Appendix NOI

Supporting Noise Information

Noise Setting

Noise

Setting

a. Overview of Sound Measurement

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment (California Department of Transportation [Caltrans] 2013).

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 Hertz and less sensitive to frequencies around and below 100 Hertz (Kinsler, et. al. 1999). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dBA; reducing the energy in half would result in a 3 dBA decrease (Crocker 2007).

Human perception of noise has no simple correlation with sound energy: the perception of sound is not linear in terms of dBA or in terms of sound energy. Two sources do not “sound twice as loud” as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA, increase or decrease (i.e., twice the sound energy); that a change of 5 dBA is readily perceptible (eight times the sound energy); and that an increase (or decrease) of 10 dBA sounds twice (half) as loud (10.5 times the sound energy) (Crocker 2007).

Sound changes in both level and frequency spectrum as it travels from the source to the receiver. The most obvious change is the decrease in level as the distance from the source increases. The manner by which noise reduces with distance depends on factors such as the type of sources (e.g., point or line, the path the sound will travel, site conditions, and obstructions). Noise levels from a point source typically attenuate, or drop off, at a rate of 6 dBA per doubling of distance (e.g., construction, industrial machinery, ventilation units). Noise from a line source (e.g., roadway, pipeline, railroad) typically attenuates at about 3 dBA per doubling of distance (Caltrans 2013). The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site, such as a parking lot or smooth body of water, receives no additional ground attenuation and the changes in noise levels with distance (drop-off rate) result from simply the geometric spreading of the source. An additional ground attenuation value of 1.5 dBA per doubling of distance applies to a soft site (e.g., soft dirt, grass, or scattered bushes and trees) (Caltrans 2013). Noise levels may also be reduced by intervening structures; the amount of attenuation provided by this “shielding” depends on the size of the object and the frequencies of the noise levels. Natural terrain features such as hills and dense woods, and man-made features such as buildings and walls, can significantly alter noise levels. Generally, any large structure blocking the line of sight will provide at least a 5-dBA reduction in source noise levels at the receiver (Federal Highway Administration [FHWA] 2011). Structures can substantially reduce exposure to noise as well. The FHWA’s guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important factors of project noise impact. Most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent noise level (L_{eq}); it considers both duration and sound power level. Typically, L_{eq} is summed over a one-hour period. L_{max} is the highest sound pressure level within the sampling period, and L_{min} is the lowest sound pressure level within the measuring period (Crocker 2007).

Noise that occurs at night tends to be more disturbing than that occurring during the day. Community noise is usually measured using Day-Night Average Level (L_{dn}), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours; it is also measured using Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring from 7:00 p.m. to 10:00 p.m. and a +10 dBA penalty for noise occurring from 10:00 p.m. to 7:00 a.m. (Caltrans 2013a). Noise levels described by L_{dn} and CNEL usually differ by about 1 dBA. The relationship between the peak-hour L_{eq} value and the L_{dn}/CNEL depends on the distribution of traffic during the day, evening, and night. Quiet suburban areas typically have CNEL noise levels in the range of 40 to 50 dBA, while areas near arterial streets are in the 50 to 60-plus CNEL range. Normal conversational levels are in the 60 to 65-dBA L_{eq} range; ambient noise levels greater than 65 dBA L_{eq} can interrupt conversations (Federal Transit Administration [FTA] 2018).

b. Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most groundborne vibration that can be felt by the human body starts from a low frequency of less than 1 Hz and goes to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect the structure and the vibration source (FTA 2018). Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances (Caltrans 2020). When a building is impacted by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify the vibration level due to structural resonances of the floors and walls.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec) PPV is

defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2020).

c. Existing Noise Setting

Sensitive Receivers

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. Sensitive receivers are defined as places where noise could interfere with regular activities such as sleeping, talking, and recreating, which include hospitals, residences, convalescent homes, schools, churches, libraries, and religious institutions. Noise sensitive receivers near the sport complex project site include single-family residences and Chowchilla High School to the north. Noise sensitive receivers near the CTE facility include single-family residences to the north, east, and south and Chowchilla High School to the west.

Vibration sensitive receivers are similar to noise sensitive receivers, such as residences, and institutional uses, such as schools, churches, and hospitals. However, vibration sensitive receivers also include buildings where vibrations may interfere with vibration-sensitive equipment, affected by levels that may be well below those associated with human annoyance.

Construction Noise Methodology

Construction noise was estimated using the FHWA Roadway Construction Noise Model (RCNM) (FHWA 2006). RCNM predicts construction noise levels for a variety of construction operations based on empirical data and the application of acoustical propagation formulas. Using RCNM, construction-noise levels were estimated at noise-sensitive receivers near the project site. RCNM provides reference noise levels for standard construction equipment, with an attenuation rate of 6 dBA per doubling of distance for stationary equipment.

Variation in power imposes additional complexity in characterizing the noise source level from construction equipment. Power variation is accounted for by describing the noise at a reference distance from the equipment operating at full power and adjusting it based on the duty cycle of the activity to determine the L_{eq} of the operation (FTA 2018). Each phase of construction has a specific equipment mix, depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some will have higher continuous noise levels than others, and some have high-impact noise levels.

Noise Monitoring Data

ST-1

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 30-90
- Max dB : 72.7 - 2022/10/14 18:51:33
- Level Range : 30-90
- SEL : 81.4
- Leq : 51.9
-

No.s	Date Time	(dB)				
1	2022/10/14 18:48:53	55.0	51.6	50.5	49.4	48.6
6	2022/10/14 18:49:08	48.8	47.8	47.7	47.3	48.3
11	2022/10/14 18:49:23	47.4	46.9	47.4	47.2	48.3
16	2022/10/14 18:49:38	46.8	46.9	47.3	48.5	47.4
21	2022/10/14 18:49:53	50.2	49.4	48.5	48.3	48.9
26	2022/10/14 18:50:08	48.6	49.1	48.1	48.7	48.6
31	2022/10/14 18:50:23	49.0	48.8	48.8	48.7	48.1
36	2022/10/14 18:50:38	48.5	47.8	48.4	49.8	49.3
41	2022/10/14 18:50:53	49.6	49.4	49.5	49.5	46.9
46	2022/10/14 18:51:08	52.5	47.8	49.4	49.5	49.3
51	2022/10/14 18:51:23	50.2	51.0	51.5	68.8	57.7
56	2022/10/14 18:51:38	53.2	56.3	54.6	51.1	51.2
61	2022/10/14 18:51:53	52.1	57.5	51.5	53.7	49.6
66	2022/10/14 18:52:08	61.1	53.7	50.5	50.5	52.3
71	2022/10/14 18:52:23	57.8	48.9	49.0	49.3	48.3
76	2022/10/14 18:52:38	49.2	48.5	48.4	47.1	48.6
81	2022/10/14 18:52:53	48.9	50.0	50.3	51.2	48.6
86	2022/10/14 18:53:08	47.0	47.5	46.0	48.3	46.5
91	2022/10/14 18:53:23	45.6	46.6	47.2	48.0	47.5
96	2022/10/14 18:53:38	48.1	50.6	52.5	50.5	47.8
101	2022/10/14 18:53:53	51.8	51.7	51.7	49.3	50.8
106	2022/10/14 18:54:08	49.5	49.9	49.0	47.8	48.7
111	2022/10/14 18:54:23	48.5	47.2	50.3	49.1	49.6
116	2022/10/14 18:54:38	48.8	48.3	50.6	49.8	50.5
121	2022/10/14 18:54:53	48.1	49.3	51.6	50.5	49.7
126	2022/10/14 18:55:08	49.4	48.8	50.3	50.2	50.7
131	2022/10/14 18:55:23	50.9	51.0	50.4	50.6	50.8
136	2022/10/14 18:55:38	51.6	51.7	50.2	49.6	50.5
141	2022/10/14 18:55:53	51.5	50.5	49.3	51.1	51.6
146	2022/10/14 18:56:08	50.2	49.6	48.0	45.5	46.8
151	2022/10/14 18:56:23	46.5	46.0	45.8	46.5	45.6
156	2022/10/14 18:56:38	45.6	44.8	44.8	44.8	48.4
161	2022/10/14 18:56:53	49.9	49.6	47.9	48.8	49.9
166	2022/10/14 18:57:08	49.9	49.2	51.5	50.1	49.3
171	2022/10/14 18:57:23	49.8	49.7	48.5	47.9	52.6
176	2022/10/14 18:57:38	49.0	49.1	48.1	48.8	47.4
181	2022/10/14 18:57:53	47.1	48.4	47.5	48.8	49.6
186	2022/10/14 18:58:08	48.9	48.9	48.5	48.1	49.1
191	2022/10/14 18:58:23	49.4	48.9	49.6	47.6	49.5
196	2022/10/14 18:58:38	48.4	47.0	46.9	49.2	49.7
201	2022/10/14 18:58:53	50.3	49.5	49.8	50.1	52.5
206	2022/10/14 18:59:08	50.3	49.2	49.7	49.8	48.9
211	2022/10/14 18:59:23	48.0	48.3	49.4	50.2	51.9
216	2022/10/14 18:59:38	50.5	50.1	53.3	53.2	54.8
221	2022/10/14 18:59:53	53.3	53.0	67.9	58.7	50.6
226	2022/10/14 19:00:08	48.8	48.6	49.7	49.7	49.9
231	2022/10/14 19:00:23	49.1	49.4	49.3	49.6	49.2
236	2022/10/14 19:00:38	48.6	50.8	50.1	50.8	50.4
241	2022/10/14 19:00:53	49.9	49.2	49.0	47.9	47.2
246	2022/10/14 19:01:08	47.0	49.7	49.5	47.3	47.5
251	2022/10/14 19:01:23	48.1	47.7	46.4	47.1	46.1
256	2022/10/14 19:01:38	47.0	48.2	50.2	50.2	51.8
261	2022/10/14 19:01:53	49.3	49.8	51.5	50.6	49.1
266	2022/10/14 19:02:08	48.6	48.5	48.0	47.7	47.1
271	2022/10/14 19:02:23	48.1	48.3	51.8	49.4	46.7
276	2022/10/14 19:02:38	45.9	45.9	45.6	46.0	48.6
281	2022/10/14 19:02:53	48.8	50.2	50.0	47.4	46.7
286	2022/10/14 19:03:08	46.0	48.1	46.3	46.3	47.1
291	2022/10/14 19:03:23	47.2	46.7	46.4	46.6	46.7
296	2022/10/14 19:03:38	46.1	45.5	45.5	48.1	46.1

ST-2

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 30-90
- Max dB : 72.2 - 2022/10/14 19:26:33
- Level Range : 30-90
- SEL : 91.5
- Leq : 62.0
-

No.s	Date Time	(dB)				
1	2022/10/14 19:14:39	55.0	55.6	68.1	66.6	69.0
6	2022/10/14 19:14:54	59.3	56.4	60.0	56.6	55.4
11	2022/10/14 19:15:09	54.2	52.1	50.3	49.3	53.2
16	2022/10/14 19:15:24	68.8	65.7	68.4	68.5	57.8
21	2022/10/14 19:15:39	56.1	55.6	53.9	54.0	54.5
26	2022/10/14 19:15:54	54.6	50.4	48.4	52.2	46.9
31	2022/10/14 19:16:09	53.4	53.4	68.4	65.0	61.2
36	2022/10/14 19:16:24	64.6	57.1	58.7	58.7	57.8
41	2022/10/14 19:16:39	56.3	58.7	68.5	61.4	57.6
46	2022/10/14 19:16:54	50.5	49.4	49.8	48.6	47.5
51	2022/10/14 19:17:09	49.2	52.4	68.2	62.2	52.1
56	2022/10/14 19:17:24	50.9	56.8	68.5	63.7	68.2
61	2022/10/14 19:17:39	70.6	61.8	53.8	51.6	53.0
66	2022/10/14 19:17:54	63.8	60.5	57.7	56.5	57.9
71	2022/10/14 19:18:09	61.6	56.6	68.2	69.0	60.1
76	2022/10/14 19:18:24	57.7	53.8	56.9	54.4	56.9
81	2022/10/14 19:18:39	67.6	57.7	66.3	67.0	57.6
86	2022/10/14 19:18:54	50.2	50.3	52.0	59.1	62.2
91	2022/10/14 19:19:09	67.3	62.8	63.6	67.5	66.0
96	2022/10/14 19:19:24	55.3	51.3	50.8	51.4	53.7
101	2022/10/14 19:19:39	63.9	62.8	55.2	67.9	68.7
106	2022/10/14 19:19:54	61.1	53.7	51.6	56.3	55.2
111	2022/10/14 19:20:09	60.4	58.5	54.4	60.9	61.3
116	2022/10/14 19:20:24	64.3	65.1	59.3	58.7	59.4
121	2022/10/14 19:20:39	56.6	57.5	61.6	60.0	59.6
126	2022/10/14 19:20:54	59.1	58.0	57.5	59.2	58.8
131	2022/10/14 19:21:09	65.5	64.5	62.3	54.9	54.7
136	2022/10/14 19:21:24	54.8	53.1	52.5	53.5	52.8
141	2022/10/14 19:21:39	53.0	54.0	53.4	53.2	52.7
146	2022/10/14 19:21:54	52.7	59.8	54.3	52.0	51.5
151	2022/10/14 19:22:09	55.3	57.9	66.1	59.2	55.2
156	2022/10/14 19:22:24	52.0	53.7	52.4	69.5	64.9
161	2022/10/14 19:22:39	58.9	56.0	56.7	54.8	56.5
166	2022/10/14 19:22:54	55.4	55.8	53.9	53.0	50.5
171	2022/10/14 19:23:09	48.5	49.8	53.2	61.5	69.2
176	2022/10/14 19:23:24	64.4	69.0	63.5	63.8	55.9
181	2022/10/14 19:23:39	66.8	67.3	59.4	60.0	56.7
186	2022/10/14 19:23:54	56.6	59.3	57.8	57.9	58.6
191	2022/10/14 19:24:09	58.4	61.7	61.6	66.7	66.4
196	2022/10/14 19:24:24	63.3	57.1	56.5	54.0	55.6
201	2022/10/14 19:24:39	55.2	54.9	50.1	49.8	48.8
206	2022/10/14 19:24:54	52.6	67.6	60.7	56.9	55.9
211	2022/10/14 19:25:09	54.3	67.2	59.5	56.6	53.7
216	2022/10/14 19:25:24	52.7	55.7	55.8	53.7	69.5
221	2022/10/14 19:25:39	67.4	62.7	53.6	49.9	48.7
226	2022/10/14 19:25:54	48.0	47.6	49.8	49.3	50.6
231	2022/10/14 19:26:09	50.5	49.8	70.8	68.2	70.1
236	2022/10/14 19:26:24	71.0	69.4	70.9	67.9	59.3
241	2022/10/14 19:26:39	54.2	52.9	51.7	54.6	52.3
246	2022/10/14 19:26:54	56.9	55.7	55.0	59.8	52.3
251	2022/10/14 19:27:09	66.1	65.7	55.6	51.7	49.4
256	2022/10/14 19:27:24	50.1	65.2	63.5	58.7	66.4
261	2022/10/14 19:27:39	60.7	62.7	60.6	54.9	50.4
266	2022/10/14 19:27:54	49.8	50.3	49.4	51.2	52.8
271	2022/10/14 19:28:09	59.4	58.8	61.3	57.8	68.2
276	2022/10/14 19:28:24	68.4	68.7	62.6	59.0	61.4
281	2022/10/14 19:28:39	56.5	59.6	55.8	56.3	51.8
286	2022/10/14 19:28:54	52.8	51.0	51.9	53.5	65.1
291	2022/10/14 19:29:09	58.7	69.9	60.8	57.2	56.0
296	2022/10/14 19:29:24	54.3	55.6	55.6	54.9	55.7

ST-3

- Freq Weight : A
- Time Weight : SLOW
- Level Range : 30-90
- Max dB : 73.5 - 2022/10/14 19:42:03
- Level Range : 30-90
- SEL : 86.7
- Leq : 57.1
-

No.s	Date Time	(dB)				
1	2022/10/14 19:38:09	59.9	55.8	54.3	58.5	56.7
6	2022/10/14 19:38:24	53.0	51.6	52.5	52.6	61.6
11	2022/10/14 19:38:39	57.1	56.1	65.8	60.9	56.8
16	2022/10/14 19:38:54	53.1	53.5	52.8	52.0	53.0
21	2022/10/14 19:39:09	54.2	52.6	52.5	53.5	53.4
26	2022/10/14 19:39:24	55.1	52.9	52.8	52.4	51.9
31	2022/10/14 19:39:39	52.9	53.2	54.2	58.9	52.6
36	2022/10/14 19:39:54	51.7	55.7	54.3	54.7	52.7
41	2022/10/14 19:40:09	55.1	55.0	52.7	51.0	53.3
46	2022/10/14 19:40:24	53.0	57.7	52.6	56.6	54.9
51	2022/10/14 19:40:39	56.6	57.2	53.0	49.7	50.1
56	2022/10/14 19:40:54	51.0	51.2	52.9	52.5	55.3
61	2022/10/14 19:41:09	57.6	54.8	57.4	53.7	53.6
66	2022/10/14 19:41:24	53.4	56.6	54.4	57.3	54.1
71	2022/10/14 19:41:39	56.0	57.7	55.0	65.0	65.8
76	2022/10/14 19:41:54	65.2	71.1	72.8	64.7	61.5
81	2022/10/14 19:42:09	58.9	56.2	58.6	54.3	53.1
86	2022/10/14 19:42:24	53.3	53.4	53.4	56.0	56.4
91	2022/10/14 19:42:39	54.5	57.4	56.9	57.7	60.0
96	2022/10/14 19:42:54	58.2	57.7	58.5	59.2	57.1
101	2022/10/14 19:43:09	58.5	55.1	53.4	54.8	61.6
106	2022/10/14 19:43:24	55.2	55.4	56.2	52.2	55.6
111	2022/10/14 19:43:39	53.0	55.0	54.0	56.3	58.6
116	2022/10/14 19:43:54	59.6	59.4	57.2	52.3	62.4
121	2022/10/14 19:44:09	56.1	55.5	53.5	51.4	58.3
126	2022/10/14 19:44:24	55.6	54.9	49.9	49.4	50.8
131	2022/10/14 19:44:39	54.8	55.5	51.3	49.5	49.4
136	2022/10/14 19:44:54	50.5	53.9	60.7	56.3	57.3
141	2022/10/14 19:45:09	56.2	54.5	56.6	53.8	51.4
146	2022/10/14 19:45:24	50.5	49.4	50.7	50.4	49.9
151	2022/10/14 19:45:39	49.8	51.1	49.7	55.0	56.3
156	2022/10/14 19:45:54	54.9	53.5	55.9	52.3	51.9
161	2022/10/14 19:46:09	49.1	50.5	57.8	61.7	63.5
166	2022/10/14 19:46:24	56.5	59.0	57.5	54.1	50.3
171	2022/10/14 19:46:39	52.6	59.3	55.3	58.2	58.1
176	2022/10/14 19:46:54	62.3	56.8	57.3	50.9	49.9
181	2022/10/14 19:47:09	54.2	62.3	63.1	61.0	55.4
186	2022/10/14 19:47:24	64.1	59.5	56.8	56.1	53.4
191	2022/10/14 19:47:39	49.3	51.5	57.0	51.3	51.6
196	2022/10/14 19:47:54	63.0	59.9	64.7	59.9	57.3
201	2022/10/14 19:48:09	54.6	53.8	55.1	52.6	53.2
206	2022/10/14 19:48:24	53.5	54.3	53.4	53.6	55.0
211	2022/10/14 19:48:39	56.2	55.5	58.8	54.0	53.3
216	2022/10/14 19:48:54	51.9	51.7	53.2	52.9	56.7
221	2022/10/14 19:49:09	63.8	56.0	51.7	50.5	51.4
226	2022/10/14 19:49:24	53.9	53.8	56.4	51.3	50.2
231	2022/10/14 19:49:39	53.4	52.5	51.8	53.9	51.2
236	2022/10/14 19:49:54	50.8	56.1	52.2	52.1	53.9
241	2022/10/14 19:50:09	53.7	51.9	50.0	50.4	48.9
246	2022/10/14 19:50:24	48.4	49.2	48.9	49.0	49.3
251	2022/10/14 19:50:39	50.8	50.5	51.2	56.8	58.9
256	2022/10/14 19:50:54	60.3	59.1	55.8	53.9	53.5
261	2022/10/14 19:51:09	53.7	59.1	53.5	48.8	48.1
266	2022/10/14 19:51:24	47.5	48.4	48.8	50.8	54.9
271	2022/10/14 19:51:39	56.6	57.0	57.6	54.0	56.9
276	2022/10/14 19:51:54	55.9	49.8	50.6	50.7	49.7
281	2022/10/14 19:52:09	49.5	50.0	50.2	54.4	50.3
286	2022/10/14 19:52:24	50.7	51.2	48.7	47.7	47.8
291	2022/10/14 19:52:39	52.7	54.4	56.4	56.8	63.3
296	2022/10/14 19:52:54	57.9	55.5	55.8	52.5	49.9

RCNM Files & Construction Noise Calculations

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/18/2022
Case Description: Demo

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Demo	Residential	60.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40	80.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Dozer	No	40	85.0		50.0	0.0
Dump Truck	No	40	84.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Vacuum Street Sweeper	No	10	80.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Generator	No	50	82.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Compressor (air)	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Dozer			85.0	81.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck			84.0	80.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader			80.0	76.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader			80.0	76.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper			85.0	81.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader			80.0	76.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vacuum Street Sweeper			80.0	70.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor			84.0	80.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator			82.0	79.0		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total		85.0	89.1		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/18/2022
Case Description: Site Prep

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Site Prep	Residential	60.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40	80.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Generator	No	50	82.0		50.0	0.0
Grader	No	40	85.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Vacuum Street Sweeper	No	10	80.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Backhoe	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Dozer			85.0	81.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Excavator			85.0	81.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Generator			82.0	79.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Grader			85.0	81.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Front End Loader			80.0	76.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Front End Loader			80.0	76.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Vacuum Street Sweeper			80.0	70.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Tractor			84.0	80.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
Excavator			85.0	81.0		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						
		Total	85.0	89.6		N/A		N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A						

**** Receptor #2 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
	Residential	0.0	0.0	0.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Backhoe	No	40	80.0		0.0	0.0
Tractor	No	40	84.0		0.0	0.0
Dozer	No	40	85.0		0.0	0.0
Excavator	No	40	85.0		0.0	0.0
Generator	No	50	82.0		0.0	0.0
Grader	No	40	85.0		0.0	0.0
Front End Loader	No	40	80.0		0.0	0.0
Front End Loader	No	40	80.0		0.0	0.0
Vacuum Street Sweeper	No	10	80.0		0.0	0.0
Tractor	No	40	84.0		0.0	0.0
Excavator	No	40	85.0		0.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Backhoe		0.0		0.0		0.0		0.0		0.0		0.0
Tractor		0.0		0.0		0.0		0.0		0.0		0.0
Dozer		0.0		0.0		0.0		0.0		0.0		0.0
Excavator		0.0		0.0		0.0		0.0		0.0		0.0
Generator		0.0		0.0		0.0		0.0		0.0		0.0
Grader		0.0		0.0		0.0		0.0		0.0		0.0
Front End Loader		0.0		0.0		0.0		0.0		0.0		0.0
Front End Loader		0.0		0.0		0.0		0.0		0.0		0.0
Vacuum Street Sweeper		0.0		0.0		0.0		0.0		0.0		0.0
Tractor		0.0		0.0		0.0		0.0		0.0		0.0
Excavator		0.0		0.0		0.0		0.0		0.0		0.0
Total	0.0	0.0		0.0		0.0		0.0		0.0		0.0

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/18/2022
Case Description: Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Grading	Residential	60.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compactor (ground)	No	20	80.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Generator	No	50	82.0		50.0	0.0
Grader	No	40	85.0		50.0	0.0
Compressor (air)	No	40	80.0		50.0	0.0
Roller	No	20	85.0		50.0	0.0
Vacuum Street Sweeper	No	10	80.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	82.0	79.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Compressor (air)			80.0	76.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Roller			85.0	78.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Vacuum Street Sweeper			80.0	70.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Tractor			84.0	80.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
		Total	85.0	87.5	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/18/2022
Case Description: Building Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Building Construction	Residential	60.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Man Lift	No	20	85.0		50.0	0.0
Auger Drill Rig	No	20	85.0		50.0	0.0
Concrete Mixer Truck	No	40	85.0		50.0	0.0
Concrete Saw	No	20	90.0		50.0	0.0
Crane	No	16	85.0		50.0	0.0
Man Lift	No	20	85.0		50.0	0.0
Generator	No	50	82.0		50.0	0.0
Compressor (air)	No	40	80.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0
Welder / Torch	No	40	73.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Man Lift	85.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	85.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Mixer Truck	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Concrete Saw			90.0	83.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Crane			85.0	77.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Man Lift			85.0	78.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Generator			82.0	79.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Compressor (air)			80.0	76.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Tractor			84.0	80.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Welder / Torch			73.0	69.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	Total		90.0	89.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/22/2022
Case Description: Architectural Coating

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Architectural Coating	Residential	60.0	55.0	55.0

Description	Impact Device	Usage (%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40	80.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Compressor (air)	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/18/2022
Case Description: Paving

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Paving	Residential	60.0	55.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40	85.0		50.0	0.0
Concrete Saw	No	20	90.0		50.0	0.0
Generator	No	50	82.0		50.0	0.0
Paver	No	50	85.0		50.0	0.0
Compressor (air)	No	40	80.0		50.0	0.0
Pavement Scarafier	No	20	85.0		50.0	0.0
Roller	No	20	85.0		50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Concrete Mixer Truck	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	90.0	83.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	82.0	79.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	85.0	82.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

								N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	85.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	85.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	90.0	89.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

CTE Facility Construction Noise

	Noise Level @ 50 ft	Residential Area to N	Residential Area to E	Residential Area to S	Chowchilla HS to W
Distance from Construction Activity (feet)		200	145	200	110
Site Prep	**89.6**	**77.559**	**80.352**	**77.559**	**82.752**
Grading	**87.5**	**75.459**	**78.252**	**75.459**	**80.652**

	Noise Level @ 50 ft	Residential Area to N	Residential Area to E	Residential Area to S	Chowchilla HS to W
Distance from Construction Activity (feet)		160	205	240	60
Building Construction	**89**	**78.897**	**76.744**	**75.375**	**87.416**
Architectural Coating	**76**	**65.897**	**63.744**	**62.375**	**74.416**

	Noise Level @ 50 ft	Residential Area to N	Residential Area to E	Residential Area to S	Chowchilla HS to W
Distance from Construction Activity (feet)		215	100	190	150
Paving	**89.2**	**76.531**	**83.179**	**77.604**	**79.658**

	Noise Level @ 50 ft	Residential Area to N	Residential Area to E	Residential Area to S	Chowchilla HS to W
Distance from Construction Activity (feet)		170	90	230	180
Demolition	**89.1**	**78.470**	**83.995**	**75.845**	**77.974**

Sports Complex Construction Noise

Distance from Construction Activity (feet)	Noise Level @ 50 ft	Residential Area to N 535	Chowchilla HS to N 575
Site Prep	**89.6**	**69.012**	**68.386**
Grading	**87.5**	**66.912**	**66.286**

Distance from Construction Activity (feet)	Noise Level @ 50 ft	Residential Area to N 400	Chowchilla HS to N 815
Building Construction	**89**	**70.938**	**64.756**
Architectural Coating	**76**	**57.938**	**51.756**

Distance from Construction Activity (feet)	Noise Level @ 50 ft	Residential Area to N 200	Chowchilla HS to N 345
Paving	**89.2**	**77.159**	**72.423**