Fire Station 41 Project

Noise Impact Study

County of San Bernardino, CA

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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 County's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the County of San Bernardino General Plan 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 the sensitive receptors and the project site; and
- An analysis of construction noise and vibration impacts to the sensitive receptors.

1.2 Site Location and Study Area

The Project site is located near the southwest corner of Joshua Lane and Twentynine Palms Highway, Yucca Valley, County of San Bernardino, CA. See Exhibit A for the location. Existing land uses surrounding the Project site include commercial uses to the north, west, and south, and a public library to the east.

1.3 Proposed Project Description

The Project proposes to develop a New Fire Station #41 at 7238 Joshua Lane by constructing a new 13,230 SF station and new associated facilities (Project). The new fire station will house 5 personnel, 1 engine, and 1 paramedic truck. The new fire station will be part of the District's Division 4, which will serve the unincorporated area adjacent to the Town of Yucca Valley, and the contract cities of Joshua Tree and 29 Palms.

Improvements to the site would include new security fencing, a hose house, hose rack, generator, fuel tank, trash enclosure, new access road, landscaping, and hardscaping. Parking will consist of thirteen (13) parking spots. Ingress and egress to the project site will be via Twentynine Palms Outer Highway and Joshua Lane through two driveways: the southern driveway will be the primary entrance and exit for the emergency vehicles, while the northern driveway will serve as the public entrance and exit.

Exhibit A

Location Map

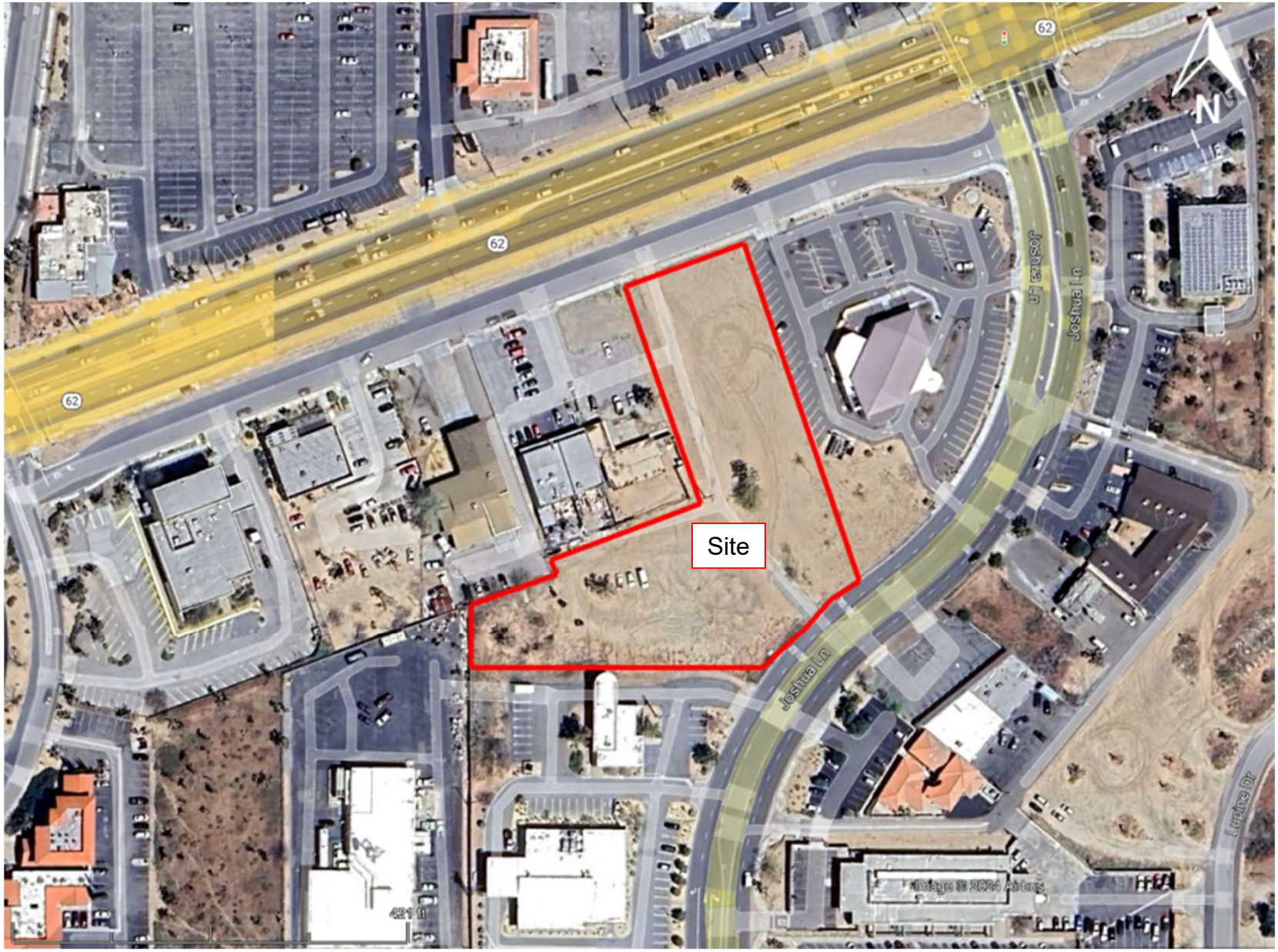
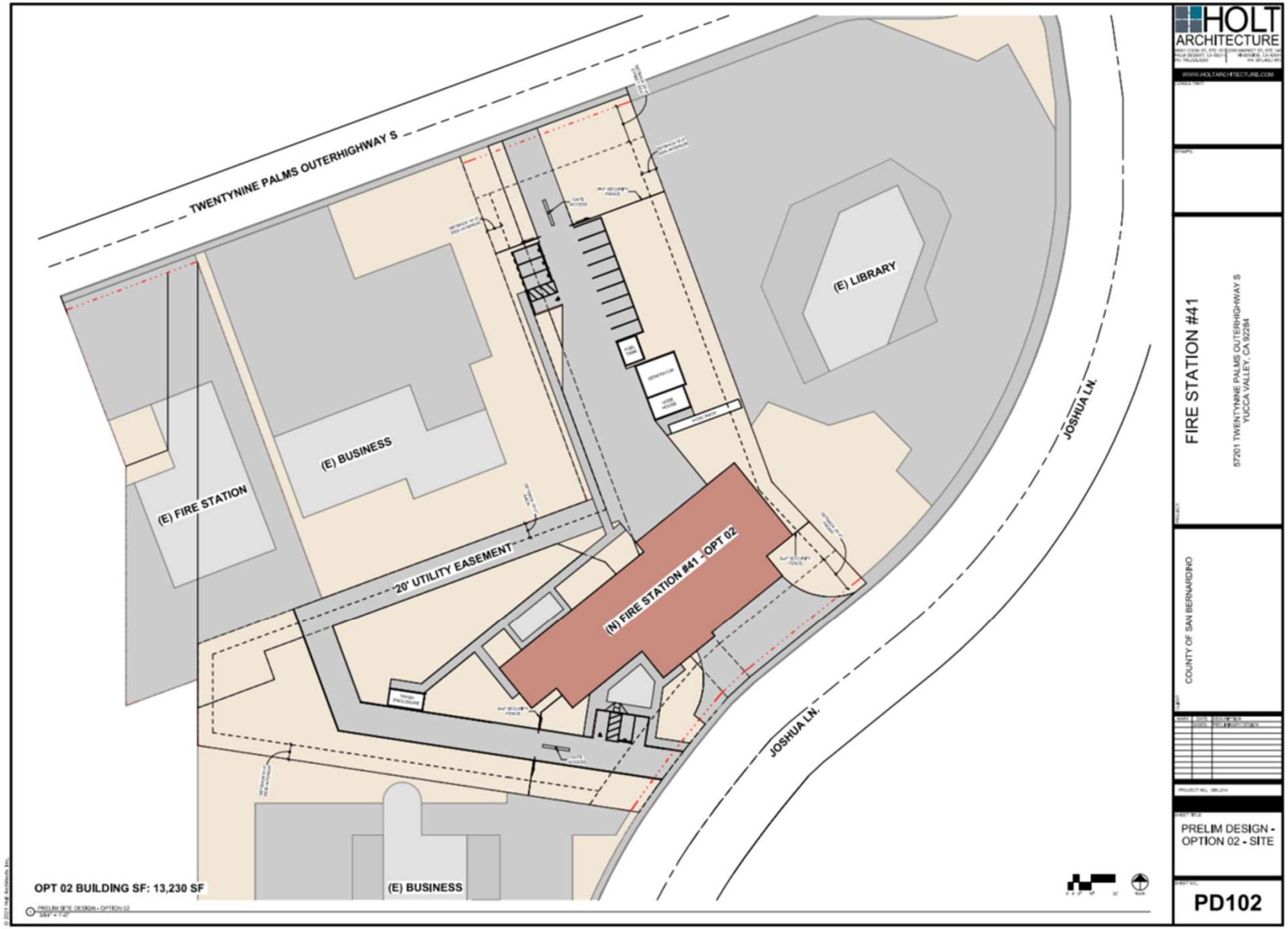


Exhibit B

Site Plan



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.

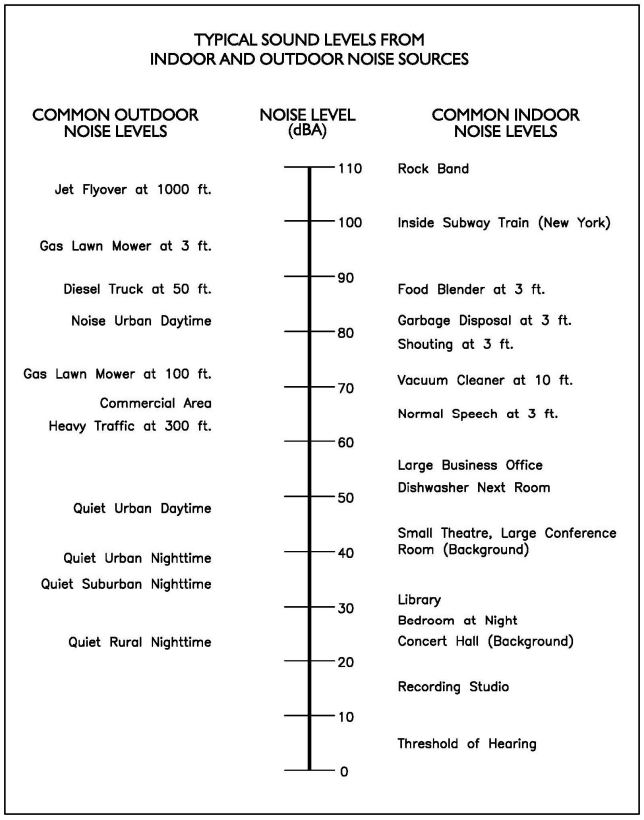
2.1 Sound, Noise, and Acoustics

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 at 20 Hz 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 its 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 Sensitive Receptors

Noise-sensitive land uses include residential (single and multi-family dwellings, mobile home parks, dormitories, and similar uses); transient lodging (including hotels, motels, and similar uses); hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care; public or private educational facilities, libraries, churches, and places of public assembly.

2.6 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 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.

Table 1: Decibel Changes and Loudness

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud
Source: https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm	

2.7 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 the addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and 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.

2.8 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: volume of traffic; the speed of traffic; auto, medium truck (2-axle), and heavy truck percentage (3-axle and greater); and sound propagation. Higher traffic volume, 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.

2.9 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.

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 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 Town of Yucca Valley, County of San Bernardino, 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 developments in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or 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.

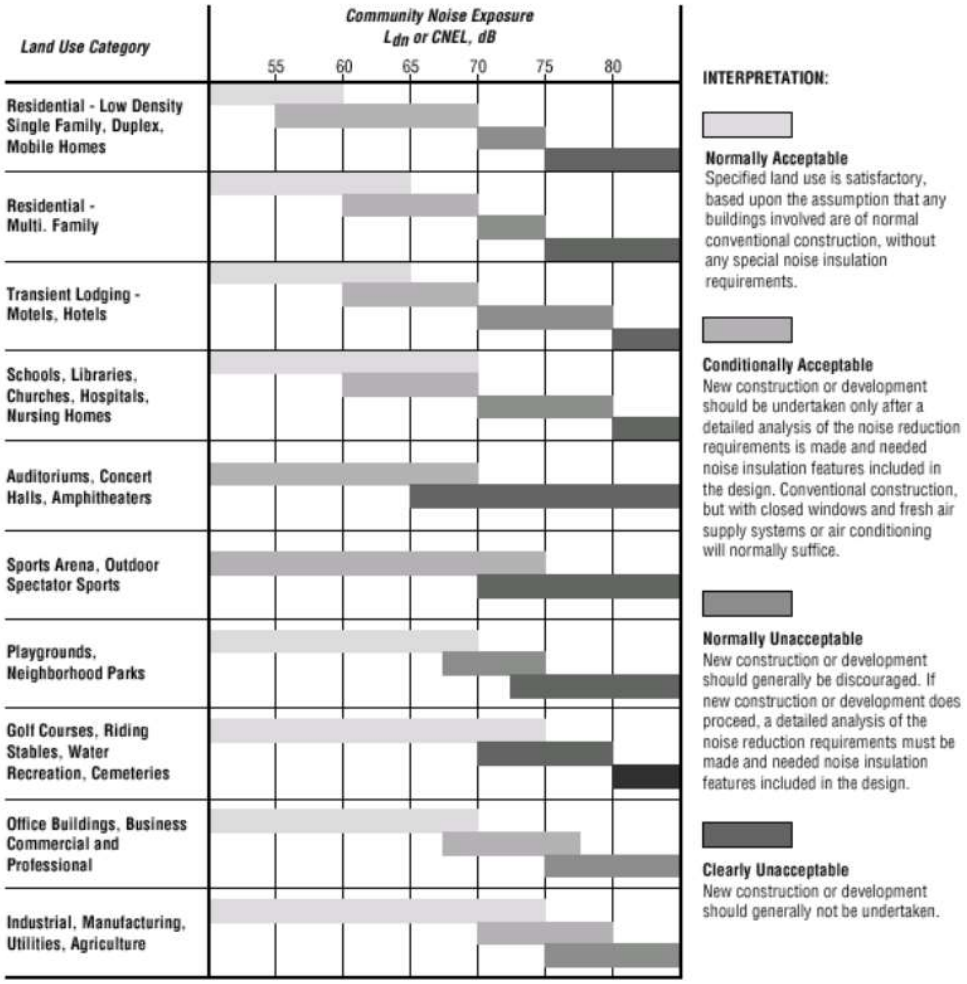
4.2 State Regulations

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 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



4.3 County of San Bernardino Noise Regulations

The County of San Bernardino outlines their noise regulations and standards within the Policy Plan, Safety and Security Section, Hazards Element from the General Plan and the Noise Ordinance from the Municipal Code.

County of San Bernardino General Plan

Applicable policies and standards governing environmental noise in the County of San Bernardino are set forth in the Policy Plan Hazards Element. The County has outlined goals and policies to reduce potential noise impacts and are presented below:

Goals, Policies, and Implementation Measures

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

Goal HZ-2 Human-generated Hazards: People and the natural environment protected from exposure to hazardous materials, excessive noise, and other human-generated hazards.

Policy HZ-2.6: Coordination with transportation authorities. We collaborate with airport owners, FAA, Caltrans, SBCTA, SCAG, neighboring jurisdictions, and other transportation providers in the preparation and maintenance of, updates to transportation-related plans and projects to minimize noise impacts and provide appropriate mitigation measures.

Policy HZ-2.7: Truck delivery areas. We encourage truck delivery areas to be located away from residential properties and require associated noise impacts to be mitigated.

Policy HZ-2.8: Proximity to noise generating uses. We limit or restrict new noise sensitive land uses in proximity to existing conforming noise generating uses and planned industrial areas.

Policy HZ-2.9: Control sound at the source. We prioritize noise mitigation measures that control sound at the source before buffers, soundwalls, and other perimeter measures.

Policy HZ-2.10: Agricultural operations. We require new development adjacent to existing conforming agricultural operations to provide adequate buffers to reduce the exposure of new development to operational noise, odor, and the storage or application of pesticides or other hazardous materials.

County of San Bernardino Municipal Code

Chapter 83.01 General Performance Standards of the County's Municipal Code outlines the County's noise ordinance.

Section 83.01.080 –Noise

This Section establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

(a) *Noise Measurement*. Noise shall be measured:

(1) At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise-sensitive land uses;

(2) With a sound level meter that meets the standards of the American National Standards Institute (ANSI § SI4 1979, Type 1 or Type 2);

(3) Using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).

(b) *Noise Impacted Areas*. Areas within the County shall be designated as "noise-impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subdivision (d) (Noise Standards for Stationary Noise Sources) and Subdivision (e) (Noise Standards for Adjacent Mobile Noise Sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.

(c) *Noise Standards for Stationary Noise Sources*.

(1) *Noise Standards*. Table 2 (Table 83-2 in the Municipal Code) describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties.

Table 2: Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	Noise Level Limit (Leq dBA)	
	7:00 a.m. - 10:00 p.m.	10:00 p.m. - 7:00 a.m.
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

(2) Noise Limit Categories. No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

1. The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.
2. The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour.
3. The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour.
4. The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

5. The noise standard plus 20 dB(A) for any period of time.

(d) Noise Standards for Adjacent Mobile Noise Sources. Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 3 (Table 83-3 in the Municipal Code).

Table 3: Noise Standards for Adjacent Mobile Noise Sources

Land Use		Ldn (or CNEL) dBA	
Categories	**Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single and multi-family, duplex, mobile homes	45	60[3]
Commercial	Hotel, motel, transient housing	45	60[3]
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/Public	Hospital, nursing home, school, religious institution, library	45	65
Open Space	Park	N/A	65

Notes:
[1] The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.
[2] The outdoor environment shall be limited to
- Hospital/office building patios
- Mobile home parks
- Multi-family private patios or balconies
- Park picnic areas
- Private yard of single-family dwellings
- School playgrounds

[3] An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

(e) *Increases in Allowable* Noise Levels. If the measured ambient level exceeds any of the first four noise limit categories in Subdivision (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subdivision (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) *Reduction in Allowable Noise Levels.* If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 2 shall be reduced by five dB(A).

(g) *Exempt Noise.* The following sources of noise shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the commercial or industrial use.

(2) Emergency equipment, vehicles, and devices.

(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

(h) Noise Standards for Other Structures. All other structures shall be sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria.

Per the table outlined above, the County's noise limit for residential uses is 55 dBA during the hours of 7:00 AM to 6:00 PM, 50 dBA during the hours of 6:00 PM to 10:00 PM, 45 dBA during the hours of 10:00 PM to 7:00 AM.

Table 4: Noise Standards for Other Structures

Typical Uses	12-Hour Equivalent Sound Level (Interior) dBA Ldn
Educational institutions, libraries, meeting facilities, etc.	45
General office, reception, etc.	55
Retail stores, restaurants, etc.	60
Other areas for manufacturing, assembly, testing, warehousing, etc.	70

In addition, the average of the maximum levels on the loudest of intrusive sounds occurring during a 24-hour period shall not exceed 65 dBA interior.

Section 83.01.090 –Vibration

(a) Vibration Standard: No ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to 0.2 inch per second measured at or beyond the lot line.

(b) Vibration Measurement. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use zoning district.

(c) Exempt Vibrations. The following sources of vibration shall be exempt from the regulations of this Section.

(1) Motor vehicles not under the control of the subject use.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

4.4 Town of Yucca Valley Noise Regulations

The Town of Yucca Valley outlines their noise regulations and standards within the Noise Element from the Yucca Valley General Plan and the Noise Ordinance of the Yucca Valley Municipal Code. Sections 9.34.080 and 9.34.090 of the Yucca Valley Municipal Code exactly mimic the wording of the San Bernardino County Municipal Code.

Town of Yucca Valley General Plan

Goals, Policies, and Implementation Measures

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

Goal N1: A noise environment where excessive noise from stationary, transportation-related, and temporary sources of noise are appropriately managed.

Noise-Sensitive Land Use Policies:

Policy N1-1: Separate excessive noise-generating uses from residential uses and other sensitive receptors through building design and noise-minimizing buffers such as landscaping, berms, and setbacks. (See LU 1-23)

Policy N1-3: Require daytime only truck deliveries to commercial and industrial uses adjacent to residential uses and other sensitive receptors unless there is no feasible alternative.

Non-Transportation-Related Noise Policies:

Policy N1-13: Enforce Town noise standards and monitor compliance with noise standards.

Policy N1-15: Require the design and construction of industrial and commercial development to minimize excessive offsite noise impacts to surrounding properties.

Policy N1-16: Encourage existing and proposed industrial uses to use operation methods that minimize excessive noise.

Policy N1-17: Consider potential noise impacts before purchasing large or heavy equipment for Town facilities and encourage selection of equipment that generates the least noise.

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

All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). MD noise measurement procedures are presented below:

- The sound level meter was calibrated (NTI XL2) before and after the 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 noise measurements were recorded on field data sheets
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

The noise monitoring location was selected to obtain a baseline of the existing noise environment. One short-term noise measurement was conducted at the Project site. Appendix A includes photos, the field sheet, and measured noise data. Exhibit E illustrates the location of the measurement.

5.3 SoundPLAN Noise Model (Operational Noise)

SoundPLAN acoustical modeling software was utilized to model Project operational noise at nearby sensitive receptors. The SoundPLAN software utilizes algorithms (based on the inverse square law) to calculate noise level projections. It allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations. It also calculates noise level increases due to the reflection of noise from hard surfaces.

Measured and referenced sound level data was utilized to model the various stationary on-site noise sources associated with Project operation, (i.e. generator, HVAC, and parking movements).

Noise associated with proposed parking areas was modeled using the SoundPLAN parking tool. The Project proposes 13 total parking spaces. The Trip Generation Memo estimates 70 daily trips to and from

the Project site. Assuming 10% of trips occur during the peak hour, there would be approximately 0.5 movements per space per hour. As a worst-case, the parking lot was modeled with a lot-wide average of 1 movement per space per hour. There are four (4) 5-ton HVAC rooftop units. The rooftop units were modeled as continuous point sources each with a sound power level of 78 dBA. The generator was modeled using sound level data from a Generac - SD30 2.4L 30kW – Level 1 enclosure. This generator has a sound power level of 73 dBA at 7 meters. Modeling assumptions are summarized in Table 5. SoundPLAN noise modeling input and results are provided in Appendix B.

Table 5: SoundPLAN Modeling Assumptions

Noise Source	Source Type	Reference Level	Descriptor
HVAC	Point Source	78	Lw
Generator	Point Source	73	Lp at 7m
Parking	Area (Parking Tool)	1	Movements per hr
Source: See Appendix B.			

5.4 Traffic Noise Prediction Modeling

The FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) was utilized to model future traffic noise levels on the Project site and existing and existing plus Project traffic noise volumes along roadways affected by Project generated vehicle traffic. The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL).

Project-generated vehicle traffic will result in an incremental increase in ambient noise levels. To determine the Project's noise impact to the surrounding land uses, MD generated noise contours for existing ADT, and existing plus Project ADT. Traffic volumes were obtained from the Caltrans Traffic Volumes for vehicles on California State Highways, and the Project's trip generation was prepared by Integrated Engineering Group (IEG). The total Project ADT was calculated assuming 10% of trips occur during the peak hour. Table 6 indicates the roadway parameters and vehicle distribution utilized.

Noise contours are used to provide a characterization of sound levels experienced at a set distance from the centerline of a subject roadway. They are intended to represent a worst-case scenario and do not take into account structures, sound walls, topography, and/or other sound attenuating features that may further reduce the actual noise level. Noise contours are developed for comparative purposes and are used to demonstrate potential increases/decreases along subject roadways as a result of a Project. The referenced traffic data and traffic noise calculation worksheets outputs are located in Appendix C.

- Roadway classification – (e.g., freeway, major arterial, arterial, secondary, collector, etc.),
- Roadway Active Width – (distance between the center of the outermost travel lanes on each side of the roadway)
- Average Daily Traffic Volumes (ADT), Speeds, Percentages of autos, medium and heavy trucks
- Roadway grade and angle of view

- Site Conditions (e.g., soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period

Table 6: Roadway Parameters and Vehicle Distribution

Roadway	Existing ADT[1]	Existing + Project ADT[2]	Speed (MPH)	Site Conditions
Twentynine Palms Highway	32,000	32,070	40	Hard
Joshua Lane	11,700	11,770	35	Hard
Freeway Motor-Vehicle Type		**Total % of Traffic Flow**		
Automobiles		97.4		
Medium Trucks		1.84		
Heavy Trucks		0.74		

Notes:
[1] 2022 Caltrans Traffic Volumes
[2] Project trip generation was provided in the trip generation assessment prepared for the Project by IEG.

6.0 Existing Noise Environment

One (1) 15-minute noise measurement was conducted at the Project site to document the existing noise environment. The measurements include the 15-minute Leq, Lmin, Lmax, and other statistical data (e.g. L2, L8). The results of the noise measurement are presented in Table 7. Noise measurement field sheets are provided in Appendix A.

Table 7: Short-Term Noise Measurement Data (dBA)[1]

Location	Start Time	Stop Time	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)	L(90)
NM1	10:53 AM	11:08 AM	57.5	70.2	48.5	64.2	60.6	57.7	55.6	52.1

Notes:
1. Short-term noise monitoring locations are illustrated in Exhibit E.

The data presented in Table 7 indicate that the ambient noise level in the Project vicinity was 57.5 dBA Leq. Field data and notes provided in Appendix A indicate that the dominant noise source is traffic along Twentynine Palms Highway.

Exhibit E

Measurement Locations

= Short-Term Monitoring Locations



7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts to sensitive receptors and the Project and compares the results to the County's and Town's Noise Standards. The analysis details the estimated exterior noise levels associated with traffic from adjacent roadway sources. The County has established different significance thresholds for different types of noise impacts.

7.1 Off-Site Traffic Noise Impact

The potential off-site noise impacts caused by the increase in vehicular traffic as a result of the Project were calculated at the nearest sensitive receptor, the Yucca Valley Library. The noise levels at Yucca Valley Library both with and without Project-generated vehicle traffic were compared and the increase was calculated. The distance to the 55, 60, 65, and 70 dBA CNEL noise contours are also provided for reference (Appendix C). Noise contours were calculated for the following scenarios and conditions:

- Existing Condition: This scenario refers to the existing traffic noise condition and is demonstrated in Table 8.

- Existing + Project Condition: This scenario refers to the existing plus Project traffic noise condition and is demonstrated in Table 8.

As shown in Table 8, the addition of Project-generated vehicle traffic on Twentynine Palms Highway and Joshua Lane would result in negligible increases in ambient noise levels and would not be significant.

Table 8: Change in Existing Noise Levels as a Result of Project Generated Traffic[1]

Roadway	Segment	Modeled Noise Levels (dBA CNEL) at Yucca Valley Library			
		Existing without Project	Existing with Project	Change in Noise Level	Increase of 3 dB or more[2]
Twentynine Palms Highway	Dumosa Ave to Joshua Lane	64.9	64.9	0.0	No
Joshua Lane	Yucca Ave to Twentynine Palms Highway	61.7	61.7	0.0	No

Notes:
[1] FHWA roadway noise modeling worksheets are provided in Appendix C.
[2] Typical CEQA significance threshold

7.2 On-Site Traffic Noise Impact

Future noise levels associated with traffic were modeled using the FHWA Traffic Noise Model calculations in order to evaluate the Project in light of the County's land use compatibility guidelines presented in Exhibit D of this report as they apply to future traffic noise impacts to the proposed Project. The Project is currently within the normally acceptable range for commercial uses at 61.2 dBA CNEL. It will not change due to the increase in traffic levels due to the Project.

7.1.3 Noise Impacts to Off-Site Receptors Due to Stationary Noise Sources

Existing conditions show that the nearest sensitive receptor is Yucca Valley Library located east of the Project site. All other adjacent land uses surrounding the site are commercial. Worst-case operational noise was modeled using SoundPLAN acoustical modeling software. Four (4) receptors representative of the adjacent library and commercial uses were modeled using the SoundPLAN noise model to evaluate the proposed Project's operational impact. A receptor is denoted by a yellow dot, as shown in Exhibit F. Receptors 1 and 2 (R1 and R2) represent the noise level at Yucca Valley Library, while receptors 3 and 4 (R3 and R4) represent the noise levels at the adjacent commercial uses. The results are in Table 9.

Project Operational Noise Levels

Worst-case "project-only" exterior operational noise is presented in Exhibit F. Operational noise levels are expected to reach 34 to 43 dBA Leq and meets the 60 dBA commercial limit provided in Table 4. All receivers are assumed to have an ambient noise level of 58 dBA Leq; therefore, the operational noise level at any receiver would not be perceptible and will be masked by ambient noise.

Project Plus Ambient Operational Noise Levels

Project generated operational noise is not expected to result in an increase in ambient noise levels at any of the nearby receptors. Existing plus Project noise level projections are anticipated to reach 58 dBA Leq at all surrounding receptors, which meets the 60 dBA Leq commercial limit provided in Table 4.

Section 83.01.080(h) of the San Bernardino County Municipal Code states that libraries shall not exceed 45 dBA LDN interior. The loudest level expected at the exterior of the Yucca Valley Library (at receptor 2) is estimated to be 61 dBA Leq during the hour of 4 PM (see Appendix A for calculation). The existing plus Project noise level during this hour is 61 dBA Leq. The construction of the library is assumed to provide a conservative 20 dB noise reduction to the interior of the building. Thus, the interior noise level during the loudest hour of library operation is estimated to be 41 dBA. This is below the 45 dBA interior limit for libraries.

Other noises associated with Project operation include emergency siren and vehicle operation noises. However, section 83.01.080(g)(2) of the Municipal Code exempts noise from emergency equipment, vehicles, and devices. Thus, Project operational noise complies with all noise standards set forth in the Municipal Code, and the noise impact form Project operations is less than significant.

<Table 9, next page>

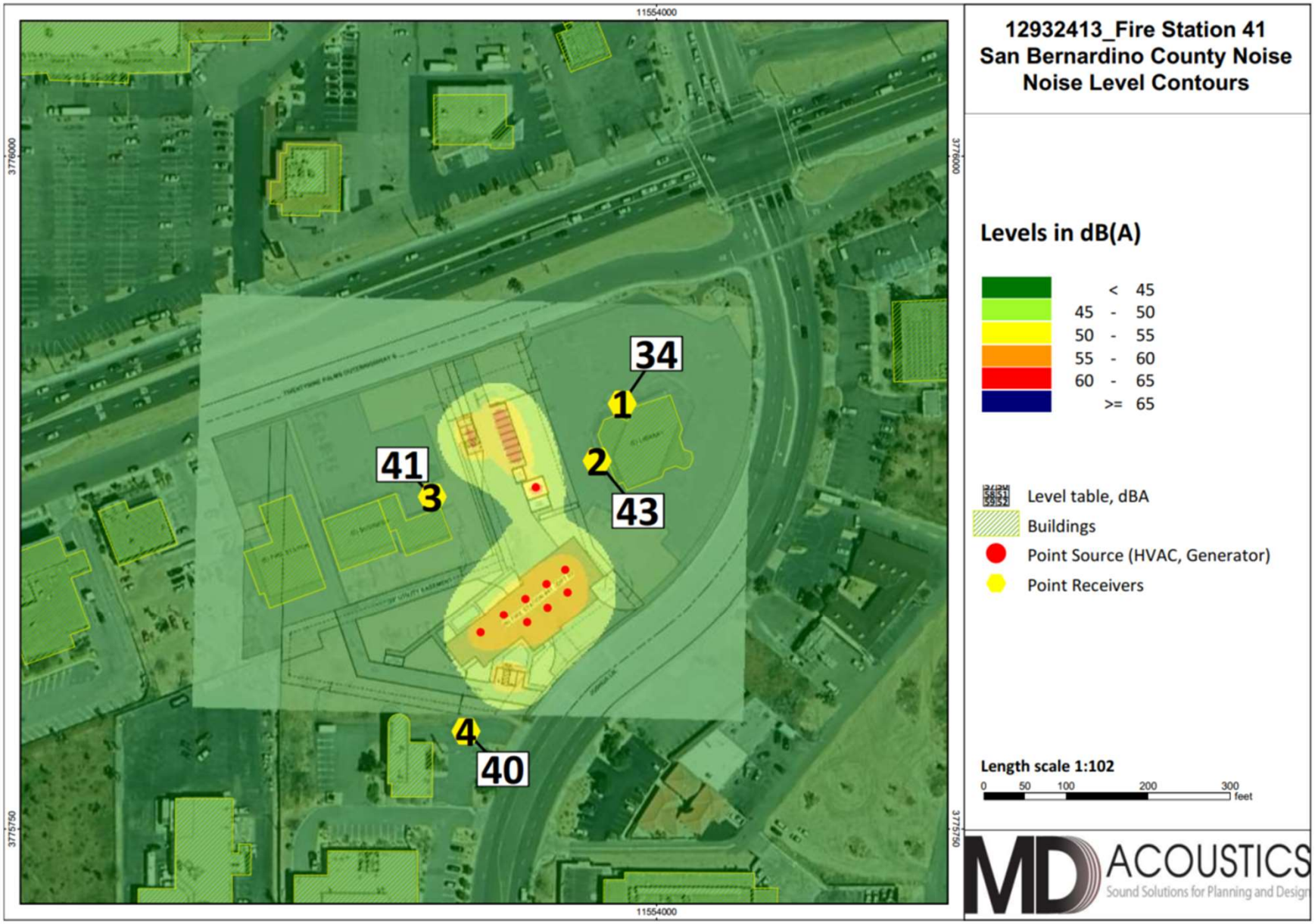
Table 9: Operational Noise Levels (dBA, Leq)

Receptor[1]	Existing Ambient Noise Level[2]	Project Noise Level[3]	Total Combined Noise Level	Normally Acceptable Commercial Noise Level	Change in Noise Level as Result of Project
1	58	34	58	**60**	0
2		43	58		0
3		41	58		0
4		40	58		0

Notes:
1. Receptors 1-2 represent Yucca Valley Library, receptors 3-4 represent adjacent commercial uses.
2. See Table 6 for existing ambient level. The dominant noise source is traffic along Twentynine Palms Highway to the north.
3. See Exhibit F for the operational noise level projections at said receptors.

Exhibit F

Operational Noise Levels



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 10.

Table 10: 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 County's Municipal Code (Section 83.01.080(g)(3)). Construction is anticipated to occur during the permissible hours (7 a.m. to 7 p.m.) according to the County's Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the Project vicinity. The construction noise impact is considered less than significant; however, construction noise level projections are provided.

The closest sensitive land use to the Project is the Yucca Valley Library to the east of the site. The library is an average of 175 feet away from construction activities and as close as 45 feet from construction activities.

Construction equipment was taken from the Project's CalEEMod. 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 are in Table 11. A likely worst-case construction noise scenario assumes equipment operating as close as 45 feet and an average of 175 feet from the property line of the nearest sensitive receptor, the library to the east. The Lmax levels represent maximum levels when construction occurs adjacent to the residential receptors. Leq levels represent the average construction noise level during each phase. The construction noise calculation output worksheet is located in Appendix C.

Table 11: Construction Noise Level by Phase (dBA, Leq)

Activity	Noise Levels at Nearest Sensitive Receptor	
	Leq	Lmax
Site Preparation	70	86
Grading	71	86
Building Construction	69	85
Paving	71	91
Architectural Coating	60	79
Notes: Construction Modeling Worksheets are provided in Appendix C.		

As shown in Table 9, Project construction noise will range between 60 to 71 dBA Leq and 79 to 91 dBA Lmax at the nearest sensitive receptor.

The Project will be required to adhere to the allowed times for construction outlined in the Municipal Code in Section 83.01.080(g)(3). This impact is less than significant, and no mitigation is required.

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 vibratory roller. A large vibratory roller has a vibration impact of 0.21 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 12 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 12: 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 13 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 13: 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
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
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.

The nearest existing building to the Project site is a commercial building located as close as 20 feet west of the site. At a distance of 20 feet, a vibratory roller would yield a worst-case 0.268 PPV (in/sec) which is perceptible but below the threshold of any risk of damage for commercial buildings. Section 83.01.090(c)(2) exempts vibration from temporary construction activities from the vibration thresholds outlined in the San Bernardino County Municipal Code. Thus, the impact is less than significant and no mitigation is required.

9.0 References

State of California Building Standards Code, Title 24.

County of San Bernardino: General Policy Plan Hazards Element. October 2020.

County of San Bernardino: Chapter 83.01, Section 83.01.080 Noise of the Municipal Code.

Town of Yucca Valley: Noise Element. April 2022.

Town of Yucca Valley: Sections 9.34.080 Noise and 9.34.090 Vibration of the Municipal Code.

Caltrans Traffic Volumes 2022.

Trip Generation Assessment Memo for Fire Station 41 – Integrated Engineering Group.

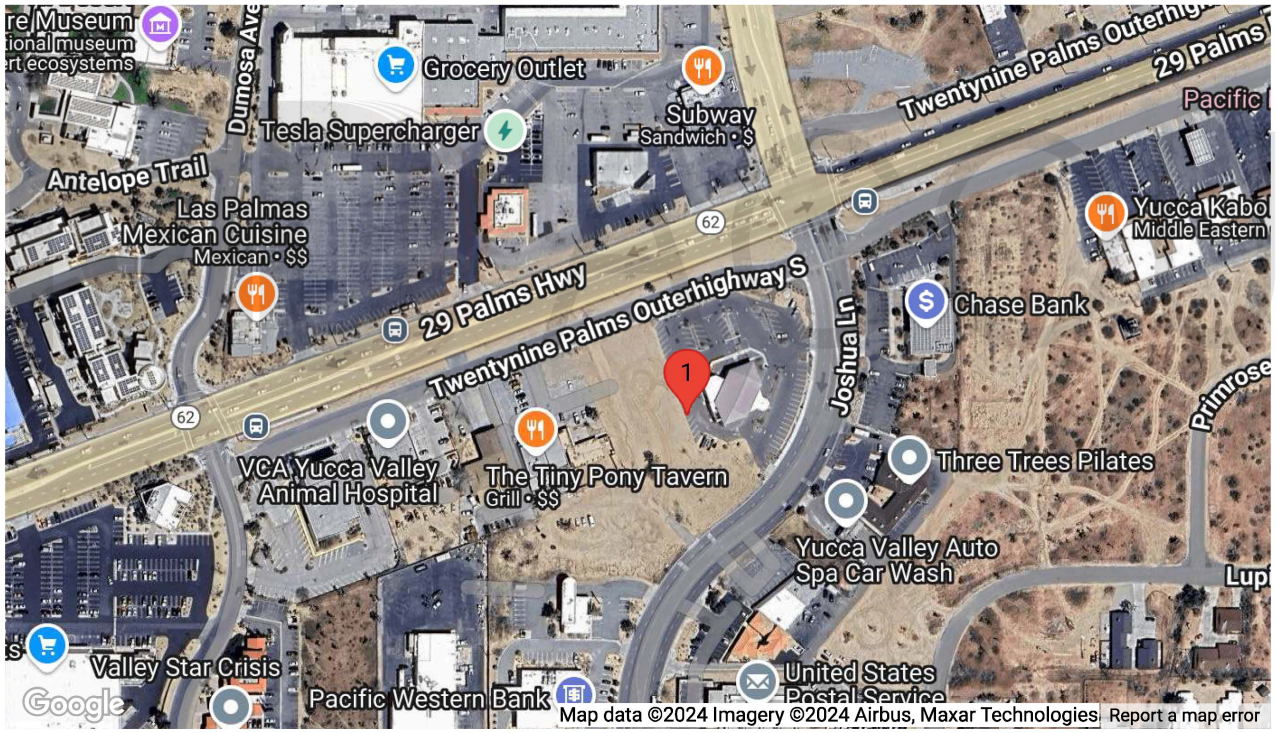
SoundPLAN Essential 9.0 Manual - SoundPLAN International, LLC.

Appendix A:

Field Measurement Data

15-Minute Continuous Noise Measurement Datasheet - NM1

Project Name:	Fire Station 41 Noise	**Site Observations:**	
Project: #/Name:	1293-2024-013	57F Clear skies, winds 0-3MPH	
Site Address/Location:	57201 Twentynine Palms Highway S		
Date:	11/20/2024		
Field Tech/Engineer:	Jason Schuyler / Naomi Jensen		
Sound Meter:	XL2, NTI	**SN:** A2A-08562-E0	
Settings:	A-weighted, slow, 1-sec, 15-minute interval		
Site Id:	NM1		



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont. - NM1

Project Name: Fire Station 41 Noise

Site Address/Location: 57201 Twentynine Palms Highway S

Site Id: NM1

Calibrator:

Cal Check: Pre-test: **Post Test:**

Figure 1: NM1



Figure 2: NM1



Figure 3: NM1



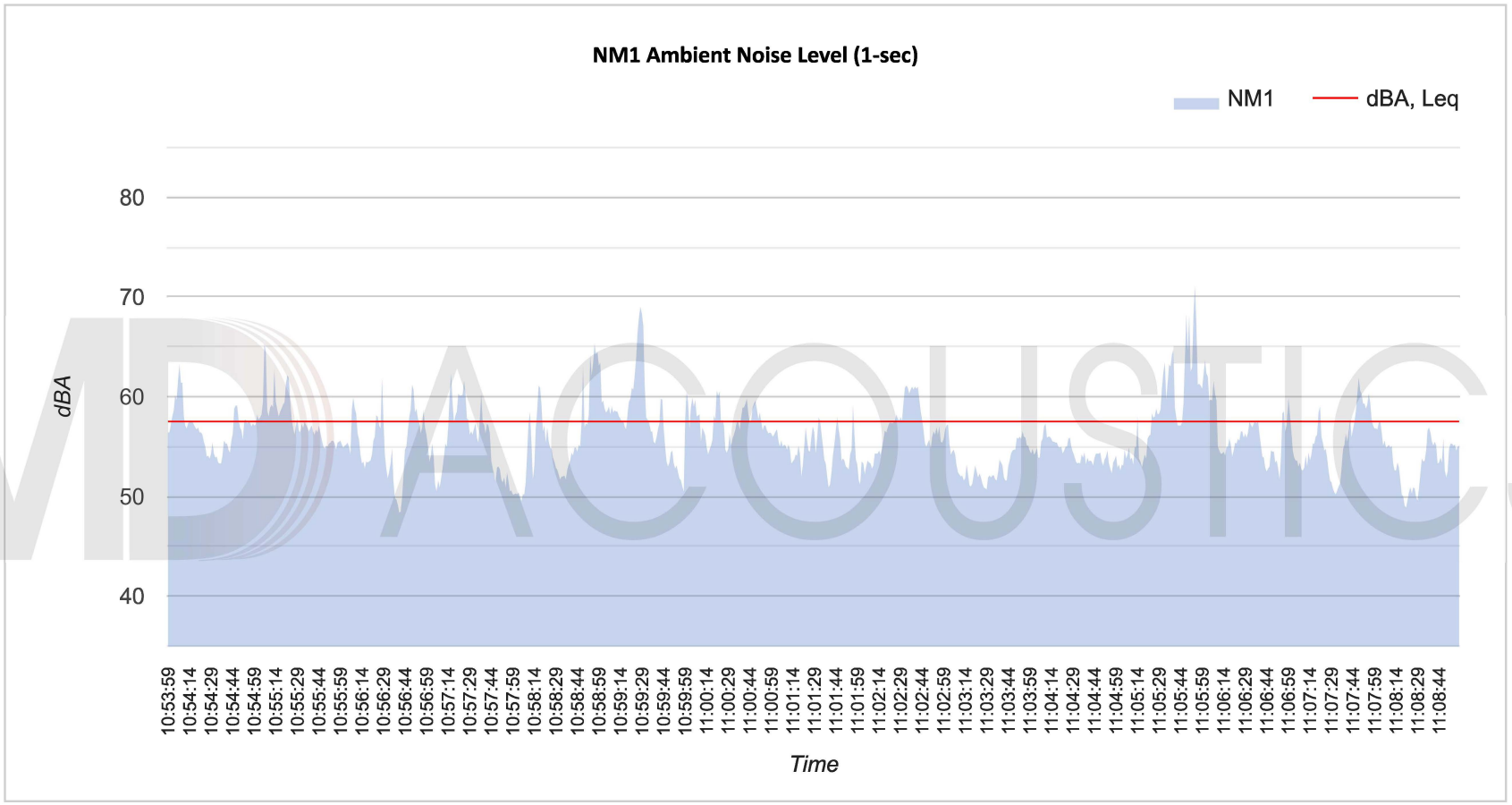
Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	10:53 AM	11:08 AM	57.5	70.2	48.5	64.2	60.6	57.7	55.6	52.1

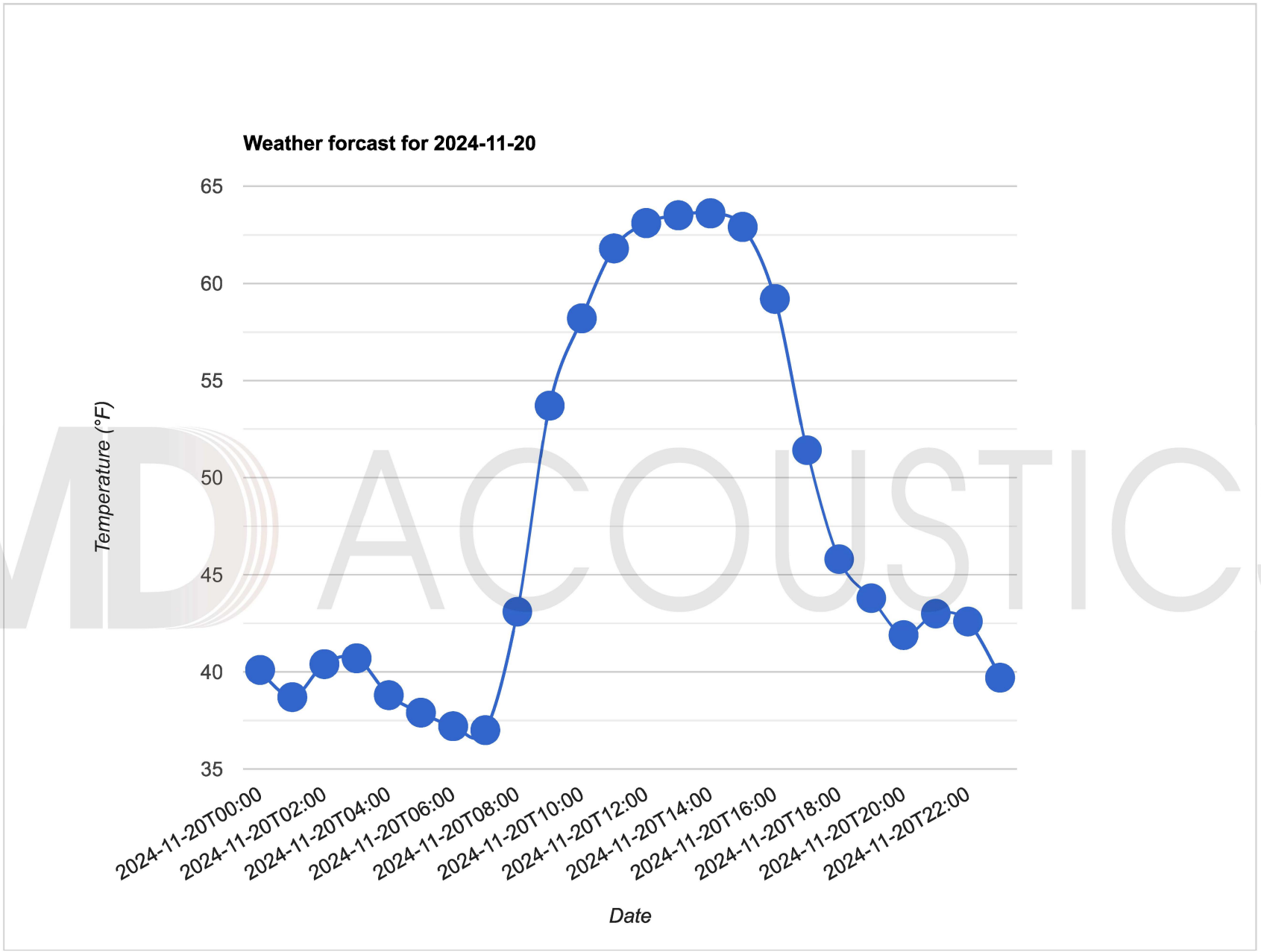
MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont. - NM1

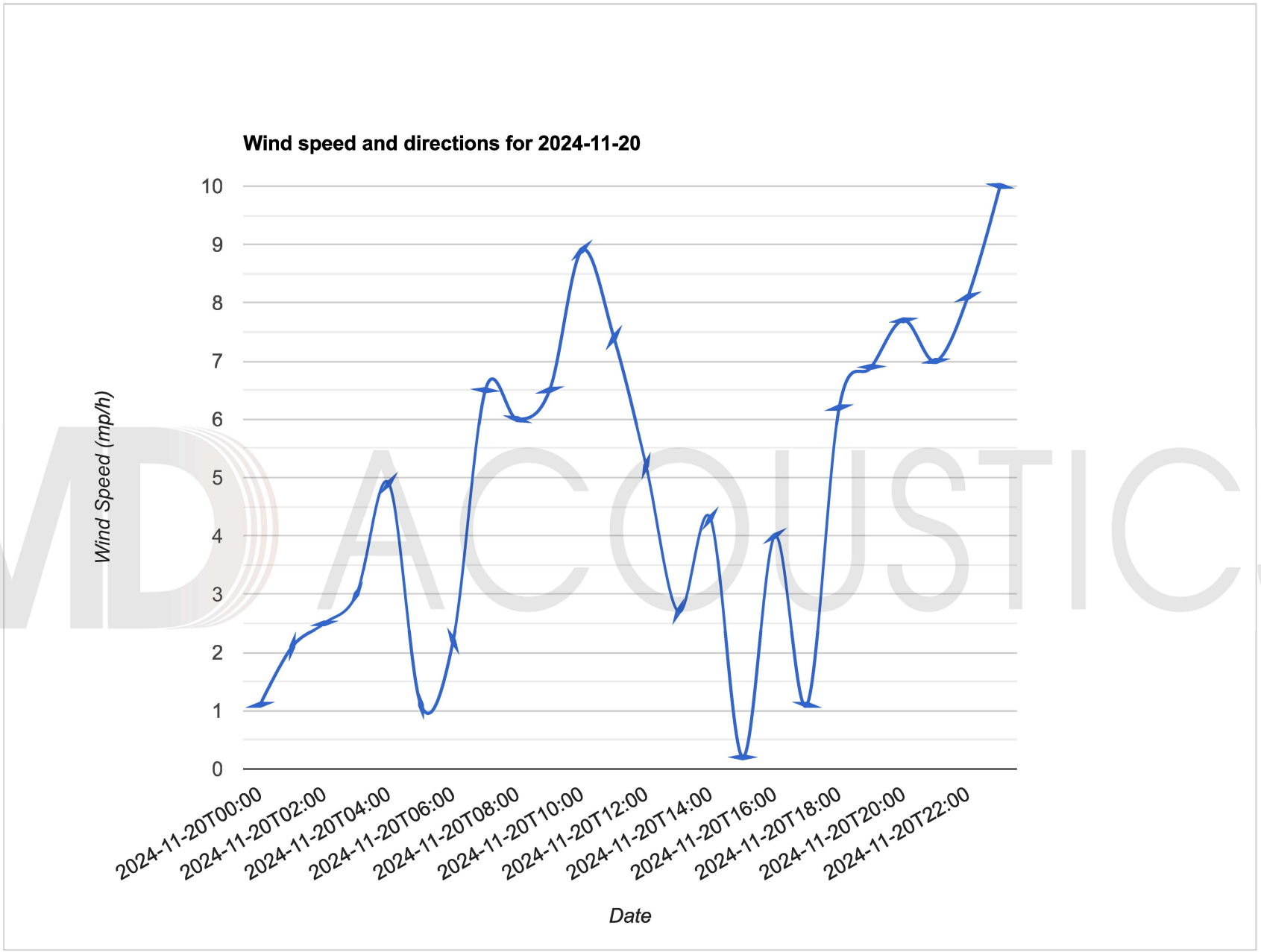
Project Name:	Fire Station 41 Noise	**Site Topo:**	Flat open desert with a few tree	**Noise Source(s) w/ Distance:**	
Site Address/Location:	57201 Twentynine Palms Highway S	**Meteorological Cond.:**	57F Sunny winds 0-3MPh	traffic noise	
Site Id:	NM1	**Ground Type:**	Open soil lot, Sand, clay, rock		



MD ACOUSTICS



MD ACOUSTICS



MD ACOUSTICS

Source: Global Forecast System (GFS) weather forcast model

CNEL CALCULATED FROM SITE MEASUREMENTS

PROJECT: Fire Station 41 DATE: 26-Nov-24

LOCATION: Yucca Valley Library JN: 1293-24-13

TIME BEGINNING	HOURLY LEQ		HOURLY LEQ WEIGHTING	ADJUSTED HOURLY LEQ
0000	52.4		10.0	62.4
0100	50.0		10.0	60.0
0200	48.7		10.0	58.7
0300	47.0		10.0	57.0
0400	48.0		10.0	58.0
0500	51.8		10.0	61.8
0600	58.2		10.0	68.2
0700	60.5		0.0	60.5
0800	58.6		0.0	58.6
0900	57.6		0.0	57.6
1000	57.5	*	0.0	57.5
1100	57.7		0.0	57.7
1200	57.8		0.0	57.8
1300	57.9		0.0	57.9
1400	58.1		0.0	58.1
1500	59.3		0.0	59.3
1600	60.8		0.0	60.8
1700	60.5		0.0	60.5
1800	58.7		0.0	58.7
1900	57.4		5.0	62.4
2000	56.3		5.0	61.3
2100	55.6		5.0	60.6
2200	54.6		10.0	64.6
2300	54.0		10.0	64.0
CNEL (dBA)				61.2

HR. MEASURED: 1000 *

MEASURED LEQ: 57.5 *

Appendix B:

SoundPLAN Noise Modeling Data

Fire Station 41
Contribution spectra - Situation 1 - Outdoor SP

Source	Sum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Receiver R1 Fl G Lr,lim dB(A) Leq,d 34.1 dB(A)									
3 parking spaces	3.7				3.7				
4 parking spaces	26.7				26.7				
9 parking spaces	32.7				32.7				
9	11.5	0.6	3.9	2.8	4.4	4.8	3.2	-1.7	
Generator	21.1	8.1	11.1	10.6	17.0	13.6	12.7	8.1	
HVAC	9.2	-1.5	1.7	0.5	2.2	2.6	0.7	-4.9	
HVAC	9.7	-1.1	2.1	1.0	2.6	3.1	1.3	-4.0	
HVAC	10.3	-0.6	2.6	1.6	3.2	3.6	2.0	-3.0	
HVAC	11.4	-1.0	2.7	1.9	4.7	5.9	3.5	-3.0	
HVAC	11.7	-0.4	3.2	2.4	5.0	6.1	3.7	-2.5	
HVAC	11.0	0.1	3.4	2.3	3.9	4.3	2.5	-2.7	
HVAC	11.1	-1.6	2.2	1.4	4.4	5.8	3.2	-3.6	
Receiver R2 Fl G Lr,lim dB(A) Leq,d 42.7 dB(A)									
3 parking spaces	23.0				23.0				
4 parking spaces	29.9				29.9				
9 parking spaces	36.7				36.7				
9	33.7	10.6	18.7	20.0	25.6	28.7	28.5	24.4	
Generator	33.8	16.8	21.4	22.9	30.0	26.2	25.9	22.8	
HVAC	29.6	6.8	14.6	15.5	21.4	24.9	24.5	20.0	
HVAC	30.8	7.9	15.8	16.8	22.6	26.0	25.7	21.3	
HVAC	32.1	9.1	16.6	18.3	24.0	27.3	27.0	22.8	
HVAC	29.4	6.6	14.4	15.3	21.1	24.7	24.4	19.9	
HVAC	30.8	7.9	15.7	16.8	22.5	26.0	25.7	21.3	
HVAC	32.2	9.2	17.2	18.3	24.0	27.3	27.0	22.8	
HVAC	28.2	5.4	13.1	13.9	19.8	23.4	23.4	18.5	
Receiver R3 Fl G Lr,lim dB(A) Leq,d 40.9 dB(A)									
3 parking spaces	13.1				13.1				
4 parking spaces	35.2				35.2				
9 parking spaces	35.4				35.4				
9	28.8	8.1	13.8	14.9	20.7	24.0	23.7	19.4	
Generator	28.8	13.0	16.6	17.2	24.6	21.6	21.4	17.9	
HVAC	28.4	4.7	13.1	14.5	20.2	23.6	23.3	18.9	
HVAC	28.3	4.8	13.0	14.3	20.1	23.5	23.1	18.8	
HVAC	28.0	7.3	12.9	14.0	19.7	23.2	22.8	18.4	
HVAC	23.4	5.3	10.5	11.3	16.1	18.7	17.3	13.2	
HVAC	29.7	6.2	14.5	15.8	21.5	24.8	24.6	20.6	
HVAC	29.3	8.6	14.3	15.4	21.1	24.5	24.1	19.9	
HVAC	15.9	4.1	8.1	7.0	9.0	9.7	7.3	1.8	
Receiver R4 Fl G Lr,lim dB(A) Leq,d 40.2 dB(A)									
3 parking spaces	33.4				33.4				
4 parking spaces	19.6				19.6				
9 parking spaces	23.1				23.1				
9	26.7	6.2	11.7	12.6	18.4	22.0	21.6	17.0	
Generator	18.6	5.9	8.7	6.0	13.1	12.0	12.0	7.4	
HVAC	30.7	9.8	15.7	16.9	22.6	25.8	25.5	21.4	
HVAC	29.1	8.3	14.0	15.1	20.9	24.2	23.9	19.6	
HVAC	27.6	7.0	12.6	13.6	19.4	22.9	22.5	18.1	
HVAC	31.3	10.0	15.8	17.1	23.2	26.5	26.2	22.0	
HVAC	29.3	8.5	14.2	15.4	21.1	24.4	24.1	19.9	
HVAC	27.9	7.2	12.8	13.8	19.6	23.1	22.7	18.3	
HVAC	33.1	11.8	17.8	19.2	24.9	28.1	27.8	23.9	

Fire Station 41
Assessed contribution level - Situation 1 - Outdoor SP

Source	Source type	Leq,d dB(A)	
Receiver R1 Fl G Lr,lim dB(A) Leq,d 34.1 dB(A)			
9 parking spaces	PLot	32.7	
4 parking spaces	PLot	26.7	
Generator	Point	21.1	
HVAC	Point	11.7	
9	Point	11.5	
HVAC	Point	11.4	
HVAC	Point	11.1	
HVAC	Point	11.0	
HVAC	Point	10.3	
HVAC	Point	9.7	
HVAC	Point	9.2	
3 parking spaces	PLot	3.7	
Receiver R2 Fl G Lr,lim dB(A) Leq,d 42.7 dB(A)			
9 parking spaces	PLot	36.7	
Generator	Point	33.8	
9	Point	33.7	
HVAC	Point	32.2	
HVAC	Point	32.1	
HVAC	Point	30.8	
HVAC	Point	30.8	
4 parking spaces	PLot	29.9	
HVAC	Point	29.6	
HVAC	Point	29.4	
HVAC	Point	28.2	
3 parking spaces	PLot	23.0	
Receiver R3 Fl G Lr,lim dB(A) Leq,d 40.9 dB(A)			
9 parking spaces	PLot	35.4	
4 parking spaces	PLot	35.2	
HVAC	Point	29.7	
HVAC	Point	29.3	
9	Point	28.8	
Generator	Point	28.8	
HVAC	Point	28.4	
HVAC	Point	28.3	
HVAC	Point	28.0	
HVAC	Point	23.4	
HVAC	Point	15.9	
3 parking spaces	PLot	13.1	
Receiver R4 Fl G Lr,lim dB(A) Leq,d 40.2 dB(A)			
3 parking spaces	PLot	33.4	
HVAC	Point	33.1	
HVAC	Point	31.3	
HVAC	Point	30.7	

Fire Station 41
Assessed contribution level - Situation 1 - Outdoor SP

9

Source	Source type	Leq,d dB(A)	
HVAC	Point	29.3	
HVAC	Point	29.1	
HVAC	Point	27.9	
HVAC	Point	27.6	
9	Point	26.7	
9 parking spaces	PLot	23.1	
4 parking spaces	PLot	19.6	
Generator	Point	18.6	

Fire Station 41
Octave spectra of the sources in dB(A) - Situation 1 - Outdoor SP

Name	Source type	l or A	Li	Rw	L'w	Lw	KI	KT	DO-Wall	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
3 parking spaces	PLot	60.19			54.0	71.8	0.0	0.0	0					71.8						
4 parking spaces	PLot	78.85			54.1	73.0	0.0	0.0	0					73.0						
9 parking spaces	PLot	167.31			54.3	76.5	0.0	0.0	0					76.5						
9	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
Generator	Point				72.2	72.2	0.0	0.0	0	30k Generator Level 1 Enclosure	52.7	58.5	62.7	69.6	62.9	61.9	59.5	52.4		
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	
HVAC	Point				74.9	74.9	0.0	0.0	0	HVAC @ 3ft - Carrier 50TFQ0006 - 5 Ton	51.2	60.0	62.8	67.6	69.3	69.1	66.1	61.7	50.0	

Project:	Sound Library		**Site Observations:**
Job Number:	0000-2020-02		Measured @ 7m
Site Address/Location:	NA		
Date:	11/10/2020		
Field Tech/Engineer:	Generac		
Source/System:	Generac - SD30 2.4L 30kW - L1A		
General Location:	Measured @ 7'm		
Sound Meter:	NA	**SN:** NA	
Settings:	NA		
Meteorological Cond.:	NA		

Leq	Lmin	Lmax
0.0	0.0	0.0

Ln 2	Ln 8	Ln 25	Ln 50	Ln 90	Ln 99
0.0	0.0	0.0	0.0	0.0	0.0

Table 1: Summary Measurement Data

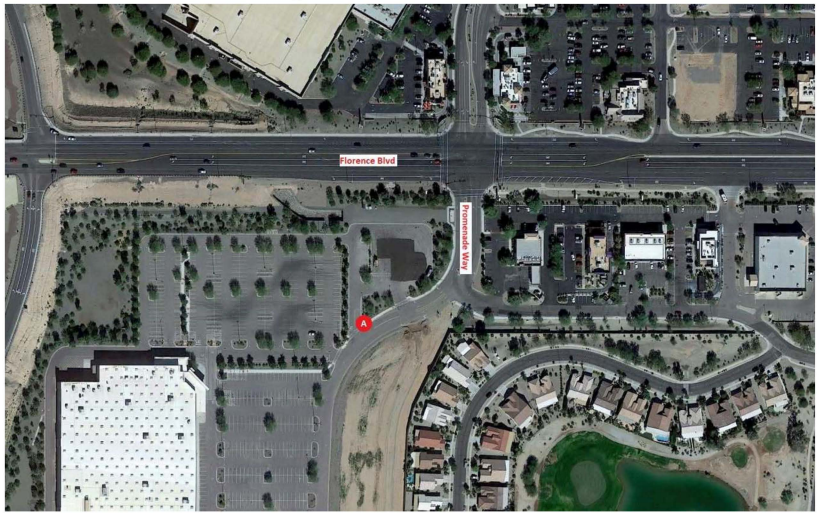
Source/System	Overall Source	Overall	3rd Octave Band Data (dBA)																													
		dB(A)	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25	1.6k	2k	2.5k	3.15	4k	5k	6.3k	8k	10k	12.5	16k	20k
Generac - SD30 2.4L 30kW - L1	EM Generator	73.0	0.0	0.0	27.0	0.0	0.0	52.0	0.0	0.0	59.0	0.0	0.0	63.0	0.0	0.0	70.0	0.0	0.0	63.0	0.0	0.0	62.0	0.0	0.0	60.0	0.0	0.0	52.0	0.0	0.0	0.0	0.0

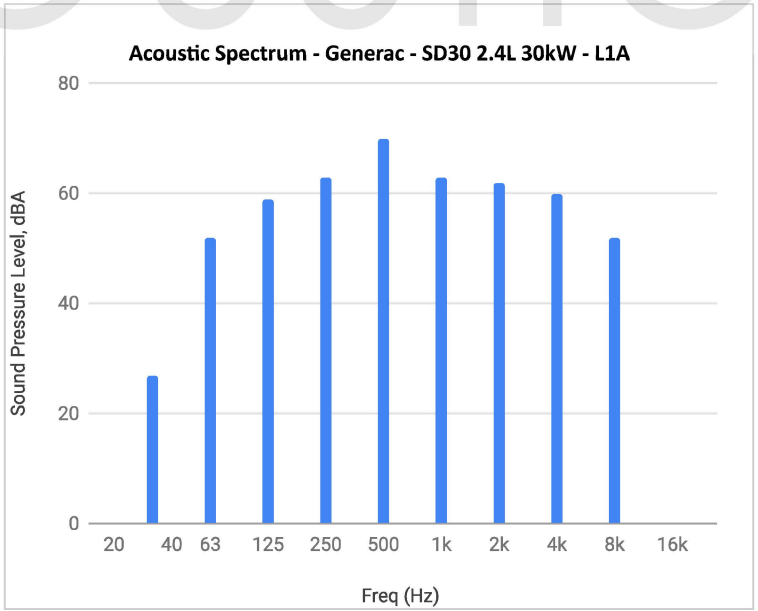
Table 2: Summary Measurement Data (1/1 octave)

Source/System	Overall Source	Overall	1st Octave Band Data (dBA)									
		dB(A)	31.5	63	125	250	500	1k	2k	4k	8k	16k
Generac - SD30 2.4L 30kW - L1	EM Generator	72.5	27	52	59	63	70	63	62	60	52	4.8

MD ACOUSTICS

Figure 1: Generac Generator





50PG03–14
Ultra High Efficiency Single Package Electric Cooling with Optional Electric Heat Commercial Rooftop Units with Puron® (R–410A) Refrigerant, Optional EnergyX™ (Energy Recovery Ventilator)
2 to 12.5 Nominal Tons

Carrier
turn to the experts

Not equipment being used, but a similar assumption

Product Data

CENTURION



DEALER DESIGN AWARDS
the NEWS | GOLD

BUILDINGS magazine
Editors' Choice
TOP 100 PRODUCTS
2005

Puron
the environmentally sound refrigerant

AHRI* CAPACITY RATINGS

50PG03-14

UNIT 50PG	NOMINAL CAPACITY (Tons)	NET COOLING CAPACITY (Btuh)	TOTAL POWER (kW)	SEER	EER†	SOUND RATING (dB)	IEER
03	2.0	24,000	2.1	14.1	11.5	75	—
04	3.0	35,800	3.1	14.1	11.7	73	—
05	4.0	47,500	4.0	15.0	12.2	72	—
06	5.0	58,500	4.9	14.8	12.2	78	—
07	6.0	69,000	5.8	—	12.2	78	13.0
08	7.5	88,000	7.0	—	12.7	80	13.5
09	8.5	102,000	8.4	—	12.4	80	13.4
12	10.0	119,000	9.9	—	12.2	80	13.0
14	12.5	150,000	13.2	—	11.5	83	11.6

LEGEND
EER – Energy Efficiency Ratio
SEER – Seasonal Energy Efficiency Ratio

*Air Conditioning, Heating and Refrigeration Institute.
† AHRI does not require EER ratings for units with capacity below 65,000 Btuh.

NOTES:
1. Tested in accordance with AHRI Standards 210–94 (sizes 03–12), 360–93 (size 14).
2. Ratings are net values, reflecting the effects of circulating fan heat.
3. Ratings are based on:
Cooling Standard: 80°F db, 67°F wb indoor entering–air temperature and 95°F db air entering outdoor unit.
IPLV Standard: 80°F db, 67°F wb indoor entering–air temperature and 80°F db outdoor entering–air temperature.
4. All 50PG units are in compliance with Energy Star® and ASHRAE 90.1 2010 Energy Standard for minimum SEER and EER requirements.
5. Units are rated in accordance with AHRI sound standards 270 or 370.
6. Per AHRI, Integrated Energy Efficiency Ratio (IEER) became effective beginning January 1, 2010. Integrated Part–Load Value (IPLV) was superseded by IEER on January 1, 2010. IEER is intended to be a measure of merit for the part load performance of the unit. Each building may have different part load performance due to local occupancy schedules, building construction, building location and ventilation requirements. For specific building energy analysis, an hour–by–hour analysis program should be used.



Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

Appendix C:

FHWA Roadway Noise Modeling Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: FIRE STATION 41
ROADWAY: 29 PALMS HWY
LOCATION: YUCCA VALLEY LIBRARY

JOB #: 1293-24-013
DATE: ########
ENGINEER: N. Jensen

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	32,000	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DI	0	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	3,200	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		235
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		235
PAD ELEVATION =		0.5
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	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	235.03	- -
MEDIUM TRUCKS	4.0	235.00	- -
HEAVY TRUCKS	8.0	235.01	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	64.2	62.3	60.5	54.5	63.1	63.7
MEDIUM TRUCKS	55.9	54.4	48.0	46.5	54.9	55.2
HEAVY TRUCKS	56.8	55.4	46.3	47.6	55.9	56.1
NOISE LEVELS (dBA)	65.4	63.6	60.9	55.8	64.4	64.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	64.2	62.3	60.5	54.5	63.1	63.7
MEDIUM TRUCKS	55.9	54.4	48.0	46.5	54.9	55.2
HEAVY TRUCKS	56.8	55.4	46.3	47.6	55.9	56.1
NOISE LEVELS (dBA)	65.4	63.6	60.9	55.8	64.4	64.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	72	228	722	2283
LDN	64	204	644	2035

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: FIRE STATION 41
ROADWAY: 29 PALMS HWY
LOCATION: YUCCA VALLEY LIBRARY

JOB #: 1293-24-013
DATE: ########
ENGINEER N. Jensen

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	32,070	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DI:	0	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	3,207	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		235
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVEF		235
PAD ELEVATION =		0.5
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	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	235.03	- -
MEDIUM TRUCKS	4.0	235.00	- -
HEAVY TRUCKS	8.0	235.01	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	64.2	62.3	60.5	54.5	63.1	63.7
MEDIUM TRUCKS	55.9	54.4	48.0	46.5	55.0	55.2
HEAVY TRUCKS	56.8	55.4	46.3	47.6	55.9	56.1
NOISE LEVELS (dBA)	65.4	63.6	60.9	55.8	64.4	64.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	64.2	62.3	60.5	54.5	63.1	63.7
MEDIUM TRUCKS	55.9	54.4	48.0	46.5	55.0	55.2
HEAVY TRUCKS	56.8	55.4	46.3	47.6	55.9	56.1
NOISE LEVELS (dBA)	65.4	63.6	60.9	55.8	64.4	64.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	72	229	723	2288
LDN	64	204	645	2039

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: FIRE STATION 41
ROADWAY: JOSHUA LANE
LOCATION: YUCCA VALLEY LIBRARY

JOB #: 1293-24-013
DATE: ########
ENGINEER N. Jensen

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	11,700	
SPEED =	35	
PK HR % =	10	
NEAR LANE/FAR LANE DI:	0	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	1,170	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		130
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVEF		130
PAD ELEVATION =		0.5
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	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	130.05	- -
MEDIUM TRUCKS	4.0	130.01	- -
HEAVY TRUCKS	8.0	130.02	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	60.7	58.8	57.0	51.0	59.6	60.2
MEDIUM TRUCKS	53.2	51.7	45.3	43.8	52.2	52.5
HEAVY TRUCKS	54.5	53.0	44.0	45.2	53.6	53.7
NOISE LEVELS (dBA)	62.2	60.5	57.5	52.6	61.2	61.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	60.7	58.8	57.0	51.0	59.6	60.2
MEDIUM TRUCKS	53.2	51.7	45.3	43.8	52.2	52.5
HEAVY TRUCKS	54.5	53.0	44.0	45.2	53.6	53.7
NOISE LEVELS (dBA)	62.2	60.5	57.5	52.6	61.2	61.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	19	60	190	602
LDN	17	54	171	539

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: FIRE STATION 41
ROADWAY: JOSHUA LANE
LOCATION: YUCCA VALLEY LIBRARY

JOB #: 1293-24-013
DATE: ########
ENGINEER N. Jensen

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	11,770	
SPEED =	35	
PK HR % =	10	
NEAR LANE/FAR LANE DI:	0	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	1,177	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		130
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVEF		130
PAD ELEVATION =		0.5
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	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	130.05	- -
MEDIUM TRUCKS	4.0	130.01	- -
HEAVY TRUCKS	8.0	130.02	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	60.7	58.8	57.1	51.0	59.6	60.2
MEDIUM TRUCKS	53.2	51.7	45.3	43.8	52.3	52.5
HEAVY TRUCKS	54.5	53.1	44.0	45.3	53.6	53.8
NOISE LEVELS (dBA)	62.2	60.5	57.6	52.7	61.2	61.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	60.7	58.8	57.1	51.0	59.6	60.2
MEDIUM TRUCKS	53.2	51.7	45.3	43.8	52.3	52.5
HEAVY TRUCKS	54.5	53.1	44.0	45.3	53.6	53.8
NOISE LEVELS (dBA)	62.2	60.5	57.6	52.7	61.2	61.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	19	61	192	606
LDN	17	54	172	542

DISTRICT	ROUTE	COUNTY	PM	LOCATION DESCRIPTION	BACK_PEAK_HOUR	BACK_PEAK_MADT	BACK_AADT	AHEAD_PEAK_HOUR	AHEAD_PEAK_MADT	AHEAD_AADT
08	062	SBD	12.404	YUCCA VALLEY, JCT. RTE. 247 N	3000	36500	32000	2400	27000	24000
08	247	SBD	0.000	YUCCA VALLEY, JCT. RTE. 62				1100	12100	11700

Appendix D:
Construction Noise Modeling Outputs

Receptor - Yucca Valley Library to the East

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									
Grader	1	85	45	175	40	0.66	0.40	86.2	66.5
Dozer	1	82	45	175	40	0.66	0.40	83.2	63.5
Tractor	1	84	45	175	40	0.66	0.40	85.2	65.5
							Log Sum	86.2	70.2
GRADE									
Grader	1	85	45	175	40	0.66	0.40	86.2	66.5
Dozer	1	82	45	175	40	0.66	0.40	83.2	63.5
Tractor	2	84	45	175	40	0.66	0.40	85.2	65.5
								86.2	71.4
BUILD									
Crane	1	81	45	175	16	0.66	0.16	82.2	58.6
Man lift	1	75	45	175	20	0.66	0.20	76.2	53.5
Generator	1	81	45	175	50	0.66	0.50	82.2	63.5
Tractor	1	84	45	175	40	0.66	0.40	85.2	65.5
Welder/Torch	3	74	45	175	40	0.66	0.40	75.2	55.5
								85.2	69.0
PAVE									
Concrete Mixer Truck	1	79	45	175	40	0.66	0.40	80.2	60.5
Paver	1	77	45	175	50	0.66	0.50	78.2	59.5
Pavement Scarifier	1	90	45	175	20	0.66	0.20	91.2	68.5
Roller	1	80	45	175	20	0.66	0.20	81.2	58.5
Tractor	1	84	45	175	40	0.66	0.40	85.2	65.5
								91.2	71.1
ARCH COAT									
Compressor (air)	1	78	45	175	40	0.66	0.40	79.2	59.5
								79.2	59.5

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

Remove	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Site Preparation	Site Preparation	4/30/2025	5/2/2025	5.00	2.00	—
Grading	Grading	5/3/2025	5/8/2025	5.00	4.00	—
Building Construction	Building Construction	5/9/2025	2/13/2026	5.00	200	—
Paving	Paving	2/14/2026	2/28/2026	5.00	10.0	—
Architectural Coating	Architectural Coating	3/1/2026	3/15/2026	5.00	10.0	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Preparation	Rubber Tired Dozers	Diesel	Average	1.00	7.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Tractors/Loaders/Backhoes	Diesel	Average	2.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	6.00	367	0.29
Building Construction	Forklifts	Diesel	Average	1.00	6.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Building Construction	Welders	Diesel	Average	3.00	8.00	46.0	0.45
Paving	Cement and Mortar Mixers	Diesel	Average	1.00	6.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	6.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	1.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	1.00	7.00	36.0	0.38
Paving	Tractors/Loaders/Backhoes	Diesel	Average	1.00	8.00	84.0	0.37
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Site Preparation	—	—	—	—
Site Preparation	Worker	7.50	18.5	LDA,LDT1,LDT2
Site Preparation	Vendor	—	10.2	HHDT,MHDT

VIBRATION LEVEL IMPACT

Project: Fire Station 41 Date: 11/26/24

Source: Vibratory Roller

Scenario: Unmitigated

Location: West Commercial Building

Address: 56994 29 Palms Hwy, Yucca Valley, CA

PPV = PPVref(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 =	20.00	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 =	**0.268**	IN/SEC	OUTPUT IN RED