

Foothill Blvd & Larch Ave Public Storage Facility

Noise Impact Study

City of Rialto, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this noise impact study is to evaluate the potential noise impacts for the project study area and to compare the results to City and CEQA thresholds. The assessment was conducted and compared to the noise standards set forth by the Federal, State and Local agencies. Consistent with the California Environmental Quality Act (CEQA) and CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined to result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable agencies.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The following are 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 evaluation of the existing ambient noise environment
- An analysis of the traffic noise impacts to the project site
- An analysis of the exterior noise limit compliance

1.2 Site Location and Study Area

The project site is located at Northwest Corner of Foothill Blvd and Larch Ave, Rialto, CA. The project proposes a 2-story storage building with a front office, and four 1-story drive up storage buildings,. The City of Rialto Zoning map classifies the land use designation of the site as General Commercial. The land uses surrounding the project site are Single Family Residential to the north and General Commercial to the East, South, and West. An aerial of the project site is shown in Exhibit A.

1.3 Proposed Project Description

The project proposes a 45,910 square foot 2-story storage building with a 900 square foot front office, 29,467 square feet of 1-story drive up storage buildings, and 12 parking spaces. A copy of the site plan is shown in Exhibit B.

Exhibit A
Location Map

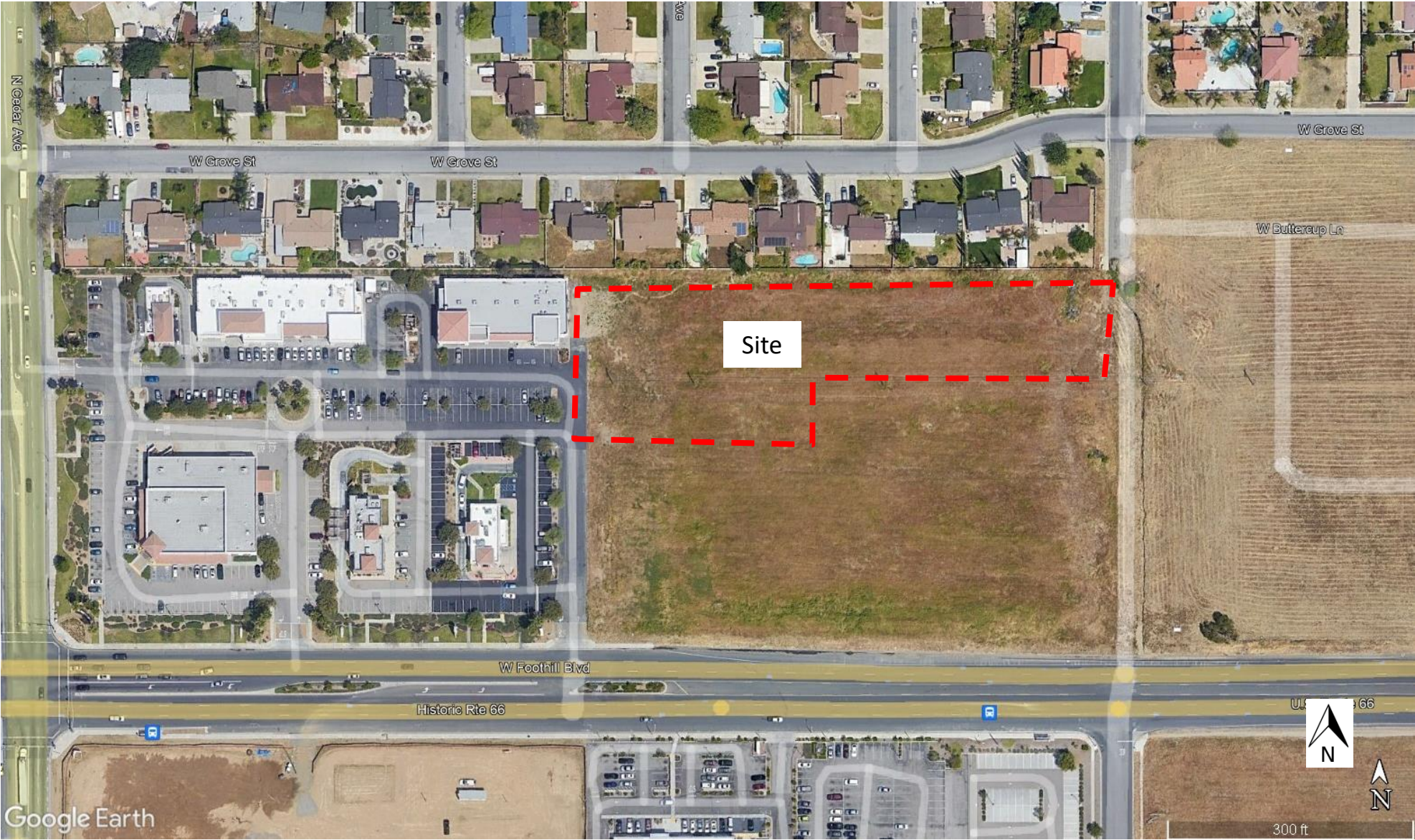
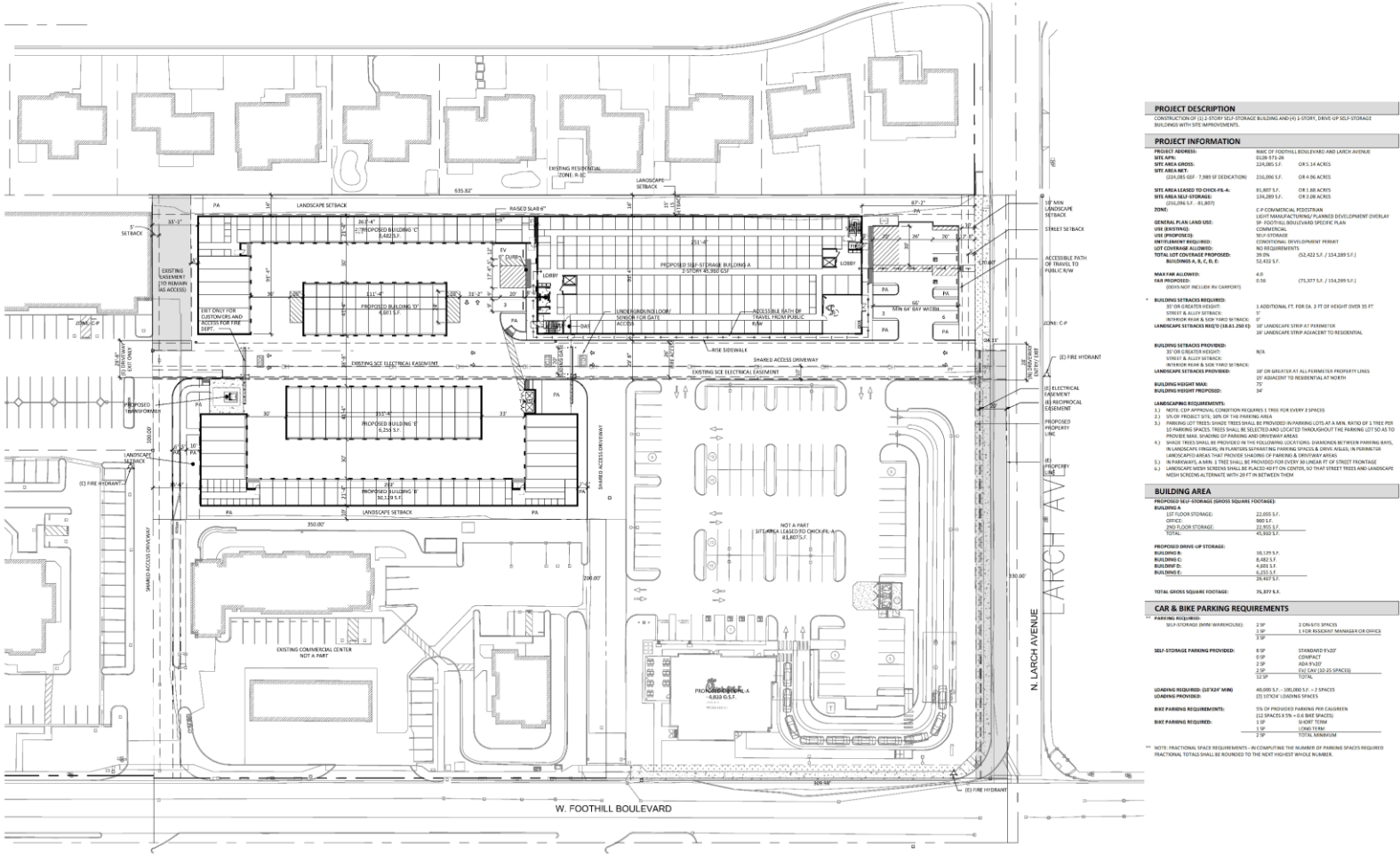


Exhibit B
Site Plan



NWC OF FOOTHILL BLVD & LARCH AVE | RIALTO, CA
APN: 0128-571-26

CONCEPTUAL SITE PLAN
05.09.23

NO.	REVISION	DATE	NO.	REVISION	DATE	NO.	REVISION	DATE
1	CONCEPTUAL SITE PLAN	05/09/23	2	CONCEPTUAL SITE PLAN	05/09/23	3	CONCEPTUAL SITE PLAN	05/09/23

SHEET 2
KSP
STUDIO
ARCHITECTURE + ENGINEERING
23 ORCHARD ROAD, SUITE 200
LAKE FOREST, CA 92650
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2.0 Fundamentals of Noise

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

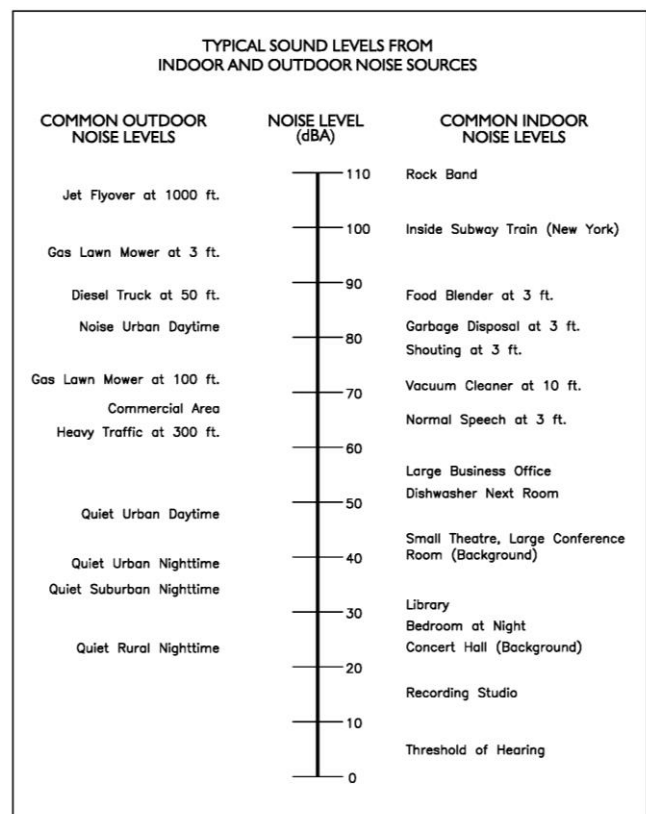
2.2 Frequency and Hertz

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.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter ($\mu\text{N}/\text{m}^2$), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.0000000001) 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 reference sound levels for different noise sources.

Exhibit C: Typical A-Weighted Noise Levels



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 of 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, 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), a scale designed to account for the frequency-dependent sensitivity of the ear. Typically, the human ear can barely perceive a 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.

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: Any 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 how 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 Propagation

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 wavefront, 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 wavefront. 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 wavefront. 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 within the City of Rialto, California 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 for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating 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 Housing and Urban Development (HUD) is responsible for establishing noise regulations as it relates to exterior/interior noise levels for new HUD-assisted housing developments near high noise areas.

The federal government advocates that local jurisdictions 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 the 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.

Exhibit D: Land Use Compatibility Guidelines

Exhibit 5.5: Rialto Noise Guidelines for Land Use Planning							
Land Use Category	Community Noise Equivalent Level (CNEL), dB						
	55	60	65	70	75	80	85
R2 - Residential 2, R6 - Residential 6							
R12 - Residential 12							
R21 - Residential 21, R45 - Residential 45							
DMU - Downtown Mixed-Use							
CC - Community Commercial							
GC - General Commercial							
BP - Business Park, O - Office							
LI - Light Industrial							
GI - General Industrial							
P - Public Facility, P - School Facility							
OSRC Open Space - Recreation							
OSRS - Open Space - Resources							
Normally Acceptable							
Specified land use is satisfactory, assuming buildings are of conventional construction							
Conditionally Acceptable							
New development should be undertaken only after detailed analysis of noise reduction requirements are made.							
Normally Unacceptable							
New development should be generally discouraged, if not, a detailed analysis of noise reduction requirements must be made.							
Clearly Unacceptable							
New development should generally not be undertaken							

4.3 City of Rialto Noise Regulations

The project is located in the City of Rialto outlines their noise regulations and standards within the Safety and Noise Element of the City's General Plan and the Noise Control section located in the City's Municipal Code.

City of Rialto General Plan

General Plan Noise Element goals and policies applicable to the proposed project are presented below.

Goal 5-10: Minimize the impact of point sources and ambient noise levels throughout the community.

Policy 5-10.2: Consider noise impacts as part of the development review process, particularly the location of parking, ingress/egress/loading, and refuse collection areas relative to surrounding residential development and other noise-sensitive land uses.

Policy 5-10.2: Ensure that acceptable noise levels are maintained near schools, hospitals, and other noise sensitive areas in accordance with the Municipal Code and noise standards contained in Exhibit 5-5.

Policy 5-10.5: Require all exterior noise sources (construction operations, air compressors, pumps, fans and leaf blowers) to use available noise suppression devices and techniques to reduce exterior noise to acceptable levels that are compatible with adjacent land uses.

Goal 5-11: Minimize the impacts of transportation-related noise.

Policy 5-11.3: Require development of truck-intensive uses to minimize noise impacts on adjacent uses through appropriate site design.

Exhibit 5-5 of the General Plan is presented in Table 2 below. The Project must comply with these guidelines on the Project site and surrounding uses.

City of Rialto Municipal Code

the City of Rialto Municipal Code does not identify specific exterior noise level standards. Therefore, the County of San Bernardino Development Code standards are used in this noise study to evaluate potential impacts.

Section 9.50.050(B) of the The City of Rialto does state that loading activities within 1000 ft of a residence to between the hours of 7AM and 8PM. The project is within 1000 ft of a residence, so loading must occur during these daytime hours.

Section 9.50.070 restricts construction activity to 6AM to 7PM Monday through Friday and 8AM to 5PM on Saturday from May through September. From October through April, construction is restricted to 7AM to 5:30PM Monday through Friday and 8AM to 5PM on Saturday.

County of San Bernardino – Noise Ordinance

Section 83.01.080(c)(1) No person shall create any sound, or allow the creation of any sound, on any property that causes the exterior sound level on any other occupied property to exceed the sound level standards set forth in Table 1.

Table 1: San Bernardino County Allowable Exterior Noise Level
Sound Level Standards (dBA Lmax)

General Plan Land Use Designation	Maximum Decibel Level	
	7 a.m. - 10 p.m.	10 p.m. - 7 a.m.
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

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 the 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 the County's and Caltrans (TeNS) technical noise specifications. All measurement 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 windscreen 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 Location

The noise monitoring location was selected based on the nearest sensitive receptors relative to the proposed onsite noise sources. Three (3) short-term 15-minute noise measurement was conducted at or near the project site and is illustrated in Exhibit E. Appendix A includes photos, the field sheet, and measured noise data.

5.3 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources (parking spaces). The model assumes approximately 94 parking spaces with 1 car movement per parking space per hour. Additionally, the project developments of the site are included, which involves the elevations for noise sources and receivers and the project security and screening walls. The project security and screening walls include a six (6) foot tall wall at the residential property to the east as seen in Exhibit B Site Plan for the project.

Table 2: Reference Sound Level Measurements for SoundPlan Model

Source	Source Type	Reference Level (Lw or SPL dBA)	Descriptor
Parking	Area (SP Parking Tool)	77	1 car per hr

The SP model assumes that all noise sources are operating simultaneously (worst-case scenario), when in actuality the noise will be intermittent and lower in noise level. SP modeling inputs and outputs are provided 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 in one phase. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

Measurement Locations

X = Measurement location



6.0 Existing Noise Environment

Three (3) 15-minute ambient noise measurements were conducted at the property site. The noise measurement was taken to determine the existing ambient noise levels. Noise data indicates that traffic along US Route 66 is the primary source of noise impacting the site and the adjacent uses. This assessment utilizes the ambient noise data as a basis and compares project operational levels to said data.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 3.

Table 3: Short-Term Noise Measurement Data¹

Date	Time	1-Hour dB(A)							
		L _{EQ}	L _{MAX}	L _{MIN}	L ₂	L ₈	L ₂₅	L ₅₀	L ₉₀
12/28/22	3:49PM-4:04PM	56.3	73.6	46.8	60.7	58	55.2	53.1	49.8
12/28/22	3:29PM-3:44PM	52.8	64.1	43.5	58.3	55.9	53.7	51.6	47.1
12/28/22	3:06PM-3:21PM	56.8	68.8	44.0	64.8	61.1	56.2	53.6	48.1
Notes: ¹ Short-term noise monitoring location (ST1) is illustrated in Exhibit E.									

Noise data indicates the ambient noise level ranged from 58 dBA Leq to 66 dBA Leq at the project site. Maximum levels reached up to 74 dBA as a result of traffic along US Route 66. Additional field notes and photographs are provided in Appendix A.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts as a result of the project. The analysis details the estimated exterior noise levels.

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 Stationary Sources

Sensitive receptors that may be affected by project operational noise include existing residences to the east, and south. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes that all the mechanical equipment and parking noise are always operational when in reality the noise will be intermittent and cycle on/off depending on the customer usage. Project operations are assumed to occur 24 hours continuously.

A total of five (5) receptors R1 – R5 were modeled to evaluate the proposed project’s operational noise impact. R1 – R5 represent the residential land uses. A receptor is denoted by a yellow dot. All yellow dots represent either a property line or a sensitive receptor such as an outdoor sensitive area (e.g. courtyard, patio, backyard, etc).

This study compares the Project’s operational noise levels to two (2) different noise assessment scenarios: 1) Project Only operational noise level projections, 2) Project plus ambient noise level projections.

Project Operational Noise Levels

Exhibit F shows the “project only” operational noise levels at the property lines and/or sensitive receptor area. Operational noise levels are anticipated to range between 26 dBA to 45 dBA at adjacent uses (depending on the location). Exhibit C provides a scale that illustrates loudness associated with common noise levels.

Project Plus Ambient Operational Noise Levels

Table 4 demonstrates the project plus the ambient (measured average level) noise levels. Project plus ambient noise level projections are anticipated to range between 53 to 57 dBA Leq at nearby receptors (R1 – R5).

**Exhibit F:
Operational Noise Level Contours**

Project Operational Noise Levels (Leq)

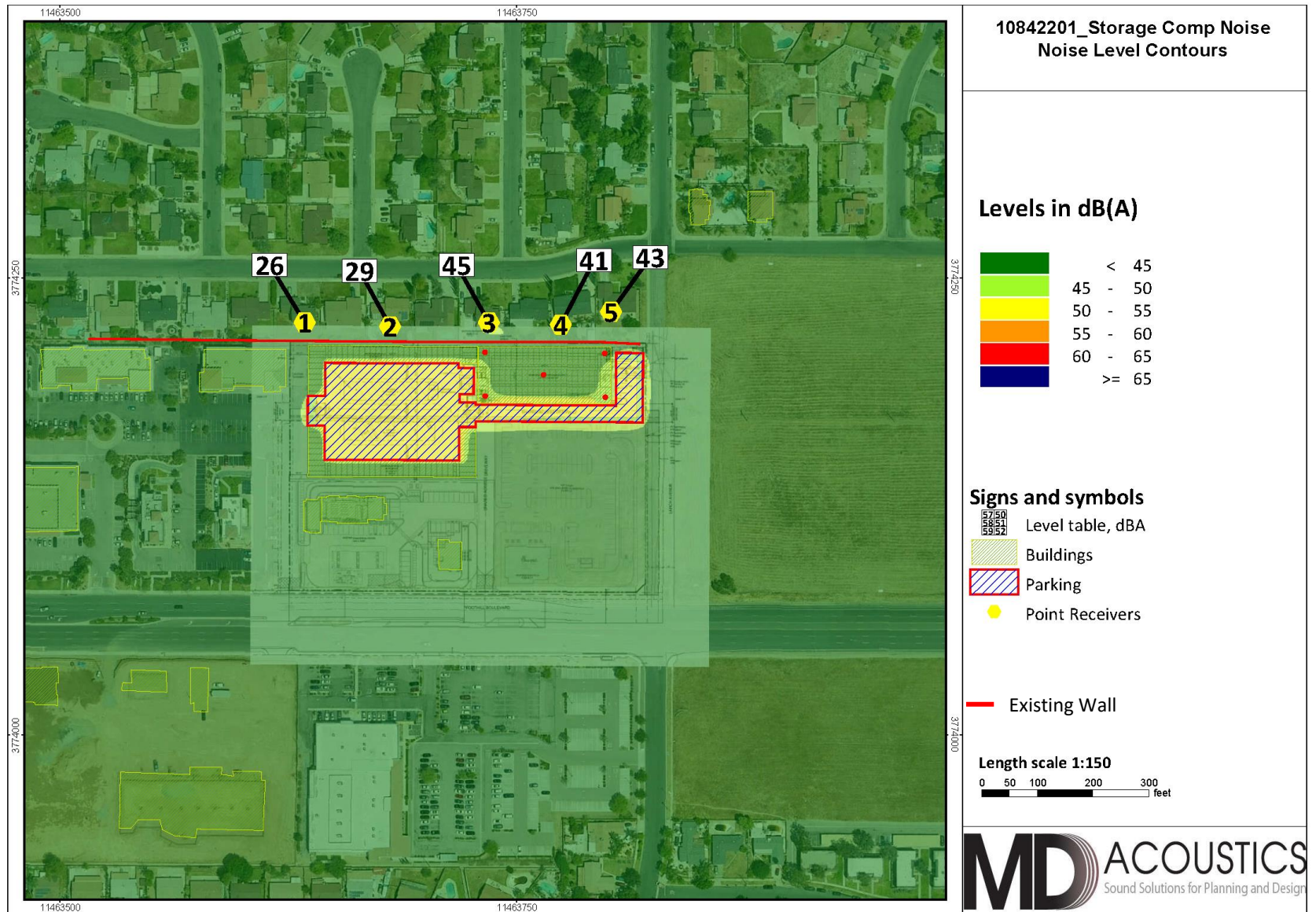


Table 4: Worst-Case Predicted Operational Noise Levels (dBA)

Receptor ¹	Existing Ambient Noise Level (dBA, Leq) ²	Project Noise Level (dBA, Leq) ³	Total Combined Noise Level (dBA, Leq)	Nighttime (10PM – 7AM) Noise Limit (dBA, Leq) ⁴	Change in Noise Level as Result of Project
1	56	26	56	45	0
2	53	29	53		0
3	57	45	57		0
4		41	57		0
5		43	57		0
Notes: ¹ Receptors 1 - 5 represents residential receptors ² See Appendix A for the ambient noise measurements ³ See Exhibit F for the operational noise level projections at said receptors. ⁴ Per section 83.01.080(c)(1) of the County of San Bernardino municipal code.					

As shown in Table 4, the project does not exceed the County's exterior noise limit. The predicted exterior noise level at the residential properties ranged from 26 to 45 dBA, Leq which does not exceed County's residential nighttime exterior limit of 45 dBA.

Table 4 provides the anticipated change in noise level as a result of the proposed project. The ambient noise level is anticipated to increase by 0 dBA at the residential properties.

Table 5 provides the characteristics associated with changes in noise levels.

Table 5: Change in Noise Level Characteristics¹

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

1. https://www.fhwa.dot.gov/transportation/noise/regulations_and_guidance/poiguide/poiguide02.cfm

It takes a change of 3 dBA for the human ear to perceive a difference. The change in noise level is anticipated to increase by 0 dBA. Therefore, the project falls within the "Not Perceptible" category.

7.1.2 Noise Impacts to On/Off-Site Receptors Due to Project Generated Traffic

The project generates less than 500 daily trips and less than 50 peak hour trips during any peak hour; therefore, the project is presumed to have a less than significant impact on VMT and a traffic impact study for LOS evaluation is not required. Per the memo provided by TJW Engineering, 2/3/2023 (*Self Storage Trip Generation Analysis Generation & VMT Screening Analysis*).

Traffic along the subject roadways would need to double in average daily traffic volumes to see a 3 dBA increase in noise level. Since the project generates a nominal amount of traffic relative to the existing ADTs, the project's traffic noise level increase would be nominal and therefore less than significant, see Appendix B

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 Equipment Noise Levels¹

Type	Lmax (dBA) at 50 Feet
Backhoe	80
Truck	88
Concrete Mixer	85
Pneumatic Tool	85
Pump	76
Saw, Electric	76
Air Compressor	81
Generator	81
Paver	89
Roller	74
Notes: ¹ Referenced Noise Levels from FTA noise and vibration manual.	

Construction noise is considered a short-term impact and would be considered significant if construction activities are taken outside the allowable 6AM to 7PM Monday through Friday and 8AM to 5PM on Saturday from May through September. From October through April, construction is restricted to 7AM to 5:30PM Monday through Friday and 8AM to 5PM on Saturday as described in the City of Rialto Municipal Code Section 9.50.070. 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 less than significant however construction noise level projections are provided. All construction noise calculation sheets are provided in Appendix C.

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 the grading phase. A likely worst-case construction noise scenario during grading assumes the use of 1 grader, 1 dozer, 1 excavator, and 3 tractors operating at 170 feet from the nearest sensitive receptor (residential uses to the north). The distance is considered from the project site center.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 170 feet have the potential to reach 73 dBA L_{eq} at the nearest sensitive receptors during grading. Noise levels for the other construction phases would be lower, approximately from 60 to 72 dBA L_{eq} .

8.2 Construction Vibration

Construction activities can produce a 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 a bulldozer. A large bulldozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk of 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 Equipment¹

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 50 feet (residences to the north) a large bulldozer would yield a worst-case 0.98 PPV (in/sec) which means the vibration would not be perceptible during grading along the northern property line of the project site and is below any threshold of damage. There is less than significant impact, and no mitigation is required. The vibration calculation sheets are provided in Appendix C.

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 and apply practical techniques to minimize noise. 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 9.50.070.
2. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices, such as mufflers, silencers, and original equipment devices.
3. The contractor shall 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 Rialto: General Plan.

City of Rialto: Municipal Code. Section 9.50.070.

County of San Bernardino Municipal Code.

Federal Highway Administration. Noise Barrier Design Handbook. June 2017.

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

Appendix A:
Photographs and Field Measurement Data

15-Minute Continuous Noise Measurement Datasheet

Project Name:	Storage Comp Noise	Site Observations:
Project: #/Name:	1084-2022-001	59°, winds 0 to 5 mph, sun with some clouds, light to moderate traffic on roadways near site.
Site Address/Location:	Foothill Blvd & Larch Ave	
Date:	12/28/2022	
Field Tech/Engineer:	Dennis Jordan / Robert Pearson	
Sound Meter:	XL2, NTI	SN: A2A-05967-E0
Settings:	A-weighted, slow, 1-sec, 15-minute interval	
Site Id:	ST-1, ST-2, ST-3	



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Storage Comp Noise
Site Address/Location: Foothill Blvd & Larch Ave
Site Id: ST-1, ST-2, ST-3

Figure 1: ST-1 130 ft from ST2 reading



Figure 2: ST-2 215 ft from ST3 reading



Figure 3: ST-3 140 ft from Larch Ave

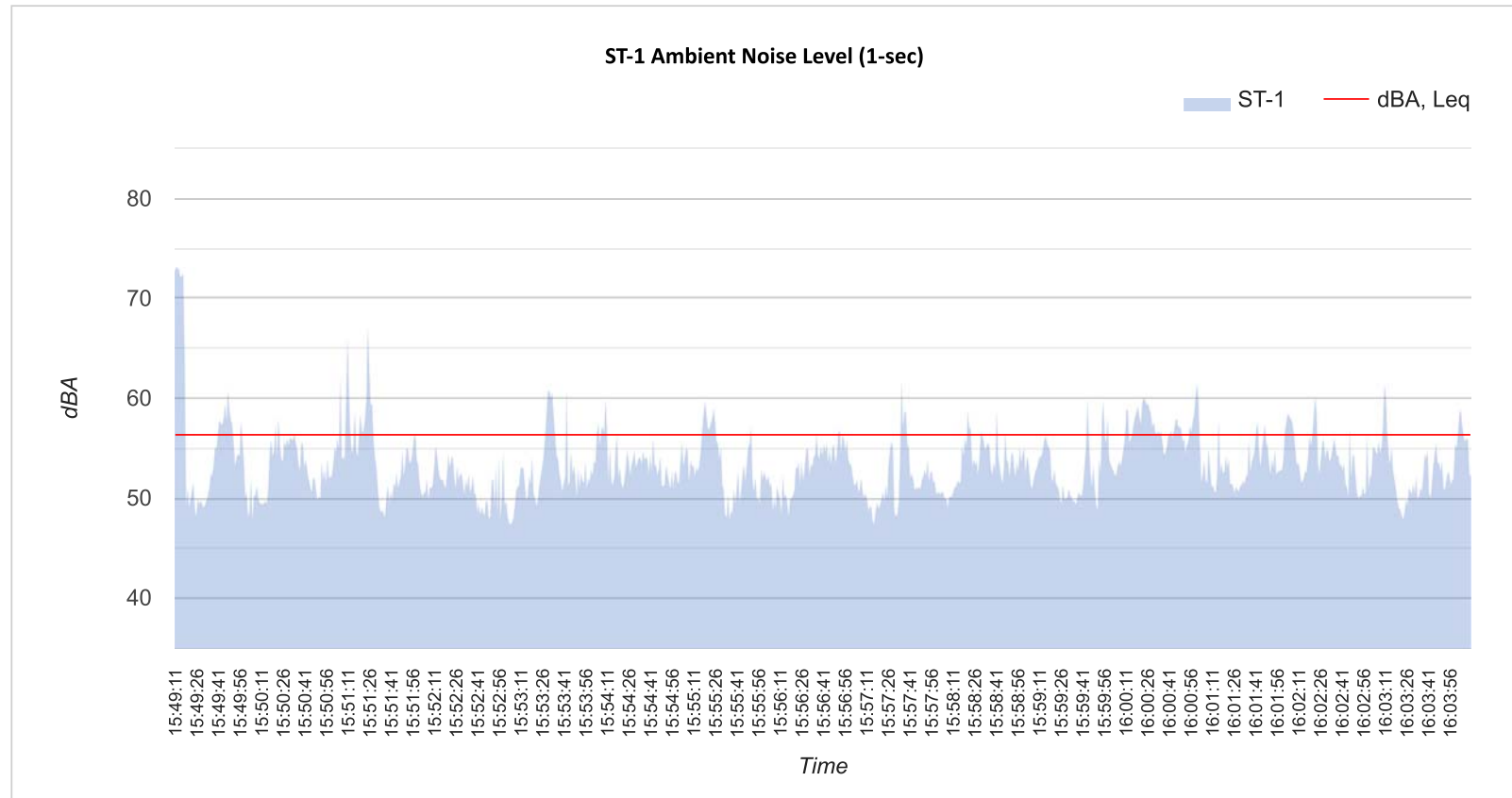


Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
ST-1	3:49 PM	4:04 PM	56.3	73.6	46.8	60.7	58	55.2	53.1	49.8
ST-2	3:29 PM	3:44 PM	52.8	64.1	43.5	58.3	55.9	53.7	51.6	47.1
ST-3	3:06 PM	3:21 PM	56.8	68.8	44.0	64.8	61.1	56.2	53.6	48.1

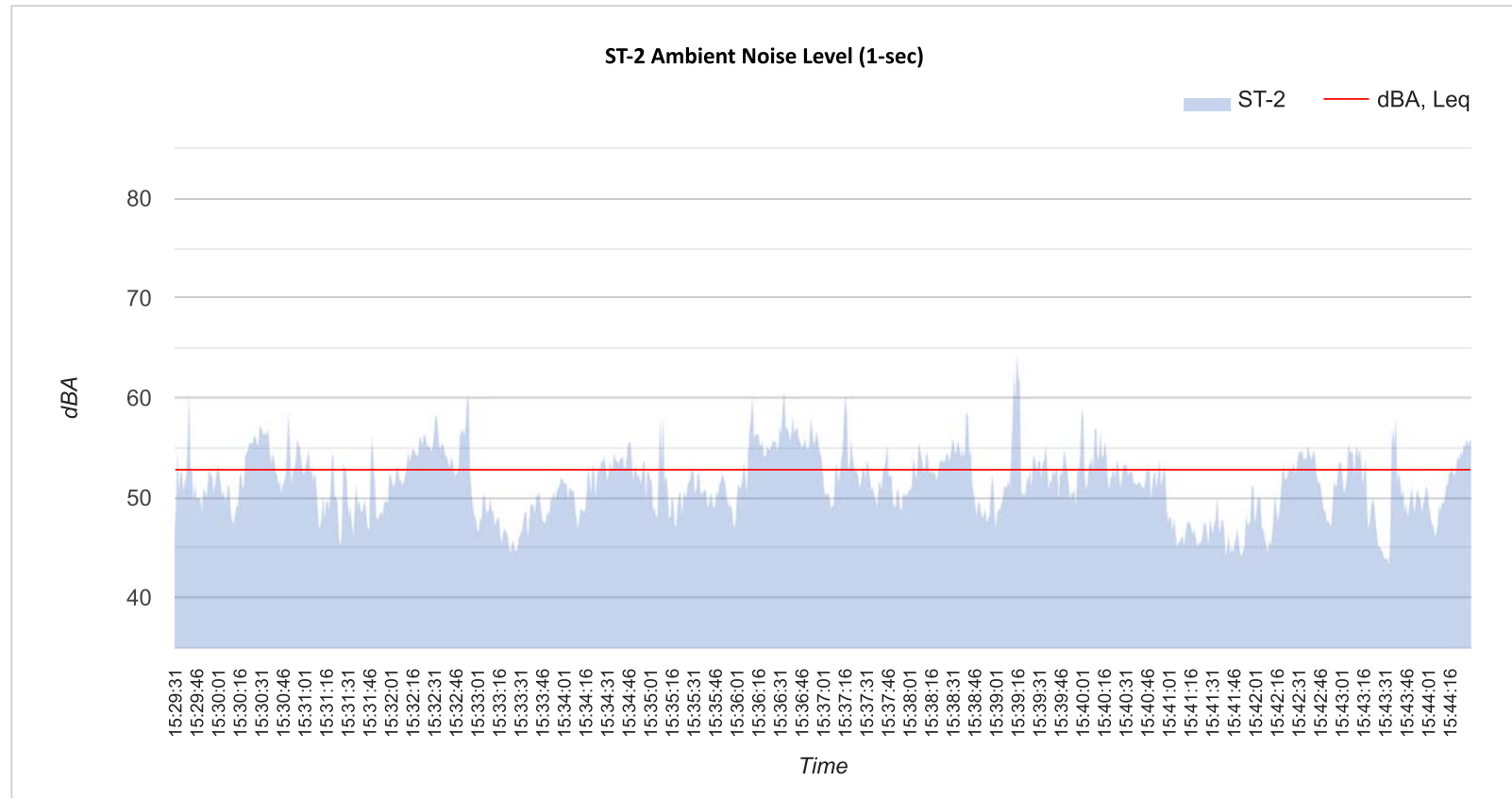
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Storage Comp Noise	Site Topo:	Buildings 1 to 2 stories tall	Noise Source(s) w/ Distance:
Site Address/Location:	Foothill Blvd & Larch Ave	Meteorological Cond.:	59°, winds 0-5 mph, sun with some clouds	Road Noise / Foothill Blvd & Cedar Ave
Site Id:	ST-1	Ground Type:	Buildings, Cement, Asphalt, Dirt and Vegetation	



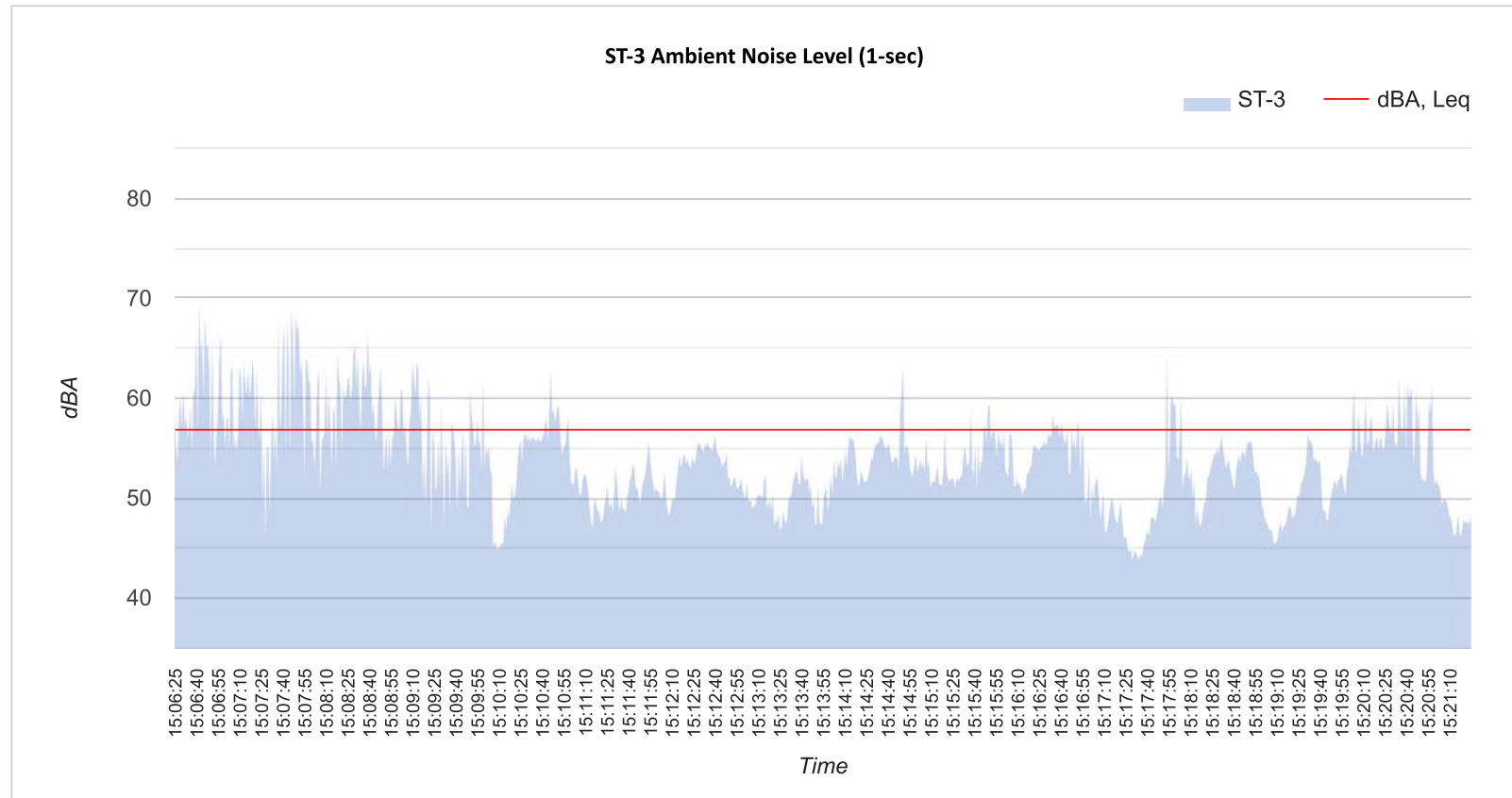
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Storage Comp Noise	Site Topo:	Single/Two story housing	Noise Source(s) w/ Distance:
Site Address/Location:	Foothill Blvd & Larch Ave	Meteorological Cond.:	59°, winds 0-5 mph, sun with some clouds	Road Noise / Foothill Blvd & Larch Ave
Site Id:	ST-2	Ground Type:	Housing, Dirt and Vegetation	



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Storage Comp Noise	Site Topo:	Single/Two story housing	Noise Source(s) w/ Distance:
Site Address/Location:	Foothill Blvd & Larch Ave	Meteorological Cond.:	59°, winds 0-5 mph, sun with some clouds	Road Noise / Foothill Blvd & Larch Ave
Site Id:	ST-3	Ground Type:	Housing, Dirt and Vegetation	



Appendix B:
Sound Plan model inputs and outputs

AHRI RATINGS

COOLING MODE

50GCQ	NOM. CAPACITY (tons)	NET COOLING CAPACITY (Btuh)	TOTAL POWER (kW)	SEER	EER
M04	3	35,000	2.8	16.2	12.5
M05	4	47,500	3.9	16.2	12.2
M06	5	60,000	4.9	16.2	12.2

HEATING MODE

50GCQ	HSPF	HIGH HEATING CAPACITY (Btuh)	HIGH HEAT COP	LOW HEATING CAPACITY (Btuh)	LOW HEAT COP
M04	8.3	34,000	3.8	17,600	2.4
M05	8.3	45,500	3.7	24,400	2.3
M06	8.3	55,500	3.9	30,000	2.4

LEGEND

AHRI	— Air Conditioning, Heating and Refrigeration Institute
ASHRAE	— American Society of Heating, Refrigerating and Air Conditioning Engineers
COP	— Coefficient of Performance
EER	— Energy Efficiency Ratio
HSPF	— Heating Seasonal Performance Factor
SEER	— Seasonal Energy Efficiency Ratio

NOTES:

- Rated and certified under AHRI Standard 210/240.
- Ratings are based on:
Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temperature and 95°F (35°C) db outdoor air temperature.
High Temperature Heating Ratings: 47°F (8°C) db, 43°F (6°C) wb outdoor air temperature and 70°F (21°C) entering indoor coil air.
Low Temperature Heating Ratings: 17°F (–8°C) db, 15°F (–9°C) wb outdoor air temperature and 70°F (21°C) entering indoor coil air.
- All 50GCQ units comply with ASHRAE 90.1 Energy Standard for minimum SEER and EER requirements.



SOUND RATINGS TABLE

50GCQ UNIT	COOLING STAGES	OUTDOOR SOUND (dB) AT 60 Hz								
		A-WEIGHTED	63	125	250	500	1000	2000	4000	8000
M04	2	75.4	81.8	81.8	77.0	72.6	69.9	64.6	59.3	55.6
M05	2	79.0	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3
M06	2	79.0	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3

LEGEND

dB — Decibel

NOTES:

- Outdoor sound data is measured in accordance with AHRI.
- Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
- A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of “average” human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI.

MINIMUM - MAXIMUM AIRFLOW RATINGS (CFM) — COOLING UNITS AND ACCESSORY ELECTRIC HEAT

UNIT	COOLING				ELECTRIC HEAT*	
	MINIMUM AIRFLOW CFM	MINIMUM 2-SPEED AIRFLOW (LOW SPEED)	MINIMUM 2-SPEED AIRFLOW (HIGH SPEED)	MAXIMUM AIRFLOW CFM	MINIMUM AIRFLOW CFM	MAXIMUM AIRFLOW CFM
50GCQM04	900	675	900	1500	900	1500
50GCQM05	1200	900	1200	2000	1200	2000
50GCQM06	1500	1125	1500	2500	1500	2500

* Electric heat modules are available as both factory-installed options or field-installed accessories for 50GCQ units.

MINIMUM - MAXIMUM AIRFLOWS (CFM) COOLING AND ELECTRIC HEAT

UNIT	COOLING			ELECTRIC HEATERS		
	Minimum CFM	Minimum CFM 2-Speed Fan Motor (at High Speed)	Minimum CFM 2-Speed Fan Motor (at Low Speed)	Maximum CFM	Minimum CFM	Maximum CFM
50HCQA04	900	N/A	N/A	1500	900	1500
50HCQA05	1200	N/A	N/A	2000	1200	2000
50HCQA06	1500	N/A	N/A	2500	1500	2500
50HCQA07	1800	N/A	N/A	3000	1800	3000
50HCQD07	1800	1800	1200	3000	1800	3000
50HCQD08	2250	2250	1500	3750	2250*	3750
50HCQD09	2550	2873	1915	4250	2252*	4250
50HCQD12	3000	3380	2253	5000	3000*	5000

* Minimum electric heat CFM exceptions:

UNIT	UNIT VOLTAGE	HEATER kW	UNIT CONFIGURATION	REQUIRED MINIMUM CFM
50HCQD08 50HCQD09	575	17.0	Horizontal or Vertical	2800
		34.0		2350
50HCQD12	230	50.0	Vertical	3550
		50.0	Horizontal	3420
		43.5	Horizontal or Vertical	3040
	575	50.0	Vertical	3150
		33.5	Vertical	3520
		33.5	Horizontal	3420
		26.5	Vertical	3610

SOUND PERFORMANCE

50HCQ UNIT	OUTDOOR SOUND (dB) AT 60 Hz								
	A-Weighted	63	125	250	500	1000	2000	4000	8000
A04	76	51.8	69.0	64.6	67.8	70.7	63.8	60.9	59.0
A05	79	56.1	69.6	68.7	72.5	72.8	68.9	65.0	61.2
A06	79	57.7	66.6	68.7	72.9	74.5	71.1	67.6	62.6
A07	81	86.7	82.7	79.1	78.4	75.4	71.2	67.8	62.9
D07	81	86.7	82.7	79.1	78.4	75.4	71.2	67.8	62.9
D08	83	87.3	81.6	79.7	80.6	79.0	73.5	69.2	66.1
D09	87	61.7	74.7	77.4	82.6	84.9	81.9	78.8	75.9
D12	83	61.0	67.3	75.1	77.7	78.1	75.5	71.2	66.7

LEGEND

dB —Decibel

NOTES:

1. Outdoor sound data is measure in accordance with AHRI standard 270.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI standard 270.

Storage Comp Noise

Octave spectra of the sources in dB(A) - 001 - Storage Comp: Outdoor SP

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Name	Source type	I or A m,m²	Li dB(A)	R'w dB	L'w dB(A)	Lw dB(A)	KI dB	KT dB	LwMax dB(A)	DO-Wall dB	Time histogram	Emission spectrum	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	16kHz dB(A)
Parking Area	PLot	5532.99			47.4	84.9	0.0	0.0		0	100%/24h	Typical spectrum	68.2	79.8	72.3	76.8	76.9	77.3	74.6	68.4	55.6
HVAC	Point				80.0	80.0	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	57.1	65.6	68.0	72.3	74.6	74.2	71.2	66.3	54.0
HVAC	Point				80.0	80.0	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	57.1	65.6	68.0	72.3	74.6	74.2	71.2	66.3	54.0
HVAC	Point				80.0	80.0	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	57.1	65.6	68.0	72.3	74.6	74.2	71.2	66.3	54.0
HVAC	Point				80.0	80.0	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	57.1	65.6	68.0	72.3	74.6	74.2	71.2	66.3	54.0
HVAC	Point				80.0	80.0	0.0	0.0		0	100%/24h	HVAC: 67.7dB @ 3ft - Carrier 50TFQ0006 -	57.1	65.6	68.0	72.3	74.6	74.2	71.2	66.3	54.0

Storage Comp Noise

Contribution level - 001 - Storage Comp: Outdoor SP

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Source group	Source type	Fr. lane	Leq,d dB(A)	A dB	
Receiver 11463634,3774226 FI G Lr,lim dB(A) Leq,d 26.3 dB(A)					
Default parking lot noise	PLot		22.7	0.0	
Default industrial noise	Point		14.8	0.0	
Default industrial noise	Point		19.5	0.0	
Default industrial noise	Point		15.9	0.0	
Default industrial noise	Point		17.4	0.0	
Default industrial noise	Point		14.6	0.0	
Receiver 11463681,3774223 FI G Lr,lim dB(A) Leq,d 29.2 dB(A)					
Default parking lot noise	PLot		24.7	0.0	
Default industrial noise	Point		15.1	0.0	
Default industrial noise	Point		22.6	0.0	
Default industrial noise	Point		17.7	0.0	
Default industrial noise	Point		23.3	0.0	
Default industrial noise	Point		16.6	0.0	
Receiver 11463735,3774225 FI G Lr,lim dB(A) Leq,d 44.9 dB(A)					
Default parking lot noise	PLot		23.3	0.0	
Default industrial noise	Point		25.6	0.0	
Default industrial noise	Point		28.9	0.0	
Default industrial noise	Point		30.2	0.0	
Default industrial noise	Point		44.5	0.0	
Default industrial noise	Point		29.8	0.0	
Receiver 11463774,3774224 FI G Lr,lim dB(A) Leq,d 40.6 dB(A)					
Default parking lot noise	PLot		22.9	0.0	
Default industrial noise	Point		28.9	0.0	
Default industrial noise	Point		36.9	0.0	
Default industrial noise	Point		27.2	0.0	
Default industrial noise	Point		35.2	0.0	
Default industrial noise	Point		32.2	0.0	
Receiver 11463802,3774231 FI G Lr,lim dB(A) Leq,d 42.5 dB(A)					
Default parking lot noise	PLot		27.2	0.0	
Default industrial noise	Point		30.2	0.0	
Default industrial noise	Point		41.3	0.0	
Default industrial noise	Point		25.4	0.0	
Default industrial noise	Point		31.7	0.0	
Default industrial noise	Point		29.3	0.0	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

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Storage Comp Noise

Contribution spectra - 001 - Storage Comp: Outdoor SP

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Time slice	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz																	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)																	
Receiver	11463634,3774226	FI	G	Lr,lim	dB(A)	Leq,d 26.3 dB(A)																																										
Leq,d	22.7					14.3			20.5			9.4			11.8			11.0			9.4			3.8			-8.2			-33.2																		
Leq,d	14.6	-28.7	-22.8	-19.0	-6.2	-1.5	-7.8	-0.1	1.4	-0.2	1.2	0.7	2.0	2.3	2.6	5.8	6.8	1.9	2.9	3.1	-0.2	-0.7	-5.6	-7.1	-12.3	-16.9	-28.2	-42.0	-55.9	-75.4																		
Leq,d	17.4	-24.2	-18.3	-14.6	-1.8	2.9	-3.5	3.9	5.3	3.6	4.3	3.5	4.6	5.0	5.1	8.1	9.5	4.5	5.4	5.6	2.4	2.0	-2.8	-3.8	-8.5	-12.2	-22.2	-34.1	-45.1	-60.3	-80.1																	
Leq,d	15.9	-27.2	-21.3	-17.4	-4.5	0.2	-6.1	1.7	3.2	1.6	2.8	2.2	3.4	3.6	3.8	6.9	7.9	2.9	3.9	4.2	0.9	0.5	-4.2	-5.4	-10.2	-14.0	-24.3	-36.5	-48.2	-64.7	-85.4																	
Leq,d	19.5	-30.8	-24.8	-20.8	-7.8	-2.8	-8.8	-0.8	1.1	0.1	2.1	2.1	4.1	5.0	6.0	10.0	11.8	7.7	9.6	10.7	8.3	8.7	4.7	4.1	-0.4	-4.3	-15.2	-28.8	-43.2	-65.1	-93.4																	
Leq,d	14.8	-29.3	-23.4	-19.6	-6.9	-2.2	-8.4	-0.8	0.8	-0.6	0.7	0.3	1.8	2.4	2.8	6.1	7.4	2.5	3.6	3.9	0.5	-0.1	-5.2	-7.0	-12.8	-18.3	-31.0	-46.9	-63.7	-87.0																		
Receiver	11463681,3774223	FI	G	Lr,lim	dB(A)	Leq,d 29.2 dB(A)																																										
Leq,d	24.7					16.2			22.8			11.5			13.5			11.8			10.3			5.7			-4.8			-26.7																		
Leq,d	16.6	-25.2	-19.4	-15.6	-2.8	1.9	-4.4	3.2	4.7	3.0	4.1	3.3	4.3	4.3	7.3	8.3	3.2	4.2	4.4	1.1	0.8	-3.9	-4.8	-9.3	-12.7	-22.2	-33.3	-42.9	-56.5	-74.4																		
Leq,d	23.3	-18.7	-12.8	-9.0	3.7	8.4	2.1	9.8	11.2	9.6	10.3	9.5	10.6	11.0	11.0	14.0	15.3	10.2	11.2	11.4	8.3	8.1	3.7	3.1	-0.8	-3.2	-11.4	-20.3	-27.1	-37.4	-51.1																	
Leq,d	17.7	-22.6	-16.8	-13.1	-0.4	4.1	-2.3	5.4	6.6	4.7	5.2	4.2	5.1	5.1	8.0	9.0	3.9	4.9	5.1	1.9	1.6	-2.9	-3.6	-7.6	-10.4	-18.0	-26.9	-34.1	-45.2	-59.9																		
Leq,d	22.6	-27.9	-21.9	-17.9	-4.9	0.1	-5.9	2.1	4.0	3.0	5.0	5.0	7.0	7.9	8.9	12.9	14.7	10.6	12.5	13.7	11.4	12.0	8.2	8.0	4.1	1.2	-8.3	-19.8	-30.9	-46.9	-67.5																	
Leq,d	15.1	-27.2	-21.4	-17.6	-4.9	-0.2	-6.5	1.2	2.7	1.1	2.2	1.5	2.7	2.9	3.0	6.0	7.1	2.1	3.0	3.2	-0.1	-0.6	-5.4	-6.8	-11.9	-16.2	-27.2	-40.4	-53.5	-71.9	-95.1																	
Receiver	11463735,3774225	FI	G	Lr,lim	dB(A)	Leq,d 44.9 dB(A)																																										
Leq,d	23.3					14.5			21.1			10.1			12.9			11.6			9.6			3.5			-8.6			-33.3																		
Leq,d	29.8	-18.9	-12.9	-8.9	4.1	9.0	3.0	11.1	13.0	11.9	13.6	13.5	15.3	16.1	16.9	20.6	22.3	17.9	19.5	20.1	17.5	17.7	13.8	13.6	10.2	8.3	0.8	-7.5	-13.7	-23.2	-35.7																	
Leq,d	44.5	-10.8	-4.8	-0.8	12.3	17.3	11.3	20.1	22.2	21.2	22.7	22.9	25.1	26.8	28.2	32.8	35.4	32.9	34.9	36.0	33.9	34.9	31.7	32.5	30.3	29.8	24.1	18.1	14.8	9.0	0.7																	
Leq,d	30.2	-16.8	-10.9	-7.1	5.7	10.4	4.2	12.5	14.2	12.9	14.1	14.0	15.7	16.5	17.3	20.9	22.6	18.2	19.7	20.4	17.7	18.0	14.0	13.9	10.5	8.6	1.1	-7.1	-13.3	-22.6	-34.9																	
Leq,d	28.9	-22.8	-16.8	-12.8	0.2	5.2	-0.8	7.2	9.2	8.2	10.2	10.2	12.2	13.3	14.3	18.3	20.3	16.3	18.4	19.7	17.8	18.8	15.7	16.6	14.4	14.0	6.5	-2.4	-9.7	-20.9	-35.8																	
Leq,d	25.6	-24.1	-18.0	-14.1	-1.1	3.9	-2.1	6.1	8.0	6.9	8.7	8.7	10.6	11.5	12.4	16.2	18.0	13.7	15.5	16.4	13.9	14.3	10.3	10.1	6.3	3.7	-4.9	-15.0	-23.9	-36.9	-53.9																	
Receiver	11463774,3774224	FI	G	Lr,lim	dB(A)	Leq,d 40.6 dB(A)																																										
Leq,d	22.9					13.8			20.4			9.8			12.7			12.5			10.9			3.7			-9.7			-36.2																		
Leq,d	32.2	-15.8	-9.8	-5.9	7.0	11.9	5.9	14.2	16.0	14.8	16.2	16.1	18.2	18.9	19.6	23.2	24.8	20.2	21.7	22.2	19.5	19.6	15.6	15.5	12.0	10.2	2.9	-4.9	-10.3	-18.5	-29.3																	
Leq,d	35.2	-19.4	-13.3	-9.3	5.7	10.6	4.7	12.8	14.8	13.7	15.7	15.8	17.8	18.8	19.9	24.0	26.1	22.2	24.4	25.9	24.1	25.6	23.1	24.9	22.3	21.0	14.1	6.4	0.6	-8.4	-20.6																	
Leq,d	27.2	-21.6	-15.6	-11.6	1.3	6.3	0.2	8.6	10.5	9.4	10.9	10.8	12.6	13.5	14.3	18.1	19.8	15.4	16.9	17.6	14.9	15.1	11.0	10.7	7.0	4.7	-3.4	-12.6	-20.1	-31.1	-45.7																	
Leq,d	36.9	-15.7	-9.6	-5.6	7.4	12.3	6.4	14.9	16.8	15.8	17.4	17.5	19.5	20.5	21.6	25.6	27.8	23.9	26.0	27.4	25.6	27.0	24.4	26.0	24.9	24.1	17.9	11.2	6.9	-0.3	-10.2																	
Leq,d	28.9	-19.9	-13.9	-9.9	3.0	7.9	1.9	10.3	12.2	11.0	12.4	12.3	14.1	15.5	16.3	19.9	21.6	17.1	18.7	19.3	16.7	16.9	12.8	12.5	8.8	6.5	-1.4	-10.2	-17.0	-27.0	-40.3																	
Receiver	11463802,3774231	FI	G	Lr,lim	dB(A)	Leq,d 42.5 dB(A)																																										
Leq,d	27.2					15.5			23.8			14.6			18.4			18.2			18.0			12.8			1.3			-23.9																		
Leq,d	29.3	-20.6	-14.5	-10.6	2.4	7.4	1.3	9.4	11.3	10.2	12.1	12.0	14.6	15.4	16.3	20.1	21.8	17.5	19.2	20.0	17.4	17.8	13.8	13.7	10.0	7.8	-0.2	-9.1	-16.2	-26.6	-40.3																	
Leq,d	31.7	-23.6	-17.6	-13.6	-0.6	6.6	0.6	8.7	10.6	9.6	11.7	11.8	13.8	14.9	16.1	20.2	22.4	18.7	21.1	23.0	21.9	23.4	19.8	20.0	16.7	14.7	6.7	-2.7	-10.8	-22.9	-38.9																	
Leq,d	25.4	-24.8	-18.8	-14.8	-1.8	3.1	-2.9	5.4	7.3	6.2	8.0	8.0	9.9	10.9	11.8	15.7	17.8	13.6	15.4	16.4	13.9	14.4	10.5	10.3	6.5	3.9	-4.9	-15.2	-24.5	-38.1	-55.9																	
Leq,d	41.3	-13.7	-7.7	-3.7	9.4	14.4	8.4	17.1	19.1	18.2	19.7	19.9	22.1	23.5	24.9	29.4	32.1	29.3	31.9	33.0	31.0	31.9	28.7	29.4	27.1	26.4	20.5	14.1	10.2	3.7	-5.4																	
Leq,d	30.2	-17.1	-11.2	-7.3	5.6	10.5	4.3	12.6	14.3	12.9	13.8	13.6	15.3	16.1	17.2	20.9	22.6	18.2	19.9	20.6	18.1	18.4	14.4	14.3	10.8	8.7	1.0	-7.6	-14.2	-24.2	-37.4																	

MD Acoustics 1197 E Los Angeles Ave,Unit C 256 Simi Valley, CA 93065 USA

Receptor - Residences to the North

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA ¹	Edge of Site to Receptor, feet	Center of Site to Receptor, feet	Item Usage Percent ¹	Ground Factor ²	Usage Factor	Receptor Item Lmax, dBA	Recptor. Item Leq, dBA
SITE PREP									
Tractor	3	84	40	170	40	0.66	0.40	86.6	65.9
Dozer	2	82	40	170	40	0.66	0.40	84.6	63.9
							Log Sum	86.6	72.2
GRADE									
Excavator	1	81	40	170	40	0.66	0.40	83.6	62.9
Grader	1	85	40	170	40	0.66	0.40	87.6	66.9
Dozer	1	82	40	170	40	0.66	0.40	84.6	63.9
Tractor	3	84	40	170	40	0.66	0.40	86.6	65.9
								87.6	73.2
BUILD									
Crane	1	81	40	170	16	0.66	0.16	83.6	58.9
Man lift	3	75	40	170	20	0.66	0.20	77.6	53.9
Generator	1	81	40	170	50	0.66	0.50	83.6	63.9
Tractor	3	84	40	170	40	0.66	0.40	86.6	65.9
Welder/Torch	1	74	40	170	40	0.66	0.40	76.6	55.9
								86.6	72.0
PAVE									
Paver	2	77	40	170	50	0.66	0.50	79.6	59.9
Compactor (ground)	2	83	40	170	20	0.66	0.20	85.6	61.9
Roller	2	80	40	170	20	0.66	0.20	82.6	58.9
								85.6	68.2
ARCH COAT									
Compressor (air)	1	78	40	170	40	0.66	0.40	80.6	59.9
								80.6	59.9

¹FHWA Construction Noise Handbook: Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors

Appendix C:
Construction Noise Modeling Output

Receptor - Residences to the North

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA ¹	Edge of Site to Receptor, feet	Center of Site to Receptor, feet	Item Usage Percent ¹	Ground Factor ²	Usage Factor	Receptor Item Lmax, dBA	Recptor. Item Leq, dBA
SITE PREP									
Tractor	3	84	40	170	40	0.66	0.40	86.6	65.9
Dozer	2	82	40	170	40	0.66	0.40	84.6	63.9
							Log Sum	86.6	72.2
GRADE									
Excavator	1	81	40	170	40	0.66	0.40	83.6	62.9
Grader	1	85	40	170	40	0.66	0.40	87.6	66.9
Dozer	1	82	40	170	40	0.66	0.40	84.6	63.9
Tractor	3	84	40	170	40	0.66	0.40	86.6	65.9
								87.6	73.2
BUILD									
Crane	1	81	40	170	16	0.66	0.16	83.6	58.9
Man lift	3	75	40	170	20	0.66	0.20	77.6	53.9
Generator	1	81	40	170	50	0.66	0.50	83.6	63.9
Tractor	3	84	40	170	40	0.66	0.40	86.6	65.9
Welder/Torch	1	74	40	170	40	0.66	0.40	76.6	55.9
								86.6	72.0
PAVE									
Paver	2	77	40	170	50	0.66	0.50	79.6	59.9
Compactor (ground)	2	83	40	170	20	0.66	0.20	85.6	61.9
Roller	2	80	40	170	20	0.66	0.20	82.6	58.9
								85.6	68.2
ARCH COAT									
Compressor (air)	1	78	40	170	40	0.66	0.40	80.6	59.9
								80.6	59.9

¹FHWA Construction Noise Handbook: Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors

VIBRATION LEVEL IMPACT		
Project:	Foothill Blvd & Larch Ave	Date: 2/7/23
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Adjacent residences	
Address:	Rialto	
PPV = $PPV_{ref}(25/D)^n$ (in/sec)		

DATA INPUT		
Equipment = Type	1	Vibratory Roller
		INPUT SECTION IN BLUE
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.
D =	50.00	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 =	0.098	IN/SEC
		OUTPUT IN RED