NOISE AND VIBRATION IMPACT ANALYSIS

JEFFERSON SQUARE MULTI-FAMILY PROJECT

LA QUINTA, CALIFORNIA

LSA

June 2023

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JEFFERSON SQUARE MULTI-FAMILY PROJECT

LA QUINTA, CALIFORNIA

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LIST OF ABBREVIATIONS AND ACRONYMS

ADT	average daily trips
ALUC	Airport Land Use Compatibility
CEQA	California Environmental Quality Act
City	City of La Quinta
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibel(s)
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTA Manual	FTA *Transit Noise and Vibration Impact Assessment Manual*
in/sec	inch/inches per second
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous sound level
mi	mile/miles
Noise Element	City of La Quinta General Plan Noise Element
PPV	peak particle velocity
project	Jefferson Square Multi-family Project
RMS	root-mean-square
STC	Sound Transmission Class
VdB	vibration velocity decibels

INTRODUCTION

This noise and vibration impact analysis has been prepared to evaluate the potential noise and vibration impacts and reduction measures associated with the proposed Jefferson Square Multi-family Project (project) in La Quinta, California. This report is intended to satisfy the City of La Quinta's (City) requirement for a project-specific noise impact analysis by examining the impacts of the project site and evaluating noise reduction measures that the project may require.

PROJECT LOCATION AND DESCRIPTION

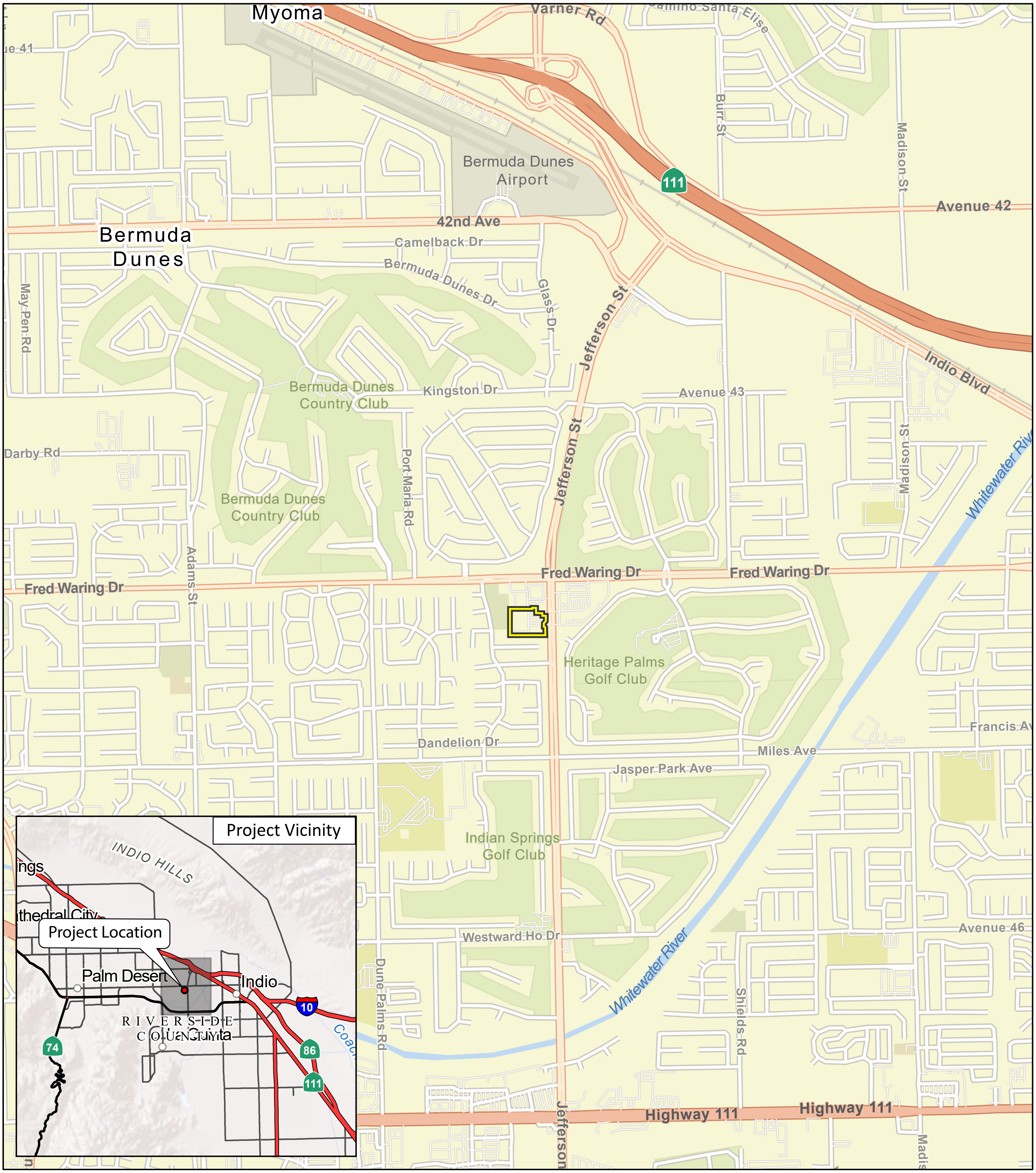
The proposed project is located generally southwest of the Fred Waring Drive and Jefferson Street intersection in La Quinta, California.

The project consists of constructing approximately 88 residentials units in three (3) buildings along with common areas totaling 110,512 square feet (sf). Common areas include lobbies, a mailroom, office spaces, a community room, a gym, and utility rooms. Figures 1 and 2 show the project location and site plan, respectively.

EXISTING LAND USES IN THE PROJECT AREA

The project site is surrounded primarily by residential and commercial uses. The areas adjacent to the project site include the following uses:

- **North:** Existing commercial uses;
- **East:** Existing commercial uses and single-family residences opposite Jefferson Street;
- **South:** Existing single-family residences along Memorial Place; and
- **West:** Existing Monticello Park.



LSA

Project Location

FIGURE 1

0 1000 2000
FEET

Jefferson Square Multi-Family

Project Location

SOURCE: World Street Map, 2022

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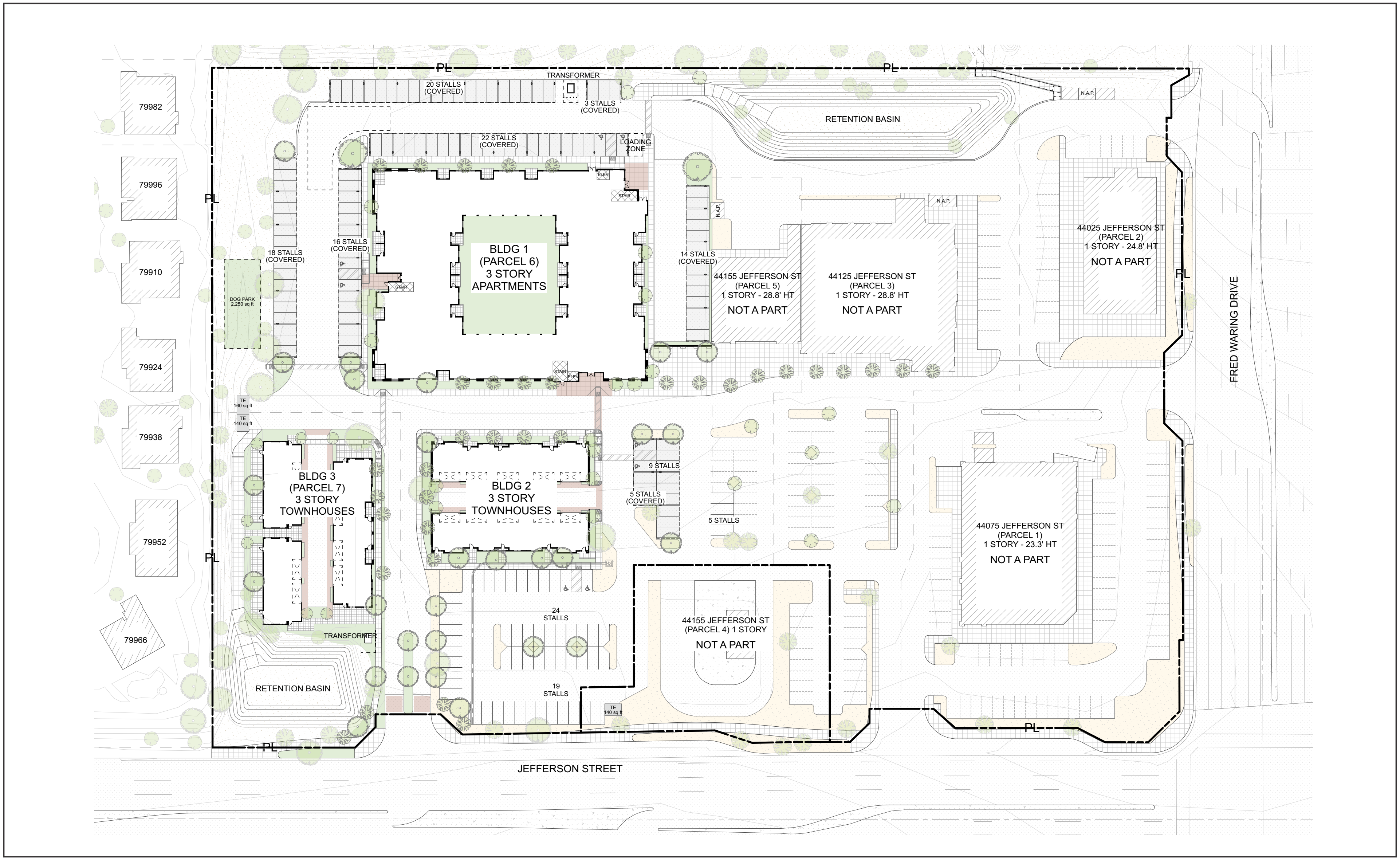

FIGURE 2

SOURCE: AERO Collective

Jefferson Square Multi-Family

Site Plan

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NOISE AND VIBRATION FUNDAMENTALS

CHARACTERISTICS OF SOUND

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 sound wave, which results in the tone's range from high to low. Loudness is the strength of a sound, and it describes a noisy or quiet environment; it 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 is the average rate of sound energy transmitted through a unit area perpendicular to the direction in which the sound waves are traveling. 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 with the A-weighted decibel (dBA) 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 representing points on a sharply rising curve.

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 sound's loudness. 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 levels dissipate exponentially with distance from their noise sources. 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. Line-source sound levels decrease 4.5 dB for each doubling of distance in a relatively flat environment with absorptive vegetation.

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 the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels. CNEL is the time-weighted average 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 relaxation 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 traffic 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 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, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts, which are increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, 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 sound levels higher than 85 dBA. Exposure to high sound levels affects the entire system, with prolonged sound 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 sound exposure above 90 dBA would result in permanent cell damage. When the sound level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of sound is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by a feeling of pain in the ear (i.e., the threshold of pain). A sound level of 160–165 dBA will result in dizziness or a 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 sound 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., the number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes 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, respectively.
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 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
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 p.m. and 7:00 a.m.
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 from 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, 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	Reference level
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 (2022).

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, where 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.

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. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 feet . 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, construction of the project 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 even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile-driving to cause vibration of sufficient amplitudes to damage nearby buildings. 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 is best for characterizing human response to building vibration, and PPV is used to characterize the potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

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

where "L_v" is the vibration velocity in decibels (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.

REGULATORY SETTING

APPLICABLE NOISE STANDARDS

The applicable noise standards governing the project site include the criteria in the California Code of Regulations and the City of La Quinta Municipal Code.

California Code of Regulations

Interior noise levels for residential habitable rooms are regulated by Title 24 of the California Code of Regulations California Noise Insulation Standards. Title 24, Chapter 12, Section 1206.4, of the 2019 California Building Code requires that interior noise levels attributable to exterior sources not exceed 45 CNEL in any habitable room. A habitable room is a room used for living, sleeping, eating, or cooking. Bathrooms, closets, hallways, utility spaces, and similar areas are not considered habitable rooms for this regulation (Title 24 California Code of Regulations, Chapter 12, Section 1206.4).

City of La Quinta

City of La Quinta Environmental Hazards Element

The Noise Section of the General Plan Environmental Hazards Element (Chapter IV) provides the City's goals and policies related to noise. The City has identified the following goals and policies in the Noise Section which are applicable to the project:

Goal N-1 *A healthful noise environment which complements the City's residential and resort character.*

Policies.

N-1.1 Noise standards in the City shall be consistent with the Community Noise and Land Use Compatibility scale described in this Element.

- **Program N-1.1a:** Propose to City Council an amendment to the Municipal Code (Section 9.100.210) to allow 65 dBA CNEL for sensitive land uses.
- **Program N-1.1b:** Ensure that City Building Code standards include interior noise level standards that are consistent with the Community Noise and Land Use Compatibility scale.

N-1.2 New residential development located adjacent to any roadway Identified in Table IV-4 as having a build out noise level in excess of 65 dBA shall continue to be required to submit a noise impact analysis in conjunction with the first Planning Department application, which demonstrates compliance with the City's noise standards.

N-1.6 All noise impact analysis will include, at a minimum, short-term construction noise and noise generated by the daily operation of the project at build out.

City of La Quinta Municipal Code

The City's Municipal Code establishes guidelines for appropriate noise level ranges for a variety of land uses within a community. Section 9.100.210, Noise Control, provides the specific noise standards utilized for impact determinations. The range of allowable exterior noise levels due to traffic noise impacts for various land uses is shown in Table C. This matrix is used to ensure noise compatibility of proposed land uses and helps predict the future noise environment. Where sensitive land uses will be exposed to noise levels of 60 dBA CNEL or higher, an acoustical study is required. In residential areas in California, the standard is a CNEL of 65 dBA. Mitigation measures are required where sensitive land uses will be exposed to noise levels greater than 65 dBA CNEL.

Section 9.100.210 also establishes base ambient noise level limits for noise sensitive and other non-residential uses based on time of day for non-transportation sources. Table D shows exterior noise limits established by the City. Noise sensitive land uses include residential uses, schools, hospitals, churches, daycare, and similar uses. All other uses must comply with the "Other Non-Residential" standard.

The City's Municipal Code also establishes limits on construction activity during the day. Construction noise is considered temporary but can often be disruptive for surrounding land uses. Section 6.08.050, Disturbances by construction noises, limits construction to the following hours:

- **October 1st through April 30th:** Monday – Friday: 7:00 a.m. to 5:30 p.m.; Saturday: 8:00 a.m. to 5:00 p.m.; Sunday and Holidays: None
- **May 1st through September 30th:** Monday – Friday: 6:00 a.m. to 7:00 p.m.; Saturday: 8:00 a.m. to 5:00 p.m.; Sunday and Holidays: None

In addition, Section 9.100.220, Operational standards, states: "No use, except a temporary construction operation, shall be permitted which generates inherent and recurrent ground vibration perceptible, without instruments, at the boundary of the lot on which the use is located."

Table C: Land Use Compatibility for Community Noise Environments

Land Uses	CNEL (dBA) 50	55	60	65	70	75	80
Residential – Single Family Dwellings, Duplex, Mobile Homes	A	A					
		B	B	B			
					C		
						D	D
Residential – Multiple Family		A					
			B	B			
					C		
						D	D
Transient Lodging: Hotels and Motels	A	A	A				
			B	B			
					C	C	
							D
School Classrooms, Libraries, Churches, Hospitals, Nursing Homes and Convalescent Hospitals	A	A	A	A			
			B	B			
					C	C	
							D
Auditoriums, Concert Halls, Amphitheaters	B	B	B	B			
				C	C	C	C
Sports Arenas, Outdoor Spectator Sports	B	B	B	B	B		
					C	C	C
Playgrounds, Neighborhood Parks	A	A	A	A			
				C	C		
					D	D	D
Golf Courses, Riding Stables, Water Recreation, Cemeteries	A	A	A	A	A		
					C	C	
							D
Office Buildings, Business, Commercial and Professional	A	A	A	A			
				B	B	B	
						D	D
Industrial, Manufacturing, Utilities, Agriculture	A	A	A	A	A		
					B	B	
						D	D

Source: California Department of Health Services, "Guidelines for the Preparation and Content of the Noise Element of the General Plan," 1990

A	**Normally Acceptable:** With no special noise reduction requirements assuming standard construction.
B	**Conditionally Acceptable:** New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design
C	**Normally Unacceptable**: New construction is discouraged. If new construction does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
D	**Clearly Unacceptable**: New construction or development should generally not be undertaken.

Table D: Exterior Noise Standards

Receiving Land Use	Noise Standard	Time Period
Noise sensitive	65 dB(A)	7:00 a.m. – 10 p.m.
	50 dB(A)	10:00 p.m. – 7:00 a.m.
Other nonresidential	75 dB(A)	7:00 a.m. – 10:00 p.m.
	65 dB(A)	10:00 p.m. – 7:00 a.m.

Source: City of La Quinta Municipal Code, Section 9.100.210 (2022).
dBA = A-weighted decibels

Federal Transit Administration

Because the City does not have construction noise level limits, construction noise was assessed using criteria from the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (2018) (FTA Manual). Table E shows the FTA's Detailed Analysist Construction Noise Criteria based on the composite noise levels per construction phase.

Table E: Detailed Assessment Construction Noise Criteria

Land Use	Daytime 1-hour L_{eq} (dBA)	Nighttime 1-hour L_{eq} (dBA)
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

APPLICABLE VIBRATION STANDARDS

Federal Transit Administration

Vibration standards included in the FTA Manual are used in this analysis for ground-borne vibration impacts on human annoyance. The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table F provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table G lists the potential vibration building damage criteria associated with construction activities, as suggested in the FTA Manual. FTA guidelines show that a vibration level of up to 0.5 in/sec in PPV 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 0.2 in/sec in PPV.

Table F: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Max 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 20×).
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 (100×) 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 a frequency range of 8 to 80 Hertz.
FTA = Federal Transit Administration
Max = maximum
L_V = velocity in decibels
VdB = vibration velocity decibels

Table G: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
Reinforced concrete, steel, or timber (no plaster)	0.50
Engineered concrete and masonry (no plaster)	0.30
Non-engineered timber and masonry buildings	0.20
Buildings extremely susceptible to vibration damage	0.12

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
FTA = Federal Transit Administration
PPV = peak particle velocity
in/sec = inch/inches per second

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are transportation facilities. Traffic on Jefferson Street is a steady source of ambient noise.

AMBIENT NOISE MEASUREMENTS

Long-Term Noise Measurements

Long-term (24-hour) noise level measurements were conducted on October 6 and 7, 2022, using four (4) Larson Davis Spark 706RC Dosimeters. Table H provides a summary of the measured hourly noise levels from the long-term noise level measurements. Hourly noise levels at surrounding sensitive uses are as low as 42.3 dBA L_{eq} during nighttime hours and 52.4 dBA L_{eq} during daytime hours. Long-term noise monitoring data results are provided in Appendix A. Figure 3 shows the long-term monitoring locations.

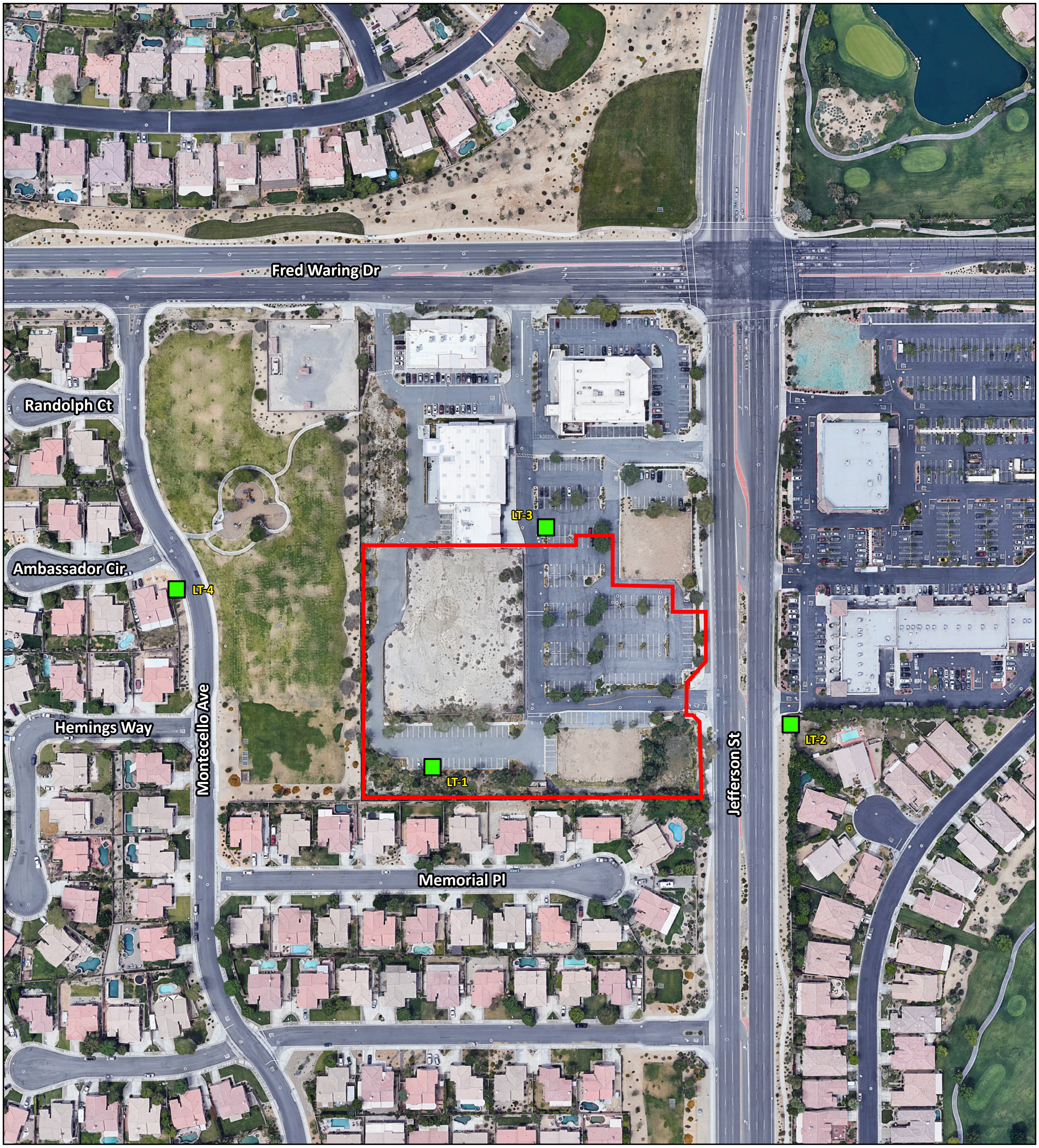
Table H: Long-Term Ambient Noise Level Measurements

Location		Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Community Noise Equivalent Levels (CNEL)
LT-1	On a light pole south of the project site near a parking lot, approximately 470 feet away from Jefferson Street centerline.	52.4-60.1	50.0-58.3	44.7-54.0	58.4
LT-2	Southeast of the project site on a palm tree across Jefferson Street by residence, approximately 75 feet away from Jefferson Street centerline.	69.7-72.4	66.4-68.3	58.2-70.7	73.2
LT-3	Parking lot west of Dutch Bros Coffee, approximately 320 feet away from Jefferson Street centerline.	58.4-65.6	56.0-63.9	49.3-61.5	64.0
LT-4	West of the project site on a palm tree in front of a single-family residence at 79819 Ambassador Cir, approximately 30 feet away from Monticello Avenue.	53.9-68.2	53.9-64.7	42.3-60.0	62.5

Source: Compiled by LSA (2022).
Note: Noise measurements were conducted from October 6 to October 7, 2022, starting at 1:00 p.m.
[1] Daytime Noise Levels = Noise levels during the hours from 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = Noise levels during the hours from 7:00 p.m. to 10:00 p.m.
[2] Nighttime Noise Levels = Noise levels during the hours from 10:00 p.m. to 7:00 a.m.
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

EXISTING AIRCRAFT NOISE

Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The closest airport to the proposed project site is Crown Aero (Bermuda Dunes Airport) located approximately 1.15 miles (mi) north of the project site. The proposed project is located outside of the 60 dBA CNEL noise contour.



LSA

LEGEND

- Project Site Boundary

LT-1 - Long-term Noise Monitoring Location

FIGURE 3

N

0 125 250

FEET

SOURCE: Google Earth, 2022

Jefferson Square Multi-Family

Noise Monitoring Locations

I:\GUD2201\G\Noise_Locations.ai (11/29/2022)

PROJECT IMPACT ANALYSIS

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance (passing trucks at 50 feet would generate up to 84 dBA L_{max}), the effect on longer-term ambient noise levels would be small when compared to existing daily traffic volumes on Jefferson Street. Because construction-related vehicle trips would not approach existing daily traffic volumes, traffic noise would not increase by 3 dBA CNEL. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, short-term, construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during construction, which includes demolition, site preparation, grading, building construction, paving, and architectural coating on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site 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 I lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor, taken from the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* (FHWA 2006).

In addition to the reference maximum noise level, the usage factor provided in Table I is used to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: $L_{eq}(equip)$ = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L. = noise emission level of the particular piece of equipment at a reference distance of 50 feet.

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

D = distance from the receiver to the piece of equipment.

Table I: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)[1]	Maximum Noise Level (L_{max}) at 50 Feet[2]
Auger Drill Rig	20	84
Backhoes	40	80
Compactor (ground)	20	80
Compressor	40	80
Cranes	16	85
Dozers	40	85
Dump Trucks	40	84
Excavators	40	85
Flat Bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Graders	40	85
Impact Pile Drivers	20	95
Jackhammers	20	85
Paver	50	77
Pickup Truck	40	55
Pneumatic Tools	50	85
Pumps	50	77
Rock Drills	20	85
Rollers	20	85
Scrapers	40	85
Tractors	40	84
Trencher	50	80
Welder	40	73

Source: *FHWA Roadway Construction Noise Model User's Guide,* Table 1 (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] 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 Central Artery/Tunnel program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
FHWA = Federal Highway Administration
L_{max} = maximum instantaneous sound level

Each piece of construction equipment operates as an individual point source. Using the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Using the equations from the methodology above, the reference information in Table I, and the construction equipment list provided, the composite noise level of each construction phase was calculated. The project construction composite noise levels at a distance of 50 feet would range from 74 dBA L_{eq} to 88 dBA L_{eq}, with the highest noise levels occurring during the site preparation phase.

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA, while halving the distance would increase noise levels by 6 dBA.

Table J shows the nearest sensitive uses to the project site, their distance from the center of construction activities, and composite noise levels expected during construction. These noise level projections do not consider intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

Table J: Potential Construction Noise Impacts at Nearest Receptor – Site Preparation

Receptor (Location)	Composite Noise Level (dBA L_{eq}) at 50 feet[1]	Distance (feet)	Composite Noise Level (dBA L_{eq})
Commercial (North)	88	160	78
Residences (South)		280	73
Residences (West)		540	67
Commercial/ Residences (East)		540	67

Source: Compiled by LSA (2022).

[1] The composite construction noise level represents the site preparation phase, which is expected to result in the greatest noise level as compared to other phases.

dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

While construction noise will vary, it is expected that composite noise levels during construction at the nearest off-site sensitive residential uses to the south would reach an average noise level of 73 dBA L_{eq} during daytime hours. These predicted noise levels would only occur when all construction equipment is operating simultaneously and, therefore, are assumed to be rather conservative in nature. While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed.

In addition to the site preparation phase, construction noise levels expected during the construction of Building 3, the building closest to the neighboring residences to the south, were calculated. At an average distance of 85 feet from the property line, noise levels have the potential to approach 78 dBA L_{eq}. Similar to site preparation activities discussed above, these predicted noise levels would only occur when all construction equipment is operating simultaneously and, therefore, are assumed to be rather conservative in nature. While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed. Additionally, the existing 6-foot-high property line wall would further reduce noise level impacts for activities at ground level.

As stated above, construction activities are regulated by the City's Noise Ordinance. The proposed project would comply with the construction hours specified in the City's Noise Ordinance, which limits construction to the following hours:

- October 1st through April 30th : Monday – Friday: 7:00 a.m. to 5:30 p.m.; Saturday: 8:00 a.m. to 5:00 p.m.; Sunday and Holidays: None

- May 1st through September 30th: Monday – Friday: 6:00 a.m. to 7:00 p.m.; Saturday: 8:00 a.m. to 5:00 p.m.; Sunday and Holidays: None

As it relates to off-site uses, construction-related noise levels would remain below the daytime 80 dBA L_{eq} 1-hour construction noise level criteria established by the FTA for residential and similar sensitive uses and, therefore, would be considered less than significant. Best construction practices presented at the end of this analysis shall be implemented to minimize noise impacts to surrounding receptors.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and assesses the potential for building damages using vibration levels in PPV (in/sec). This is because vibration levels calculated in RMS are best for characterizing human response to building vibration, while calculating vibration levels in PPV is best for characterizing the potential for damage.

Table K shows the PPV and VdB values at 25 feet from the construction vibration source. As shown in Table K, bulldozers and other heavy-tracked construction equipment (expected to be used for this project) generate approximately 0.089 PPV in/sec or 87 VdB of ground-borne vibration when measured at 25 feet, based on the FTA Manual. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project construction boundary (assuming the construction equipment would be used at or near the project setback line).

Table K: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 feet	
	PPV (in/sec)	L_V (VdB)[1]
Hoe Ram	0.089	87
Large Bulldozer[2]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks[2]	**0.076**	**86**
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *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 = microinches per second
FTA = Federal Transit Administration
in/sec = inch/inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The formulae for vibration transmission are provided below, and Tables L and M provide a summary of off-site construction vibration levels.

$$L_v dB\ (D) = L_v dB\ (25\ feet) - 30\ Log\ (D/25)$$

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

Table L: Potential Construction Vibration Annoyance Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (VdB) at 25 feet[1]	Distance (feet)[2]	Vibration Level (VdB)
Commercial (North)	87	160	63
Residences (South)		280	56
Residences (West)		540	47
Commercial/ Residences (East)		540	47

Source: Compiled by LSA (2022).

[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.

[2] The reference distance is associated with the average condition, identified by the distance from the center of construction activities to surrounding uses.

VdB = vibration velocity decibels

Table M: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 feet[1]	Distance (feet)[2]	Vibration Level (PPV)
Commercial (North)	0.089	5	0.335
Residences (South)		25	0.089
Residences (West)		300	0.002
Commercial/ Residences (East)		270	0.003

Source: Compiled by LSA (2022).

[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.

[2] The reference distance is associated with the peak condition, identified by the distance from the perimeter of construction activities to surrounding structures.

PPV = peak particle velocity

As shown in Table E, above, the threshold at which vibration levels would result in annoyance would be 78 VdB for daytime residential uses. As shown in Table F, the FTA guidelines indicate that for a non-engineered timber and masonry building, the construction vibration damage criterion is 0.2 in/sec in PPV.

Based on the information provided in Table K, vibration levels are expected to approach 56 VdB at the closest residential uses located immediately south of the project site, which is below the 78 VdB threshold for annoyance.

The closest structure to the project site is the commercial uses to the north of site, approximately 5 feet from the limits of construction activity. It is expected that vibration levels generated by dump trucks and other large equipment that would be as close as 5 feet from the property line would generate ground-borne vibration levels of up to 0.352 PPV (in/sec) at the closest structure to the project site. This vibration level would exceed the 0.2 PPV (in/sec) threshold considered safe for non-engineered timber and masonry buildings. It is expected that construction activities utilizing heavy equipment would generate vibration levels greater than 0.2 in/sec in PPV when operating within 5 feet of the property line, which would result in a potentially significant impact. Therefore, the use of heavy equipment should be prohibited within 15 feet of existing structures to ensure that vibration levels are below the 0.2 PPV (in/sec) threshold.

At 15 feet, dump trucks and other large equipment would generate ground-borne vibrations levels of up to 0.191 PPV (in/sec) at the closest structure to the project site and would not exceed the 0.2 PPV (in/sec) threshold. If heavy equipment is necessary within 15 feet of the north boundary of the project site, construction specifications would be implemented to reduce potential impacts. Therefore, construction would not result in any vibration damage and impacts would be less than significant with the incorporation of the construction specifications below:

Construction Specifications

Construction Vibration Damage. Due to the close proximity to surrounding structures, the City of La Quinta (City) Director of Community Development, or designee, shall verify prior to issuance of demolition or grading permits, that the approved plans require that the construction contractor shall implement the following specifications during project construction activities to ensure that damage does not occur at surrounding structures:

- The use of heavy equipment shall be prohibited within 15 feet of existing structures. If heavy equipment is necessary within 15 of existing structure the following actions shall be implemented:
    - Identify structures that could be affected by ground-borne vibration and would be located within 15 feet of where heavy construction equipment would be used. This task shall be conducted by a qualified structural engineer as approved by the City's Director of Community Development or designee.
    - Develop a vibration monitoring and construction contingency plan for approval by the City's Director of Community Development, or designee, to identify structures where monitoring would be conducted; set up a vibration monitoring schedule; define structure-specific

vibration limits; and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies would be identified for when vibration levels approached the limits.

- At a minimum, monitor vibration during initial demolition activities. Monitoring results may indicate the need for more intensive measurements if vibration levels approach the 0.2 PPV (in/sec) threshold.

- When vibration levels approach the 0.2 PPV (in/sec) limit, suspend construction and implement contingencies as identified in the approved vibration monitoring and construction contingency plan to either lower vibration levels or secure the affected structures.

Implementation of the above specifications would ensure a less than significant level by prohibiting heavy equipment within 15 feet of existing structures or requiring a vibration monitoring plan that would ensure that vibration levels are below the 0.2 PPV (in/sec) and vibration damage would not occur. Construction activities are regulated by the City's Municipal Code, which states that temporary construction, maintenance, or demolition activities are not allowed during the nighttime hours , vibration impacts would not occur during the more sensitive nighttime hours.

LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS

In order to assess the potential traffic impacts related to the proposed project, a *Traffic Impact Analysis* (translutions 2022) has been prepared. Based on the analysis results, it was determined that the project would generate 231 fewer daily trips. A reduction in daily trips would not generate an increase in traffic noise. Therefore, traffic noise impacts from project-related traffic on off-site sensitive receptors would be less than significant. No mitigation is required.

LONG-TERM OFF-SITE STATIONARY NOISE IMPACTS

The proposed buildings would have rooftop HVAC units. The HVAC equipment could operate 24 hours per day. Rooftop HVAC equipment would generate noise levels of 66.6 dBA L_{eq} at 5 feet per HVAC unit based on previous measurements conducted by LSA.

Table N presents the noise levels from HVAC equipment at the nearest noise-sensitive location. The closest off-site sensitive uses to the proposed location of on-site HVAC units would be located approximately 25 feet away south of the project site.

Table N: Summary of HVAC Noise Levels

Off-Site Land Use (Direction)	Distance from HVAC Units (feet)	Reference Noise Level for 1 Unit at 5 feet (dBA L_{eq})	Total Reference Noise for each bank at 5 feet (dBA L_{eq})[1]	Distance Attenuation (dBA)	Noise Level from each bank (dBA L_{eq})	Combined Noise Level (dBA L_{eq})
Residences - Memorial Place (South)	335	66.6	74.4	37	33	39

Source: Compiled by LSA (2022).

[1] Includes a minimum reduction of 5 dBA provided by rooftop parapet walls.

dBA = A-weighted decibel(s)

HVAC = heating, ventilation, and air conditioning

L_{eq} = equivalent continuous sound level

According to the site plan, 4 banks of HVAC units (6 units within each bank) are proposed to be installed. Per the building plans, each building would have parapet walls to hide the mechanical equipment, which would reduce noise levels by a minimum of 5 dBA. After distance attenuation, noise generated from the four banks of HVAC equipment at rooftop of Building 1 would be up to 39.0 dBA L_{eq} at the nearest sensitive use. This noise level would not exceed the City's exterior daytime (7:00 a.m. to 11:00 p.m.) and nighttime (11:00 p.m. to 7:00 a.m.) noise standards of 65 dBA L_{eq} and 50 dBA L_{eq}, respectively. Therefore, noise associated with the on-site HVAC equipment would be less than significant, and no mitigation is required.

LONG-TERM TRAFFIC-RELATED VIBRATION IMPACTS

The proposed project would not generate vibration levels related to on-site operations. In addition, vibration levels generated from project-related traffic on the adjacent roadways are unusual for on-road vehicles because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Vibration levels generated from project-related traffic on the adjacent roadways would be less than significant, and no mitigation measures are required.

BEST CONSTRUCTION PRACTICES

In addition to compliance with the City's Municipal Code which limits construction to the following hours:

- October 1st through April 30th : Monday – Friday: 7:00 a.m. to 5:30 p.m.; Saturday: 8:00 a.m. to 5:00 p.m.; Sunday and Holidays: None

- May 1st through September 30th: Monday – Friday: 6:00 a.m. to 7:00 p.m.; Saturday: 8:00 a.m. to 5:00 p.m.; Sunday and Holidays: None

The following recommendations would reduce construction noise to the extent feasible:

- The project construction contractor should equip all construction equipment, fixed or mobile, with properly operating and maintained noise mufflers, consistent with manufacturer's standards.
- The project construction contractor should locate staging areas away from off-site sensitive uses during the later phases of project development.
- The project construction contractor should place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site whenever feasible.

LAND USE COMPATIBILITY

The dominant sources of noise in the project vicinity are traffic noise from roadways in the vicinity of the project as well as surrounding commercial uses.

EXTERIOR NOISE ASSESSMENT

In order to assess on-site noise impacts, exterior noise levels located east of the project site could reach 64 dBA CNEL based on measured noise levels in the vicinity of the project. Exterior noise levels at the courtyard located at the center of Building 1 would be further reduced due to distance attenuation and shielding from the building, which would reduce the noise levels by 3 dBA or more. For noise levels that are less than 65 dBA CNEL, the Land Use Compatibility Standards shown in Table C defines the noise environment as normally acceptable for residential uses; therefore, exterior traffic noise levels would remain below the City's exterior noise level standards for transportation noise. Based on this, the long-term on-site traffic noise levels would be less than significant. No mitigation is required.

INTERIOR NOISE ASSESSMENT

As discussed above, per the California Code of Regulations, an interior noise level standard of 45 dBA CNEL or less is required for all noise-sensitive rooms. Based on the expected future exterior noise levels at the lots closest to Jefferson Street approaching 64 dBA CNEL after distance attenuation, a minimum noise reduction of 19 dBA would be required.

Based on reference information from transmission loss test reports for various Milgard windows (Milgard 2008), the necessary reduction can be achieved with standard building construction and standard windows with Sound Transmission Class (STC) typically in the ratings of 25–28 range, and interior noise levels of 45 dBA CNEL or less would be achieved.

Once final plans are available to detail the exterior wall construction and a window manufacturer has been chosen, a Final Acoustical Report (FAR) would be required to confirm the reduction capability of the exterior façades and to identify any specific upgrades necessary to achieve an interior noise level of 45 dBA CNEL or below.

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Harris, Cyril M., editor. 1991. *Handbook of Acoustical Measurements and Noise Control*. Third Edition.

Milgard. 2008. Various Transmission Loss Reports.

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

APPENDIX A

NOISE MONITORING DATA

Noise Measurement Survey – 24 HR

Project Number: GUD2201
Test Personnel: Kevin Nguyendo
Project Name: Jefferson Square Project
Equipment: Spark 706RC (SN:905)

Site Number: LT-1 Date: 10/6/22
Time: From 1:00 p.m. To 1:00 p.m.

Site Location: On a light pole south of the project site near a parking lot.

Primary Noise Sources: Faint traffic noise on Jefferson Street.

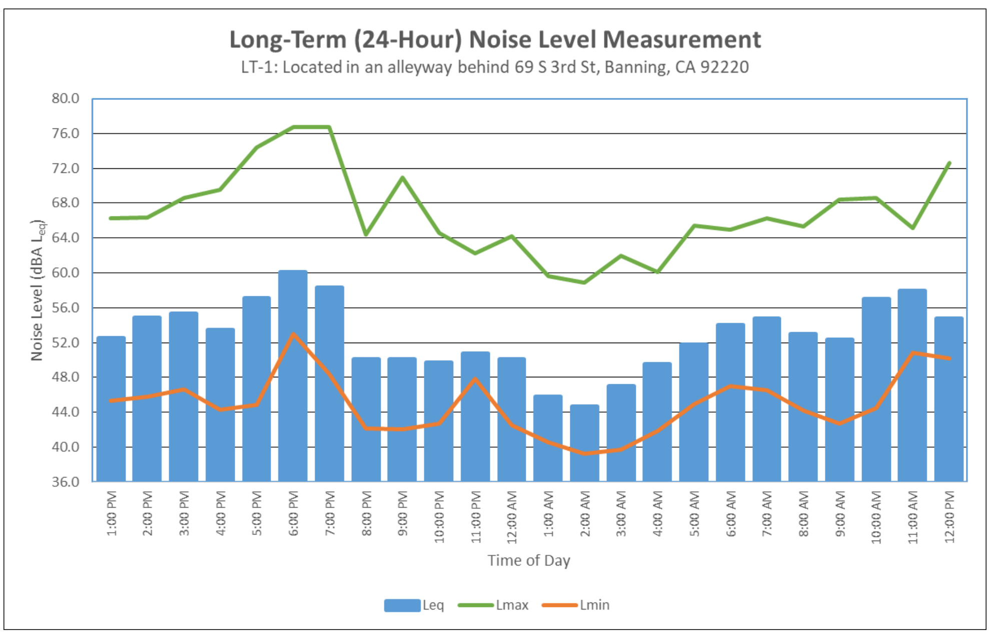
Comments: 5 foot 7 inch retaining wall south of the project site blocking the residential Homes.

Photo:

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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	10/6/22	52.5	66.3	45.3
2:00 PM	10/6/22	54.9	66.4	45.8
3:00 PM	10/6/22	55.4	68.6	46.6
4:00 PM	10/6/22	53.4	69.5	44.3
5:00 PM	10/6/22	57.1	74.4	44.8
6:00 PM	10/6/22	60.1	76.7	53.0
7:00 PM	10/6/22	58.3	76.7	48.4
8:00 PM	10/6/22	50.0	64.4	42.1
9:00 PM	10/6/22	50.0	70.9	42.0
10:00 PM	10/6/22	49.7	64.6	42.7
11:00 PM	10/6/22	50.8	62.2	47.8
12:00 AM	10/7/22	50.1	64.2	42.5
1:00 AM	10/7/22	45.8	59.6	40.5
2:00 AM	10/7/22	44.7	58.9	39.2
3:00 AM	10/7/22	47.0	62.0	39.7
4:00 AM	10/7/22	49.5	60.1	41.9
5:00 AM	10/7/22	51.8	65.4	44.9
6:00 AM	10/7/22	54.0	65.0	47.0
7:00 AM	10/7/22	54.8	66.3	46.5
8:00 AM	10/7/22	53.0	65.3	44.2
9:00 AM	10/7/22	52.4	68.4	42.7
10:00 AM	10/7/22	57.0	68.6	44.5
11:00 AM	10/7/22	57.9	65.1	50.8
12:00 PM	10/7/22	54.8	72.6	50.2

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: GUD2201
Project Name: Jefferson Square Project

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:906)

Site Number: LT-2 Date: 10/6/22

Time: From 1:00 p.m. To 1:00 p.m.

Site Location: Located southeast of the project site on a palm tree just across Jefferson Street.

Primary Noise Sources: Traffic noise on Jefferson Street.

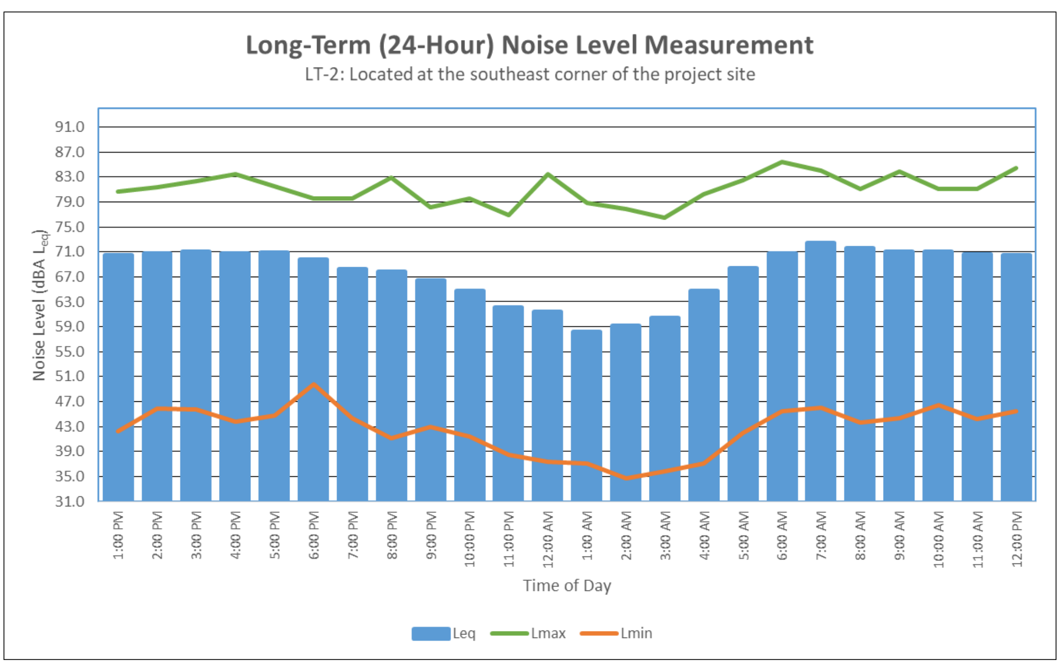
Comments: Nearby retaining wall is 6 feet tall.

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	10/6/22	70.4	80.6	42.2
2:00 PM	10/6/22	70.7	81.3	45.9
3:00 PM	10/6/22	71.1	82.4	45.8
4:00 PM	10/6/22	70.8	83.5	43.8
5:00 PM	10/6/22	70.9	81.5	44.8
6:00 PM	10/6/22	69.7	79.5	49.8
7:00 PM	10/6/22	68.3	79.5	44.3
8:00 PM	10/6/22	67.8	82.9	41.1
9:00 PM	10/6/22	66.4	78.1	42.9
10:00 PM	10/6/22	64.8	79.6	41.4
11:00 PM	10/6/22	62.1	76.9	38.5
12:00 AM	10/7/22	61.4	83.4	37.3
1:00 AM	10/7/22	58.2	78.9	37.1
2:00 AM	10/7/22	59.2	77.8	34.7
3:00 AM	10/7/22	60.4	76.5	35.8
4:00 AM	10/7/22	64.7	80.2	37.1
5:00 AM	10/7/22	68.4	82.5	42.0
6:00 AM	10/7/22	70.7	85.4	45.4
7:00 AM	10/7/22	72.4	84.0	46.0
8:00 AM	10/7/22	71.6	81.1	43.6
9:00 AM	10/7/22	71.0	83.9	44.4
10:00 AM	10/7/22	71.1	81.1	46.4
11:00 AM	10/7/22	70.6	81.1	44.2
12:00 PM	10/7/22	70.5	84.5	45.4

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: GUD2201
Project Name: Jefferson Square Project

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:907)

Site Number: LT-3 Date: 10/6/22

Time: From 1:00 p.m. To 1:00 p.m.

Site Location:

Primary Noise Sources: Faint Traffic noise on Jefferson Street. Noise from loudspeakers at a nearby coffee shop. Parking lot activity noise.

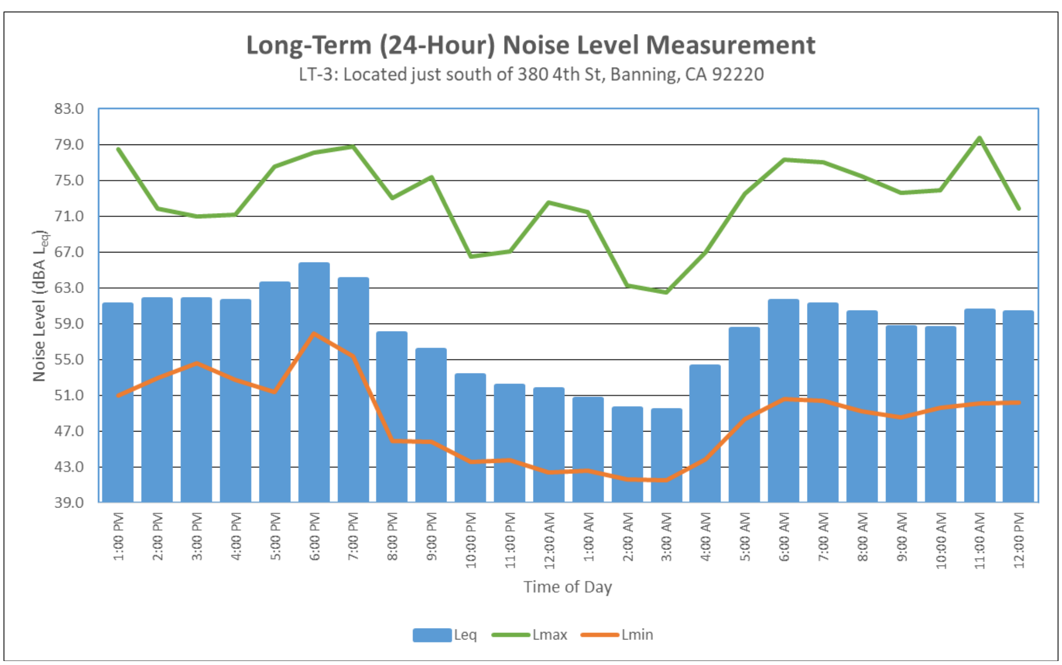
Comments:

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-3

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	10/6/22	61.1	78.5	51.0
2:00 PM	10/6/22	61.6	71.8	52.9
3:00 PM	10/6/22	61.7	71.0	54.6
4:00 PM	10/6/22	61.5	71.1	52.7
5:00 PM	10/6/22	63.4	76.5	51.3
6:00 PM	10/6/22	65.6	78.1	57.9
7:00 PM	10/6/22	63.9	78.8	55.3
8:00 PM	10/6/22	57.9	73.0	45.9
9:00 PM	10/6/22	56.0	75.3	45.8
10:00 PM	10/6/22	53.2	66.5	43.5
11:00 PM	10/6/22	52.1	67.1	43.7
12:00 AM	10/7/22	51.6	72.5	42.4
1:00 AM	10/7/22	50.5	71.4	42.6
2:00 AM	10/7/22	49.5	63.2	41.6
3:00 AM	10/7/22	49.3	62.5	41.5
4:00 AM	10/7/22	54.2	67.0	43.8
5:00 AM	10/7/22	58.3	73.5	48.3
6:00 AM	10/7/22	61.5	77.3	50.6
7:00 AM	10/7/22	61.1	77.0	50.4
8:00 AM	10/7/22	60.2	75.4	49.2
9:00 AM	10/7/22	58.6	73.6	48.5
10:00 AM	10/7/22	58.4	73.9	49.6
11:00 AM	10/7/22	60.4	79.7	50.1
12:00 PM	10/7/22	60.2	71.8	50.2

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: GUD2201
Project Name: Jefferson Square Project

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:908)

Site Number: LT-4 Date: 10/6/22

Time: From 1:00 p.m. To 1:00 p.m.

Site Location: Located west of the project site on a palm tree in front of a single family Home on 79819 Ambassador Cir, La Quinta, CA 92253.

Primary Noise Sources: Traffic noise from low-speed vehicles passing by.

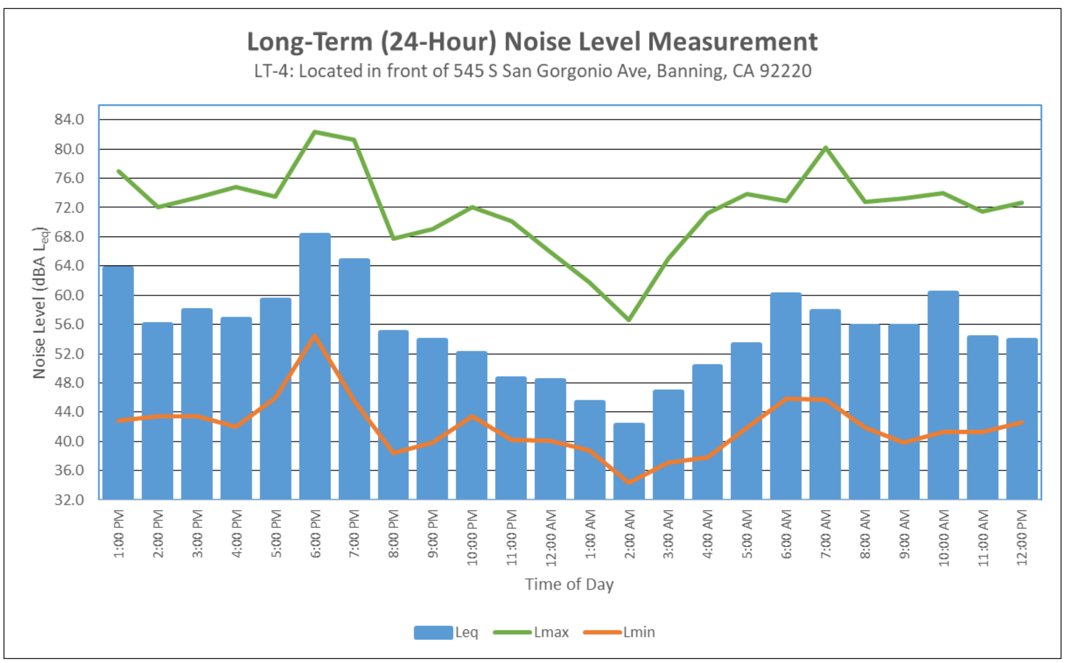
Comments: 5 foot and 5 inch tall retaining wall nearby.

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-4

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	10/6/22	63.7	77.0	42.8
2:00 PM	10/6/22	56.0	72.1	43.5
3:00 PM	10/6/22	57.9	73.4	43.4
4:00 PM	10/6/22	56.7	74.8	42.0
5:00 PM	10/6/22	59.4	73.5	46.0
6:00 PM	10/6/22	68.2	82.4	54.5
7:00 PM	10/6/22	64.7	81.3	45.6
8:00 PM	10/6/22	55.0	67.7	38.4
9:00 PM	10/6/22	53.9	69.1	39.9
10:00 PM	10/6/22	52.0	72.1	43.4
11:00 PM	10/6/22	48.6	70.1	40.2
12:00 AM	10/7/22	48.4	66.0	40.1
1:00 AM	10/7/22	45.4	61.8	38.8
2:00 AM	10/7/22	42.3	56.6	34.3
3:00 AM	10/7/22	46.8	65.0	37.1
4:00 AM	10/7/22	50.2	71.2	37.8
5:00 AM	10/7/22	53.3	73.9	41.9
6:00 AM	10/7/22	60.0	72.9	45.8
7:00 AM	10/7/22	57.8	80.2	45.7
8:00 AM	10/7/22	55.8	72.8	41.9
9:00 AM	10/7/22	55.7	73.3	39.9
10:00 AM	10/7/22	60.3	74.0	41.3
11:00 AM	10/7/22	54.2	71.5	41.3
12:00 PM	10/7/22	53.9	72.7	42.6

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



APPENDIX B

CONSTRUCTION NOISE CALCULATIONS

Construction Calculations

Phase: Demolition

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Concrete Saw	1	90	20	50	0.5	90	83
Excavator	3	81	40	50	0.5	81	82
Dozer	2	82	40	50	0.5	82	81
					Combined at 50 feet	**91**	**87**

Phase: Site Preparation

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Dozer	3	82	40	50	0.5	82	83
Tractor	4	84	40	50	0.5	84	86
					Combined at 50 feet	**86**	**88**
					Combined at Receptor 160 feet	**76**	**78**
					Combined at Receptor 280 feet	**71**	**73**
					Combined at Receptor 540 feet	**65**	**67**

Phase: Grading

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Excavator	1	81	40	50	0.5	81	77
Grader	1	85	40	50	0.5	85	81
Dozer	1	82	40	50	0.5	82	78
Tractor	3	84	40	50	0.5	84	85
					Combined at 50 feet	**89**	**87**
					Combined at Receptor 160 feet	**79**	**77**
					Combined at Receptor 280 feet	**74**	**72**
					Combined at Receptor 540 feet	**69**	**67**

Phase:Building Construstion

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Crane	1	81	16	50	0.5	81	73
Man Lift	3	75	20	50	0.5	75	73
Generator	1	81	50	50	0.5	81	78
Tractor	3	84	40	50	0.5	84	85
Welder / Torch	1	74	40	50	0.5	74	70
					Combined at 50 feet	**87**	**86**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Paver	2	77	50	50	0.5	77	77
All Other Equipment > 5 HP	2	85	50	50	0.5	85	85
Roller	2	80	20	50	0.5	80	76
					Combined at 50 feet	**87**	**86**

Phase:Architectural Coating

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Compressor (air)	1	78	40	50	0.5	78	74
					Combined at 50 feet	**78**	**74**

Sources: RCNM

[1]- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level