10426 LOCUST AVENUE WAREHOUSE NOISE IMPACT ANALYSIS

County of San Bernardino

July 8, 2022 (Revised November 16, 2022)

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

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Project No. 19509

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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 10426 Locust Avenue Warehouse 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 2.81-acre project site is located at 10426 Locust Avenue, in the unincorporated area of Bloomington, in the County of San Bernardino, California. The project site is currently developed with an industrial use and two single-family residential dwelling units.

Project Description

The proposed project involves construction of a new 55,020 square foot warehouse building. The proposed project also includes 56 parking stalls for employees and vendors. Access to the Project Site would be will be provided by two driveways on Locust Avenue.

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 as part of the proposed project 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 shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/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).

Construction Impacts

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 75.1 dBA L_{eq} at the nearest residential property line to the north of the project site, 73.9 dBA L_{eq} at the nearest residential property line to the east of the project site, and 75.1 dBA L_{eq} at the nearest residential property line to the south of the project site. Furthermore, when combined with existing measured ambient noise levels, the single-family residential property located to the north of the project site will be exposed to short-term increases in ambient noise levels of up to 18 dB Leq, to the east of the project site up to 20 dB Leq, and to the south of the project site up to 21 dB Leq. However, 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.

Construction truck trips would occur throughout the construction period. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[1] The estimated existing average daily trips along Slover Avenue in the vicinity of the project site range between 8,921 to 10,368 average daily vehicle trips.[2] As shown in the CalEEMod output files provided in the Air Quality Analysis prepared for the proposed project (Lilburn Corporation, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 72 vehicle trips per day (52 for worker trips and 20 for vendor trips). Given the project site's proximity to the 10 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. 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

During operation, the proposed project is expected to generate approximately 95 average daily trips with 8 trips during the AM peak-hour and 9 trips during the PM peak-hour. Existing traffic noise levels range between 59-74 dBA CNEL at the right-of-way of each modeled roadway segment; and the modeled Existing Plus Project traffic noise levels range between 62-74 dBA CNEL at the right-of-way of each modeled roadway segment. Project generated vehicle traffic is anticipated to change the noise between approximately 0.13 to 2.51 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.

The SoundPLAN noise model was utilized to estimate peak hour operation of the project in order to determine if it is likely to result in substantial increases in ambient noise levels. A description of each noise source and model parameters are discussed in Section 5 of this report. As shown in Figures 6 and 7, modeled peak hour project operational noise is expected to range between 35 and 43 dBA L_{eq} at these receptors. Existing measured ambient noise levels at the sensitive receptor locations ranged between 54 and 70 dBA Leq. At the most, project generated ambient noise levels may result in an increase of 0.3 dB at existing sensitive receptors. This increase would not be readily noticeable. Project operation would not result in substantial increases in ambient noise levels. No mitigation is required.

[1] Federal Highway Administration, Highway Noise Prediction Model, December 1978.

[2] Existing average daily vehicle traffic along Slover Avenue was obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017).

Further, 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 43 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

Damage

The Caltrans Transportation and Construction Vibration Guidance Manual (2020) establishes that there is a risk of architectural damage at modern residential and commercial/industrial buildings when groundborne vibration levels reach a PPV of 0.5 inches per second. The nearest off-site structure is the residential structure located approximately 33 feet north of the proposed project's northern property line. . At 33 feet, use of a vibratory roller would be expected to generate a PPV of 0.138 in/sec and a bulldozer would be expected to generate a PPV of 0.059 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to modern residential and commercial/industrial buildings of a PPV of 0.5 in/sec PPV. 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

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 peak particle velocity (PPV) greater than or equal to two-tenths (0.2) inches per second (in./sec.) measured at or beyond the lot line.* However, per 83.01.090 (c) construction activities are exempt from compliance with this code as long as construction and demolition activities occur between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays. Project construction will only occur between the hours during which construction activities are exempt. Therefore, project demolition and construction will be consistent with the applicable code and will result in less than significant impacts. 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 10426 Locust Avenue Warehouse 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

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PROJECT DESCRIPTION

The proposed project involves construction of a new 55,020 square foot warehouse building. The proposed project also includes 56 parking stalls for employees and vendors. Access to the Project Site would be will be provided by two driveways on Locust Avenue.

Figure 1
Project Location Map

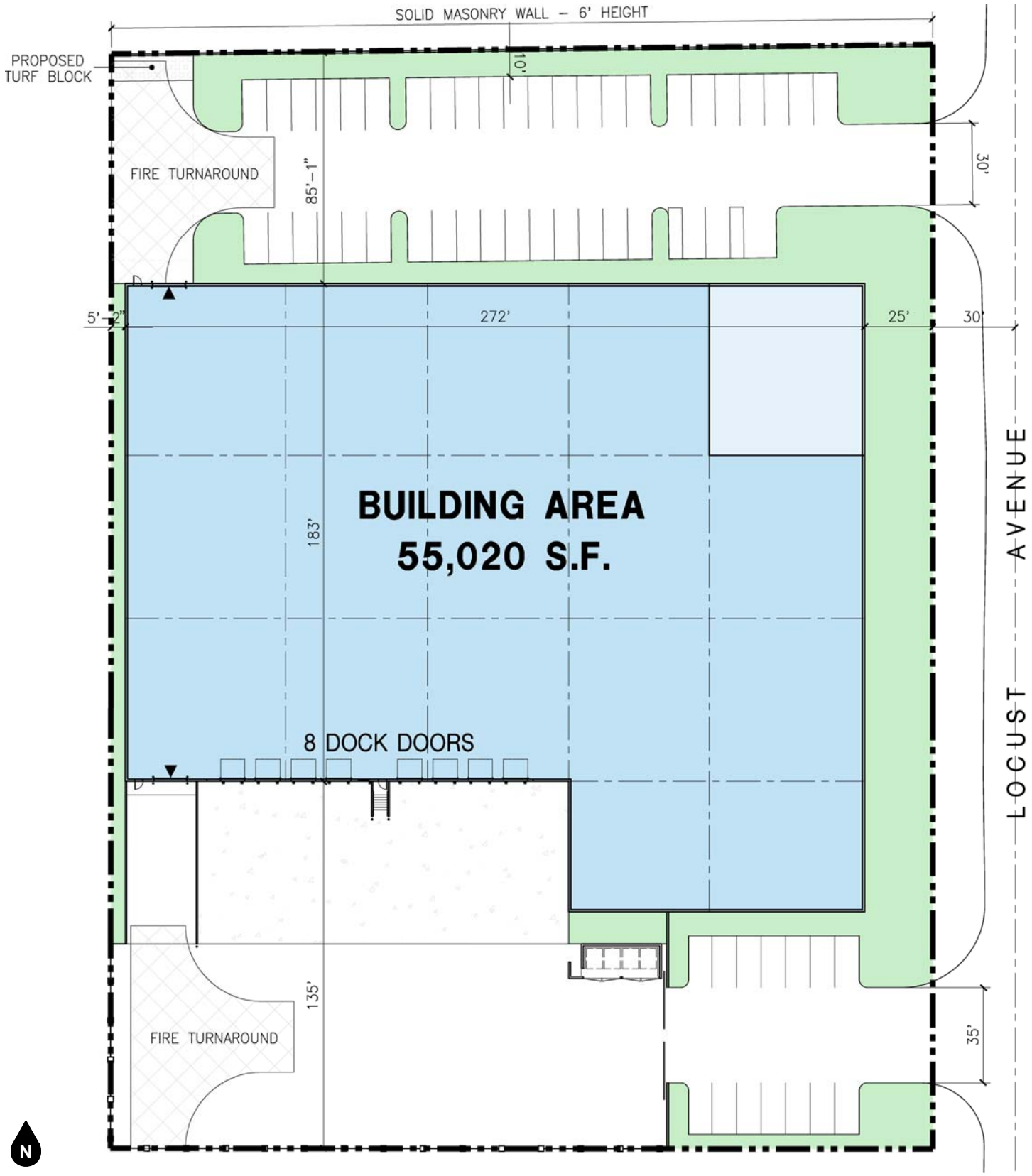


Figure 2
Site Plan

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.

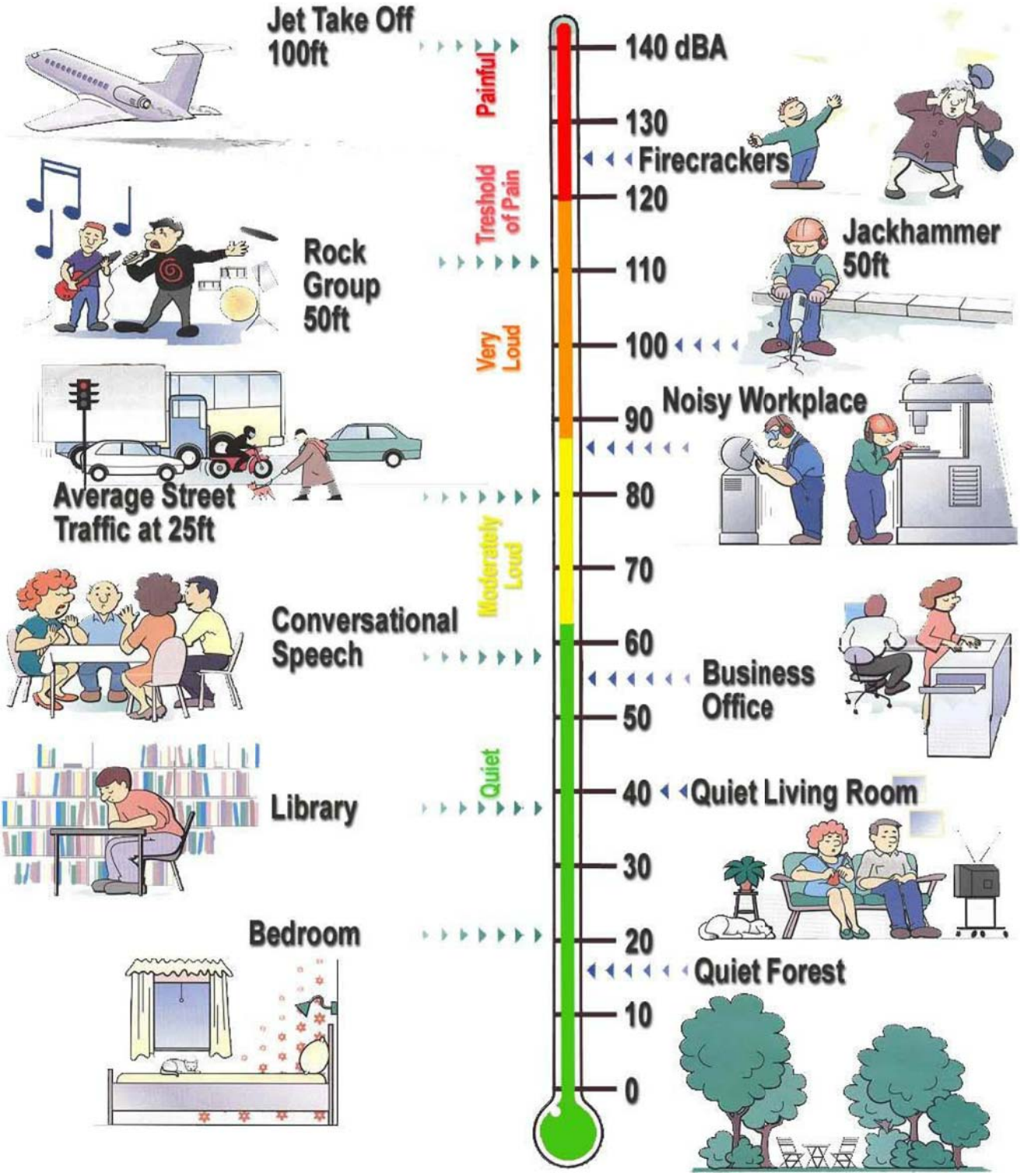
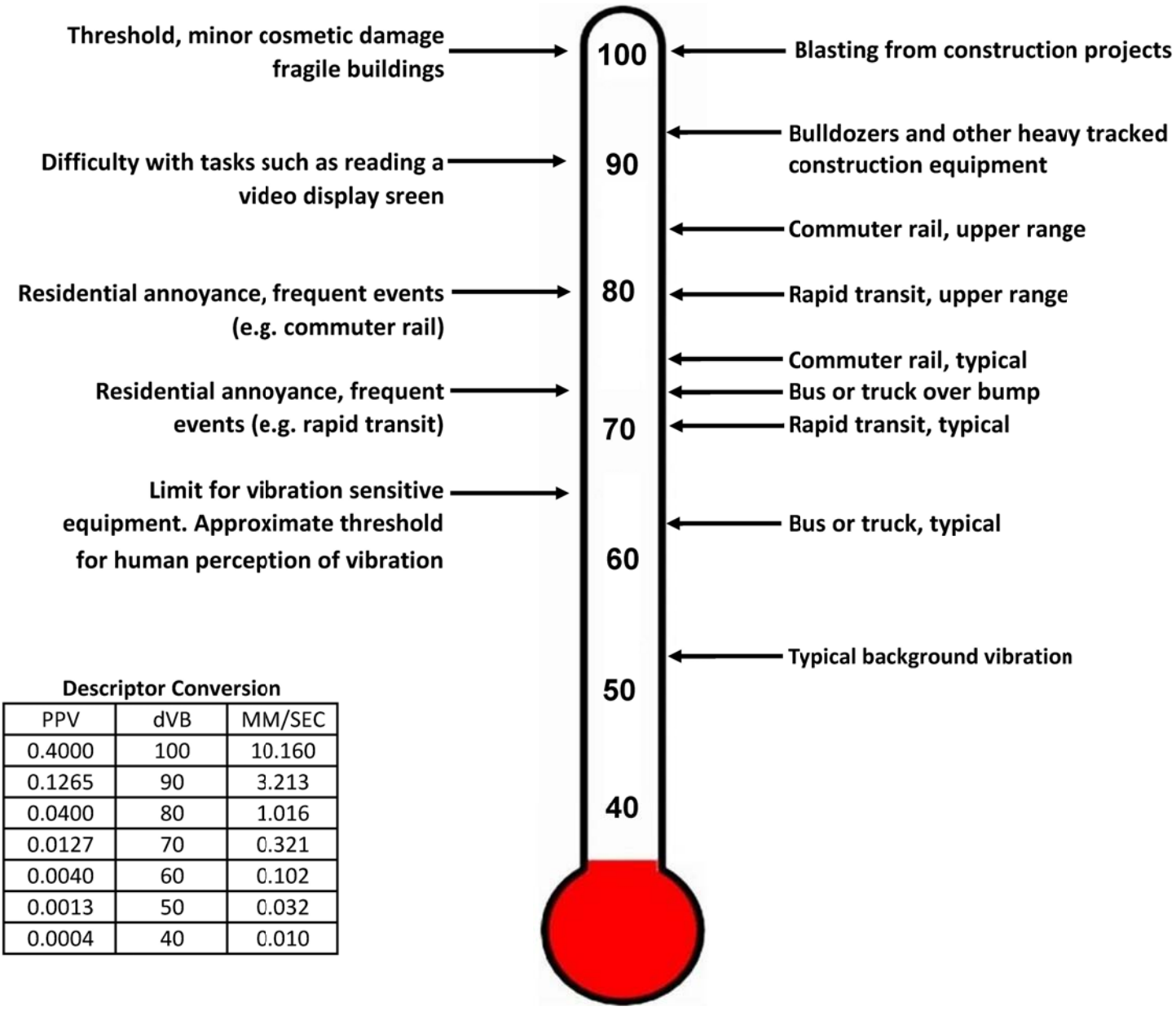


Figure 3
Weighted Sound Levels in Common Environments

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 and single-family residential uses to the south, Locust Avenue to the east, single-family residential uses to the north, and industrial uses to the west 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 single-family residential uses located adjacent to the north and south and approximately 60 feet to the east (across Locust Avenue), 630 feet to the southeast (across intersection of Locust Avenue and Slover Avenue), 1,229 feet to the south (along the western side of Slover Avenue), and 1,278 feet to the southwest (along Otilla Street) of the project site. In addition, a church use is located approximately 895 feet to the southeast (along the eastern side of Locust Avenue) 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, four (4) 15-minute daytime noise measurements were taken between 12:26 PM and 2:20 PM on May 18, 2022. In addition, one (1) long-term 24-hour noise measurement was also taken from May 18, 2022, to May 19, 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 single-family residential use located at 10356 Locust Avenue, Bloomington. The noise meter was placed along the eastern property line of the residence just west of Locust Avenue.

- STNM2: represents the existing noise environment of the single-family residential uses along the eastern side of Locust Avenue (10431 Locust Avenue, Bloomington). The noise meter was placed along the western property line of the residential use just east of Locust Avenue.

- STNM3: represents the existing noise environment of the single-family residential use located at the southeastern corner of Slover Avenue and Locust Avenue (18111 Slover Avenue, Bloomington). The noise meter was placed along the northern property lien of the residence just south of Slover Avenue.

- STNM4: represents the existing noise environment of the church use located at 10575 Locust Avenue, Bloomington. The noise

- LTNM2: represents the existing noise environment of the project site. The noise meter was placed in the northeastern corner of the project site.

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 54.1 and 70.4 dBA L_{eq}. Long-term hourly noise measurement ambient noise levels ranged from 48.6 to 63.3 dBA L_{eq}. The dominant noise source was vehicle traffic from vehicle traffic associated with Slover Avenue, Locust Avenue, 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	12:26 PM	57.3	64.3	52.8	61.2	60.2	58.2	56.4
STNM2	12:58 PM	54.1	65.7	49.6	59.8	55.9	54.1	52.9
STNM3	1:34 PM	70.4	89.1	56.1	77.5	74.5	70.5	65.8
STNM4	2:05 PM	68.5	82.2	47.5	77.2	73.5	68.7	62.5

Notes:
(1) See Figure 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.
(2) Noise measurements performed on May 18, 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	7:00 PM	55.9	88.7	44.2	61.1	57.4	53.9	51.7
1	7:00 PM	53.8	72.3	48.4	58.1	55.3	53.6	52.3
2	8:00 PM	53.0	65.2	47.3	60.1	57.0	52.8	50.9
3	9:00 PM	52.2	65.1	46.5	60.2	56.0	51.2	49.6
4	10:00 PM	51.8	63.8	45.8	60.0	55.2	50.9	49.0
5	11:00 PM	50.1	62.1	45.2	57.6	52.4	49.8	48.2
6	12:00 AM	50.0	68.8	45.5	56.9	52.1	49.7	48.6
7	1:00 AM	51.7	63.2	44.2	59.0	56.4	51.5	49.0
8	2:00 AM	48.6	58.4	44.4	53.8	51.5	48.5	47.5
9	3:00 AM	50.8	64.3	44.8	59.7	53.1	49.5	48.2
10	4:00 AM	52.2	66.1	46.5	58.8	55.6	51.7	49.9
11	5:00 AM	54.8	65.2	46.8	60.0	57.7	56.0	53.9
12	6:00 AM	54.1	68.3	47.6	58.5	56.5	54.5	52.9
13	7:00 AM	55.5	69.6	48.7	61.0	58.3	55.6	54.1
14	8:00 AM	56.2	70.1	49.0	61.9	59.2	57.0	54.9
15	9:00 AM	55.0	65.7	47.3	62.9	59.3	54.3	52.4
16	10:00 AM	53.1	65.2	47.1	59.6	56.6	53.4	51.3
17	11:00 AM	61.5	88.7	46.3	66.1	59.9	55.1	52.1
18	12:00 PM	63.3	86.3	48.4	73.5	62.1	57.2	54.6
19	1:00 PM	60.7	83.9	47.5	69.5	61.1	56.4	52.8
20	2:00 PM	53.1	67.5	49.2	58.3	54.6	53.0	52.2
21	3:00 PM	54.0	75.4	48.7	58.8	55.2	53.0	51.8
22	4:00 PM	54.5	68.7	49.3	61.3	57.2	54.1	52.6
23	5:00 PM	53.2	77.9	47.2	57.8	54.6	52.9	51.9
24	6:00 PM	55.3	64.5	50.2	61.0	59.1	55.2	53.7
CNEL	59.90							

Notes:

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

(2) Noise measurement performed from May 18, 2022 to May 19, 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 0.5 inches per section (in/sec) PPV not be exceeded for the protection of modern residential and commercial/industrial 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.

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

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

Notes:

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

(2) The outdoor environment shall be limited to:

Hospital/office building patios
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, 2022). 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

The roadway noise level increases from project generated vehicular traffic were modeled utilizing a computer program that replicates the FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

The FHWA Traffic Noise Prediction Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emissions Levels.[1] Adjustments are then made to the REMEL to account for: total average daily traffic volumes, roadway classification (i.e., collector, secondary, major or arterial), the roadway active width (i.e., distance between the center of the outermost travel lanes on each side of the roadway), travel speed, truck mix (i.e., percentage of automobiles, medium trucks, and heavy trucks in the traffic volume), roadway grade and site conditions (hard or soft ground surface relating to the absorption of the ground, pavement, or landscaping). Research conducted by Caltrans identifies that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model.[2] Therefore, surfaces adjacent to all modeled roadways were assumed to have a "soft site". Possible reductions in noise levels due to intervening topography and buildings were not accounted for in this analysis.

Project average daily vehicle trips and vehicle mix were obtained from the trip generation provided in the 10426 Locust Avenue Warehouse Project Transportation Study Screening Assessment (Ganddini Group April 29, 2022). As no project trip distribution was provide, and to be conservative, all project generated vehicle trips were assumed to travel on each of the modeled roadway segments. Existing average daily vehicle traffic along Slover Avenue was obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017).[3] Existing average daily vehicle traffic along Locust Avenue was estimated utilizing the existing measured ambient noise levels (see Table 1, STNM2). Existing Plus Project vehicle mixes were calculated by adding the proposed project trips to existing conditions. FHWA spreadsheets are included in Appendix E.

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[1] California Department of Transportation Environmental Program, Office of Environmental Engineering. Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction. September 1995. TAN 95-03.

[2] California Department of Transportation. Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report. June 1995. FHWA/CA/TL-95/23.

[3] Existing ADT for Jurupa Avenue east of Cedar Avenue obtained at https://countywideplan.com/wpcontent/uploads/sites/68/2020/10/Trans_CWP_221_77_ExCon_FinalDraft_032917.pdf

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, 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[4].

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.

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[5]. A rooftop HVAC plan is not available at the time of this analysis so the exact

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

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

location and number of units per building were estimated. A roof plan is not yet available, so a conservative number of rooftop units (9) 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.

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.

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.

NOISE IMPACTS DUE TO CONSTRUCTION ACTIVITIES

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 October 2022 and be completed by mid-October 2023.

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 adjacent to the north and south and approximately 60 feet to the east 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 6. Worksheets for each phase are included as Appendix D.

Modeled unmitigated construction noise levels reached 75.1 dBA L_{eq} at the nearest residential property line to the north of the project site, 73.9 dBA L_{eq} at the nearest residential property line to the east of the project site, and 75.1 dBA L_{eq} at the nearest residential property line to the south of the project site. The expected duration of each phase and the loudest sound level at the nearest sensitive receptors (single-family residential properties located to the north and south) is presented below:

Phase	Number of Days	Maximum Leq
Demolition	20	75.1
Site Preparation	3	72.7
Grading	6	73.5
Building Construction	220	70.9
Paving	10	71
Architectural Coating	10	61.6

Table 6 also includes a comparison of existing noise levels and project construction noise levels. STNM1 was chosen to represent noise levels at the property line of the single-family residential use located to the north of the project site and STNM2 was chosen to represent the property line of the single-family residential uses located to the east and south of the project site. When combined with existing measured ambient noise levels, the single-family residential property located to the north of the project site will be exposed to short-term increases in ambient noise levels of up to 18 dB Leq, to the east of the project site up to 20 dB Leq, and to the south of the project site up to 21 dB Leq. However, 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) (as follows) 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.

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.

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 as part of the project 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 shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/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).

Construction truck trips would occur throughout the construction period. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[6] The estimated existing average daily trips along Slover Avenue in the vicinity of the project site range between 8,921 to 10,368 average daily vehicle trips.[7] As shown in the CalEEMod output files provided in the Air Quality Analysis prepared for the proposed project (Lilburn Corporation, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 72 vehicle trips per day (52 for worker trips and 20 for vendor trips). Given the project site's proximity to the 10 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. 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.

[6] Federal Highway Administration, Highway Noise Prediction Model, December 1978.

[7] Existing average daily vehicle traffic along Slover Avenue was obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017).

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 95 average daily trips with 8 trips during the AM peak-hour and 9 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 7. 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 7.

Existing Year (With Project): This scenario refers to existing year plus project traffic noise conditions and is demonstrated in Table 7.

As shown in Table 8, modeled Existing traffic noise levels range between 59-74 dBA CNEL at the right-of-way of each modeled roadway segment; and the modeled Existing Plus Project traffic noise levels range between 62-74 dBA CNEL at the right-of-way of each modeled roadway segment.

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 0.13 to 2.51 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

The SoundPLAN noise model was utilized to estimate peak hour operation of the project in order to determine if it is likely to result in substantial increases in ambient noise levels. A description of each noise source and model parameters are discussed in Section 5 of this report. As shown in Figures 6 and 7, modeled peak hour project operational noise is expected to range between 35 and 43 dBA L_{eq} at these receptors. Existing measured ambient noise levels at the sensitive receptor locations ranged between 54 and 70 dBA Leq. At the most, project generated ambient noise levels may result in an increase of 0.3 dB at existing sensitive receptors. This increase would not be readily noticeable. Project operation would not result in substantial increases in ambient noise levels. No mitigation is required.

Further, 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 43 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

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.

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.

The Caltrans Transportation and Construction Vibration Guidance Manual (2020) establishes that there is a risk of architectural damage at modern residential and commercial/industrial buildings when groundborne vibration levels reach a PPV of 0.5 inches per second (see Table 11). The nearest off-site structures include a residential structure located approximately 33 feet north of the proposed project's northern property line, , a residential structure located approximately 91 feet to the east of the proposed project's eastern property line, a residential structure (associated with an industrial use) located approximately 80 feet south of the proposed project's southern property line, an industrial structure located approximately 198 feet to the west of the proposed project's western property line, and an industrial structure located approximately 194 feet to the northeast of the proposed project's northern property line. Therefore, the nearest off-site structure is the residential structure located approximately 33 feet to the north of the northern project property line. At 33 feet, use of a vibratory roller would be expected to generate a PPV of 0.138 in/sec and a bulldozer would be expected to generate a PPV of 0.059 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to modern residential and commercial/industrial buildings of a PPV of 0.5 in/sec PPV. Impacts associated with construction equipment would be less than significant. No mitigation is required.

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 (in./sec.) at a distance of 25 feet (Caltrans 2020). Trucks entering and exiting the site via the driveway proposed in the northeast corner of the project site may result in groundborne vibration levels of up to 0.058 PPV (in./sec.) at the northern property line that is shared with the closest sensitive receptor. 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 peak particle velocity (PPV) greater than or equal to two-tenths (0.2) inches per second (in./sec.) measured at or beyond the lot line*. The Caltrans Transportation and Construction Vibration Guidance Manual (2020) establishes that there is a risk of architectural damage at modern residential and commercial/industrial buildings when groundborne vibration levels reach a PPV of 0.5 (in./sec.). Groundborne vibration associated with heavy loaded trucks entering and exiting the project site would not exceed the County's vibration threshold of 0.2 PPV (in./sec.) or the Caltrans damage threshold of 0.5 PPV (in./sec). Groundborne vibration levels associated with passenger vehicles is much lower.

Groundborne vibration associated with heavy loaded trucks would be less than significant. No mitigation is required. Groundborne 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).

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 peak particle velocity (PPV) greater than or equal to two-tenths (0.2) inches per second (in./sec.) measured at or beyond the lot line.* However, per 83.01.090 (c) construction activities are exempt from compliance with this code as long as construction and demolition activities occur between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays. Project construction will only occur between the hours during which construction activities are exempt. Therefore, project demolition and construction will be consistent with the applicable code and will result in less than significant impacts. No mitigation is required.

Table 6
Construction Noise Levels (dBA L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[2]	Construction Noise Levels (dBA Leq)	Combined Noise Levels (dBA Leq)	Increase (dB)
Demolition	Single-Family Residential to North (10356 Locust Ave)	57.3	75.1	75.2	17.9
	Single-Family Residential to East (10423 Locust Ave)	54.1	73.9	73.9	19.8
	Single-Family Residential to South (10450 Locust Ave)	54.1	75.1	75.1	21.0
Site Preparation	Single-Family Residential to North (10356 Locust Ave)	57.3	72.7	72.8	15.5
	Single-Family Residential to East (10423 Locust Ave)	54.1	71.5	71.6	17.5
	Single-Family Residential to South (10450 Locust Ave)	54.1	72.7	72.8	18.7
Grading	Single-Family Residential to North (10356 Locust Ave)	57.3	73.5	73.6	16.3
	Single-Family Residential to East (10423 Locust Ave)	54.1	72.3	72.4	18.3
	Single-Family Residential to South (10450 Locust Ave)	54.1	73.5	73.5	19.4
Building Construction	Single-Family Residential to North (10356 Locust Ave)	57.3	70.9	71.1	13.8
	Single-Family Residential to East (10423 Locust Ave)	54.1	69.7	69.8	15.7
	Single-Family Residential to South (10450 Locust Ave)	54.1	70.9	71.0	16.9
Paving	Single-Family Residential to North (10356 Locust Ave)	57.3	71.0	71.2	13.9
	Single-Family Residential to East (10423 Locust Ave)	54.1	69.8	69.9	15.8
	Single-Family Residential to South (10450 Locust Ave)	54.1	71.0	71.1	17.0
Architectural Coating	Single-Family Residential to North (10356 Locust Ave)	57.3	61.6	63.0	5.7
	Single-Family Residential to East (10423 Locust Ave)	54.1	60.4	61.3	7.2
	Single-Family Residential to South (10450 Locust Ave)	54.1	61.6	62.3	8.2

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 north and STNM2 was used for residential uses to the east and south of the project site.

Table 7
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		
Slover Avenue	West of Locust Avenue	8,921	9,016	45	Soft
	East of Locust Avenue	10,368	10,463	50	Soft
Locust Avenue	North of Slover Avenue	1,683	1,778	25	Soft

Vehicle Distribution (Light Mix)[2]			
Motor-Vehicle Type	Daytime % (7 AM-7 PM)	Evening % (7 PM-10 PM)	Night % (10 PM-7 AM)
Automobiles	75.56	13.96	10.49
Medium Trucks	48.91	2.17	48.91
Heavy Trucks	47.30	5.41	47.30

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) Project average daily vehicle trips and vehicle mix were obtained from the trip generation provided in the 10426 Locust Avenue Warehouse Project Transportation Study Screening Assessment (Ganddini Group April 29, 2022). As no project trip distribution was provided, and to be conservative, all project generated vehicle trips were assumed to travel on each of the modeled roadway segments. Existing average daily vehicle traffic along Slover Avenue was obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017). Existing average daily vehicle traffic along Locust Avenue was estimated utilizing the existing measured ambient noise levels (see Table 1, STNM2).

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

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?
Slover Avenue	East of Locust Avneue	52	73.59	73.72	0.13	Yes	No
	West of Locust Avenue	52	72.24	72.40	0.16	Yes	No
Locust Avenue	North of Slover Avenue	30	58.58	61.09	2.51	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 Measured Noise 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	57.3	35.3	57.3	0.0
STNM2	54.1	42.8	54.4	0.3
STNM3	70.4	34.5	70.4	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 May 18, 2022.

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	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: 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.

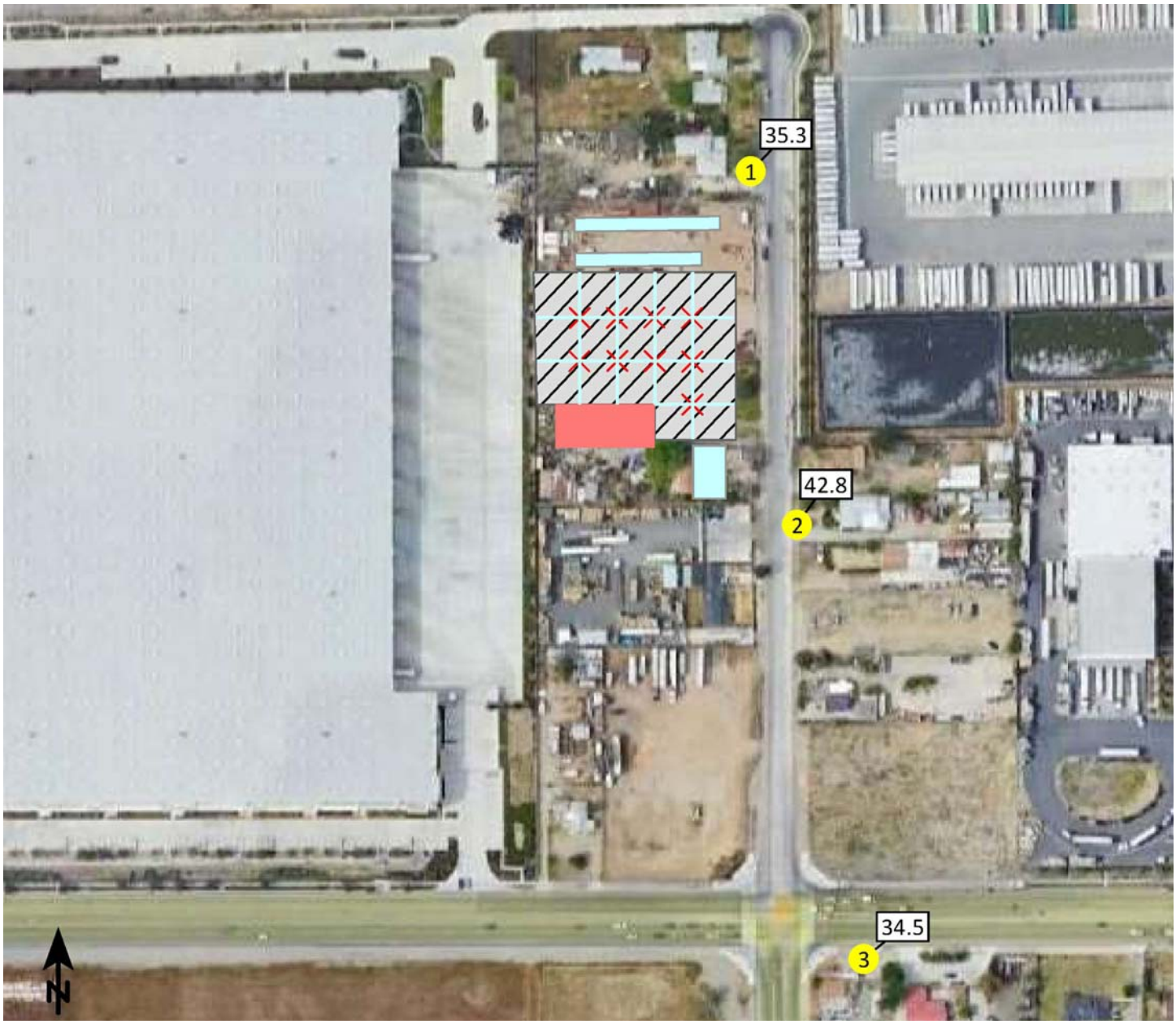

Figure 6
Project Operational Noise Levels (dBA, Leq)

Figure 7
Operational Noise Contours (dBA, Leq)

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 October 2022 and be completed by mid-October 2023.

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 75.1 dBA L_{eq} at the nearest residential property line to the north of the project site, 73.9 dBA L_{eq} at the nearest residential property line to the east of the project site, and 75.1 dBA L_{eq} at the nearest residential property line to the south of the project site. Furthermore, when combined with existing measured ambient noise levels, the single-family residential property located to the north of the project site will be exposed to short-term increases in ambient noise levels of up to 18 dB Leq, to the east of the project site up to 20 dB Leq, and to the south of the project site up to 21 dB Leq. However, 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.

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.

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 as part of the project 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 shall be shut off when not in use.

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/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. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[8] The estimated existing average daily trips along Slover Avenue in the vicinity of the project site range between 8,921 to 10,368 average daily vehicle trips.[9] As shown in the CalEEMod output files provided in the Air Quality Analysis prepared for the proposed project (Lilburn Corporation, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 72 vehicle trips per day (52 for worker trips and 20 for vendor trips). Given the project site's proximity to the 10 Freeway, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. 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 SoundPLAN noise model was utilized to estimate peak hour operation of the project in order to determine if it is likely to result in substantial increases in ambient noise levels. A description of each noise source and model parameters are discussed in Section 5 of this report. As shown in Figures 6 and 7, modeled peak hour project operational noise is expected to range between 35 and 43 dBA L_{eq} at these receptors. Existing measured ambient noise levels at the sensitive receptor locations ranged between 54 and 70 dBA Leq. At the most, project generated ambient noise levels may result in an increase of 0.3 dB at existing sensitive receptors. This increase would not be readily noticeable. Project operation would not result in substantial increases in ambient noise levels. No mitigation is required.

Further, 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 43 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.

[8] Federal Highway Administration, Highway Noise Prediction Model, December 1978.

[9] Existing average daily vehicle traffic along Slover Avenue was obtained from the San Bernardino Countywide Plan Transportation Existing Conditions Report, Table 3 - San Bernardino County Existing ADT Counts (March 2017).

During operation, the proposed project is expected to generate approximately 95 average daily trips with 8 trips during the AM peak-hour and 9 trips during the PM peak-hour. A Project generated vehicle noise along affected roadways was modeled utilizing a computer program that replicates the FHWA Traffic Noise Prediction Model FHWA-RD-77-108. Project generated vehicle trips are anticipated to increase noise levels between approximately 0.13 to 2.51 dB along modeled roadway segments and would not result in significant increases in ambient noise levels. The impact would be less than significant. No mitigation is required.

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

Less Than Significant Impact:

Excessive groundborne vibration levels can result in two types of impacts; architectural/structural related impacts and annoyance impacts.

Damage

The Caltrans Transportation and Construction Vibration Guidance Manual (2020) establishes that there is a risk of architectural damage at modern residential and commercial/industrial buildings when groundborne vibration levels reach a PPV of 0.5 inches per second (see Table 11). The nearest off-site structures include a residential structure located approximately 33 feet north of the proposed project's northern property line, a residential structure located approximately 91 feet to the east of the proposed project's eastern property line, a residential structure (associated with an industrial use) located approximately 80 feet south of the proposed project's southern property line, an industrial structure located approximately 198 feet to the west of the proposed project's western property line, and an industrial structure located approximately 194 feet to the northeast of the proposed project's northern property line. Therefore, the nearest off-site structure is the residential structure located approximately 33 feet to the north of the northern project property line. At 33 feet, use of a vibratory roller would be expected to generate a PPV of 0.138 in/sec and a bulldozer would be expected to generate a PPV of 0.059 in/sec. Temporary vibration levels associated with project construction would not exceed the threshold at which there is a risk to "architectural" damage to modern residential and commercial/industrial buildings of a PPV of 0.5 in/sec PPV. Impacts would be less than significant. No mitigation is required.

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). Trucks entering and exiting the site via the driveway proposed in the northeast corner of the project site may result in groundborne vibration levels of up to 0.058 PPV (in./sec.) at the property line northern property line that is shared with the closest sensitive receptor. 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 peak particle velocity (PPV) greater than or equal to two-tenths (0.2) inches per second (in./sec.) measured at or beyond the lot line*. The Caltrans Transportation and Construction Vibration Guidance Manual (2020) establishes that there is a risk of architectural damage at modern residential and commercial/industrial buildings when groundborne vibration levels reach a PPV of 0.5 (in./sec.). Groundborne vibration associated with heavy loaded trucks entering and exiting the project site would not exceed the County's vibration threshold of 0.2 PPV (in./sec.) or the Caltrans damage threshold of 0.5 PPV (in./sec). 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.

Annoyance

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 peak particle velocity (PPV) greater than or equal to two-tenths (0.2) inches per second (in./sec.)*

measured at or beyond the lot line. However, per 83.01.090 (c) construction activities are exempt from compliance with this code as long as construction and demolition activities occur between 7:00 AM and 7:00 PM Mondays through Saturdays and not on Sundays or Federal holidays. Project construction will only occur between the hours during which construction activities are exempt. Therefore, project demolition and construction will be consistent with the applicable code and will result in less than significant impacts. 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 airports to the project site are the Flabob Airport, with associated airport runways located as close as approximately 5.16 miles to the south; the Riverside Municipal Airport, with associated airport runways located as close as approximately 7.99 miles to the south; the San Bernardino International Airport, with associated airport runways located as close as approximately 9.10 miles to the northeast; and the Ontario International Airport, with associated airport runaways located as close as approximately 9.80 miles to the southwest of the project site.

Per the City of Riverside General Plan Safety Element, the project site is well outside Zone E for both the Riverside Municipal Airport and the Flabob Airport. The Riverside County Airport Land Use Compatibility Plan Volume 1 Policy Document (ALUCP) Map FL-3 Noise Compatibility Contours (December 2004) provides the noise compatibility contours for the Flabob Airport, which show that the project site is well outside the 55 dBA CNEL noise contour for the airport. The Riverside County ALUCP Policy Document Map RI-1 Noise Compatibility Contours (March 2005) shows that the project site is also well outside the 55 dBA CNEL noise contour for the Riverside Municipal Airport.

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.[10] 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.

As shown on the Ontario International Airport Land Use Compatibility Plan (ALUCP) Map 2-3, the project site is just outside of the 60 dBA CNEL noise contour for the Ontario 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.

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

8. REFERENCES

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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).

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

APPENDICES

Appendix A List of Acronyms
Appendix B Definitions of Acoustical Terms
Appendix C Noise Measurement Field Worksheets
Appendix D Construction Noise Modeling
Appendix E FHWA Worksheets
Appendix F SoundPLAN Worksheets
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.
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 WORKSHEETS

Noise Measurement
Field Data

Project Name: 18060 Slover Avenue Warehouse (19508) & 10428 Locust Avenue Warehouse (19509) **Date:** May 18, 2022

Project #: 19508 & 19509

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

Nearest Address or Cross Street: 10356 Locust Avenue, Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Noise Measurement Site: Locust Ave to east with industrial uses further east, single-family residential to west & NW, 19509 project site to SW, & train yard further north of measurement site.

Weather: Clear skies sunshine **Settings:** SLOW FAST

Temperature: 74 deg F **Wind:** 8mph **Humidity:** 49% **Terrain:** Flat

Start Time: 12:26 PM **End Time:** 12:41 PM **Run Time:**

Leq: 57.3 dB
Lmax 64.3 dB
L2 61.2 dB
L8 60.2 dB
L25 58.2 dB
L50 56.4 dB

Primary Noise Source: Traffic noise from vehicles traveling along Slover Avenue & Locust Avenue and traffic ambiance from other roads.

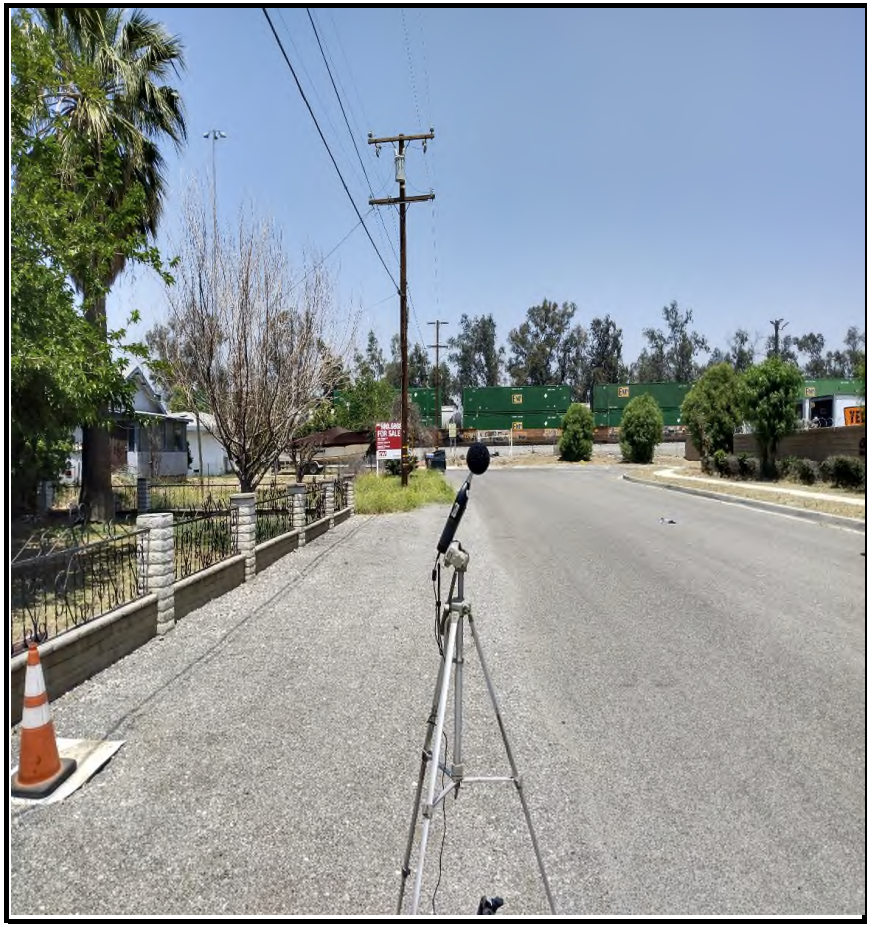
Secondary Noise Sources: Leaf rustle from breeze. Bird song. Warehouse & storage yard ambiance. Occassional overhead air traffic. Train yard to north.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL 200
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CAL 200
SERIAL NUMBER:	3855	**SERIAL NUMBER:**	11178
FACTORY CALIBRATION DATE:	6/7/2021	**FACTORY CALIBRATION DATE:**	6/8/2021
FIELD CALIBRATION DATE:	5/18/2022		

Noise Measurement
Field Data

PHOTOS:

STNM1 looking W towards driveway & frontyard of residence 10356 Locust Avenue, Bloomington.



STNM1 looking N up Locust Avenue towards train yard.

Summary	
File Name on Meter	LxT_Data.014.s
File Name on PC	LxT_0003855-20220518 122645-LxT_Data.014.ldbin
Serial Number	0003855
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM1 34° 3'57.39"N 117°24'34.45"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Projects 19508 & 19508, City of Bloomington

Measurement	
Start	2022-05-18 12:26:45
Stop	2022-05-18 12:41:45
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-18 12:26:07
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1
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	145.2 dB

Results			
L_{Aeq}	57.3		
LAE	86.9		
EA	54.163 µPa²h		
EA8	1.733 mPa²h		
EA40	8.666 mPa²h		
$L_{Apeak\ (max)}$	2022-05-18 12:30:21	90.0 dB	
L_{ASmax}	2022-05-18 12:35:04	64.3 dB	
L_{ASmin}	2022-05-18 12:27:59	52.8 dB	

		Statistics	
L_{Ceq}	75.1 dB	**LA2.00**	61.2 dB
L_{Aeq}	57.3 dB	**LA8.00**	60.2 dB
L_{Ceq} - L_{Aeq}	17.7 dB	**LA25.00**	58.2 dB
L_{AIeq}	59.6 dB	**LA50.00**	56.4 dB
L_{Aeq}	57.3 dB	**LA66.60**	55.7 dB
L_{AIeq} - L_{Aeq}	2.3 dB	**LA90.00**	54.5 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.014.s	Computer's File Name	LxT_0003855-20220518 122645-LxT_Data.014.ldbin
Meter	LxT1 0003855		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM1 34° 3'57.39"N 117°24'34.45"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Projects 19508 & 19508, City of Bloomington		
Start Time	2022-05-18 12:26:45	Duration	0:15:00.0
End Time	2022-05-18 12:41:45	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	57.3 dB		
LAE	86.9 dB	SEA	--- dB
EA	54.2 µPa²h	LAFTM5	60.5 dB
EA8	1.7 mPa²h		
EA40	8.7 mPa²h		
LA_{peak}	90.0 dB	2022-05-18 12:30:21	
LAS_{max}	64.3 dB	2022-05-18 12:35:04	
LAS_{min}	52.8 dB	2022-05-18 12:27:59	
LA_{eq}	57.3 dB		
LC_{eq}	75.1 dB	LC_{eq} - LA_{eq}	17.7 dB
LAI_{eq}	59.6 dB	LAI_{eq} - LA_{eq}	2.3 dB

Exceedances	Count	Duration
LAS > 65.0 dB	0	0:00:00.0
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

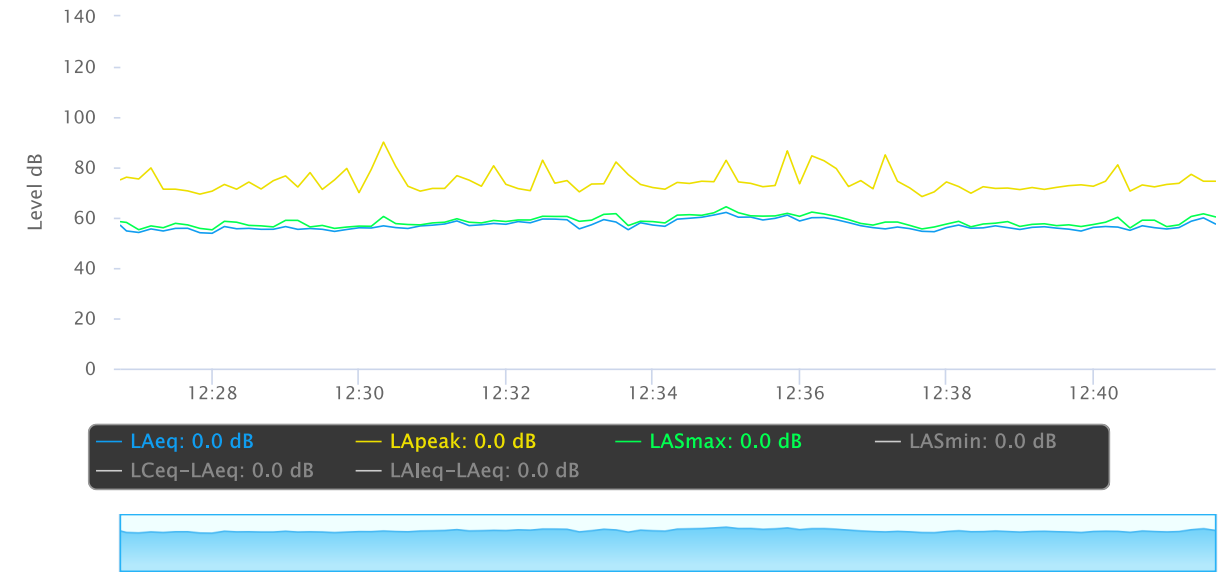
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	57.3 dB		75.1 dB		--- dB	
$L_{S(max)}$	64.3 dB	2022-05-18 12:35:04	--- dB		--- dB	
$L_{S(min)}$	52.8 dB	2022-05-18 12:27:59	--- dB		--- dB	
$L_{Peak(max)}$	90.0 dB	2022-05-18 12:30:21	--- dB		--- dB	

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

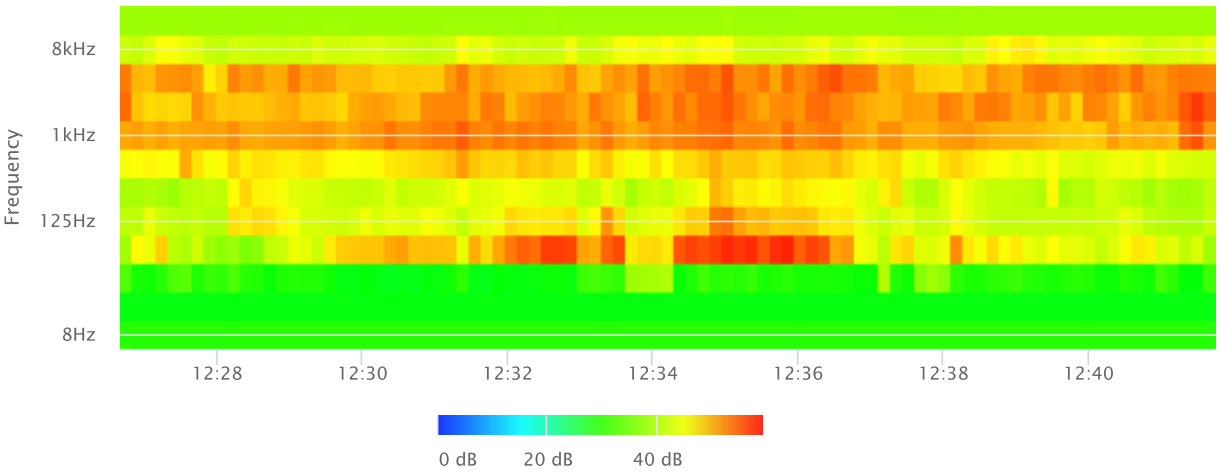
Statistics

LAS 2.0	61.2 dB
LAS 8.0	60.2 dB
LAS 25.0	58.2 dB
LAS 50.0	56.4 dB
LAS 66.6	55.7 dB
LAS 90.0	54.5 dB

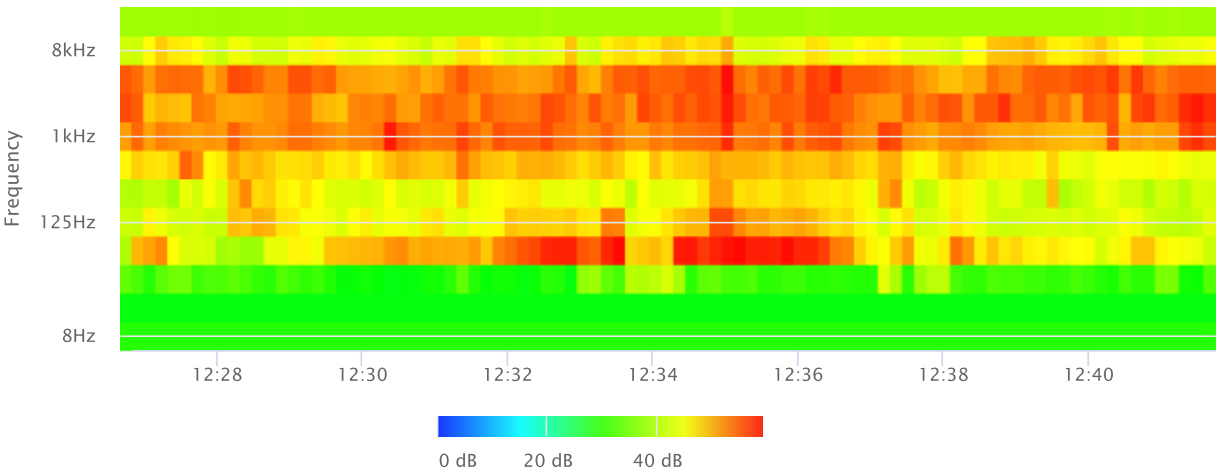
Time History



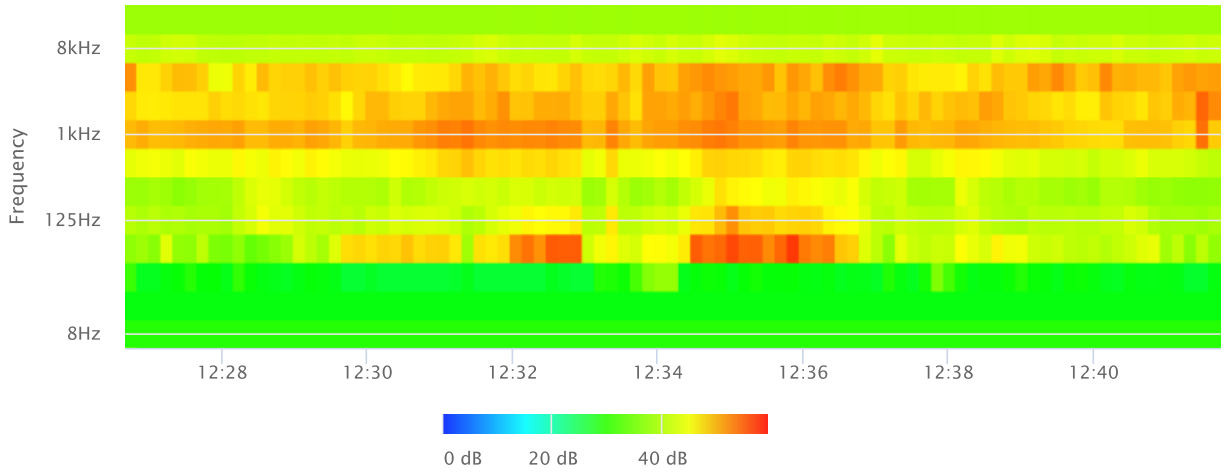
OBA 1/1 Leq



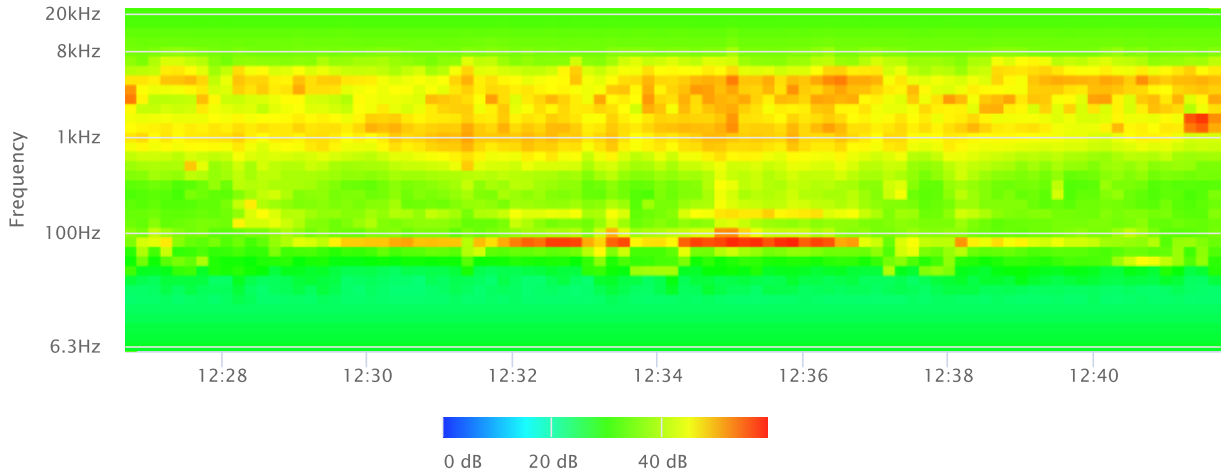
OBA 1/1 Lmax



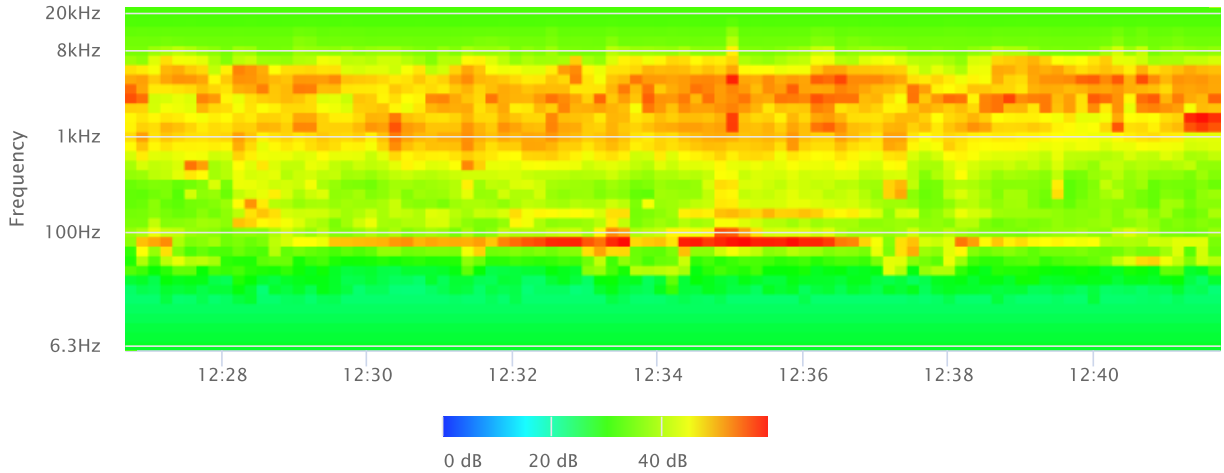
OBA 1/1 Lmin



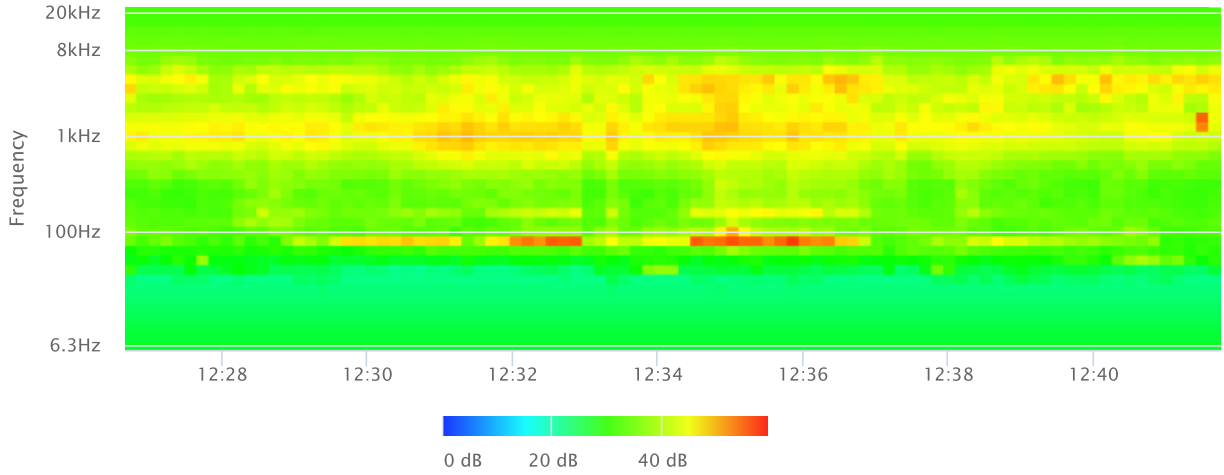
OBA 1/3 Leq



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
0 dB
20 dB
40 dB

Noise Measurement
Field Data

Project Name: 18060 Slover Avenue Warehouse (19508) & 10428 Locust Avenue Warehouse (19509) **Date:** May 18, 2022

Project #: 19508 & 19509

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

Nearest Address or Cross Street: 10431 Locust Avenue, Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Noise Measurement Site: Locust Ave to west w/ single-family and industrial uses further west, single-family residential to east. 19509 project site to NW and 19508 project site to SW.

Weather: Clear skies sunshine **Settings:** SLOW FAST

Temperature: 74 deg F **Wind:** 8mph **Humidity:** 49% **Terrain:** Flat

Start Time: 12:58 PM **End Time:** 1:13 PM **Run Time:**

Leq: 54.1 dB
Lmax 65.7 dB
L2 59.8 dB
L8 55.9 dB
L25 54.1 dB
L50 52.9 dB

Primary Noise Source: Traffic noise from vehicles traveling along Slover Avenue & Locust Avenue and traffic ambiance from other roads.

Secondary Noise Sources: Leaf rustle from breeze. Bird song. Warehouse & storage yard ambiance. Occassional overhead air traffic. Train yard to north.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL 200
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CAL 200
SERIAL NUMBER:	3855	**SERIAL NUMBER:**	11178
FACTORY CALIBRATION DATE:	6/7/2021	**FACTORY CALIBRATION DATE:**	6/8/2021
FIELD CALIBRATION DATE:	5/18/2022		

Noise Measurement
Field Data

PHOTOS:

STNM2 looking E towards frontyard of residence 10431 Locust Avenue, Bloomington.

STNM2 looking S down Locust Avenue towards Slover Avenue intersection.

Summary	
File Name on Meter	LxT_Data.015.s
File Name on PC	LxT_0003855-20220518 125809-LxT_Data.015.ldbir
Serial Number	0003855
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM2 34° 3'52.60"N 117°24'33.97"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Projects 19508 & 19508, City of Bloomington

Measurement	
Start	2022-05-18 12:58:09
Stop	2022-05-18 13:13:09
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-18 12:57:38
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1
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	145.3 dB

Results			
LA_{eq}		54.1	
LAE		83.7	
EA		25.753	µPa²h
EA8		824.093	µPa²h
EA40		4.120	mPa²h
$LA_{peak\ (max)}$	2022-05-18 13:09:14	85.9	dB
LAS_{max}	2022-05-18 13:10:19	65.7	dB
LAS_{min}	2022-05-18 13:01:41	49.6	dB

		Statistics	
LC_{eq}	73.5 dB	**LA2.00**	59.8 dB
LA_{eq}	54.1 dB	**LA8.00**	55.9 dB
LC_{eq} - LA_{eq}	19.4 dB	**LA25.00**	54.1 dB
LAI_{eq}	56.3 dB	**LA50.00**	52.9 dB
LA_{eq}	54.1 dB	**LA66.60**	52.3 dB
LAI_{eq} - LA_{eq}	2.2 dB	**LA90.00**	51.4 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.015.s	Computer's File Name	LxT_0003855-20220518 125809-LxT_Data.015.ldbin
Meter	LxT1 0003855		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM2 34° 3'52.60"N 117°24'33.97"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Projects 19508 & 19508, City of Bloomington		
Start Time	2022-05-18 12:58:09	Duration	0:15:00.0
End Time	2022-05-18 13:13:09	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	54.1 dB		
LAE	83.7 dB	SEA	--- dB
EA	25.8 µPa²h	LAFTM5	57.6 dB
EA8	824.1 µPa²h		
EA40	4.1 mPa²h		
LA_{peak}	85.9 dB	2022-05-18 13:09:14	
LAS_{max}	65.7 dB	2022-05-18 13:10:19	
LAS_{min}	49.6 dB	2022-05-18 13:01:41	
LA_{eq}	54.1 dB		
LC_{eq}	73.5 dB	LC_{eq} - LA_{eq}	19.4 dB
LAI_{eq}	56.3 dB	LAI_{eq} - LA_{eq}	2.2 dB

Exceedances	Count	Duration
LAS > 65.0 dB	1	0:00:06.1
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

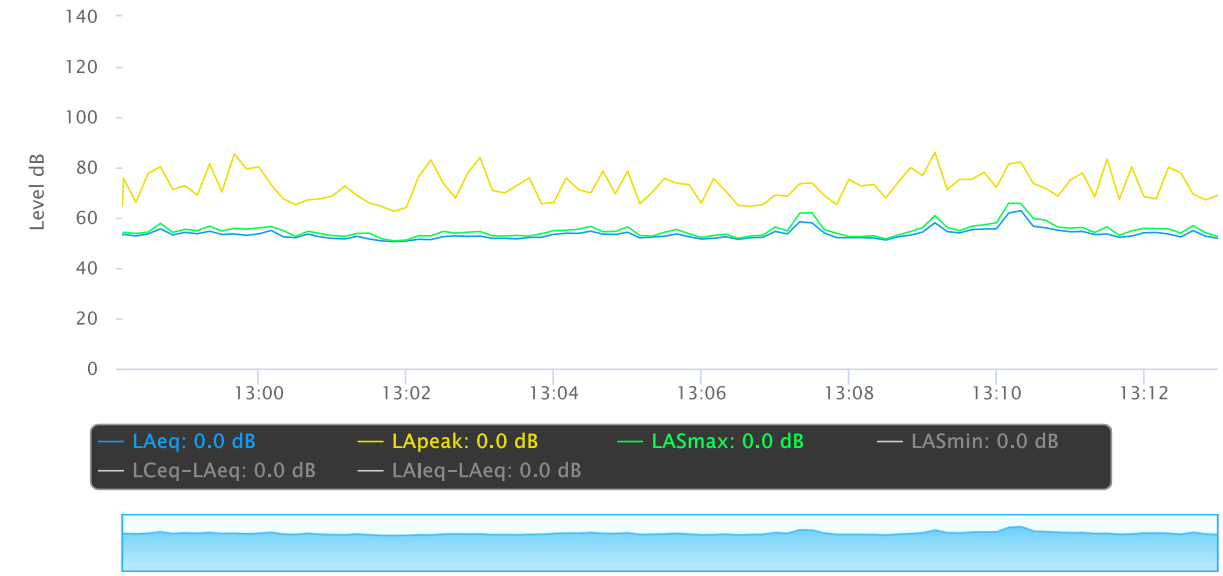
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	54.1 dB		73.5 dB		--- dB	
$L_{S(max)}$	65.7 dB	2022-05-18 13:10:19	--- dB		--- dB	
$L_{S(min)}$	49.6 dB	2022-05-18 13:01:41	--- dB		--- dB	
$L_{Peak(max)}$	85.9 dB	2022-05-18 13:09:14	--- dB		--- dB	

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

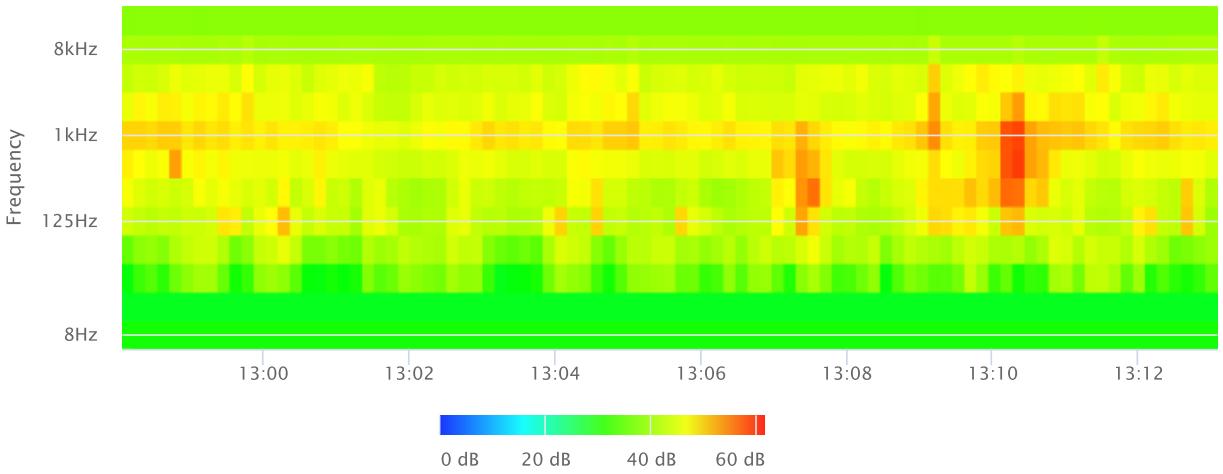
Statistics

LAS 2.0	59.8 dB
LAS 8.0	55.9 dB
LAS 25.0	54.1 dB
LAS 50.0	52.9 dB
LAS 66.6	52.3 dB
LAS 90.0	51.4 dB

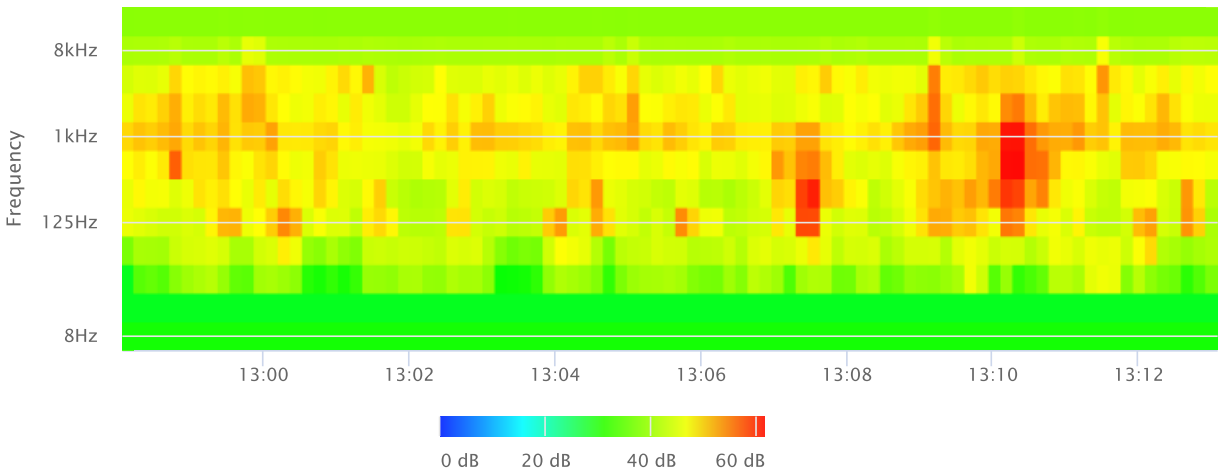
Time History



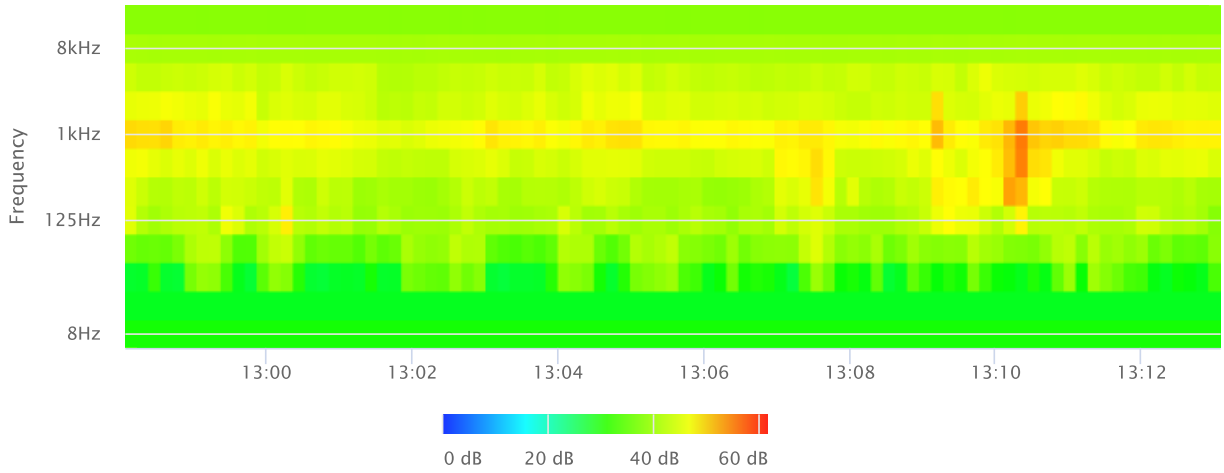
OBA 1/1 Leq



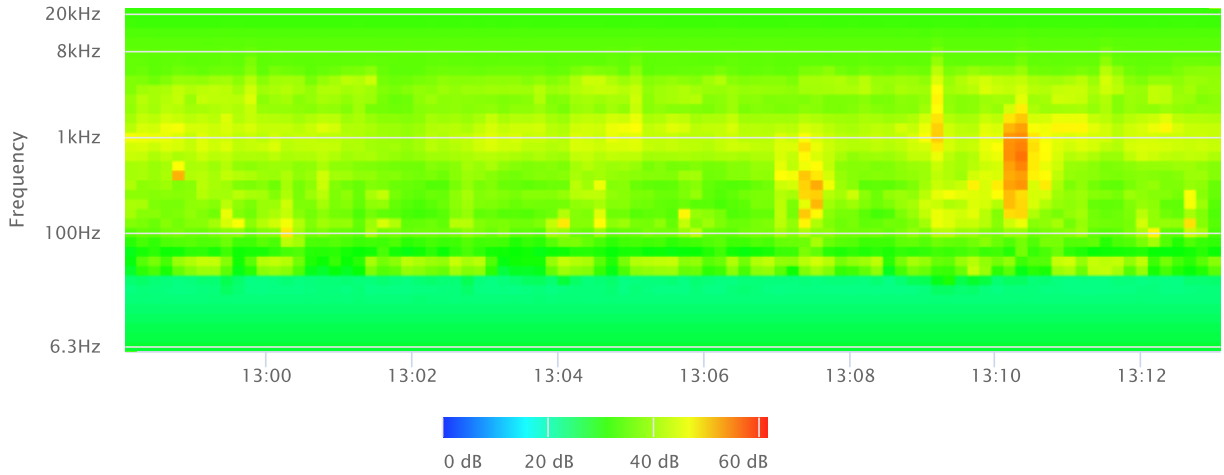
OBA 1/1 Lmax



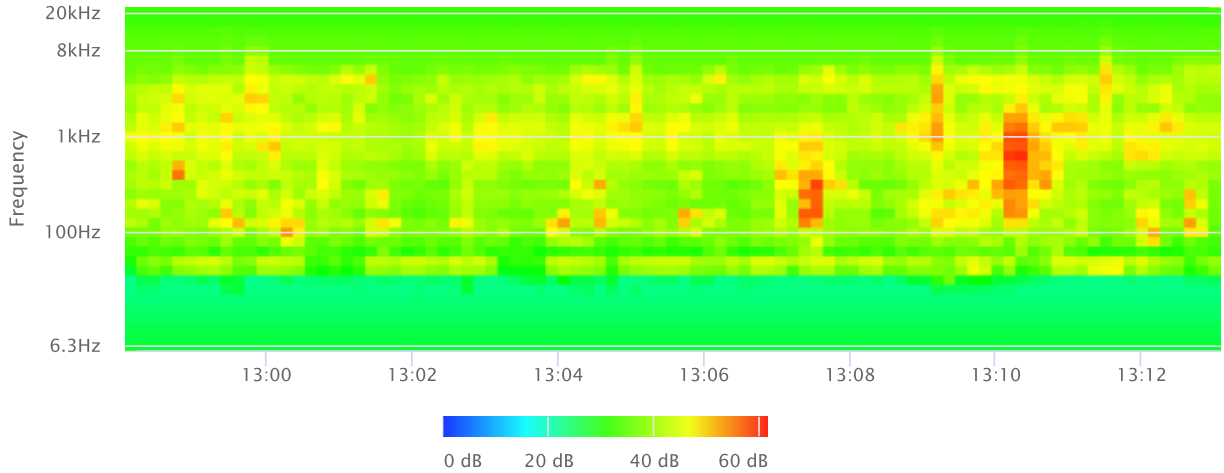
OBA 1/1 Lmin



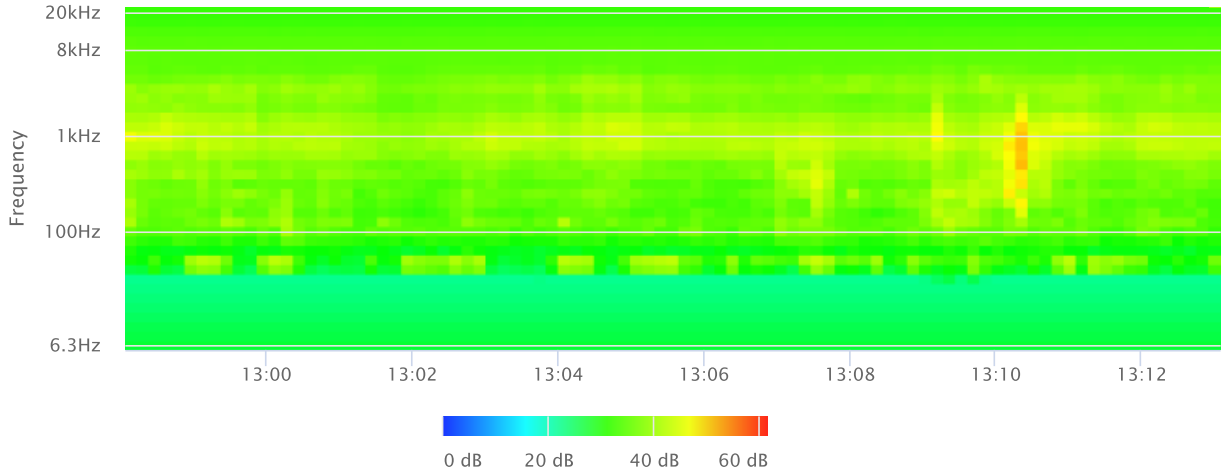
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:00
13:02
13:04
13:06
13:08
13:10
13:12
0 dB
20 dB
40 dB
60 dB

Noise Measurement
Field Data

Project Name: 18060 Slover Avenue Warehouse (19508) & 10428 Locust Avenue Warehouse (19509) **Date:** May 18, 2022

Project #: 19508 & 19509

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

Nearest Address or Cross Street: 18111 Slover Avenue, Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Noise Measurement Site: Locust Ave to west, Slover Avenue to north, single-family residential to south.

Weather: Clear skies sunshine **Settings:** SLOW FAST

Temperature: 74 deg F **Wind:** 8mph **Humidity:** 49% **Terrain:** Flat

Start Time: 1:34 PM **End Time:** 1:49 PM **Run Time:**

Leq: 70.4 dB

Lmax 89.1 dB

L2 77.5 dB

L8 74.5 dB

L25 70.5 dB

L50 65.8 dB

Primary Noise Source: Traffic noise from the 220 vehicles traveling along Slover Avenue, traffic ambiance from Locust Avenue and other roads.

Secondary Noise Sources: Leaf rustle from breeze. Bird song. Warehouse & storage yard ambiance. Occassional overhead air traffic.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL 200
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CAL 200
SERIAL NUMBER:	3855	**SERIAL NUMBER:**	11178
FACTORY CALIBRATION DATE:	6/7/2021	**FACTORY CALIBRATION DATE:**	6/8/2021
FIELD CALIBRATION DATE:	5/18/2022		

Noise Measurement
Field Data

PHOTOS:

STNM3 looking NW across Slover Avenue & Locust Avenue intersection.

STNM3 looking SW towards residence 18111 Slover Avenue, Bloomington.

Summary	
File Name on Meter	LxT_Data.017.s
File Name on PC	LxT_0003855-20220518 133450-LxT_Data.017.ld
Serial Number	3855
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM3 34° 3'46.85"N 117°24'32.95"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Projects 19508 & 19508, City of Bloomington

Measurement	
Start	2022-05-18 13:34:50
Stop	2022-05-18 13:49:50
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-18 13:28:25
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1
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	145.4 dB

Results			
LAeq	70.4		
LAE	99.9		
EA	1.09406	mPa²h	
EA8	35.00991	mPa²h	
EA40	175.0496	mPa²h	
LApeak (max)	2022-05-18 13:37:23	103.7	dB
LASmax	2022-05-18 13:37:23	89.1	dB
LASmin	2022-05-18 13:45:08	56.1	dB

			Statistics		
LCeq	81.7	dB	**LA2.00**	77.5	dB
LAeq	70.4	dB	**LA8.00**	74.5	dB
LCeq - LAeq	11.3	dB	**LA25.00**	70.5	dB
LAIeq	72.2	dB	**LA50.00**	65.8	dB
LAeq	70.4	dB	**LA66.60**	62.9	dB
LAIeq - LAeq	1.8	dB	**LA90.00**	58.6	dB
Overload Count	0				

Measurement Report

Report Summary

Meter's File Name	LxT_Data.017.s	Computer's File Name	LxT_0003855-20220518 133450-LxT_Data.017.ldbin
Meter	LxT1 0003855		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM3 34° 3'46.85"N 117°24'32.95"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Projects 19508 & 19508, City of Bloomington		
Start Time	2022-05-18 13:34:50	Duration	0:15:00.0
End Time	2022-05-18 13:49:50	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	70.4 dB		
LAE	99.9 dB	SEA	--- dB
EA	1.1 mPa²h	LAFTM5	75.1 dB
EA8	35.0 mPa²h		
EA40	175.0 mPa²h		
LA_{peak}	103.7 dB	2022-05-18 13:37:23	
LAS_{max}	89.1 dB	2022-05-18 13:37:23	
LAS_{min}	56.1 dB	2022-05-18 13:45:08	
LA_{eq}	70.4 dB		
LC_{eq}	81.7 dB	LC_{eq} - LA_{eq}	11.3 dB
LAI_{eq}	72.2 dB	LAI_{eq} - LA_{eq}	1.8 dB

Exceedances	Count	Duration
LAS > 65.0 dB	33	0:09:10.4
LAS > 85.0 dB	1	0:00:02.8
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

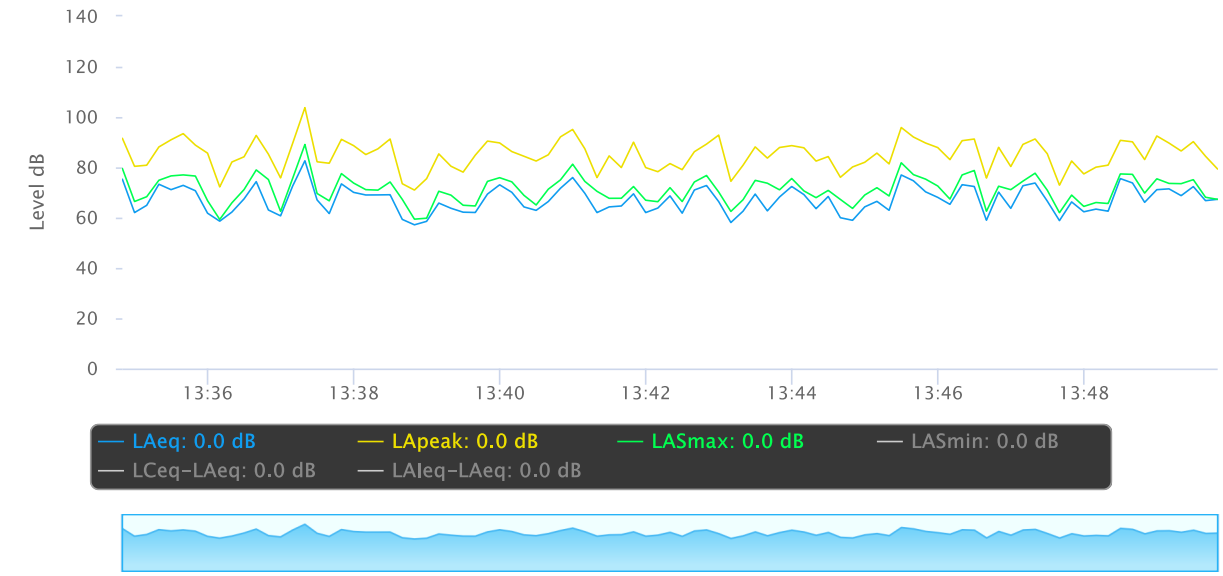
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	70.4 dB		81.7 dB		--- dB	
$L_{S(max)}$	89.1 dB	2022-05-18 13:37:23	--- dB		--- dB	
$L_{S(min)}$	56.1 dB	2022-05-18 13:45:08	--- dB		--- dB	
$L_{Peak(max)}$	103.7 dB	2022-05-18 13:37:23	--- dB		--- dB	

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

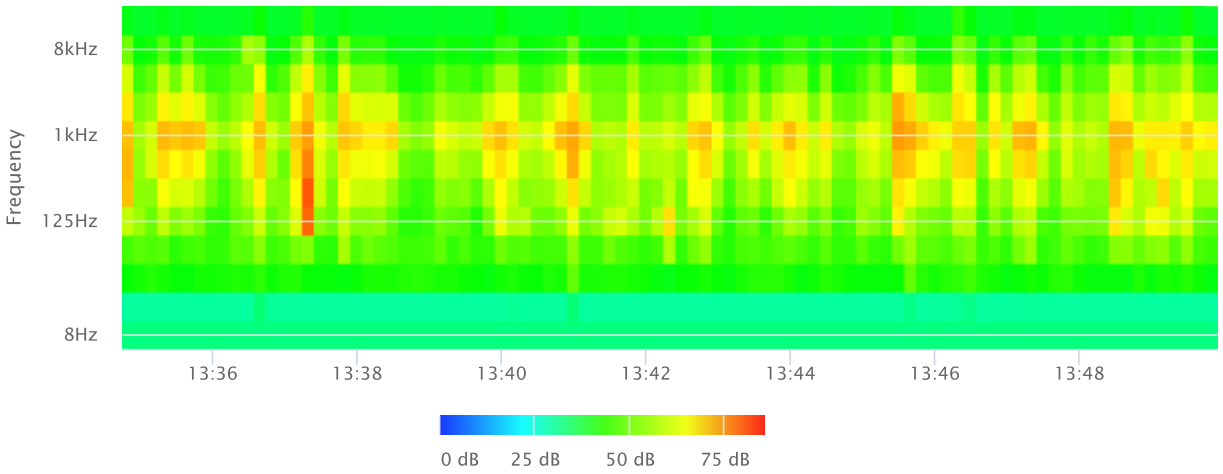
Statistics

LAS 2.0	77.5 dB
LAS 8.0	74.5 dB
LAS 25.0	70.5 dB
LAS 50.0	65.8 dB
LAS 66.6	62.9 dB
LAS 90.0	58.6 dB

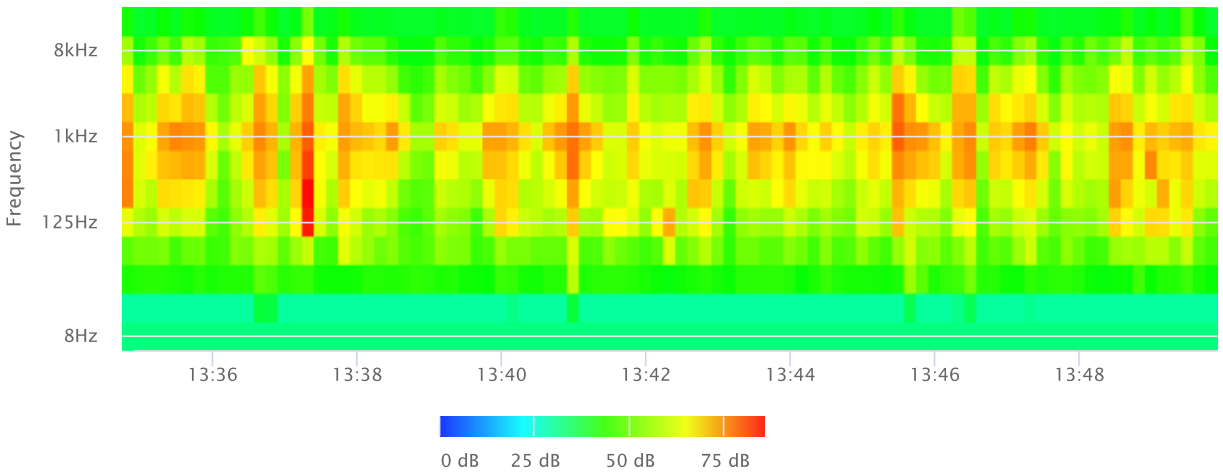
Time History



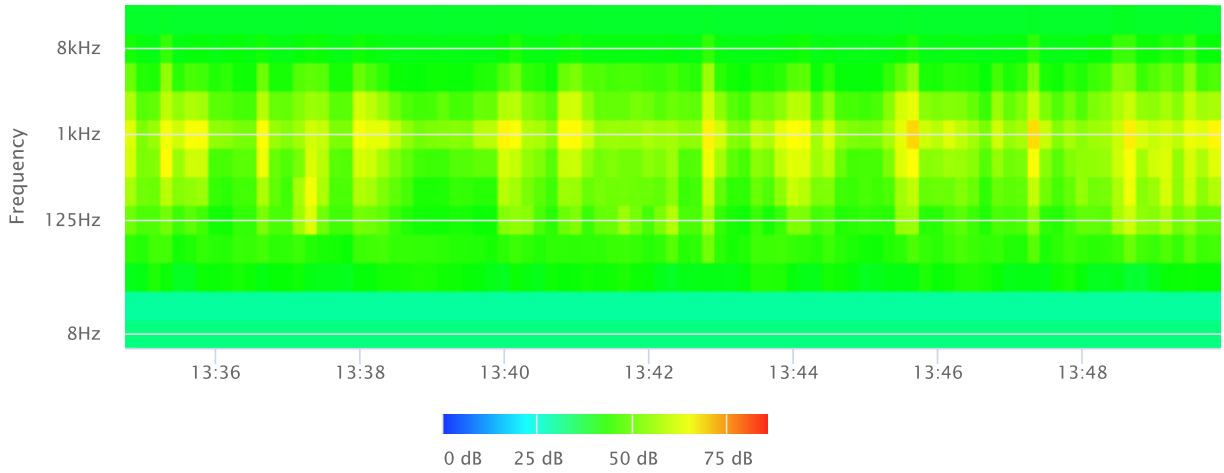
OBA 1/1 Leq



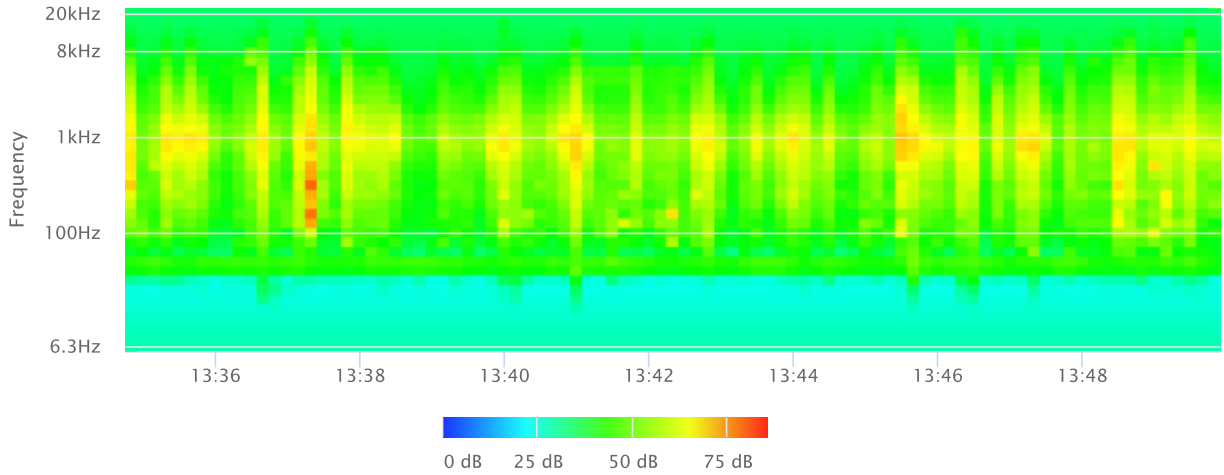
OBA 1/1 Lmax



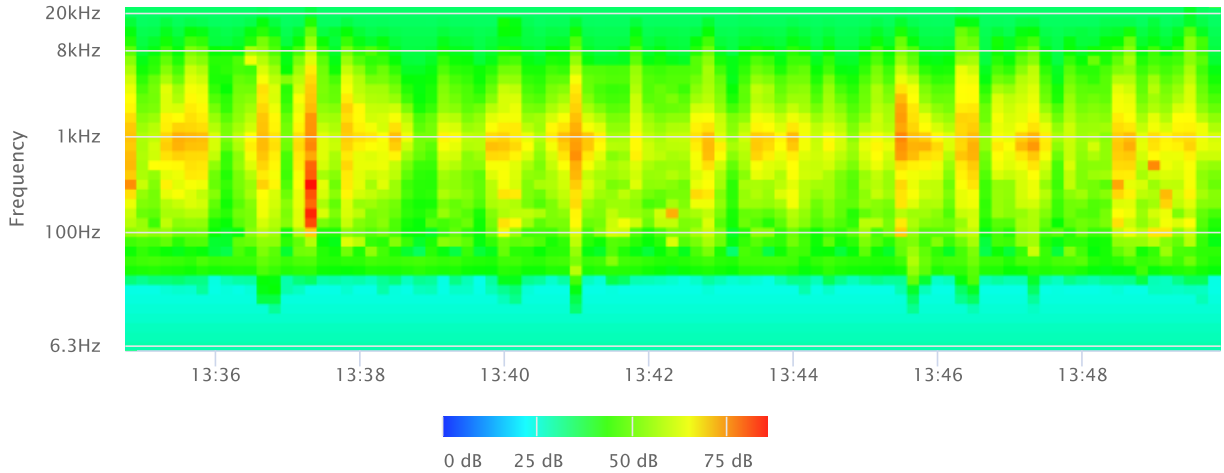
OBA 1/1 Lmin



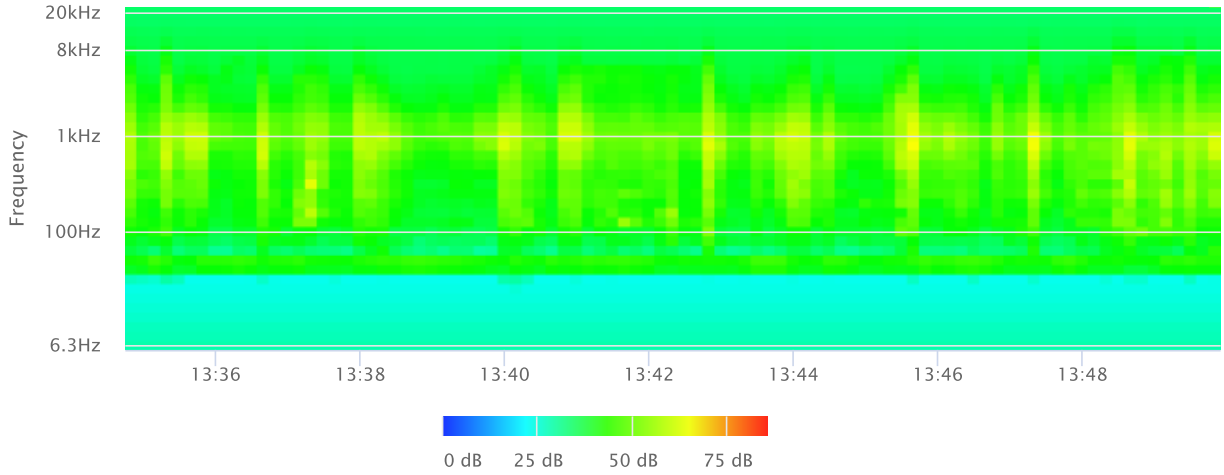
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:36
13:38
13:40
13:42
13:44
13:46
13:48
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: 18060 Slover Avenue Warehouse (19508) & 10428 Locust Avenue Warehouse (19509) **Date:** May 18, 2022

Project #: 19508 & 19509

Noise Measurement #: STNM4 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 10575 Locust Avenue, Bloomington, CA 92316

Site Description (Type of Existing Land Use and any other notable features): Noise Measurement Site: Locust Ave to west with industrial use further west, church use to east, and single-family residential uses to southeast.

Weather: Clear skies sunshine **Settings:** SLOW FAST

Temperature: 74 deg F **Wind:** 8mph **Humidity:** 49% **Terrain:** Flat

Start Time: 2:05 PM **End Time:** 2:20 PM **Run Time:**

Leq: 68.5 dB
Lmax 82.2 dB
L2 77.2 dB
L8 73.5 dB
L25 68.7 dB
L50 62.5 dB

Primary Noise Source: Traffic noise from the 88 vehicles traveling along Locust Avenue, traffic ambiance from Slover Avenue and other roads.

Secondary Noise Sources: Leaf rustle from breeze. Bird song. Warehouse & storage yard ambiance. Occassional overhead air traffic.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL 200
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CAL 200
SERIAL NUMBER:	3855	**SERIAL NUMBER:**	11178
FACTORY CALIBRATION DATE:	6/7/2021	**FACTORY CALIBRATION DATE:**	6/8/2021
FIELD CALIBRATION DATE:	5/18/2022		

Noise Measurement
Field Data

PHOTOS:

STNM4 looking E across fenced parking lot towards building 10575 Locust Avenue, Bloomington.

STNM4 looking SW across Locust Avenue towards SE corner of Delivery Station, 18025 Slover Avenue, Bloomimgton.

Summary	
File Name on Meter	LxT_Data.018.s
File Name on PC	LxT_0003855-20220518 140512-LxT_Data.018.ldb
Serial Number	3855
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM4 34° 3'42.26"N 117°24'33.69"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Projects 19508 & 19508, City of Bloomington

Measurement	
Start	2022-05-18 14:05:12
Stop	2022-05-18 14:20:12
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-18 14:03:42
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1
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	145.4 dB

Results			
LA_{eq}	68.5		
LAE	98.0		
EA	704.2979 µPa²h		
EA8	22.53753 mPa²h		
EA40	112.6877 mPa²h		
$LA_{peak\ (max)}$	2022-05-18 14:15:01	98.8 dB	
LAS_{max}	2022-05-18 14:18:50	82.2 dB	
LAS_{min}	2022-05-18 14:19:38	47.5 dB	
			Statistics
LC_{eq}	75.5 dB		**LA2.00** 77.2 dB
LA_{eq}	68.5 dB		**LA8.00** 73.5 dB
LC_{eq} - LA_{eq}	7.1 dB		**LA25.00** 68.7 dB
LAI_{eq}	70.9 dB		**LA50.00** 62.5 dB
LA_{eq}	68.5 dB		**LA66.60** 58.2 dB
LAI_{eq} - LA_{eq}	2.4 dB		**LA90.00** 50.8 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.018.s	Computer's File Name	LxT_0003855-20220518 140512-LxT_Data.018.ldbin
Meter	LxT1 0003855		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM4 34° 3'42.26"N 117°24'33.69"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Projects 19508 & 19508, City of Bloomington		
Start Time	2022-05-18 14:05:12	Duration	0:15:00.0
End Time	2022-05-18 14:20:12	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	68.5 dB		
LAE	98.0 dB	SEA	--- dB
EA	704.3 µPa²h	LAFTM5	74.2 dB
EA8	22.5 mPa²h		
EA40	112.7 mPa²h		
LA_{peak}	98.8 dB	2022-05-18 14:15:01	
LAS_{max}	82.2 dB	2022-05-18 14:18:50	
LAS_{min}	47.5 dB	2022-05-18 14:19:38	
LA_{eq}	68.5 dB		
LC_{eq}	75.5 dB	LC_{eq} - LA_{eq}	7.1 dB
LAI_{eq}	70.9 dB	LAI_{eq} - LA_{eq}	2.4 dB

Exceedances	Count	Duration
LAS > 65.0 dB	46	0:06:55.2
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

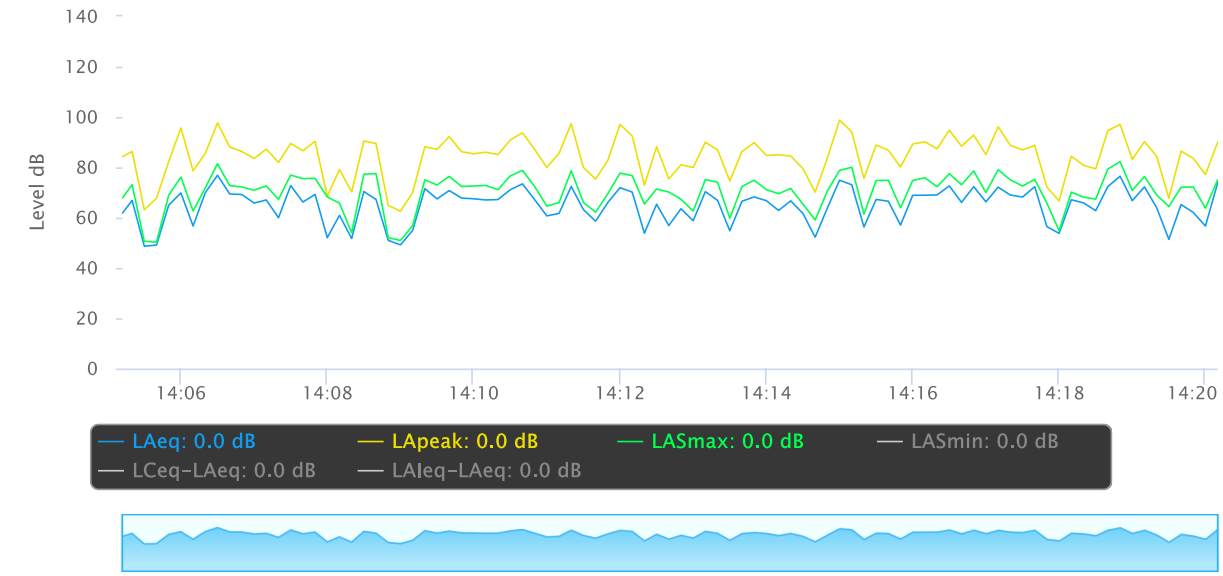
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	68.5 dB		75.5 dB		--- dB	
$L_{S(max)}$	82.2 dB	2022-05-18 14:18:50	--- dB		--- dB	
$L_{S(min)}$	47.5 dB	2022-05-18 14:19:38	--- dB		--- dB	
$L_{Peak(max)}$	98.8 dB	2022-05-18 14:15:01	--- dB		--- dB	

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

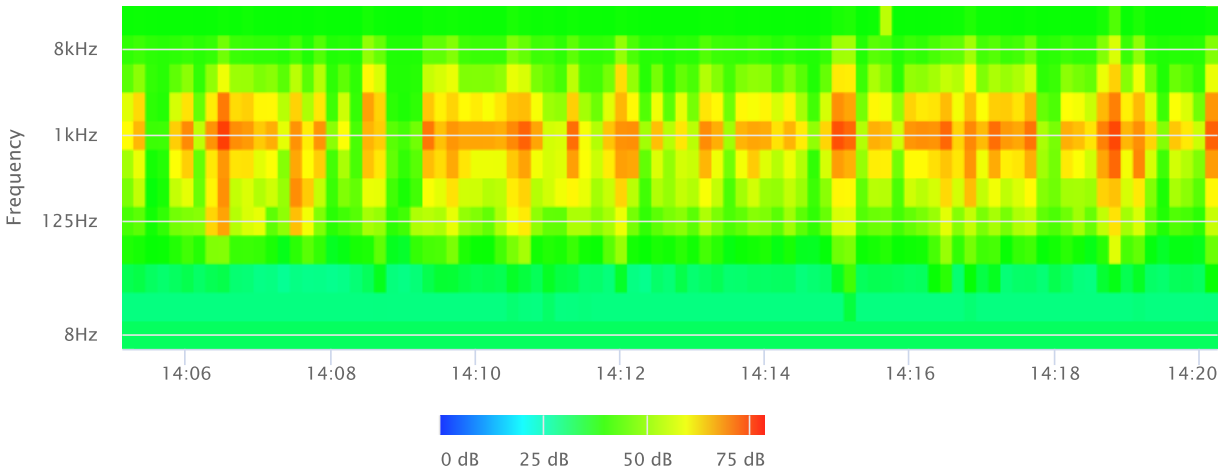
Statistics

LAS 2.0	77.2 dB
LAS 8.0	73.5 dB
LAS 25.0	68.7 dB
LAS 50.0	62.5 dB
LAS 66.6	58.2 dB
LAS 90.0	50.8 dB

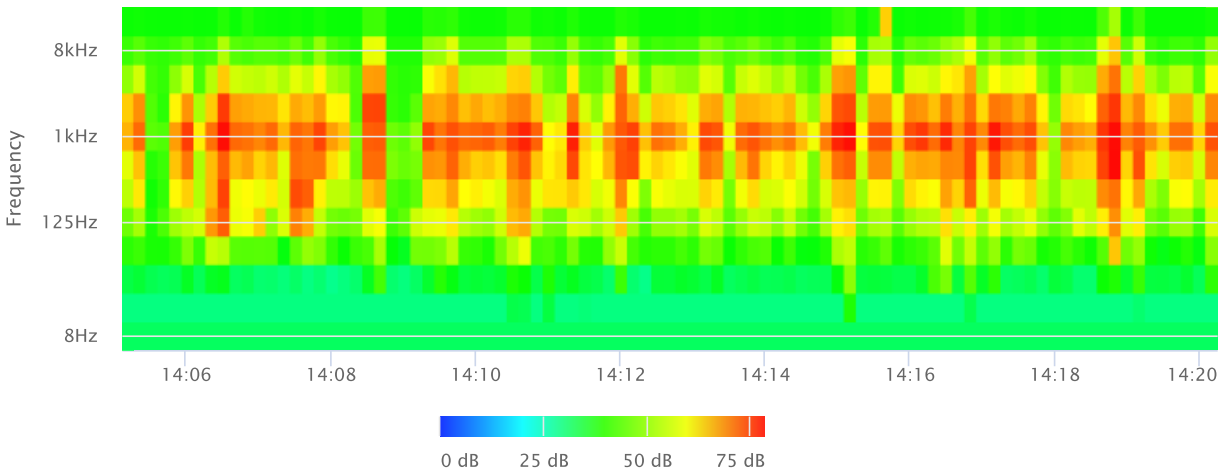
Time History



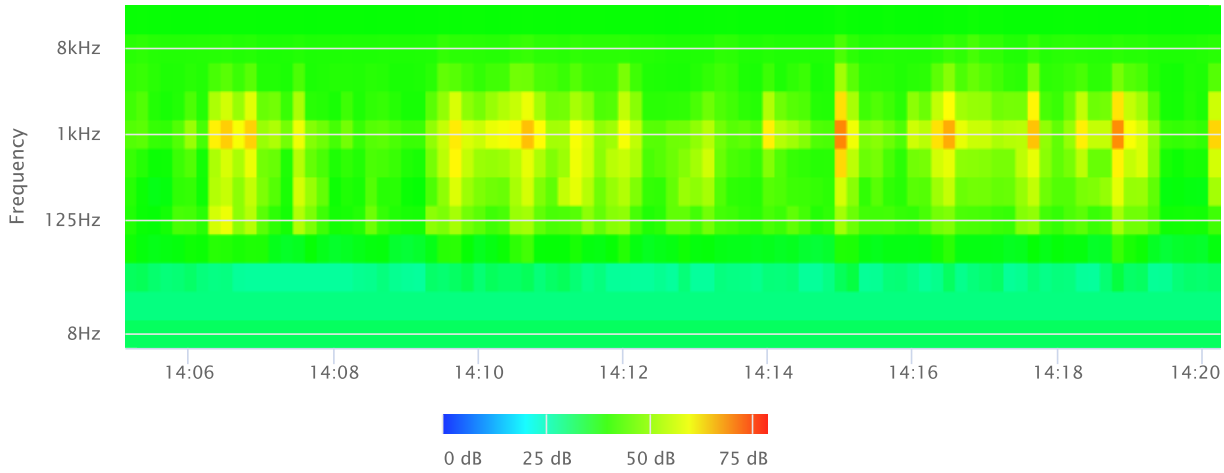
OBA 1/1 Leq



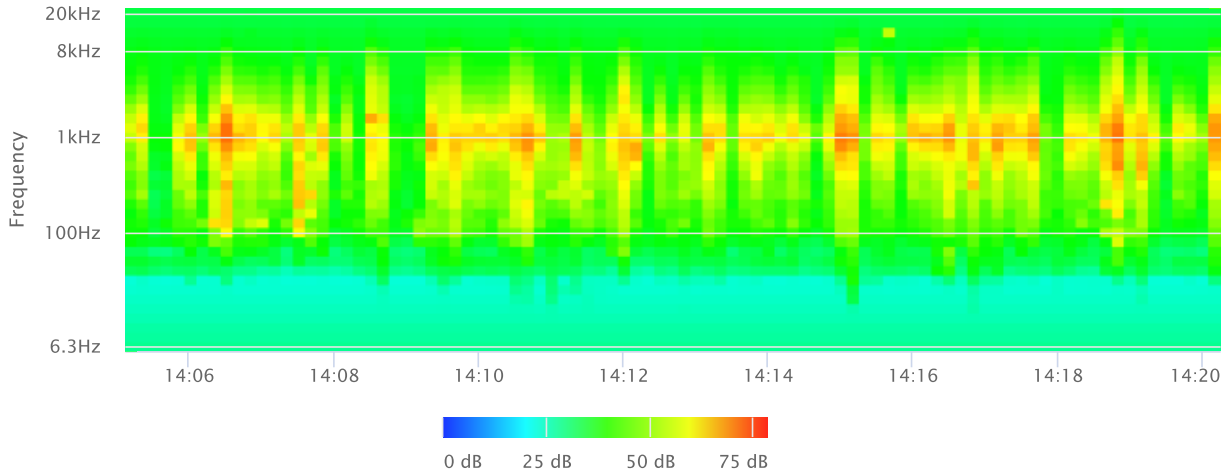
OBA 1/1 Lmax



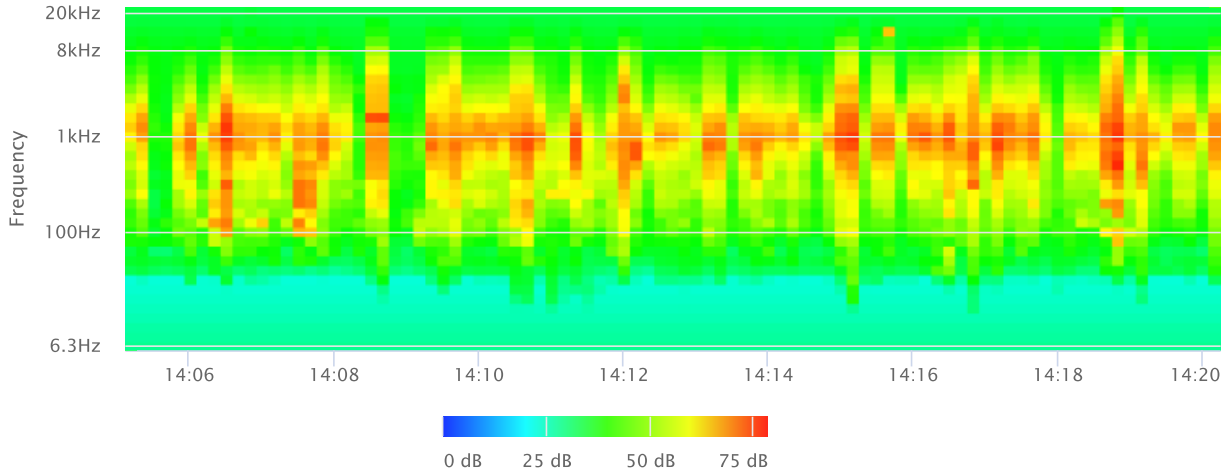
OBA 1/1 Lmin



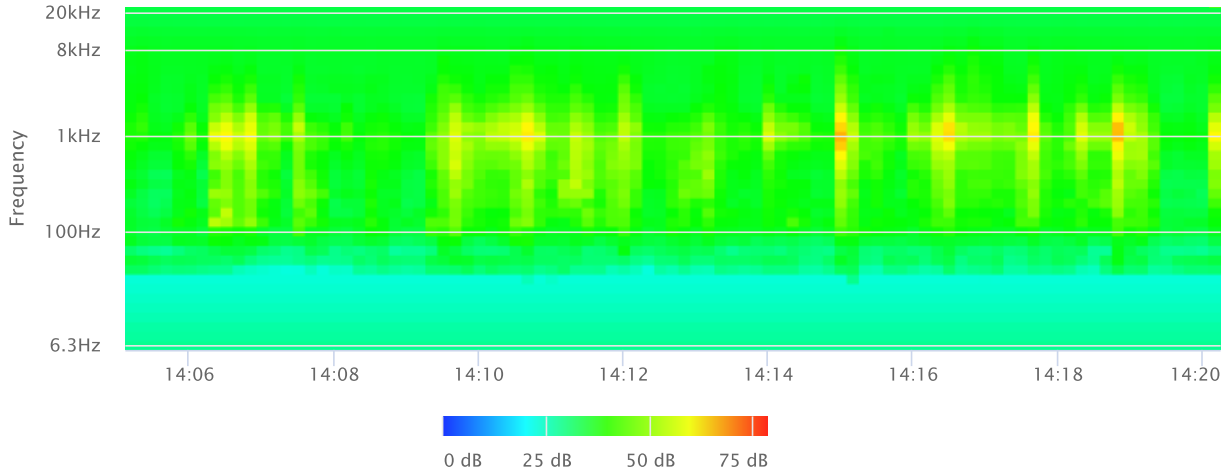
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
14:06
14:08
14:10
14:12
14:14
14:16
14:18
14:20
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: 10426 Locust Avenue Warehouse, City of Bloomington. **Date:** May 18 to 19, 2022

Project #: 19509

Noise Measurement #: LTNM2 Run Time: 24 hours (24 x 1 hours) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 10410 Locust Avenue, Bloomington, CA 92136

Site Description (Type of Existing Land Use and any other notable features): Project Site: Developed w/ storage & two occupied residences and bordered by single-family residential to north, Locust Ave to east, industrial and single-family to south, & industrial to west. Train yard also located to north. Noise Measurement Site: Located in NE corner of site with singl-family residnetial to north and Locust Avenue to east with industrial uses further east.

Weather: Clear skies, sunnrise/set: 5:42AM/ 7:53PM **Settings:** SLOW FAST

Temperature: 57 -88 deg F **Wind:** 2-10 mph **Humidity:** 41-60% **Terrain:** Flat

Start Time: 7:00 PM **End Time:** 7:00 PM **Run Time:**

Leq: 55.9 dB **Primary Noise Source:** Traffic noise from Vehicles traveling along Slover Avenue & Locust Avenue and

Lmax 88.7 dB traffic ambiance from other roads.

L2 61.1 dB **Secondary Noise Sources:** Leaf rustle from breeze. Bird song by day, crickets at night. Warehouse & storage

L8 57.4 dB yard ambiance. Occassional overhead air traffic. Train yard to N.

L25 53.9 dB

L50 51.7 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:	5/18/2022		

Noise Measurement
Field Data

PHOTOS:

LTNM2 looking SE toward Locust Ave & frontyard of residence 10356 Locust Ave, Bloomington.

LTNM2 aerial view showing location of LTNM2 microphone in relation to surrounding area.

Summary	
File Name on Meter	LxT_Data.046.s
File Name on PC	LxT_0003099-20220518 190000-LxT_Data.046.ldbin
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	LTNM2
Job Description	24 hour noise measurement (24 x 1 hours)
Note	Ganddini 19509 10426 Locust Avenue, Bloomington.

Measurement	
Start	2022-05-18 19:00:00
Stop	2022-05-19 19:00:00
Duration	24:00:00.0
Run Time	24:00:00.0
Pause	00:00:00.0
Pre-Calibration	2022-05-18 17:59:10
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	123.1 dB

Results			
LA_{eq}	55.9		
LAE	105.3		
EA	3.730	mPa^2h	
EA8	1.243	mPa^2h	
EA40	6.217	mPa^2h	
$LA_{peak\ (max)}$	2022-05-19 11:23:51	105.2	dB
LAS_{max}	2022-05-19 11:22:40	88.7	dB
LAS_{min}	2022-05-19 01:41:44	44.2	dB

		Statistics	
LC_{eq}	69.7 dB	**LA2.00**	61.1 dB
LA_{eq}	55.9 dB	**LA8.00**	57.4 dB
LC_{eq} - LA_{eq}	13.8 dB	**LA25.00**	53.9 dB
LAI_{eq}	60.4 dB	**LA50.00**	51.7 dB
LA_{eq}	55.9 dB	**LA90.00**	47.8 dB
LAI_{eq} - LA_{eq}	4.6 dB	**LA99.00**	46.2 dB
Overload Count	0		

Record #	Date	Time	Run Duration	Run Time	Pause	LAeq	LASmin	LASmin Time	LASmax	LASmax Time	LAS2.00	LAS8.00	LAS25.00	LAS50.00	LAS90.00	LAS99.00
1	2022-05-18	19:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.8	48.4	19:59:54	72.3	19:22:36	58.1	55.3	53.6	52.3	50.5	49.5
2	2022-05-18	20:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.0	47.3	20:52:39	65.2	20:50:38	60.1	57.0	52.8	50.9	48.8	47.8
3	2022-05-18	21:00:00	01:00:00.0	01:00:00.0	00:00:00.0	52.2	46.5	21:41:04	65.1	21:13:34	60.2	56.0	51.2	49.6	48.1	47.0
4	2022-05-18	22:00:00	01:00:00.0	01:00:00.0	00:00:00.0	51.8	45.8	22:37:26	63.8	22:19:05	60.0	55.2	50.9	49.0	47.3	46.6
5	2022-05-18	23:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.1	45.2	23:21:26	62.1	23:22:04	57.6	52.4	49.8	48.2	46.6	45.6
6	2022-05-19	00:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.0	45.5	00:29:37	68.8	00:41:19	56.9	52.1	49.7	48.6	46.9	46.1
7	2022-05-19	01:00:00	01:00:00.0	01:00:00.0	00:00:00.0	51.7	44.2	01:41:44	63.2	01:06:23	59.0	56.4	51.5	49.0	46.8	45.4
8	2022-05-19	02:00:00	01:00:00.0	01:00:00.0	00:00:00.0	48.6	44.4	02:54:10	58.4	02:44:38	53.8	51.5	48.5	47.5	46.1	45.0
9	2022-05-19	03:00:00	01:00:00.0	01:00:00.0	00:00:00.0	50.8	44.8	03:11:14	64.3	03:57:59	59.7	53.1	49.5	48.2	46.7	45.6
10	2022-05-19	04:00:00	01:00:00.0	01:00:00.0	00:00:00.0	52.2	46.5	04:30:14	66.1	04:32:38	58.8	55.6	51.7	49.9	48.1	47.1
11	2022-05-19	05:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.8	46.8	05:16:59	65.2	05:14:31	60.0	57.7	56.0	53.9	48.5	47.4
12	2022-05-19	06:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.1	47.6	06:06:17	68.3	06:23:29	58.5	56.5	54.5	52.9	50.5	48.9
13	2022-05-19	07:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.5	48.7	07:40:57	69.6	07:28:48	61.0	58.3	55.6	54.1	51.4	49.8
14	2022-05-19	08:00:00	01:00:00.0	01:00:00.0	00:00:00.0	56.2	49.0	08:47:59	70.1	08:59:37	61.9	59.2	57.0	54.9	52.0	50.3
15	2022-05-19	09:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.0	47.3	09:51:57	65.7	09:03:07	62.9	59.3	54.3	52.4	50.0	48.6
16	2022-05-19	10:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.1	47.1	10:05:19	65.2	10:40:10	59.6	56.6	53.4	51.3	48.8	47.7
17	2022-05-19	11:00:00	01:00:00.0	01:00:00.0	00:00:00.0	61.5	46.3	11:00:39	88.7	11:22:40	66.1	59.9	55.1	52.1	49.2	47.6
18	2022-05-19	12:00:00	01:00:00.0	01:00:00.0	00:00:00.0	63.3	48.4	12:03:41	86.3	12:20:31	73.5	62.1	57.2	54.6	50.9	49.5
19	2022-05-19	13:00:00	01:00:00.0	01:00:00.0	00:00:00.0	60.7	47.5	13:52:39	83.9	13:09:52	69.5	61.1	56.4	52.8	49.9	48.4
20	2022-05-19	14:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.1	49.2	14:51:38	67.5	14:37:40	58.3	54.6	53.0	52.2	50.8	49.9
21	2022-05-19	15:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.0	48.7	15:29:33	75.4	15:54:51	58.8	55.2	53.0	51.8	50.5	49.5
22	2022-05-19	16:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.5	49.3	16:32:34	68.7	16:12:16	61.3	57.2	54.1	52.6	50.7	49.9
23	2022-05-19	17:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.2	47.2	17:21:00	77.9	17:15:56	57.8	54.6	52.9	51.9	50.4	49.1
24	2022-05-19	18:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.3	50.2	18:11:59	64.5	18:50:59	61.0	59.1	55.2	53.7	52.0	51.1

Measurement Report

Report Summary

Meter's File Name	LxT_Data.046.s	Computer's File Name	LxT_0003099-20220518 190000-LxT_Data.046.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	LTNM2
Job Description	24 hour noise measurement (24 x 1 hours)		
Note	Ganddini 19509 10426 Locust Avenue, Bloomington.		
Start Time	2022-05-18 19:00:00	Duration	24:00:00.0
End Time	2022-05-19 19:00:00	Run Time	24:00:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	55.9 dB		
LAE	105.3 dB	SEA	--- dB
EA	3.7 mPa²h	LAFTM5	62.7 dB
EA8	1.2 mPa²h		
EA40	6.2 mPa²h		
LA_{peak}	105.2 dB	2022-05-19 11:23:51	
LAS_{max}	88.7 dB	2022-05-19 11:22:40	
LAS_{min}	44.2 dB	2022-05-19 01:41:44	
LA_{eq}	55.9 dB		
LC_{eq}	69.7 dB	LC_{eq} - LA_{eq}	13.8 dB
LAI_{eq}	60.4 dB	LAI_{eq} - LA_{eq}	4.6 dB

Exceedances	Count	Duration
LAS > 65.0 dB	132	0:10:50.5
LAS > 85.0 dB	5	0:00:06.5
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

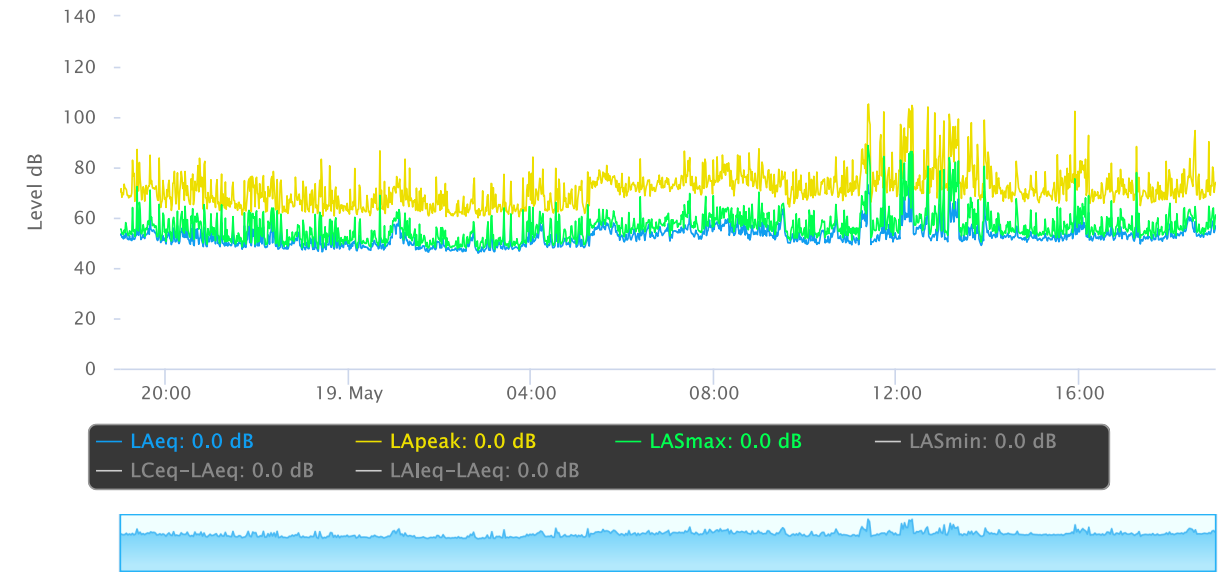
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	55.9 dB		69.7 dB		--- dB	
$L_{S(max)}$	88.7 dB	2022-05-19 11:22:40	--- dB		--- dB	
$L_{S(min)}$	44.2 dB	2022-05-19 01:41:44	--- dB		--- dB	
$L_{Peak(max)}$	105.2 dB	2022-05-19 11:23:51	--- dB		--- dB	

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

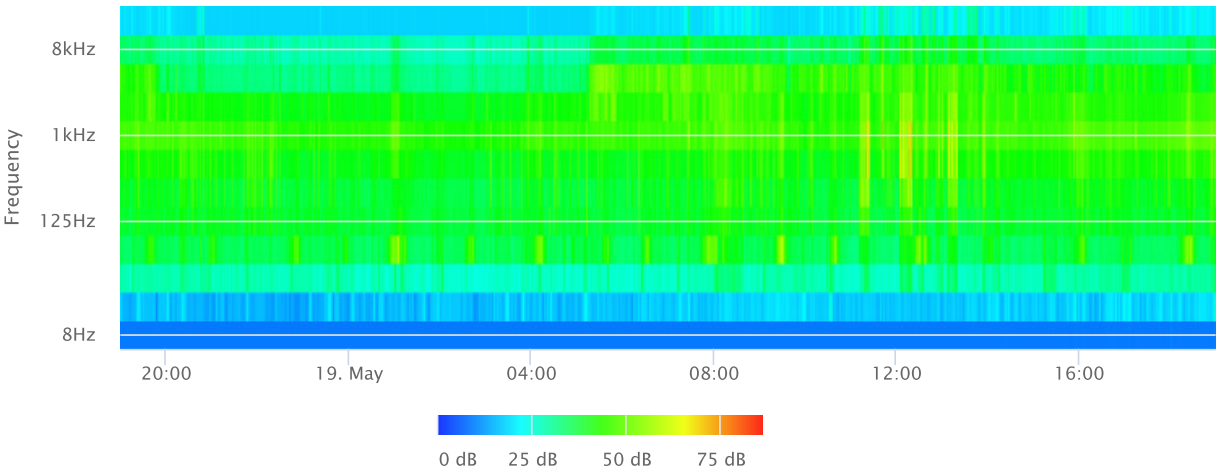
Statistics

LAS 2.0	61.1 dB
LAS 8.0	57.4 dB
LAS 25.0	53.9 dB
LAS 50.0	51.7 dB
LAS 90.0	47.8 dB
LAS 99.0	46.2 dB

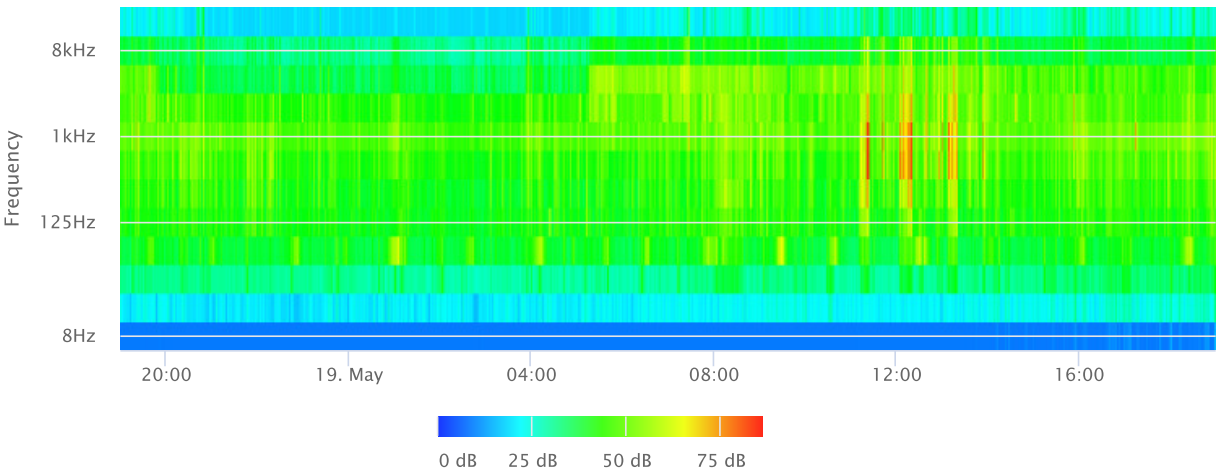
Time History



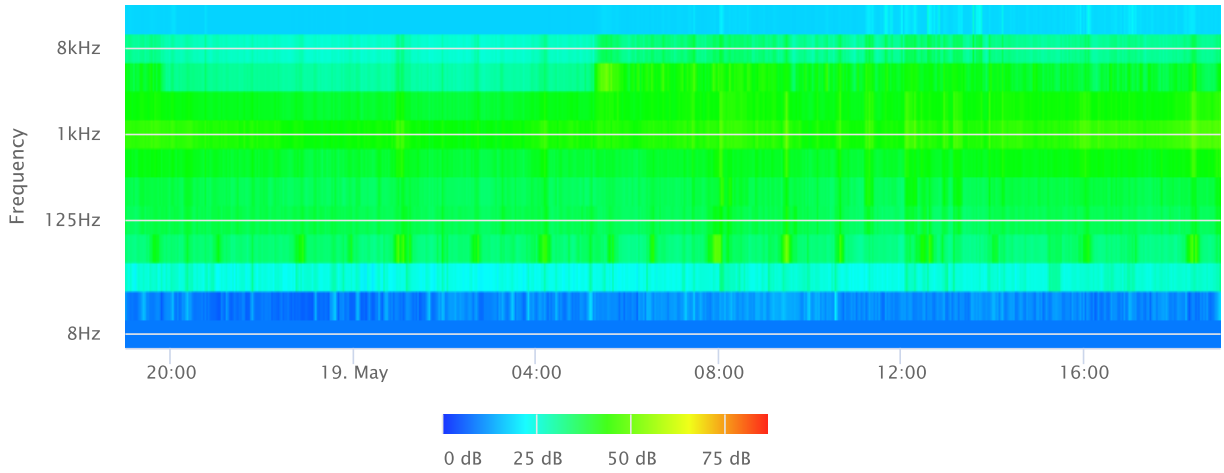
OBA 1/1 Leq



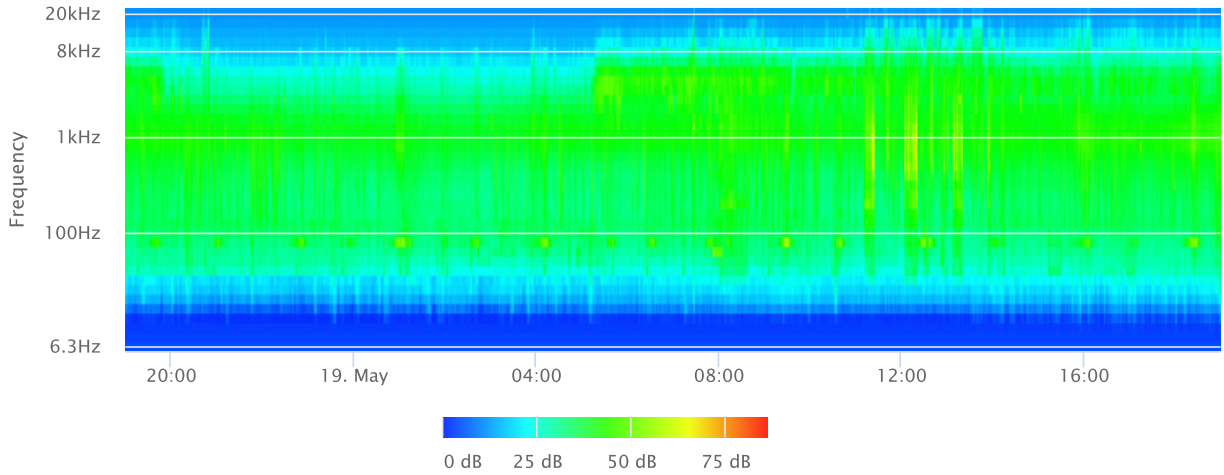
OBA 1/1 Lmax



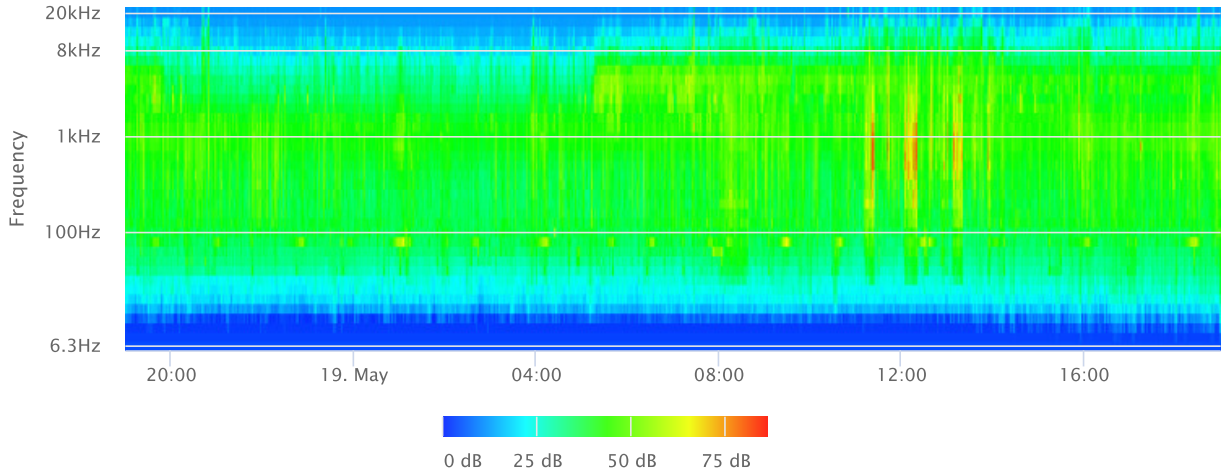
OBA 1/1 Lmin



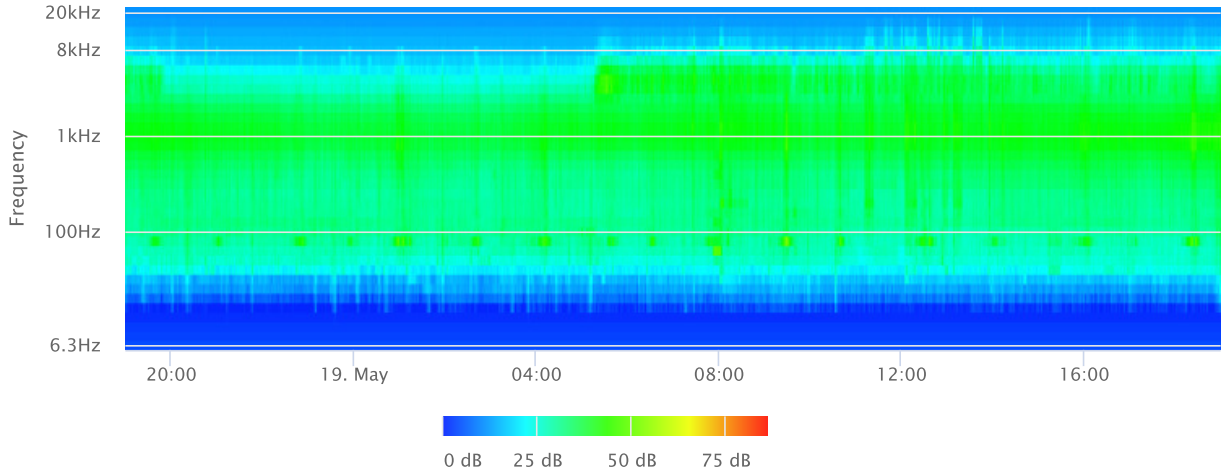
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


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

APPENDIX D

CONSTRUCTION NOISE MODELING

Receptor - Single-Family Residential to North (10356 Locust Ave, Bloomington)

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									
Concrete/Industrial Saw	1	90	209	20	0.20	-12.4	-7.0	77.6	70.6
Tractors/Loaders/Backhoes	3	84	209	40	1.20	-12.4	0.8	71.6	72.4
Rubber Tired Dozers	1	82	209	40	0.40	-12.4	-4.0	69.6	65.6
							Log Sum	79.1	75.1
Site Preparation									
Grader	1	85	209	40	0.40	-12.4	-4.0	72.6	68.6
Scrapers	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
Tractors/Loaders/Backhoes	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
							Log Sum	76.7	72.7
Grading									
Grader	1	85	209	40	0.40	-12.4	-4.0	72.6	68.6
Rubber Tired Dozers	1	82	209	40	0.40	-12.4	-4.0	69.6	65.6
Tractors/Loaders/Backhoes	2	84	209	40	0.80	-12.4	-1.0	71.6	70.6
							Log Sum	76.2	73.5
Building Construction									
Cranes	1	81	209	16	0.16	-12.4	-8.0	68.6	60.6
Forklifts [2]	2	48	209	40	0.80	-12.4	-1.0	35.6	34.6
Generator Sets	1	81	209	50	0.50	-12.4	-3.0	68.6	65.6
Welders	3	74	209	40	1.20	-12.4	0.8	61.6	62.4
Tractors/Loaders/Backhoes	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
							Log Sum	74.8	70.9
Paving									
Pavers	1	77	209	50	0.50	-12.4	-3.0	64.6	61.6
Cement and Mortar Mixer	1	79	209	40	0.40	-12.4	-4.0	66.6	62.6
Paving Equipment	1	77	209	50	0.50	-12.4	-3.0	64.6	61.6
Tractors/Loaders/Backhoes	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
Rollers	2	80	209	20	0.40	-12.4	-4.0	67.6	63.6
							Log Sum	74.8	71.0
Architectural Coating									
Air Compressors	1	78	209	40	0.40	-12.4	-4.0	65.6	61.6
							Log Sum	65.6	61.6

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) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(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 to East (10423 Locust Ave, Bloomington)

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									
Concrete/Industrial Saw	1	90	240	20	0.20	-13.6	-7.0	76.4	69.4
Tractors/Loaders/Backhoes	3	84	240	40	1.20	-13.6	0.8	70.4	71.2
Rubber Tired Dozers	1	82	240	40	0.40	-13.6	-4.0	68.4	64.4
							Log Sum	77.9	73.9
Site Preparation									
Grader	1	85	240	40	0.40	-13.6	-4.0	71.4	67.4
Scrapers	1	84	240	40	0.40	-13.6	-4.0	70.4	66.4
Tractors/Loaders/Backhoes	1	84	240	40	0.40	-13.6	-4.0	70.4	66.4
							Log Sum	75.5	71.5
Grading									
Grader	1	85	240	40	0.40	-13.6	-4.0	71.4	67.4
Rubber Tired Dozers	1	82	240	40	0.40	-13.6	-4.0	68.4	64.4
Tractors/Loaders/Backhoes	2	84	240	40	0.80	-13.6	-1.0	70.4	69.4
							Log Sum	75.0	72.3
Building Construction									
Cranes	1	81	240	16	0.16	-13.6	-8.0	67.4	59.4
Forklifts [2]	2	48	240	40	0.80	-13.6	-1.0	34.4	33.4
Generator Sets	1	81	240	50	0.50	-13.6	-3.0	67.4	64.4
Welders	3	74	240	40	1.20	-13.6	0.8	60.4	61.2
Tractors/Loaders/Backhoes	1	84	240	40	0.40	-13.6	-4.0	70.4	66.4
							Log Sum	73.6	69.7
Paving									
Pavers	1	77	240	50	0.50	-13.6	-3.0	63.4	60.4
Cement and Mortar Mixer	1	79	240	40	0.40	-13.6	-4.0	65.4	61.4
Paving Equipment	1	77	240	50	0.50	-13.6	-3.0	63.4	60.4
Tractors/Loaders/Backhoes	1	84	240	40	0.40	-13.6	-4.0	70.4	66.4
Rollers	2	80	240	20	0.40	-13.6	-4.0	66.4	62.4
							Log Sum	73.6	69.8
Architectural Coating									
Air Compressors	1	78	240	40	0.40	-13.6	-4.0	64.4	60.4
							Log Sum	64.4	60.4

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) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(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 to South (10450 Locust Ave, Bloomington)

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									
Concrete/Industrial Saw	1	90	209	20	0.20	-12.4	-7.0	77.6	70.6
Tractors/Loaders/Backhoes	3	84	209	40	1.20	-12.4	0.8	71.6	72.4
Rubber Tired Dozers	1	82	209	40	0.40	-12.4	-4.0	69.6	65.6
							Log Sum	79.1	75.1
Site Preparation									
Grader	1	85	209	40	0.40	-12.4	-4.0	72.6	68.6
Scrapers	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
Tractors/Loaders/Backhoes	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
							Log Sum	76.7	72.7
Grading									
Grader	1	85	209	40	0.40	-12.4	-4.0	72.6	68.6
Rubber Tired Dozers	1	82	209	40	0.40	-12.4	-4.0	69.6	65.6
Tractors/Loaders/Backhoes	2	84	209	40	0.80	-12.4	-1.0	71.6	70.6
							Log Sum	76.2	73.5
Building Construction									
Cranes	1	81	209	16	0.16	-12.4	-8.0	68.6	60.6
Forklifts [2]	2	48	209	40	0.80	-12.4	-1.0	35.6	34.6
Generator Sets	1	81	209	50	0.50	-12.4	-3.0	68.6	65.6
Welders	3	74	209	40	1.20	-12.4	0.8	61.6	62.4
Tractors/Loaders/Backhoes	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
							Log Sum	74.8	70.9
Paving									
Pavers	1	77	209	50	0.50	-12.4	-3.0	64.6	61.6
Cement and Mortar Mixer	1	79	209	40	0.40	-12.4	-4.0	66.6	62.6
Paving Equipment	1	77	209	50	0.50	-12.4	-3.0	64.6	61.6
Tractors/Loaders/Backhoes	1	84	209	40	0.40	-12.4	-4.0	71.6	67.6
Rollers	2	80	209	20	0.40	-12.4	-4.0	67.6	63.6
							Log Sum	74.8	71.0
Architectural Coating									
Air Compressors	1	78	209	40	0.40	-12.4	-4.0	65.6	61.6
							Log Sum	65.6	61.6

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) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(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: **19509 10426 Locust Avenue Warehouse Project**

Road: **Slover Avenue**

Segment: **East of Locust Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	10368.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	50.00
										DISTANCE	52.00
INPUT PARAMETERS											
Vehicles per hour	600.48	12.44	20.74	445.82	2.07	3.46	110.59	17.28	28.80	% 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	20.49	3.65	5.87	19.20	-4.13	-1.91	13.14	5.08	7.30		
Distance	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	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	73.59
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.56
LEQ	66.37	57.21	63.65	65.08	49.42	55.87	59.02	58.63	65.08	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.56		EVENING LEQ	65.67		NIGHT LEQ	66.77		Use hour?	no
										GRADE dB	0.00
		CNEL	**73.59**								

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

Existing Plus Project Traffic Noise

Project: **19509 10426 Locust Avenue Warehouse Project**

Road: **Slover Avenue**

Segment: **East of Locust Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	10463.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	50.00
										DISTANCE	52.00
INPUT PARAMETERS											
Vehicles per hour	604.32	12.96	21.58	448.67	2.16	3.60	111.30	18.00	29.97	% A	91.75
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	3.10
NOISE CALCULATIONS											
Reference levels	71.12	78.79	83.02	71.12	78.79	83.02	71.12	78.79	83.02	% HT	5.16
ADJUSTMENTS											
Flow	20.52	3.83	6.04	19.22	-3.95	-1.74	13.17	5.26	7.47		
Distance	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	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	73.72
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.65
LEQ	66.40	57.38	63.82	65.10	49.60	56.04	59.05	58.81	65.25	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.65		EVENING LEQ	65.72		NIGHT LEQ	66.91		Use hour?	no
										GRADE dB	0.00
		CNEL	**73.72**								

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

Existing Traffic Noise

Project: **19509 10426 Locust Avenue Warehouse Project**

Road: **Slover Avenue**

Segment: **West of Locust Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	8921.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	52.00
INPUT PARAMETERS											
Vehicles per hour	516.67	10.71	17.84	383.60	1.78	2.97	95.16	14.87	24.78	% 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	20.29	3.46	5.68	19.00	-4.32	-2.11	12.95	4.88	7.10		
Distance	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	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	72.24
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	66.94
LEQ	64.40	55.84	62.58	63.11	48.06	54.80	57.05	57.27	64.00	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	66.94		EVENING LEQ	63.82		NIGHT LEQ	65.51		Use hour?	no
										GRADE dB	0.00
		CNEL	**72.24**								

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

Existing Plus Project Traffic Noise

Project: **19509 10426 Locust Avenue Warehouse Project**

Road: **Slover Avenue**

Segment: **West of Locust Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	9016.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	52.00
INPUT PARAMETERS											
Vehicles per hour	520.51	11.23	18.68	386.45	1.87	3.11	95.86	15.59	25.95	% A	91.71
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	3.11
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5.18
ADJUSTMENTS											
Flow	20.33	3.66	5.88	19.03	-4.12	-1.91	12.98	5.09	7.30		
Distance	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	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	72.40
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.05
LEQ	64.43	56.05	62.78	63.14	48.26	55.00	57.08	57.47	64.20	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.05		EVENING LEQ	63.88		NIGHT LEQ	65.68		Use hour?	no
										GRADE dB	0.00
		CNEL	**72.40**								

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

Existing Traffic Noise

Project: **19509 10426 Locust Avenue Warehouse Project**

Road: **Locust Avenue**

Segment: **North of Slover Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	1683.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	25.00
										DISTANCE	30.00
INPUT PARAMETERS											
Vehicles per hour	103.22	1.26	0.49	76.28	0.22	0.22	19.11	1.68	0.65	% A	97.4
Speed in MPH	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00		
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	1.84
NOISE CALCULATIONS											
Reference levels	59.44	71.09	77.24	59.44	71.09	77.24	59.44	71.09	77.24	% HT	0.74
ADJUSTMENTS											
Flow	15.85	-3.27	-7.38	14.54	-10.78	-10.77	8.53	-2.02	-6.13		
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	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	58.58
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	54.10
LEQ	52.44	44.96	47.01	51.13	37.45	43.62	45.12	46.21	48.26	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	54.10		EVENING LEQ	51.99		NIGHT LEQ	51.50		Use hour?	no
										GRADE dB	0.00
		CNEL	**58.58**								

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

Existing Plus Project Traffic Noise

Project: **19509 10426 Locust Avenue Warehouse Project**

Road: **Locust Avenue**

Segment: **North of Slover Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	1778.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	25.00
										DISTANCE	30.00
INPUT PARAMETERS											
Vehicles per hour	107.06	1.79	1.32	79.12	0.32	0.60	19.82	2.39	1.76	% A	95.63
Speed in MPH	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00		
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	2.47
NOISE CALCULATIONS											
Reference levels	59.44	71.09	77.24	59.44	71.09	77.24	59.44	71.09	77.24	% HT	1.88
ADJUSTMENTS											
Flow	16.01	-1.75	-3.08	14.70	-9.26	-6.48	8.69	-0.50	-1.84		
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	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	61.09
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	55.58
LEQ	52.60	46.49	51.30	51.29	38.98	47.91	45.27	47.73	52.55	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	55.58		EVENING LEQ	53.10		NIGHT LEQ	54.36		Use hour?	no
										GRADE dB	0.00
		CNEL	**61.09**								

APPENDIX F

SOUNDPLAN WORKSHEETS

Noise emissions of industry sources

Source name	Reference	Level		Frequency spectrum [dB(A)]										Corrections		
				31	63	125	250	500	1	2	4	8	16	Cwall	CI	CT
			dB(A)	Hz	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	kHz	dB	dB	dB
Loading/Unloading Area L	Lw/unit	Day	94.5	-	61.5	71.5	78.6	84.6	87.5	88.5	88.6	86.5	-	-	-	-
Loading/Unloading Area L1	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L2	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L3	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L4	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L5	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L6	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L7	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L8	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-
Loading/Unloading Area L9	Lw/unit	Day	78.7	42.5	46.5	59.5	64.5	58.5	69.5	71.5	70.5	72.5	72.5	-	-	-

Noise emissions of parking lot traffic

Name	Parking bays	Movements		Corrections		Level	
		Day	Lmax	Parking lot type	dB(A)	Day dB(A)	Night dB(A)
1	23.0	0.100	0.000	Car parking lots	0.0	40.6	0.0
2	19.0	0.100	0.000	Car parking lots	0.0	39.8	0.0
3	14.0	0.100	0.000	Car parking lots	0.0	38.5	0.0

Receiver list

No.	Receiver name	Building side	Floor	Limit Day dB(A)	Level Day dB(A)	Conflict Day dB
1	2	-	EG	-	35.3	-
2	3	-	EG	-	42.8	-
3	4	-	EG	-	34.5	-

APPENDIX G

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to the North		
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 =	33.00	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 =	0.138	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to the North		
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 =	33.00	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 =	0.059	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to the East		
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 =	91.00	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 =	0.030	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to East		
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 =	91.00	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 =	0.013	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential/Industrial to the South		
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 =	80.00	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 =	0.037	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential/Industrial to the South		
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 =	80.00	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 =	0.016	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Industrial to the 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 =	198.00	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:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Industrial to the 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 =	198.00	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

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Industrial to the Northeast		
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 =	194.00	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 =	0.010	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Industrial to the Northeast		
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 =	194.00	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

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Annoyance Threshold		
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 =	41.00	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 =	0.100	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19509 10426 Locust Avenue		Date: 4/26/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Annoyance Threshold		
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 =	23.00	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 =	0.101	IN/SEC	OUTPUT IN BLUE

VIBRATION LEVEL IMPACT

Project:	19509 10426 Locust Avenue	Date: 11/14/22
Source:	Loaded Trucks	
Scenario:	North	
Location:	Project Site	
Address:	Project Site	

PPV = PPVref(5/D)^n (in/sec)

DATA INPUT

Equipment = Type	4	Loaded Trucks	INPUT SECTION IN BLUE
PPVref =	0.076	Reference PPV (in/sec) at 25 ft.	
D =	33.00	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.

DATA OUT RESULTS

PPV =	**0.050**	IN/SEC	OUTPUT IN RED

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