Appendix J

Noise Supplemental Information

Estimated Distances to 55 CNEL Traffic Noise Contour in the Highway Transportation Corridors (feet from roadway edge)

	Highway Segment	Existing	Existing-plus-Alternative 1	Existing-plus-Alternative 2	Existing-plus-Alternative 3	Existing-plus-Alternative 4 (No Project)	Cumulative-plus-Alternative 1	Cumulative-plus-Alternative 2	Cumulative-plus-Alternative 3	Cumulative-plus-Alternative 4 (No Project)	Cumulatively Considerable? Alt 1	Alt 2	Alt 3
L	SR 89 between West of Tahoe City and 0	371	381	380	381	379	421	418	419	410	yes	yes	no
	SR 89 between Fanny Bridge and Sunnyside	343	347	346	347	348	368	367	368	362	yes	yes	no
L	SR 89 between Mackinaw Road and SR 28	241	131	131	133	138	137	137	139	138			
	SR 28 between East of SR 89 and 0	201	208	203	212	216	226	221	230	228			
L	SR 28 between West Lake Boulevard and Mackinaw Road	200	207	202	211	219	225	220	229	227			
L	SR 28 between Mackinaw Road and Grove Street	200	205	202	209	219	220	217	224	232			
L	SR 28 between Grove Street and Jackpine Street	224	223	221	226	227	241	238	243	240			
	SR 28 between Dollar Hill and Tahoe Vista	281	292	295	296	302	307	310	311	310	no	no	yes
	SR 28 between Beach Street and SR 267	296	307	310	310	313	322	325	326	325	no	no	yes
	SR 28 between East of SR 267 and 0	356	359	354	359	361	376	372	377	375	yes	no	yes
	SR 28 between SR 267 and Bear Street	355	357	353	358	360	375	371	376	374	yes	no	yes
	SR 28 between Bear Street and Coon Street	280	288	289	280	294	299	299	290	300			
	SR 28 between Coon Street and Fox Street	265	267	268	260	272	276	277	269	277			
	SR 267 between North of SR 28 and 0	289	298	302	304	302	325	329	330	329	no	no	yes

Notes

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol.

Hoover & Keith Inc. 2000. Noise Control for Buildings and Manufacturing Plants. Houston, TX. Available:
http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_Nois

Source Files

Existing-plus-Alt Traffic Noise Levels.xlsx

Cumulative-plus-Alt Traffic Noise Levels.xlsx

Summary of Modeled Traffic Noise Levels 300 Feet from Roadway Edge

Highway Segment	Existing	Existing-plus-Alternative 1	Existing-plus-Alternative 2	Existing-plus-Alternative 3	Existing-plus-Alternative 4	Cumulative-plus-Alternative 1	Cumulative-plus-Alternative 2	Cumulative-plus-Alternative 3	Cumulative-plus-Alternative 4
SR 89 between West of Tahoe City and 0	56	56	56	56	56	57	57	57	57
SR 89 between Fanny Bridge and Sunnyside	55	56	56	56	56	56	56	56	56
SR 89 between Mackinaw Road and SR 28	53	49	49	49	49	49	49	49	49
SR 28 between East of SR 89 and 0	52	52	52	52	53	53	53	53	53
SR 28 between West Lake Boulevard and Mackinaw Road	52	52	52	52	52	53	52	53	53
SR 28 between Mackinaw Road and Grove Street	52	52	52	52	52	52	52	53	53
SR 28 between Grove Street and Jackpine Street	53	52	52	53	53	53	53	53	53
SR 28 between Dollar Hill and Tahoe Vista	54	55	55	55	55	55	55	55	55
SR 28 between Beach Street and SR 267	54	54	55	55	55	55	55	55	55
SR 28 between East of SR 267 and 0	56	56	56	56	56	56	56	56	56
SR 28 between SR 267 and Bear Street	56	56	56	56	56	56	56	56	56
SR 28 between Coon Street and Fox Street	54	54	54	54	54	55	55	54	55
SR 28 between Bear Street and Coon Street	54	54	54	54	54	54	54	54	54
SR 267 between North of SR 28 and 0	54	55	55	55	55	55	55	55	55

Notes

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol.
Hoover & Keith Inc. 2000. Noise Control for Buildings and Manufacturing Plants. Houston, TX. Available:

Source Files

Existing-plus-Alt Traffic Noise Levels.xlsx
Cumulative-plus-Alt Traffic Noise Levels.xlsx

Estimated Distances to 60 CNEL and 65 CNEL Traffic Noise Contour in the Highway Transportation Corridors (feet from roadway edge)

		Existing		Existing-plus-Alternative 1			Existing-plus-Alternative 2			Existing-plus-Alternative 3			Existing-plus-Alternative 4 (No Project)			Cumulative-plus-Alternative 1			Cumulative-plus-Alternative 2			Cumulative-plus-Alternative 3			Cumulative-plus-Alternative 4 (No Project)		
	Highway Segment	60 CNEL	65 CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL
1	SR 89 between West of Tahoe City and 0	172	80	177	82	5	176	82	4	177	82	5	176	82	4	195	91	23	194	90	22	195	90	23	190	88	18
2	SR 89 between Fanny Bridge and Sunnyside	159	74	161	75	2	161	75	2	161	75	2	161	75	2	171	79	12	170	79	11	171	79	12	168	78	9
3	SR 89 between Mackinaw Road and SR 28	112	52	61	28	-51	61	28	-51	62	29	-50	64	30	-48	64	30	-48	63	29	-49	65	30	-47	64	30	-48
4	SR 28 between East of SR 89 and 0	93	43	96	45	3	94	44	1	99	46	6	100	46	7	105	49	12	103	48	10	107	49	14	106	49	13
5	SR 28 between West Lake Boulevard and Mackinaw Road	93	43	96	45	3	94	44	1	98	46	5	102	47	9	104	48	11	102	47	9	106	49	13	105	49	12
6	SR 28 between Mackinaw Road and Grove Street	93	43	95	44	2	94	44	1	97	45	4	102	47	9	102	47	9	101	47	8	104	48	11	108	50	15
7	SR 28 between Grove Street and Jackpine Street	104	48	104	48	0	103	48	-1	105	49	1	106	49	2	112	52	8	111	51	7	113	52	9	112	52	8
8	SR 28 between Dollar Hill and Tahoe Vista	131	61	136	63	5	137	64	6	138	64	7	140	65	9	142	66	11	144	67	13	144	67	13	144	67	13
9	SR 28 between Beach Street and SR 267	137	64	142	66	5	144	67	7	144	67	7	145	67	8	149	69	12	151	70	14	151	70	14	151	70	14
10	SR 28 between East of SR 267 and 0	165	77	166	77	1	164	76	-1	167	77	2	168	78	3	175	81	10	173	80	8	175	81	10	174	81	9
11	SR 28 between SR 267 and Bear Street	165	76	166	77	1	164	76	-1	166	77	1	167	78	2	174	81	9	172	80	7	174	81	9	174	81	9
12	SR 28 between Bear Street and Coon Street	130	60	134	62	4	134	62	4	130	60	0	136	63	6	139	64	9	139	65	9	135	63	5	139	65	9
13	SR 28 between Coon Street and Fox Street	123	57	124	58	1	124	58	1	121	56	-2	126	59	3	128	59	5	128	60	5	125	58	2	128	60	5
14	SR 267 between North of SR 28 and 0	134	62	138	64	4	140	65	6	141	65	7	140	65	6	151	70	17	153	71	19	153	71	19	153	71	19
	MIN			95	44		94	44		97	45		102	47		64	30		63	29		65	30		64	30	
	MAX			177	82		176	82		177	82		176	82		195	91		194	90		195	90		190	88	

Notes:
ft = feet

Notes

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All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol.
Hoover & Keith Inc. 2000. Noise Control for Buildings and Manufacturing Plants. Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Notes

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Hoover & Keith Inc. 2000. Noise Control for Buildings and Manufacturing Plants. Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Source Files

Existing-plus-Alt Traffic Noise Levels.xlsx
Cumulative-plus-Alt Traffic Noise Levels.xlsx

Traffic Noise Spreadsheet Calculator

Project: Existing Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	CNEL, (dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		16,800	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.0	37	80	172	371
2	SR 89	Fanny Bridge	Sunnyside	22,300	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.5	34	74	159	343
3	SR 89	Mackinaw Road	SR 28	22,300	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	53.0	24	52	112	241
4	SR 28	East of SR 89		16,900	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.1	20	43	93	201
5	SR 28	West Lake Boulevard	Mackinaw Road	16,900	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	51.8	20	43	93	200
6	SR 28	Mackinaw Road	Grove Street	16,900	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	51.8	20	43	93	200
7	SR 28	Grove Street	Jackpine Street	20,000	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.5	22	48	104	224
8	SR 28	Dollar Hill	Tahoe Vista	13,700	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.3	28	61	131	281
9	SR 28	Beach Street	SR 267	21,300	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.2	30	64	137	296
10	SR 28	East of SR 267		28,000	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	165	356
11	SR 28	SR 267	Bear Street	28,000	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.7	35	76	165	355
12	SR 28	Bear Street	Coon Street	19,500	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.1	28	60	130	280
13	SR 28	Coon Street	Fox Street	18,000	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.8	27	57	123	265
14	SR 267	North of SR 28		14,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.4	29	62	134	289

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California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available:
http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Existing-plus-Area Plan Alternative 1 Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		17,500	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.2	38	82	177	381
2	SR 89	Fanny Bridge	Sunnyside	22,700	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.6	35	75	161	347
3	SR 89	Mackinaw Road	SR 28	8,900	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.0	13	28	61	131
4	SR 28	East of SR 89		17,700	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.3	21	45	96	208
5	SR 28	West Lake Boulevard	Mackinaw Road	17,700	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.0	21	45	96	207
6	SR 28	Mackinaw Road	Grove Street	17,500	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.0	21	44	95	205
7	SR 28	Grove Street	Jackpine Street	19,900	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.5	22	48	104	223
8	SR 28	Dollar Hill	Tahoe Vista	14,500	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.6	29	63	136	292
9	SR 28	Beach Street	SR 267	22,500	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.4	31	66	142	307
10	SR 28	East of SR 267		28,300	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	166	359
11	SR 28	SR 267	Bear Street	28,300	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	166	357
12	SR 28	Bear Street	Coon Street	20,400	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.3	29	62	134	288
13	SR 28	Coon Street	Fox Street	18,200	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.9	27	58	124	267
14	SR 267	North of SR 28		14,700	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.6	30	64	138	298

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

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http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Existing-plus-Area Plan Alternative 2 Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		17,400	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.2	38	82	176	380
2	SR 89	Fanny Bridge	Sunnyside	22,600	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.5	35	75	161	346
3	SR 89	Mackinaw Road	SR 28	8,900	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.0	13	28	61	131
4	SR 28	East of SR 89		17,100	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.2	20	44	94	203
5	SR 28	West Lake Boulevard	Mackinaw Road	17,100	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	51.8	20	44	94	202
6	SR 28	Mackinaw Road	Grove Street	17,100	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	51.9	20	44	94	202
7	SR 28	Grove Street	Jackpine Street	19,600	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.4	22	48	103	221
8	SR 28	Dollar Hill	Tahoe Vista	14,700	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.6	29	64	137	295
9	SR 28	Beach Street	SR 267	22,900	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.5	31	67	144	310
10	SR 28	East of SR 267		27,800	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.7	35	76	164	354
11	SR 28	SR 267	Bear Street	27,800	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.7	35	76	164	353
12	SR 28	Bear Street	Coon Street	20,500	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.3	29	62	134	289
13	SR 28	Coon Street	Fox Street	18,300	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.9	27	58	124	268
14	SR 267	North of SR 28		15,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.7	30	65	140	302

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available:
http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Existing-plus-Area Plan Alternative 3 Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

Number	Name	Segment Description and Location: From	To	ADT	Speed (mph)	Distance to Directional Centerline, (feet)[4]: Near	Far	Traffic Distribution Characteristics: % Auto	% Medium	% Heavy	% Day	% Eve	% Night	CNEL, (dBA)[5,6,7]	Distance to Contour, (feet)[3]: 70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		17,500	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.2	38	82	177	381
2	SR 89	Fanny Bridge	Sunnyside	22,700	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.6	35	75	161	347
3	SR 89	Mackinaw Road	SR 28	9,100	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.1	13	29	62	133
4	SR 28	East of SR 89		18,300	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.5	21	46	99	212
5	SR 28	West Lake Boulevard	Mackinaw Road	18,300	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.1	21	46	98	211
6	SR 28	Mackinaw Road	Grove Street	18,000	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.1	21	45	97	209
7	SR 28	Grove Street	Jackpine Street	20,300	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.6	23	49	105	226
8	SR 28	Dollar Hill	Tahoe Vista	14,800	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.7	30	64	138	296
9	SR 28	Beach Street	SR 267	22,900	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.5	31	67	144	310
10	SR 28	East of SR 267		28,400	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	167	359
11	SR 28	SR 267	Bear Street	28,400	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	166	358
12	SR 28	Bear Street	Coon Street	19,500	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.1	28	60	130	280
13	SR 28	Coon Street	Fox Street	17,500	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.7	26	56	121	260
14	SR 267	North of SR 28		15,100	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.7	30	65	141	304

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available:
http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Existing-plus-Area Plan Alternative 4 (No Project) Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		17,346	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.2	38	82	176	379
2	SR 89	Fanny Bridge	Sunnyside	22,737	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.6	35	75	161	348
3	SR 89	Mackinaw Road	SR 28	9,637	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.4	14	30	64	138
4	SR 28	East of SR 89		18,737	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.6	22	46	100	216
5	SR 28	West Lake Boulevard	Mackinaw Road	19,283	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.3	22	47	102	219
6	SR 28	Mackinaw Road	Grove Street	19,337	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.4	22	47	102	219
7	SR 28	Grove Street	Jackpine Street	20,437	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.6	23	49	106	227
8	SR 28	Dollar Hill	Tahoe Vista	15,210	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.8	30	65	140	302
9	SR 28	Beach Street	SR 267	23,200	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.6	31	67	145	313
10	SR 28	East of SR 267		28,600	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.8	36	78	168	361
11	SR 28	SR 267	Bear Street	28,600	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.8	36	78	167	360
12	SR 28	Bear Street	Coon Street	21,000	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.4	29	63	136	294
13	SR 28	Coon Street	Fox Street	18,700	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.0	27	59	126	272
14	SR 267	North of SR 28		15,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.7	30	65	140	302

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Citation	Reference	
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Pg 4-17.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Equation (4-5), Pg 4-17.
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.	
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.	
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-23), Pg 2-51, 52.
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-24), Pg 2-53.
7	Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53.	Caltrans Technical Noise Supplement. 2013 (September). Pg 2-57.
8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.	
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.	
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.	
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.	
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.	
13	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (16), Pg 67	
14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69	
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69	

Traffic Noise Spreadsheet Calculator

Project: Cumulative-plus-Area Plan Alternative 1 Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	CNEL, (dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		20,300	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.8	42	91	195	421
2	SR 89	Fanny Bridge	Sunnyside	24,800	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.9	37	79	171	368
3	SR 89	Mackinaw Road	SR 28	9,600	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.3	14	30	64	137
4	SR 28	East of SR 89		20,100	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.9	23	49	105	226
5	SR 28	West Lake Boulevard	Mackinaw Road	20,100	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.5	22	48	104	225
6	SR 28	Mackinaw Road	Grove Street	19,500	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.4	22	47	102	220
7	SR 28	Grove Street	Jackpine Street	22,300	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	53.0	24	52	112	241
8	SR 28	Dollar Hill	Tahoe Vista	15,600	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.9	31	66	142	307
9	SR 28	Beach Street	SR 267	24,200	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.8	32	69	149	322
10	SR 28	East of SR 267		30,400	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	56.1	38	81	175	376
11	SR 28	SR 267	Bear Street	30,400	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	56.1	37	81	174	375
12	SR 28	Bear Street	Coon Street	21,500	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.5	30	64	139	299
13	SR 28	Coon Street	Fox Street	19,100	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.1	28	59	128	276
14	SR 267	North of SR 28		16,700	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	55.1	32	70	151	325

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Cumulative-plus-Area Plan Alternative 2 Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		20,100	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.8	42	90	194	418
2	SR 89	Fanny Bridge	Sunnyside	24,700	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.9	37	79	170	367
3	SR 89	Mackinaw Road	SR 28	9,500	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.3	14	29	63	137
4	SR 28	East of SR 89		19,500	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.8	22	48	103	221
5	SR 28	West Lake Boulevard	Mackinaw Road	19,500	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.4	22	47	102	220
6	SR 28	Mackinaw Road	Grove Street	19,000	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.3	22	47	101	217
7	SR 28	Grove Street	Jackpine Street	21,900	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.9	24	51	111	238
8	SR 28	Dollar Hill	Tahoe Vista	15,800	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.9	31	67	144	310
9	SR 28	Beach Street	SR 267	24,600	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.8	33	70	151	325
10	SR 28	East of SR 267		29,900	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	56.0	37	80	173	372
11	SR 28	SR 267	Bear Street	29,900	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	56.0	37	80	172	371
12	SR 28	Bear Street	Coon Street	21,600	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.5	30	65	139	299
13	SR 28	Coon Street	Fox Street	19,200	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.1	28	60	128	277
14	SR 267	North of SR 28		17,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	55.2	33	71	153	329

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Cumulative-plus-Area Plan Alternative 3 Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		20,200	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.8	42	90	195	419
2	SR 89	Fanny Bridge	Sunnyside	24,800	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.9	37	79	171	368
3	SR 89	Mackinaw Road	SR 28	9,800	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.4	14	30	65	139
4	SR 28	East of SR 89		20,600	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.0	23	49	107	230
5	SR 28	West Lake Boulevard	Mackinaw Road	20,600	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.6	23	49	106	229
6	SR 28	Mackinaw Road	Grove Street	20,000	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.5	22	48	104	224
7	SR 28	Grove Street	Jackpine Street	22,600	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	53.0	24	52	113	243
8	SR 28	Dollar Hill	Tahoe Vista	15,900	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.0	31	67	144	311
9	SR 28	Beach Street	SR 267	24,700	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.8	33	70	151	326
10	SR 28	East of SR 267		30,500	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	56.1	38	81	175	377
11	SR 28	SR 267	Bear Street	30,500	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	56.1	38	81	174	376
12	SR 28	Bear Street	Coon Street	20,600	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.3	29	63	135	290
13	SR 28	Coon Street	Fox Street	18,400	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.9	27	58	125	269
14	SR 267	North of SR 28		17,100	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	55.2	33	71	153	330

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Traffic Noise Spreadsheet Calculator

Project: Cumulative-plus-Area Plan Alternative 4 (No Project) Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	West of Tahoe City		19,500	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.7	41	88	190	410
2	SR 89	Fanny Bridge	Sunnyside	24,200	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.8	36	78	168	362
3	SR 89	Mackinaw Road	SR 28	9,700	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	49.4	14	30	64	138
4	SR 28	East of SR 89		20,400	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.0	23	49	106	228
5	SR 28	West Lake Boulevard	Mackinaw Road	20,400	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.6	23	49	105	227
6	SR 28	Mackinaw Road	Grove Street	21,100	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.8	23	50	108	232
7	SR 28	Grove Street	Jackpine Street	22,200	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	53.0	24	52	112	240
8	SR 28	Dollar Hill	Tahoe Vista	15,800	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.9	31	67	144	310
9	SR 28	Beach Street	SR 267	24,500	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.8	32	70	151	325
10	SR 28	East of SR 267		30,300	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	56.1	38	81	174	375
11	SR 28	SR 267	Bear Street	30,300	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	56.1	37	81	174	374
12	SR 28	Bear Street	Coon Street	21,700	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.6	30	65	139	300
13	SR 28	Coon Street	Fox Street	19,200	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.1	28	60	128	277
14	SR 267	North of SR 28		17,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	55.2	33	71	153	329

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). *Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol* .

Hoover & Keith Inc. 2000. *Noise Control for Buildings and Manufacturing Plants* . Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Citation	Reference	
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Pg 4-17.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Equation (4-5), Pg 4-1
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.	
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.	
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-23), Pg 2-5
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-24), Pg 2-5
7	Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53.	Caltrans Technical Noise Supplement. 2013 (September). Pg 2-57.
8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.	
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.	
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.	
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.	
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.	
13	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (16), Pg 67	
14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69	
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69	

Estimated Distances to 55, 60, and 65 CNEL Traffic Noise Contour sin the Highway Transportation Corridors with Lodge Alternative 4 (feet from roadway edge)

	Existing			Existing-plus-Alternative 4 (No Project)			
	55 CNEL	60 CNEL	65 CNEL	55 CNEL	60 CNEL	65 CNEL	increase in distance to 60CNEL
Highway Segment							
SR 89 from West of Tahoe City to	371	172	80	379	176	82	4
SR 89 from Fanny Bridge to Sunnyside	343	159	74	350	162	75	3
SR 89 from Mackinaw Road to SR 28	241	112	52	246	114	53	2
SR 28 from East of SR 89 to	201	93	43	206	96	44	3
SR 28 from West Lake Boulevard to Mackinaw Road	200	93	43	210	97	45	4
SR 28 from Mackinaw Road to Grove Street	200	93	43	205	95	44	2
SR 28 from Grove Street to Jackpine Street	224	104	48	229	106	49	2
SR 28 from Dollar Hill to Tahoe Vista	281	131	61	288	134	62	3
SR 28 from Beach Street to SR 267	296	137	64	299	139	64	2
SR 28 from East of SR 267 to	356	165	77	359	167	77	2
SR 28 from SR 267 to Bear Street	355	165	76	358	166	77	1
SR 28 from Bear Street to Coon Street	280	130	60	284	132	61	2
SR 28 from Coon Street to Fox Street	265	123	57	269	125	58	2
SR 267 from North of SR 28 to	289	134	62	289	134	62	0
Notes:					95	44	
ft = feet					176	82	

Notes

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

California Department of Transportation. 2013. (September). Technical Noise Supplement (TeNS). Technical supplement to the Traffic Noise Analysis Protocol.

Hoover & Keith Inc. 2000. Noise Control for Buildings and Manufacturing Plants. Houston, TX. Available: http://www.co.monterey.ca.us/planning/major/Pebble%20Beach%20Company/Pebble_Beach_DEIR_Nov_2011/Pebble_Beach_DEIR_Admin_Records_Nov_2011/Hoover/Hoover_Keith_2000_NoiseControl.pdf. Accessed March 14, 2016.

Notes

*All modeling assumes average pavement, level roadways

All traffic noise modeling assumes average pavement, level

California Department of Transportation. 2013. (September).

Hoover & Keith Inc. 2000. Noise Control for Buildings and

Source Files

Existing-plus-Alt Traffic Noise Levels.xlsx

Cumulative-plus-Alt Traffic Noise Levels.xlsx

Traffic Noise Spreadsheet Calculator

Project: Existing Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output			
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	Mackinaw Road	SR 28	22,300	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	53.0	24	52	112	241
2	SR 28	West Lake Boulevard	Mackinaw Road	16,900	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	51.8	20	43	93	200
3	SR 28	Mackinaw Road	Grove Street	16,900	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	51.8	20	43	93	200
4	SR 28	Grove Street	Jackpine Street	20,000	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.5	22	48	104	224
5	SR 28	Beach Street	SR 267	21,300	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.2	30	64	137	296
6	SR 28	SR 267	Bear Street	28,000	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.7	35	76	165	355
7	SR 28	Bear Street	Coon Street	19,500	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.1	28	60	130	280
8	SR 28	Coon Street	Fox Street	18,000	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.8	27	57	123	265
9	SR 89	West of Tahoe City		16,800	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.0	37	80	172	371
10	SR 89	Fanny Bridge	Sunnyside	22,300	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.5	34	74	159	343
11	SR 28	East of SR 89		16,900	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.1	20	43	93	201
12	SR 28	Dollar Hill	Tahoe Vista	13,700	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.3	28	61	131	281
13	SR 28	East of SR 267		28,000	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	165	356
14	SR 267	North of SR 28		14,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.4	29	62	134	289

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

Traffic Noise Spreadsheet Calculator

Project: Existing-plus-Lodge Alternative 4 (No Project) Conditions

Noise Level Descriptor: CNEL
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

				Input											Output			
		Segment Description and Location				Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
#REF!																		
1	SR 89	Mackinaw Road	SR 28	22,937	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	53.1	25	53	114	246
2	SR 28	West Lake Boulevard	Mackinaw Road	18,083	25	330	330	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.0	21	45	97	210
3	SR 28	Mackinaw Road	Grove Street	17,537	25	328	328	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.0	21	44	95	205
4	SR 28	Grove Street	Jackpine Street	20,637	25	329	329	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	52.6	23	49	106	229
5	SR 28	Beach Street	SR 267	21,700	30	334	334	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.3	30	64	139	299
6	SR 28	SR 267	Bear Street	28,400	30	317	317	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	166	358
7	SR 28	Bear Street	Coon Street	19,900	30	321	321	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	54.2	28	61	132	284
8	SR 28	Coon Street	Fox Street	18,400	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	53.9	27	58	125	269
9	SR 89	West of Tahoe City		17,346	35	317	317	92.6%	5.2%	2.2%	76.4%	11.8%	11.8%	56.2	38	82	176	379
10	SR 89	Fanny Bridge	Sunnyside	22,937	35	319	319	98.4%	1.2%	0.4%	76.4%	11.8%	11.8%	55.6	35	75	162	350
11	SR 28	East of SR 89		17,537	25	312	312	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	52.3	21	44	96	206
12	SR 28	Dollar Hill	Tahoe Vista	14,210	35	312	312	96.4%	2.2%	1.4%	76.4%	11.8%	11.8%	54.5	29	62	134	288
13	SR 28	East of SR 267		28,400	30	317	317	96.3%	2.3%	1.4%	76.4%	11.8%	11.8%	55.8	36	77	167	359
14	SR 267	North of SR 28		14,000	35	319	319	96.8%	1.4%	1.8%	76.4%	11.8%	11.8%	54.4	29	62	134	289

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

All traffic noise modeling assumes average pavement, level roadways (less than 1.5% grade), and constant traffic flow. Estimated distances to the 55 CNEL contour do not account for shielding provided by stands of evergreen trees or buildings located along the modeled roadway segments or any other types of site-specific features. Studies have found that a dense stand of trees can provide additional noise reduction of 5 to 7 dB between a receiver and a noise source (Hoover & Keith Inc. 2000:6-9, as cited in Caltrans 2013:7-8). Generally, for an at-grade facility in an average developed area where the first row of buildings covers at least 40% of total area (i.e., no more than 60% spacing), the reduction provided by the first row is reasonably assumed to be 3 dBA, with 1.5 dBA for each additional row (Caltrans 2013:2-35).

Citation	Reference
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60. Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Pg 4-17.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60. Caltrans Technical Noise Supplement. 2013 (September). Equation (4-5), Pg 4-1
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56. Caltrans Technical Noise Supplement. 2013 (September). Equation (2-23), Pg 2
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57. Caltrans Technical Noise Supplement. 2013 (September). Equation (2-24), Pg 2
7	Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53. Caltrans Technical Noise Supplement. 2013 (September). Pg 2-57.
8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.
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14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69

Construction Source Noise Prediction Model

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
Threshold	2,848	55.0
Private Residence 1	150	80.6
Tahoe Marina Lodge	200	78.1

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Scraper	85	1
Dozer	85	1
Dump Truck	84	0.4
Backhoe	80	0.4
Paver	85	0.4
Concrete Mixer Truck	85	0.4

Ground Type	HARD
Source Height	12
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Scraper	85.0
Dozer	85.0
Dump Truck	80.0
Backhoe	76.0
Paver	81.0
Concrete Mixer Truck	81.0
Combined Predicted Noise Level (L_{eq} dBA at 50 feet)	
	90.1

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Auger Drill Rig	20	85	84	36	79.0	72.0	100	78.0	71.0
Backhoe	40	80	78	372	74.0	70.0	100	72.0	68.0
Bar Bender	20	80	na	0	74.0	67.0	100		
Blasting	na	94	na	0	88.0		100		
Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Compactor (ground)	20	80	83	57	74.0	67.0	100	77.0	70.0
Compressor (air)	40	80	78	18	74.0	70.0	100	72.0	68.0
Concrete Batch Plant	15	83	na	0	77.0	68.7	100		
Concrete Mixer Truck	40	85	79	40	79.0	75.0	100	73.0	69.0
Concrete Pump Truck	20	82	81	30	76.0	69.0	100	75.0	68.0
Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Generator (<25KVA, VMS si	50	70	73	74	64.0	61.0	100	67.0	64.0
Gradall	40	85	83	70	79.0	75.0	100	77.0	73.0
Grader	40	85	na	0	79.0	75.0	100		
Grapple (on Backhoe)	40	85	87	1	79.0	75.0	100	81.0	77.0
Horizontal Boring Hydr. Jac	25	80	82	6	74.0	68.0	100	76.0	70.0
Hydra Break Ram	10	90	na	0	84.0	74.0	100		
Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
Mounted Impact Hammer (	20	90	90	212	84.0	77.0	100	84.0	77.0
Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0
Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Pumps	50	77	81	17	71.0	68.0	100	75.0	72.0
Refrigerator Unit	100	82	73	3	76.0	76.0	100	67.0	67.0
Rivit Buster/chipping gun	20	85	79	19	79.0	72.0	100	73.0	66.0
Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
Sand Blasting (Single Nozzle	20	85	96	9	79.0	72.0	100	90.0	83.0
Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Soil Mix Drill Rig	50	80	na	0	74.0	71.0	100		
Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Excavator (Vac-tru	40	85	85	149	79.0	75.0	100	79.0	75.0
Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
Ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibrating Hopper	50	85	87	1	79.0	76.0	100	81.0	78.0
Vibratory Concrete Mixer	20	80	80	1	74.0	67.0	100	74.0	67.0
Vibratory Pile Driver	20	95	101	44	89.0	82.0	100	95.0	88.0
Warning Horn	5	85	83	12	79.0	66.0	100	77.0	64.0
Welder / Torch	40	73	74	5	67.0	63.0	100	68.0	64.0

Source:
FHWA Roadway Construction Noise Model, January 2006. Table 9.1
U.S. Department of Transportation
CA/T Construction Spec. 721.560

Distance Propagation Calculations for Stationary Sources of Ground Vibration

KEY: Orange cells are for input.

Grey cells are intermediate calculations performed by the model.

Green cells are data to present in a written analysis (output).

STEP 1: Determine units in which to perform calculation.

— If vibration decibels (VdB), then use Table A and proceed to Steps 2A and 3A.

— If peak particle velocity (PPV), then use Table B and proceed to Steps 2B and 3B.

STEP 2A: Identify the vibration source and enter the reference vibration level (VdB) and distance.

STEP 3A: Select the distance to the receiver.

Table A. Propagation of vibration decibels (VdB) with distance

Noise Source/ID	Reference Noise Level			Attenuated Noise Level at Receptor			
	vibration level (VdB)	@	distance (ft)	vibration level (VdB)	@	distance (ft)	
large bull dozer	87.0	@	25	83.0	@	34.0	human annoyance
loaded truck	86.0	@	25	82.8	@	32.0	
small bulldozer	58.0	@	25	82.9	@	3.7	
Test	52.0	@	25	79.6	@	3	house on Fairfield Drive is further than 43 feet.

STEP 2B: Identify the vibration source and enter the reference peak particle velocity (PPV) and distance.

STEP 3B: Select the distance to the receiver.

Table B. Propagation of peak particle velocity (PPV) with distance

Noise Source/ID	Reference Noise Level			Attenuated Noise Level at Receptor			
	vibration level (PPV)	@	distance (ft)	vibration level (PPV)	@	distance (ft)	
large bull dozer	0.089	@	25	0.201	@	14.5	structural damage
loaded truck	0.076	@	25	0.203	@	13.0	
small bulldozer	0.003	@	25	0.007	@	14.5	
Test	0.050	@	25	0.198	@	10	

Notes:

Computation of propagated vibration levels is based on the equations presented on pg. 12-11 of FTA 2006. Estimates of attenuated vibration levels do not account for reductions from intervening underground barriers or other underground structures of any type, or changes in soil type.

Sources:

Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.

Attenuation Calculations for Stationary Noise Sources

KEY: Orange cells are for input.

Grey cells are intermediate calculations performed by the model.

Green cells are data to present in a written analysis (output).

STEP 1: Identify the noise source and enter the reference noise level (dBA and distance).

STEP 2: Select the ground type (hard or soft), and enter the source and receiver heights.

STEP 3: Select the distance to the receiver.

Noise Source/ID	Reference Noise Level			Attenuation Characteristics				Attenuated Noise Level at Receptor		
	noise level (dBA)	@	distance (ft)	Ground Type (soft/hard)	Source Height (ft)	Receiver Height (ft)	Ground Factor	noise level (dBA)	@	distance (ft)
Amplified outdoor music at EXISTING golf course clubhouse										
hourly Leq	70	@	50	soft	5	5	0.58	54	@	200
Lmax	75	@	50	soft	5	5	0.58	59	@	200
CNEL	65	@	50	soft	5	5	0.58	49	@	200
Amplified outdoor music at Proposed golf course clubhouse							0.66			
hourly Leq	70	@	50	soft	5	5	0.58	58	@	150
Lmax	75	@	50	soft	5	5	0.58	63	@	150
CNEL	65	@	50	soft	5	5	0.58	53	@	150
Applicable Standards at Residence										
hourly Leq, daytime	50									
hourly Leq, nighttime	40									
Lmax, daytime	65									
Lmax, nighttime	60									
TRPA CNEL thershold	55									

Notes:

The reference noise levels are from j.c. brennan & associates 2015, p. 12.

Based on other noise analyses of outdoor events, it is estimated that the Lmax nosie levels would be approximately 5 dB greater than hourly Leq noise levels. See Bollard Acoustic Consultants 2015, p.13, 15.

Estimates of attenuated noise levels do not account for reductions from intervening barriers, including walls, trees, vegetation, or structures of any type.

Computation of the attenuated noise level is based on the equation presented on pg. 12-3 and 12-4 of FTA 2006.

Computation of the ground factor is based on the equation presentd in Figure 6-23 on pg. 6-23 of FTA 2006, where the distance of the reference noise leve can be adjusted and the usage factor is not applied (i.e., the usage factor is equal to 1).

Sources:

Bollard Acoustic Consultants. 2015 (February 5). Environmental Noise Assessment for Saint James Park Outdoor Music Events. Available at https://www.sanjoseca.gov/DocumentCenter/View/55581. Accessed May 26, 2016.

Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.

J.C. Brennan & Associates. 2016 (May) 17. Tahoe Public Utility District Winter Sports Park Ice Skating Rink Environmental Noise Assessment. Available as Appendix D at https://tcicerink.files.wordpress.com/2016/05/3-wsp-ice-rink_-is.pdf. Accessed May 27, 2016.