contribution	10.0	N/A ^d	10.0	10.0
Above Threshold?	Yes	N/A ^d	Yes	No

Sources:

CalEEMod modeling, AERMOD modeling, EMFAC2014 modeling, and other off-model calculations discussed in the AQTR and presented in AQTR Appendix B.

Notes:

- Mitigated construction emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (MM AQ-1.1), all haul trucks are model year 2010 (Measure AQ-1.2), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1) and auto vehicle trips are reduced by 20% (Measure AQ-2.3).
- "-" means that a receptor does not meet the criteria for the table. For example, there may not be an onsite receptor that is currently in an APEZ or is placed into an APEZ with only the operational contribution from the proposed project.
- The mitigated values may represent different receptor locations than the Alternative B values because the highest mitigated values may occur at different locations due to the varying effectiveness of mitigation measures on each

individual source of emissions.

- d. Because this receptor is not placed into an APEZ with the mitigated project contribution (i.e. the total background plus project lifetime excess cancer risk is less than the APEZ threshold of 100), the project-level threshold does not apply.

Abbreviations:

APEZ: Air Pollutant Exposure Zone

VDECS: Verified Diesel Emissions Control Strategies

Emissions over threshold levels are in **bold**

ALTERNATIVE C: NO CHANGE TO PIER 48 ALTERNATIVE

ACTIVITY DATA

The table numbers below match the table numbers in the Air Quality Technical Report for comparison purposes.

TABLE 23. DWELLING UNITS AND BUILDING SQUARE FOOTAGES BY OPERATIONAL LAND USE TYPE

Land Use Type	Dwelling Units (residential) and Square Footage (nonresidential)			
	Area 1 ^a	Area 2 ^a	Area 3 ^a	Area 4 ^a
Residential (dwelling units)	501	239	308	532
Residential (square footage)	500,966	238,828	307,720	531,985
Commercial - office	279,698	567,702	125,275	0
Commercial – general/retail	32,678	43,849	9,383	43,765
Sit-down Restaurant	23,864	23,864	15,909	14,318
Quick Service Restaurant	10,227	10,227	6,818	6,136
Parking Structure	0	837,230	0	0
Underground Parking	0	0	227,180	0
China Basin Park	191,200	0	0	0
Mission Rock Square	0	0	48,366	0
Channel Plaza	0	0	0	21,551
Pier 48 - Brewery/ Distillery	0	0	0	0
Pier 48 - Brewery Retail / Exhibition	0	0	0	0
Pier 48 - Brewery Restaurant	0	0	0	0

Source:

Hall, Kristen. Urban Designer III, Associate. Perkins+Will. December 2, 2015—email communication with ICF.

Notes:

- a. The project site has been divided into four areas, with four construction phases occurring per area. Each area would consist of two to three development blocks and associated area for streets and open space. Table 2 summarizes the proposed development for each area. Used same land use data as the proposed project for the high residential scenario (Assumption B).

TABLE 24. PROPOSED DEVELOPMENT BY AREA AND OVERALL PROJECT PHASING

Area	Proposed Development	Years of Construction	Operational Date	Total Number of Work Days	Total Truck Trips
Area 1	Block A Block G China Basin Park Mission Rock Square	2017–2020	3/31/2020	783	15,398
Area 2	Block B Block C Block D (including Garage)	2018–2021	4/1/2021	783	14,880
Area 3	Block E Block F Block K Parking Garage	2019–2022	4/1/2022	783	20,165
Area 4	Block H Block I Block J Channel Plaza	2020–2023	4/5/2023	785	8,700

Sources:

1. Mesikepp, Sam. Hathaway Dinwiddie Construction Company. October 5, 2016—email communication with ICF
2. Hall, Kristen. Urban Designer III, Associate. Perkins+Will. December 2, 2015—email communication with ICF.

Notes:

- a. Total truck trips include excavation fill removal.

TABLE 25. CONSTRUCTION EQUIPMENT ACTIVITY

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
Area 1 (Building A, G, K, China Basin Park, Mission Rock Square, Pier 48)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	2	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	2	330	2
	Water Truck/Diesel	n/a ^b	1	330	-
Infrastructure	Dump Truck/Diesel	n/a ^b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Excavator/Diesel	Excavators	3	385	1
	Dump Truck/Diesel	n/a ^b	3	325	1
	Crane/Diesel	Cranes	2	335	4
	Crane/Electric	Cranes	1	150	4
	Drill/Diesel	Bore/Drill Rigs	3	225	1
	Forklift/Diesel	Forklifts	3	210	2
	Concrete truck/Diesel	n/a ^b	3	325	2
	Water Truck/Diesel	n/a ^b	3	330	2
	Concrete pump/Diesel	Pumps	3	73	2
	Welder/Diesel	Welders	6	35	2
	Air compressor/Diesel	Air Compressors	3	150	5
	High-lift forklift/Diesel	Forklifts	3	120	2
	Pile hammer/Diesel	Bore/Drill Rigs	3	130	2
	CX80 excavator/Diesel	Excavators	1	53	1
	Rubber-tired loader/Diesel	Rubber Tired	1	260	1

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
Paving + Landscape		Loaders			
	Temporary generators for welding, metal decking, miscellaneous trades/Diesel	Generator Sets	8	10	4
	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Berm Machine/Diesel	Surfacing Equipment	1	44	1
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8
Area 2 (Buildings B, C & D)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	2	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	1	330	4
	Water Truck/Diesel	n/a ^b	1	330	4
Infrastructure	Dump Truck/Diesel	n/a ^b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Excavator/Diesel	Excavators	3	385	1
	Dump Truck/Diesel	n/a ^b	3	325	1
	Crane/Diesel	Cranes	1	335	4
	Crane/Electric	n/a ^d	2	150	4
	Drill/Diesel	Bore/Drill Rigs	3	225	1
	Forklift/Diesel	Forklifts	3	210	2
	Concrete truck/Diesel	n/a ^b	4	325	2
	Water Truck/Diesel	n/a ^b	4	330	2
	Concrete Pump/Diesel	Pumps	4	73	2

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Welder/Diesel	Welders	4	35	2
	Air compressor/Diesel	Air Compressors	6	150	5
	High-lift forklift/Diesel	Forklifts	3	120	2
	Pile hammer/Diesel	Bore/Drill Rigs	4	130	2
	Temporary generators for welding, metal decking, miscellaneous trades / Diesel	Generator Sets	8	10	4
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8
Area 3 (Buildings E, F, & K, Underground Parking)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	1	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	1	330	4
	Water Truck/Diesel	n/a ^b	1	330	4
Infrastructure	Dump Truck/Diesel	n/a ^b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Dump Truck/Diesel	n/a ^b	3	325	8
	Excavator	Excavators	3	385	8
	Crane/Diesel	Cranes	1	335	4
	Crane/Electric ^a	n/a ^d	3	150	4
	Drill/Diesel	Bore/Drill Rigs	3	225	1
	Forklift/Diesel	Forklifts	2	210	2
	Concrete truck/Diesel	n/a ^b	8	325	2

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Water Truck/Diesel	n/a ^b	8	330	2
	Concrete Pump/Diesel	Pumps	8	73	2
	Welder/Diesel	Welders	3	35	2
	Air compressor/Diesel	Air Compressors	3	150	5
	High-lift forklift/Diesel	Forklifts	2	120	2
	Pile hammer/Diesel	Bore/Drill Rigs	3	130	2
	Temporary generators for welding, metal decking, miscellaneous trades / Diesel	Generator Sets	6	10	4
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Berm Machine/Diesel	Surfacing Equipment	1	44	1
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8
Area 4 (Buildings H, I & J, Channel Plaza)					
Demo + Rough Grade	Loader/Diesel	Tractors/ Loaders/ Backhoes	2	120	8
	Dump Truck/Diesel	n/a ^b	2	325	8
	Bulldozer/Diesel	Crawler Tractors	1	400	8
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	350	4
	Scraper/Diesel	Scrapers	1	330	4
	Water Truck/Diesel	n/a ^b	1	330	4
Infrastructure	Dump Truck/Diesel	n/a ^b	2	325	4
	Backhoe/Diesel	Tractors/ Loaders/ Backhoes	1	250	4
	Trencher/Diesel	Trenchers	1	41	4
Foundations + Building	Excavator/Diesel	Excavators	3	385	1
	Dump Truck/Diesel	n/a ^b	3	325	1
	Crane/Diesel	Cranes	1	335	4

Phase	Applicant-Provided Equipment Type/Fuel	CalEEMod Equipment Type	Number/ Day ^a	Horsepower	Average Hours/ Day
	Crane/Electric	n/a ^d	3	150	4
	Drill/Diesel	Bore/Drill Rigs	3	225	1
	Forklift/Diesel	Forklifts	3	210	2
	Concrete truck/Diesel	n/a ^b	3	325	2
	Water Truck/Diesel	n/a ^b	3	330	2
	Concrete Pump/Diesel	Pumps	3	73	2
	Welder/Diesel	Welders	6	35	2
	Air compressor/Diesel	Air Compressors	3	150	5
	High-lift forklift/Diesel	Forklifts	3	120	2
	Pile Hammer/ Diesel	Bore/Drill Rigs	3	130	2
	Temporary generators for welding, metal decking, miscellaneous trades / Diesel	Generator Sets	6	10	4
Paving + Landscape	Roller/Diesel	Rollers	1	40	2
	Paver/Diesel	Pavers	1	175	2
	Berm Machine/Diesel	Surfacing Equipment	1	44	1
	Dump truck/Diesel	n/a ^b	1	325	4
	Pickup/Diesel	n/a ^b	2	250	8

Source:

Mesikepp, Sam. Hathaway Dinwiddie Construction Company. October 5, 2016—email communication with ICF.

Notes:

- All equipment assumed to operate each day throughout the entire phase duration.
- On-road trucks were modeled based on anticipated daily trips and estimated vehicle miles traveled. See Table 6 for a summary of on-road assumptions used in this analysis.
- In-water equipment was modeled outside of CalEEMod. See Table 5 for a summary of in-water assumptions used in this analysis.
- Electricity use results in indirect criteria pollutant, toxic air contaminant (TAC), and greenhouse gas (GHG) emissions at the applicable power plant, but the Air Quality Technical Report does not evaluate these offsite indirect emissions. Therefore, electric equipment was not included in the CalEEMod modeling or the impact analysis.

Abbreviations:

CalEEMod: CALifornia Emissions Estimator **MODEL**

Eq.: Equipment

TABLE 26. HAULING TRUCK TRIPS AND WORKER TRIPS

Area and Phase	Haul/Vendor Trips ^a		Worker Trips ^b		Soil Moved (cubic yards)		
	Daily	Total ^c	Daily	Total ^c	Import	Export	Balance
Area 1 (Building A, G, China Basin Park, Mission Rock Square)							
Demo + Rough Grade	45	2,695	80	4,800	29,230	15,000	15,000
Infrastructure	5	1,540	80	20,800	3,600	4,000	3,600
Foundations + Buildings	15	10,008	700	406,000	-	7,650	n/a
Paving + Landscape	4	1,155	120	9,960	-	-	-
Area 2 (Buildings B, C & D)							
Demo + Rough Grade	50	3,000	60	3,600	33,570	20,000	20,000
Infrastructure	4	380	60	15,600	3,024	3,360	3,024
Foundations + Buildings	47	11,050	900	405,000	-	14,250	n/a
Paving + Landscape	10	450	80	17,040	-	-	-
Area 3 (Buildings E, F, & K, Underground Parking)							
Demo + Rough Grade	18	265	60	3,600	15,791	10,000	10,000
Infrastructure	11	400	60	15,600	3,420	3,800	3,420
Foundations + Buildings	143	18,750	400	200,000	9,870	103,200	9,870
Paving + Landscape	20	750	80	13,040	-	-	-
Area 4 (Buildings H, I & J, Channel Plaza)							
Demo + Rough Grade	57	1,500	80	4,800	25,156	15,000	15,000
Infrastructure	4	400	80	20,800	4,050	4,500	4,050
Foundations + Buildings	43	6,200	450	261,000	-	7,800	n/a
Paving + Landscape	14	600	100	8,500	-	-	-

Source:

Mesikepp, Sam. Hathaway Dinwiddie Construction Company. October 5, 2016—email communication with ICF

Notes:

- Represents one-way truck trips. The average one-way trip length is 20.6 miles, which is based on anticipated subcontractor delivery locations. Specifically, it was assumed that 15% of deliveries would originate from Brisbane and South San Francisco, 50% from the South Bay, 7.5% from the North Bay, 10% from the East Bay, and 2.5% from Southern California or the Pacific Northwest.
- Represents one-way worker trips. The average one-way trip length is 20.4 miles.
- Total trips account for variation in daily trips and represent total trips for each area and phase.

TABLE 27. ARCHITECTURAL COATING SQUARE FOOTAGE

Area	Residential Floor Area (ft ²)	Nonresidential Floor Area (ft ²) ^a	Building Surface Area Coated (ft ²)			
			Residential		Nonresidential	
			Interior ^b	Exterior ^c	Interior ^d	Exterior ^e
Area 1	500,966	346,467	1,014,456	338,152	519,701	173,234
Area 2	238,828	645,642	483,627	161,209	968,463	322,821
Area 3	307,720	157,385	623,133	207,711	236,078	78,693
Area 4	531,985	64,219	1,077,270	359,090	96,329	32,110

Sources:

1. ENVIRON International Corporation and the California Air Districts. 2013. CalEEMod User's Guide. Version 2013.2. Appendix A: Calculation Details for CalEEMod. Prepared for the California Air Pollution Control Officers Association. July. Available: <<http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixa.pdf?sfvrsn=2>>. Accessed: October 12, 2015.
2. Mesikepp, Sam. Hathaway Dinwiddie Construction Company. October 5, 2016—email communication with ICF.
3. Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF

Notes:

Excludes parking components because they would not require architectural coatings.

- a. Residential interior coated area = total residential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for residential painting equals 2.7 times the floor square footage, and that 75% of the interior surface area is painted. Accordingly, the equation becomes total residential floor area * 2.7 * 75%. The default values are described on page A-16 of the CalEEMod User Guide.
- b. Residential exterior coated area = total residential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for residential painting equals 2.7 times the floor square footage, and that 25% of the exterior surface area is painted. Accordingly, the equation becomes total residential floor area * 2.7 * 25%.
- c. Nonresidential interior coated area = total nonresidential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for nonresidential painting equals 2.0 times the floor square footage, and that 75% of the interior surface area is painted. Accordingly, the equation becomes total nonresidential floor area * 2.0 * 75%.
- d. Nonresidential exterior coated area = total nonresidential floor area * surface area multiplier * fraction of surface area coated. CalEEMod assumes the total surface for nonresidential painting equals 2.0 times the floor square footage, and that 25% of the exterior surface area is painted. Accordingly, the equation becomes total nonresidential floor area * 2.0 * 25%.

Abbreviations:

CalEEMod: CALifornia Emissions Estimator **MO**del

ft²: square feet

TABLE 28. CONSUMER PRODUCT SQUARE FOOTAGE

Year	Total Floor Area (ft ²) ^a
2020	847,433
2021	2,569,133
2022	3,261,418
2023	3,857,622
2024	3,857,622

Sources:

Hall, Kristen. Urban Designer III, Associate. Perkins+Will. December 2, 2015—email communication with ICF.

Notes:

- a. Total floor area for consumer product use is based on the total square footage presented in Table 1 for all land use types except the following: Parking Structure, Underground Parking, China Basin Park, Mission Rock Square, Channel Plaza

Abbreviations:

ft²: square feet

TABLE 29. DAILY TRIP RATES BY LAND USE TYPE

Land Use Type	CalEEMod Land Use Type	Daily Auto Trip Rates ^a	Daily Truck Trip Rates ^b	Unit
Residential	Apartments High Rise	1.8	0.03	/DU
Commercial - office	General Office Building	3.0	0.21	/1,000sf
Commercial – general/retail	Strip Mall	19.6	0.22	/1,000sf
Sit-down Restaurant	High Turnover (Sit Down Restaurant)	24.5	3.60	/1,000sf
Quick Service Restaurant	Fast Food Restaurant w/o Drive Thru	79.4	3.60	/1,000sf
Parking Structure	Enclosed Parking Structure with Elevator	-	-	/1,000sf
Underground Parking	Enclosed Parking Structure with Elevator	-	-	/1,000sf
China Basin Park	Park	6.6	-	/acre
Mission Rock Square	Park	6.6	-	/acre
Channel Plaza	Park	6.6	-	/acre
Pier 48 - Brewery/ Distillery	Manufacturing	-	-	/1,000sf
Pier 48 - Brewery Retail / Exhibition	Strip Mall	-	-	/1,000sf
Pier 48 - Brewery Restaurant	High Turnover (Sit Down Restaurant)	-	-	/1,000sf

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF

Notes:

- Represents daily automobile trips by residents and visitors to residential land uses. The daily trip rates were conservatively assumed 365 days per year. Emissions were modeled using CalEEMod.
- Represents daily truck trips visitor and deliveries to nonresidential (e.g., commercial, retail) land uses. Emissions were modeled using EMFAC2014 emission factors because CalEEMod cannot estimate emissions generated by a fleet mix of only model year 2010 or newer engines, which would be required by Measure AQ-1.2.

Abbreviations:

CalEEMod = **C**ALifornia **E**missions **E**stimator **M**ODEl

DU = dwelling unit

sf: square foot

TABLE 30. DAILY TRIP LENGTHS (MILES) BY LAND USE TYPE

Land Use Type	CalEEMod Land Use Type	Automobiles	Vendor Trucks
Residential	Apartments High Rise	4.54	12.1
Commercial - office	General Office Building	13.82	12.1
Commercial – general/retail	Strip Mall	0.99	12.1
Sit-down Restaurant	High Turnover (Sit Down Restaurant)	0.99	12.1
Quick Service Restaurant	Fast Food Restaurant w/o Drive Thru	0.99	12.1
Parking Structure	Enclosed Parking Structure with Elevator	-	-
Underground Parking	Enclosed Parking Structure with Elevator	-	-
China Basin Park	Park	-	-
Mission Rock Square	Park	-	-
Channel Plaza	Park	-	-
Pier 48 - Brewery/ Distillery	Manufacturing	-	-
Pier 48 - Brewery Retail / Exhibition	Strip Mall	-	-
Pier 48 - Brewery Restaurant	High Turnover (Sit Down Restaurant)	-	-

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF

TABLE 31. DAILY VEHICLE TRIPS BY LAND USE TYPE

Land Use Type	Daily Auto Trips	Daily Truck Trips
Residential	2,815	47
Commercial - office	2,869	214
Commercial – general/retail	2,359	27
Sit-down Restaurant	2,063	304
Quick Service Restaurant	2,870	130
Parking Structure	0	0
Underground Parking	0	0
China Basin Park	0	0
Mission Rock Square	0	0
Channel Plaza	0	0
Pier 48 - Brewery/ Distillery	0	0
Pier 48 - Brewery Retail / Exhibition	0	0
Pier 48 - Brewery Restaurant	0	0
Total	12,976	712

Source:

Ballus Armet, Ingrid. Fehr & Peers. October 14, 2016—email communication with ICF

TABLE 32. EMERGENCY GENERATOR DETAILS

Stationary Combustion Source and Location	Fuel	Number of generators	Horsepower	Hours/year
Emergency generators – Area 1	Diesel	2	2,000	50
Emergency generators – Area 2	Diesel	2	2,000	50
Emergency generators – Area 3	Diesel	2	2,000	50
Emergency generators – Area 4	Diesel	2	2,000	50
Pier 48	-	-	-	-

Sources:

1. Kirk, Alison. Senior Environmental Planner. Bay Area Air Quality Management District. August 31, 2016—email communication with ICF.
2. Mesikepp, Sam. Hathaway Dinwiddie Construction Company. October 5, 2016—email communication with ICF

RESULTS TABLES

CONSTRUCTION IMPACTS

TABLE 33. AVERAGE DAILY CONSTRUCTION EMISSIONS BY CATEGORY FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	Off-road Equipment	1.2	13.6	0.6	0.6
	On-road Truck Travel	0.2	4.6	<0.1	<0.1
	On-road Truck Idling	<0.1	0.1	<0.1	<0.1
	Worker Commute	0.2	0.4	<0.1	<0.1
	Fugitive ROG	0.0	0.0	0.0	0.0
	<i>Total</i>	<i>1.6</i>	<i>18.8</i>	<i>0.6</i>	<i>0.6</i>
2018	Off-road Equipment	5.2	45.0	2.2	2.1
	On-road Truck Travel	0.3	10.2	<0.1	<0.1
	On-road Truck Idling	<0.1	0.3	<0.1	<0.1
	Worker Commute	2.7	5.0	<0.1	<0.1
	Fugitive ROG	18.1	0.0	0.0	0.0
	<i>Total</i>	<i>26.3</i>	<i>60.5</i>	<i>2.3</i>	<i>2.2</i>
2019	Off-road Equipment	8.6	72.0	3.5	3.4
	On-road Truck Travel	0.4	13.7	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	5.4	9.9	0.2	0.2
	Fugitive ROG	40.6	0.0	0.0	0.0
	<i>Total</i>	<i>55.0</i>	<i>96.0</i>	<i>3.8</i>	<i>3.6</i>
2020	Off-road Equipment	8.6	73.6	3.4	3.3
	On-road Truck Travel	0.6	20.1	<0.1	<0.1
	On-road Truck Idling	<0.1	0.6	<0.1	<0.1
	Worker Commute	4.2	7.7	0.2	0.2
	Fugitive ROG	33.0	0.0	0.0	0.0
	<i>Total</i>	<i>46.4</i>	<i>102.1</i>	<i>3.6</i>	<i>3.5</i>
2021	Off-road Equipment	6.2	50.9	2.3	2.2
	On-road Truck Travel	0.4	13.5	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	2.6	4.7	0.1	0.1
	Fugitive ROG	25.1	0.0	0.0	0.0
	<i>Total</i>	<i>34.3</i>	<i>69.5</i>	<i>2.5</i>	<i>2.4</i>

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2022	Off-road Equipment	2.4	18.0	0.8	0.8
	On-road Truck Travel	0.1	3.2	<0.1	<0.1
	On-road Truck Idling	<0.1	<0.1	<0.1	<0.1
	Worker Commute	1.3	2.3	<0.1	<0.1
	Fugitive ROG	14.1	0.0	0.0	0.0
	<i>Total</i>	<i>17.8</i>	<i>23.6</i>	<i>0.9</i>	<i>0.9</i>
2023	Off-road Equipment	0.6	4.1	0.2	0.2
	On-road Truck Travel	<0.1	1.1	<0.1	<0.1
	On-road Truck Idling	<0.1	<0.1	<0.1	<0.1
	Worker Commute	0.3	0.6	<0.1	<0.1
	Fugitive ROG	3.4	0.0	0.0	0.0
	<i>Total</i>	<i>4.4</i>	<i>5.9</i>	<i>0.2</i>	<i>0.2</i>
Significance Threshold		54	54	82	54

Source:

ENVIRON International Corporation and the California Air Districts. 2013. CalEEMod User's Guide. Version 2013.2. Appendix A: Calculation Details for CalEEMod. Prepared for the California Air Pollution Control Officers Association. July. Available: <<http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixa.pdf?sfvrsn=2>>. Accessed: October 12, 2015.

Notes:

a. Categories defined as follows:

Off-road Equipment = Operating emissions from heavy-duty equipment, such as bulldozer, cranes, and excavators. Refer to Table 3 for equipment activity assumptions. Emissions were modeled using CalEEMod.

On-road Truck Travel = Operating emissions from heavy-duty on-road trucks. Refer to Table 6 for vehicle activity assumptions. Emissions were modeled using emission factors from EMFAC2014.

On-road Truck Idling = Idling emissions from heavy-duty on-road trucks. The analysis assumed that each truck would idle 5 minutes while unloading soil or material on the project site. Emissions were modeled using idling emission factors from EMFAC2011-HD.

Worker Commute = Operating emission from employee vehicles. Refer to Table 6 vehicle activity assumptions. Emissions were modeled using CalEEMod.

Fugitive ROG = Fugitive ROG emissions from the asphalt paving and the application of architectural coatings. Refer to Section 3.2.1.6, *Asphalt Paving*, for a summary of paving assumptions and Table 8 for a summary of architectural coating assumptions. Paving emissions were modeled using emission factors from the CalEEMod User Guide, where ROG = acres paved * 2.62 pounds ROG/acre paved (ENVIRON 2013). Architectural coating emissions were modeled using CalEEMod.

Emissions over threshold levels are in **bold**

Abbreviations:

CalEEMod: **C**ALifornia **E**missions Estimator **M**ODEl

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 34. SUMMARIZED AVERAGE DAILY CONSTRUCTION EMISSIONS BY ANALYSIS YEAR FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	1.6	18.8	0.6	0.6
2018	26.3	60.5	2.3	2.2
2019	55.0	96.0	3.8	3.6
2020	46.4	102.1	3.6	3.5
2021	34.3	69.5	2.5	2.4
2022	17.8	23.6	0.9	0.9
2023	4.4	5.9	0.2	0.2
2024	0.0	0.0	0.0	0.0
Significance Threshold	54	54	82	54

Source:

Refer to Table 33.

Notes:Emissions over threshold levels are in **bold**Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 35. MITIGATED AVERAGE DAILY CONSTRUCTION EMISSIONS BY CATEGORY FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2017	Off-road Equipment	0.2	4.3	<0.1	<0.1
	On-road Truck Travel	<0.1	1.6	<0.1	<0.1
	On-road Truck Idling	<0.1	0.1	<0.1	<0.1
	Worker Commute	0.2	0.4	<0.1	<0.1
	Fugitive ROG	0.0	0.0	0.0	0.0
	<i>Total</i>	<i>0.5</i>	<i>6.4</i>	<i><0.1</i>	<i><0.1</i>
2018	Off-road Equipment	0.9	21.7	0.3	0.3
	On-road Truck Travel	0.2	3.8	<0.1	<0.1
	On-road Truck Idling	<0.1	0.3	<0.1	<0.1
	Worker Commute	2.7	5.0	<0.1	<0.1
	Fugitive ROG	3.4	0.0	0.0	0.0
	<i>Total</i>	<i>7.3</i>	<i>30.9</i>	<i>0.4</i>	<i>0.4</i>

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust
2019	Off-road Equipment	1.7	42.2	0.5	0.5
	On-road Truck Travel	0.2	5.4	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	5.4	9.9	0.2	0.2
	Fugitive ROG	7.7	0.0	0.0	0.0
	<i>Total</i>	<i>15.0</i>	<i>57.9</i>	<i>0.7</i>	<i>0.7</i>
2020	Off-road Equipment	2.2	50.7	0.6	0.6
	On-road Truck Travel	0.4	8.5	<0.1	<0.1
	On-road Truck Idling	<0.1	0.6	<0.1	<0.1
	Worker Commute	4.2	7.7	0.2	0.2
	Fugitive ROG	6.3	0.0	0.0	0.0
	<i>Total</i>	<i>13.2</i>	<i>67.5</i>	<i>0.8</i>	<i>0.8</i>
2021	Off-road Equipment	1.8	41.0	0.5	0.5
	On-road Truck Travel	0.3	6.0	<0.1	<0.1
	On-road Truck Idling	<0.1	0.4	<0.1	<0.1
	Worker Commute	2.6	4.7	0.1	0.1
	Fugitive ROG	4.8	0.0	0.0	0.0
	<i>Total</i>	<i>9.5</i>	<i>52.1</i>	<i>0.7</i>	<i>0.6</i>
2022	Off-road Equipment	0.6	15.6	0.2	0.2
	On-road Truck Travel	<0.1	1.5	<0.1	<0.1
	On-road Truck Idling	<0.1	<0.1	<0.1	<0.1
	Worker Commute	1.3	2.3	<0.1	<0.1
	Fugitive ROG	2.7	0.0	0.0	0.0
	<i>Total</i>	<i>4.6</i>	<i>19.5</i>	<i>0.3</i>	<i>0.2</i>
2023	Off-road Equipment	0.2	3.9	<0.1	<0.1
	On-road Truck Travel	<0.1	0.5	<0.1	<0.1
	On-road Truck Idling	<0.1	<0.1	<0.1	<0.1
	Worker Commute	0.3	0.6	<0.1	<0.1
	Fugitive ROG	0.6	0.0	0.0	0.0
	<i>Total</i>	<i>1.2</i>	<i>5.1</i>	<i><0.1</i>	<i><0.1</i>
Significance Threshold		54	54	82	54

Year	Category ^b	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Exhaust	PM2.5 Exhaust

Source:

ENVIRON International Corporation and the California Air Districts. 2013. CalEEMod User's Guide. Version 2013.2. Appendix A: Calculation Details for CalEEMod. Prepared for the California Air Pollution Control Officers Association. July. Available: <<http://www.aqmd.gov/docs/default-source/caleemod/caleemod-appendixa.pdf?sfvrsn=2>>. Accessed: October 12, 2015.

Notes:

(all table references below refer to tables in the memorandum Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016)

- a. Emissions over threshold levels are in **bold**
- b. Mitigated emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (Measure AQ-1.1), all haul trucks are model year 2010 or newer (Measure AQ-1.2), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-1.3), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Does not include effect of Mitigation Measure M-AQ-1.5, which requires NO_x offsets.
- c. Categories defined as follows:

Off-road Equipment = Operating emissions from heavy-duty equipment, such as bulldozer, cranes, and excavators. Refer to Table 4 for equipment activity assumptions. Emissions were modeled using CalEEMod.

On-road Truck Travel = Operating emissions from heavy-duty on-road trucks. Refer to Table 6 for vehicle activity assumptions. Emissions were modeled using emission factors from EMFAC2014.

On-road Truck Idling = Idling emissions from heavy-duty on-road trucks. The analysis assumed that each truck would idle 5 minutes while unloading soil or material on the project site. Emissions were modeled using idling emission factors from EMFAC2011-HD.

Worker Commute = Operating emission from employee vehicles. Refer to Table 6 vehicle activity assumptions. Emissions were modeled using CalEEMod.

Fugitive ROG = Fugitive ROG emissions from the asphalt paving and the application of architectural coatings. Refer to Section 3.2.1.7 of the Air Quality Technical Report for a summary of paving assumptions and Table 8 for a summary of architectural coating assumptions. Paving emissions were modeled using emission factors from the CalEEMod User Guide, where ROG = acres paved * 2.62 pounds ROG/acre paved (ENVIRON 2013). Architectural coating emissions were modeled using CalEEMod.

Abbreviations:

ROG: reactive organic gases
 NO_x: nitrogen oxides
 PM10: particulate matter less than or equal to 10 microns in diameter
 PM2.5: particulate matter less than or equal to 2.5 microns in diameter
 lbs: pounds

TABLE 36. SUMMARIZED MITIGATED AVERAGE DAILY CONSTRUCTION EMISSIONS BY ANALYSIS YEAR FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NOX	PM10 Exhaust	PM2.5 Exhaust
2017	0.5	6.4	<0.1	<0.1
2018	7.3	30.9	0.4	0.4
2019	15.0	57.9	0.7	0.7
2020	13.2	67.5	0.8	0.8
2021	9.5	52.1	0.7	0.6
2022	4.6	19.5	0.3	0.2
2023	1.2	5.1	<0.1	<0.1
2024	0.0	0.0	0.0	0.0
Significance Threshold	54	54	82	54

Source:

Refer to Table 35.

Notes:

- a. Emissions over threshold levels are in **bold**
- b. Mitigated emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (Measure AQ-1.1), all haul trucks are model year 2010 or newer (Measure AQ-1.2), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-1.3), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Does not include effect of Mitigation Measure M-AQ-1.5, which requires NOx offsets.

Abbreviations:

ROG: reactive organic gases

NOx.: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

OPERATIONAL IMPACTS**TABLE 37. AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE NO CHANGE TO PIER 48 ALTERNATIVE**

Year	Category	Average Daily Emissions (lbs/day)			
		ROG	NOX	PM10 Total	PM2.5 Total
2020	Area	16.3	0.2	0.1	0.1
	Energy	0.4	3.5	0.3	0.3
	Mobile	8.3	5.7	7.1	2.1
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.2	3.0	<0.1	<0.1
	Onroad Truck Travel	0.3	3.4	1.2	0.4
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>46.9</i>	<i>16.2</i>	<i>8.8</i>	<i>3.0</i>
2021	Area	45.4	0.4	0.2	0.2
	Energy	0.6	5.5	0.4	0.4
	Mobile	15.8	12.9	18.0	5.3
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.3	6.1	0.2	0.2
	Onroad Truck Travel	0.6	6.9	2.7	0.9
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>84.2</i>	<i>32.1</i>	<i>21.4</i>	<i>6.9</i>
2022	Area	57.9	0.5	0.2	0.2
	Energy	0.8	6.8	0.5	0.5
	Mobile	19.0	15.2	21.4	6.3
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.5	9.1	0.3	0.3
	Onroad Truck Travel	0.7	8.4	3.3	1.1
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>100.3</i>	<i>40.3</i>	<i>25.8</i>	<i>8.4</i>
2023	Area	69.8	0.7	0.4	0.4
	Energy	0.9	8.0	0.6	0.6
	Mobile	22.7	17.0	23.8	7.0
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.6	12.2	0.4	0.4
	Onroad Truck Travel	0.8	9.4	3.9	1.3
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>116.3</i>	<i>47.6</i>	<i>29.1</i>	<i>9.6</i>

Year	Category	Average Daily Emissions (lbs/day)			
		ROG	NOX	PM10 Total	PM2.5 Total
2024	Area	69.8	0.7	0.4	0.4
	Energy	0.9	8.0	0.6	0.6
	Mobile	22.7	17.0	23.8	7.0
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.8	15.2	0.5	0.5
	Onroad Truck Travel	0.7	7.0	3.8	1.2
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	116.3	48.3	29.1	9.7
Significance Threshold		54	54	82	54

Sources:

1. California Air Resources Board. 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available: <<http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf>>.
2. Fehr & Peers. 2016. Screencheck Draft - Transportation Impact Study: Mission Rock (Seawall Lot 337/Pier 48). Prepared for the San Francisco Planning Department. July. San Francisco, CA.
3. United States Environmental Protection Agency. 1996. Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors. 9.12.1 Malt Beverages. Available: <<https://www3.epa.gov/ttnchie1/ap42/>>. Accessed: February 29, 2016.

Notes:

(all table references below refer to tables in the memorandum Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016)

- a. Emissions over threshold levels are in **bold**
- b. Categories defined as follows:

Area = Emissions from landscaping equipment, consumer products, and natural gas fireplaces. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.

Energy = Emissions from natural gas combustion for space heating and cooking. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.

Mobile = Operating emissions from daily resident and commercial truck trips. Refer to Table 10 for the daily vehicle trips by land use type. The trip rates were provided by the *Screencheck Draft- Transportation Impact Study* prepared by the transportation consultants, Fehr & Peers (2016). Emission from resident trips were estimated using CalEEMod; emissions from commercial truck trips were estimated using emission factors from EMFAC2014.

Brewery = Operating emissions from brewing activities. Refer to Table 15 for brewery activity data assumed in the modeling. Emissions were modeled using CalEEMod and emission factors from EMFAC2014.

Generators = Operating emissions from diesel-powered emergency generators. Refer to Table 13 for operating assumptions for the emergency generators. Emissions were modeled using CalEEMod.

On-road Truck Travel = Operating emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed 38 daily haul truck trips. Emissions were estimated using emission factors from EMFAC2014.

On-road Truck Idling = Idling emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed that each truck would idle 5 minutes while unloading materials at the brewery. Emissions were estimated using idling emission factors from EMFAC2011-HD.

Abbreviations:

ROG: reactive organic gases
NO_x: nitrogen oxides

Year	Category	Average Daily Emissions (lbs/day)			
		ROG	NOX	PM10 Total	PM2.5 Total
PM10:	particulate matter less than or equal to 10 microns in diameter				
PM2.5:	particulate matter less than or equal to 2.5 microns in diameter				
lbs:	pounds				

TABLE 38. SUMMARIZED AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NOX	PM10 Exhaust	PM2.5 Exhaust
2017	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0
2019	0.0	0.0	0.0	0.0
2020	46.9	16.2	8.8	3.0
2021	84.2	32.1	21.4	6.9
2022	100.3	40.3	25.8	8.4
2023	116.3	47.6	29.1	9.6
2024 (full buildout)	116.3	48.3	29.1	9.7
Significance Threshold	54	54	82	54

Source:

Refer to Table 37.

Notes:

a. Emissions over threshold levels are in **bold**.

Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 39. MITIGATED AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Category ^c	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Total ^c	PM2.5 Total ^c
2020	Area	14.0	0.2	0.1	0.1
	Energy	0.4	3.2	0.2	0.2
	Mobile	6.6	4.5	5.7	1.7
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.2	3.0	<0.1	<0.1
	Onroad Truck Travel	0.3	3.4	1.2	0.4

Year	Category ^c	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Total ^c	PM2.5 Total ^c
2021	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>42.8</i>	<i>14.8</i>	<i>7.3</i>	<i>2.5</i>
	Area	40.7	0.4	0.2	0.2
	Energy	0.6	5.0	0.4	0.4
	Mobile	12.6	10.3	14.4	4.2
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.3	6.1	<0.1	<0.1
	Onroad Truck Travel	0.6	6.9	2.7	0.9
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>76.3</i>	<i>28.9</i>	<i>17.6</i>	<i>5.7</i>
2022	Area	51.9	0.5	0.2	0.2
	Energy	0.7	6.2	0.5	0.5
	Mobile	15.2	12.2	17.2	5.1
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.5	9.1	<0.1	<0.1
	Onroad Truck Travel	0.7	8.4	3.3	1.1
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>90.4</i>	<i>36.6</i>	<i>21.2</i>	<i>6.9</i>
2023	Area	61.9	0.7	0.4	0.4
	Energy	0.8	7.3	0.6	0.6
	Mobile	18.2	13.6	19.1	5.6
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.6	12.2	<0.1	<0.1
	Onroad Truck Travel	0.8	9.4	3.9	1.3
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>103.8</i>	<i>43.5</i>	<i>23.9</i>	<i>7.9</i>
2024	Area	61.9	0.7	0.4	0.4
	Energy	0.8	7.3	0.6	0.6
	Mobile	18.2	13.6	19.1	5.6
	Brewery	21.4	0.0	0.0	0.0
	Generators	0.8	15.2	<0.1	<0.1
	Onroad Truck Travel	0.7	7.0	3.8	1.2
	Onroad Truck Idling	<0.1	0.3	<0.1	<0.1
	<i>Total</i>	<i>103.8</i>	<i>44.1</i>	<i>23.9</i>	<i>7.8</i>
Significance Threshold		54	54	82	54

Year	Category ^c	Average Daily Emissions (lbs/day)			
		ROG	NO _x	PM10 Total ^c	PM2.5 Total ^c
<u>Sources:</u>					
1. California Air Resources Board. 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available: < http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf >.					
2. Fehr & Peers. 2016. Screencheck Draft - Transportation Impact Study: Mission Rock (Seawall Lot 337/Pier 48). Prepared for the San Francisco Planning Department. July. San Francisco, CA.					
3. United States Environmental Protection Agency. 1996. Emissions Factors & AP 42, Compilation of Air Pollutant Emission Factors. 9.12.1 Malt Beverages. Available: < https://www3.epa.gov/ttnchie1/ap42/ >. Accessed: February 29, 2016.					
<u>Notes:</u>					
<i>(all table references below refer to tables in the memorandum Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016)</i>					
a. Mitigated emissions assume all emergency generators have model year 2008+ engines consistent with ARB California Airborne Toxics Control Measure (ATCM) emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-2.2), and auto vehicle trips are reduced by 20% (Measure AQ-2.3). Does not include effect of Mitigation Measure M-AQ-1.5, which requires ROG offsets.					
b. Categories defined as follows:					
Area = Emissions from landscaping equipment, consumer products, and natural gas fireplaces. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.					
Energy = Emissions from natural gas combustion for space heating and cooking. Refer to Tables 1 and 9 for the land use type and sizes assumed in the modeling. Emissions were modeled using CalEEMod.					
Mobile = Operating emissions from daily resident and commercial truck trips. Refer to Table 10 for the daily vehicle trips by land use type. The trip rates were provided by the <i>Screencheck Draft- Transportation Impact Study</i> prepared by the transportation consultants, Fehr & Peers (2016). Emission from resident trips were estimated using CalEEMod; emissions from commercial truck trips were estimated using emission factors from EMFAC2014.					
Brewery = Operating emissions from brewing activities. Refer to Table 15 for brewery activity data assumed in the modeling. Emissions were modeled using CalEEMod and emission factors from EMFAC2014.					
Generators = Operating emissions from diesel-powered emergency generators. Refer to Table 13 for operating assumptions for the emergency generators. Emissions were modeled using CalEEMod.					
On-road Truck Travel = Operating emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed 38 daily haul truck trips. Emissions were estimated using emission factors from EMFAC2014.					
On-road Truck Idling = Idling emissions from haul trucks used for deliveries to the Pier 48 brewery. The analysis assumed that each truck would idle 5 minutes while unloading materials at the brewery. Emissions were estimated using idling emission factors from EMFAC2011-HD.					
c. PM10 and PM2.5 include both exhaust and dust emissions.					
<u>Abbreviations:</u>					
ROG: reactive organic gases					
NO _x : nitrogen oxides					
PM10: particulate matter less than or equal to 10 microns in diameter					
PM2.5: particulate matter less than or equal to 2.5 microns in diameter					
lbs: pounds					
VDECS: Verified Diesel Emissions Control Strategies					

TABLE 40. SUMMARIZED MITIGATED AVERAGE DAILY OPERATIONAL EMISSIONS BY CATEGORY FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Average Daily Emissions (lbs/day)			
	ROG	NO _x	PM10 Total ^b	PM2.5 Total ^b
2017	0.0	0.0	0.0	0.0
2018	0.0	0.0	0.0	0.0
2019	0.0	0.0	0.0	0.0
2020	42.8	14.8	7.3	2.5
2021	76.3	28.9	17.6	5.7
2022	90.4	36.6	21.2	6.9
2023	103.8	43.5	23.9	7.9
2024 (full buildout)	103.8	44.1	23.9	7.8
Significance Threshold	54	54	82	54

Source:

Refer to Table 39.

Notes:

- a. Mitigated emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.3), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-2.2), and auto vehicle trips are reduced by 20% (Measure AQ-2.3). Does not include effect of Mitigation Measure M-AQ-1.5, which requires ROG offsets.
- b. PM10 and PM2.5 include both exhaust and dust emissions.

Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

VDECS: Verified Diesel Emissions Control Strategies

COMBINED CONSTRUCTION AND OPERATIONAL IMPACTS**TABLE 41. SUMMARIZED AVERAGE DAILY CONSTRUCTION PLUS OPERATIONAL EMISSIONS FOR THE NO CHANGE TO PIER 48 ALTERNATIVE**

Year	Average Daily Emissions (lbs/day)							
	ROG	NO _x	PM10 Exhaust	PM10 Dust ^b	PM10 Total ^c	PM2.5 Exhaust	PM2.5 Dust ^b	PM2.5 Total ^c
2017	1.6	18.8	0.6	0.0	0.6	0.6	0.0	0.6
2018	26.3	60.5	2.3	0.0	2.3	2.2	0.0	2.2
2019	55.0	96.0	3.8	0.0	3.8	3.6	0.0	3.6
2020	93.3	118.3	4.3	8.1	12.5	4.1	2.3	6.5
2021	118.5	101.6	3.6	20.2	23.9	3.5	5.8	9.3
2022	118.1	63.9	2.4	24.3	26.7	2.4	7.0	9.3
2023	120.7	53.5	2.1	27.2	29.3	2.1	7.8	9.8
2024	116.3	48.3	1.9	27.2	29.1	1.9	7.8	9.7
Significance Threshold	54	54	82	82	82	54	54	54

Source:

Refer to Tables 34 and 38.

Notes:

(all table references below refer to tables in the memorandum Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016)

- As shown in Tables 1 and 2 of the AQTR, construction of Area 1 would occur between 2017 and 2020. It was conservatively assumed that structures would be fully occupied immediately following construction and operational emissions associated with Area 1 would begin in 2021. Accordingly, concurrent construction and operational activities would occur between 2021 and 2023, resulting in higher daily emissions than either component when analyzed separately. This table presents emissions for overlapping construction and operational activities to analyze maximum air quality impacts during concurrent activities.
- PM10 and PM2.5 dust only includes dust from operations; construction dust is not included as it is addressed by Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008).
- PM10 and PM2.5 total includes exhaust from both construction and operations and dust from operations only.

Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

TABLE 42. SUMMARIZED MITIGATED AVERAGE DAILY CONSTRUCTION PLUS OPERATIONAL EMISSIONS FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Year	Average Daily Emissions (lbs/day)							
	ROG	NO _x	PM10 Exhaust	PM10 Dust ^c	PM10 Total ^d	PM2.5 Exhaust	PM2.5 Dust ^c	PM2.5 Total ^d
2017	0.5	6.4	<0.1	0.0	<0.1	<0.1	0.0	<0.1
2018	7.3	30.9	0.4	0.0	0.4	0.4	0.0	0.4
2019	15.0	57.9	0.7	0.0	0.7	0.7	0.0	0.7
2020	56.0	82.3	1.4	6.7	8.1	1.3	1.9	3.3
2021	85.8	81.0	1.6	16.7	18.3	1.5	4.8	6.3
2022	95.0	56.1	1.4	20.1	21.5	1.4	5.8	7.1
2023	105.0	48.6	1.5	22.5	24.0	1.5	6.5	7.9
2024	103.8	44.1	1.4	22.5	23.9	1.4	6.5	7.8
Significance Threshold	54	54	82	82	82	54	54	54

Source:

Refer to Tables 36 and 43.

Notes: (all table references below refer to tables in the memorandum Seawall Lot 337/Pier 48 (Mission Rock) Project Air Quality Technical Report: Modeling Data for Emission Results for Alternatives and Variants, October 28, 2016)

- Mitigated emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (Measure AQ-1.1), all haul trucks are model year 2010 or newer (Measure AQ-1.2), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-1.3), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4e). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1), 90% of all architectural coatings have a maximum of 10 grams of volatile organic compounds per liter (Measure AQ-2.2), and auto vehicle trips are reduced by 20% (Measure AQ-2.3). Does not include effect of Mitigation Measure M-AQ-1.5, which requires ROG and NO_x offsets.
- As shown in Tables 1 and 2 of the AQTR, construction of Area 1 would occur between 2017 and 2020. It was conservatively assumed that structures would be fully occupied immediately following construction and operational emissions associated with Area 1 would begin in 2021. Accordingly, concurrent construction and operational activities would occur between 2021 and 2023, resulting in higher daily emissions than either component when analyzed separately. This table presents emissions for overlapping construction and operational activities to analyze maximum air quality impacts during concurrent activities.
- PM10 and PM2.5 dust only includes dust from operations; construction dust is not included as it is addressed by Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008).
- PM10 and PM2.5 total includes exhaust from both construction and operations and dust from operations only.

Abbreviations:

ROG: reactive organic gases

NO_x: nitrogen oxides

PM10: particulate matter less than or equal to 10 microns in diameter

PM2.5: particulate matter less than or equal to 2.5 microns in diameter

lbs: pounds

VDECS: Verified Diesel Emissions Control Strategies

TOXIC AIR CONTAMINANTS**CANCER RISK ANALYSIS (DPM/TOG)****TABLE 43. MAXIMUM LIFETIME EXCESS CANCER RISK WITHIN STUDY AREA AT ONSITE AND OFFSITE RECEPTORS CURRENTLY LOCATED IN THE APEZ DURING EXISTING/FUTURE CONDITIONS FOR THE NO CHANGE TO PIER 48 ALTERNATIVE**

Receptor	Lifetime Excess Cancer Risk (per million) ^{a, b}			
	Onsite Receptors		Offsite Receptors	
	No Change to Pier 48 Alternative	Mitigated ^c	No Change to Pier 48 Alternative	Mitigated ^c
Construction Plus Operation				
<u>2014 Background Analysis</u>				
Total (Background + Project)	-	-	124.2	109.5
Background	-	-	107.2	107.2
Construction Plus Operation Contribution	-	-	17.0	2.3
Significance Threshold for Project Contribution	-	-	7.0	7.0
Above Threshold?	-	-	Yes	No
<u>2025 Background Analysis</u>				
Total (Background + Project)	-	-	174.2	163.3
Background	-	-	161.6	161.6
Construction Plus Operation Contribution	-	-	12.6	1.8
Significance Threshold for Project Contribution	-	-	7.0	7.0
Above Threshold?	-	-	Yes	No

Sources:

CalEEMod modeling, AERMOD modeling, EMFAC2014 modeling, and other off-model calculations discussed in the AQTR and presented in AQTR Appendix B.

Notes:

- a Mitigated construction emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (MM AQ-1.1), all haul trucks are model year 2010 (Measure AQ-1.2), and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1) and auto vehicle trips are reduced by 20% (Measure AQ-2.3).
- b “-” means that a receptor does not meet the criteria for the table. For example, there may not be an onsite receptor that is currently in an APEZ or is placed into an APEZ with only the operational contribution from the proposed project.
- c The mitigated values may represent different receptor locations than the Alternative C values because the highest mitigated values may occur at different locations due to the varying effectiveness of mitigation measures on each individual source of emissions.

Emissions over threshold levels are in **bold**

TABLE 44. MAXIMUM LIFETIME EXCESS CANCER RISK WITHIN STUDY AREA AT ONSITE AND OFFSITE RECEPTORS NOT LOCATED IN THE APEZ DURING EXISTING/FUTURE CONDITIONS BUT WOULD BE LOCATED IN THE APEZ DURING EXISTING/FUTURE PLUS PROPOSED PROJECT CONDITIONS FOR THE NO CHANGE TO PIER 48 ALTERNATIVE

Receptor	Lifetime Excess Cancer Risk (per million) ^{a, b}			
	Onsite Receptors		Offsite Receptors	
	No Change to Pier 48 Alternative	Mitigated ^c	No Change to Pier 48 Alternative	Mitigated ^c
Construction Plus Operation				
<u>2014 Background Analysis</u>				
Total (Background + Project)	193.3	78.7	139.9	101.1
Background	53.0	53.0	73.0	99.5
Construction Plus Operation Contribution	140.3	25.7	66.9	1.6
Significance Threshold for Project Contribution	10.0	N/A ^d	10.0	10.0
Above Threshold?	Yes	N/A ^d	Yes	No
<u>2025 Background Analysis</u>				
Total (Background + Project)	178.1	63.5	116.8	101.6
Background	37.8	37.8	49.9	99.7
Construction Plus Operation Contribution	140.3	25.7	66.9	1.9
Significance Threshold for Project Contribution	10.0	N/A ^d	10.0	10.0
Above Threshold?	Yes	N/A ^d	Yes	No

Sources:

CalEEMod modeling, AERMOD modeling, EMFAC2014 modeling, and other off-model calculations discussed in the AQTR and presented in AQTR Appendix B.

Notes:

- Mitigated construction emissions assume all off-road equipment and all diesel generators have Tier 4 interim engines (MM AQ-1.1), all haul trucks are model year 2010 (Measure AQ-1.2), 90% of and all construction barge engines have Tier 3 engines and all construction work boat engines are model year 2005 or newer (Measure AQ-1.4). Mitigated operational emissions assume all emergency generators have model year 2008+ engines consistent with ARB ATCM emission rates that also meet Tier 2 standards with level 3 VDECS (Measure AQ-2.1) and auto vehicle trips are reduced by 20% (Measure AQ-2.2).
- “-” means that a receptor does not meet the criteria for the table. For example, there may not be an onsite receptor that is currently in an APEZ or is placed into an APEZ with only the operational contribution from the proposed project.
- The mitigated values may represent different receptor locations than the Alternative C values because the highest mitigated values may occur at different locations due to the varying effectiveness of mitigation measures on each individual source of emissions.
- Because this receptor is not placed into an APEZ with the mitigated project contribution (i.e. the total background plus project lifetime excess cancer risk is less than the APEZ threshold of 100), the project-level threshold does not apply.

Emissions over threshold levels are in **bold**