KENDALL DRIVE INDUSTRIAL BUILDING NOISE IMPACT ANALYSIS

County of San Bernardino
November 1, 2022
(Revised July 28, 2023)

gandhi

Traffic Engineering ● Transportation Planning ● Parking ● Noise & Vibration
Air Quality ● Global Climate Change ● Health Risk Assessment

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Project No. 19529

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EXECUTIVE SUMMARY

The purpose of this report is to provide an assessment of the noise impacts associated with development and operation of the proposed Kendall Drive Industrial Building project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in light of applicable federal, state, and local policies, including those of the County of San Bernardino.

Although this is a technical report, effort has been made to write the report clearly and concisely. A list of acronyms and glossary are provided in Appendix A and Appendix B of this report to assist the reader with technical terms related to noise analysis.

Project Location

The 9.4-acre project site (APNs 0261-161-20 to 25, 0261-171-05 & 07) is located at the northeast corner of Kendall Drive and Little League Drive in an unincorporated area of the City of San Bernardino within the County of San Bernardino, California. The project site is currently developed with industrial uses.

Project Description

The proposed project (PROJ 2022-00174) involves removal and demolition of existing uses and construction of a new 213,335 square foot industrial warehouse building with 22 dock-high doors and associated parking and landscaping improvements. Vehicle access to the proposed project will be provided by two driveways on Kendall Drive.

Construction Impacts

On-Site Construction

Construction noise sources are regulated within Section 83.01.080(g)(3) of the County of San Bernardino's Development Code which prohibits construction activities other than between the hours of 7:00 AM and 7:00 PM, except Sundays and Federal holidays.

Modeled unmitigated construction noise levels reached 65 dBA L_{eq} at the nearest residential property line to the south of the project site, 65 dBA L_{eq} at the nearest residential property line to the southeast of the project site, 64 dBA L_{eq} at the nearest park property line to the northeast of the project site, and 61 dBA L_{eq} at the nearest residential property line to the northwest of the project site. Project construction will not occur outside of the hours outlined as "exempt" in San Bernardino Development Code Section 83.01.080(g)(3) and therefore, will not result in or generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

Impacts would be less than significant, and no mitigation is required.

In addition to adherence to the County of San Bernardino Development Code which limits the construction hours of operation, the following best management practices will be implemented to further reduce construction noise emanating from the proposed project:

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.

2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment will be shut off when not in use.

4. To the degree possible, equipment staging will be located in areas that create the greatest distance between construction-related noise and vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per County of San Bernardino Development Code within Section 83.01.080(g)(3).

Off-Site Construction

Construction truck trips would occur throughout the construction period. Given the project site's proximity to the 215 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps.

According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL. The estimated existing average daily trips along Kendall Drive in the vicinity of the project site are 5,600 average daily vehicle trips.[1] As shown in the CalEEMod output files provided in the air quality analysis prepared for the proposed project (Lilburn Corporation, 2023) the greatest number of construction-related vehicle trips per day would be during building construction at up to approximately 125 vehicle trips per day (89.6 for worker trips and 35 for vendor trips). Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

Project Operational Noise – Vehicle Trips

During operation, the proposed project is expected to generate approximately 337 total average daily trips with 32 trips during the AM peak-hour and 34 net trips during the PM peak-hour. Furthermore, with incorporation of reduction from existing uses to be removed as part of the proposed project, the proposed project is expected to generate approximately 224 net total average daily trips with 24 net trips during the AM peak-hour and 23 net trips during the PM peak-hour. Existing traffic noise levels along Kendall Drive range between 69-72 dBA CNEL at the right-of-waparkly; and the modeled Existing Plus Project traffic noise levels along Kendall Drive range between 69-72 dBA CNEL at the right-of-way. Project generated vehicle traffic is anticipated to change the noise between approximately 0.07 to 0.11 dBA CNEL. Project generated operational vehicle traffic will not result in substantial increases in ambient noise levels. This impact would be less than significant. No mitigation is required.

[1] Existing average daily vehicle traffic along Kendall Drive obtained from the Kendall Drive Industrial Building Traffic Impact Analysis prepared by Ganddini Group, Inc. (October 11, 2022).

Project Operational Noise – On-Site Operations

Sensitive land uses that may be affected by project noise include the existing single-family detached residential dwelling units located adjacent to the east of the project site. Modeled peak hour project operational noise is expected to range between 34 and 53 dBA L_{eq} at these receptors. Operation of the project will also not exceed County of San Bernardino daytime (55 dBA Leq) noise standards but may exceed the applicable nighttime standards at existing residential land uses northeast of the project site. However, existing measured ambient noise levels at the sensitive receptor locations ranged between 64 and 73 dBA Leq. Therefore, peak hour project operational noise levels would not be readily noticeable over existing ambient noise levels. With existing nighttime noise levels ranging between 64.0 and 72.5 dBA Leq, project peak hour operation, even if it occurs during nighttime hours, would not be readily noticeable. Project operation would not result in substantial increases in ambient noise levels. No mitigation is required.

Construction Vibration Impacts

Architectural Damage

The closest existing off-site structures include an industrial building located as close as approximately 130 feet west of the western project property line and a residential building located as close as approximately 210 feet southeast of the eastern property line. At a distance of 130 feet, use of a vibratory roller would be expected to generate a PPV of 0.018 in/sec and a bulldozer would be expected to generate a PPV of 0.008 in/sec. In addition, at a distance of 210 feet, use of a vibratory roller would be expected to generate a PPV of 0.009 in/sec and a bulldozer would be expected to generate a PPV of 0.009 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to older residential structures of 0.3 in/sec PPV nor the County's threshold of 0.2 in/sec PPV. In addition, it is anticipated that project construction will occur within the exempt hours as identified in Section 83.01.090(c) of the County's Development Code. The project does not propose any non-construction related sources of ground-borne vibration. Impacts would be less than significant. No mitigation is required.

Annoyance

Annoyance - Groundborne vibration becomes strongly perceptible to sensitive receptors at a level of 0.1 in/sec PPV. Therefore, project construction would not cause annoyance to the residential uses to the southeast. Impacts from vibration related annoyance would be less than significant. No mitigation is required.

1. INTRODUCTION

This section describes the purpose of this noise impact analysis, project location, proposed development, and study area. Figure 1 shows the project location map and Figure 2 illustrates the project site plan.

PURPOSE AND OBJECTIVES

The purpose of this report is to provide an assessment of the noise impacts resulting from development of the proposed Kendall Drive Industrial Building project and to identify mitigation measures that may be necessary to reduce those impacts. The noise issues related to the proposed land use and development have been evaluated in light of applicable federal, state, and local policies, including those of the County of San Bernardino.

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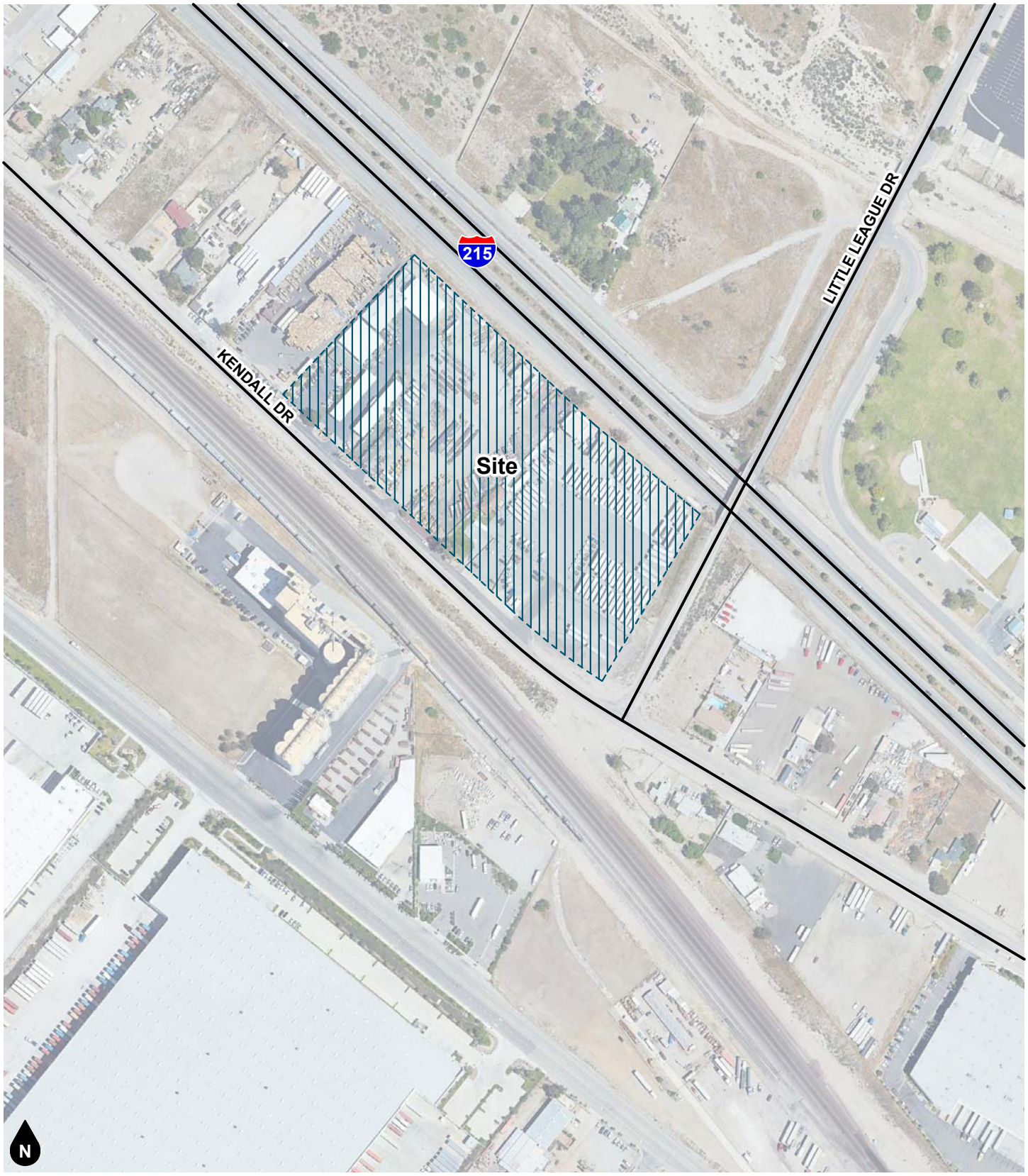


Figure 1
Project Location Map

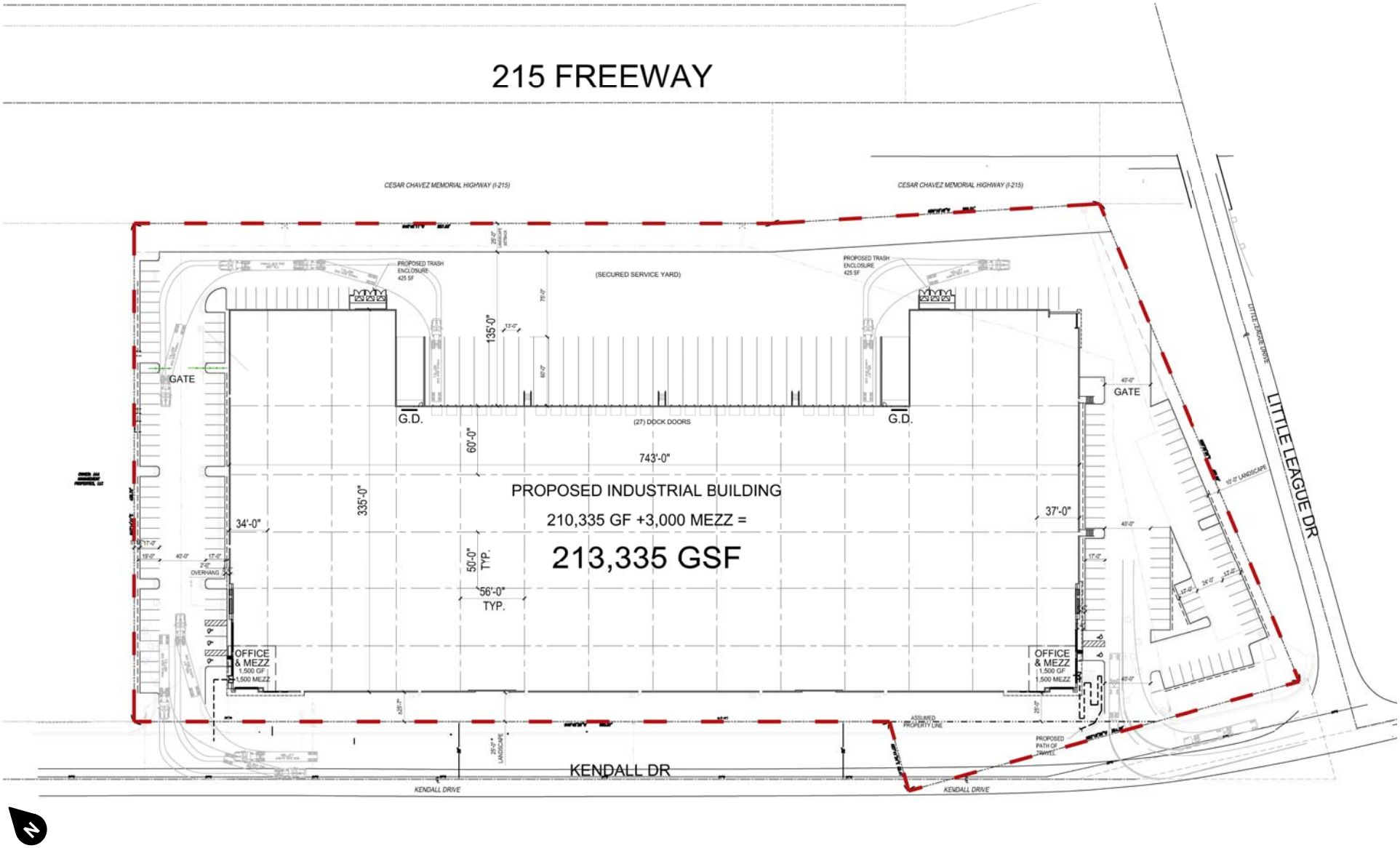


Figure 2
Site Plan

2. NOISE AND VIBRATION FUNDAMENTALS

NOISE FUNDAMENTALS

Sound is a pressure wave created by a moving or vibrating source that travels through an elastic medium such as air. Noise is defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in extreme circumstances, hearing impairment.

Commonly used noise terms are presented in Appendix B. The unit of measurement used to describe a noise level is the decibel (dB). The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, the "A-weighted" noise scale, which weights the frequencies to which humans are sensitive, is used for measurements. Noise levels using A-weighted measurements are written dB(A) or dBA.

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects, and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiates uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

Decibels are measured on a logarithmic scale, which quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubled traffic volume, would increase the noise levels by 3 dBA; halving of the energy would result in a 3 dBA decrease. Figure 3 shows the relationship of various noise levels to commonly experienced noise events.

Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, or the equivalent noise level for that period of time. For example, $L_{eq(3\text{-}hr)}$ would represent a 3-hour average. When no period is specified, a one-hour average is assumed.

Noise standards for land use compatibility are stated in terms of the Community Noise Equivalent Level (CNEL) and the Day-Night Average Noise Level (DNL). CNEL is a 24-hour weighted average measure of community noise. CNEL is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours. DNL is a very similar 24-hour average measure that weights only the nighttime hours.

It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA; that a change of 5 dBA is readily perceptible, and that an increase (decrease) of 10 dBA sounds twice (half) as loud. This definition is recommended by the California Department of Transportation's Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013).

VIBRATION FUNDAMENTALS

The way in which vibration is transmitted through the earth is called propagation. Propagation of earthborn vibrations is complicated and difficult to predict because of the endless variations in the soil through which waves travel. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water.

Compression waves, or P-waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. Shear waves, or S-waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse or "side-to-side and perpendicular to the direction of propagation".

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous peak of the vibration signal in inches per second. The RMS of a signal is the average of the squared amplitude of the signal in vibration decibels (VdB), ref one micro-inch per second. The Federal Railroad Administration uses the abbreviation "VdB" for vibration decibels to reduce the potential for confusion with sound decibel.

PPV is appropriate for evaluating the potential of building damage and VdB is commonly used to evaluate human response. Decibel notation acts to compress the range of numbers required in measuring vibration. Similar to the noise descriptors, L_{eq} and L_{max} can be used to describe the average vibration and the maximum vibration level observed during a single vibration measurement interval. Figure 4 illustrates common vibration sources and the human and structural responses to ground-borne vibration. As shown in the figure, the threshold of perception for human response is approximately 65 VdB; however, human response to vibration is not usually substantial unless the vibration exceeds 70 VdB. Vibration tolerance limits for sensitive instruments such as magnetic resonance imaging (MRI) or electron microscopes could be much lower than the human vibration perception threshold.

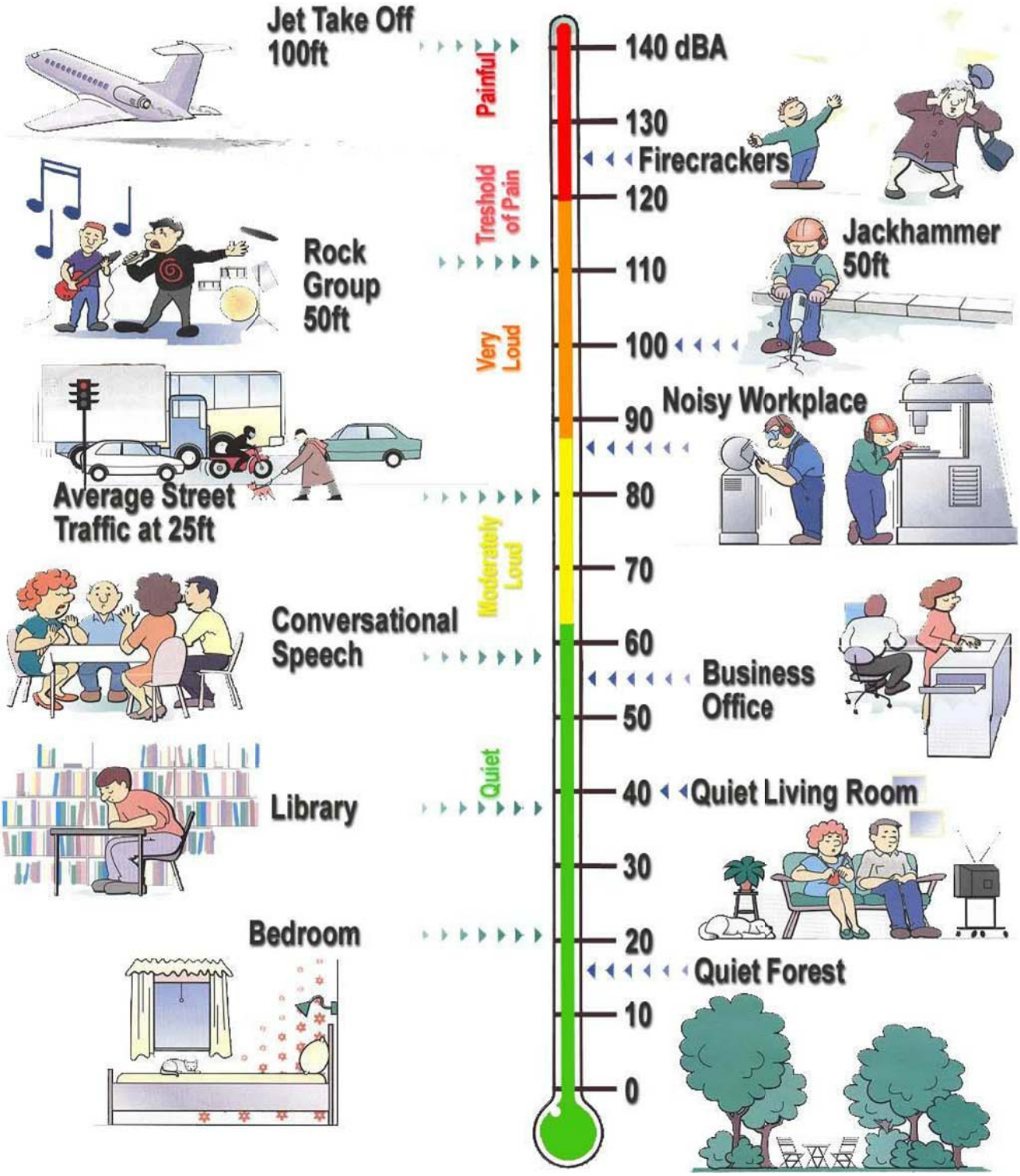
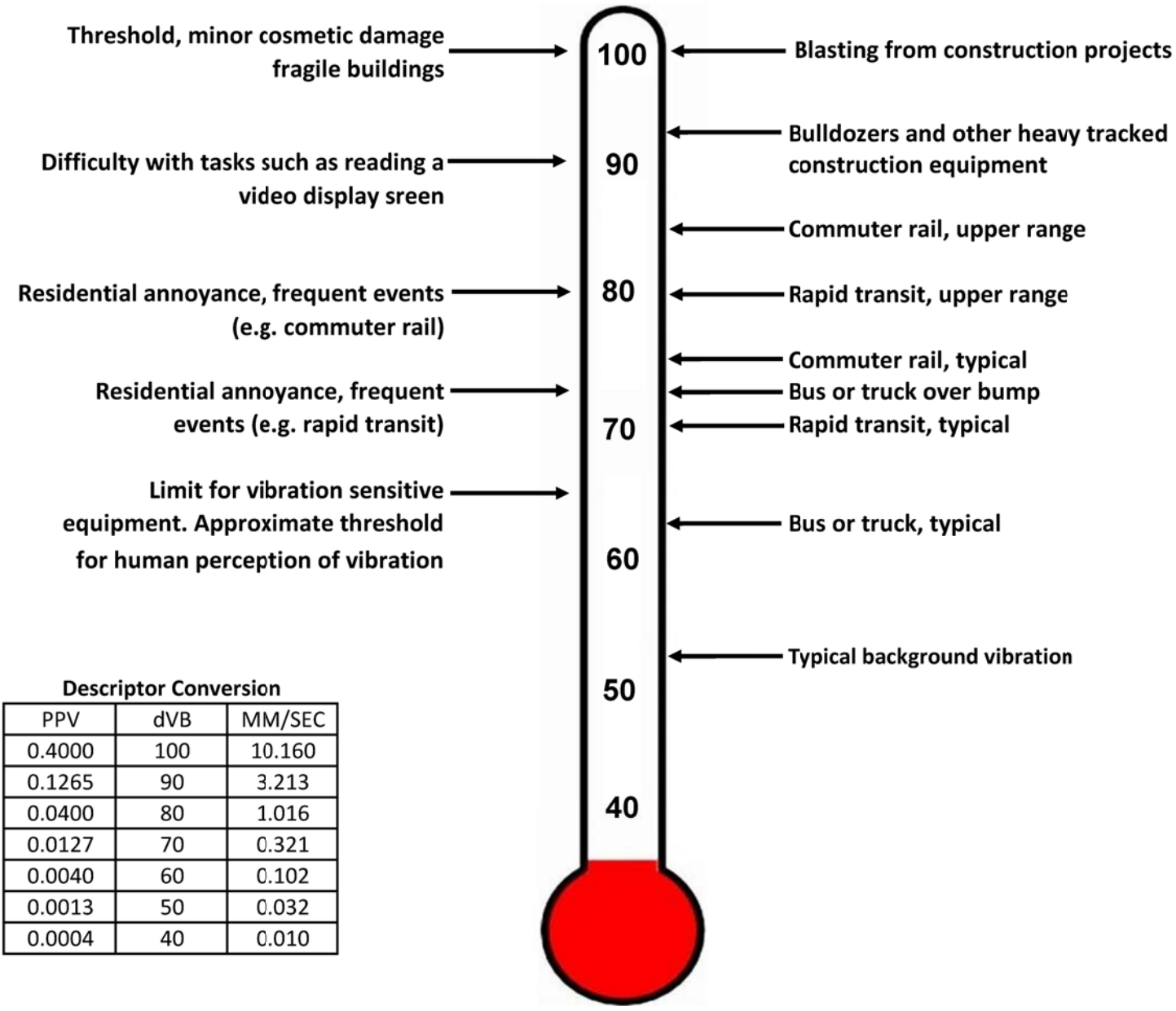


Figure 3
Weighted Sound Levels in Common Environments

Source: Bruel & Kjaer 2001



Descriptor Conversion

PPV	dVB	MM/SEC
0.4000	100	10.160
0.1265	90	3.213
0.0400	80	1.016
0.0127	70	0.321
0.0040	60	0.102
0.0013	50	0.032
0.0004	40	0.010

Source: FRA, 2012. Federal Railroad Administration High-Speed Ground Transportation Noise and Vibration Impact Assessment. Office of Railroad Policy Development, Washington, D.C. DOT/FRA/ORD-12/15. September.

Figure 4
Typical Levels of Groundborne Vibration

3. EXISTING NOISE ENVIRONMENT

EXISTING LAND USES AND SENSITIVE RECEPTORS

The project site is bordered by industrial uses to the west, the 215 Freeway to the north, Little League Drive to the east, and Kendall Drive to the south of the project site.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single and multiple-family residential, including transient lodging, motels and hotel uses make up the majority of these areas. Sensitive land uses that may be affected by project noise include the existing multi-family residential uses located approximately 216 feet to the south; the single-family residential uses located approximately 207 feet to the southeast and 715 feet to the northwest; and the park uses located as close as approximately 330 feet to the northeast of the project site.

AMBIENT NOISE MEASUREMENTS

An American National Standards Institute (ANSI Section S1.4 2014 Class 1) Larson Davis model LxT sound level meter was used to document existing ambient noise levels. In order to document existing ambient noise levels in the project area, three (3) 15-minute daytime noise measurements were taken between 12:27 PM and 1:59 PM on September 22, 2022. In addition, one (1) long-term 24-hour noise measurement was also taken from September 22, 2022, to September 23, 2022. Field worksheets and noise measurement output data are included in Appendix C.

As shown in Figure 5, the noise meter was placed at the following locations:

- STNM1: represents the existing noise environment of the residential uses located to the southeast and south of the project site (19829 Kendall Drive, San Bernardino). The noise meter was placed just north of the residential use and south of Kendall Drive.

- STNM2: represents the existing noise environment of park uses to the northeast of the project site (Guhin Park, 3664 Little League Drive, San Bernardino). The noise meter was placed at the southwestern corner of the park just north of W Little League Drive.

- STNM3: represents the existing noise environment of the residential use located to the northwest of the project site (19612 Kendall Drive, San Bernardino). The noise meter was placed just south of the residential use and north of Kendall Drive.

- LTNM1: represents the existing noise environment of the project site. The noise meter was placed near the existing building located at 19768 Kendall Drive, San Bernardino, just north of Kendall Drive.

Table 1 provides a summary of the short-term ambient noise data. Table 2 provides hourly interval ambient noise data from the long-term noise measurement. Short-term ambient noise levels were measured between 67.8 and 69.9 dBA L_{eq}. Long-term hourly noise measurement ambient noise levels ranged from 64.3 to 73 dBA L_{eq}. The dominant noise source was vehicle traffic from vehicle traffic associated with Kendall Drive, Little League Drive, 215 Freeway, and other surrounding roadways.

Table 1
Short-Term Noise Measurement Summary (dBA)

Daytime Measurements[1,2]								
Site Location	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
STNM1	1:44 PM	68.1	83.1	53.1	77.4	74.0	66.1	58.1
STNM2	12:27 PM	67.8	77.5	57.1	73.6	71.0	68.8	66.4
STNM3	1:09 PM	69.9	85.3	45.6	79.3	75.5	69.1	58.7

Notes:
(1) See Figure 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.
(2) Noise measurements performed on September 22, 2022.

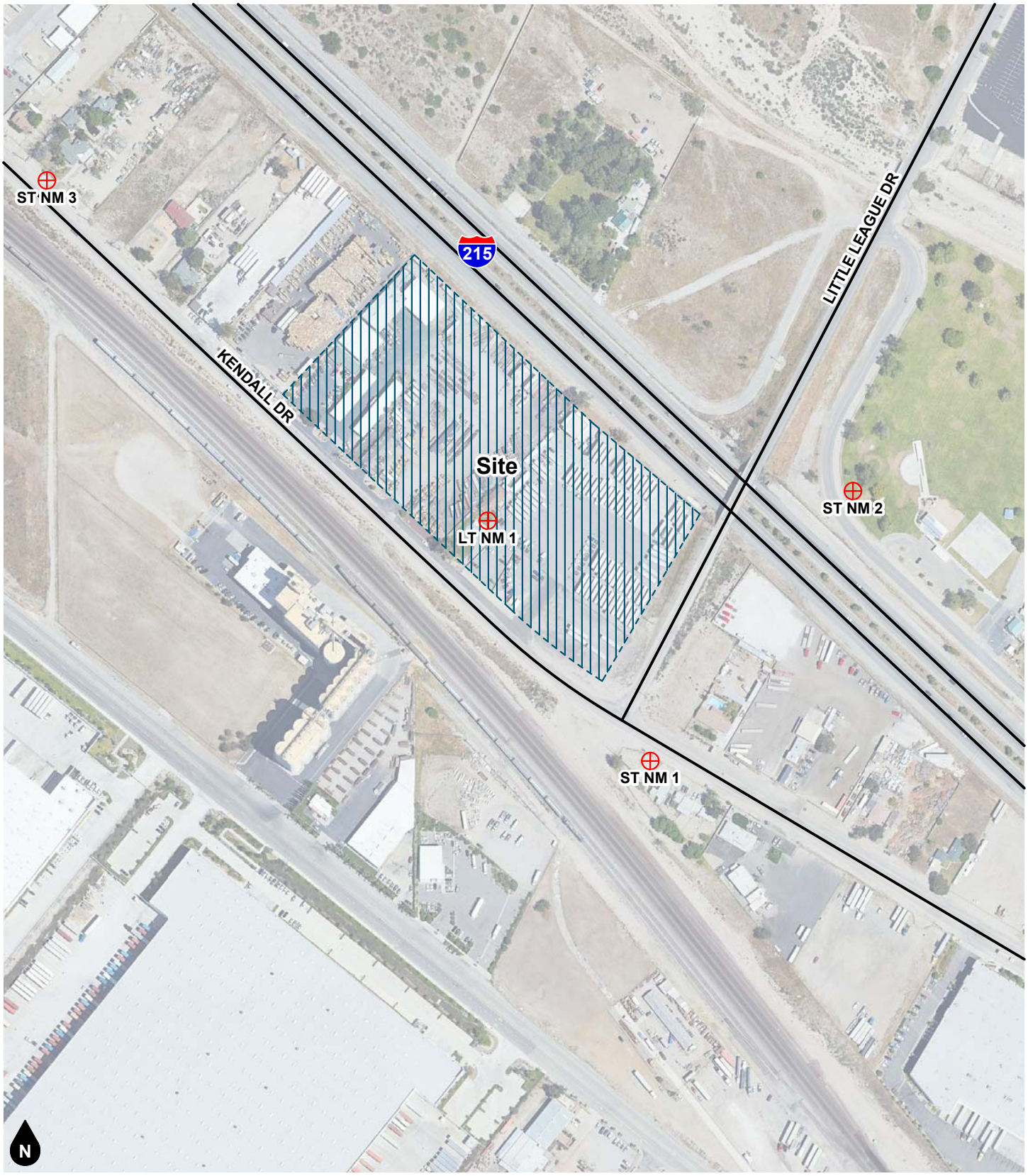
Table 2
Long-Term Noise Measurement Summary (dBA)

24-Hour Ambient Noise[1,2]								
Hourly Measurements	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
Overall Summary	3:00 PM	70.5	98.2	50.7	79.3	74.2	68.9	62.0
1	3:00 PM	71.0	89.5	53.2	78.8	74.9	71.7	67.5
2	4:00 PM	72.8	87.4	55.2	82.5	76.5	72.4	68.1
3	5:00 PM	69.7	87.6	54.1	77.1	74.1	70.5	65.8
4	6:00 PM	71.0	89.0	54.1	80.8	74.1	68.9	61.8
5	7:00 PM	68.8	84.4	54.5	77.9	73.4	69.2	61.7
6	8:00 PM	67.3	86.1	56.3	75.6	71.4	66.4	60.6
7	9:00 PM	73.0	88.2	53.9	83.8	77.5	70.7	61.6
8	10:00 PM	71.1	93.0	53.1	81.0	74.3	69.6	61.4
9	11:00 PM	67.2	92.2	52.8	75.6	70.8	60.7	55.4
10	12:00 AM	69.3	90.1	50.7	78.8	74.3	64.9	60.0
11	1:00 AM	72.5	92.3	52.3	83.2	75.3	68.6	61.6
12	2:00 AM	64.3	84.9	52.2	74.8	68.5	57.5	55.6
13	3:00 AM	69.1	98.2	52.5	75.2	68.7	61.4	56.5
14	4:00 AM	68.8	86.7	53.1	78.2	74.3	67.0	60.3
15	5:00 AM	71.4	91.5	54.0	80.2	74.8	69.8	63.6
16	6:00 AM	68.9	86.9	57.6	76.4	72.5	67.4	62.9
17	7:00 AM	71.3	90.9	57.4	80.5	74.4	70.0	65.0
18	8:00 AM	71.6	89.7	59.7	80.3	74.8	69.3	63.1
19	9:00 AM	71.5	88.7	57.5	81.5	74.4	69.7	64.1
20	10:00 AM	67.4	89.6	55.0	76.6	71.9	66.3	59.9
21	11:00 AM	70.3	87.0	53.9	79.2	75.3	68.9	61.4
22	12:00 PM	69.4	87.9	54.5	77.8	72.9	68.1	61.1
23	1:00 PM	71.4	86.8	53.5	81.3	75.4	70.7	64.5
24	2:00 PM	72.2	94.6	54.1	81.5	74.9	70.9	65.8
CNEL	76.6							

Notes:

(1) See Figure 5 for noise measurement locations. Noise measurement was performed over a 24-hour duration.

(2) Noise measurement performed from September 22, 2022 to September 23, 2022.



Legend

NM 1 Noise Measurement Location

ST NM Short-Term Noise Measurement

LT NM Long-Term Noise Measurement

Figure 5
Noise Measurement Location Map

4. REGULATORY SETTING

FEDERAL REGULATION

Federal Noise Control Act of 1972

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception, EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In response, the EPA published Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Levels of Environmental Noise). The Levels of Environmental Noise recommended that the Ldn should not exceed 55 dBA outdoors or 45 dBA indoors to prevent significant activity interference and annoyance in noise-sensitive areas.

In addition, the Levels of Environmental Noise identified five (5) dBA as an "adequate margin of safety" for a noise level increase relative to a baseline noise exposure level of 55 dBA Ldn (i.e., there would not be a noticeable increase in adverse community reaction with an increase of five dBA or less from this baseline level). The EPA did not promote these findings as universal standards or regulatory goals with mandatory applicability to all communities, but rather as advisory exposure levels below which there would be no risk to a community from any health or welfare effect of noise.

In 1981, EPA administrators determined that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to State and local governments. However, noise control guidelines and regulations contained in EPA rulings in prior years remain in place by designated Federal agencies, allowing more individualized control for specific issues by designated Federal, State, and local government agencies.

STATE REGULATIONS

State of California General Plan Guidelines 2017

Though not adopted by law, the State of California General Plan Guidelines 2017, published by the California Governor's Office of Planning and Research (OPR) (OPR Guidelines), provides guidance for the compatibility of projects within areas of specific noise exposure. The OPR Guidelines identify the suitability of various types of construction relative to a range of outdoor noise levels and provide each local community some flexibility in setting local noise standards that allow for the variability in community preferences. Findings presented in the Levels of Environmental Noise Document (EPA 1974) influenced the recommendations of the OPR Guidelines, most importantly in the choice of noise exposure metrics (i.e., Ldn or CNEL) and in the upper limits for the normally acceptable outdoor exposure of noise-sensitive uses.

The OPR Guidelines include a Noise and Land Use Compatibility Matrix which identifies acceptable and unacceptable community noise exposure limits for various land use categories. Where the "normally acceptable" range is used, it is defined as the highest noise level that should be considered for the construction of the buildings which do not incorporate any special acoustical treatment or noise mitigation. The "conditionally acceptable" or "normally unacceptable" ranges include conditions calling for detailed acoustical study prior to the construction or operation of the proposed project. The County of San Bernardino has adopted their own version of the State Land Use Compatibility Guidelines (see Tables 3 and 4).

California Department of Transportation (Caltrans)

The California Department of Transportation has published one of the seminal works for the analysis of ground-borne noise and vibration relating to transportation- and construction-induced vibrations and although

the project is not subject to these regulations, it serves as useful tools to evaluate vibration impacts. These guidelines recommend that a standard of 0.2 inches per section (in/sec) PPV not be exceeded for the protection of normal residential buildings (California Department of Transportation, 2013). This is the appropriate threshold for construction related ground-borne vibration impacts.

LOCAL REGULATIONS

County of San Bernardino General Plan

The County of San Bernardino Countywide Plan (Policy Plan) serves as the County's General Plan and was adopted in October 2020. The County's Policy Plan's Hazards Element provides goals and policies that are intended to protect life, property, and commerce from impacts associated with natural hazards, human-generated hazards, and increased risk due to climate change. The noise related goals and policies from the Hazards Element that are applicable to the proposed project are presented below:

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

Policies

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, sound walls, and other perimeter measures.

County of San Bernardino Development Code

Section 83.01.080 of the County of San Bernardino Development Code establishes noise criteria not to be exceeded at the property line of adjacent land uses. These criteria would apply to on-site operational noise generated by the project. Nearby residential land uses may be affected by project-generated operational noise. Sections of the code applicable to the proposed project are presented below.

Noise Standards for Stationary Noise Sources

Table 3, Noise Standards for Stationary Noise Sources, describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties. Stationary noise sources associated with the proposed project may impact nearby residential land uses. As shown in Table 3, the base exterior noise level standards for residential land uses are 55 dBA L_{eq} during daytime hours and 45 dBA during nighttime hours; and the base noise level criteria for park land uses is 65 dBA (anytime). As described in Table 3, other criteria apply depending on the duration of the noise event. For example, the maximum event noise level standard for impacts to the adjacent residential land uses is 75 dBA L_{eq} during daytime hours and 65 dBA during nighttime hours. Typically, if the 30-minute L_{eq} is not exceeded the other shorter criteria, with the exception of the L_{max} would be likely to be exceeded.

Noise Standards for Adjacent Mobile Noise Sources

The County of San Bernardino Development Code also sets forth interior and exterior noise level standards for transportation noise impacts to the proposed project (see Table 4). The noise level criteria of 45 dBA CNEL for interior noise and the 65 dBA CNEL apply to the nearby residential buildings.

Noise Standards for Construction Noise

Temporary construction, maintenance, repair, and demolition activities between 7:00 AM and 7:00 PM, except Sundays and Federal holidays are exempt from Section 83.01.080(g)(3) the San Bernardino Development Code.

This Development Code Standard seems to be contradictory to the General Plan Policy N1.6 above. Therefore, to be conservative, it is assumed that construction noise is exempt only between the hours presented above under Ordinance 83.01.080(g)(3).

Ground Vibration

Section 83.01.090(a) of the County of San Bernardino Development Code prohibits the creation of ground vibration 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 two-tenths (0.2) inches per second measured at or beyond the lot-line. Per Section 83.01.090(c), construction and demolition related ground vibration is exempt from this requirement as long as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays. It is anticipated that project construction will occur within the exempt hours, therefore this threshold will not apply. The project does not propose any non-construction related sources of ground-borne vibration.

Table 3
County of San Bernardino Noise Standards for Stationary Noise Sources

Affected Land Uses (Receiving Noise)	7:00 AM to 10:00 PM dBA L_{eq}	10:00 PM to 7:00 AM dBA L_{eq}
Residential	55	45
Professional Services	55	55
Other Commercial	60	60
Industrial	70	70

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:

(A) The noise standard for the receiving land use as specified in Subsection B (Noise-impacted areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus 5 dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus 10 dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

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

If the measured ambient level exceeds any of the first four noise limit categories, 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, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Notes:

(1) Source: County of San Bernardino Development Code, Development Code Table 83-2.

Table 4
County of San Bernardino Noise Standards for Mobile Noise Sources

Land Use		L_{dn} (or CNEL) dB(A)	
Category	Type	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 classroom, religious institution, library	45	65
Open Space	Park	n/a	65

Notes:

Source: County of San Bernardino Development Code, Development Code Table 83-3.

(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.

(2) The outdoor environment shall be limited to:

Hospital/office building patios
Hotel and motel recreation areas
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.

5. ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

This section discusses the analysis methodologies used to assess noise impacts.

CONSTRUCTION NOISE MODELING

Construction noise associated with the proposed project was calculated at the sensitive receptor locations, utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the project site. The equipment used to calculate the construction noise levels for each phase were based on the assumptions provided in the CalEEMod modeling in the air quality analysis prepared for the proposed project (Lilburn Corporation, 2023). For construction noise purposes, the distance measured from the project site to sensitive receptors was assumed to be the acoustical center of the project site to the property line of residential properties with existing residential buildings. Sound emission levels associated with typical construction equipment as well as typical usage factors provided in Table 5 were utilized for modeling purposes. Construction noise worksheets are provided in Appendix D.

FEDERAL HIGHWAY ADMINISTRATION (FHWA) TRAFFIC NOISE PREDICTION MODEL

Traffic noise from vehicular traffic was projected using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Existing and project average daily trips and project vehicle mix were obtained from the trip generation provided in the Kendall Drive Industrial Building Traffic Impact Analysis prepared by Ganddini Group, Inc. (May 12, 2023).

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

Table 6 indicates the roadway parameters and vehicle distribution utilized for this study. The following outlines key adjustments to the REMEL for project site parameter inputs:

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

Ganddini projected the traffic noise levels to the on-site receptors. The project noise calculation worksheets are included in Appendix E.

SOUNDPLAN NOISE MODEL

The SoundPLAN acoustical modeling software was utilized to model project operational worst-case stationary noise impacts from the proposed project to adjacent sensitive uses (e.g., residences). SoundPLAN is capable of evaluating stationary noise sources (e.g., parking lots, drive-thru menus, carwash equipment, vacuums, etc.).

The SoundPLAN software utilizes algorithms (based on the inverse square law) 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. In addition to the information provided below, noise modeling input and outputs assumptions are provided in Appendix F.

Modeled noise sources include parking lot noise, loading and unloading activities, and HVAC equipment. All noise sources were modeled to be in full operation. This is a conservative modeling effort, given that in actuality, several of the noise sources are not in operation continuously for an entire hour.

Parking Lot Noise

Parking lot noise was calculated using SoundPLAN methodology. Specifically, the traffic volume of the parking lot is entered with the number of moves per parking space, the hour and the number of parking bays. The user defines whether the parking lots are for automobiles, motorcycles, or trucks, and the emission level of a parking lot is automatically adjusted accordingly. The values for the number of parking moves for each time slice is the number of parking moves per reference unit (most often per parking bay), averaged for the hour[1].

SoundPLAN utilizes parking lot noise emission levels from the 6th revised edition of the parking lot study "Recommendations for the Calculation of Sound Emissions of Parking Areas, Motorcar Centers and Bus Stations as well as of Multi-Story Car Parks and Underground Car Parks" published by the Bavarian Landesamt für Umwelt provides calculation methods to determine the emissions of parking lots.

The parking lot emission table documents the reference level (Lw, ref) from the parking lot study.

Lw, ref = Lw0 + KPA + KI + KD + KStrO + 10 log(B) [dB(A)]

With the following parameters:

Lw0 = Basic sound power, sound power level of one motion / per hour on P+R areas = 63 dB(A)
KPA = Surcharge parking lot type
KI = Surcharge for impulse character
KD = Surcharge for the traffic passaging and searching for parking bays in the driving lanes 2,5 * lg (f * B - 9)
f = Parking bays per unit of the reference value
B = Reference value
KStrO = Surcharge for the road surface
B = Reference value

Loading/Unloading

The proposed loading area was modeled using a sound reference level for loading/unloading of truck pallet loading with a sound power level representative of 70 dBA in the center of the loading area.

Mechanical Equipment (HVAC Units) Noise

A noise reference level of 67.7 dBA at 3 feet (sound power level of 78.7 dB) was utilized to represent rooftop 5 Ton Carrier HVAC units[2]. A rooftop HVAC plan is not available at the time of this analysis so the exact location and number of units per building were estimated. A roof plan is not yet available, so a conservative number of rooftop units (16) was modeled on the proposed rooftops. The noise source height for each HVAC unit was assumed at 1 meter above the roof top. Roof top is assumed to be approximately 12.2 meters (40 feet) above grade.

[1] SoundPLAN Essential 4.0 Manual. SoundPLAN International, LLC. May 2016.

[2] MD Acoustics, LLC Noise Measurement Data for RTU –Carrier 50TFQ0006 and car alarm.

Table 5 (1 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. of Actual Data Samples (Count)
All Other Equipment > 5 HP	No	50	85	-N/A-	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-N/A-	0
Blasting	Yes	-N/A-	94	-N/A-	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-N/A-	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Forklift[2,3]	No	50	n/a	61	n/a
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-N/A-	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-N/A-	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	50	85	77	9
Paving Equipment	No	50	85	77	9
Pneumatic Tools	No	50	85	85	90

Table 5 (2 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. of Actual Data Samples (Count)
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-N/A-	0
Tractor	No	40	84	-N/A-	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

Notes:

(1) Source: FHWA Roadway Construction Noise Model User's Guide January 2006.

(2) Warehouse & Forklift Noise Exposure - NoiseTesting.info Carl Stautins, November 4, 2014 http://www.noisetesting.info/blog/carl-strautins/page-3/

(3) Data provided Leq as measured at the operator. Sound Level at 50 feet is calculated using Inverse Square Law.

Table 6
Project Average Daily Traffic Volumes and Roadway Parameters

Roadway	Segment	Average Daily Traffic Volume[1]		Posted Travel Speeds (MPH)	Site Conditions
		Existing	Existing Plus Project		
Kendall Drive	North of Little League Drive	5,600	5,660	45	Soft
	South of Little League Drive	3,800	3,860	45	Soft

Vehicle Distribution (Heavy Mix)[2]			
Motor-Vehicle Type	Daytime % (7 AM-7 PM)	Evening % (7 PM-10 PM)	Night % (10 PM-7 AM)
Automobiles	75.54	14.02	10.43
Medium Trucks	48.00	2.00	50.00
Heavy Trucks	48.00	2.00	50.00

Notes:

(1) Existing and project average daily trips and project vehicle mix obtained from the trip generation provided in the Kendall Drive Industrial Building Traffic Impact Analysis prepared by Ganddini Group, Inc. (May 12, 2023).

(2) Existing vehicle percentages are based on the Riverside County Industrial Hygiene Letter for Traffic Noise.

6. IMPACT ANALYSIS

This impact discussion analyzes the potential for noise and/or groundborne vibration impacts to cause the exposure of a person to, or generation of, noise levels in excess of established County of San Bernardino standards related to construction, transportation, and operational noise related impacts from the proposed project.

IMPACTS RELATED TO CONSTRUCTION NOISE

On-Site Construction Noise

Construction activities will occur in phases including demolition, site preparation, grading, building construction, paving, and architectural coating. Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant. Construction activities are anticipated to begin no sooner than the beginning of January 2024 and be completed by the end of March 2025

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. The existing residential uses with property lines located approximately 216 feet to the south, 207 feet to the southeast, and 715 feet to the northwest and the existing park uses with property lines located approximately 330 feet to the northeast of the project site boundaries may be affected by short-term noise impacts associated with construction noise.

Construction noise associated with the proposed project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the proposed construction activity. Construction noise levels were calculated for each phase. Anticipated noise levels during each construction phase are presented in Table 7. Worksheets for each phase are included as Appendix D.

Modeled unmitigated construction noise levels reached 65 dBA L_{eq} at the nearest residential property line to the south of the project site, 65 dBA L_{eq} at the nearest residential property line to the southeast of the project site, 64 dBA L_{eq} at the nearest park property line to the northeast of the project site, and 61 dBA L_{eq} at the nearest residential property line to the northwest of the project site.

Table 7 also includes a comparison of existing noise levels and project construction noise levels. Short-term noise measurement (STNM)1 was chosen to represent noise levels at the nearest property lines of the single and multi-family residential uses located to the south and southeast of the project site, STNM2 was chosen to represent the nearest property line of the park uses located to the northeast of the project site, and STNM3 was chosen to represent the nearest property line of the single-family residential use located to the northwest of the project site.

Construction noise sources are regulated within Section 83.01.080(g)(3) of the County of San Bernardino's Development Code which prohibits construction activities other than between the hours of 7:00 AM and 7:00 PM, except Sundays and Federal holidays.

Project construction will not occur outside of the hours outlined as "exempt" in County of San Bernardino Development Code Section 83.01.080(g)(3) and therefore, will not result in or generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

Impacts would be less than significant, and no mitigation is required.

The following BMPs will be included on the project plans and any related contract specifications. Construction noise impacts would be less than significant.

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.

2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment will be shut off when not in use.

4. To the degree possible, equipment staging will be located in areas that create the greatest distance between construction-related noise and vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per County of San Bernardino Development Code within Section 83.01.080(g)(3).

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. Given the project site's proximity to the 215 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps.

According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL. The estimated existing average daily trips along Kendall Drive in the vicinity of the project site are 5,600 average daily vehicle trips.[3] As shown in the CalEEMod output files provided in the air quality analysis prepared for the proposed project (Lilburn Corporation, 2023) the greatest number of construction-related vehicle trips per day would be during building construction at up to approximately 125 vehicle trips per day (89.6 for worker trips and 35 for vendor trips). Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

NOISE IMPACTS DUE TO PROJECT OPERATION

Noise Impacts to Off-Site Receptors Due to Project Generated Trips

During operation, the proposed project is expected to generate approximately 337 total average daily trips with 32 trips during the AM peak-hour and 34 net trips during the PM peak-hour. Furthermore, with

[3] Existing average daily vehicle traffic along Kendall Drive obtained from the Kendall Drive Industrial Building Traffic Impact Analysis prepared by Ganddini Group, Inc. (October 11, 2022).

incorporation of reduction from existing uses to be removed as part of the proposed project, the proposed project is expected to generate approximately 224 net total average daily trips with 24 net trips during the AM peak-hour and 23 net trips during the PM peak-hour. A project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated at the right of way from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. Roadway input parameters including average daily traffic volumes (ADTs), speeds, and vehicle distribution data is shown in Table 6. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions and is demonstrated in Table 6.

Existing Year (With Project): This scenario refers to existing year plus project traffic noise conditions and is demonstrated in Table 6.

As shown in Table 8, modeled Existing traffic noise levels along Kendall Drive range between 69-72 dBA CNEL at the right-of-way; and the modeled Existing Plus Project traffic noise levels along Kendall Drive range between 69-72 dBA CNEL at the right-of-way.

For purposes of this project, increases in ambient noise along affected roadways due to project generated vehicle traffic is considered substantial if they result in an increase of at least 5 dBA CNEL and: (1) the existing noise levels already exceed the applicable mobile source noise standard for the affected sensitive receptors set forth in the County's Development Code; or (2) the project increases noise levels by at least 5 dBA CNEL and raises the ambient noise level from below the applicable standard to above the applicable standard.

Project generated vehicle traffic is anticipated to change the noise a between approximately 0.07 to 0.1 dBA CNEL. Therefore, a change in noise level would not be audible and would be considered less than significant. No mitigation is required.

Noise Impacts to Off-Site Receptors Due to On-Site Operational Noise

Sensitive land uses that may be affected by project noise include the existing single-family detached residential dwelling units located adjacent to the east of the project site. Modeled peak hour project operational noise is expected to range between 27 and 48 dBA L_{eq} at these receptors.

Operation of the project will also not exceed County of San Bernardino daytime (55 dBA Leq) noise standards but may exceed the applicable nighttime standard (45 dBA Leq) at existing residential land uses northeast of the project site. However, existing measured ambient noise levels at the sensitive receptor locations ranged between 64 and 73 dBA Leq. Therefore, peak hour project operational noise levels would not be readily noticeable over existing ambient noise levels. With existing nighttime noise levels ranging between 64.0 and 72.5 dBA Leq, project peak hour operation, even if it occurs during nighttime hours, would not be readily noticeable. Project operation would not result in substantial increases in ambient noise levels. No mitigation is required.

Residential construction typically provides an exterior to interior noise reduction of 20 dB with a windows-closed condition. An exterior sound level of 65 is typically required to necessitate mitigation for interior noise levels. Given that project operational noise is not expected to exceed 53 dBA Leq at nearby residences, it is not likely that project operation would cause interior noise levels at nearby residences to exceed the State of California interior noise level standard of 45 dBA CNEL (State of California 2019). Project operational noise levels would be considered less than significant. No mitigation is required.

GROUNDBORNE VIBRATION IMPACTS

Construction Vibration

There are several types of construction equipment that can cause vibration levels high enough to annoy persons in the vicinity and/or result in architectural or structural damage to nearby structures and improvements. For example, as shown in Table 10, a vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; and operation of a large bulldozer (0.089 PPV) at a distance of 25 feet (two of the most vibratory pieces of construction equipment). Groundborne vibration at sensitive receptors associated with this equipment would drop off as the equipment moves away. For example, as the vibratory roller moves further than 100 feet from the sensitive receptors, the vibration associated with it would drop below 0.0026 PPV. It should be noted that these vibration levels are reference levels and may vary slightly depending upon soil type and specific usage of each piece of equipment.

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

$$PPV_{equipment} = PPV_{ref} (25/D_{rec})^{n}$$

Where: PPV_{ref} = *reference PPV at 25ft.*
D_{rec} = *distance from equipment to receiver in ft.*
n = 1.5 (*the value related to the attenuation rate through ground*)

Architectural Damage

Construction activity has the potential to result in cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile. (California Department of Transportation, 2020). Land uses adjacent to the proposed construction are industrial and residential. Table 11 identifies a PPV level of 0.5 in/sec as the threshold at which there is a risk to "architectural" damage to modern industrial/commercial buildings and a PPV level of 0.3 in/sec for older residential structures. Furthermore, Section 83.01.090(a) of the County of San Bernardino Development Code prohibits the creation of ground vibration 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 two-tenths (0.2) inches per second measured at or beyond the lot-line. Per Section 83.01.090(c), construction and demolition related ground vibration is exempt from this requirement as long as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays.

The closest existing off-site structures include an industrial building located as close as approximately 130 feet west of the western project property line and a residential building located as close as approximately 210 feet southeast of the eastern property line. As shown in Table 12, at a distance of 130 feet, use of a vibratory roller would be expected to generate a PPV of 0.018 in/sec and a bulldozer would be expected to generate a PPV of 0.008 in/sec. In addition, at a distance of 210 feet, use of a vibratory roller would be expected to generate a PPV of 0.009 in/sec and a bulldozer would be expected to generate a PPV of 0.009 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to older residential structures of 0.3 in/sec PPV nor the County's threshold of 0.2 in/sec PPV. In addition, it is anticipated that project construction will occur within the exempt hours as identified in Section 83.01.090(c) of the County's Development Code. The project does not propose any non-construction related sources of ground-borne vibration. Impacts would be less than significant. No mitigation is required.

Temporary vibration levels associated with project construction would be less than significant. No mitigation is required. Vibration worksheets are provided in Appendix G.

Annoyance to Persons

The primary effect of perceptible vibration is often a concern. However, secondary effects, such as the rattling of a china cabinet, can also occur, even when vibration levels are well below perception. Any effect (primary perceptible vibration, secondary effects, or a combination of the two) can lead to annoyance. The degree to which a person is annoyed depends on the activity in which they are participating at the time of the disturbance. For example, someone sleeping, or reading will be more sensitive than someone who is running on a treadmill. Reoccurring primary and secondary vibration effects often lead people to believe that the vibration is damaging their home, although vibration levels are well below minimum thresholds for damage potential. (California Department of Transportation, 2020).

As shown in Table 13, groundborne vibration becomes distinctly perceptible to sensitive receptors at a level of 0.04 in/sec PPV and severely perceptible at a level of 0.1 in/sec PPV. Operation of a vibratory roller may result in groundborne vibration levels of up to 0.1 at a distance of 41 feet and a large bulldozer at a distance of 23 feet.

The closest vibration-sensitive receptor to the project site is the residential dwelling unit located as close as approximately 210 feet southeast of the eastern project property line. Therefore, as shown in Table 12, use of a vibratory roller would not cause annoyance to residents located within the single-family home to the southeast of the project site. Furthermore, annoyance will be short-term and will occur only during site grading and preparation which will be limited to daytime hours. Impacts are less than significant. Vibration worksheets are provided in Appendix G.

Table 7
Construction Noise Levels (dBA L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[2]	Construction Noise Levels (dBA Leq)
Demolition	Multi-Family Residential Uses to the South (19829 Kendall Drive)	68.1	64.0
	Single-Family Residential Use to the Southeast (19842 Kendall Drive)	68.1	64.3
	Park Uses to the Northeast (3664 Little League Drive)	67.8	62.9
	Single-Family Residential Use to the Northwest (19612 Kendall Drive)	69.9	60.1
Site Preparation	Multi-Family Residential Uses to the South (19829 Kendall Drive)	68.1	64.9
	Single-Family Residential Use to the Southeast (19842 Kendall Drive)	68.1	65.2
	Park Uses to the Northeast (3664 Little League Drive)	67.8	63.9
	Single-Family Residential Use to the Northwest (19612 Kendall Drive)	69.9	61.1
Grading	Multi-Family Residential Uses to the South (19829 Kendall Drive)	68.1	64.5
	Single-Family Residential Use to the Southeast (19842 Kendall Drive)	68.1	64.8
	Park Uses to the Northeast (3664 Little League Drive)	67.8	63.5
	Single-Family Residential Use to the Northwest (19612 Kendall Drive)	69.9	60.7
Building Construction	Multi-Family Residential Uses to the South (19829 Kendall Drive)	68.1	63.1
	Single-Family Residential Use to the Southeast (19842 Kendall Drive)	68.1	63.4
	Park Uses to the Northeast (3664 Little League Drive)	67.8	62.1
	Single-Family Residential Use to the Northwest (19612 Kendall Drive)	69.9	59.3
Paving	Multi-Family Residential Uses to the South (19829 Kendall Drive)	68.1	58.6
	Single-Family Residential Use to the Southeast (19842 Kendall Drive)	68.1	58.9
	Park Uses to the Northeast (3664 Little League Drive)	67.8	57.6
	Single-Family Residential Use to the Northwest (19612 Kendall Drive)	69.9	54.8
Architectural Coating	Multi-Family Residential Uses to the South (19829 Kendall Drive)	68.1	51.2
	Single-Family Residential Use to the Southeast (19842 Kendall Drive)	68.1	51.5
	Park Uses to the Northeast (3664 Little League Drive)	67.8	50.2
	Single-Family Residential Use to the Northwest (19612 Kendall Drive)	69.9	47.4

Notes:

(1) Construction noise worksheets are provided in Appendix D.

(2) Per measured existing ambient noise levels (see Table 1). STNM1 was used for residential uses to the south and southeast, STNM2 was used for park uses to the northeast, and STNM3 was used for residential uses to the northwest of the project site.

Table 8
Increase in Existing Noise Levels Along Roadways as a Result of Project (dBA CNEL)

Roadway	Segment	Distance from roadway centerline to right-of-way (feet)[2]	Modeled Noise Levels (dBA CNEL)[1]				
			Existing Without Project at right-of-way	Existing Plus Project at right-of-way	Change in Noise Level	Exceeds Standards[3]	Increase of 5 dB or More?
Kendall Drive	North of Little League Drive	44	71.64	71.71	0.07	Yes	No
	South of Little League Drive	44	69.26	69.37	0.11	Yes	No

Notes:
(1) Exterior noise levels calculated 5 feet above pad elevation, perpendicular to subject roadway.
(2) Right of way per the County of San Bernardino Policy Plan, Transportation & Mobility Element Table TM-1 (2020).
(3) Per the County of San Bernardino residential exterior noise standards for mobile noise sources of 60 dBA CNEL (see Table 4).

Table 9
Comparison of Existing and Peak Hour Project Operational Noise (dBA, Leq)

	Measured Ambient Noise Level[1,2]	Modeled Operational Noise Level[3]	Combined Noise Level	Increase in Noise Level Due to Proposed Project
STNM1	68.1	36.0	68.1	0.0
STNM2	67.8	46.0	67.8	0.0
STNM3	69.9	34.0	69.9	0.0

Notes:

(1) See Figures 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.

(2) Noise measurements performed on September 22, 2020.

(3) Modeled noise levels are shown in Figure 6.

Table 10
Construction Equipment Vibration Source Levels

Equipment		PPV at 25 ft, in/sec	Approximate Lv* at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Loaded Trucks		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58

Source: Federal Transit Administration: Transit Noise and Vibration Impact Assessment Manual, 2018.
*RMS velocity in decibels, VdB re 1 micro-in/sec

Table 11
Guideline Vibration Damage Potential Threshold Criteria

Structure Condition	Maximum PPV (in/sec)	
	Transient Sources	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: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 7 Table 19, April 2020.

Notes:

(1) 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 12
Construction Vibration Levels at the Nearest Receptors

Receptor Location	Distance from Property Line to Nearest Structure (feet)	Equipment	Vibration Level (PPV in/secc)	Threshold Exceeded?[2]
Architectural Damage Analysis				
Inudstrial to West	130	Vibratory Roller	0.018	No
	130	Large Bulldozer	0.008	No
Residential to Southeast	210	Vibratory Roller	0.009	No
	210	Large Bulldozer	0.004	No

Notes:

(1) Caltrans identifies the threshold at which there is a risk to "architectural" damage to older residential structures as a 0.3 in/sec PPV. In addition, Section 83.01.090(c) of the County's Development Code includes a threshold of 0.2 in/sec PPV; however, construction and demolition related ground vibration is exempt from this requirement as long as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays.

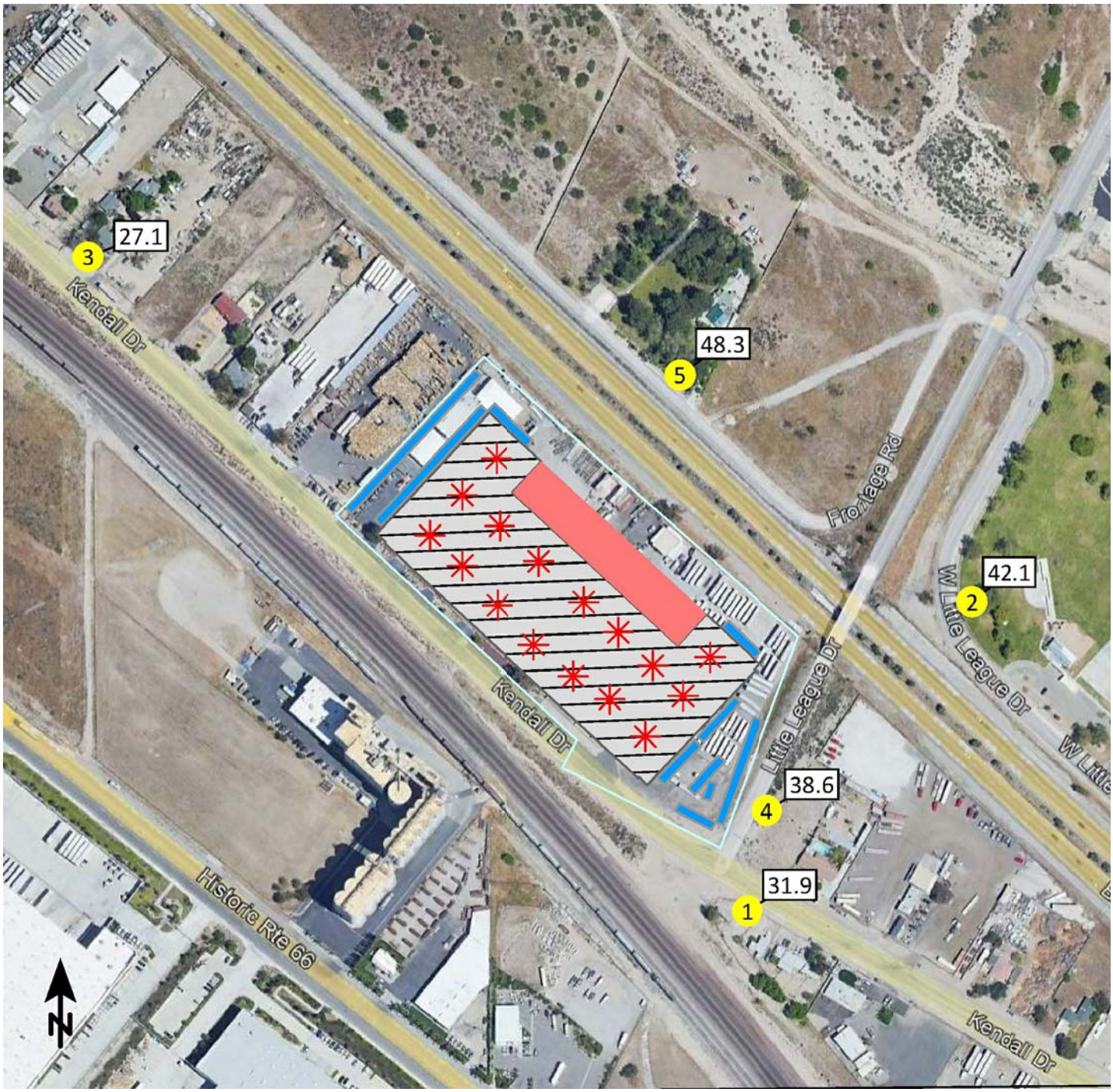
Table 13
Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 7 Table 20, April 2020.

Notes:

(1) 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, vibratorypile drivers, and vibratory compaction equipment.



Signs and symbols

- Receiver
- Point source (HVAC)
- Area source (Loading Area)
- Parking lot
- Noise Levels dBA, Leq

Figure 6
Peak Operational Noise Levels (dBA, Leq)

Figure 7
Peak Operational Noise Contours (dBA, CNEL)

7. CEQA THRESHOLDS & IMPACTS EVALUATION

Will the project result in the:

a) *Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

Less Than Significant Impact:

On-Site Construction Noise

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. Construction activities will occur in phases including demolition, site preparation, grading, building construction, paving, and architectural coating. Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant. Construction activities are anticipated to begin no sooner than the beginning of January 2024 and be completed by the end of March 2025.

Construction noise associated with each phase of project construction associated with the proposed project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site.

Modeled unmitigated construction noise levels reached 65 dBA L_{eq} at the nearest residential property line to the south of the project site, 65 dBA L_{eq} at the nearest residential property line to the southeast of the project site, 64 dBA L_{eq} at the nearest park property line to the northeast of the project site, and 61 dBA L_{eq} at the nearest residential property line to the northwest of the project site.

As discussed earlier, construction noise sources are regulated within Section 83.01.080(g)(3) of the County of San Bernardino's Development Code which prohibits construction activities other than between the hours of 7:00 AM and 7:00 PM, except Sundays and Federal holidays.

Project construction will not occur outside of the hours outlined as "exempt" in County of San Bernardino Development Code Section 83.01.080(g)(3) and therefore, will not result in or generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

Impacts would be less than significant, and no mitigation is required.

The following BMPs will be included on the project plans and any related contract specifications. Construction noise impacts would be less than significant.

Construction Noise - Best Management Practices

1. All construction equipment whether fixed or mobile, will be equipped with properly operating and maintained mufflers, consistent with manufacturer standards.

2. All stationary construction equipment will be placed so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. As applicable, all equipment shall be shut off when not in use.

4. To the degree possible, equipment staging will be located in areas that create the greatest distance between construction-related noise and vibration sources and existing sensitive receptors.

5. Jackhammers, pneumatic equipment, and all other portable stationary noise sources will be directed away and shielded from existing residences in the vicinity of the project site. Either one-inch plywood or sound blankets can be utilized for this purpose. They should reach up from the ground and block the line of sight between equipment and existing residences. The shielding should be without holes and cracks.

6. No amplified music and/or voice will be allowed on the project site.

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction County of San Bernardino Development Code within Section 83.01.080(g)(3).

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. Given the project site's proximity to the 215 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps.

According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL. The estimated existing average daily trips along Kendall Drive in the vicinity of the project site are 5,600 average daily vehicle trips.[4] As shown in the CalEEMod output files provided in the air quality analysis prepared for the proposed project (Lilburn Corporation, 2023) the greatest number of construction-related vehicle trips per day would be during building construction at up to approximately 125 vehicle trips per day (89.6 for worker trips and 35 for vendor trips). Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

On-Site Operational Noise

The nearest sensitive receptors to the project site include the existing multi-family residential uses located approximately 216 feet to the south, the single-family residential uses located approximately 207 feet to the southeast and 715 feet to the northwest, and the park uses located as close as approximately 330 feet to the northeast of the project site.

Operation of the project will range between 27 and 48 dBA Leq and will not exceed County of San Bernardino daytime (55 dBA Leq) noise standards but may exceed the applicable nighttime standard (45 dBA Leq) at existing residential land uses northeast of the project site. However, existing measured ambient noise levels at the sensitive receptor locations ranged between 64 and 73 dBA Leq. Therefore, peak hour project operational noise levels would not be readily noticeable over existing ambient noise levels. With existing nighttime noise levels ranging between 64.0 and 72.5 dBA Leq, project peak hour operation, even if it occurs during nighttime hours, would not be readily noticeable. Project operation would not result in substantial increases in ambient noise levels. No mitigation is required.

Residential construction typically provides an exterior to interior noise reduction of 20 dB with a windows-closed condition. An exterior sound level of 65 is typically required to necessitate mitigation for interior noise levels. Given that project operational noise is not expected to exceed 53 dBA Leq at nearby residences, it is

[4] Existing average daily vehicle traffic along Kendall Drive obtained from the Kendall Drive Industrial Building Traffic Impact Analysis prepared by Ganddini Group, Inc. (October 11, 2022).

not likely that project operation would cause interior noise levels at nearby residences to exceed the State of California interior noise level standard of 45 dBA CNEL (State of California 2019). Project operational noise levels would be considered less than significant. No mitigation is required.

Off-Site Operational Noise

During operation, the proposed project is expected to generate approximately 337 total average daily trips with 32 trips during the AM peak-hour and 34 net trips during the PM peak-hour. Furthermore, with incorporation of reduction from existing uses to be removed as part of the proposed project, the proposed project is expected to generate approximately 224 net total average daily trips with 24 net trips during the AM peak-hour and 23 net trips during the PM peak-hour. Existing traffic noise levels along Kendall Drive range between 69-72 dBA CNEL at the right-of-way; and the modeled Existing Plus Project traffic noise levels along Kendall Drive range between 69-72 dBA CNEL at the right-of-way. Project generated vehicle traffic is anticipated to change the noise between approximately 0.07 to 0.11 dBA CNEL. Project generated operational vehicle traffic will not result in substantial increases in ambient noise levels. This impact would be less than significant. No mitigation is required.

b) Generation of excessive groundborne vibration of groundborne noise levels?

Less Than Significant Impact:

Vibration generated by construction activity generally has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile. (California Department of Transportation, 2020)

Table 11 identifies a PPV level of 0.5 in/sec as the threshold at which there is a risk to "architectural" damage to modern industrial/commercial buildings and a PPV level of 0.3 in/sec for older residential structures. Furthermore, Section 83.01.090(a) of the County of San Bernardino Development Code prohibits the creation of ground vibration 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 two-tenths (0.2) inches per second measured at or beyond the lot-line. Per Section 83.01.090(c), construction and demolition related ground vibration is exempt from this requirement as long as it occurs between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays.

Construction-Related Vibration Impacts

Architectural Damage

The closest existing off-site structures include an industrial building located as close as approximately 130 feet west of the western project property line and a residential building located as close as approximately 210 feet southeast of the eastern property line. As shown in Table 12, at a distance of 130 feet, use of a vibratory roller would be expected to generate a PPV of 0.018 in/sec and a bulldozer would be expected to generate a PPV of 0.008 in/sec. In addition, at a distance of 210 feet, use of a vibratory roller would be expected to generate a PPV of 0.009 in/sec and a bulldozer would be expected to generate a PPV of 0.009 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to older residential structures as 0.3 in/sec PPV nor the County's threshold of 0.2 in/sec PPV. In addition, it is anticipated that project construction will occur within the exempt hours as identified in Section 83.01.090(c) of the County's Development Code. The project does not propose any non-construction related sources of ground-borne vibration. Impacts would be less than significant. No mitigation is required. Vibration worksheets are provided in Appendix G.

Annoyance to Persons

As shown in Table 13, groundborne vibration becomes distinctly perceptible to sensitive receptors at a level of 0.04 in/sec PPV and severely perceptible at a level of 0.1 in/sec PPV. Operation of a vibratory roller may result in groundborne vibration levels of up to 0.1 at a distance of 41 feet and a large bulldozer at a distance of 23 feet. The closest vibration-sensitive receptor to the project site is the residential dwelling unit located as close as approximately 210 feet southeast of the eastern project property line. Therefore, as shown in Table 12, use of a vibratory roller would not cause annoyance to residents located within the single-family home to the southeast of the project site. Furthermore, annoyance will be short-term and will occur only during site grading and preparation which will be limited to daytime hours. Impacts are less than significant.

Operational Vibration

Operation of the proposed project will involve the movement of passenger vehicles and trucks. Driving surfaces associated with the project will be paved and will generally be smooth. Loaded trucks generally have a PPV of 0.076 at a distance of 25 feet (Caltrans 2020). Groundborne vibration levels associated with passenger vehicles is much lower. The movement of vehicles on the project site would not result in the generation of excessive groundborne vibration or groundborne noise. Impacts would be less than significant. No mitigation is required.

c) *For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?*

No Impact:

The closest airport to the project site is the San Bernardino International Airport, with associated airport runways located as close as approximately 10.1 miles to the southeast of the project site. The San Bernardino International Airport noise contours provided in the Technical Memorandum prepared for the San Bernardino International Airport – Eastgate Air Cargo Facility – Aircraft Noise Contour Development (July 2019) shows that the proposed project is well outside the 60 dBA CNEL noise contour for the San Bernardino International Airport.[5] In addition, Policy Map HZ-9 Airport Safety and Planning of the County's Policy Plan shows that the project site is well outside the 60 Ldn noise contour as well as the Airport Safety Review Area of the San Bernardino International Airport. Therefore, the proposed project would not expose people residing or working in the area to excessive noise levels. There is no impact, and no mitigation is required.

[5] http://www.sbiaa.org/wp-content/uploads/2019/07/7_Appendix-F_Noise-Technical-Memo.pdf

8. REFERENCES

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2023 Kendall Drive Industrial Building Traffic Impact Analysis. May 12.

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2001 General Plan, Chapter 4, Figure C-3 "Link Volume Capacities/Level of Service for Riverside County Roadways".

2009 County of Riverside Industrial Hygiene Guidelines for Determining and Mitigating Traffic Noise Impacts to Residential Structures and County.

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2007 County of San Bernardino 2007 Development Code. March 13 (as amended December 14, 2021).

2020 County of San Bernardino Policy Plan. October.

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2006 FHWA Roadway Construction Noise Model User's Guide. January.

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APPENDICES

Appendix A List of Acronyms
Appendix B Definitions of Acoustical Terms
Appendix C Noise Measurement Field Worksheet
Appendix D Construction Noise Modeling
Appendix E FHWA Worksheets
Appendix F SoundPLAN Inputs and Outputs
Appendix G Vibration Worksheets

APPENDIX A

LIST OF ACRONYMS

Term	Definition
ADT	Average Daily Traffic
ANSI	American National Standard Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
D/E/N	Day / Evening / Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
dBA/DD	Decibel per Double Distance
dBA L_{eq}	Average Noise Level over a Period of Time
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, respectively, of the time period
DNL	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for '"x" period of time
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
Lp	Sound Pressure Level
LOS C	Level of Service C
Lw	Sound Power Level
OPR	California Governor's Office of Planning and Research
PPV	Peak Particle Velocities
RCNM	Road Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root Mean Square

APPENDIX B

DEFINITIONS OF ACOUSTICAL TERMS

Term	Definition
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
CNEL	Community Noise Equivalent Level. CNEL is a weighted 24-hour noise level that is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours.
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
DNL, Ldn	Day Night Level. The DNL, or Ldn is a weighted 24-hour noise level that is obtained by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the nighttime hours.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
L_{max}, L_{min}	Lmax is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. Lmin is the minimum level.
Lp	Sound pressure level. The sound pressure level is a measure for the effect of the energy of an acoustic source (or a collection of sources) and depends on the distance to the source(s) and acoustic properties of the surroundings of the source. Given a well-defined operation condition, the sound power level of a machine is a fixed value, where the sound pressure level always depends on position and environment.
Lw	Sound power level. The sound power level indicates the total acoustic energy that a machine, or piece of equipment, radiates to its environment.

Term	Definition
Offensive/ Offending/Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.

APPENDIX C

NOISE MEASUREMENT FIELD WORKSHEET

Noise Measurement
Field Data

Project Name: Kendall Drive Industrial Buiding, County of San Bernardino **Date:** September 22, 2022

Project #: 19529

Noise Measurement #: STNM1 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 19829 Kendall Drive, San Bernardino, CA 92407

Site Description (Type of Existing Land Use and any other notable features): Measurement Location: Just N of driveway to residence to 19849 Kendall Drive. Adjacent: Kendall Drive just N of STNM1, Little League Drive intersection with Kendall Drive ~100 ft NW of STNM1, residential to south of STNM1, & 215 Fwy ~550 ft NE & train tracks ~150' SW of STNM1.

Weather: Clear skies, sunshine. Sunset: 6:46 PM **Settings:** SLOW FAST

Temperature: 86 deg F **Wind:** 5 mph **Humidity:** 14% **Terrain:** Flat

Start Time: 1:44 PM **End Time:** 1:59 PM **Run Time:**

Leq:	68.1	dB	**Primary Noise Source:** Traffic noise from the 46 vehicles passing microphone traveling along Kendall
Lmax	83.1	dB	Drive. Traffic ambiance from Little League Drive, 215 Fwy and other roads.
L2	77.4	dB	**Secondary Noise Sources:** Some residential ambiance. Occasional distant overhead air traffic. Bird song
L8	74.0	dB	No passing trains during measurement.
L25	66.1	dB	
L50	58.1	dB	

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	9/22/2022		

Noise Measurement
Field Data

PHOTOS:

STNM1 looking S towards front yard of residence 19829 Kendall Drive, San Bernardino.

STNM1 looking NE across Kendall Drive towards residence 19842 Kendall Drive, San Bernardino (on the right of image).

Summary	
File Name on Meter	LxT_Data.091.s
File Name on PC	LxT_0003099-20220922 134409-LxT_Data.091.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM1 34°11'50.72"N 117°22'21.17"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino

Measurement	
Start	2022-09-22 13:44:09
Stop	2022-09-22 13:59:09
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-09-22 13:43:42
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	123.0 dB

Results				
LA_{eq}	68.1			
LAE	97.6			
EA	640.9472	µPa²h		
EA8	20.51031	mPa²h		
EA40	102.5516	mPa²h		
$LA_{peak\ (max)}$	2022-09-22 13:44:22	97.7	dB	
LAS_{max}	2022-09-22 13:44:23	83.1	dB	
LAS_{min}	2022-09-22 13:54:16	53.1	dB	

			Statistics	
LC_{eq}	75.3	dB	**LA2.00**	77.4 dB
LA_{eq}	68.1	dB	**LA8.00**	74.0 dB
LC_{eq} - LA_{eq}	7.2	dB	**LA25.00**	66.1 dB
LAI_{eq}	70.2	dB	**LA50.00**	58.1 dB
LA_{eq}	68.1	dB	**LA66.60**	56.5 dB
LAI_{eq} - LA_{eq}	2.1	dB	**LA90.00**	55.2 dB
Overload Count	0			

Measurement Report

Report Summary

Meter's File Name	LxT_Data.091.s	Computer's File Name	LxT_0003099-20220922 134409-LxT_Data.091.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM1 34°11'50.72"N 117°22'21.17"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino		
Start Time	2022-09-22 13:44:09	Duration	0:15:00.0
End Time	2022-09-22 13:59:09	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	68.1 dB		
LAE	97.6 dB	SEA	--- dB
EA	640.9 µPa²h	LAFTM5	73.6 dB
EA8	20.5 mPa²h		
EA40	102.6 mPa²h		
LA_{peak}	97.7 dB	2022-09-22 13:44:22	
LAS_{max}	83.1 dB	2022-09-22 13:44:23	
LAS_{min}	53.1 dB	2022-09-22 13:54:16	
LA_{eq}	68.1 dB		
LC_{eq}	75.3 dB	LC_{eq} - LA_{eq}	7.2 dB
LAI_{eq}	70.2 dB	LAI_{eq} - LA_{eq}	2.1 dB

Exceedances	Count	Duration
LAS > 65.0 dB	32	0:04:43.3
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	--- dB	--- dB	0.0 dB

	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

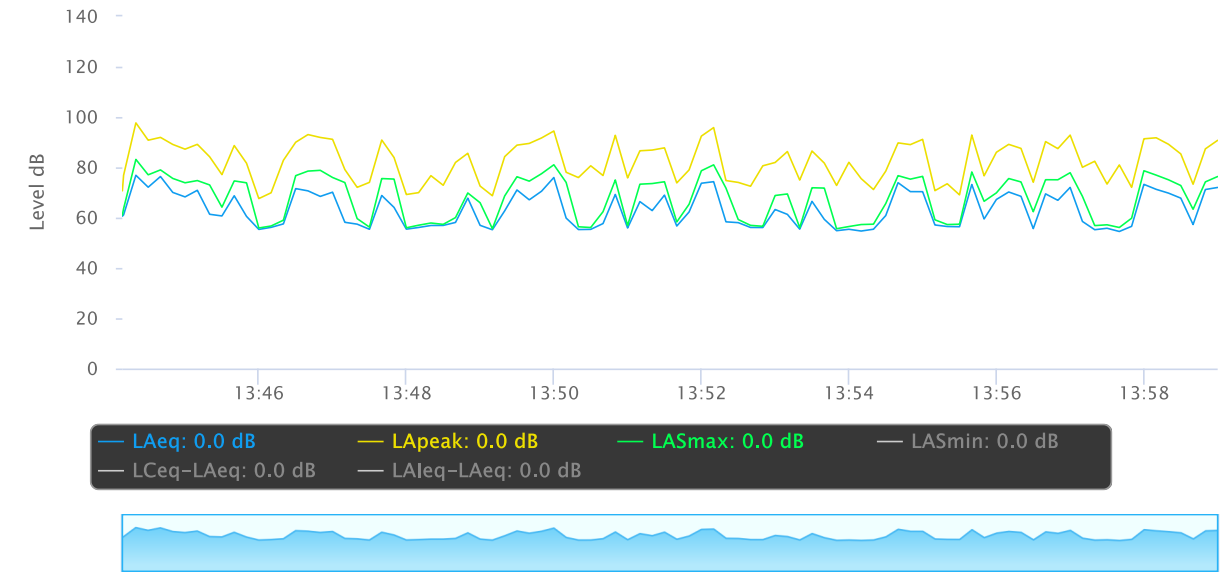
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	68.1 dB		75.3 dB		--- dB	
$L_{S(max)}$	83.1 dB	2022-09-22 13:44:23	--- dB		--- dB	
$L_{S(min)}$	53.1 dB	2022-09-22 13:54:16	--- dB		--- dB	
$L_{Peak(max)}$	97.7 dB	2022-09-22 13:44:22	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

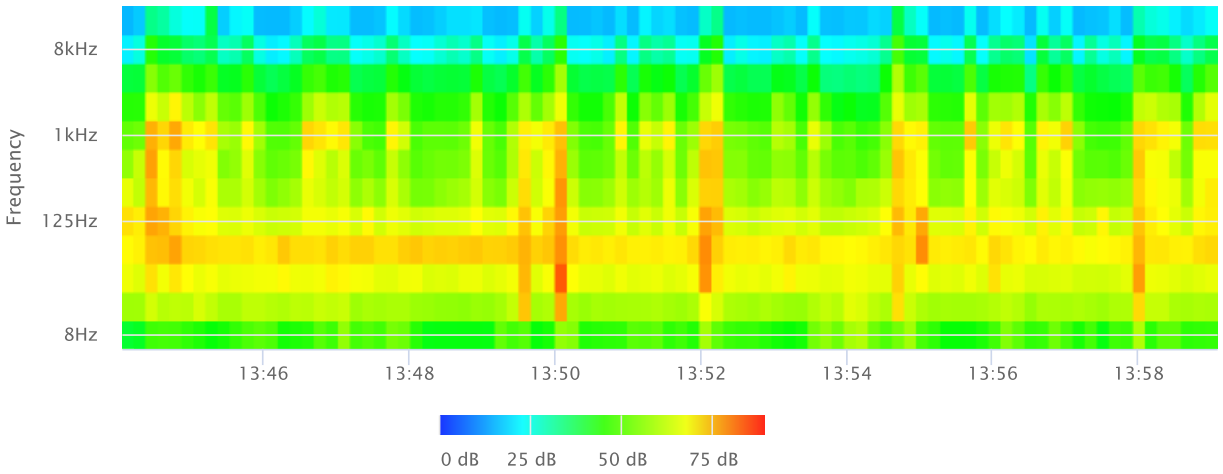
Statistics

LAS 2.0	77.4 dB
LAS 8.0	74.0 dB
LAS 25.0	66.1 dB
LAS 50.0	58.1 dB
LAS 66.6	56.5 dB
LAS 90.0	55.2 dB

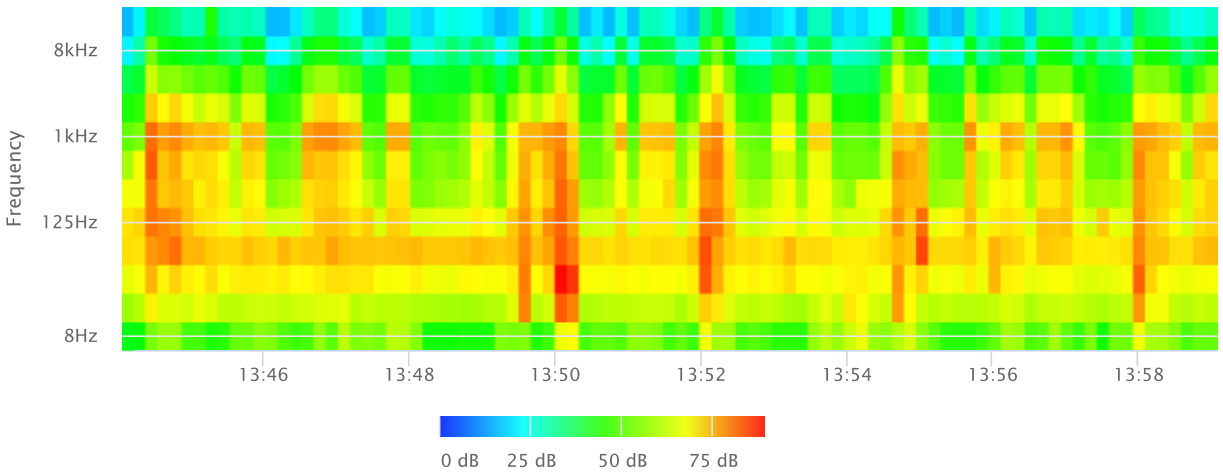
Time History



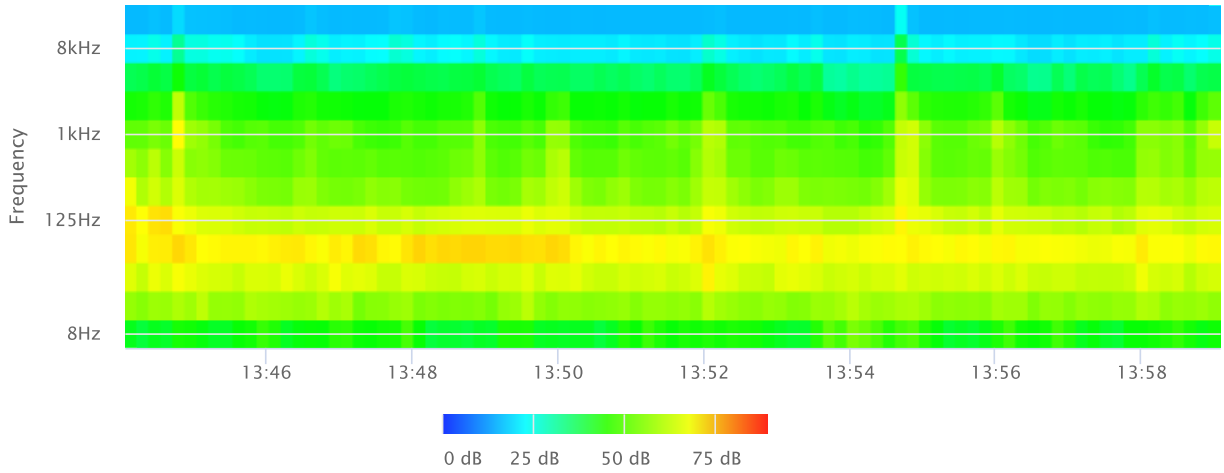
OBA 1/1 Leq



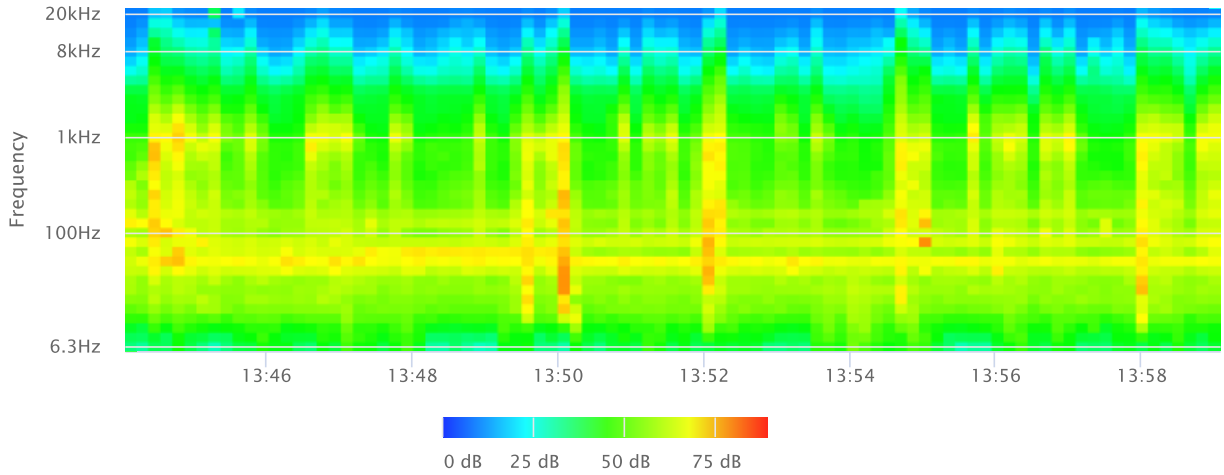
OBA 1/1 Lmax



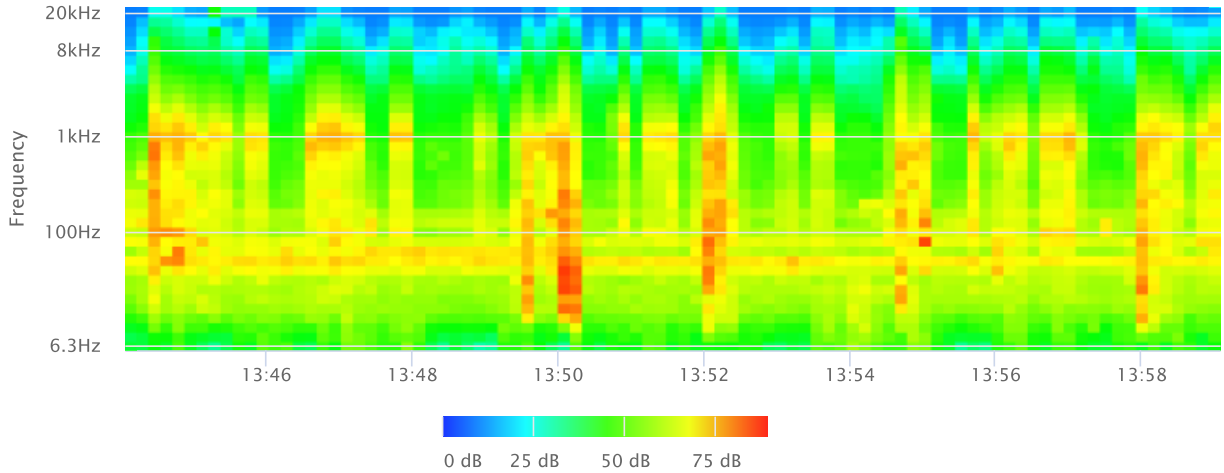
OBA 1/1 Lmin



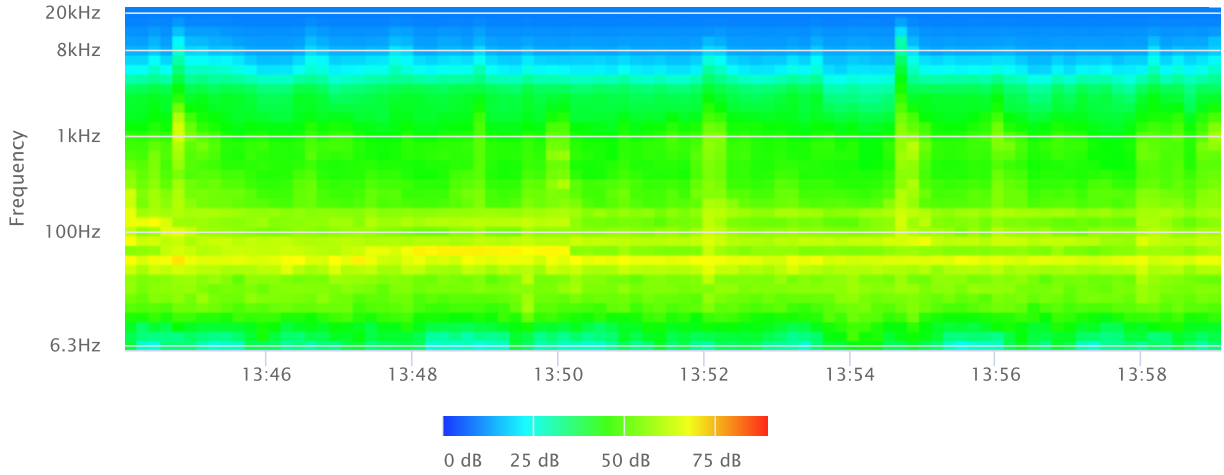
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:46
13:48
13:50
13:52
13:54
13:56
13:58
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Kendall Drive Industrial Buiding, County of San Bernardino **Date:** September 22, 2022

Project #: 19529

Noise Measurement #: STNM2 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 3664 Little League Drive, San Bernardino, CA 92407

Site Description (Type of Existing Land Use and any other notable features): Measurement Location: Southwestern most corner of Guhin Park. Adjacent: W Little League Dr just SW with 215 Fwy further SW of STNM2, Guhin Park adjacent to NE, Verdemont Community Center to SE, & train tracks ~900 ft SW of STNM2.

Weather: Clear skies, sunshine. Sunset: 6:46 PM **Settings:** SLOW FAST

Temperature: 86 deg F **Wind:** 5 mph **Humidity:** 14% **Terrain:** Flat

Start Time: 12:27 PM **End Time:** 12:42 PM **Run Time:**

Leq: 67.8 dB

Lmax 77.5 dB

L2 73.6 dB

L8 71.0 dB

L25 68.8 dB

L50 66.4 dB

Primary Noise Source: Traffic noise from the 5 vehicles passing microphone traveling along W Little League Drive. Traffic noise 215 Fwy, traffic ambiance from other roads.

Secondary Noise Sources: Occasional distant overhead air traffic. Bird song, leaf rustle from 5 mph breeze. No passing trains during measurement.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	9/22/2022		

Noise Measurement
Field Data

PHOTOS:

STNM2 looking WSW from western corner of Guhin Park across W Little League Drive & 215 Freeway towards Little League Drive overpass over the freeway.

STNM2 looking ESE towards building 3664 Little League Drive (Verdemont Community Center).

Summary	
File Name on Meter	LxT_Data.089.s
File Name on PC	LxT_0003099-20220922 122712-LxT_Data.089.ldbin
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM2 34°11'57.01"N 117°22'16.01"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino

Measurement	
Start	2022-09-22 12:27:12
Stop	2022-09-22 12:42:12
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-09-22 12:26:35
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	122.7 dB

Results			
LAeq	67.8		
LAE	97.3		
EA	601.376	µPa²h	
EA8	19.244	mPa²h	
EA40	96.220	mPa²h	
LApeak (max)	2022-09-22 12:30:21	91.2	dB
LASmax	2022-09-22 12:34:07	77.5	dB
LASmin	2022-09-22 12:28:40	57.1	dB

			Statistics	
LCeq	76.2	dB	**LA2.00**	73.6 dB
LAeq	67.8	dB	**LA8.00**	71.0 dB
LCeq - LAeq	8.4	dB	**LA25.00**	68.8 dB
LAleq	68.8	dB	**LA50.00**	66.4 dB
LAeq	67.8	dB	**LA66.60**	65.3 dB
LAleq - LAeq	1.0	dB	**LA90.00**	62.9 dB
Overload Count	0			

Measurement Report

Report Summary

Meter's File Name	LxT_Data.089.s	Computer's File Name	LxT_0003099-20220922 122712-LxT_Data.089.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM2 34°11'57.01"N 117°22'16.01"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino		
Start Time	2022-09-22 12:27:12	Duration	0:15:00.0
End Time	2022-09-22 12:42:12	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	67.8 dB		
LAE	97.3 dB	SEA	--- dB
EA	601.4 µPa²h	LAFTM5	70.8 dB
EA8	19.2 mPa²h		
EA40	96.2 mPa²h		
LA_{peak}	91.2 dB	2022-09-22 12:30:21	
LAS_{max}	77.5 dB	2022-09-22 12:34:07	
LAS_{min}	57.1 dB	2022-09-22 12:28:40	
LA_{eq}	67.8 dB		
LC_{eq}	76.2 dB	LC_{eq} - LA_{eq}	8.4 dB
LAI_{eq}	68.8 dB	LAI_{eq} - LA_{eq}	1.0 dB

Exceedances

	Count	Duration
LAS > 65.0 dB	25	0:12:32.10
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight
--- dB	--- dB	0.0 dB

LDEN	LDay	LEve	LNight
--- dB	--- dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	67.8 dB		76.2 dB		--- dB	
$L_{S(max)}$	77.5 dB	2022-09-22 12:34:07	--- dB		--- dB	
$L_{S(min)}$	57.1 dB	2022-09-22 12:28:40	--- dB		--- dB	
$L_{Peak(max)}$	91.2 dB	2022-09-22 12:30:21	--- dB		--- dB	

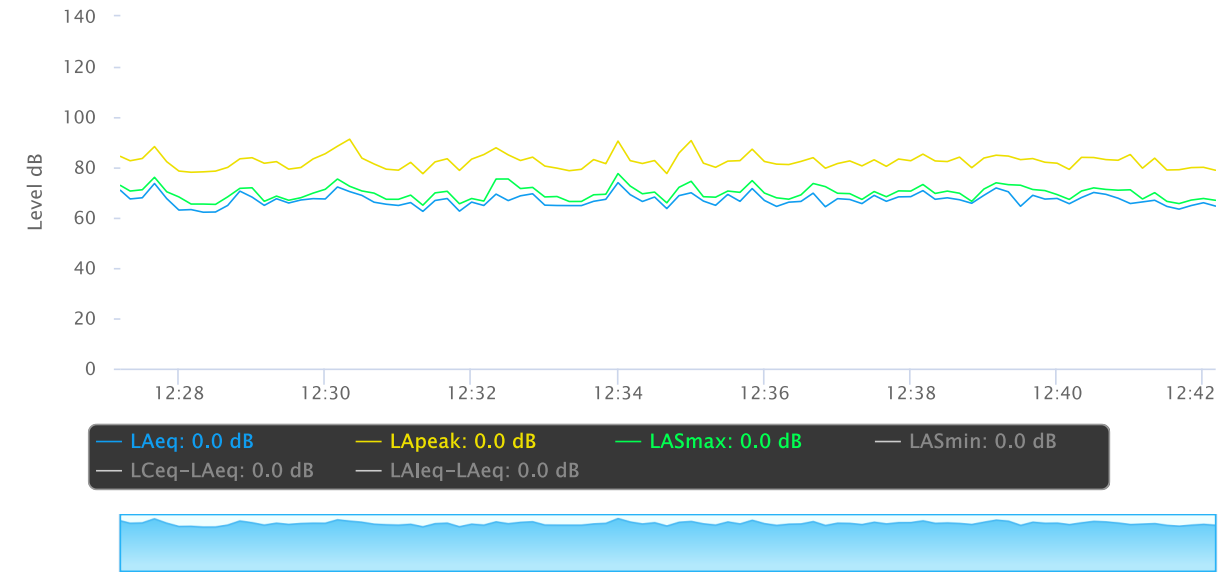
Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	0	0:00:00.0

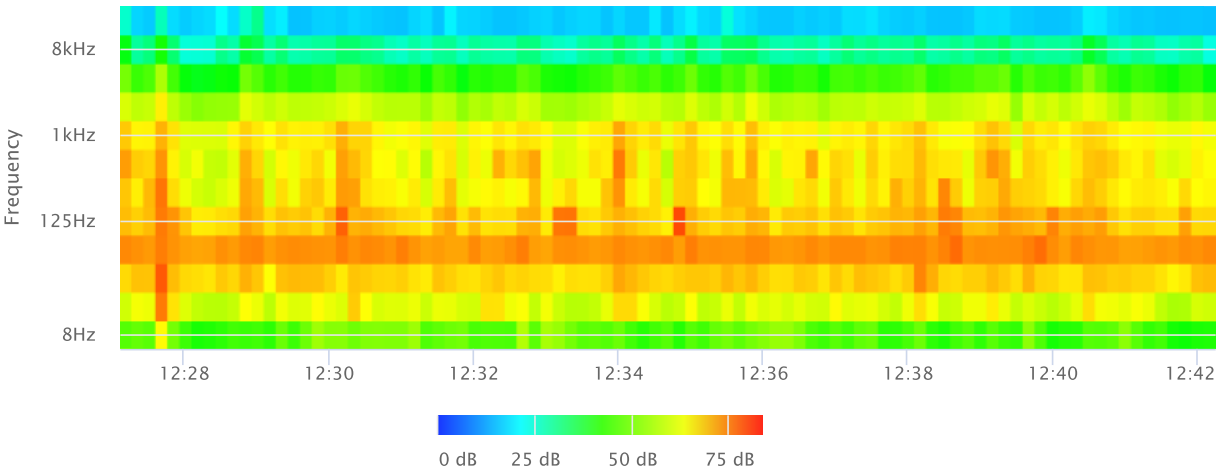
Statistics

LAS 2.0	73.6 dB
LAS 8.0	71.0 dB
LAS 25.0	68.8 dB
LAS 50.0	66.4 dB
LAS 66.6	65.3 dB
LAS 90.0	62.9 dB

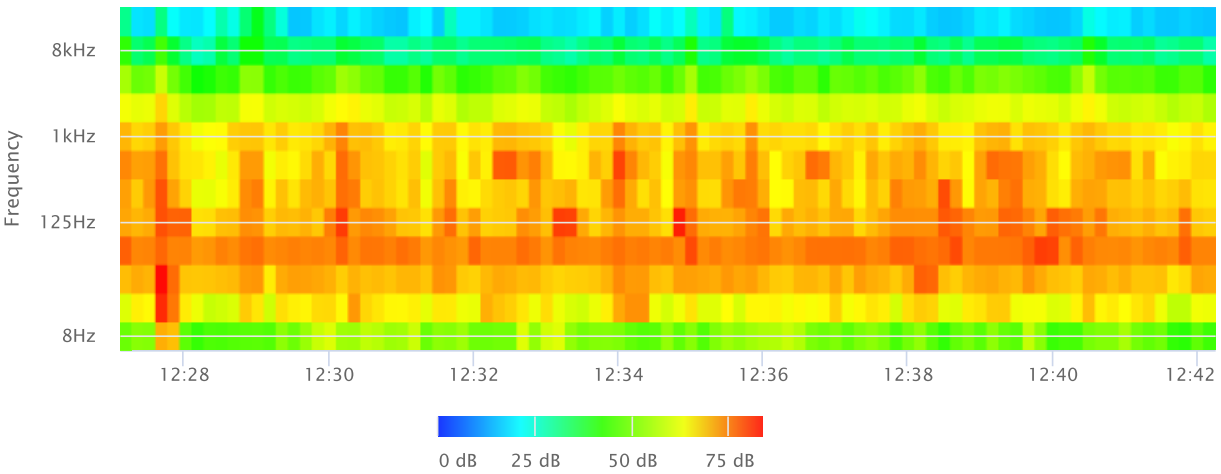
Time History



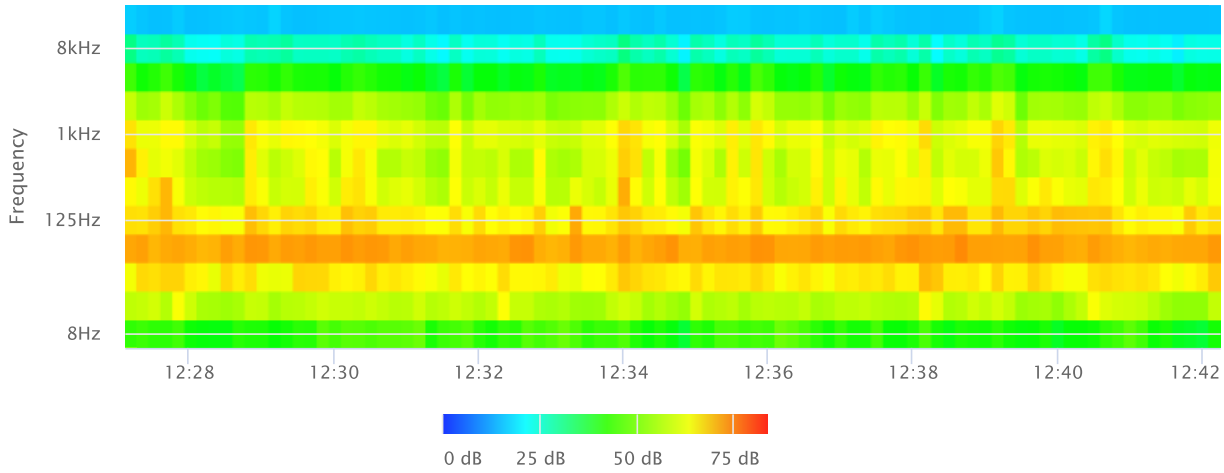
OBA 1/1 Leq



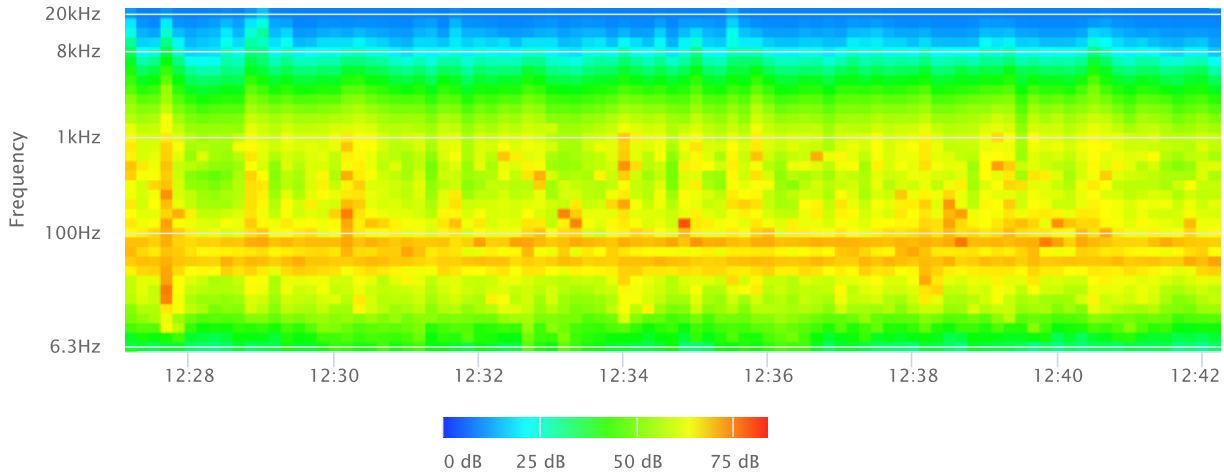
OBA 1/1 Lmax



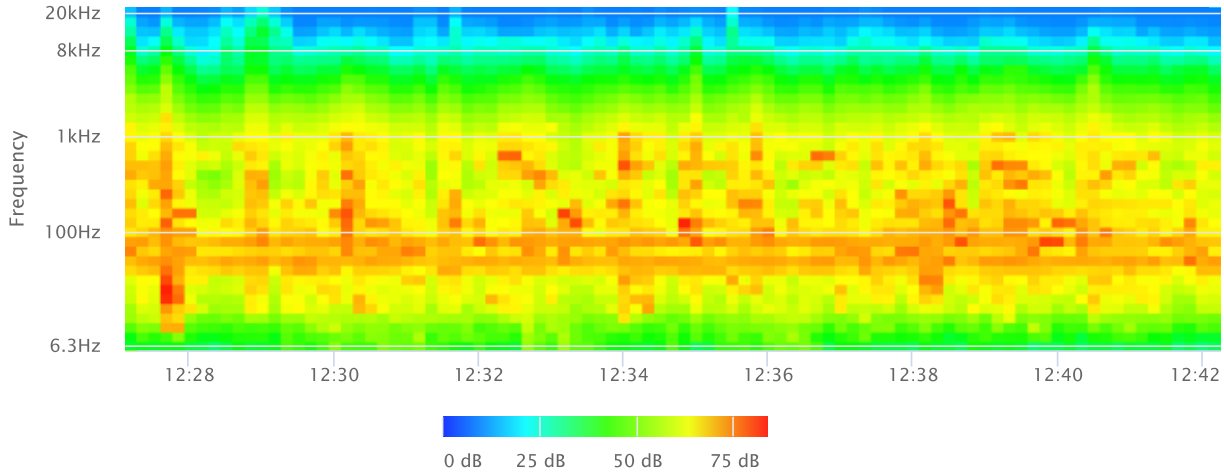
OBA 1/1 Lmin



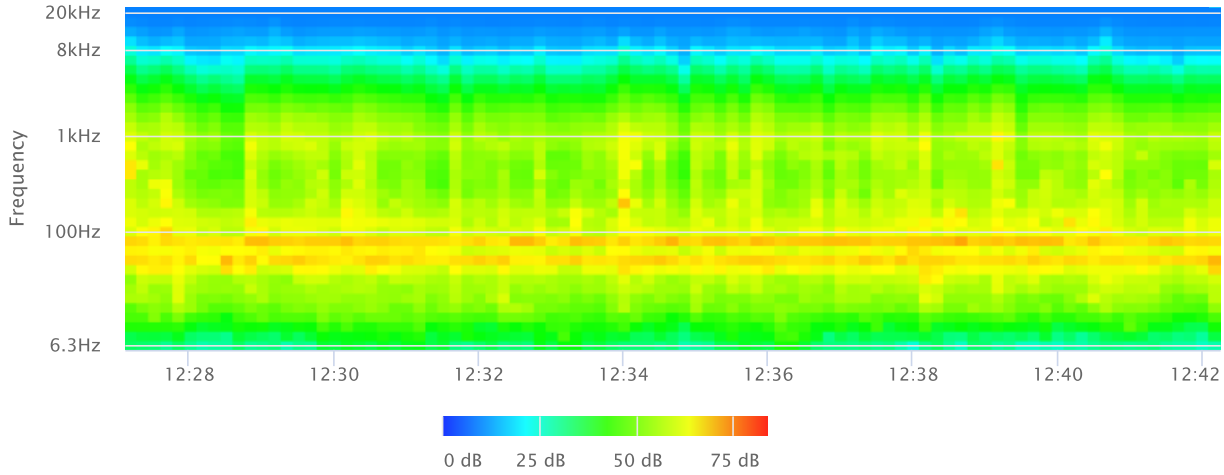
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
12:28
12:30
12:32
12:34
12:36
12:38
12:40
12:42
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Kendall Drive Industrial Buiding, County of San Bernardino **Date:** September 22, 2022

Project #: 19529

Noise Measurement #: STNM3 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 19612 Kendall Drive, San Bernardino, CA 92407

Site Description (Type of Existing Land Use and any other notable features): Measurement Site: Just S of residence 19612 Kendall Drive . Adjacent: Kendall Drive & train tracks just SW of STNM3, 215 Fwy ~515 ft NE of STNM3, & residential (appears unoccupied) adjacent to north of STNM3.

Weather: Clear skies, sunshine. Sunset: 6:46 PM **Settings:** SLOW FAST

Temperature: 86 deg F **Wind:** 5 mph **Humidity:** 14% **Terrain:** Flat

Start Time: 1:09 PM **End Time:** 1:24 PM **Run Time:**

Leq:	69.9	dB	**Primary Noise Source:** Traffic noise from the 66 vehicles passing microphone traveling along Kendall Drive. Traffic ambiance from 215 Fwy and other roads.
Lmax	85.3	dB	
L2	79.3	dB	**Secondary Noise Sources:** Occasional distant overhead air traffic. Bird song. No passing trains during measurement.
L8	75.5	dB	
L25	69.1	dB	
L50	58.7	dB	

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	9/22/2022		

Noise Measurement
Field Data

PHOTOS:

STNM3 looking NE towards residence 19612 Kendall Drive, San Bernardino. Residence appears unoccupied.

STNM3 looking W across Kendall Drive towards stationary cars on train tracks.

Summary				
File Name on Meter	LxT_Data.090.s			
File Name on PC	LxT_0003099-20220922 130950-LxT_Data.090.ldbin			
Serial Number	3099			
Model	SoundTrack LxT®			
Firmware Version	2.404			
User	Ian Edward Gallagher			
Location	STNM3 34°12'3.65"N 117°22'37.93"W			
Job Description	15 minute noise measurement (1 x 15 minutes)			
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino			
Measurement				
Start	2022-09-22 13:09:50			
Stop	2022-09-22 13:24:50			
Duration	00:15:00.0			
Run Time	00:15:00.0			
Pause	00:00:00.0			
Pre-Calibration	2022-09-22 13:09:32			
Post-Calibration	None			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamplifier	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Frequency Weighting	C Weighting			
OBA Max Spectrum	At LMax			
Overload	123.0 dB			
Results				
LA_{eq}	69.9			
LAE	99.4			
EA	970.3351 µPa²h			
EA8	31.05072 mPa²h			
EA40	155.2536 mPa²h			
$LA_{peak\ (max)}$	2022-09-22 13:24:12	99.8 dB		
LAS_{max}	2022-09-22 13:24:12	85.3 dB		
LAS_{min}	2022-09-22 13:10:15	45.6 dB		
			Statistics	
LC_{eq}	77.0 dB		**LA2.00**	79.3 dB
LA_{eq}	69.9 dB		**LA8.00**	75.5 dB
LC_{eq} - LA_{eq}	7.2 dB		**LA25.00**	69.1 dB
LAI_{eq}	72.0 dB		**LA50.00**	58.7 dB
LA_{eq}	69.9 dB		**LA66.60**	52.5 dB
LAI_{eq} - LA_{eq}	2.1 dB		**LA90.00**	48.2 dB
Overload Count	0			

Measurement Report

Report Summary

Meter's File Name	LxT_Data.090.s	Computer's File Name	LxT_0003099-20220922 130950-LxT_Data.090.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM3 34°12'3.65"N 117°22'37.93"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino		
Start Time	2022-09-22 13:09:50	Duration	0:15:00.0
End Time	2022-09-22 13:24:50	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	69.9 dB		
LAE	99.4 dB	SEA	--- dB
EA	970.3 µPa²h	LAFTM5	75.7 dB
EA8	31.1 mPa²h		
EA40	155.3 mPa²h		
LA_{peak}	99.8 dB	2022-09-22 13:24:12	
LAS_{max}	85.3 dB	2022-09-22 13:24:12	
LAS_{min}	45.6 dB	2022-09-22 13:10:15	
LA_{eq}	69.9 dB		
LC_{eq}	77.0 dB	LC_{eq} - LA_{eq}	7.2 dB
LAI_{eq}	72.0 dB	LAI_{eq} - LA_{eq}	2.1 dB

Exceedances	Count	Duration
LAS > 65.0 dB	31	0:05:43.0
LAS > 85.0 dB	1	0:00:01.3
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	--- dB	--- dB	0.0 dB

	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

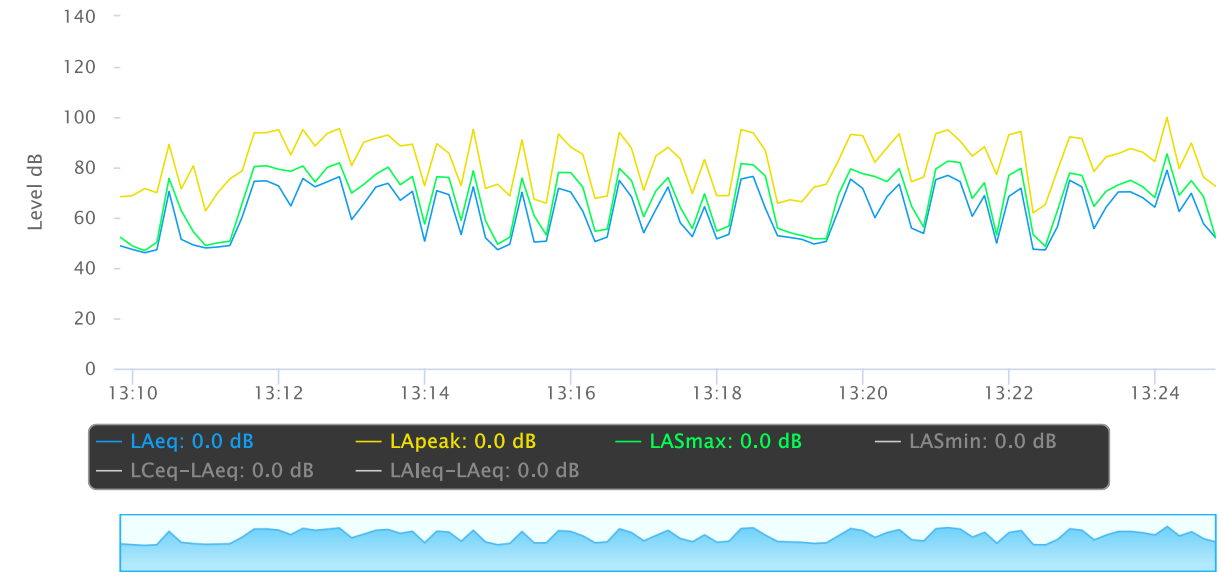
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	69.9 dB		77.0 dB		--- dB	
$L_{S(max)}$	85.3 dB	2022-09-22 13:24:12	--- dB		--- dB	
$L_{S(min)}$	45.6 dB	2022-09-22 13:10:15	--- dB		--- dB	
$L_{Peak(max)}$	99.8 dB	2022-09-22 13:24:12	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

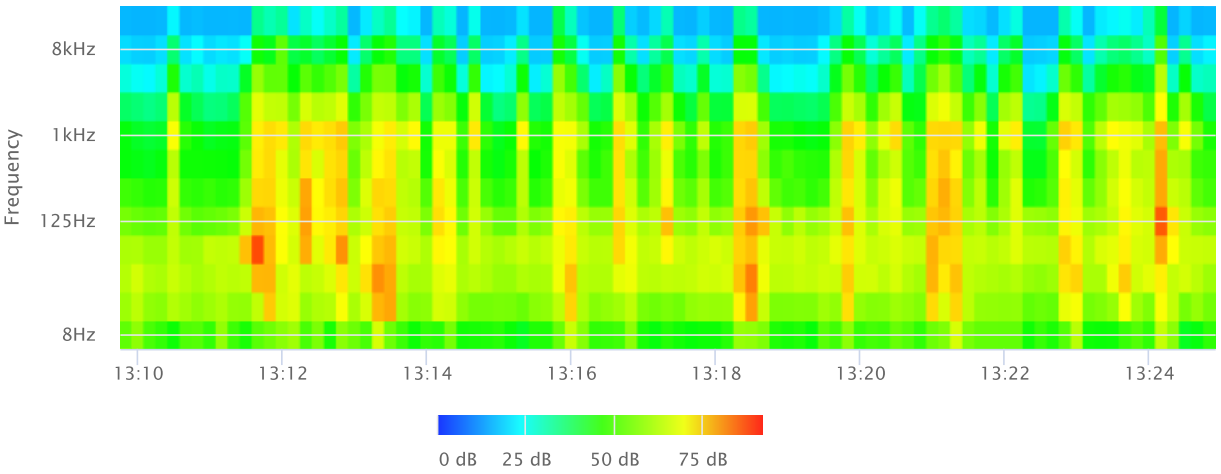
Statistics

LAS 2.0	79.3 dB
LAS 8.0	75.5 dB
LAS 25.0	69.1 dB
LAS 50.0	58.7 dB
LAS 66.6	52.5 dB
LAS 90.0	48.2 dB

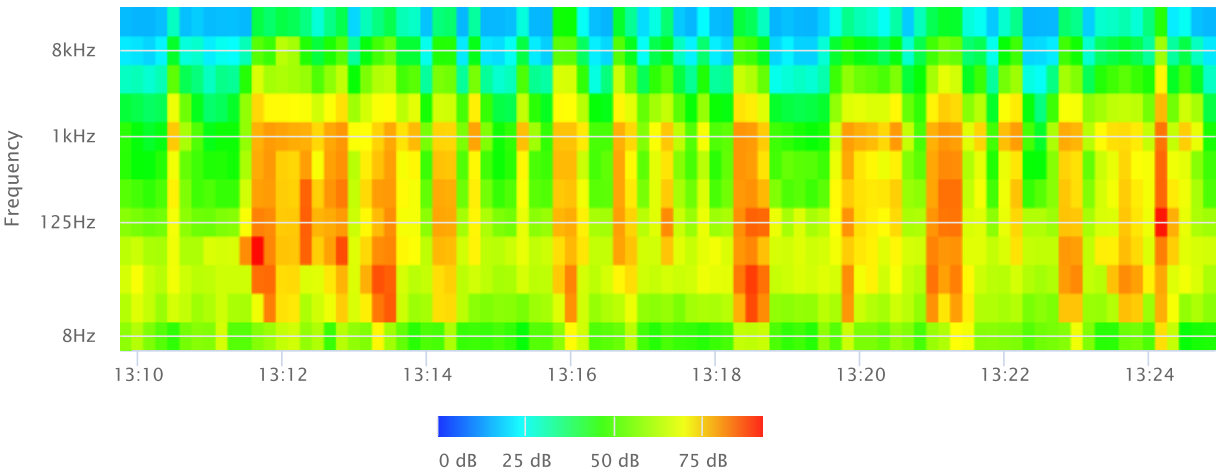
Time History



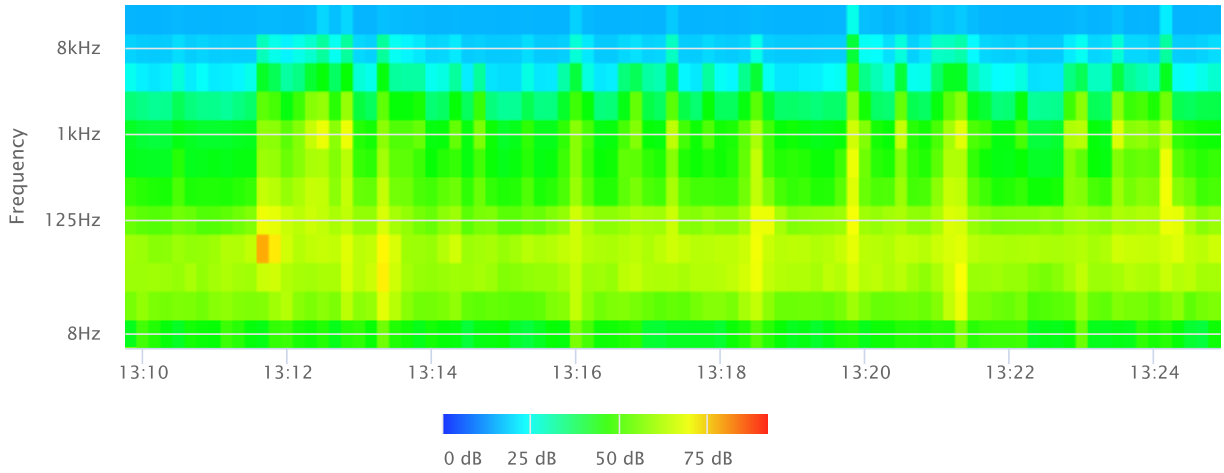
OBA 1/1 Leq



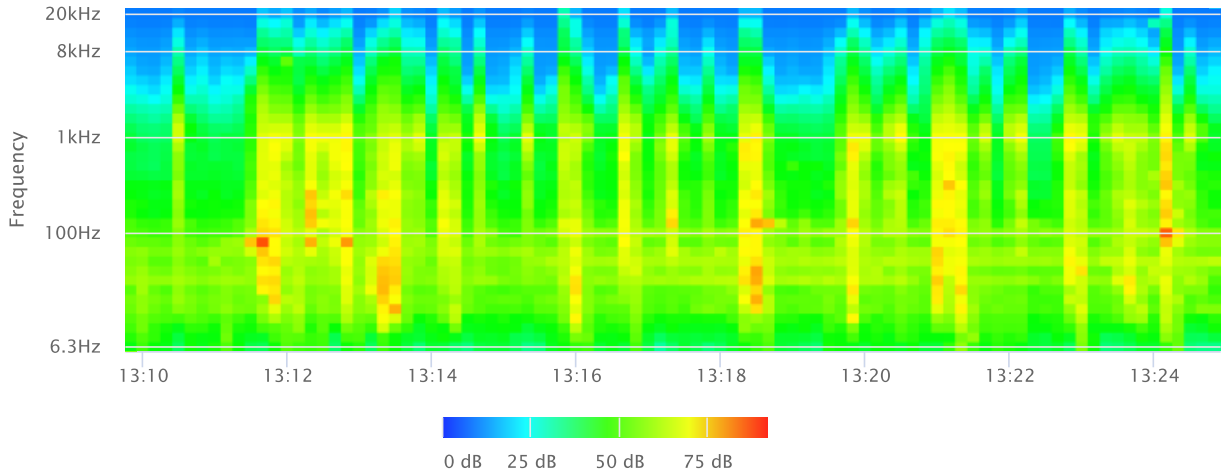
OBA 1/1 Lmax



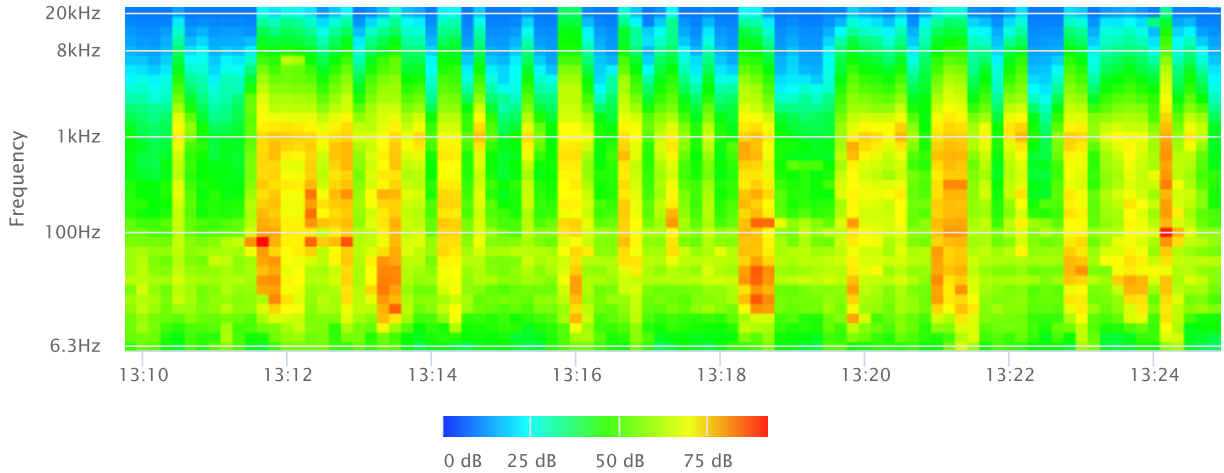
OBA 1/1 Lmin



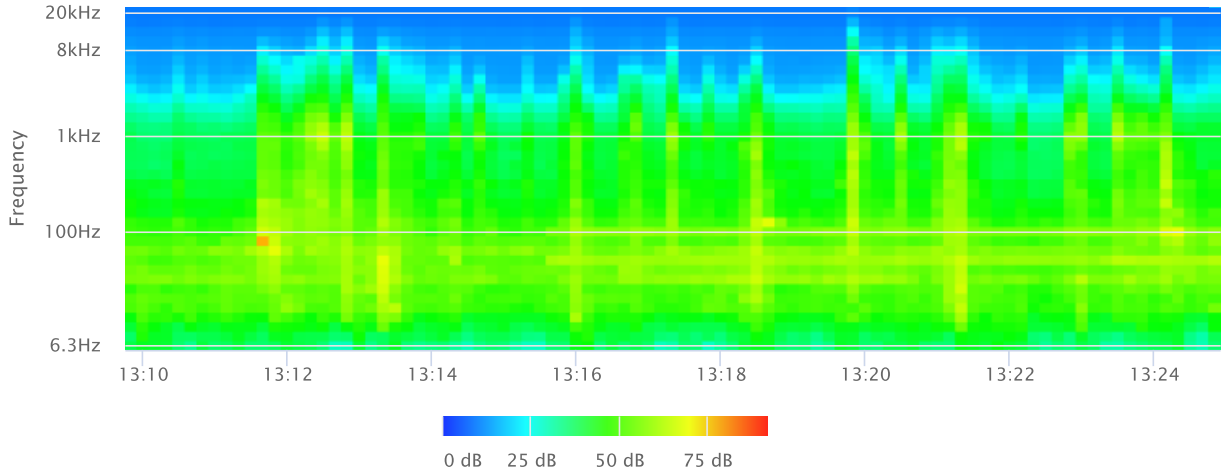
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:10
13:12
13:14
13:16
13:18
13:20
13:22
13:24
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: Kendall Drive Industrial Buiding, County of San Bernardino **Date:** Sept 22-23, 2022

Project #: 19529

Noise Measurement #: LTNM1 Run Time: 24 hours (24 x 1 hours) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 19768 Kendall Drive, San Bernardino, CA 92407

Site Description (Type of Existing Land Use and any other notable features): Measurement Location: Just N of driveway to building to 19768 Kendall Drive. Adjacent: Kendall Drive just S of LTNM1, Little League Dr intersection with Kendall Dr ~485 ft to SE of LTNM1, project site to north of LTNM1 with the 215 Fwy ~490 ft NE & train tracks ~150 ft SW of STNM1.

Weather: Clear skies. Sunset/rise: 6:46 PM/6:38 AM **Settings:** SLOW FAST

Temperature: 66-90 deg F **Wind:** 2-9 mph **Humidity:** 14-30 % **Terrain:** Flat

Start Time: 3:00 PM **End Time:** 3:00 PM **Run Time:**

Leq:	70.5	dB
Lmax	98.2	dB
L2	79.3	dB
L8	74.2	dB
L25	68.9	dB
L50	62.0	dB

Primary Noise Source: Traffic noise from vehicles passing microphone traveling along Kendall Drive. Traffic ambiance from Little League Drive, 215 Fwy and other roads.

Secondary Noise Sources: Some residential ambiance. Occasional distant overhead air traffic. Bird song Noise from passing trains. Industrial ambiance from mill, 19684 Cajon Blvd.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	9/22/2022		

Noise Measurement
Field Data

PHOTOS:

LTNM1 looking NE towards building 19768 Kendall Drive, San Bernardino.

LTNM1 looking NW along Kendall Drive, microphone on top of fence.

Summary				
File Name on Meter	LxT_Data.092.s			
File Name on PC	LxT_0003099-20220922 150000-LxT_Data.092.ldbin			
Serial Number	3099			
Model	SoundTrack LxT®			
Firmware Version	2.404			
User	Ian Edward Gallagher			
Location	LTNM1 34°11'55.41"N 117°22'26.85"W			
Job Description	24 hour noise measurement (24 x 1 hours)			
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino			
Measurement				
Start	2022-09-22 15:00:00			
Stop	2022-09-23 15:00:00			
Duration	24:00:00.0			
Run Time	24:00:00.0			
Pause	00:00:00.0			
Pre-Calibration	2022-09-22 14:24:18			
Post-Calibration	None			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamplifier	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Frequency Weighting	A Weighting			
OBA Max Spectrum	Bin Max			
Overload	122.9 dB			
Results				
L_{Aeq}	70.5			
LAE	119.9			
EA	107.4436 mPa²h			
EA8	35.81452 mPa²h			
EA40	179.0726 mPa²h			
$L_{Apeak\ (max)}$	2022-09-23 03:51:25	113.9 dB		
L_{ASmax}	2022-09-23 03:51:25	98.2 dB		
L_{ASmin}	2022-09-23 00:53:20	50.7 dB		
			Statistics	
L_{Ceq}	81.6 dB		**LA2.00**	79.3 dB
L_{Aeq}	70.5 dB		**LA8.00**	74.2 dB
L_{Ceq} - L_{Aeq}	11.1 dB		**LA25.00**	68.9 dB
L_{AIeq}	72.0 dB		**LA50.00**	62.0 dB
L_{Aeq}	70.5 dB		**LA90.00**	55.4 dB
L_{AIeq} - L_{Aeq}	1.5 dB		**LA99.00**	53.3 dB
Overload Count	0			

Record #	Date	Time	Run Duration	LAeq	LASmin	LASmin Time	LASmax	LASmax Time	LAS2.00	LAS8.00	LAS25.00	LAS50.00	LAS90.00	LAS99.00
1	2022-09-22	15:00:00	01:00:00.0	71.0	53.2	15:09:20	89.5	15:39:07	78.8	74.9	71.7	67.5	56.5	53.9
2	2022-09-22	16:00:00	01:00:00.0	72.8	55.2	16:19:23	87.4	16:33:11	82.5	76.5	72.4	68.1	57.1	55.9
3	2022-09-22	17:00:00	01:00:00.0	69.7	54.1	17:57:59	87.6	17:08:12	77.1	74.1	70.5	65.8	57.1	55.0
4	2022-09-22	18:00:00	01:00:00.0	71.0	54.1	18:26:18	89.0	18:09:02	80.8	74.1	68.9	61.8	55.4	54.6
5	2022-09-22	19:00:00	01:00:00.0	68.8	54.5	19:42:26	84.4	19:00:00	77.9	73.4	69.2	61.7	56.3	55.1
6	2022-09-22	20:00:00	01:00:00.0	67.3	56.3	20:18:14	86.1	20:45:47	75.6	71.4	66.4	60.6	57.5	56.7
7	2022-09-22	21:00:00	01:00:00.0	73.0	53.9	21:48:44	88.2	21:56:46	83.8	77.5	70.7	61.6	57.2	55.6
8	2022-09-22	22:00:00	01:00:00.0	71.1	53.1	22:57:18	93.0	22:51:49	81.0	74.3	69.6	61.4	54.9	53.6
9	2022-09-22	23:00:00	01:00:00.0	67.2	52.8	23:28:12	92.2	23:15:22	75.6	70.8	60.7	55.4	54.1	53.5
10	2022-09-23	00:00:00	01:00:00.0	69.3	50.7	00:53:20	90.1	00:58:43	78.8	74.3	64.9	60.0	52.8	51.5
11	2022-09-23	01:00:00	01:00:00.0	72.5	52.3	01:08:49	92.3	01:43:59	83.2	75.3	68.6	61.6	54.7	53.4
12	2022-09-23	02:00:00	01:00:00.0	64.3	52.2	02:20:20	84.9	02:09:50	74.8	68.5	57.5	55.6	53.8	53.1
13	2022-09-23	03:00:00	01:00:00.0	69.1	52.5	03:53:00	98.2	03:51:25	75.2	68.7	61.4	56.5	54.1	53.1
14	2022-09-23	04:00:00	01:00:00.0	68.8	53.1	04:00:01	86.7	04:57:43	78.2	74.3	67.0	60.3	55.4	53.9
15	2022-09-23	05:00:00	01:00:00.0	71.4	54.0	05:35:39	91.5	05:23:08	80.2	74.8	69.8	63.6	58.1	55.8
16	2022-09-23	06:00:00	01:00:00.0	68.9	57.6	06:04:50	86.9	06:26:30	76.4	72.5	67.4	62.9	60.1	58.7
17	2022-09-23	07:00:00	01:00:00.0	71.3	57.4	07:27:01	90.9	07:04:01	80.5	74.4	70.0	65.0	60.6	58.7
18	2022-09-23	08:00:00	01:00:00.0	71.6	59.7	08:55:16	89.7	08:56:58	80.3	74.8	69.3	63.1	60.6	60.0
19	2022-09-23	09:00:00	01:00:00.0	71.5	57.5	09:31:19	88.7	09:25:45	81.5	74.4	69.7	64.1	59.8	58.3
20	2022-09-23	10:00:00	01:00:00.0	67.4	55.0	10:48:13	89.6	10:33:55	76.6	71.9	66.3	59.9	57.2	55.9
21	2022-09-23	11:00:00	01:00:00.0	70.3	53.9	11:21:15	87.0	11:33:38	79.2	75.3	68.9	61.4	55.9	54.9
22	2022-09-23	12:00:00	01:00:00.0	69.4	54.5	12:57:53	87.9	12:45:34	77.8	72.9	68.1	61.1	56.2	55.2
23	2022-09-23	13:00:00	01:00:00.0	71.4	53.5	13:45:49	86.8	13:28:52	81.3	75.4	70.7	64.5	56.2	55.0
24	2022-09-23	14:00:00	01:00:00.0	72.2	54.1	14:38:53	94.6	14:14:14	81.5	74.9	70.9	65.8	56.1	54.9

Measurement Report

Report Summary

Meter's File Name	LxT_Data.092.s	Computer's File Name	LxT_0003099-20220922 150000-LxT_Data.092.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	LTNM1 34°11'55.41"N 117°22'26.85"W
Job Description	24 hour noise measurement (24 x 1 hours)		
Note	Ganddini Project 19529 Kendall Drive Industrial Building, San Bernardino		
Start Time	2022-09-22 15:00:00	Duration	24:00:00.0
End Time	2022-09-23 15:00:00	Run Time	24:00:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	70.5 dB		
LAE	119.9 dB	SEA	--- dB
EA	107.4 mPa²h	LAFTM5	74.4 dB
EA8	35.8 mPa²h		
EA40	179.1 mPa²h		
LA_{peak}	113.9 dB	2022-09-23 03:51:25	
LAS_{max}	98.2 dB	2022-09-23 03:51:25	
LAS_{min}	50.7 dB	2022-09-23 00:53:20	
LA_{eq}	70.5 dB		
LC_{eq}	81.6 dB	LC_{eq} - LA_{eq}	11.1 dB
LAI_{eq}	72.0 dB	LAI_{eq} - LA_{eq}	1.5 dB

Exceedances	Count	Duration
LAS > 65.0 dB	2218	10:36:25.0
LAS > 85.0 dB	50	0:07:59.6
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight
	--- dB	--- dB	0.0 dB

	LDEN	LDay	LEve	LNight
	--- dB	--- dB	--- dB	--- dB

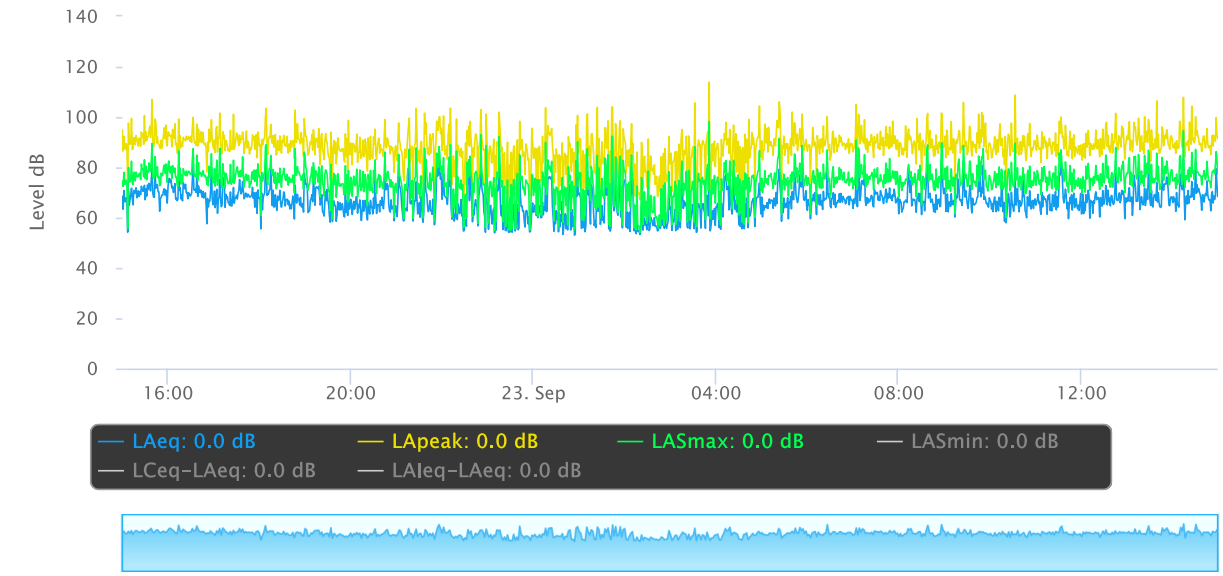
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	70.5 dB		81.6 dB		--- dB	
$L_{S(max)}$	98.2 dB	2022-09-23 03:51:25	--- dB		--- dB	
$L_{S(min)}$	50.7 dB	2022-09-23 00:53:20	--- dB		--- dB	
$L_{Peak(max)}$	113.9 dB	2022-09-23 03:51:25	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

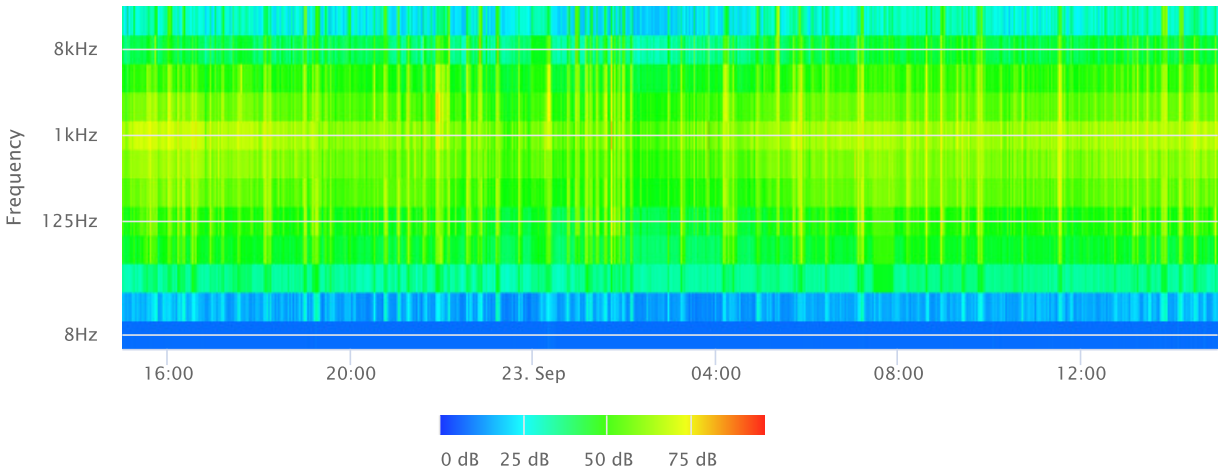
Statistics

LAS 2.0	79.3 dB
LAS 8.0	74.2 dB
LAS 25.0	68.9 dB
LAS 50.0	62.0 dB
LAS 90.0	55.4 dB
LAS 99.0	53.3 dB

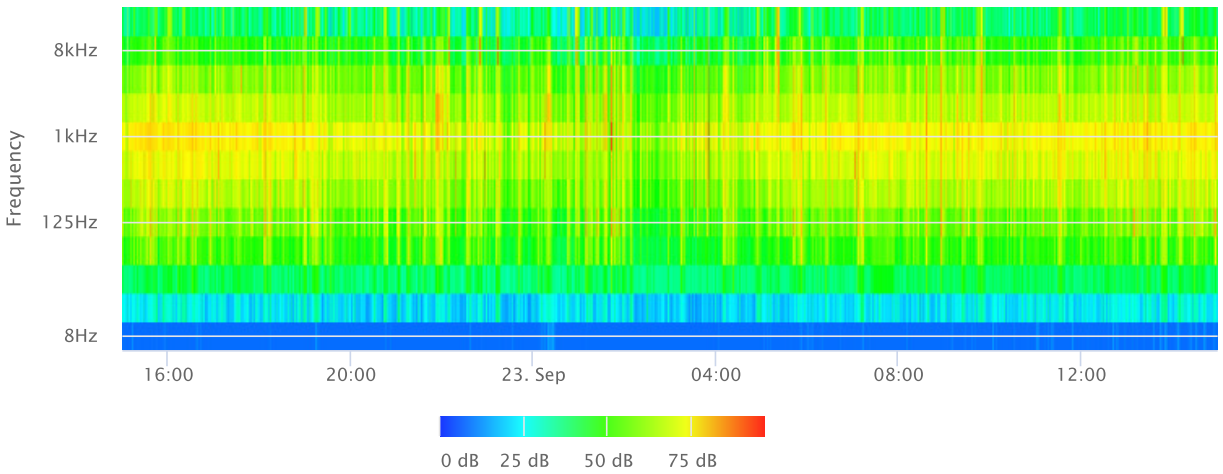
Time History



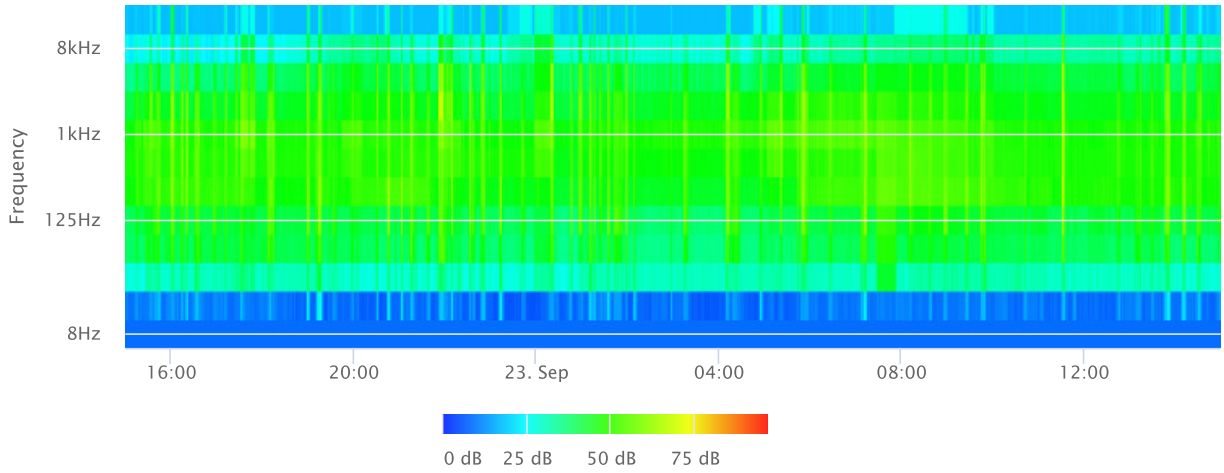
OBA 1/1 Leq



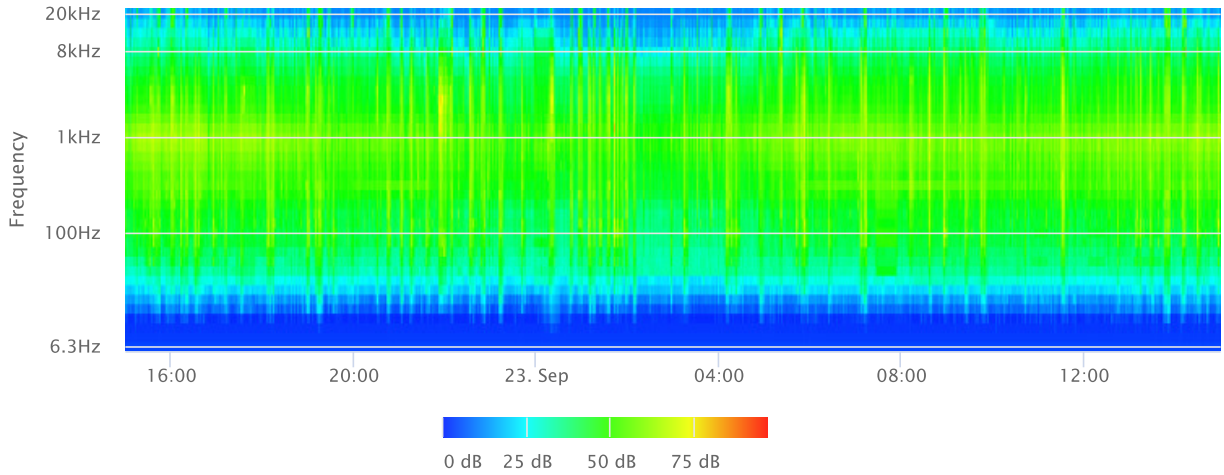
OBA 1/1 Lmax



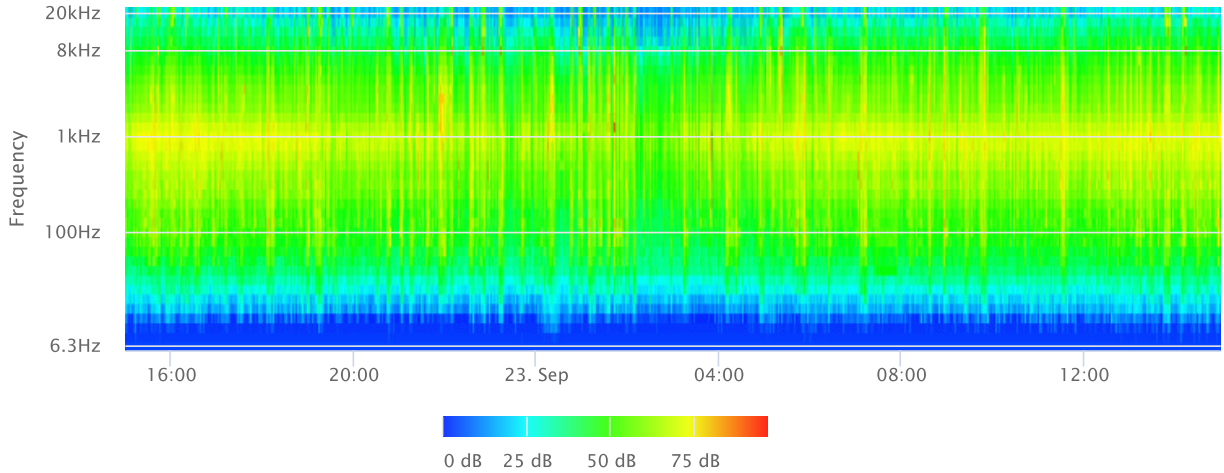
OBA 1/1 Lmin



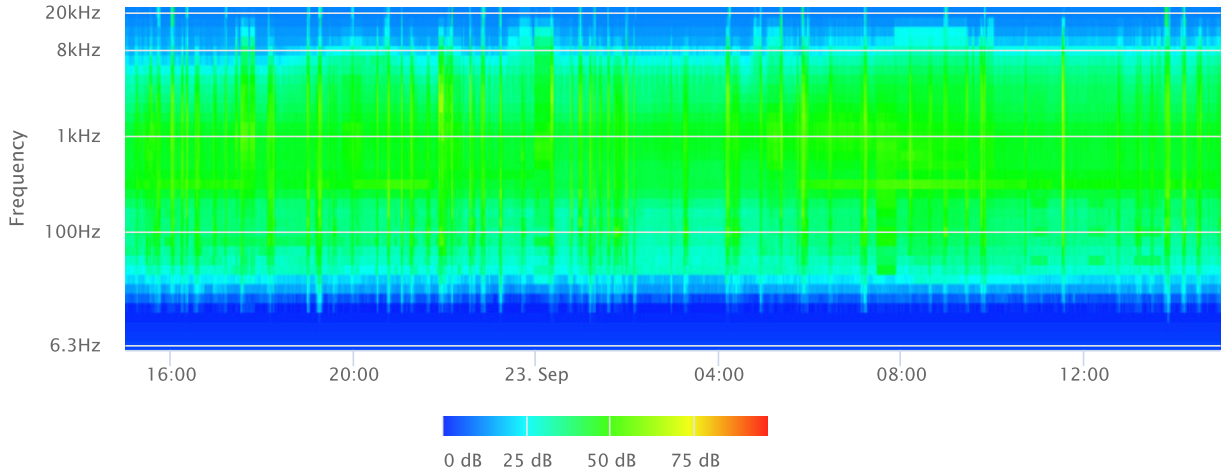
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
16:00
20:00
23. Sep
04:00
08:00
12:00
0 dB
25 dB
50 dB
75 dB

APPENDIX D

CONSTRUCTION NOISE MODELING

Receptor - Multi-Family Residential Uses to the South (19829 Kendall Drive, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Excavators	3	81	693	40	1.20	-22.8	0.8	58.2	59.0
Rubber Tired Dozers	2	82	693	40	0.80	-22.8	-1.0	59.2	58.2
Concrete/Industrial Saws	1	90	693	20	0.20	-22.8	-7.0	67.2	60.2
								Log Sum	64.0
Site Preparation									
Rubber Tired Dozers	3	82	693	40	1.20	-22.8	0.8	59.2	60.0
Tractors/Loaders/Backhoes	4	84	693	40	1.60	-22.8	2.0	61.2	63.2
								Log Sum	64.9
Grading									
Rubber Tired Dozers	1	82	693	40	0.40	-22.8	-4.0	59.2	55.2
Excavators	1	81	693	40	0.40	-22.8	-4.0	58.2	54.2
Tractors/Loaders/Backhoes	3	84	693	40	1.20	-22.8	0.8	61.2	62.0
Graders	1	85	693	40	0.40	-22.8	-4.0	62.2	58.2
								Log Sum	64.5
Building Construction									
Cranes	1	81	693	16	0.16	-22.8	-8.0	58.2	50.2
Forklifts[2]	3	48	693	40	1.20	-22.8	0.8	25.2	26.0
Generator Sets	1	81	693	50	0.50	-22.8	-3.0	58.2	55.2
Welders	1	74	693	40	0.40	-22.8	-4.0	51.2	47.2
Tractors/Loaders/Backhoes	3	84	693	40	1.20	-22.8	0.8	61.2	62.0
								Log Sum	63.1
Paving									
Pavers	2	77	693	50	1.00	-22.8	0.0	54.2	54.2
Paving Equipment	2	77	693	50	1.00	-22.8	0.0	54.2	54.2
Rollers	2	80	693	20	0.40	-22.8	-4.0	57.2	53.2
								Log Sum	58.6
Architectural Coating									
Air Compressors	1	78	693	40	0.40	-22.8	-4.0	55.2	51.2
								Log Sum	51.2

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

Receptor - Single-Family Residential Use to the Southeast (19842 Kendall Drive, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Excavators	3	81	669	40	1.20	-22.5	0.8	58.5	59.3
Rubber Tired Dozers	2	82	669	40	0.80	-22.5	-1.0	59.5	58.5
Concrete/Industrial Saws	1	90	669	20	0.20	-22.5	-7.0	67.5	60.5
								Log Sum	64.3
Site Preparation									
Rubber Tired Dozers	3	82	669	40	1.20	-22.5	0.8	59.5	60.3
Tractors/Loaders/Backhoes	4	84	669	40	1.60	-22.5	2.0	61.5	63.5
								Log Sum	65.2
Grading									
Rubber Tired Dozers	1	82	669	40	0.40	-22.5	-4.0	59.5	55.5
Excavators	1	81	669	40	0.40	-22.5	-4.0	58.5	54.5
Tractors/Loaders/Backhoes	3	84	669	40	1.20	-22.5	0.8	61.5	62.3
Graders	1	85	669	40	0.40	-22.5	-4.0	62.5	58.5
								Log Sum	64.8
Building Construction									
Cranes	1	81	669	16	0.16	-22.5	-8.0	58.5	50.5
Forklifts[2]	3	48	669	40	1.20	-22.5	0.8	25.5	26.3
Generator Sets	1	81	669	50	0.50	-22.5	-3.0	58.5	55.5
Welders	1	74	669	40	0.40	-22.5	-4.0	51.5	47.5
Tractors/Loaders/Backhoes	3	84	669	40	1.20	-22.5	0.8	61.5	62.3
								Log Sum	63.4
Paving									
Pavers	2	77	669	50	1.00	-22.5	0.0	54.5	54.5
Paving Equipment	2	77	669	50	1.00	-22.5	0.0	54.5	54.5
Rollers	2	80	669	20	0.40	-22.5	-4.0	57.5	53.5
								Log Sum	58.9
Architectural Coating									
Air Compressors	1	78	669	40	0.40	-22.5	-4.0	55.5	51.5
								Log Sum	51.5

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

Receptor - Park Uses to the Northeast (3664 Little League Drive, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Excavators	3	81	780	40	1.20	-23.9	0.8	57.1	57.9
Rubber Tired Dozers	2	82	780	40	0.80	-23.9	-1.0	58.1	57.2
Concrete/Industrial Saws	1	90	780	20	0.20	-23.9	-7.0	66.1	59.1
								Log Sum	62.9
Site Preparation									
Rubber Tired Dozers	3	82	780	40	1.20	-23.9	0.8	58.1	58.9
Tractors/Loaders/Backhoes	4	84	780	40	1.60	-23.9	2.0	60.1	62.2
								Log Sum	63.9
Grading									
Rubber Tired Dozers	1	82	780	40	0.40	-23.9	-4.0	58.1	54.2
Excavators	1	81	780	40	0.40	-23.9	-4.0	57.1	53.2
Tractors/Loaders/Backhoes	3	84	780	40	1.20	-23.9	0.8	60.1	60.9
Graders	1	85	780	40	0.40	-23.9	-4.0	61.1	57.2
								Log Sum	63.5
Building Construction									
Cranes	1	81	780	16	0.16	-23.9	-8.0	57.1	49.2
Forklifts[2]	3	48	780	40	1.20	-23.9	0.8	24.1	24.9
Generator Sets	1	81	780	50	0.50	-23.9	-3.0	57.1	54.1
Welders	1	74	780	40	0.40	-23.9	-4.0	50.1	46.2
Tractors/Loaders/Backhoes	3	84	780	40	1.20	-23.9	0.8	60.1	60.9
								Log Sum	62.1
Paving									
Pavers	2	77	780	50	1.00	-23.9	0.0	53.1	53.1
Paving Equipment	2	77	780	50	1.00	-23.9	0.0	53.1	53.1
Rollers	2	80	780	20	0.40	-23.9	-4.0	56.1	52.2
								Log Sum	57.6
Architectural Coating									
Air Compressors	1	78	780	40	0.40	-23.9	-4.0	54.1	50.2
								Log Sum	50.2

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

Receptor - Single-Family Residential Use to the Northwest (19612 Kendall Drive, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Excavators	3	81	1075	40	1.20	-26.6	0.8	54.4	55.1
Rubber Tired Dozers	2	82	1075	40	0.80	-26.6	-1.0	55.4	54.4
Concrete/Industrial Saws	1	90	1075	20	0.20	-26.6	-7.0	63.4	56.4
								Log Sum	60.1
Site Preparation									
Rubber Tired Dozers	3	82	1075	40	1.20	-26.6	0.8	55.4	56.1
Tractors/Loaders/Backhoes	4	84	1075	40	1.60	-26.6	2.0	57.4	59.4
								Log Sum	61.1
Grading									
Rubber Tired Dozers	1	82	1075	40	0.40	-26.6	-4.0	55.4	51.4
Excavators	1	81	1075	40	0.40	-26.6	-4.0	54.4	50.4
Tractors/Loaders/Backhoes	3	84	1075	40	1.20	-26.6	0.8	57.4	58.1
Graders	1	85	1075	40	0.40	-26.6	-4.0	58.4	54.4
								Log Sum	60.7
Building Construction									
Cranes	1	81	1075	16	0.16	-26.6	-8.0	54.4	46.4
Forklifts[2]	3	48	1075	40	1.20	-26.6	0.8	21.4	22.1
Generator Sets	1	81	1075	50	0.50	-26.6	-3.0	54.4	51.3
Welders	1	74	1075	40	0.40	-26.6	-4.0	47.4	43.4
Tractors/Loaders/Backhoes	3	84	1075	40	1.20	-26.6	0.8	57.4	58.1
								Log Sum	59.3
Paving									
Pavers	2	77	1075	50	1.00	-26.6	0.0	50.4	50.4
Paving Equipment	2	77	1075	50	1.00	-26.6	0.0	50.4	50.4
Rollers	2	80	1075	20	0.40	-26.6	-4.0	53.4	49.4
								Log Sum	54.8
Architectural Coating									
Air Compressors	1	78	1075	40	0.40	-26.6	-4.0	51.4	47.4
								Log Sum	47.4

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(2) Source: SoundPLAN reference list.

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to nearest sensitive use (property line).

APPENDIX E

FHWA WORKSHEETS

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **19529 Kendall Drive Industrial Building (Xebec)**

Road: **Kendall Drive**

Segment: **North of Little League Drive**

	DAYTIME			EVENING			NIGHTTIME			ADT	5600.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	50.00
										DISTANCE	44.00
INPUT PARAMETERS											
Vehicles per hour	324.33	6.72	11.20	240.80	1.12	1.87	59.73	9.33	15.56	% A	92
Speed in MPH	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	% HT	5
ADJUSTMENTS											
Flow	17.81	0.98	3.20	16.52	-6.80	-4.58	10.47	2.40	4.62		
Distance	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	71.64
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	66.61
LEQ	64.42	55.26	61.70	63.13	47.48	53.92	57.07	56.68	63.13	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	66.61		EVENING LEQ	63.72		NIGHT LEQ	64.82		Use hour?	no
										GRADE dB	0.00
		CNEL	**71.64**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **19529 Kendall Drive Industrial Building (Xebec)**

Road: **Kendall Drive**

Segment: **North of Little League Drive**

	DAYTIME			EVENING			NIGHTTIME			ADT	5660.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	50.00
										DISTANCE	44.00
INPUT PARAMETERS											
Vehicles per hour	327.63	6.80	11.42	243.25	1.13	1.90	60.34	9.45	15.87	% A	91.95
Speed in MPH	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3.00
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	% HT	5.05
ADJUSTMENTS											
Flow	17.86	1.03	3.28	16.56	-6.75	-4.50	10.51	2.46	4.71		
Distance	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	71.71
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	66.67
LEQ	64.46	55.31	61.79	63.17	47.53	54.01	57.12	56.74	63.21	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	66.67		EVENING LEQ	63.77		NIGHT LEQ	64.89		Use hour?	no
										GRADE dB	0.00
		CNEL	**71.71**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **19529 Kendall Drive Industrial Building (Xebec)**

Road: **Kendall Drive**

Segment: **South of Little League Drive**

	DAYTIME			EVENING			NIGHTTIME			ADT	3800.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	44.00
INPUT PARAMETERS											
Vehicles per hour	220.08	4.56	7.60	163.40	0.76	1.27	40.53	6.33	10.56	% A	92
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5
ADJUSTMENTS											
Flow	16.59	-0.25	1.97	15.29	-8.03	-5.81	9.24	1.18	3.40		
Distance	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	69.26
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	63.96
LEQ	61.42	52.86	59.60	60.12	45.08	51.82	54.07	54.29	61.02	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	63.96		EVENING LEQ	60.84		NIGHT LEQ	62.53		Use hour?	no
										GRADE dB	0.00
		CNEL	**69.26**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **19529 Kendall Drive Industrial Building (Xebec)**

Road: **Kendall Drive**

Segment: **South of Little League Drive**

	DAYTIME			EVENING			NIGHTTIME			ADT	3860.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	44.00
INPUT PARAMETERS											
Vehicles per hour	223.38	4.64	7.82	165.85	0.77	1.30	41.14	6.45	10.87	% A	91.93
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3.01
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5.07
ADJUSTMENTS											
Flow	16.65	-0.17	2.10	15.36	-7.95	-5.69	9.30	1.25	3.52		
Distance	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	69.37
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	64.05
LEQ	61.48	52.94	59.72	60.19	45.15	51.94	54.13	54.36	61.15	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	64.05		EVENING LEQ	60.91		NIGHT LEQ	62.64		Use hour?	no
										GRADE dB	0.00
		CNEL	**69.37**								

APPENDIX F

SOUNDPLAN INPUTS AND OUTPUTS

Noise emissions of industry sources

Source name	Reference	Level		Frequency spectrum [dB(A)]										Corrections		
				31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	16 kHz	Cwall dB	CI dB	CT dB
Loading Area	Lw/m²	Day	65.0											-	-	-
HVAC1	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC2	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC3	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC4	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC5	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC6	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC7	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC8	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC9	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC10	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC11	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC12	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC13	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC14	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC15	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-
HVAC16	Lw/unit	Day	56.2	20.0	24.0	37.0	42.0	36.0	47.0	49.0	48.0	50.0	50.0	-	-	-

Noise emissions of parking lot traffic

Name	Parking lot type	Size	Movements per hour			Road surface	Separated method	Lw,ref
			Day	Evening	Night			dB(A)
P1	Visitors and staff	11 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	74.2
P2	Visitors and staff	9 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	72.5
P3	Visitors and staff	24 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	79.7
P4	Visitors and staff	10 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	73.0
P5	Visitors and staff	4 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	69.0
P6	Visitors and staff	12 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	75.0
P7	Visitors and staff	10 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	73.0
P8	Visitors and staff	12 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	75.0
P9	Visitors and staff	30 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	81.1
P10	Visitors and staff	39 Parking bays	0.200	0.000	0.000	Asphaltic driving lanes	no	82.6

Receiver list

No.	Receiver name	Building side	Floor	Limit Day dB(A)	Level w/o NP Day dB(A)	Level w NP Day dB(A)	Difference Day dB	Conflict Day dB
1	1	-	EG	-	31.9	0.0	-31.9	-
2	2	-	EG	-	42.1	0.0	-42.1	-
3	3	-	EG	-	27.1	0.0	-27.1	-
4	4	-	EG	-	38.6	0.0	-38.6	-
5	5	-	EG	-	48.3	0.0	-48.3	-

APPENDIX G

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19529 Kendall Drive Warehouse		Date: 6/20/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Industrial to West		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment Type =	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	130.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.			
RESULTS			
PPV =	0.018	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19529 Kendall Drive Warehouse		Date: 6/20/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Industrial to West		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	130.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.			
RESULTS			
PPV =	0.008	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19529 Kendall Drive Warehouse		Date: 6/20/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to Southeast		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	210.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.			
RESULTS			
PPV =	0.009	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19529 Kendall Drive Warehouse		Date: 6/20/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to Southeast		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	210.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.			
RESULTS			
PPV =	0.004	IN/SEC	OUTPUT IN BLUE

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