Troutdale Village Apartments Project- Noise

Noise Impact Study

City of La Quinta, CA

Prepared for:

Rich Malacoff
The Altum Group
72140 Magnesia Falls, Suite 1
Rancho Mirage, CA 92270

Prepared by:

MD Acoustics, LLC
Francisco Irarrazabal
1197 Los Angeles Ave, Ste C-256
Simi Valley, CA 93065

Date: 1/12/2022

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This noise assessment was prepared to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to the noise standards set forth by the Federal, State and Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the City's Noise Element and Municipal Code.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An analysis of traffic noise impacts to and from the project site
- An analysis of construction noise impacts

1.2 Site Location and Study Area

The project site is located at the northeast corner of Washington Street and Avenue 50 intersection in La Quinta, California, as shown in Exhibit A. The site is currently zoned as medium/high density residential use with vacant residential use to the south and north, low density residential to the west, and open space to the east.

1.3 Proposed Project Description

The Project proposes a high/medium residential-use development consisting of 284 units, on 13.84 acres. As a worst-case scenario, this assessment assumes the project is built-out in one (1) complete phase. Construction activities within the Project area will consist of on-site grading, building, paving, and architectural coating.

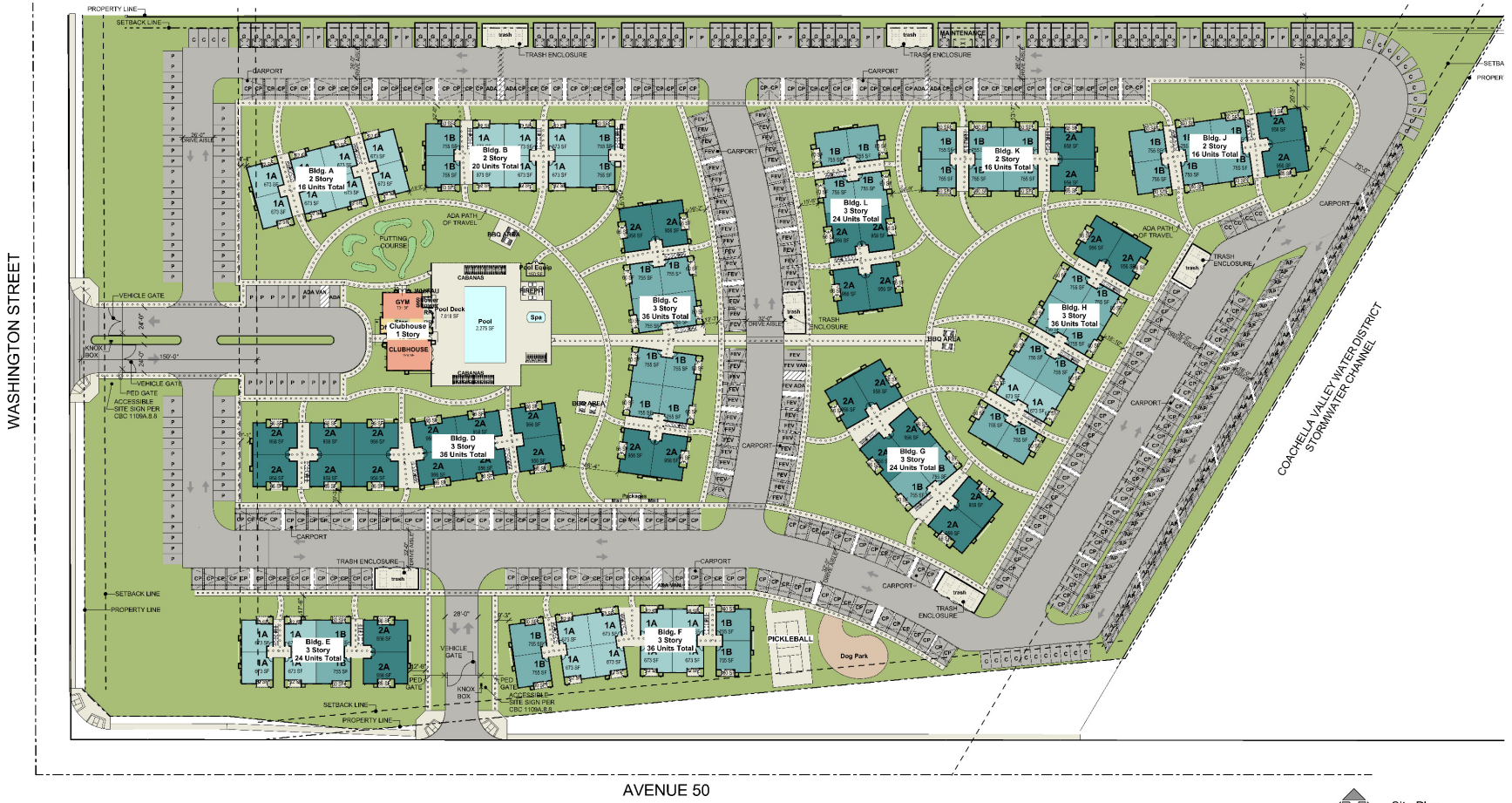
This study assesses both the traffic and short-term stationary noise to and from the project site and compares the results to the applicable City noise limits. The primary source of traffic noise propagates from Washington Street. The primary source of short-term stationary noise propagates from construction equipment to be deployed in the area for construction activities. The site plan used for this is illustrated in Exhibit B.

Exhibit A

Location Map

Exhibit B

Site Plan



Common Area Calculations

		Area (SF)
1, First Floor		
CLUBHOUSE	RESIDENT ACTIVITY	976
FIREPIT	HARDSCAPE	322
GYM	RESIDENT ACTIVITY	731
HALL	CIRCULATION	188
HK	SERVICE	36
MAINTENANCE	SERVICE	420
Office	ADMINISTRATION	290
Pool	RETENTION BASIN	2,275
Pool Deck	TERRACE	7,010
Pool Equip	MECHANICAL	150
RR	RESTROOMS	124
Shower	RESTROOMS	68
Spa	RETENTION BASIN	133
Stor	SERVICE	119
Wet Bar	RESIDENT ACTIVITY	36
WH/FAU	MECHANICAL	24
		12,694 sq ft

UNIT MIX

Unit Type	Unit Name	Beds	Qty	Area (SF)	Total (SF)
1-Bed Apartment	1B	1	116	755	87,580
1-Bed Apartment	1A	1	70	673	47,110
2-Bed Apartment	2A	2	98	956	93,688
		382	**284**		**228,378 sq ft**

MARKET RATE UNITS	221
AFFORDABLE UNITS (28.5%)	63
TOTAL UNITS	**284**
PARKING REQUIRED	621
PARKING PROPOSED	**666**
TOTAL PATIO AREA	6,994 SF
TOTAL BALCONY AREA	11,196 SF (N.I.C. STAIR LANDINGS)

Parking Calcs	Qty
ADA	6
ADA VAN	2
AP	82
C	26
CC	4
CP	224
FEV	55
FEV ADA	1
FEV VAN	1
G	56
Mail	1
P	100
	560

PARKING LEGEND:

ADA = ACCESSIBLE STANDARD PARKING SPACE (9' X 19') +5' AISLE
ADA G = ACCESSIBLE GARAGE PARKING SPACE (10' X 20')
ADA VAN = ACCESSIBLE VAN PARKING SPACE (9' X 19') +8' AISLE
AP = ANGLED PARKING SPACE, COVERED
C = COMPACT PARKING SPACE (8.5' X 16')
CC = COVERED COMPACT PARKING SPACE (8.5' X 17.5')
CP = COVERED STANDARD PARKING SPACE (9' X 19')
FEV = FUTURE EV PARKING SPACE (9' X 19')
FEV ADA = FUTURE EV ADA PARKING SPACE (9' X 19') +5' AISLE
FEV VAN = FUTURE EV VAN PARKING SPACE (9' X 19') +8' AISLE
G = GARAGE STANDARD PARKING SPACE (10' X 20')
MAIL = DESIGNATED MAIL VAN PARKING SPACE (9' X 19')
P = STANDARD PARKING SPACE (9' X 19') (9' X 17')

Site Plan
SCALE: 1/32" = 1'-0"

N

IPA IRWIN PARTNERS ARCHITECTS
245 Fischer Avenue, Suite B-2 Costa Mesa CA 92626
(714) 557 2448 www.ipaoc.com
ARCHITECTURE PLANNING CONSULTING

La Quinta Apartments
Parker Development NW
Washington Street & Avenue 50
La Quinta, California 92253

Site Plan
A1

PROJECT NO: 21014
PLOT DATE: 10/12/2021
21014 La Quinta SD V2

2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

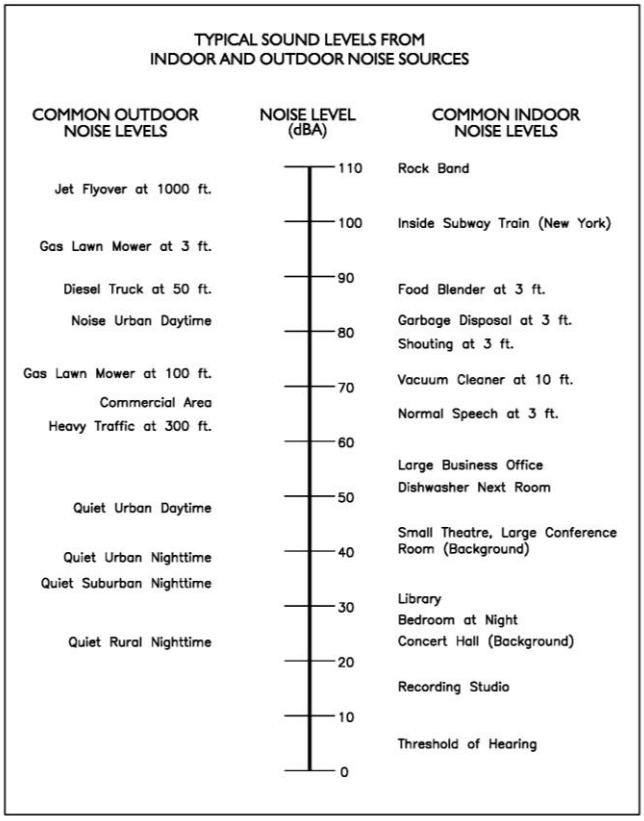
2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

Exhibit C: Typical A-Weighted Noise Levels



2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measure in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels abbreviated dB. Exhibit C illustrates references sound levels for different noise sources.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2–3 axle) and heavy truck percentage (4 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity and turbulence can further impact have far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Perception

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of La Quinta and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The federal government advocates that local jurisdiction use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the “Land Use Compatibility for Community Noise Environments Matrix.” The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan.

The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D. (Table IV-3 and Exhibit III-12 of the City's GP, EIR).

Exhibit D: Land Use Compatibility Guidelines

Table IV-3
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	B			C	D	
Residential – Multiple Family	A	A	B		C	D	
Transient Lodging: Hotels and Motels	A		B		C		D
School Classrooms, Libraries, Churches, Hospitals, Nursing Homes and Convalescent Hospitals	A		B		C		D
Auditoriums, Concert Halls, Amphitheaters	B			C			
Sports Arenas, Outdoor Spectator Sports	B				C		
Playgrounds, Neighborhood Parks	A			C	D		
Golf Courses, Riding Stables, Water Recreation, Cemeteries	A				C		D
Office Buildings, Business, Commercial and Professional	A			B		D	
Industrial, Manufacturing, Utilities, Agriculture	A				B	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.

4.3 City of La Quinta Noise Regulations

The City of La Quinta outlines their noise regulations and standards within the Noise Element from the General Plan and the Noise Ordinance from the Municipal Code.

City of La Quinta General Plan

Applicable policies and standards governing environmental noise in the City are set forth in Chapter IV of the General Plan, Environmental Hazards, Noise. Table IV-3 (Exhibit D of this report) of the City's Noise Element outlines the exterior noise standards for community noise environments. According to said Table IV-3, multiple family residential noise limits are normally acceptable up to 60 dBA CNEL and conditionally acceptable up to 65 dBA CNEL.

In addition to the noise standards, the City has outlined goals, policies, and implementation measures to reduce potential noise impacts and are presented below:

Goals, Policies, and Implementation Measures

Policies, goals and implementation program measures from the Noise Element that would mitigate potential impacts on noise include the following.

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

Policy 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 N1.1.a: Propose to City Council an amendment to the Municipal Code (Section 9.100.210) to allow 65 dBA CNEL for sensitive land uses.

Program N1.1.b: Ensure that City Building Code standards include interior noise level standards that are consistent with the Community Noise and Land Use Compatibility scale.

Policy 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.

Policy N.1.3: New non-residential development located adjacent to existing residential development, sensitive receptors or residentially designated land, shall be required to submit a noise impact analysis in conjunction with the first Planning Department application, which demonstrates that it will not significantly impact the adjacent residential development or residential land.

Program N1.3.a: Provide accommodation for special events in the public interest, such as concerts and festivals, which may temporarily exceed the maximum allowable decibel level.

Policy N.1.4: All Mixed Use projects shall 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.

Policy N.1.5: 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.

Policy N.1.6: The City may require remedial noise control plans and/or improvements for areas experiencing noise in excess of adopted City standards.

Program N1.6.a: Remedial improvements will be included in the Capital Improvement Program.

Policy N.1.7: Noise impact analysis shall be included in all City Capital Improvement Plan (CIP) and developer-required roadway widening projects to demonstrate compliance with City noise standards.

Policy N.1.8: Maintain a truck route plan restricting truck travel to arterial roadways.

RELATED GOALS

As described above, this Element relates to others in this General Plan. The following Goals and their associated policies and programs are closely related to those of this Element.

GOAL LU-1: Land use compatibility throughout the City.

GOAL LU-3: Safe and identifiable neighborhoods that provide a sense of place.

GOAL OS-2: Good stewardship of natural open space and [reservation of open space areas.

City of La Quinta – Noise Ordinance/Municipal Code

Chapter 9.100.210 of the City's Municipal Code outlines the City's noise ordinance.

Section 9.100.210 – Noise Control

A. Purpose. The noise control standards for nonresidential land use districts set forth in this section are established to prevent excessive sound levels which are detrimental to the public health, welfare and safety or which are contrary to the public interest.
B. Noise Standards. Exterior noise standards are set forth below. Residential property, schools, hospitals, and churches are considered noise sensitive land uses, regardless of the land use district in which they are located. All other uses shall comply with the "other nonresidential" standard. All noise measurements shall be taken using standard noise measuring instruments. Measurements shall be taken within the receiving property at locations determined by director to be most appropriate to the individual situation.

Table 1: 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						
		B					
					C		
						D	
Residential Multiple Family	A						
			B				
					C		
						D	
Transient Lodging: Hotels and Motels	A						
			B				
					C		
							D
Schools Classrooms, Libraries, Churches, Hospitals, Nursing Homes and Convalescent Hospitals	A						
			B				
					C		
							D
Auditoriums, Concert Halls, Amphitheaters	B						
				C			
Sports Arenas, Outdoor Spectator Sports	B						
					C		
Playgrounds, Neighborhood Parks	A						
				C			
					D		
Golf Courses, Riding Stables, Water Recreation, Cemeteries	A						
					C		
							D
Office Buildings, Business, Commercial and Professional	A						
				B			
						D	
Industrial, Manufacturing, Utilities, Agriculture	A						
					B		
						D	

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

Chart Legend

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 requirements 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 insulation features included in the design.
D Clearly Unacceptable: New construction or development should generally not be undertaken.

Table 2: Exterior Noise Standards

Receiving Land Use	Noise Standard	Time Period
Noise sensitive	65 dB(A)	7:00 a.m. - 10:00 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.

If the noise consists entirely of impact noise, simple tone noise, speech or music, or any combination thereof, each of the noise levels specified in the table in this section shall be reduced by five (5) dB(A).

C. Noise Limits. It is unlawful for any person at any location within the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, when such noise causes the noise level, when measured on any adjacent property, to exceed:
    1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour:
    2. The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour;
    3. The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour;
    4. The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or
    5. The noise standard plus twenty (20) dB(A) for any period of time.

    For purposes of this section, the term “cumulative period” means the number of minutes that noise occurs within any hour, whether such minutes are consecutive or not.
D. Ambient Noise Level. If the ambient or background noise level exceeds any of the preceding noise categories, no increase above such ambient noise level shall be permitted.
E. Exceptions. The following are exempt from noise restrictions of this section:
    1. Emergency vehicles or other emergency operations.
    2. City maintenance, construction or similar activities.
    3. Construction activities regulated by Section 6.08.050 of the La Quinta Municipal Code.
    4. Golf course maintenance activities between 5:30 a.m. and ending no later than 8:00 p.m. on any given day
F. Enforcement. The city manager or designee shall have the responsibility and authority to enforce the provisions of this section.

Chapter 6.08.050 – Disturbances by construction noises

A. It is a nuisance and it is unlawful, for any person to be engaged or employed, or for any person to cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition to, or improvement to realty, except between the hours set forth as follows:

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:	none
	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:	none
	Holidays*:	none
*For purposes of this section, the following shall be considered Holidays: New Year's Day (January 1st) Dr. Martin Luther King Jr. Day (third Monday in January) President's Day (third Monday in February formerly Washington's birthday) Memorial Day (last Monday in May) Independence Day (July 4th) Labor Day (first Monday in September) Veteran's Day (November 11th) Thanksgiving (fourth Thursday in November) Christmas Day (December 25 th)		

B. No person doing or causing work prohibited by subsection A of this section, after being informed orally or in writing that the work is in violation of subsection A, shall fail, refuse or neglect to cease said work.

Exceptions:

1. Emergency repair of existing installations or equipment or appliances:
2. Construction work complying with the terms of a written early work permit which may be issued by the city manager or designee, upon a showing of sufficient need due to hot or inclement weather, or the use of an unusually long process material, or other circumstances of unusual and compelling nature.

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to CalTrans technical noise specifications. All measurements equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a wind screen was placed over the microphone
- Frequency weighting was set on “A” and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

Noise monitoring locations were selected based on the distance of the nearest sensitive on-site receptors to the main noise source (Washington Road). Short-term noise measurements were conducted near the northeastern, southeastern, and western corners of the project site. Measurements represent ambient levels at the site. Appendix A includes photos, field sheet, and measured noise data. Exhibit E (next page) illustrates the location of the measurements.

5.3 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Roadway volumes and percentages correspond to the project’s traffic impact study as projected by the Trip Generation and VMT scoping agreement for Washington Street and Avenue 50 multi-family

development made by Integrated Engineering Group, and the City's General Plan, Chapter II Circulation (Modified – January 2017). The referenced traffic data was applied to the model and is in Appendix B. The following outlines the key adjustments made to the REMEL for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic Volumes (ADT), Travel Speeds, Percentages of automobiles, medium trucks and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour through-out a 24-hour period

Table 3 indicates the roadway parameters and vehicle distribution utilized for this study.

Table 3: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT[1]	Existing Plus Project ADT[2]	Speed (MPH)	Site Conditions
Washington St	Eisenhower Dr to Ave 50	41,381	42,628	50	Hard
Avenue 50	Wash. St to Jefferson St	16,121	16,329	50	Hard
Major Arterial Vehicle Distribution (Truck Mix)[3]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		81.4	10.4	8.2	96.05
Medium Trucks		86.7	5.3	8.0	2.65
Heavy Trucks		89.2	3.4	7.3	1.30

Notes:
[1] Per La Quinta General Plan Chapter II Circulation, 01/2017) LOS C, and Trip Generation and VMT scoping agreement, Integrated Engineering Group.
[2] Trip distribution per Integrated Engineering Group TIA report December 2021, Figure 2.
[3] Vehicle distribution data is based on La Quinta General Plan Environmental Impact Report, Sect. III., O. Transportation/Traffic.

The following outlines key adjustments to the REMEL for project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra
- Topography

MD projected the traffic noise levels to the on-site receptors. The project noise calculation worksheet outputs are located in Appendix B.

5.4 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading, concrete and building phases of construction. The construction noise calculation output worksheet is located in Appendix C. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 1 to 2-year time period. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

Exhibit E
Measurement Locations

= Short-Term Monitoring Location

6.0 Existing Noise Environment

Three (3) short-term (30-min) ambient noise measurement were conducted at or near the project site. The noise measurements were taken to determine the existing baseline noise conditions.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 4.

Table 4: Short-Term Nosie Measurement Data (dBA)[1]

Date	Location	30-minutes dB(A)				
		Start	Stop	L_{EQ}	L_{MAX}	L_{MIN}
10/19/2021	ST-1	01:03 PM	01:23 PM	45.5	62.4	38.2
10/19/2021	ST-2	01:09 PM	01:29 PM	61.1	79.7	37.2
10/19/2021	ST-3	01:33 PM	01:53 PM	65.8	79.6	40.2

Notes:
1. Short-term noise monitoring locations (ST-1 through ST-3) are illustrated in Exhibit E. The quietest measured noise level is at location ST-1.

Noise data indicate the equivalent ambient level ranged between 45.5 dBA to 65.8 dBA near the project site. Maximum levels reach up to 79.7 dBA at the ST-2 location. The quietest noise level measured 37.2 dBA at location ST-2. The measured ambient level at or near the project site shows that the primary noise source is traffic along Washington Street. Additional field notes and photographs are provided in Appendix A.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts to and from the project and compares the results to the City's Noise Standards. The analysis details the estimated exterior noise levels associated with traffic from adjacent roadways.

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed project.

7.1.1 Noise Impacts to Off-Site Receptors Due to Project Generated Traffic

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated 180 feet from the centerline of Washington Street and 120 feet from the centerline of Avenue 50 roadway. The trip generation for the multi-family residence project is 2,079, distributed 60% on Washington Street and 10% on Avenue 50. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. In addition, the noise contours for 60, 65 and 70 dBA CNEL were calculated. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions.

Existing Year (Plus Project): This scenario refers to existing year + project traffic noise conditions.

Table 5 compares the without and with project scenario and shows the change in traffic noise levels as a result of the proposed project. It takes a change of 3 dB or more to hear a perceptible difference. As demonstrated in Table 5, the project is anticipated to generate a small change in the noise CNEL level.

The change in noise level is less than significant as 0.2 dBA noise increase is projected. No further mitigation is required.

7.1.2 Noise Impacts to On-Site Receptors Due to Traffic

Traffic noise from the local roadway network was evaluated and compared to the City's noise compatibility matrix. Per the City's Land Use Compatibility (Section 9.100.210 from Municipal Code), multi-family residential is conditionally acceptable up to 65 dBA CNEL. As shown in Table 5, Existing Plus Project traffic 70 dBA CNEL noise projections from Washington Street will reach up to 173 feet from the centerline of the Roadway. Residential structures are located approximately 180 feet away from Washington Street centerline and fall within the 70 to 65 dBA CNEL contour of the Roadway and are located within the conditionally acceptable region for multiple-family residential (per land use compatibility matrix).

To mitigate exterior to interior noise levels to the multi-family uses the project shall implement noise control solutions to mitigate interior noise levels down to 45 dBA CNEL which requires a noise reduction of at least 25 dBA or more for the first and second floor units.

Table 5: Existing Scenario - Noise Levels Along Roadways (dBA CNEL)

Existing Without Project Exterior Noise Levels

Roadway	Segment	CNEL at 180 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Washington St	Eisenhower Dr to Avenue 50	69.7	169	536	1694	5357
Avenue 50	Washington St to Jefferson St	67.6	70	220	695	2199

Existing With Project Exterior Noise Levels

Roadway	Segment	CNEL at 180 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Washington St	Eisenhower Dr to Avenue 50	69.9	175	552	1745	5518
Avenue 50	Washington St to Jefferson St	67.7	70	223	704	2228

Change in Existing Noise Levels as a Result of Project

Roadway	Segment	CNEL at 60 Feet dBA[1,2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
Washington St	Eisenhower Dr to Avenue 50	69.7	69.9	0.2	No
Avenue 50	Washington St to Jefferson St	67.6	67.7	0.1	No

Notes:
[1] Exterior noise levels calculated at 5 feet above ground level.
[2] Noise levels calculated from centerline of subject roadway.

7.1.3 Noise Impacts to Off-Site Receptors Due to Operational Traffic

The nearest off-site sensitive uses are located across Washington Street to the west of the project site. Due to the projected change in noise contour are beyond the residences locations, the project's operations will have no impact on any off-site sensitive uses.

7.2 Summary of Recommendations

The following recommendations are provided:

MM-1: The project shall achieve a minimum of 25 dBA noise reduction in the residential building shell design to meet the City's 45 dBA CNEL interior residential requirement.

8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise-generated characteristics of typical construction activities. The data is presented in Table 6.

Table 6: Typical Construction Noise Levels[1]

Equipment Powered by Internal Combustion Engines

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86

Impact Equipment

Type	Noise Levels (dBA) at 50 Feet
Saws	71 - 82
Vibrators	68 - 82

Notes:
[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

Construction noise is considered a short-term impact and would be considered significant if construction activities are taken outside the allowable times as described in the City's Municipal Code (Section 6.08.050(A)). Construction is anticipated to occur during the permissible hours according to the City's Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise. The impact is considered not significant however construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of a grader, a dozer, and two (2) excavators, two (2) backhoes and a scraper operating at 290 feet from the nearest sensitive receptor (north residences).

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 290 feet have the potential to reach 70 dBA L_{eq} and 74 dBA L_{max} at the nearest sensitive receptors during grading. Noise levels for the other construction phases would be lower and range between 63 to 66 dBA.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bull dozer. A large bull dozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^n$$

Where: PPV_{ref} = reference PPV at 100ft.
D_{rec} = distance from equipment to receiver in ft.
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 7 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 7: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 8 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 8: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 290 feet, a large bulldozer would yield a worst-case 0.006 PPV (in/sec) which below the threshold of perception and any risk of damage. The impact is less than significant, and no mitigation is required.

8.3 Construction Noise Reduction Measures

Construction operations must follow the City's General Plan and the Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following measures should be taken:

1. Construction should occur during the permissible hours as defined in Section 6.08.050(A).

2. During construction, the contactor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.

3. The contractor should locate equipment staging areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.

4. Idling equipment should be turned off when not in use.

5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of La Quinta: 2035 General Plan, Chapter IV Environmental Hazard, Noise.

City of La Quinta: 2035 General Plan, Chapter II Community Development, Circulation Element.

City of La Quinta: Chapter 9.100.210 Noise Control of the Municipal Code.

Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual. September 2018.

Trip Generation and VMT scoping agreement for Washington Street and Avenue 50 multi-family development, La Quinta, Integrated Engineering Group, October 26, 2021.

Troutdale Village Transportation Analysis. Integrated Engineering Group, December 2021.

Appendix A:

Field Measurement Data

MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

20-Minute Continuous Noise Measurement Datasheet

Project: La Quinta Apartments Project - Noise
Site Address/Location: Washington St and Avenue 50, La Quinta CA
Date: 10/19/2021
Field Tech/Engineer: Jason Schuyler

Site Observations: Clear sky, measurement was performed at the northeast, southeast & west lot lines. Ambient noise consisted of traffic along Washington Street and Highschool across wash channel.

General Location:
Sound Meter: ST-1: NTi Audio **SN:** A2A-05967-E0
ST-2&3: NTi Audio **SN:** A2A-07095-E0
Settings: A-weighted, slow, 1-sec, 20-minute interval
Meteorological Con.: 83 degrees F, 0-2 mph wind, southern direction
Site ID: ST-1, ST-2 & ST-3

Site Topo: Flat
Ground Type: Soft site

Noise Source(s) w/ Distance:
1 -meter is approx 600' from Avenue 50 CL.
2 - meter is approx 115' from Avenue 50 CL.
3 - meter is approx 70' from Washington St CL.

Figure 1: Monitoring Locations

Figure 2: ST-1 Photo

Figure 3: ST-2 Photo

MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

20-Minute Continuous Noise Measurement Datasheet - Cont.

Project: La Quinta Apartments Project - Noise
Site Address/Location: Washington St and Avenue 50, La Quinta CA
Site ID: ST-1, ST-2 & ST-3

Figure 4: ST-3 Photo

Figure 5: ST-3 Photo

Table 1: 20-Min Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
1	1:03 PM	1:23 PM	45.5	62.4	33.7	51.9	48.6	45.4	42.9	38.2
2	1:09 PM	1:29 PM	61.1	79.7	37.2	69.2	65.6	61.8	55.9	42.5
3	1:33 PM	1:53 PM	65.8	79.6	40.2	72.2	69.9	66.8	63.4	52.6

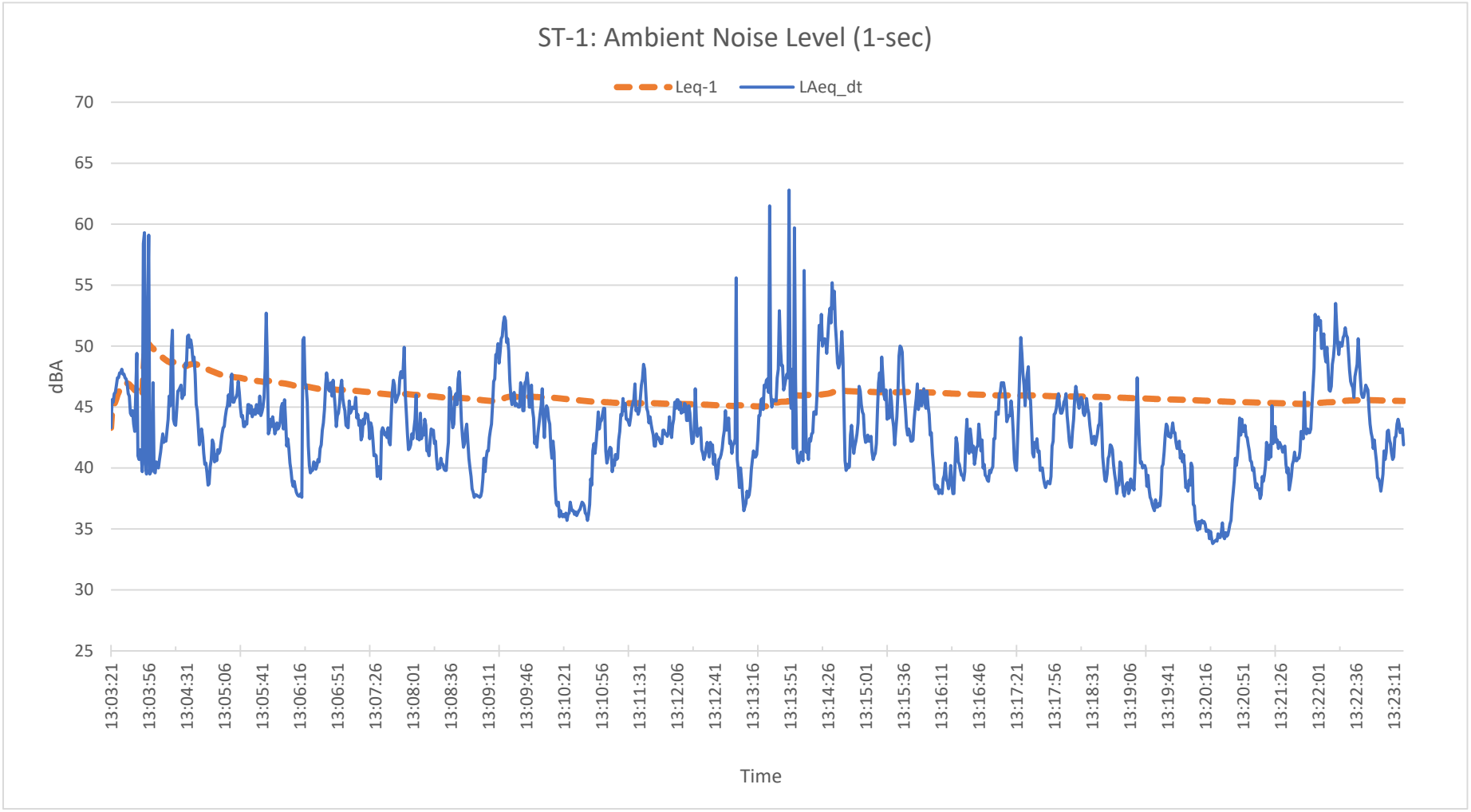
MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

20-Minute Continuous Noise Measurement Datasheet - Cont.

Site Address/Location: Washington St and Avenue 50, La Quinta CA
Site ID: ST-1



MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

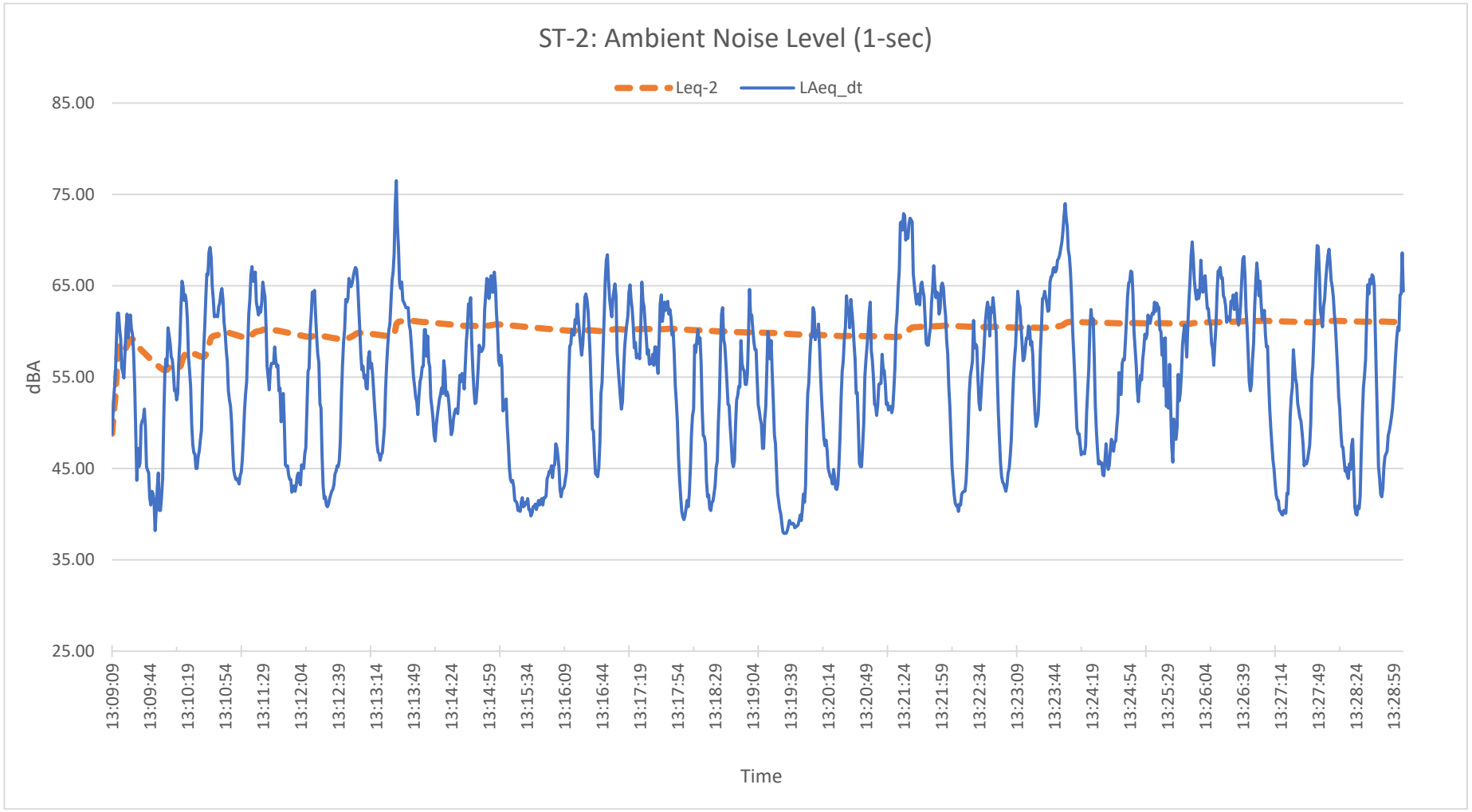
AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

20-Minute Continuous Noise Measurement Datasheet - Cont.

Site Address/Location: Washington St and Avenue 50, La Quinta CA

Site ID: ST-2



MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

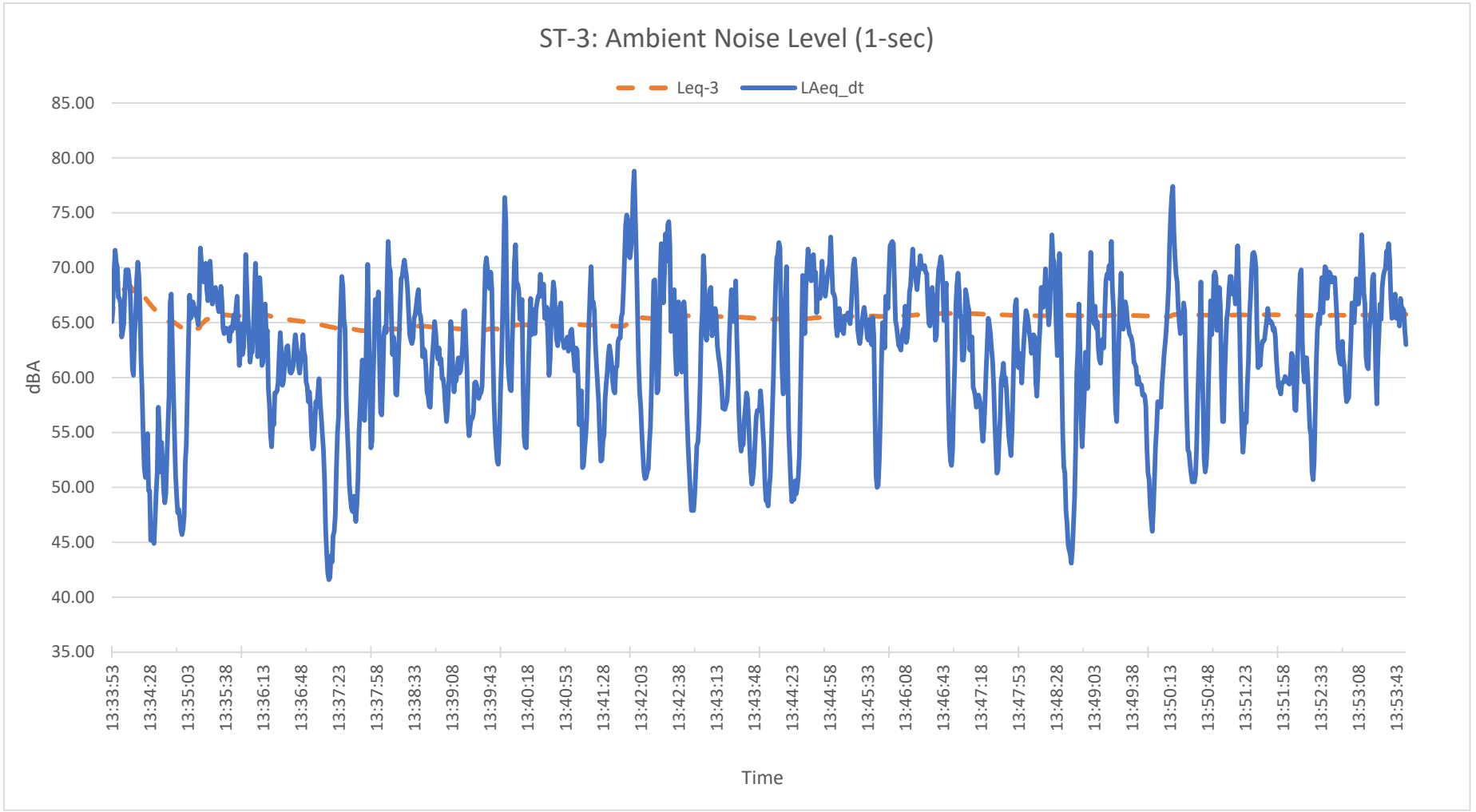
AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

20-Minute Continuous Noise Measurement Datasheet - Cont.

Site Address/Location: Washington St and Avenue 50, La Quinta CA

Site ID: ST-3



Appendix B:
Traffic FHWA Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: La Quinta Apartments
ROADWAY: Washington St
LOCATION: Northeast portion of the Washington St and Avenue 50 intersection, La Quinta, CA

JOB #: 0741-21-36
DATE: 12-Jan-22
ENGINEER: F. Irarrazabal

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	42,628
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DIS	98
ROAD ELEVATION =	0.0
GRADE =	0.0 %
PK HR VOL =	4,263

RECEIVER INPUT DATA

RECEIVER DISTANCE =		180
DIST C/L TO WALL =		65
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		115
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	
MEDIUM TRUCKS =	10	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL:	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.814	0.104	0.082	0.9605
MEDIUM TRUCK	0.867	0.053	0.080	0.0265
HEAVY TRUCKS	0.892	0.034	0.073	0.0130

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	173.23	- -
MEDIUM TRUCKS	4.0	173.21	- -
HEAVY TRUCKS	8.0	173.23	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	69.5	67.8	64.9	59.1	68.1	68.6
MEDIUM TRUCKS	61.6	60.2	54.0	51.1	60.1	60.4
HEAVY TRUCKS	62.7	61.4	53.2	51.8	61.1	61.3
NOISE LEVELS (dBA)	70.9	69.3	65.5	60.4	69.4	69.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	69.5	67.8	64.9	59.1	68.1	68.6
MEDIUM TRUCKS	61.6	60.2	54.0	51.1	60.1	60.4
HEAVY TRUCKS	62.7	61.4	53.2	51.8	61.1	61.3
NOISE LEVELS (dBA)	70.9	69.3	65.5	60.4	69.4	69.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	175	552	1745	5518
LDN	157	497	1573	4974

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: La Quinta Apartments
ROADWAY: Avenue 50
LOCATION: Northeast portion of the intersection of Washington St and Avenue 50 in La Quinta, CA

JOB #: 0741-21-36
DATE: 12-Jan-22
ENGINEER: F. Irarrazabal

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	16,329	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	98	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	1,633	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		120
DIST C/L TO WALL =		70
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		50
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	10	
MEDIUM TRUCKS =	10	(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10	

WALL INFORMATION

HTH WALL:	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.814	0.104	0.082	0.9605
MEDIUM TRUCK	0.867	0.053	0.080	0.0265
HEAVY TRUCKS	0.892	0.034	0.073	0.0130

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	109.58	- -
MEDIUM TRUCKS	4.0	109.54	- -
HEAVY TRUCKS	8.0	109.58	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	67.3	65.6	62.7	56.9	65.9	66.4
MEDIUM TRUCKS	59.4	58.0	51.9	48.9	57.9	58.2
HEAVY TRUCKS	60.5	59.2	51.1	49.6	58.9	59.1
NOISE LEVELS (dBA)	68.7	67.1	63.3	58.2	67.2	67.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	67.3	65.6	62.7	56.9	65.9	66.4
MEDIUM TRUCKS	59.4	58.0	51.9	48.9	57.9	58.2
HEAVY TRUCKS	60.5	59.2	51.1	49.6	58.9	59.1
NOISE LEVELS (dBA)	68.7	67.1	63.3	58.2	67.2	67.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	70	223	704	2228
LDN	63	201	635	2008

Appendix C:

Construction Noise Modeling Output

Construction Noise Levels at Senstive Receptors by Phase

Activity	Leq at 290 FT (North)	Lmax at 290 FT (North)
Site Preparation	63	67
Grading	70	74
Building Construction	66	70
Architectural Coating	63	67

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrapers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	86
Air Compressors	86
Trucks	86

Site Preparation

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Dozer	85	1	40	290	0.5	0	65.9	61.9	1561313.11
2	Tractor/Loader/Backhoe	80	1	40	290	0.5	0	60.9	56.9	493730.558
							Lmax*	67	Leq	63
							Lw	98	Lw	95

Source: MD Acoustics, LLC - Sept. 2021.
1- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	15.2	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
60	18.3	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
70	21.3	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
80	24.4	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
90	27.4	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
100	30.5	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
110	33.5	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
120	36.6	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
130	39.6	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
140	42.7	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
150	45.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
160	48.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
170	51.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
180	54.9	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
190	57.9	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
200	61.0	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
210	64.0	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
220	67.1	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
230	70.1	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
240	73.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
250	76.2	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
260	79.2	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
270	82.3	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
280	85.3	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
290	88.4	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
300	91.4	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
310	94.5	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
320	97.5	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
330	100.6	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
340	103.6	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
350	106.7	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
360	109.7	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
370	112.8	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26

Grading

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Grader	86	1	40	290	0.5	0	66.9	62.9	1965576.75
2	Dozer	85	1	40	290	0.5	0	65.9	61.9	1561313.11
3	Tractor/Backhoe	80	2	40	290	0.5	0	63.9	59.9	987461.116
4	Scrapers	87	1	40	290	0.5	0	67.9	63.9	2474514.53
5	Excavators	86	2	40	290	0.5	0	69.9	65.9	3931153.51
							Lmax*	**74**	**Leq**	**70**
							Lw	**103**	**Lw**	**102**

Source: MD Acoustics, LLC - Sept. 2021.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	15.2	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
60	18.3	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
70	21.3	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
80	24.4	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
90	27.4	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
100	30.5	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
110	33.5	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
120	36.6	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
130	39.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
140	42.7	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
150	45.7	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
160	48.8	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
170	51.8	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
180	54.9	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
190	57.9	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
200	61.0	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
210	64.0	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
220	67.1	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
230	70.1	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
240	73.1	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
250	76.2	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
260	79.2	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
270	82.3	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
280	85.3	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
290	88.4	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
300	91.4	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
310	94.5	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
320	97.5	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
330	100.6	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
340	103.6	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
350	106.7	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
360	109.7	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
370	112.8	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34

Building Construction

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Leq	Energy
1	Forklift/Tractor	80	3	40	290	0.5	0	65.7	61.7	1481191.67
2	Tractor/Backhoe	80	3	40	290	0.5	0	65.7	61.7	1481191.67
3	Cranes	82	1	40	290	0.5	0	62.9	58.9	782510.2
4	Generator	80	1	40	290	0.5	0	60.9	56.9	493730.558
							Lmax*	**70**	**Leq**	**66**
							Lw	**102**	**Lw**	**98**

Source: MD Acoustics, LLC - Sept. 2021.
1- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**
60	18.3	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
70	21.3	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
80	24.4	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
90	27.4	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
100	30.5	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
110	33.5	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	**44**	43
120	36.6	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
130	39.6	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
140	42.7	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
150	45.7	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
160	48.8	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
170	51.8	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
180	54.9	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
190	57.9	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
200	61.0	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
210	64.0	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
220	67.1	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
230	70.1	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
240	73.1	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
250	76.2	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
260	79.2	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
270	82.3	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
280	85.3	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
290	88.4	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
300	91.4	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
310	94.5	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
320	97.5	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
330	100.6	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
340	103.6	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
350	106.7	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
360	109.7	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
370	112.8	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30

Architectural Coating

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Air Compressor	86	1	40	290	0.5	0	66.9	62.9	1965576.75
							Lmax*	**67**	**Leq**	**63**
							Lw	**99**	**Lw**	**95**

Source: MD Acoustics, LLC - Sept. 2021.
1- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**	**50**	**49**	**48**
60	18.3	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
70	21.3	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
80	24.4	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
90	27.4	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
100	30.5	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
110	33.5	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	**40**	39
120	36.6	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
130	39.6	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
140	42.7	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
150	45.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
160	48.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
170	51.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
180	54.9	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
190	57.9	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
200	61.0	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
210	64.0	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
220	67.1	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
230	70.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
240	73.1	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
250	76.2	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
260	79.2	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
270	82.3	0.5	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30
280	85.3	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
290	88.4	0.5	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29
300	91.4	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
310	94.5	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
320	97.5	0.5	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28
330	100.6	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
340	103.6	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
350	106.7	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
360	109.7	0.5	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
370	112.8	0.5	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26

VIBRATION LEVEL IMPACT

Project:	La Quinta apartments project	Date: 10/29/21
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Project Site	
Address:	NE corner of Washington Street and Avenue 50, La Quinta, CA 92253	

PPV = PPVref(25/D)^n (in/sec)

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	290.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV =	**0.006**	IN/SEC	OUTPUT IN RED