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MEMORANDUM

DATE: April 28, 2021

TO: Ryan Fowler, Senior Planner, City of Menifee

FROM: Jason Lui, Associate/Senior Noise Specialist

SUBJECT: Boulder Mixed-Use Noise and Vibration Impact Analysis

INTRODUCTION

This Noise and Vibration Impact Analysis has been prepared to evaluate the potential noise and vibration impacts associated with the Boulder Mixed-Use Project (project) in Menifee, California. This report is intended to satisfy the City of Menifee (City) requirements and the California Environmental Quality Act (CEQA) for a project-specific analysis by examining the noise and vibration impacts of the proposed uses on the project site to surrounding sensitive receptors. All references cited in this memorandum are included in Attachment A.

Project Location

The 10.14-acre Boulder Mixed-Use Project (herein referred to as "proposed Project" or "Project") site is located on Assessors' Parcel Number (APN) 339-200-080 in the City of Menifee, in Riverside County, California. Specifically, the Project site is located at the northeast corner of Normandy Road and Berea Road. Figure 1 shows the project and regional location (all figures are provided in Attachment B of this document).

Project Description

The proposed Project would develop a mixed-use commercial and multiple family residential use consisting of a three-story office building with an area of 25,745 square feet, an 8,250 square-foot child day care building with an outdoor play area and a 234-unit apartment complex consisting of nine (9) three-story apartment buildings and one (1) 3,455 square foot clubhouse. The site would also be developed with a surface parking lot accommodating 429 covered/uncovered parking stalls. Access to the Project site would occur at the following three points: one (1) off Normandy Road and two (2) off Berea Road. The proposed project would begin construction in December 2021 and occur over 16 months until April 2023. Figure 2 shows the site plan.

CHARACTERISTICS OF SOUND

Sound is increasing to such disagreeable levels in the environment that it can threaten quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound; it describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Decibels (dB), unlike the linear scale (e.g., inches or pounds), are measured on a logarithmic scale, which is a scale based on powers of 10.

For example, 10 dB is 10 times more intense than 0 dB, 20 dB is 100 times more intense than 0 dB, and 30 dB is 1,000 times more intense than 0 dB. Thirty decibels (30 dB) represents 1,000 times as much acoustic energy as 0 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dB for each doubling of distance in a hard site environment; however, line source noise in a relatively flat environment with absorptive vegetation decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are L_{eq} and the Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours), and a 10 dBA weighting factor applied to noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum instantaneous noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category, audible impacts, refers to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because these levels have been found to be barely perceptible in exterior environments. The second category, potentially audible impacts, refers to a change in the noise level between 1 dB and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise levels of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear (the threshold of pain). A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas. Table A lists definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of measurement that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in 1 second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter deemphasizes the very low- and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted, unless reported otherwise.)
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1%, 10%, 50%, and 90% of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 PM to 10:00 PM and after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time; usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris 1991).

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	—
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	—
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	—
Near Freeway Auto Traffic	70	Moderately Loud	—
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	—
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	—
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	—
Rustling Leaves	20	Very Faint	—
Human Breathing	10	Very Faint	Threshold of Hearing
—	0	Very Faint	—

Source: Compiled by LSA Associates, Inc. (2015).

FUNDAMENTALS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. Outdoors, the motion may be discernible, but without the effects associated with the shaking of a building, there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items sitting on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 vibration velocity decibels (VdB) or less. This is an order of magnitude below the damage threshold for normal buildings. Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet (ft) from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (see the Federal Transit Administration [FTA] *Transit Noise and Vibration Impact Assessment Manual* [FTA 2018]). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for most projects that the roadway surface will be smooth enough that ground-borne vibration from street traffic will not exceed the impact criteria; however, both construction of a project and freight train operations on railroad tracks could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne noise is not likely to be a problem because noise arriving via the normal airborne path will usually be greater than ground-borne noise. Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for train-induced ground-borne vibration to cause cosmetic building damage, it is not uncommon for heavy-duty construction processes (e.g., blasting and pile driving) to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS velocity is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as the following:

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where L_v is the VdB, V is the RMS velocity amplitude, and V_{ref} is the reference velocity amplitude, or 1×10^{-6} inches/second (in/sec) used in the United States. Table C illustrates human response to various vibration levels, as described in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

Table C: Human Response to Different Levels of Ground-Borne Noise and Vibration

Vibration Velocity Level	Noise Level		Human Response
	Low-Frequency[1]	Mid-Frequency[2]	
65 VdB	25 dBA	40 dBA	Approximate threshold of perception for many humans. Low-frequency sound usually inaudible; mid-frequency sound excessive for quiet sleeping areas.
75 VdB	35 dBA	50 dBA	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying. Low-frequency noise acceptable for sleeping areas, mid-frequency noise annoying in most quiet occupied areas.
85 VdB	45 dBA	60 dBA	Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise annoying for sleeping areas, mid-frequency noise annoying even for infrequent events with institutional land uses such as schools and churches.

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] Approximate noise level when vibration spectrum peak is near 30 Hz
[2] Approximate noise level when vibration spectrum peak is near 60 Hz
dBA = A-weighted decibel Hz = hertz
FTA = Federal Transit Administration VdB = vibration velocity decibels

Factors that influence ground-borne vibration and noise include the following:

- **Vibration Source:** Vehicle suspension, wheel types and condition, railroad track/roadway surface, railroad track support system, speed, transit structure, and depth of vibration source
- **Vibration Path:** Soil type, rock layers, soil layering, depth to water table, and frost depth
- **Vibration Receiver:** Foundation type, building construction, and acoustical absorption

Among the factors listed above, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of ground-borne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock.

Experience with ground-borne vibration indicates the following: (1) vibration propagation is more efficient in stiff, clay soils than in loose, sandy soils; and (2) shallow rock seems to concentrate the vibration energy close to the surface and can result in ground-borne vibration problems at large distances from a railroad track. Factors including layering of the soil and the depth to the water table can have significant effects on the propagation of ground-borne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

REGULATORY SETTING

Federal Regulations

Federal Transit Administration

Vibration standards included in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) are used in this analysis for ground-borne vibration impacts on human annoyance. Table D provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table D: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Maximum L_v (VdB)[1]	Description of Use
Workshop	90	Vibration that is distinctly felt. Appropriate for workshops and similar areas not as sensitive to vibration.
Office	84	Vibration that can be felt. Appropriate for offices and similar areas not as sensitive to vibration.
Residential Day	78	Vibration that is barely felt. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night and Operating Rooms	72	Vibration is not felt, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power microscopes (100X) and other equipment of low sensitivity.

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] As measured in 1/3-octave bands of frequency over the frequency range 8 to 80 Hz
FTA = Federal Transit Administration
Hz = hertz
L_V = velocity in decibels
VdB = vibration velocity decibels

The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table E lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). These FTA guidelines show that a vibration level of up to 102 VdB (equivalent to 0.5 in/sec in PPV [FTA 2018]) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage. For non-engineered timber and masonry buildings, the construction building vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Table E: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate L_V (VdB)[1]
Reinforced concrete, steel, or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry buildings	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
µin/sec = microinches per second
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

Local Regulations

City of Menifee

Noise Element of the General Plan. The Noise Element of the City's General Plan (City of Menifee 2018) lists the goals and policies required to meet the City's noise-related goals. The following lists the applicable goals and policies for the project.

Goal N-1: Noise-sensitive land uses are protected from excessive noise and vibration exposure.

- **Policy N-1.7:** Mitigate exterior and interior noises to the levels listed in Table F to the extent feasible, for stationary sources adjacent to sensitive receptors:

Table F: Stationary Source Noise Standards

Land Use	Period	Interior	Exterior
Residential	10:00 PM to 7:00 AM	40 dBA L_{eq} (10-minute)	45 dBA L_{eq} (10-minute)
	7:00 AM to 10:00 PM	55 dBA L_{eq} (10-minute)	65 dBA L_{eq} (10-minute)

Source: General Plan Noise Element (City of Menifee 2018) and Development Code (City of Menifee 2020a).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level

- **Policy N-1.13:** Require new development to minimize vibration impacts to adjacent uses during demolition and construction.

- **Policy N-1.17:** Prevent the construction of new noise-sensitive land uses within airport noise impact zones. New residential land uses within the 65 dBA CNEL contours of any public-use or military airports, as defined by the Riverside County Airport Land Use Commission, shall be prohibited.

Municipal Code. Section 8.01.010 of the City's Municipal Code (City of Menifee 2020b) permits any construction within the City located within 0.25 mile (mi) from an occupied residence Monday through Saturday between the hours of 6:30 a.m. and 7:00 p.m., except on nationally recognized holidays. No construction shall be permitted on Sunday or nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.

Development Code. Section 9.215.060(B)(10) of the City's Development Code (City of Menifee 2020a) exempts sound emanating from heating and air conditioning equipment in proper repair.

Section 9.215.060(C) of the City's Development Code (City of Menifee 2020a) allows exceptions to be requested from the standards set forth in Section 9.215.060 of the City's Development Code and may be characterized as construction-related, single-event, or continuous-events exceptions:

- Private construction projects, with or without a building permit, located 0.25 mi or more from an inhabited dwelling.
- Private construction projects, with or without a building permit, located within 0.25 mi from an inhabited dwelling, shall be permitted Monday through Saturday, except on nationally recognized holidays, 6:30 a.m. to 7:00 p.m., or as specified in Section 8.01.010 of the Municipal Code (City of Menifee 2020b). There shall be no construction permitted on Sunday or nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.
- Construction-related exceptions. If construction occurs during off hours or exceeds noise thresholds, an application for a construction-related exception shall be made using the temporary use application provided by the Community Development Director in Chapter 9.110 of the City's Development Code (City of Menifee 2020a). For construction activities on Sunday or nationally recognized holidays, Section 8.01.010 of the Municipal Code shall prevail.

Section 9.215.060(D) of the City's Development Code (City of Menifee 2020a) prohibits the creation of any sound on any property that causes the exterior and interior sound level on any other occupied property to exceed the noise standards shown in Table F (Stationary Source Noise Standards) above.

Section 9.215.070 of the City's Development Code (City of Menifee 2020a) requires that all uses shall be operated so as not to generate vibration discernible without instruments by the average person while on or beyond the lot upon which the source is located or within an adjoining enclosed space if more than one establishment occupies a structure. Vibration caused by motor vehicles, trains, and temporary construction is exempted from this standard.

EXISTING SETTING

Sensitive Land Uses in the Project Vicinity

Existing land uses within the project area include residences, a park, vacant land, and commercial uses. Single-family residences are located north, east, and southwest of the project site. Vacant land, Spirit Park, and a storage facility are located east, south, and west, respectively, of the project site.

Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities. Traffic on Newport Road, Berea Road, Normandy Road, and other local streets contributes to the ambient noise levels in the project vicinity. Noise from motor vehicles is generated by engines, the interaction between the tires and the road, and the vehicles' exhaust systems. Other sources of noise in the project area that contribute to the existing noise environment include commercial activity to the west and park activities to the south.

Ambient Noise Measurements

Short-Term Noise Measurements

Short-term (20-minute) noise level measurements were conducted on March 16, 2021, using a Larson Davis Model 824 Type 1 sound level meter. Table G shows the results of the short-term noise level measurements along with a description of the measurement location and noise sources that occurred during the measurement. As shown in Table G, the measured average equivalent continuous sound levels in the project vicinity range from 45.8 to 64.6 dBA L_{eq}, and the maximum instantaneous noise levels range from 63.8 to 85.4 dBA L_{max}. Figure 3 shows the short-term monitoring locations.

Table G: Short-Term Ambient Noise Level Measurements

Monitor No.	Location	Date	Start Time	Noise Level (dBA)			Noise Sources
				L_{eq}	L_{max}	L_{min}	
ST-1	Northern edge of the project site, approximately 300 ft east of Berea Road	3/16/21	10:14 AM	45.8	63.8	36.6	Faint traffic on Newport Road, faint aircraft noise, birds chirping, and dogs barking
ST-2	Eastern edge of the project site, at the end of Harzburg Road	3/16/21	11:35 AM	49.3	66.4	37.6	Traffic on Newport Road, faint aircraft noise, and a few vehicles on Harzburg Road
ST-3	Southwest corner of the intersection of Normandy Road and Berea Road, approximately 10 ft from the perimeter wall	3/16/21	10:55 AM	64.6	85.4	42.8	Traffic on Berea Road and Normandy Road (with a high number of trucks), faint aircraft noise, and birds chirping

Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{min} = minimum measured sound level
ft = foot/feet
L_{max} = maximum instantaneous noise level

Long-Term Noise Measurements

One long-term (24-hour) noise level measurement was conducted from March 16 to 17, 2021, using a Larson Davis Spark 706RC Dosimeter. Table H shows the hourly L_{eq}, L_{max}, and L_{min} results from the long-term noise level measurement, and Table I shows the calculated CNEL level from the long-term noise level measurements. As shown in Table I, the calculated CNEL levels at LT-1 is 60.5 dBA CNEL. Figure 3 shows the long-term monitoring location.

Existing Aircraft Noise

French Valley Airport is a public airport that is 8.7 mi southeast of the project site. Also, Perris Valley Airport is a private airport that is 4.9 mi north of the project site. The noise compatibility contours for French Valley Airport and Perris Valley Airport in the *Riverside County Airport Land Use Compatibility Plan* (RCALUC 2004) show that the project site is outside the 55 dBA CNEL noise contour for both airports.

Existing Traffic Noise

The guidelines included in the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA 1977; FHWA RD-77-108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. The existing (2021) average daily traffic (ADT) volumes were obtained from the project's traffic study (LSA 2021a). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Table J provides the existing traffic noise levels in the project vicinity. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Attachment C provides the specific assumptions used in developing these noise levels and model printouts.

Table J shows that traffic noise levels along Newport Road are moderately high, with the 70, 65, and 60 dBA CNEL distances extending up to 111 ft, 223 ft, and 472 ft, respectively, from the roadway centerline. Also, Table J shows that traffic noise levels along Berea Road are low, with the 70 and 65 dBA CNEL distances confined within the roadway right-of-way while the 60 dBA CNEL distance extends up to 68 ft from the roadway centerline.

IMPACTS

Short-Term Construction Noise Impacts

Two types of short-term noise impacts would occur during project construction. The first type would be from construction crew commutes and the transport of construction equipment and materials to the project site and would incrementally raise noise levels on access roads leading to the site. The pieces of construction equipment for construction activities would move on site, would remain for the duration of each construction phase, and would not add to the daily traffic volume in the project vicinity. Although there would be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to a maximum of 84 dBA), the effect on longer-term (hourly or daily) ambient noise levels would be small because the number of

Table H: Long-Term (24-Hour) Noise Level Measurement Results at LT-1

	Start Time	Date	Noise Level (dBA)[1]		
			L_{eq}	L_{max}	L_{min}
1	10:00 AM	3/16/21	55.5	74.6	42.1
2	11:00 AM	3/16/21	56.6	75.2	42.5
3	12:00 PM	3/16/21	57.0	81.0	41.9
4	1:00 PM	3/16/21	54.9	75.0	42.0
5	2:00 PM	3/16/21	57.0	76.7	41.6
6	3:00 PM	3/16/21	59.4	84.2	44.3
7	4:00 PM	3/16/21	57.8	74.6	45.5
8	5:00 PM	3/16/21	59.7	86.0	45.5
9	6:00 PM	3/16/21	59.5	79.8	47.7
10	7:00 PM	3/16/21	59.6	84.6	44.9
11	8:00 PM	3/16/21	56.5	79.7	42.9
12	9:00 PM	3/16/21	56.0	79.6	41.5
13	10:00 PM	3/16/21	52.4	78.2	38.7
14	11:00 PM	3/16/21	50.1	70.2	36.1
15	12:00 AM	3/17/21	49.9	80.2	36.0
16	1:00 AM	3/17/21	46.5	75.2	35.3
17	2:00 AM	3/17/21	46.7	72.1	35.5
18	3:00 AM	3/17/21	50.3	72.6	35.5
19	4:00 AM	3/17/21	52.9	74.7	39.9
20	5:00 AM	3/17/21	54.9	73.4	45.3
21	6:00 AM	3/17/21	55.8	70.5	47.8
22	7:00 AM	3/17/21	56.3	75.5	45.3
23	8:00 AM	3/17/21	55.8	76.1	44.8
24	9:00 AM	3/17/21	56.7	80.5	42.6

Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level

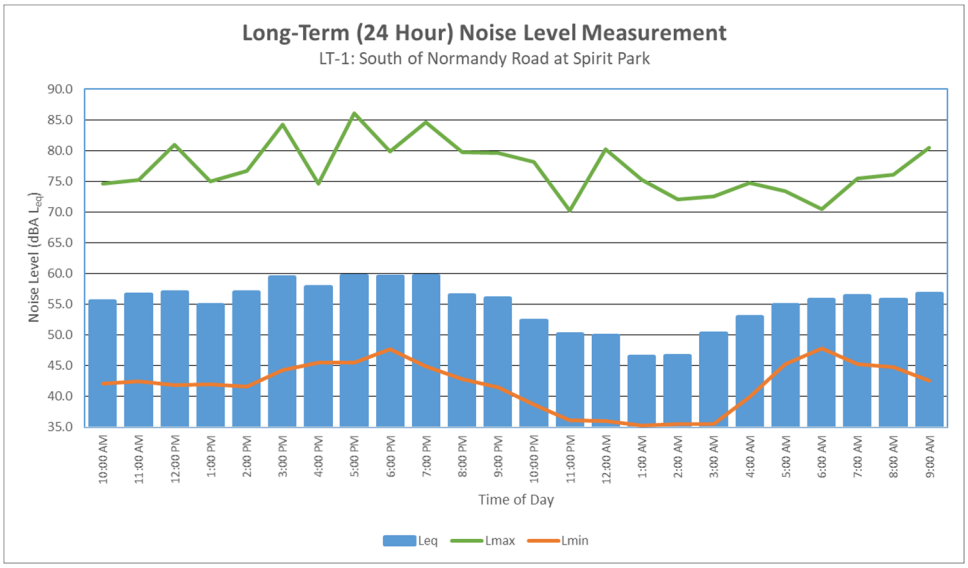


Table I: Long-Term Ambient Noise Monitoring Results

Monitoring No.	Location	Start Date	Start Time	Duration (hours)	Noise Level (dBA)		Noise Sources
					L_{eq}	CNEL	
LT-1	South of Normandy Road, on a light pole near the northeast corner of the tennis courts at Spirit Park	3/16/21	10:00 AM	24	56.2	60.5	Traffic on Newport Road, Normandy Road, and Berea Road; aircraft; and park activity

Source: Compiled by LSA Associates, Inc. (2021).
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level

Table J: Existing (2021) Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane
Pelion Road East of Berea Road	384	<50	<50	<50	46.6
Dorval Court East of Berea Road	354	<50	<50	<50	46.2
Berea Road South of Dorval Court	1,084	<50	<50	<50	52.9
Berea Road between Project Driveway 2 and Normandy Road	1,209	<50	<50	<50	53.4
Berea Road between Normandy Road and Newport Road	7,146	<50	<50	68	60.4
Park City Avenue West of Murrieta Road	684	<50	<50	<50	49.1
Lazy Creek Road West of Murrieta Road	1,534	<50	<50	<50	52.6
Newport Road between Berea Road and Murrieta Road	38,760	111	223	472	71.2
Newport Road between Murrieta Road and Evans Road	37,363	109	218	460	71.0
Newport Road between Evans Road and Winter Hawk Road	38,426	111	222	469	71.2
Newport Road between Winter Hawk Road and Bradley Road	37,763	110	219	464	71.1

Source: Compiled by LSA Associates, Inc. (2021).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
ft = foot/feet

hourly/daily construction-related vehicle trips is small compared to the existing hourly/daily traffic volume on Newport Road and Berea Road. The building construction phase would generate the most trips out of all of the construction phases, at 310 trips per hour and 622 trips per day based on the results of the California Emissions Estimator Model (CalEEMod, Version 2016.3.2) in the project's Air Quality and Greenhouse Gas Emissions Analysis (LSA 2021b). Roadways that would be used to access the project site are Newport Road and Berea Road. Based on Table J, Newport Road and Berea Road have existing daily traffic volumes of 37,363 and 7,146 and estimated hourly traffic volumes of 3,736 and 715, respectively, near the project site. Based on the maximum daily trips generated by construction-related traffic, construction-related traffic would increase noise by up to 1.6 dBA. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, no short-term construction-related impacts associated with worker commutes and transport of construction equipment and material to the project site would occur, and no noise reduction measures would be required.

The second type of short-term noise impact is related noise generated from construction activities. The project anticipates site preparation and grading, building construction, paving, and architectural coating phases of construction. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases change the character of the noise generated on a project site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table K lists the L_{max} recommended for noise impact assessments for typical construction equipment included in the *FHWA Highway Construction Noise Handbook* (FHWA 2006), based on a distance of 50 ft between the equipment and a noise receptor.

Typical noise levels range up to 88 dBA L_{max} at 50 ft during the noisiest construction phases. The site preparation and grading phase tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front-end loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders.

Project construction is expected to require the use of graders, bulldozers, and water trucks/pickup trucks. Noise associated with the use of each type of construction equipment for the site preparation and grading phase is estimated to be between 55 dBA L_{max} and 85 dBA L_{max} at a distance of 50 ft from the active construction area. As shown in Table K, the maximum noise level generated by each grader is assumed to be approximately 85 dBA L_{max} at 50 ft. Each bulldozer would generate approximately 85 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks/pickup trucks is approximately 55 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of construction would be 88 dBA L_{max} at a distance of 50 ft from the active construction area.

Table K: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor[1] (%)	Maximum Noise Level (L_{max}) at 50 ft[2]
Backhoe	40	80
Compactor (ground)	20	80
Compressor	40	80
Crane	16	85
Dozer	40	85
Dump Truck	40	84
Excavator	40	85
Flatbed Truck	40	84
Forklift	20	85
Front-End Loader	40	80
Grader	40	85
Impact Pile Driver	20	95
Jackhammer	20	85
Pavement Scarifier	20	85
Paver	50	85
Pickup Truck	40	55
Pneumatic Tools	50	85
Pump	50	77
Rock Drill	20	85
Roller	20	85
Scraper	40	85
Tractor	40	84
Welder	40	73

Source: *FHWA Highway Construction Noise Handbook.* Table 9.1 (FHWA 2006).
Note: The noise levels reported in this table are rounded to the nearest whole number.
[1] The usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.
[2] Maximum noise levels were developed based on Specification 721.560 from the CA/T program to be consistent with the City of Boston, Massachusetts, Noise Code for the "Big Dig" project.
CA/T = Central Artery/Tunnel
FHWA = Federal Highway Administration
ft = foot/feet
L_{max} = maximum instantaneous noise level

In addition to standard construction equipment during the site preparation and grading phase, the project would require the use of two rock crushers and two pneumatic hammers to remove boulders and bedrock on the project site. It is estimated that each rock crusher and pneumatic hammer would generate a noise level of 85 dBA L_{max}, similar to a rock drill and jackhammer, as shown in Table K.

Table L shows the combined construction noise level at each of the adjacent land uses to the project site based on standard construction equipment during the site preparation and grading phase with the use of rock crushers and pneumatic hammers. As shown in Table L, adjacent land uses to the project site would experience short-term construction noise levels of 78 to 93 dBA L_{max}. Ambient noise levels at the closest residential property line north of the project site range between 70.2 and 86.0 dBA L_{max} based on the long-term noise level measurement at LT-1 shown in Table H. Although the noise generated by project construction activities would be higher than the ambient noise levels and may result in a temporary increase in the ambient noise levels, construction noise would stop once project construction is completed. The project would be required to comply with the construction hours allowed under the City's Municipal Code Noise Ordinance, and the best construction practices listed below would minimize construction noise:

- The construction contractor shall limit construction activities to between the hours of 6:30 a.m. and 7:00 p.m. on Monday through Saturday. No construction shall be permitted outside these hours, on Sunday, or on nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.

- During all project site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

Table L: Summary of Construction Noise Levels

Land Use	Direction	Activity	Reference Noise Level at 50 ft (dBA L_{max})	Distance[1] (ft)	Distance Attenuation (dBA)	Noise Level (dBA L_{max})	Combined Noise Level (dBA L_{max})
Residence	North	Standard Construction Equipment	88	38	-2	90	91
		Rock Crushing	88[2]	340	17	71	
		Pneumatic Hammer	88[3]	255	14	74	
Residence	East	Standard Construction Equipment	88	650	22	66	70
		Rock Crushing	88[2]	870	25	63	
		Pneumatic Hammer	88[3]	650	22	66	
Park	South	Standard Construction Equipment	88	40	-2	90	93
		Rock Crushing	88[2]	255	14	74	
		Pneumatic Hammer	88[3]	40	-2	90	
Residence	Southwest	Standard Construction Equipment	88	170	11	77	78
		Rock Crushing	88[2]	545	21	67	
		Pneumatic Hammer	88[3]	575	21	67	
Storage Facility	West	Standard Construction Equipment	88	35	-3	91	91
		Rock Crushing	88[2]	400	18	70	
		Pneumatic Hammer	88[3]	465	19	69	

Source: Compiled by LSA Associates, Inc. (2021).

[1] For standard construction equipment, the distance is from the project construction boundary to the adjacent property line. For rock crushers and pneumatic hammers, the distance is from the equipment to the adjacent property line.

[2] Two rock crushers each generating a noise level of 85 dBA L_{max} would be 88 dBA L_{max}.

[3] Two pneumatic hammers each generating a noise level of 85 dBA L_{max} would be 88 dBA L_{max}.

dBA = A-weighted decibel

ft = foot/feet

L_{max} = maximum instantaneous noise level

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and most noise-sensitive receptors nearest the project site during all project construction.

- The construction contractor shall place all stationary construction equipment so that the emitted noise is directed away from the sensitive receptors nearest the project site.

Therefore, no noise impacts from construction activities would occur. No noise reduction measures are required.

Short-Term Construction Vibration Impacts

Although vibration levels generated from short-term construction are exempted from Section 9.215.070 of the City's Development Code (City of Menifee 2020a), vibration levels generated from short-term construction were evaluated for the level of human annoyance and potential for building damage. This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and assesses the potential for building damage using vibration levels in PPV (in/sec). Vibration levels calculated in RMS velocity are best for characterizing human response to building vibration, whereas vibration levels in PPV are best for characterizing damage potential. As shown in Table E, the FTA guidelines indicate that a vibration level up to 102 VdB (equivalent to 0.5 PPV [in/sec]) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage (FTA 2018). For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 PPV [in/sec]). For a fragile building, the construction vibration damage criterion is 90 VdB (0.12 PPV [in/sec]).

Table M shows the reference vibration levels at a distance of 25 ft for each type of standard construction equipment from the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). Outdoor site preparation and grading for the project are expected to require the use of a large bulldozer and loaded trucks, which would generate ground-borne vibration levels of up to 87 VdB (0.089 PPV [in/sec]) and 86 VdB (0.076 PPV [in/sec]), respectively, when measured at 25 ft. In addition, the project is expected to require the use of rock crushers and pneumatic hammers to remove boulders and bedrock southeast of the project site. Rock crushers would not generate vibration levels, while the pneumatic hammers would generate vibration levels similar to jackhammers, which would generate ground-borne vibration levels of 79 VdB (0.035 PPV [in/sec]) when measured at 25 ft.

Table M: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 ft	
	PPV (in/sec)	L_V (VdB)[1]
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer[2]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks[2]	**0.076**	**86**
Jackhammer[2]	**0.035**	**79**
Small Bulldozer	0.003	58

Sources: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.

[2] Equipment shown in **bold** is expected to be used on site.

µin/sec = micro-inches per second
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The greatest vibration levels are anticipated to occur during the site preparation and grading phase. All other phases are expected to result in lower vibration levels. The distance to the nearest

buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary), because vibration impacts normally occur within the buildings.

The formulas for vibration transmission are provided below:

$$L_vdB\ (D) = L_vdB\ (25\ ft) - 30\ Log\ (D/25)$$

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Table N lists the projected vibration levels from various construction equipment expected to be used on the project site to the closest buildings in the project vicinity. As shown in Table N, the closest structures are residences to the north and the storage facility to the west and would experience a vibration level of 75 VdB (0.021 PPV [in/sec]). This vibration level would not result in community annoyance because the vibration level would not exceed the FTA's community annoyance threshold of 78 VdB for daytime residences and 84 VdB for the storage facility, which is not as sensitive to vibration. In addition, this vibration level would not have the potential to affect the residential buildings immediately to the north and the storage facility buildings to the west because vibration levels would not exceed the FTA vibration damage threshold of 94 VdB (0.2 PPV [in/sec]) for buildings constructed of non-engineered timber and masonry. Other nearby buildings are farther away and would experience lower vibration levels. Therefore, no construction vibration impacts would occur, and no vibration reduction measures are required.

Table N: Summary of Construction Vibration Levels

Land Use	Direction	Equipment/Activity	Reference Vibration Level at 25 ft		Distance to Structure (ft)	Maximum Vibration Level	
			VdB	PPV (in/sec)		VdB	PPV (in/sec)
Residential	North	Large Bulldozer	87	0.089	65	75	0.021
		Loaded Truck	86	0.076	65	74	0.018
		Pneumatic Hammer[1]	79	0.035	285	47	0.001
Residential	East	Large Bulldozer	87	0.089	185	61	0.004
		Loaded Truck	86	0.076	185	60	0.004
		Pneumatic Hammer[1]	79	0.035	600	38	0.000
Park	South	Large Bulldozer	87	0.089	300	55	0.002
		Loaded Truck	86	0.076	300	54	0.002
		Pneumatic Hammer[1]	79	0.035	395	43	0.001
Residential	Southwest	Large Bulldozer	87	0.089	655	44	0.001
		Loaded Truck	86	0.076	655	43	0.001
		Pneumatic Hammer[1]	79	0.035	655	36	0.000
Storage Facility	West	Large Bulldozer	87	0.089	65	75	0.021
		Loaded Truck	86	0.076	65	74	0.018
		Pneumatic Hammer[1]	79	0.035	510	40	0.000

Source: Compiled by LSA Associates, Inc. (2021).
Note: The FTA-recommended building damage threshold is 94 VdB (0.2 PPV [in/sec]) for buildings constructed of non-engineered timber and masonry.
[1] Vibration levels generated from a pneumatic hammer would be similar to a jackhammer.
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
PPV = peak particle velocity
VdB = vibration velocity decibels

Long-Term Aircraft Noise Impacts

As discussed above, French Valley Airport is a public airport that is 8.7 mi southeast of the project site. Also, Perris Valley Airport is a private airport that is 4.9 mi north of the project site. The noise compatibility contours for French Valley Airport and Perris Valley Airport in the *Riverside County Airport Land Use Compatibility Plan* (RCALUC 2004) show that the project site is outside the 55 dBA CNEL noise contour for both airports. Therefore, the project would not expose people residing or working in the project area to excessive noise levels.

Long-Term Traffic Noise Impacts

The guidelines included in the *FHWA Highway Traffic Noise Prediction Model* (FHWA 1977; FHWA RD-77-108) were used to evaluate highway traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry, to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. The existing (2021) and opening year cumulative (2023) ADT volumes were obtained from the project's traffic study (LSA 2021a). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Tables O and P show the existing (2021) and the opening year cumulative (2023) traffic noise levels without and with the project along roadways in the project vicinity. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Attachment C provides the specific assumptions used in developing these noise levels and model printouts.

Tables O and P show that the project-related traffic noise would increase by up to 2.8 dBA, except for Berea Road between Project Driveway 2 and Normandy Road, which would have a project-related traffic noise increase of 3.2 dBA. Although the project-related traffic noise increase along Berea Road between Project Driveway 2 and Normandy Road would be perceptible to the human ear in an outdoor environment, traffic noise levels along Berea Road would remain low, with the 60 dBA CNEL distance confined within the roadway right-of-way. Therefore, no traffic noise impacts from project-related traffic on off-site sensitive receptors would occur. No noise reduction measures are required.

Long-Term Stationary Noise Impacts

Heating, ventilation, and air conditioning (HVAC) equipment; parking lot activity; and playground noise associated with the project would potentially affect the existing off-site sensitive land uses. The following provides a detailed noise analysis and discussion of each stationary noise source.

HVAC Equipment

The project would include rooftop HVAC units with 3 to 4 ft high parapets associated with the multifamily residences, office building, and day-care building. The HVAC equipment could operate 24 hours per day. Each residential HVAC unit would generate a noise level of 39.1 dBA at 50 ft, and each office and day-care HVAC unit would generate a noise level of 44.4 dBA at 50 ft. Section 9.215.060(B)(10) of the City's Development Code (City of Menifee 2020a) exempts sound emanating from heating and air conditioning equipment in proper repair. Therefore, no noise impacts from on-site HVAC equipment would occur. No noise reduction measures are required.

Table O: Existing (2021) Traffic Noise Levels Without and With Project

Roadway Segment	Without Project Traffic Conditions					With Project Traffic Conditions					
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase from Baseline Conditions
Pelion Road East of Berea Road	384	<50	<50	<50	46.6	480	<50	<50	<50	47.5	0.9
Dorval Court East of Berea Road	354	<50	<50	<50	46.2	544	<50	<50	<50	48.1	1.9
Berea Road South of Dorval Court	1,084	<50	<50	<50	52.9	1,370	<50	<50	<50	54.0	1.1
Berea Road between Project Driveway 2 and Normandy Road	1,209	<50	<50	<50	53.4	2,451	<50	<50	<50	56.5	3.1
Berea Road between Normandy Road and Newport Road	7,146	<50	<50	68	60.4	8,674	<50	<50	76	61.2	0.8
Park City Avenue West of Murrieta Road	684	<50	<50	<50	49.1	780	<50	<50	<50	49.6	0.5
Lazy Creek Road West of Murrieta Road	1,534	<50	<50	<50	52.6	1,724	<50	<50	<50	53.1	0.5
Newport Road between Berea Road and Murrieta Road	38,760	111	223	472	71.2	39,716	113	226	479	71.3	0.1
Newport Road between Murrieta Road and Evans Road	37,363	109	218	460	71.0	38,127	110	220	467	71.1	0.1
Newport Road between Evans Road and Winter Hawk Road	38,426	111	222	469	71.2	39,094	112	224	474	71.2	0.0
Newport Road between Winter Hawk Road and Bradley Road	37,763	110	219	464	71.1	38,337	110	221	468	71.1	0.0

Source: Compiled by LSA Associates, Inc. (2021).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
ft = foot/feet

Table P: Opening Year Cumulative (2023) Traffic Noise Levels Without and With Project

Roadway Segment	Without Project Traffic Conditions					With Project Traffic Conditions					
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Centerline of Outermost Lane	Increase from Baseline Conditions
Pelion Road East of Berea Road	399	<50	<50	<50	46.7	495	<50	<50	<50	47.7	1.0
Dorval Court East of Berea Road	368	<50	<50	<50	46.4	702	<50	<50	<50	49.2	2.8
Berea Road South of Dorval Court	1,127	<50	<50	<50	53.1	1,557	<50	<50	<50	54.5	1.4
Berea Road between Project Driveway 2 and Normandy Road	1,257	<50	<50	<50	53.6	2,643	<50	<50	<50	56.8	3.2
Berea Road between Normandy Road and Newport Road	7,432	<50	<50	69	60.5	9,628	<50	<50	82	61.7	1.2
Park City Avenue West of Murrieta Road	711	<50	<50	<50	49.2	807	<50	<50	<50	49.8	0.6
Lazy Creek Road West of Murrieta Road	1,595	<50	<50	<50	52.8	1,929	<50	<50	<50	53.6	0.8
Newport Road between Berea Road and Murrieta Road	40,310	114	228	484	71.4	44,476	120	243	517	71.8	0.4
Newport Road between Murrieta Road and Evans Road	38,858	111	223	473	71.2	44,172	120	242	514	71.8	0.6
Newport Road between Evans Road and Winter Hawk Road	39,963	113	227	481	71.3	46,669	123	251	533	72.0	0.7
Newport Road between Winter Hawk Road and Bradley Road	39,274	112	225	476	71.3	45,504	122	247	525	71.9	0.6

Source: Compiled by LSA Associates, Inc. (2021).
Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
ft = foot/feet

Parking Lot Activity

The project would include surface parking on the south-side project site between the office building and the day-care building. Noise generated from parking lot activities would include noise generated by vehicles traveling at slow speeds, engine start-up noise, car door slams, car horns, car alarms, and tire squeals. Representative parking activities would generate approximately 60 to 70 dBA L_{max} at 50 ft. It is assumed that parking activities would generate the maximum noise level for a cumulative period of 30 minutes in any hour and that parking activities would generate a noise level of 57 to 67 dBA L_{eq} at 50 ft. The proposed three-story multifamily residential buildings would be 45 ft in height and would provide shielding resulting in a minimum noise reduction of 10 dBA for the residences north of the project site. Also, the proposed one-story day-care building would be 18 ft in height and would provide a minimum noise reduction of 5 dBA for the residences east of the project site due to shielding. Table Q summarizes the noise levels generated from parking lot activities at the adjacent residential uses.

Table Q: Parking Lot Activity

Land Use	Direction	Reference Noise Level (dBA L_{eq})	Reference Distance (ft)	Distance[1] (ft)	Shielding (dBA)	Noise Level (dBA L_{eq})
Residence	North	67	50	530	10[2]	36.5
		57	50	530	10[2]	26.5
Residence	East	67	50	775	5[3]	38.2
		57	50	775	5[3]	28.2
Residence	Southeast	67	50	310	0	51.2
		57	50	310	0	41.2

Source: Compiled by LSA Associates, Inc. (2021).
[1] The distance is to the residential property line.
[2] The proposed 45 ft high three-story multifamily residential buildings would provide a minimum noise reduction of 10 dBA.
[3] The proposed 18 ft high one-story day-care building would provide a minimum noise reduction of 5 dBA.
dBA = A-weighted decibel
ft = foot/feet
L_{eq} = equivalent continuous sound level

Playground Noise

The project would include a playground associated with the day-care building on the southeast side of the project. Noise generated at the playground would include children conversing, children playing, and shouting that would potentially impact off-site adjacent land uses. Normal human conversations generate a noise level of 65 dBA L_{max} at 3 ft. Noise levels from continuous talking for 1 hour at 65 dBA L_{max} would be equivalent to 65 dBA L_{eq}. Shouting generates noise levels of 90 dBA L_{max} at 3 ft. Noise levels from shouting at 90 dBA L_{max} are intermittent and would be equivalent to 79 dBA L_{eq}, assuming that the shouting would occur for a cumulative period of 5 minutes in any hour. Based on the day-care capacity of 120 children, it is assumed that there would be up to 60 children conversing and 60 children shouting. The proposed 45 ft high three-story multifamily residential buildings would provide shielding resulting in a minimum noise reduction of 5 dBA for the residences north of the project site. The 6 ft high perimeter wall surrounding the playground would provide a minimum noise reduction of 5 dBA for the residences east of the project site. Also, the proposed 18 ft high one-story day-care building would provide a minimum noise reduction of 5

dBA for the residences southwest of the project site. Table R summarizes the noise levels generated from the playground at the adjacent residential uses.

Table R: Playground Noise

Land Use	Direction	No. of Children	Reference Noise Level at 3 ft (dBA L_{eq})	Total Reference Noise Level at 3 ft (dBA L_{eq})	Distance[1] (ft)	Shielding (dBA)	Noise Level (dBA L_{eq})	Combined Noise Level (dBA L_{eq})
Residence	North	60	65	83	530	5[2]	36.5	47.2
		60	79	97	530	5[2]	26.5	
Residence	East	60	65	83	670	5[3]	38.2	45.2
		60	79	97	670	5[3]	28.2	
Residence	Southeast	60	65	83	660	5[4]	51.2	45.3
		60	79	97	660	5[4]	41.2	

Source: Compiled by LSA Associates, Inc. (2021).
[1] The distance is to the residential property line.
[2] The proposed 45 ft high three-story multifamily residential buildings would provide a minimum noise reduction of 5 dBA.
[3] The 6 ft high perimeter wall surrounding the playground would provide a minimum noise reduction of 5 dBA.
[4] The proposed 18 ft high one-story day-care building would provide a minimum noise reduction of 5 dBA.
dBA = A-weighted decibel
ft = foot/feet
L_{eq} = equivalent continuous sound level

Stationary Noise Impacts Summary

Table S shows the individual and combined stationary noise from parking lot activity and playground noise at each residential property line. The interior noise level was calculated based on windows and doors closed, which would have an exterior-to-interior noise reduction of 24 dBA (EPA 1978). As shown in Table S, the stationary noise generated from the project's parking lot activity and playground noise would not exceed the City's daytime exterior and interior noise standards of 65 dBA L_{eq} (10-minute) and 55 dBA L_{eq} (10-minute), respectively. The City's nighttime exterior and interior noise standards would not be exceeded because the office building and day-care building would not operate during nighttime hours. Therefore, no noise impacts from project operations would occur. No noise reduction measures are required.

Table S: Stationary Noise Levels

Land Use	Direction	Activity	Exterior Noise Level (dBA L_{eq})	Combined Exterior Noise Level (dBA L_{eq})	Combined Interior Noise Level (dBA L_{eq})
Residential	North	Parking Lot Activity	36.5	47.6	23.6
		Playground Noise	47.2		
Residential	East	Parking Lot Activity	38.2	46.0	22.0
		Playground Noise	45.2		
Residential	Southwest	Parking Lot Activity	51.2	52.2	28.2
		Playground Noise	45.3		

Source: Compiled by LSA Associates, Inc. (2021).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level

Long-Term Vibration Impacts

The project would not generate vibration. In addition, vibration levels generated from project-related traffic on the adjacent roadways (Newport Road, Berea Road, Pelion Road, Dorval Court, Park City Avenue, and Lazy Creek Road) are exempt based on Section 9.215.070 of the City's Development Code. Therefore, no vibration impacts from project-related operations would occur, and no vibration reduction measures are required.

BEST CONSTRUCTION PRACTICES

The following best construction practices would be consistent with the City's requirements outlined in Section 9.215.060(B)(10) of the City's Development Code and would further minimize construction noise:

- The construction contractor shall limit construction activities to between the hours of 6:30 a.m. and 7:00 p.m. on Monday through Saturday. No construction shall be permitted outside these hours, on Sunday, or on nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.
- During all project site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and most noise-sensitive receptors nearest the project site during all project construction.
- The construction contractor shall place all stationary construction equipment so that the emitted noise is directed away from the sensitive receptors nearest the project site.

REDUCTION MEASURES

Short-Term Construction Noise Impacts

No noise reduction measures are required.

Short-Term Construction Vibration Impacts

No vibration reduction measures are required.

Aircraft Noise Impacts

No noise reduction measures are required.

Traffic Noise Impacts

No noise reduction measures are required.

Long-Term Stationary Noise Impacts

No noise reduction measures are required.

Long-Term Vibration Impacts

No vibration reduction measures are required.

Attachments: A: References
B: Figures 1 through 3
C: FHWA Traffic Noise Model Printouts

ATTACHMENT A

REFERENCES

City of Menifee. 2018. General Plan Noise Element. November 13.

_____. 2020a. Development Code. January.

_____. 2020b. Municipal Code. April.

Federal Highway Administration (FHWA). 1977. *FHWA Highway Traffic Noise Prediction Model*. FHWA-RD-77-108.

_____. 2006. *FHWA Highway Construction Noise Handbook*. Roadway Construction Noise Model. FHWA-HEP-06-015. DOT-VNTSC-FHWA-06-02. NTIS No. PB2006-109012. August.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. September. Website: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf (accessed April 2021).

Harris, Cyril M., editor. 1991. *Handbook of Acoustical Measurements and Noise Control*. 3rd ed.

LSA Associates, Inc. 2021a. Traffic Study for the Boulder Mixed-Use Project. April.

_____. 2021b. Air Quality and Greenhouse Gas Emissions Analysis for the Proposed Boulder Mixed-Use Project. April.

Riverside County Airport Land Use Commission (RCALUC). 2004. *Riverside County Airport Land Use Compatibility Plan.* October 14. Website: http://www.rcaluc.org/Plans/New-Compatibility-Plan (accessed April 2021).

United States Environmental Protection Agency (EPA). 1978. *Protective Noise Levels: Condensed Version of EPA Levels Document*. EPA 550/9-79-100. November.

ATTACHMENT B

FIGURES 1 THROUGH 3

Figure 1: Project and Regional Location
Figure 2: Site Plan
Figure 3: Noise Monitoring Locations

LSA

LEGEND

Project Location

FIGURE 1

N

0 375 750

FEET

SOURCE: Google (2019)

I:\CIM2002\GIS\MXD\ProjectLocation_Aerial.mxd (12/10/2020)

Boulder Mixed-Use Project
City of Menifee

Project and Regional Location

LSA

FIGURE 2

0 90 180

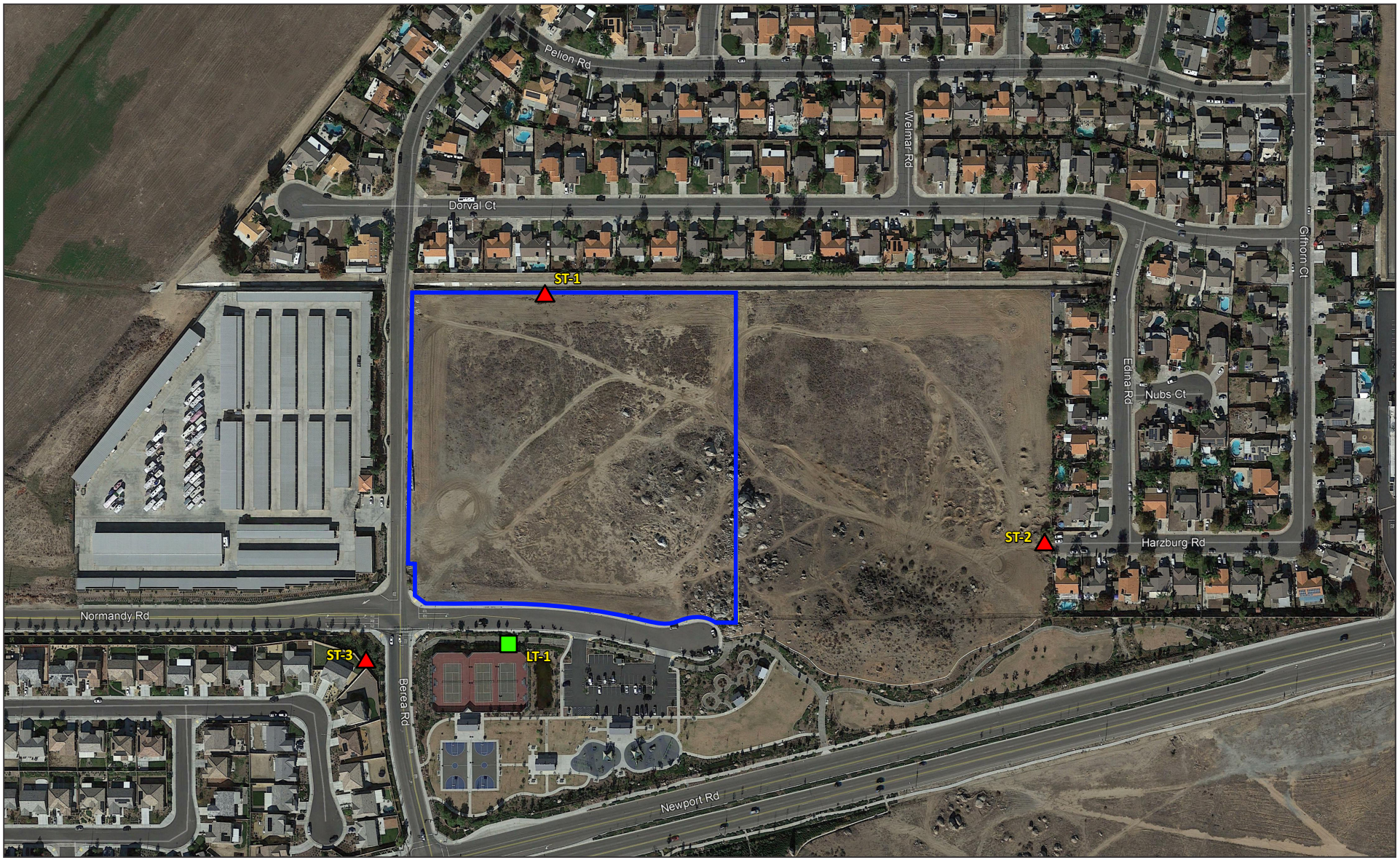
FEET

SOURCE: Summa Architecture (12/28/2020)

I:\CIM2002\G\Site_Plan_v2.ai (4/19/2021)

Boulder Mixed-Use Project
City of Menifee

Site Plan



LSA

LEGEND

- Project Site Boundary
- ST-1 - Short-term Noise Monitoring Location
- LT-1 - Long-term Noise Monitoring Location

0 150 300

FEET

SOURCE: Google Earth (2021)

I:\CIM2002\G\Noise_Monitor_Locs.ai (3/22/2021)

FIGURE 3

Boulder Mixed-Use Project
City of Menifee

Noise Monitoring Locations

ATTACHMENT C

FHWA TRAFFIC NOISE MODEL PRINTOUTS

TABLE Existing (2021) No Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Pelion Road East of Berea Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 384 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 46.57

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) No Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Dorval Court East of Berea Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 354 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 46.22

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) No Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road South of Dorval Court
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1084 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.93

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) No Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Project Driveway 2 and Normandy Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1209 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.41

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) No Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Normandy Road and Newport Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 7146 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.37

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	67.6	143.0

TABLE Existing (2021) No Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Park City Avenue West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 684 SPEED (MPH): 25 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) No Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Lazy Creek Road West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1534 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) No Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Berea Road and Murrieta Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 38760 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.19

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
111.2	222.8	471.8	1012.4

TABLE Existing (2021) No Project-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Murrieta Road and Evans Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 37363 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.04

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
108.9	217.6	460.5	988.0

TABLE Existing (2021) No Project-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Evans Road and Winter Hawk Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 38426 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.16

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
110.6	221.5	469.1	1006.6

TABLE Existing (2021) No Project-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Winter Hawk Road and Bradley Road
NOTES: Boulder Mixed-Use Project - Existing (2021) No Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 37763 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
109.6	219.1	463.7	995.0

TABLE Existing (2021) Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Pelion Road East of Berea Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 480 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 47.54

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Dorval Court East of Berea Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 544 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 48.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road South of Dorval Court
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1370 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.95

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Project Driveway 2 and Normandy Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2451 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 56.48

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	70.1

TABLE Existing (2021) Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Normandy Road and Newport Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8674 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 61.21

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	76.5	162.6

TABLE Existing (2021) Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Park City Avenue West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 780 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.65

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Lazy Creek Road West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1724 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (2021) Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Berea Road and Murrieta Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 39716 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.30

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
112.7	226.3	479.4	1028.9

TABLE Existing (2021) Project-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Murrieta Road and Evans Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 38127 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.12

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
110.1	220.4	466.7	1001.4

TABLE Existing (2021) Project-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Evans Road and Winter Hawk Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 39094 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.23

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
111.7	224.0	474.4	1018.2

TABLE Existing (2021) Project-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Winter Hawk Road and Bradley Road
NOTES: Boulder Mixed-Use Project - Existing (2021) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 38337 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.15

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
110.5	221.2	468.4	1005.0

TABLE Opening Year (2023) No Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Pelion Road East of Berea Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 399 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 46.74

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year (2023) No Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Dorval Court East of Berea Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 368 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 46.38

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year (2023) No Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road South of Dorval Court
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1127 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year (2023) No Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Project Driveway 2 and Normandy Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1257 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year (2023) No Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Normandy Road and Newport Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 7432 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.54

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	69.3	146.8

TABLE Opening Year (2023) No Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Park City Avenue West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 711 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.24

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year (2023) No Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Lazy Creek Road West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1595 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.75

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year (2023) No Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Berea Road and Murrieta Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 40310 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.36

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
113.6	228.4	484.1	1039.1

TABLE Opening Year (2023) No Project-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Murrieta Road and Evans Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 38858 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.21

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
111.3	223.1	472.5	1014.1

TABLE Opening Year (2023) No Project-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Evans Road and Winter Hawk Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 39963 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.33

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
113.1	227.2	481.4	1033.2

TABLE Opening Year (2023) No Project-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Winter Hawk Road and Bradley Road
NOTES: Boulder Mixed-Use Project - Opening Year (2023) No Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 39274 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.25

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
112.0	224.7	475.9	1021.3

TABLE Opening Year Cumulative (2023)

Project-01

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Pelion Road East of Berea Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 495 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 47.67

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year Cumulative (2023)

Project-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Dorval Court East of Berea Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 702 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.19

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year Cumulative (2023)
Project-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road South of Dorval Court
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1557 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.51

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	52.0

TABLE Opening Year Cumulative (2023)
Project-04

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Project Driveway 2 and Normandy Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2643 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 56.80

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	73.7

TABLE Opening Year Cumulative (2023)
Project-05

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Berea Road between Normandy Road and Newport Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9628 SPEED (MPH): 30 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 14 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 61.67

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	81.8	174.2

TABLE Opening Year Cumulative (2023)
Project-06

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Park City Avenue West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 807 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 49.79

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year Cumulative (2023)
Project-07

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Lazy Creek Road West of Murrieta Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1929 SPEED (MPH): 25 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Opening Year Cumulative (2023)

Project-08

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Berea Road and Murrieta Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 44476 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.79

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
120.1	243.3	516.7	1109.4

TABLE Opening Year Cumulative (2023)
Project-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Murrieta Road and Evans Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 44172 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.76

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
119.6	242.2	514.3	1104.4

TABLE Opening Year Cumulative (2023)
Project-10

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Evans Road and Winter Hawk Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 46669 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 72.00

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
123.4	250.9	533.4	1145.5

TABLE Opening Year Cumulative (2023)
Project-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 04/16/2021
ROADWAY SEGMENT: Newport Road between Winter Hawk Road and Bradley Road
NOTES: Boulder Mixed-Use Project - Opening Year Cumulative (2023) Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 45504 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 46 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.89

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
121.6	246.9	524.5	1126.4
