NWC MACY STREET AND FOOTHILL BOULEVARD RESIDENTIAL PROJECT NOISE IMPACT ANALYSIS

City of San Bernardino

May 3, 2024

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

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Project No. 19696

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EXECUTIVE SUMMARY

The approximately 16-acre project site (APN: 0142-041-09 to 11, 17, 18, 20, 21, 32, 33, 34, 44 and 0142-521-01 to 03) is located at the northwest corner of the Macy Street and Foothill Boulevard intersection in the City of San Bernardino, California. The project site is currently developed with a six (6) room motel and a 1,525 square foot bar and zoned General Commercial (CG-1).

The proposed project involves construction of 135 single family residential dwelling units. Vehicle access for the project site is proposed via gated access to Macy Street and Dallas Street.

Existing Noise Environment

Sensitive receptors that may be affected by project generated noise include the existing single-family residential property lines located adjacent to the north, the motel use property line located approximately 35 feet to the west (across Dallas Avenue), the mobile home park property line located approximately 120 feet to the south (across Foothill Boulevard), the single-family residential property lines located approximately 230 feet northeast (across Macy Street), the single-family residential property lines located approximately 495 feet southeast (across Foothill Boulevard), and the single-family residential property lines located approximately 710 feet east (across Macy Street and Terrace Road) of the project site.

Measured short-term ambient noise levels in the project vicinity ranged between 51.7 and 73.6 dBA L_{eq}. The dominant noise source in the project vicinity was vehicle traffic associated with Foothill Boulevard, Spruce Street, Dallas Avenue, Macy Street, and other surrounding roadways.

Project Construction Impacts – Onsite Equipment

Project construction will not occur outside of the hours outlined in Section 8.54.070 of the City of San Bernardino's Municipal Code which prohibits construction activities other than between the hours of 7:00 AM to 8:00 PM. Based on the modeled construction noise levels, construction noise levels are estimated to reach up to 72.7 dBA L_{eq} at the nearest residential property. Therefore, the project would not exceed City-established standards relating to construction noise. The project impact is less than significant; no mitigation is required.

Per the Federal Transit Administration (FTA), daytime construction noise levels should not exceed 80 dBA L_{eq} for an 8-hour period at residential uses and 85 dBA L_{eq} for an 8-hour period at commercial uses. Therefore, project construction would not be anticipated to exceed the FTA thresholds for either residential or commercial uses.

Notwithstanding the above, best management practices (BMPs) are provided in the Project Description and should be added to project plans and in contract specifications to minimize construction noise emanating from the proposed project.

Project Construction Impacts – Offsite Vehicle Trips

Project vehicle traffic generated during project construction would be anticipated to be nominal relative to existing roadway volumes and would not result in the doubling of traffic volume necessary to increase noise levels by 3 dBA. The project impact is less than significant; no mitigation is required.

Future Transportation Noise

Section 19.20.030.15(A) of the City's Municipal Code includes interior and exterior noise standards for residential uses. Per Section 19.20.030.15(A), residential uses can have interior noise levels reaching up to 45 dBA Ldn and exterior noise levels of up to 65 dBA Ldn. Future transportation noise associated with Foothill Boulevard, (which borders the project site on the south) and the Union Pacific Freight rail line which runs

northeast/southeast east of the project site were modeled to order to estimate impacts to the proposed residential land uses. As shown on Figure 6 and on Figure 7, transportation related noise (road and rail) are expected to range between 63 and 70 dBA Ldn at first floor façades of the first row of residential buildings exposed to Foothill Boulevard and the UP rail line east of the project site and between 64 and 72 dBA Ldn at second floor facades. Exterior noise levels will exceed the City's Noise Standard of 65 dBA Ldn under future transportation noise conditions. Mitigation is required. The project will be consistent with the City's General Plan goals and policies and the City's municipal code with implementation of these measures and impacts will be less than significant.

Mitigation Measures

MM-1 A six-foot-high concrete wall with no holes or cracks shall be constructed along the property line of homes adjacent to Foothill Boulevard as shown in Figure 8 and in Figure 9.

MM-2 Windows and sliding glass doors on building facades facing Foothill Boulevard shall have an STC rating of at least 30.

Operational Noise Impacts – Offsite Vehicle Trips

The addition of project trips is not expected to change noise levels more than the applicable threshold at any of the study roadway segments. The project impact is less than significant; no mitigation is required.

Groundborne Vibration Impacts

Groundborne vibration generated by project construction has the potential to exceed the levels necessary to cause architectural damage or severe annoyance to persons living or working in nearby buildings. Best management practices prohibiting the use of vibratory rollers within 26 feet and large bulldozers within 15 feet of the façades of residential structures to the north of the project site's northern property line will reduce potential architectural damage impacts. Furthermore, best management practices that prohibit the use of vibratory rollers, or other similar vibratory equipment, within 136 feet of the façades of the residential structures to the north and south and large bulldozers within 80 feet of the façades of the residential structures to the north have will reduce annoyance related impacts. Therefore, the project impact would be less than significant with the incorporation of best management practices.

Air Traffic Impacts

The closest airport to the project site is the San Bernardino International Airport (SBIA), which is located approximately 4.78 miles to the southeast of the project site. Per the noise contour maps provided in the Federal Aviation Administration's (FAA) Finding of No Significant Impact (FONSI) and Record of Decision (ROD) for the proposed Eastgate Air Cargo Facility at San Bernardino International Airport (December 2019), the proposed project site is well outside the 65 dBA CNEL noise contours of the San Bernardino International Airport. Therefore, as the project is not within two miles of a public airport or in the vicinity of a private airstrip, the project would not expose people residing or working in the project area to excessive noise levels associated with airports.

1. INTRODUCTION

This section describes the purpose of this study and the proposed project.

PURPOSE AND OBJECTIVES

The purpose of this report is to provide an assessment of potential noise impacts associated with development and operation of the proposed 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 considering applicable Federal, State, and local policies, including those of the City 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 approximately 16-acre project site (APN: 0142-041-09 to 11, 17, 18, 20, 21, 32, 33, 34, 44 and 0142-521-01 to 03) is located at the northwest corner of the Macy Street and Foothill Boulevard intersection in the City of San Bernardino, California. The project site is currently developed with a six (6) room motel and a 1,525 square foot bar and zoned General Commercial (CG-1). A vicinity map showing the project location is provided on Figure 1.

PROJECT DESCRIPTION

The proposed project involves construction of 135 single family residential dwelling units. Vehicle access for the project site is proposed via gated access to Macy Street and Dallas Street. Figure 2 illustrates the project site plan.

The following best management practices (BMPs) shall be provided on project plans and in contract specifications to minimize construction noise emanating from the proposed project:

1. All 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 and not left to idle when not in use.

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

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

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

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per Section 8.54.070 of the City of San Bernardino's Municipal Code.

8. The use of vibratory rollers, or other similar equipment, within 136 feet and large bulldozers within 80 feet of the façades of residential structures to the north of the project site's northern property line will be prohibited. In addition, the use of vibratory rollers, or other similar vibratory equipment, within 136 feet of the façades of the residential structures to the south will be prohibited. Construction activity that must occur within these distances would need to be performed with smaller equipment types that do not exceed the vibratory threshold identified herein.

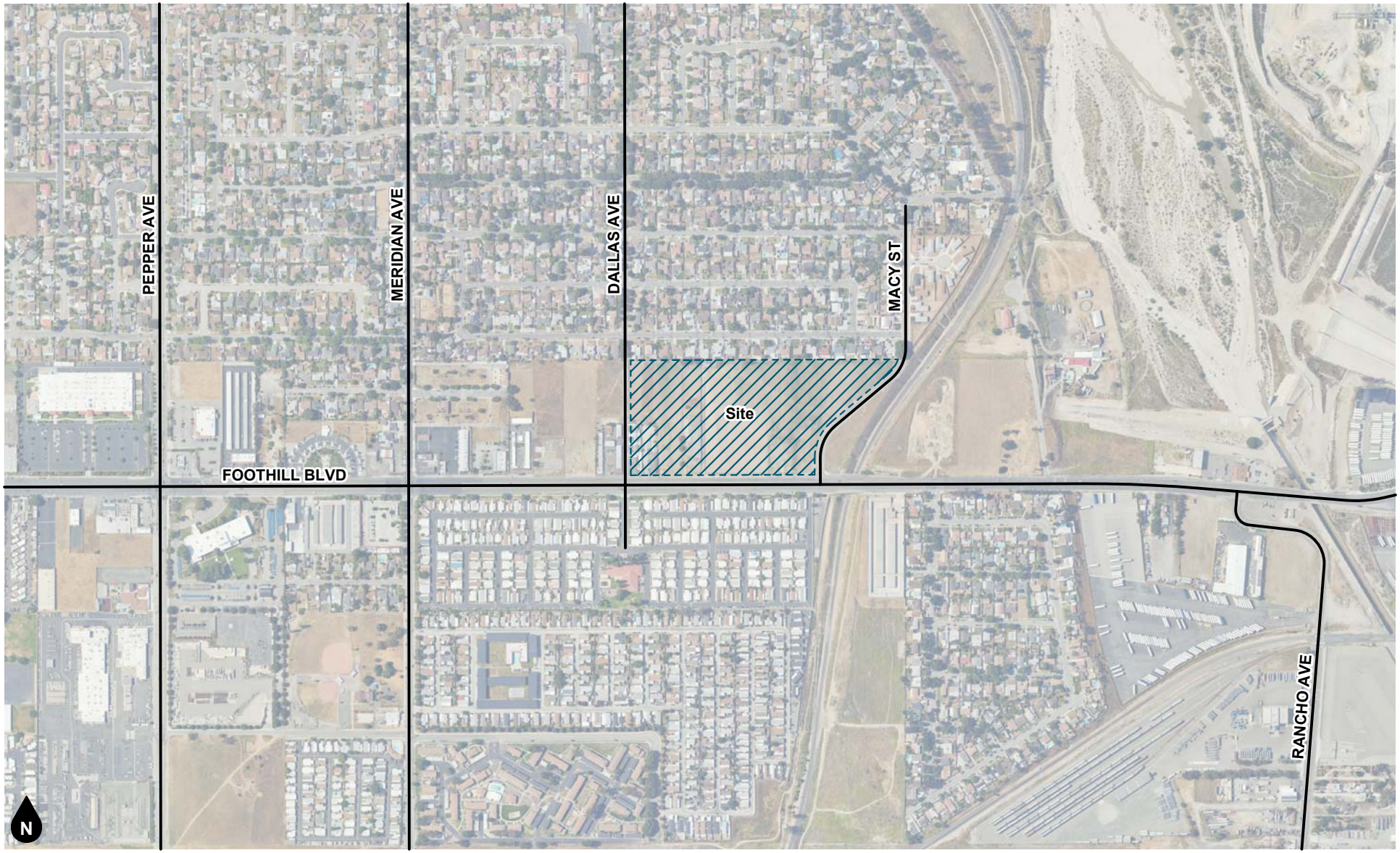


Figure 1
Project Location Map

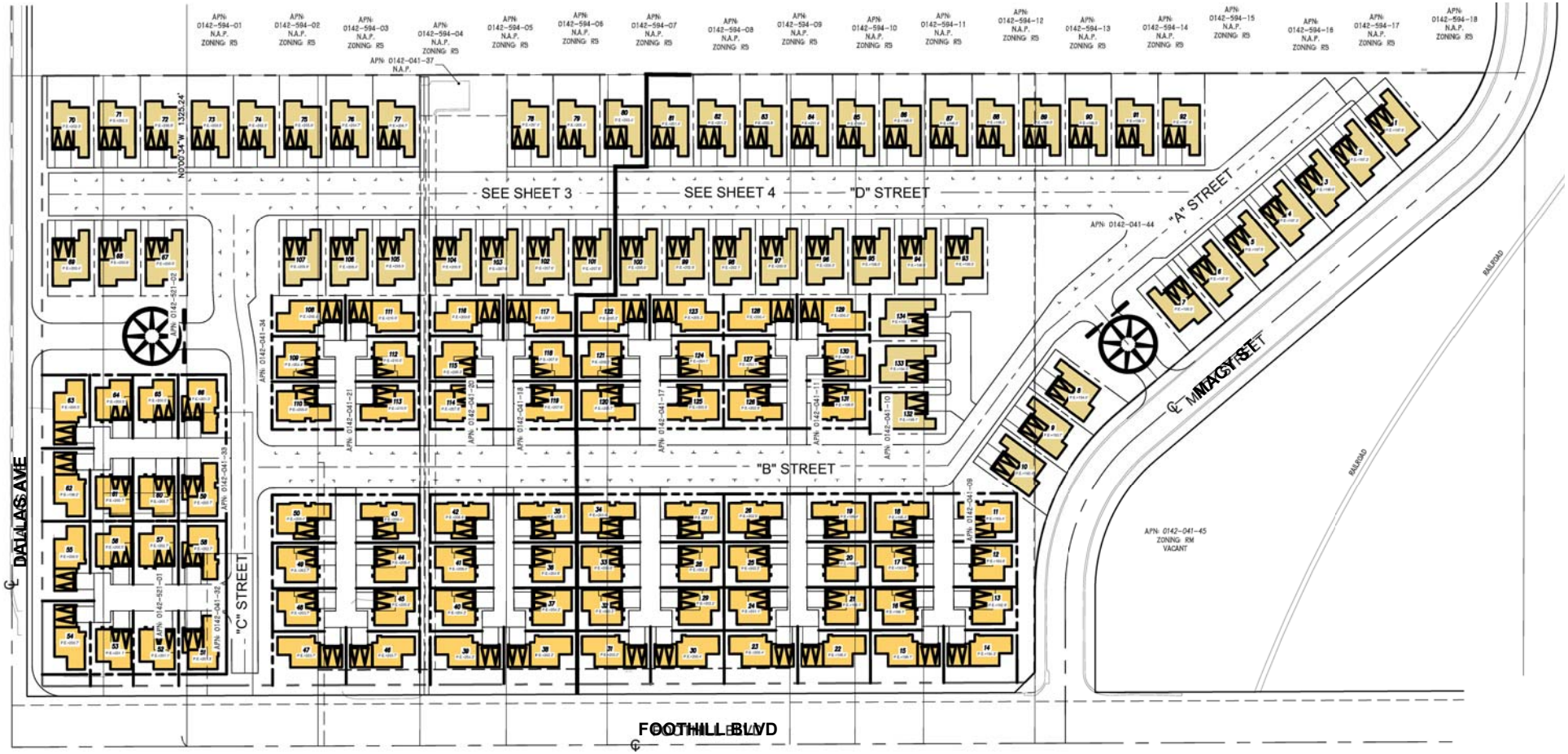


Figure 2
Site Plan

2. NOISE AND VIBRATION FUNDAMENTALS

This section provides an overview of key noise and vibration concepts.

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, $L_{eq(3)}$ 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 (Ldn. 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. Ldn 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

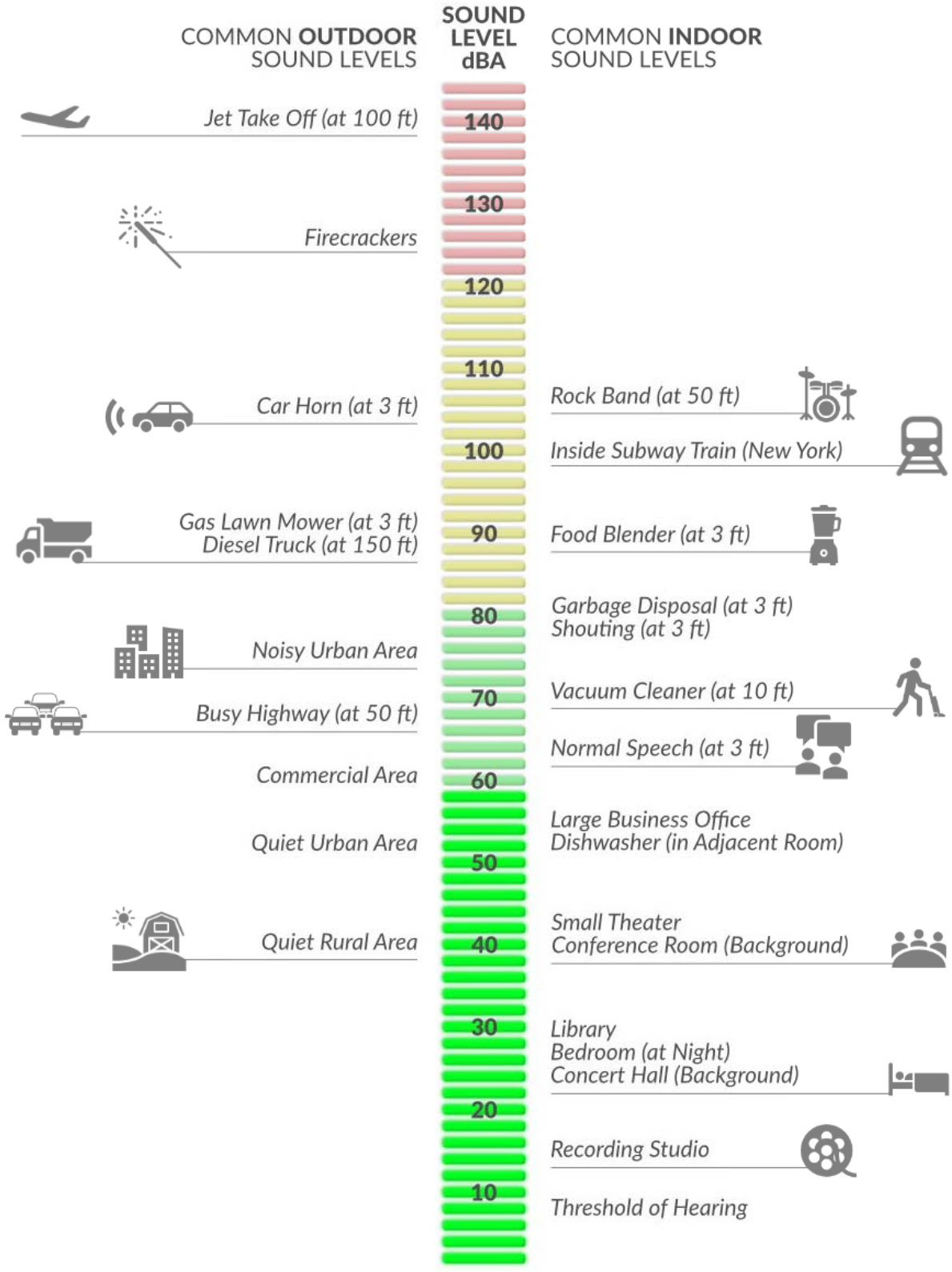
The way in which vibration is transmitted through the earth is called propagation. Propagation of earthborn vibrations is complicated and difficult to predict because of the endless variations in the soil through which waves travel. There are three main types of vibration propagation: surface, compression 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.

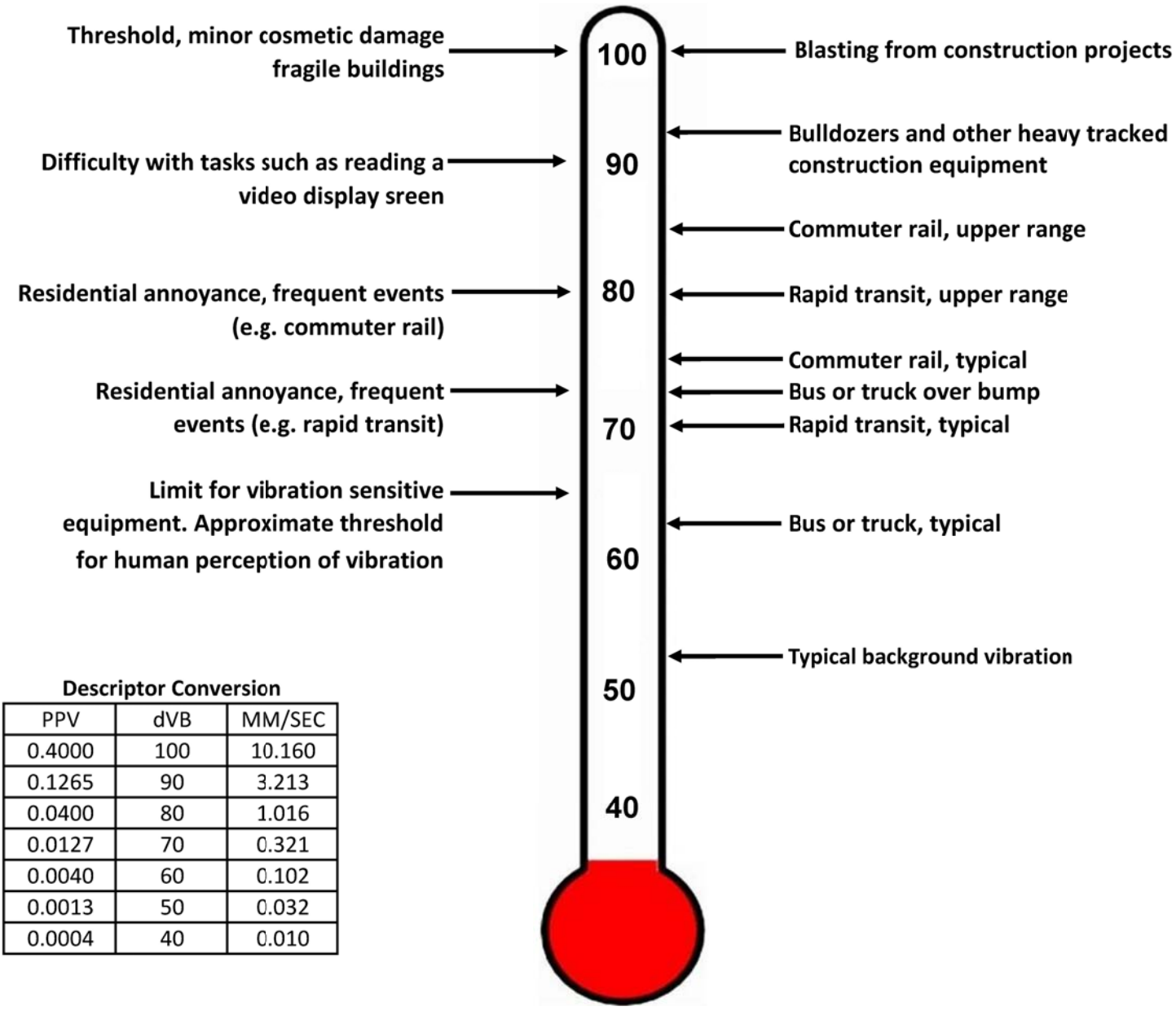
Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous peak of the vibration signal in inches per second. The RMS of a signal is the average of the squared amplitude of the signal in vibration 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.



Based on Policy & Guidance from Federal Aviation Administration

Figure 3
A-Weighted Comparative Sound Levels



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

This section describes the existing noise setting in the project vicinity.

EXISTING LAND USES AND SENSITIVE RECEPTORS

The project site is bordered by residential uses to the north, Macy Street to the east, Foothill Boulevard to the south, and Dallas Avenue to the west.

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 property lines located adjacent to the north, the motel use property line located approximately 35 feet to the west (across Dallas Avenue), the mobile home park property line located approximately 120 feet to the south (across Foothill Boulevard), the single-family residential property lines located approximately 230 feet northeast (across Macy Street), the single-family residential property lines located approximately 495 feet southeast (across Foothill Boulevard), and the single-family residential property lines located approximately 710 feet east (across Macy Street and Terrace Road) of the project site.

AMBIENT NOISE MEASUREMENTS

An American National Standards Institute (ANSI Section SI.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, five (5) 15-minute short-term noise measurements were taken between 1:39 PM and 4:19 PM on January 26, 2024; and one 24-hour noise measurement was taken between 3:00 PM on April 30th and 3:00 PM May 1, 2024. Figure 5 shows the noise measurement location map. Field worksheets and noise measurement worksheets are provided in Appendix C

As shown on Figure 5, existing ambient noise measurements were taken at the following locations:

NM1: represents the existing noise environment of the residential uses located adjacent to the north of the project site (2415 Spruce Street, San Bernardino). The noise meter was placed near the approximate center of the northern project property line.

NM2: represents the existing noise environment of the motel use to the west of the project site across Dallas Avenue (2512 Foothill Boulevard, San Bernardino). The noise meter was placed near the eastern property line of the motel use just west of Dallas Avenue.

NM3: represents the existing noise environment of the mobile home park to the south of the project site across Foothill Boulevard (2505 Foothill Boulevard, San Bernardino). The noise meter was placed near the northern property line of the mobile home park uses and south of Foothill Boulevard.

NM4: represents the existing noise environment of the residential uses located to the southeast of the project site across Foothill Boulevard (2325 Foothill Boulevard, San Bernardino). The noise meter was placed just south of Foothill Boulevard and just northwest of the property line of the residential use.

NM5: represents the existing noise environment of the residential uses located to the east and northeast of the project site across Macy Street and the train tracks (475 Terrace Road, San Bernardino). The noise meter was placed near the western property line of the residential use just east of Terrace Road.

Table 1 provides a summary of the short-term ambient noise data; and Table 2 provides a summary of the long-term noise measurement. Measured short-term ambient noise levels ranged between 51.7 and 73.6 dBA L_{eq}. The dominant noise source in the project vicinity was vehicle traffic associated with Foothill Boulevard, Spruce Street, Dallas Avenue, Macy Street, and other surrounding roadways. Measured long-term noise measurements ranged between 53.1 and 63.2 dBA L_{eq}.

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)
NM1	1:39 PM	51.7	66.6	44.1	57.5	54.7	52.1	49.7
NM2	2:24 PM	61.4	75.8	49.6	69.6	65.7	61.4	58.0
NM3	2:24 PM	73.6	83.8	51.4	79.9	78.0	74.9	71.8
NM4	3:32 PM	71.9	81.1	50.9	77.9	76.0	73.6	69.7
NM5	4:04 PM	55.8	71.9	48.8	62.9	58.0	55.3	53.7

Notes:
(1) See Figure 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.
(2) Noise measurements performed on January 26, 2024.

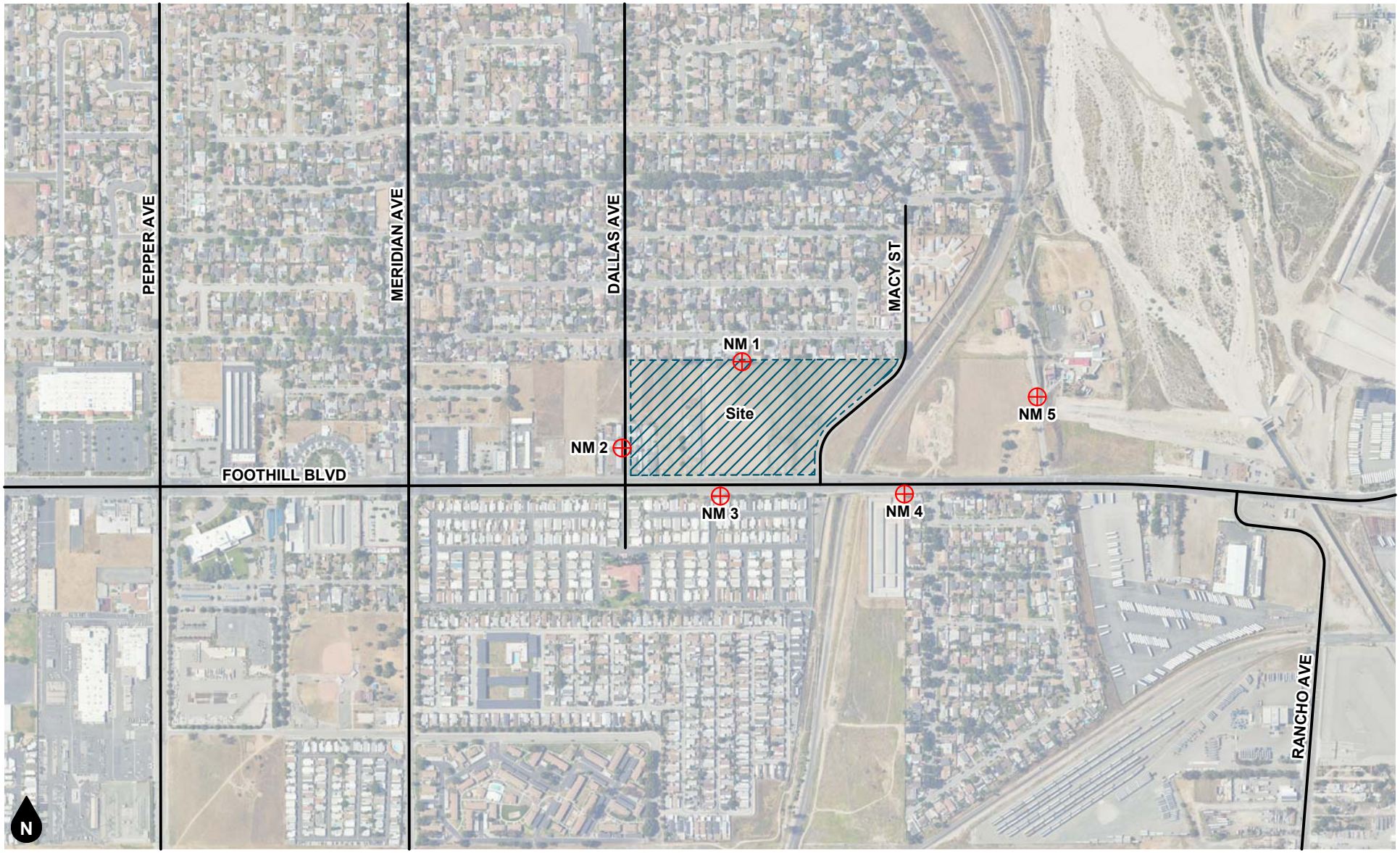
Table 2
Long-Term Noise Measurement Summary (LTNM1) (dBA)

24-Hour Ambient Noise[1,2]								
Hourly Measurements	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
Overall Summary	3:00 PM	60.6	86.5	34.8	70.2	65.3	56.7	51.8
1	3:00 PM	62.1	83.3	41.7	70.9	66.8	60.0	54.1
2	4:00 PM	60.9	75.0	44.8	70.3	65.8	59.5	55.6
3	5:00 PM	63.2	85.3	45.8	71.2	67.7	62.4	57.9
4	6:00 PM	61.9	79.1	45.8	70.3	67.0	60.9	56.7
5	7:00 PM	62.7	80.3	43.9	71.4	67.5	60.6	54.8
6	8:00 PM	60.1	78.7	44.3	69.3	64.5	56.9	53.3
7	9:00 PM	62.0	80.6	42.0	71.2	66.6	58.2	52.4
8	10:00 PM	57.5	82.9	39.1	67.3	59.3	52.9	49.9
9	11:00 PM	60.0	80.8	36.6	70.3	64.6	53.4	48.7
10	12:00 AM	53.1	77.7	36.0	62.5	53.2	48.2	44.3
11	1:00 AM	53.4	78.0	35.9	63.3	52.5	48.0	44.2
12	2:00 AM	57.9	80.5	34.8	67.7	62.2	49.8	45.2
13	3:00 AM	53.9	77.3	35.6	62.7	53.1	49.0	45.3
14	4:00 AM	55.8	76.2	36.8	66.2	55.8	51.2	47.9
15	5:00 AM	59.6	86.5	39.0	69.5	59.3	52.9	49.8
16	6:00 AM	60.8	81.6	39.5	70.7	65.8	56.2	52.1
17	7:00 AM	61.9	77.8	43.3	71.6	67.4	58.4	53.9
18	8:00 AM	61.2	76.8	41.6	71.1	66.9	57.8	52.2
19	9:00 AM	62.0	79.4	41.6	71.8	67.1	57.6	51.3
20	10:00 AM	59.7	83.3	42.3	69.6	64.5	54.0	49.5
21	11:00 AM	59.8	77.9	42.6	69.6	65.4	56.0	51.7
22	12:00 PM	61.3	81.7	42.8	70.0	66.0	58.1	52.7
23	1:00 PM	62.8	86.2	43.9	71.1	66.9	60.6	53.8
24	2:00 PM	61.7	83.5	42.2	70.4	66.6	60.0	54.4
CNEL	64.9							

Notes:

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

(2) Noise measurement performed from February 14, 2024 to February 15, 2024.



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 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.

Federal Transit Administration

The Federal Transit Administration (FTA) has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. As shown in

Table 3, the threshold at which there is a risk to "architectural" damage to reinforced-concrete, steel or timber (no plaster) buildings is a peak particle velocity (PPV) of 0.5, at engineered concrete and masonry (no plaster) buildings a PPV of 0.3, at non-engineered timber and masonry buildings a PPV of 0.2 and at buildings extremely susceptible to vibration damage a PPV of 0.1.

The FTA has also adopted standards associated with human annoyance for groundborne vibration impacts for the following three land-use categories:

(1) Vibration Category 1 – High Sensitivity,

(2) Vibration Category 2 – Residential, and

(3) Vibration Category 3 – Institutional.

The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference. The vibration criteria associated with human annoyance for these three land-use categories are shown in Table 4. Table 4 shows that 72 VdB is the threshold for annoyance from groundborne vibration at sensitive receptors.

Therefore, impacts related to building damage would be significant if construction activities result in groundborne vibration of 0.2 PPV or higher at residential structures and/or a PPV of 0.3 or higher at commercial structures. Impacts related to human annoyance would be significant if they result in groundborne vibration levels that exceed 72 VdB at sensitive receptor locations.

LOCAL REGULATIONS

City of San Bernardino General Plan

The General Plan Noise Element includes land use planning tools to reduce future noise related land use incompatibilities. These include criteria that specify acceptable limits of noise for various land uses throughout the City. These criteria are designed to integrate noise considerations into land use planning to prevent noise/land use conflicts. The City of San Bernardino has adopted their own version of the State Land Use Compatibility Guidelines (see Table 5). Table 5 presents criteria used to assess the compatibility of proposed land uses with the noise environment. These criteria are the basis for the development of specific Noise Standards (see Table 6). These tables are the primary tools which allow the City to ensure integrated planning for compatibility between land uses and outdoor noise.

The City has also established goals and policies regarding noise within the community. The goals and policies applicable to the proposed project are below.

Goal 14.1 Ensure that residents are protected from excessive noise through careful land planning.

Policies:

14.1.1 Minimize, reduce, or prohibit, as may be required, the new development of housing, health care facilities, schools, libraries, religious facilities, and other noise sensitive uses in areas where existing or future noise levels exceed an Ldn of 65 dB(A) exterior and an Ldn of 45 dB(A) interior if the noise cannot be reduced to these levels.

14.2.3 Require that development that increases the ambient noise level adjacent to noise-sensitive land uses provide appropriate mitigation measures.

14.2.6 Buffer residential neighborhoods from noise caused by train operations and increasing high traffic volumes along major arterials and freeways.

14.2.8 Minimize noise attributable to vehicular travel in residential neighborhoods by inhibiting through trips by the use of cul-de-sacs, one-way streets, and other traffic controls.

14.2.19 As may be necessary, require acoustical analysis and ensure the provision of effective noise mitigation measures for sensitive land uses, especially residential uses, in areas significantly impacted by noise.

Goal 14.3 Protect residents from the negative effects of "spill over" or nuisance noise.

Policies:

14.3.1 Require that construction activities adjacent to residential units be limited as necessary to prevent adverse noise impacts.

14.3.2 Require that construction activities employ feasible and practical techniques that minimize the noise impacts on adjacent uses.

City of San Bernardino Municipal Code

8.54.020 Prohibited Acts.

It shall be unlawful for any person to engage in the following activities:

I. The creation of loud and excessive noise in connection with the loading or unloading of motor trucks and other vehicles.

L. The operation or use between the hours of 10:00 PM and 8:00 AM of any pile driver, steam shovel, pneumatic hammers, derrick, steam or electric hoist, power drive saw, or any other tool or apparatus, the use of which is attended by loud and excessive noise, except with the approval of the City.

M. Creating excessive noise adjacent to any school, church, court, or library while the same is in use, or adjacent to any hospital or care facility, which unreasonably interferes with the workings of such institution, or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets indicating the presence of a school, institution of learning, church, court, or hospital.

N. Making or knowingly and unreasonably permitting to be made any unreasonably loud, unnecessary, or unusual noise that disturbs the comfort, repose, health, peace, and quiet, or which causes discomfort or annoyance to any reasonable person of normal sensitivity. The characteristics and conditions that may be considered in determining whether this section has been violated include, but are not limited to, the following:

1. The level of noise;
2. The level of background noise;
3. The proximity of the noise to sleeping facilities;
4. The nature and zoning of the areas within which the noise emanates;
5. The density of the inhabitation of the area within which the noise emanates;
6. The time of day or night the noise occurs;
7. The duration of the noise;
8. Whether the noise is recurrent, intermittent, or constant; and
9. Whether the noise is produced by a commercial or noncommercial activity.

78.54.050 Controlled Hours of Operation.

It shall be unlawful for any person to engage in the following activities other than between the hours of 8:00 AM and 8:00 PM in residential zones and between the hours of 7:00 AM and 8:00 PM in all other zones:

C. Operate or permit the use of domestic power tools, machinery or any other equipment or tool in any garage, workshop, house, or any other structure.
D. Operate or permit the use of gasoline or electric powered leaf blowers, such as commonly used by gardeners and other persons for cleaning lawns, yards, driveways, gutters, and other property.

8.54.060 Exemptions.

The following activities and noise sources shall be exempt from the provisions of this chapter:

B. Such noises as are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose, except where there is evidence that such noise is a nuisance and that such a nuisance is a result of the employment of unnecessary and injurious methods of operation.
C. Activities conducted on the grounds of any public or private school during regular hours of operation.
G. Construction, repair, or excavation necessary for the immediate preservation of life or property.
I. Construction, repair, or excavation work performed pursuant to a valid written agreement with the City, or any of its political subdivisions, which provides for noise mitigation measures.
J. Any activity to the extent that regulation thereof has been preempted by State and Federal law.

8.54.070 Disturbances from Construction Activity.

No person shall be engaged or employed or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 AM and 8:00 PM.

19.20.030.15 Property Development Standards – Noise.

No loudspeaker, bells, gongs, buzzers, mechanical equipment or other sounds, attention-attracting, or communication device associated with any use shall be discernible beyond any boundary line of the parcel, except fire protection devices, burglar alarms and church bells. The following provisions shall apply:

A. In residential areas, no exterior noise level shall exceed 65 dBA and no interior noise level shall exceed 45 dBA.

B. All residential developments shall incorporate the following standards to mitigate noise levels:

1. Increase the distance between the noise source and receiver.

2. Locate land uses not sensitive to noise (i.e., parking lots, garages, maintenance facilities, utility areas, etc.) between the noise source and the receiver.

3. Bedrooms should be located on the side of the structure away from major rights-of-way.

4. Quiet outdoor spaces may be provided next to a noisy right-of-way by creating a U-shaped development which faces away from the right-of-way.

C. The minimum acceptable surface weight for a noise barrier is four pounds per square foot (equivalent to ¾-inch plywood). The barrier shall be of a continuous material which is resistant to sound including:

1 Masonry block

2. Precast concrete

3 Earth berm or a combination of earth berm with block concrete.

D. Noise barriers shall interrupt the line-of-sight between noise source and receiver.

Table 3
Construction Vibration Damage Criteria

Building/Structural Category	PPV, in/sec	Approximate L_v[1]
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremelly susceptible to vibration damage	0.1	90

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

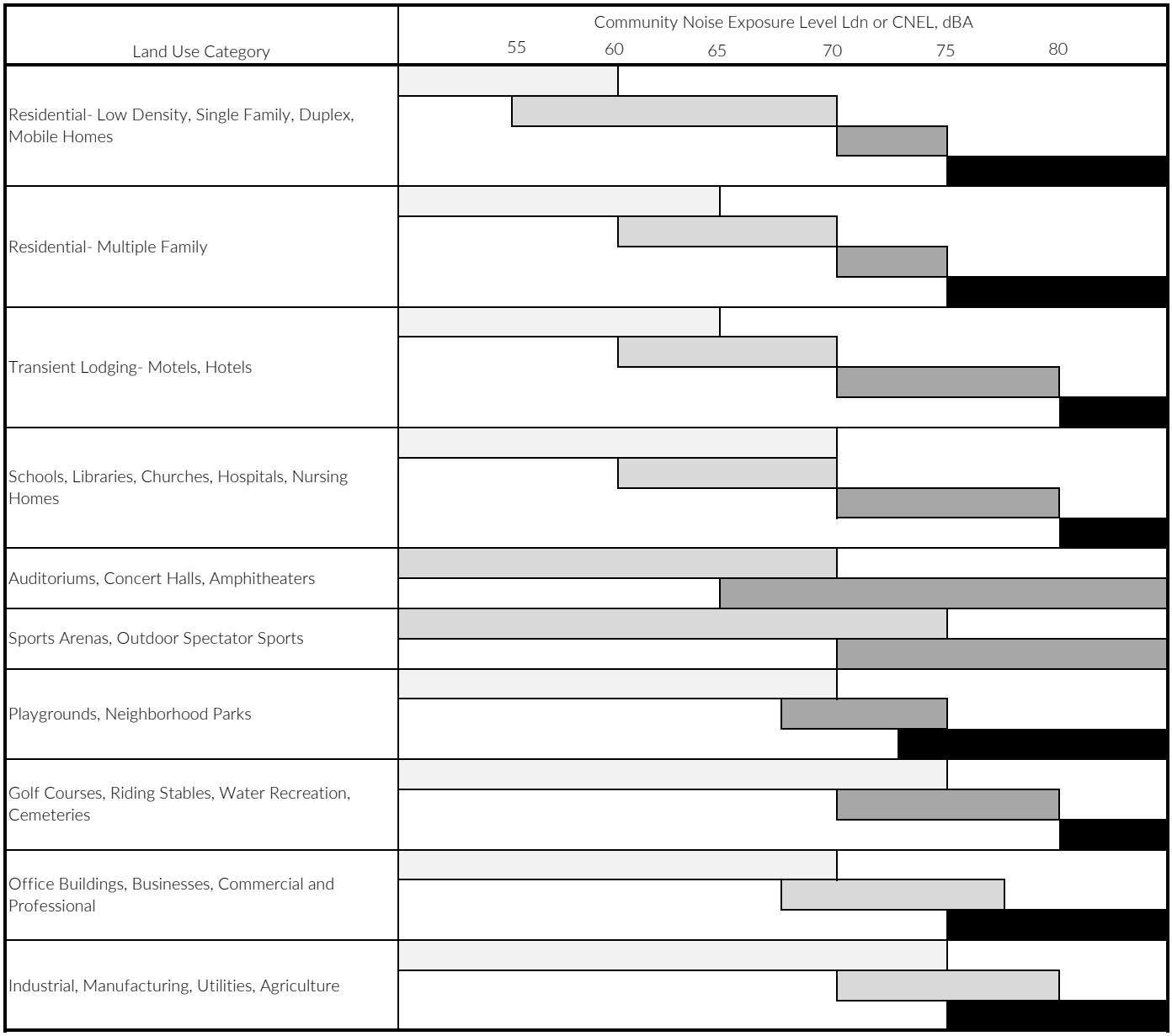
Table 4
Ground-Borne Vibration (GBV) Impact Criteria for General Vibration Assessment

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch/sec)		
	Frequent Events	Occasional Events	Infrequent Events
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB*	65 VdB*	65 VdB*
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Source: Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual (September 2018).

*This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. For equipment that is more sensitive, a Detailed Vibration Analysis must be performed.

Table 5
City of San Bernardino Land Use Compatibility for Community Noise Exposure



Normally Acceptable:	Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
Conditionally Acceptable:	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.
Normally Unacceptable:	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.
Clearly Unacceptable:	New construction or development should generally not be undertaken. Construction cost to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

Source: City of San Bernardino General Plan Noise Element, Figure N-1, November 2005.

Table 6
City of San Bernardino Interior and Exterior Noise Standards

Land Use Categories[1]		CNEL (dBA)	
Categories	Uses	Interior[2]	Exterior[3]
Residential	Single and Multiple-Family, Duplex	45 [4]	65
	Mobile Homes	---	65 [5]
Commercial	Hotel, Motel, Transient Housing	45	---
	Commercial Retail, Bank, Restaurant	55	---
	Office Building, Research and Development, Professional Offices	50	---
	Amphitheatre, Concert Hall, Auditorium, Meeting Hall	45	---
	Gymnasium (Multipurpose)	50	---
	Sports Club	55	---
	Manufacturing, Warehousing, Wholesale, Utilities	65	---
	Movie Theaters	45	---
Institutional/ Public	Hospital, School Classrooms/Playgrounds	45	65
	Church, Library	45	---
Open Space	Parks	---	65

Notes:

(1) Source: City of San Bernardino General Plan 2005: Table N-3, 2005.
(2) Indoor environment excluding: bathrooms, kitchens, toilets, closets, and corridors.
(3) Outdoor environment limited to:

- Private yard of single-family dwellings
- Multiple-family private patios or balconies accessed from within the dwelling (Balconies 6 feet deep or less are exempt)
- Mobile home parks
- Hotel and motel recreation area
- Park picnic areas
- School playgrounds
- Hospital patios

(4) Noise level requirement with closed windows, mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code.
(5) Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

5. ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

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

CONSTRUCTION NOISE MODELING

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. Noise levels associated with typical construction equipment are presented in Table 7.

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.

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 Study prepared for the proposed project (Lilburn, 2024). For analysis 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 are provided in Table 7. Construction noise worksheets are provided in Appendix D.

SOUNDPLAN NOISE MODEL

The SoundPLAN acoustical modeling software was utilized to model future roadway noise levels at the proposed sensitive receptors (e.g., residences). SoundPLAN is capable of evaluating both mobile and stationary noise sources (e.g., vehicle traffic, rail, parking lots, drive-thru menus, car wash 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 data is provided in Appendix E.

Future traffic and rail noise levels were modeled utilizing projected vehicle trips and mix as well as representative sound levels in the SoundPLAN model. Modeled noise sources include vehicle traffic on Foothill Boulevard and the Union Pacific Railroad Company (UP) rail lines.

Future Transportation Noise

Foothill Boulevard borders the project site to the south, Macy Street to the east, and Dallas Avenue to the west. The City of San Bernardino General Plan Circulation Element identifies Foothill Boulevard as a Major Arterial with a 100-foot right-of-way and Macy Street and Dallas Avenue are identified as local roadways. Therefore, Foothill Boulevard is a roadway of acoustical significance within the project vicinity. As shown in Table 8, Future Roadway LOS With Existing and Proposed General Plan Volumes, of the City's General Plan Circulation Element the future roadway capacity of Foothill Boulevard is 40,000 vehicles per day.[1]

It is important to evaluate potential impacts of the noisiest possible future conditions. These conditions occur when the maximum number of vehicles pass at the greatest speed. This scenario usually corresponds to Level of Service C (LOS C) Conditions, or about 75% of buildout capacity. Therefore, level of service (LOS) C ADT for Foothill Boulevard is expected to be approximately 30,000 vehicles per day. Arterials are expected to

[1] The segment of Foothill Boulevard that lies adjacent to the project site is labeled as 5th Street from Pepper to Interstate 215 in Table 5 of the City's General Plan Circulation Element as Foothill Boulevard becomes 5th Street just east of the project site.

handle truck traffic. An auto/medium truck/heavy truck vehicle mix of 92/3/5 and a speed of 40 miles per hour was used for modeling purposes.

Rail Noise

A Union Pacific (UP) rail line is located to the east of the project's eastern boundary. According to the Integrated Passenger and Freight Rail Forecast Study (SCAG 2022), this rail line includes approximately 48 trains per day. Representative noise measurements taken in the City of Riverside of a freight train were used to represent the sound level created by the UP rail line located east of the project site.

MOBILE SOURCE NOISE MODELING

Noise from vehicular traffic (Existing, Existing Plus Project, and Future) was modeled using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Key model parameters and REMEL adjustments are presented below:

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

Traffic noise levels were calculated at the right-of-way based on distance 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 modeled noise levels are shown for comparative purposes only to show the difference between with and without project conditions. Traffic noise calculation worksheets are included Appendix F.

Existing and Existing Plus Project Traffic Noise Levels

Project generated vehicle traffic is expected to utilize Macy Street and Dallas Street to access the project site. Existing average daily vehicle trips, project average daily vehicle trips, and project trip distribution were provided in the *NWC Macy Street and Foothill Boulevard Traffic Impact Analysis* (TIA) prepared for the project (Ganddini 2024). Per the TIA, the project is anticipated to generate 1,029 new daily trips. Table 8 includes the modeled roadway segments as well as the average daily traffic volumes, posted speed limits, and vehicle mix utilized in this analysis.

GROUNDBORNE VIBRATION MODELING

Groundborne vibration modeling was performed using vibration propagation equations and construction equipment source levels obtained from the FTA *Transit Noise and Vibration Impact Assessment Manual* (2018). Table 9 shows typical vibration levels associated with commonly used construction equipment based on data from the FTA.

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 9, a vibratory roller could generate up to 0.21 in/sec PPV at and operation of a large bulldozer could generate up to 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 in/sec 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. Groundborne vibration calculations are provided in Appendix G.

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

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

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

Table 7
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
Backhoe	No	40	80	78	372
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
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
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
Grader	No	40	85	-N/A-	0
Jackhammer	Yes	20	85	89	133
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
Roller	No	20	85	80	16
Scraper	No	40	85	84	12
Tractor	No	40	84	-N/A-	0
Vibratory Concrete Mixer	No	20	80	80	1
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

Notes:

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

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

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

Table 8
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		
Pepper Avenue	North of Foothill Boulevard	11,700	11,960	45	Hard
	South of Foothill Boulevard	13,000	13,260	45	Hard
Meridian Avenue	North of Foothill Boulevard	7,800	7,850	40	Hard
Dallas Avenue	North of Foothill Boulevard	800	850	25	Hard
Rancho Avenue	South of Foothill Boulevard	10,800	10,850	35	Hard
Foothill Boulevard	West of Pepper Avenue	23,000	23,150	40	Hard
	Pepper Avenue to Meridian Avenue	20,300	20,970	40	Hard
	Meridian Avenue to Dallas Avenue	18,600	19,320	40	Hard
	Dallas Avenue to Macy Street	16,200	16,560	40	Hard
	Macy Street to Rancho Avenue	17,500	17,760	40	Hard
	East of Rancho Avenue	21,600	21,810	40	Hard

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) Existing and project average daily traffic volumes and project vehicle mix obtained from the *NWC Macy Street and Foothills Boulevard Traffic Impact Analysis* (Ganddini Group, Inc., April 18, 2024).

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

Table 9
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

6. NOISE AND VIBRATION IMPACTS

This section analyzes the significance of project-related noise and groundborne vibration impacts relative to standards established by the City of San Bernardino and other applicable agencies in the context of CEQA. Appendix G of the California Environmental Quality Act Guidelines (Title 14, Division 6, Chapter 3 of the California Code of Regulations) includes an environmental checklist that identifies issues upon which findings of significance should be made. The CEQA Environmental Checklist Appendix G, XIII. Noise, requires determination if the project would result in:

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?*

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

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?*

NOISE IMPACTS

Would the project result in:

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?*

Finding: Significant Impact. Mitigation Required.

In relation to the Environmental Checklist noise issue "a", applicable standards established by the City of San Bernardino can be categorized into the following areas:

- Construction Noise
- Operational Noise

Project Construction

On-Site Equipment

Construction noise is regulated within Section 8.54.070 of the City of San Bernardino's Municipal Code which prohibits construction activities other than between the hours of 7:00 AM to 8:00 PM. However, neither the City of San Bernardino General Plan or Municipal Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified determination of what CEQA consists as a *substantial temporary or periodic noise increase*. Therefore, a numerical construction noise threshold based on the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable

criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use.

Accordingly, the project would result in a significant impact if:

- Project construction occurs outside the hours of 7:00 AM and 8:00 PM or,
- Project construction noise exceeds 80 dBA L_{eq} at a residential use.

Project construction noise levels at nearby sensitive receptors were calculated using the FTA methodology. Construction noise modeling worksheets for each phase are provided in Appendix D. Anticipated noise levels during each construction phase are presented in Table 10.

The single-family residential uses to the north, northeast, east, and southeast, the motel use to the west, and the mobile home park use to the south of the project site boundaries may be affected by short-term noise impacts associated with 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. Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant.

As shown in Table 10 modeled construction noise levels are forecast to reach up to 72.7 dBA L_{eq} at the nearest residential property line to the north, 61.1 dBA L_{eq} at the nearest residential property line to the northeast, 58.1 dBA L_{eq} at the nearest residential property line to the east, 62.3 dBA L_{eq} at the nearest residential property line to the southeast, 69.8 dBA L_{eq} at the nearest residential property line to the south, and 67 dBA L_{eq} at the motel property line to the west of the project site.

Table 10 also includes a comparison of existing noise levels and project construction noise levels. Noise measurement (NM)1 was chosen to represent noise levels at the nearest property lines of the residential uses located to the north, NM5 was chosen to represent noise levels at the nearest property lines of the residential uses located to the northeast and east, NM4 was chosen to represent noise levels at the nearest property lines of the residential uses located to the southeast, NM3 was chosen to represent noise levels at the nearest property lines of the residential uses located to the south, and NM2 was chosen to represent noise levels at the nearest property lines of the motel use located to the west of the project site.

Project construction will not occur outside of the hours outlined as "exempt" in City of San Bernardino's Municipal Code Section 8.54.070. Based on the modeled construction noise levels (see Table 10), construction noise levels are estimated to reach up to 72.7 dBA L_{eq} at the nearest residential use and will not exceed the FTA residential construction noise standard of 80 dBA L_{eq}. Therefore, the project would not exceed established standards relating to construction noise. The project impact is less than significant; no mitigation is required.

Notwithstanding the above, best management practices (BMPs) provided in the Project Description should be added to project plans and in contract specifications to minimize construction noise emanating from the proposed project.

Off-Site Vehicle Trips

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/Ldn.[2] The estimated existing average daily vehicle trips along Foothill Boulevard ranges between 16,200 and 23,000 daily vehicle trips,

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

along Dallas Avenue approximately 800 daily vehicle trips, and along Macy Street approximately 1,600 daily vehicle trips.[3] As shown in the CalEEMod output files provided in the Air Quality Study prepared for the proposed project (Lilburn 2024) the greatest number of construction-related vehicle trips per day would be up to 63 vehicle trips per day during building construction (48.6 for worker trips and 14.4 for vendor trips). Given the project site's location, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the 215 Freeway. 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.

Future Transportation Noise Impacts

Policy 14.1.1 in the Noise Element of the City of San Bernardino General Plan discourages development of new residential land uses, among other sensitive land uses, where the existing or future noise levels exceeds an Ldn of 65 dB(A) exterior and an Ldn of 45 dB(A) interior if the noise cannot be avoided or mitigated.

As shown in Table 6, the city identifies noise standards for single family residential uses of 65 dBA Ldn exterior and 45 dBA Ldn interior. Facades with anticipated noise levels of 65 dBA LDN are expected to have interior noise levels that do not exceed 45 dBA LDN. This is based on the assumption that heating and ventilation systems will be provided in order to allow for a windows-closed condition.

As shown on Figure 6 and on Figure 7, transportation related noise (road and rail) are expected to range between 63 and 70 dBA LDN at first floor façades of the first row of residential buildings exposed to Foothill Boulevard and the UP rail line east of the project site and between 64 and 72 dBA Ldn at second floor facades. Exterior noise levels will exceed the City's Noise Standard of 65 dBA Ldn under future transportation noise conditions. Mitigation is required.

MM-1 A six-foot-high concrete wall with no holes or cracks shall be constructed along the property line of homes adjacent to Foothill Boulevard as shown in Figure 8 and in Figure 9.

MM-2 Windows and sliding glass doors on building facades facing Foothill Boulevard shall have an STC rating of at least 30.

The project will be consistent with the City's General Plan goals and policies and the City's municipal code with implementation of these measures and impacts will be less than significant.

Impacts due to Project Generated Traffic Noise

California courts have rejected use of what is effectively a single "absolute noise level" threshold of significance (e.g., exceed 65 dBA CNEL/Ldn) on the grounds that the use of such a threshold fails to consider the magnitude or severity of increases in noise levels attributable to the project in different environments (see *King and Gardiner Farms, LLC v. County of Kern* (2020) 45 Cal.App.5th 814). California courts have also upheld the use of "ambient plus increment" thresholds for assessing project noise impacts as consistent with CEQA, noting however, that the severity of existing noise levels should not be ignored by incorporating a smaller incremental threshold for areas where existing ambient noise levels were already high (see *Mission Bay Alliance v. Office of Community Investment and Infrastructure* (2016) 6 Cal.App.5th 160).

[3] The existing average daily traffic volumes for Foothill Boulevard and Dallas Avenue were obtained from the *NWC Macy Street and Foothills Boulevard Traffic Impact Analysis* (Ganddini Group, Inc., April 18, 2024), see Table 7. The existing average daily traffic volumes for Macy Street were obtained from the *Foothill and Macy Trailer Parking Lot Project Traffic Impact Analysis* (Ganddini Group, Inc., March 2, 2022).

Increases in ambient noise along affected roadways due to project generated vehicle traffic is considered substantial if:

- Project-related traffic causes an increase in the CNEL/Ldn at any noise-sensitive receptor by an audible amount of 3 dBA and also causes the noise level at the receiving land use to exceed the noise standards detailed in the Noise Element of the City of San Bernardino General Plan (see Table 5 and 5).

Roadway noise levels were calculated for land uses adjacent to roadways in the project vicinity based on the FHWA Traffic Noise Prediction Model methodology. During operation, the proposed project is expected to generate a total of approximately 1,092 daily trips, including 93 trips during the AM peak hour and 107 trips during the PM peak hour.[4] Roadway noise levels were calculated for the following scenarios:

- Existing (without Project): This scenario refers to existing year traffic noise conditions.
- Existing Plus Project: This scenario refers to existing year plus project traffic noise conditions.

Table 11 shows the change in existing roadway noise levels with the addition of project-generated operational trips. FHWA Traffic Noise Prediction Model calculation worksheets are provided in Appendix F..

As shown in Table 11, the modeled traffic noise levels at the nearest sensitive receptors in the project vicinity range between 57 and 76 dBA CNEL/Ldn for Existing conditions and 57 and 76 dBA CNEL/Ldn for Existing Plus Project conditions; the addition of project trips /Ldn is expected to result in an increase of up to approximately 0.26 dBA CNEL/Ldn. Therefore, the addition of project trips is not expected to change noise levels in excess of the applicable thresholds at the study roadway segments (see Table 11). The project impact is less than significant; no mitigation is required.

GROUNDBORNE VIBRATION IMPACTS

Would the project result in:

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

Finding: Less Than Significant

In relation to the Environmental Checklist noise issue "b", the City of San Bernardino has not established thresholds of significance concerning groundborne vibration. In the absence of City-established thresholds, groundborne vibration impacts are based on guidance from the *Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual* (FTA, September 2018) (see Regulatory Setting section). Accordingly, the project would result in a significant impact if:

- Groundborne vibration levels generated by the project have the potential to cause architectural damage at nearby buildings by exceeding the following PPV:
  - 0.10 in/sec at buildings extremely susceptible to vibration damage
  - 0.20 in/sec at non-engineered timber and masonry buildings
  - 0.30 in/sec at engineered concrete and masonry (no plaster) buildings
  - 0.50 in/sec at reinforced-concrete, steel or timber (no plaster) buildings
- Groundborne vibration levels generated by the project have the potential to cause annoyance at sensitive receptors by exceeding 72 VdB.

Groundborne vibration modeling worksheets are provided in Appendix G.

4 Project trip generation per the *NWC Macy Street and Foothill Boulevard Traffic Impact Analysis* (TIA) prepared for the project by Ganddini Group, Inc. (April 18, 2024).

Construction-Related Vibration Impacts

Estimated groundborne vibration levels at the nearest sensitive receptors are presented in Table 12. As shown in Table 12, the existing residential uses to the north include structures (i.e., sheds etc.) located as close as approximately two feet from the northern project property line. At 2 feet, the use of a vibratory roller would be expected to generate a PPV of 9.281 in/sec and a bulldozer would be expected to generate a PPV of 3.933 in/sec (see Table 12). Therefore, use of either a vibratory roller or a bulldozer has the potential to cause architectural damage to the receptors to the north. Best management practices (BMPs) prohibiting the use of vibratory rollers within 26 feet and large bulldozers within 15 feet of the façades of residential structures to the north of the project site's northern property line will reduce potential architectural damage impacts.

The closest vibration-sensitive receptors to the project site include the residential structures (i.e., sheds etc.) located as close as approximately two feet from the northern project property line and the mobile homes located approximately 125 feet from the southern project property line. In order to reduce annoyance-related vibration impacts, BMPs that prohibit the use of vibratory rollers, or other similar vibratory equipment, within 136 feet of the façades of the residential structures to the north and south and large bulldozers within 80 feet of the façades of the residential structures to the north have been included (see Table 12). However, it should be noted that annoyance is expected to be short-term, occurring only during site grading, preparation, and paving. Construction activity that must occur within these distances would need to be performed with smaller equipment types that do not exceed the vibratory threshold identified herein.

The closest buildings to the west of the project site are that of commercial uses, which is not considered to be a vibration-sensitive land use. The FTA adopted standards associated with human annoyance for groundborne vibration impacts for three land-use categories: Vibration Category 1 – High Sensitivity, Vibration Category 2 – Residential, and Vibration Category 3 – Institutional. The FTA defines Category 1 as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference. Therefore, as commercial uses are not considered a vibration-sensitive land use, no further analysis in regard to annoyance is necessary to the adjacent commercial structures to the west.

Therefore, project construction would not result in the exposure of persons to excessive groundborne vibration and impacts would be less than significant with incorporation of best management practices.
The most substantial sources of groundborne vibration during post-construction project operations will include the movement of passenger vehicles and trucks on paved and generally smooth surfaces. Loaded trucks generally have a PPV of 0.076 at a distance of 25 feet (Caltrans 2020), which is a substantially lower PPV than that of a vibratory roller (0.210 in/sec PPV at 25 feet). Therefore, groundborne vibration levels generated by project operation would not exceed those modeled for project construction.

AIR TRAFFIC IMPACTS

Would the project result in:

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?*

Finding: No Impact

The closest airport to the project site is the San Bernardino International Airport (SBIA), which is located approximately 4.78 miles to the southeast of the project site. The City of San Bernardino General Plan states that, during the writing of the General Plan, the Airport Master Plan and the Comprehensive Land Use Plan (CLUP) for SBIA were in the process of being prepared and the Airport was operating under an Interim Airport Operating Plan. Therefore, the precise noise contours and safety zones were not available for inclusion in the City's General Plan. However, per the noise contour maps provided in the Federal Aviation Administration's (FAA) Finding of No Significant Impact (FONSI) and Record of Decision (ROD) for the proposed Eastgate Air Cargo Facility at San Bernardino International Airport (December 2019), the proposed project site is well outside the 65 dBA CNEL/Ldn noise contours of the San Bernardino International Airport. Therefore, as the project is not within two miles of a public airport or in the vicinity of a private airstrip, the project would not expose people residing or working in the project area to excessive noise levels associated with airports.

Table 10
Construction Noise Levels (dBA L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[2]	Construction Noise Levels (dBA Leq)
Demolition	North (Residential) (NM1)	51.7	71.1
	Northeast (Residential) (NM5)	55.8	59.5
	East (Residential) (NM5)	55.8	56.5
	Southeast (Residential) (NM4)	71.9	60.7
	South (Residential) (NM3)	73.6	68.2
	West (Transient Loding) (NM2)	61.4	65.4
Site Preparation	North (Residential) (NM1)	51.7	72.0
	Northeast (Residential) (NM5)	55.8	60.4
	East (Residential) (NM5)	55.8	57.4
	Southeast (Residential) (NM4)	71.9	61.7
	South (Residential) (NM3)	73.6	69.1
	West (Transient Loding) (NM2)	61.4	66.3
Grading	North (Residential) (NM1)	51.7	72.7
	Northeast (Residential) (NM5)	55.8	61.1
	East (Residential) (NM5)	55.8	58.1
	Southeast (Residential) (NM4)	71.9	62.3
	South (Residential) (NM3)	73.6	69.8
	West (Transient Loding) (NM2)	61.4	67.0
Building Construction	North (Residential) (NM1)	51.7	70.2
	Northeast (Residential) (NM5)	55.8	58.6
	East (Residential) (NM5)	55.8	55.7
	Southeast (Residential) (NM4)	71.9	59.9
	South (Residential) (NM3)	73.6	67.4
	West (Transient Loding) (NM2)	61.4	64.5
Paving	North (Residential) (NM1)	51.7	65.7
	Northeast (Residential) (NM5)	55.8	54.1
	East (Residential) (NM5)	55.8	51.2
	Southeast (Residential) (NM4)	71.9	55.4
	South (Residential) (NM3)	73.6	62.9
	West (Transient Loding) (NM2)	61.4	60.0
Architectural Coating	North (Residential) (NM1)	51.7	58.3
	Northeast (Residential) (NM5)	55.8	46.7
	East (Residential) (NM5)	55.8	43.7
	Southeast (Residential) (NM4)	71.9	48.0
	South (Residential) (NM3)	73.6	55.4
	West (Transient Loding) (NM2)	61.4	52.6

Notes:

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

(2) Per measured existing ambient noise levels (see Table 1). NM1 was chosen to represent noise levels at the property lines of the single-family residential uses to the north, NM5 was chosen to represent noise levels at the property lines of the single-family residential uses to the east and northeast, NM4 was chosen to represent noise levels at the property lines of the single-family residential uses to the southeast, NM3 was chosen to represent noise levels at the property lines of the mobile home park uses to the south, and NM2 was chosen to represent noise levels at the property lines of the motel use to the west of the project site.

Table 11
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 3 dB or More?
Pepper Avenue	North of Foothill Boulevard	50	73.59	73.68	0.09	Yes	No
	South of Foothill Boulevard	50	74.05	74.13	0.08	Yes	No
Meridian Avenue	North of Foothill Boulevard	30	69.24	69.27	0.03	Yes	No
Dallas Avenue	North of Foothill Boulevard	20	57.11	57.37	0.26	No	No
Rancho Avenue	South of Foothill Boulevard	50	71.71	71.73	0.02	Yes	No
Foothill Boulevard	West of Pepper Avenue	50	75.79	75.81	0.02	Yes	No
	Pepper Avenue to Meridian Avenue	50	75.24	75.38	0.14	Yes	No
	Meridian Avenue to Dallas Avenue	50	74.86	75.03	0.17	Yes	No
	Dallas Avenue to Macy Street	50	74.26	74.36	0.10	Yes	No
	Macy Street to Rancho Avenue	50	74.60	74.66	0.06	Yes	No
	East of Rancho Avenue	50	75.51	75.56	0.05	Yes	No

Notes:

(1) Exterior noise levels calculated 5 feet above pad elevation, perpendicular to subject roadway.

(2) Right-of-way per the City of San Bernardino General Plan Circulation Element.

(3) Per the City of San Bernardino exterior standards for residential uses (see Tables 4 and 5).

Table 12
Construction Vibration Levels at the Nearest Receptors

Receptor Location	Distance from Property Line to Nearest Structure (feet)	Equipment	Vibration Level[1]	Vibration Level Exceeded?[3]	Vibration Level with Mitigation[1,2]	Threshold Exceeded With Mitigation?[3]
Architectural Damage Analysis						
Single-Family Residential to North	2	Vibratory Roller	9.281	Yes	0.198	No
	2	Large Bulldozer	3.933	Yes	0.191	No
Commercial Motel Use to West	38	Vibratory Roller	0.112	No	-	-
	38	Large Bulldozer	0.047	No	-	-
Mobile Homes to South	125	Vibratory Roller	0.019	No	-	-
	125	Large Bulldozer	0.008	No	-	-
Annoyance Analysis						
Single-Family Residential to North	2	Vibratory Roller	127	Yes	72	No
	2	Large Bulldozer	120	Yes	72	No
Commercial Motel Use to West	38	Vibratory Roller	89	-	-	-
	5	Large Bulldozer	82	-	-	-
Mobile Homes to South	125	Vibratory Roller	73	Yes	72	No
	125	Large Bulldozer	72	No	-	-

Notes:

(1) Vibration levels are provided in PPV in/sec for architectural damage and VdB for annoyance.

(2) Best management practices (BMPs) for architectural damage include prohibiting the use of vibratory rollers, or other similar vibratory equipment, within 26 feet and large bulldozers within 15 feet of residential structures to the north of the project property lines. In addition, BMPs for vibratory annoyance includes prohibiting vibratory rollers, or other similar vibratory equipment, within 136 feet and large bulldozers within 80 feet of residential structures to the north and south of the project's property lines.

(3) The FTA identifies the threshold at which there is a risk to "architectural" damage to reinforced-concrete, steel or timber (no plaster) buildings as a peak particle velocity (PPV) of 0.5 in/sec, at engineered concrete and masonry (no plaster) buildings as a PPV of 0.3 in/sec, at non-engineered timber and masonry buildings as a PPV of 0.2 in/sec and at buildings extremely susceptible to vibration damage as a PPV of 0.1 in/sec. Therefore, vibration impacts related to architectural damage would be significant if construction activities result in groundborne vibration of 0.2 PPV or higher at residential structures and/or a PPV of 0.3 or higher at commercial structures (see Table 2). In addition, the FTA identifies a vibration annoyance threshold of 72 VdB for residential uses (see Table 3). Per the FTA Transit Noise and VIbration Impact Assessment Manual (September 2018), commercial uses are not considered vibration-sensitive land uses; therefore, the annoyance threshold does not apply to commercial uses.

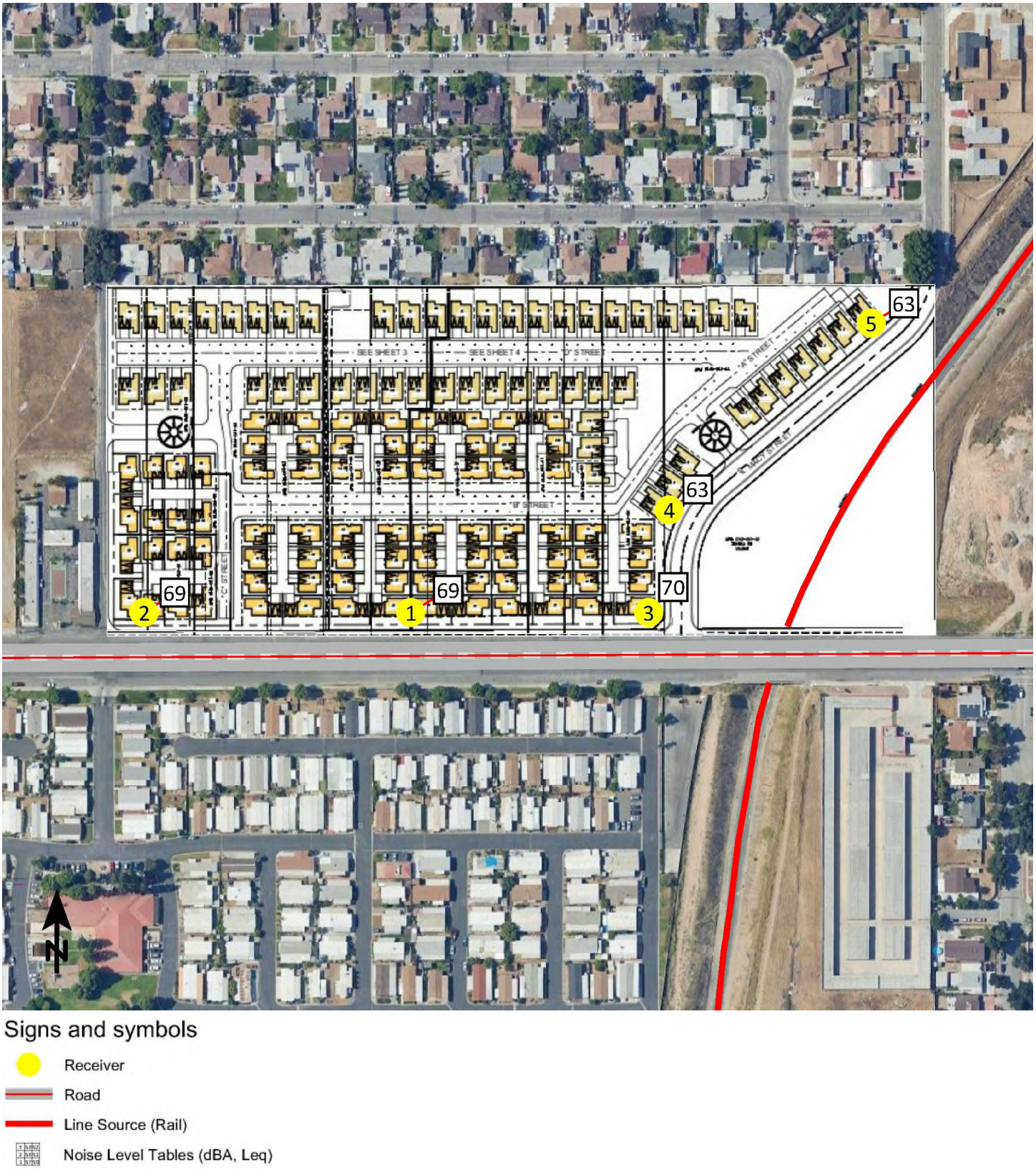


Figure 6
Future Transportation Noise Levels

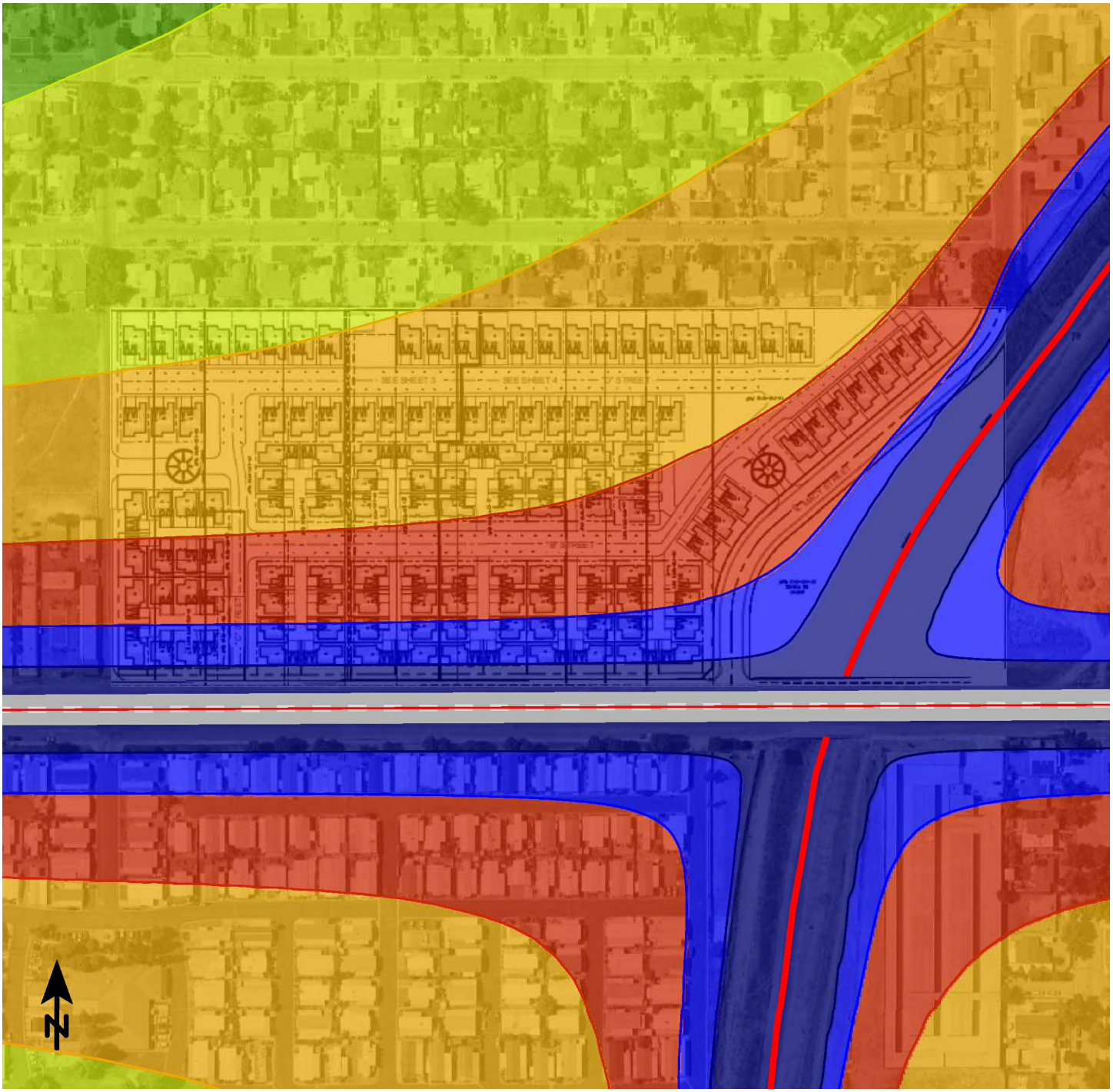
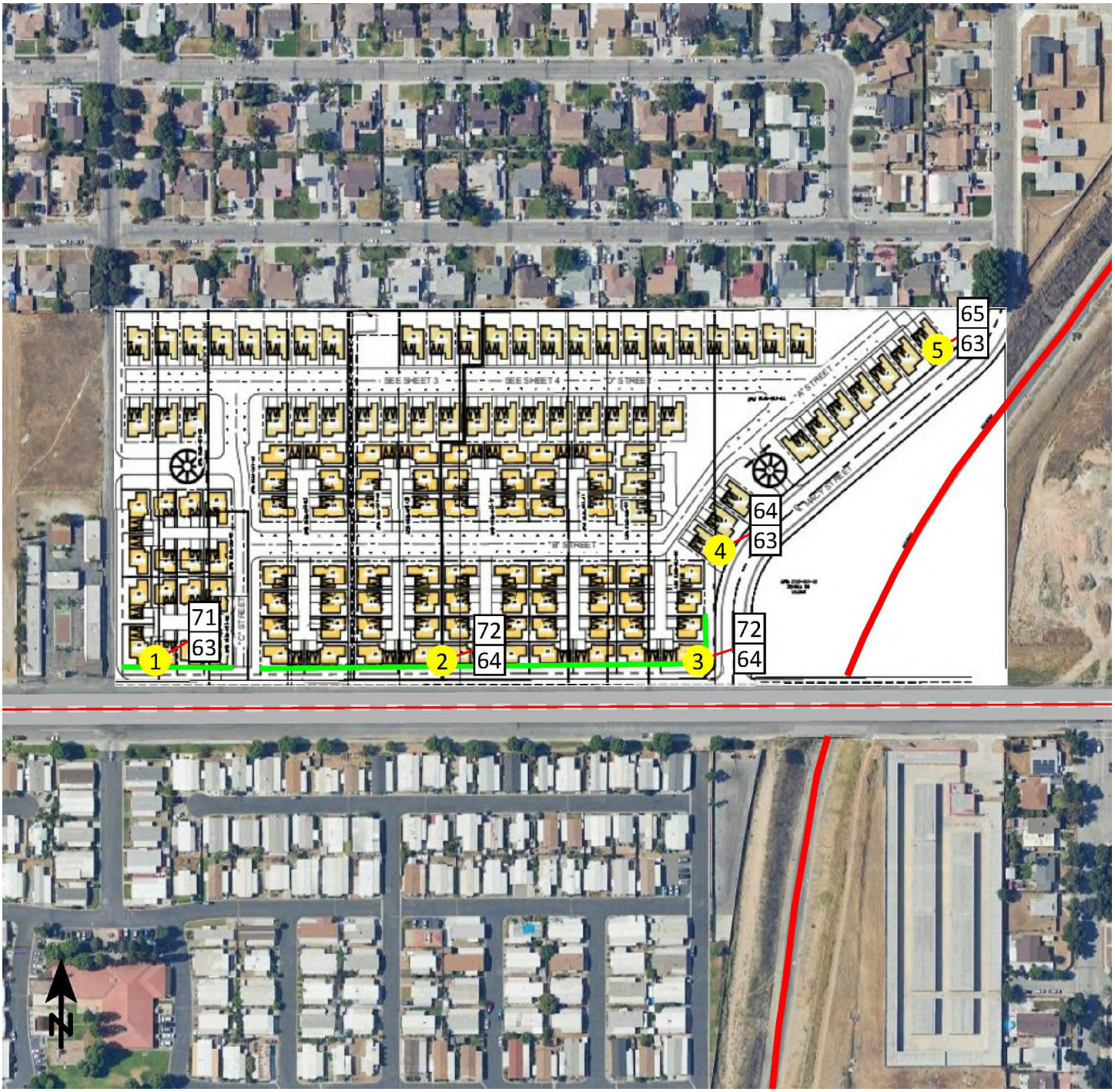


Figure 7
Future Transportation Noise Contours



Signs and symbols

- 6-Foot Mitigation Wall
- Receiver
- Road
- Union Pocific Rail Line
- Noise Level Tables (dBA, Leq) 1st Floor/2nd Floor

3	59	52
2	58	51
1	57	50

Figure 8
Future Transportation Noise Levels With Six Foot Concrete Wall

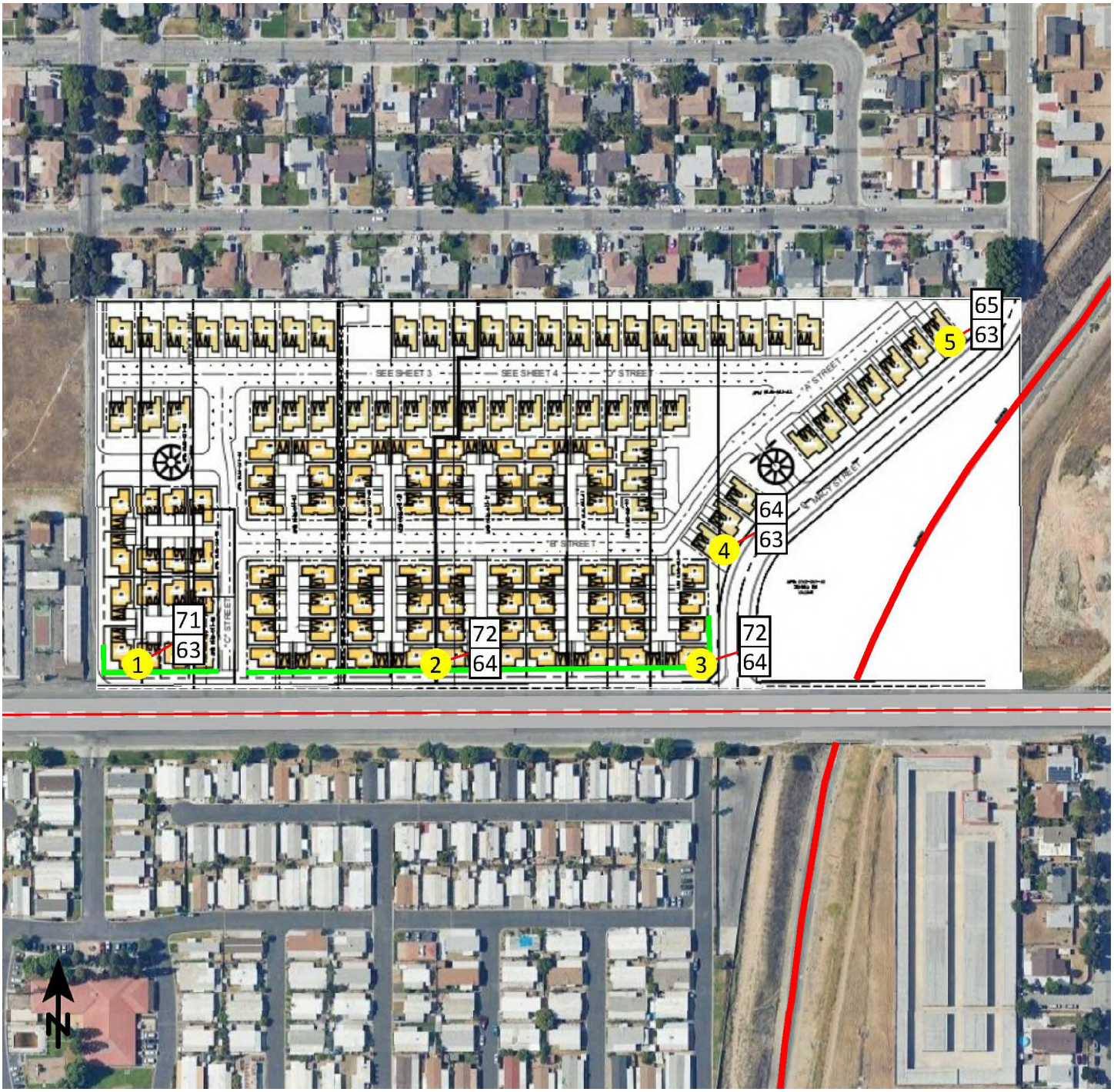


Figure 9
Future Transportation Noise Contours With Six Foot Concrete Wall

7. REFERENCES

California, State of, Department of Transportation
2020 Transportation and Construction Vibration Guidance Manual. April.

Environmental Protection Agency
1974 "Information on Levels of Environmental Noise Requisite to Protect Public Health And Welfare with an Adequate Margin of Safety," EPA/ONAC 550/9-74-004, March, 1974.

Federal Transit Administration
2018 Transit Noise and Vibration Impact Assessment. Typical Construction Equipment Vibration Emissions.

Ganddini Group, Inc.
2024 NWC Macy Street and Foothill Boulevard Traffic Impact Analysis. April 18.

Office of Planning and Research
2017 State of California General Plan Guidelines

Riverside, County of
2001 General Plan, Chapter 4, Figure C-3 "Link Volume Capacities/Level of Service for Riverside County Roadways".
2009 County of Riverside Industrial Hygiene Guidelines for Determining and Mitigating Traffic Noise Impacts to Residential Structures and County.

San Bernardino, City of
2005 City of San Bernardino General Plan. November 1.
2022 City of San Bernardino Municipal Code. Rev. March.

U.S. Department of Transportation
2006 FHWA Roadway Construction Noise Model User's Guide. January.

U.S. Department of Transportation Federal Aviation Administration
2019 Finding of No Significant Impact and Record of Decision Proposed Eastgate Cargo Facility San Bernardino International Airport. December 23.

APPENDICES

Appendix A List of Acronyms
Appendix B Glossary
Appendix C Noise Measurement Field Worksheets
Appendix D Construction Noise Modeling
Appendix E SoundPLAN Input and Output
Appendix F FHWA 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
Ldn	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)
LOS C	Level of Service C
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

GLOSSARY

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: NWC Macy St & Foothill Boulevard Residential Project **Date:** January 26, 2024

Project #: 19696

Noise Measurement #: NM1 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 2415 Spruce St W, San Bernardino, CA 92410

Site Description (Type of Existing Land Use and any other notable features): Meaurement Site: Near center of northern project boundary, just south of adjacent residential uses. Adjacent: Single-family ressidential to north and vacant project site to south. Active train tracks (running N-S) further east and various businesses southeast/southwest along Foothill Blvd.

Weather: sunny <5% cloud. Sunset 5:12PM **Settings:** SLOW FAST

Temperature: 66 deg F **Wind:** 9 mph **Humidity:** 46% **Terrain:** Flat

Start Time: 1:39 PM **End Time:** 1:54 PM **Run Time:**

Leq:	51.7	dB	**Primary Noise Source:** Traffic ambiance from vehicles traveling along Foothill Blvd,
Lmax	66.6	dB	Spruce St W, N Dallas Ave, N Macy St and other roads.
L2	57.5	dB	**Secondary Noise Sources:** Overhead air traffic. Some bird song. Some residential ambiance.
L8	54.7	dB	Leaf rustle from 9mph breeze through trees & vegetation.
L25	52.1	dB	
L50	49.7	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:	1/26/2024		

Noise Measurement
Field Data

PHOTOS:

NM1 looking N towards northern edge of site area. Residence 2415 Spruce St W on right of image, residence 2423 Spruce St W on left of image.

NM1 looking NW towards back yard of residence 2423 Spruce St W , San Bernardino.

Summary	
File Name on Meter	LxT_Data.394.s
File Name on PC	LxT_0003099-20240126 133950-LxT_Data.394.ldbin
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	NM1 34° 6'30.56"N 117°20'33.15"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.

Measurement	
Start	2024-01-26 13:39:50
Stop	2024-01-26 13:54:50
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-01-26 13:39:26
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	122.6 dB

Results		
LAeq	51.7	
LAE	81.2	
EA	14.739	µPa²h
EA8	471.643	µPa²h
EA40	2.358	mPa²h
LApeak (max)	2024-01-26 13:47:47	99.7 dB
LASmax	2024-01-26 13:47:47	66.6 dB
LASmin	2024-01-26 13:52:31	44.1 dB

		Statistics	
LCeq	78.1 dB	**LA2.00**	57.5 dB
LAeq	51.7 dB	**LA8.00**	54.7 dB
LCeq - LAeq	26.4 dB	**LA25.00**	52.1 dB
LAleq	56.0 dB	**LA50.00**	49.7 dB
LAeq	51.7 dB	**LA66.60**	48.6 dB
LAleq - LAeq	4.3 dB	**LA90.00**	46.7 dB
Overload Count	0		
Overload Duration	0.0 s		
OBA Overload Count	0		
OBA Overload Duration	0.0 s		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.394.s	Computer's File Name	LxT_0003099-20240126 133950-LxT_Data.394.ldl
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	NM1 34° 6'30.56"N 117°20'33.15"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.		
Start Time	2024-01-26 13:39:50	Duration	0:15:00.0
End Time	2024-01-26 13:54:50	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	51.7 dB		
LAE	81.2 dB	SEA	--- dB
EA	14.7 µPa²h	LAFTM5	57.4 dB
EA8	471.6 µPa²h		
EA40	2.4 mPa²h		
LA_{peak}	99.7 dB	2024-01-26 13:47:47	
LAS_{max}	66.6 dB	2024-01-26 13:47:47	
LAS_{min}	44.1 dB	2024-01-26 13:52:31	
LA_{eq}	51.7 dB		
LC_{eq}	78.1 dB	LC_{eq} - LA_{eq}	26.4 dB
LAI_{eq}	56.0 dB	LAI_{eq} - LA_{eq}	4.3 dB

Exceedances

	Count	Duration
LAS > 65.0 dB	1	0:00:01.7
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}	51.7 dB		78.1 dB		--- dB	
$L_{S(max)}$	66.6 dB	2024-01-26 13:47:47	--- dB		--- dB	
$L_{S(min)}$	44.1 dB	2024-01-26 13:52:31	--- dB		--- dB	
$L_{Peak(max)}$	99.7 dB	2024-01-26 13:47:47	--- dB		--- dB	

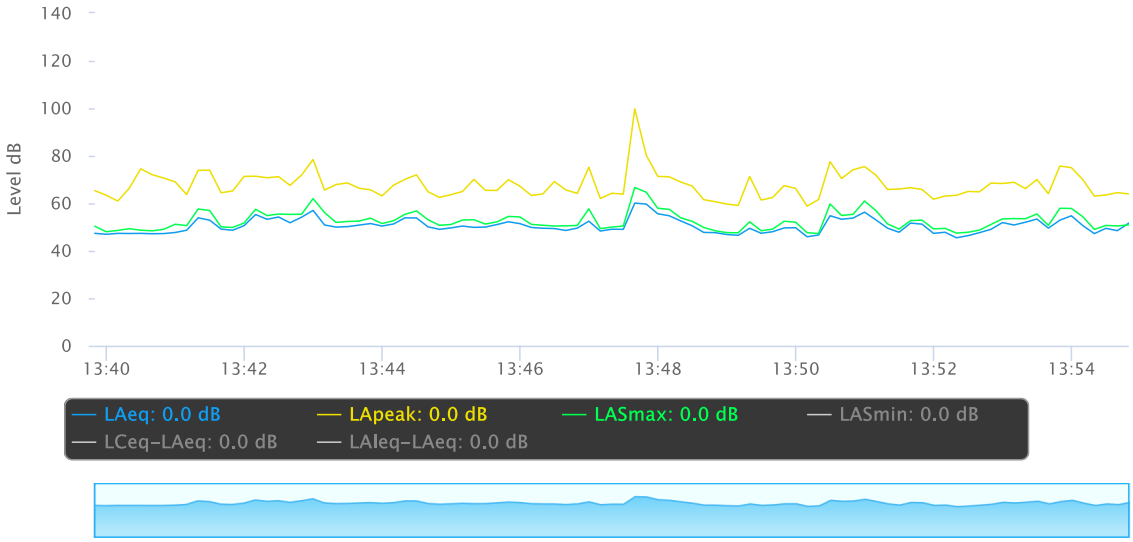
Overloads

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

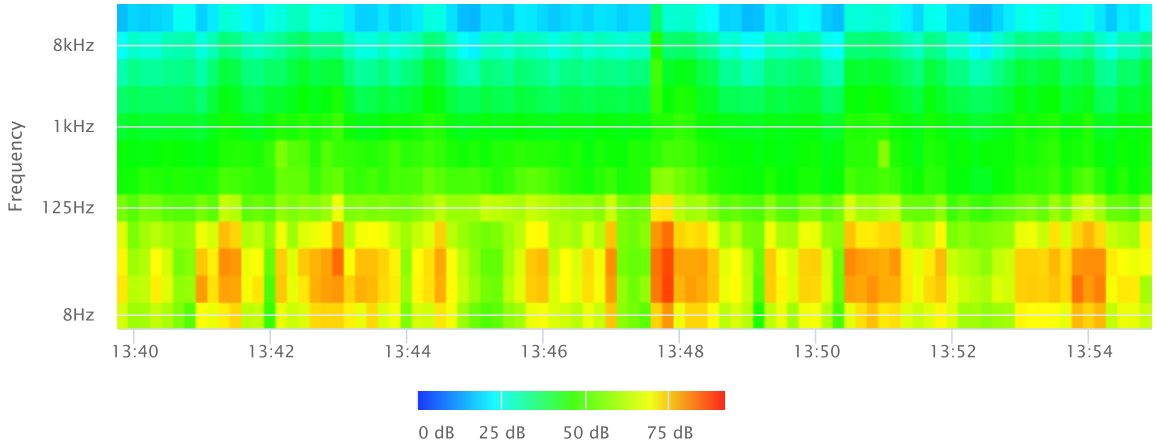
Statistics

LAS 2.0	57.5 dB
LAS 8.0	54.7 dB
LAS 25.0	52.1 dB
LAS 50.0	49.7 dB
LAS 66.6	48.6 dB
LAS 90.0	46.7 dB

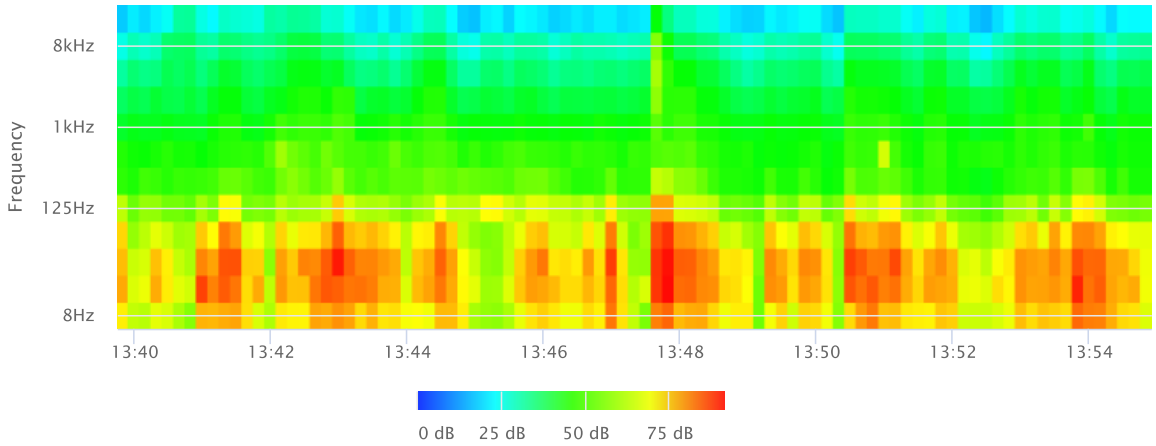
Time History



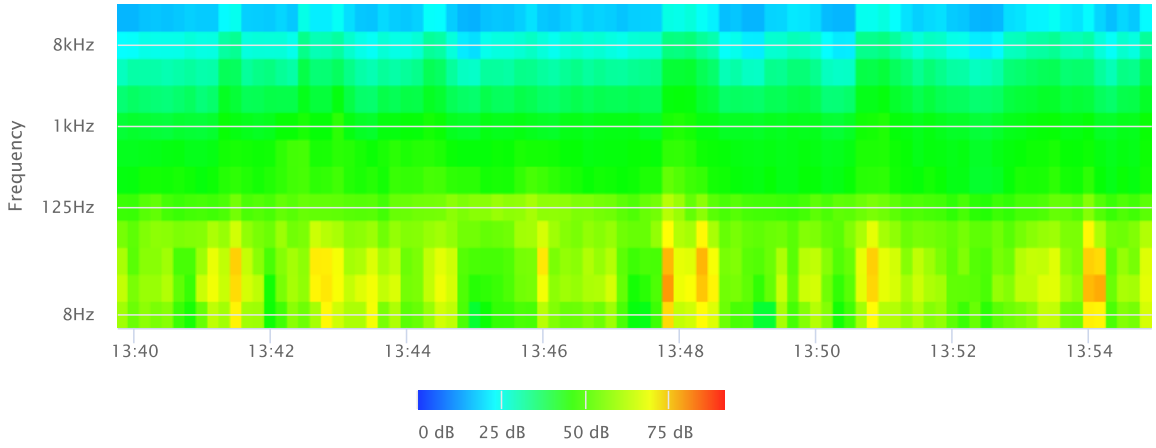
OBA 1/1 Leq



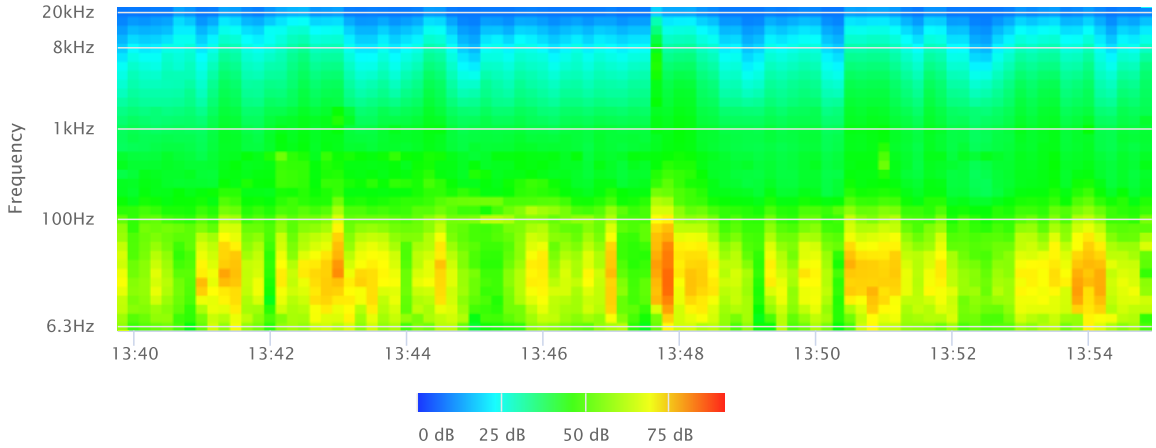
OBA 1/1 Lmax



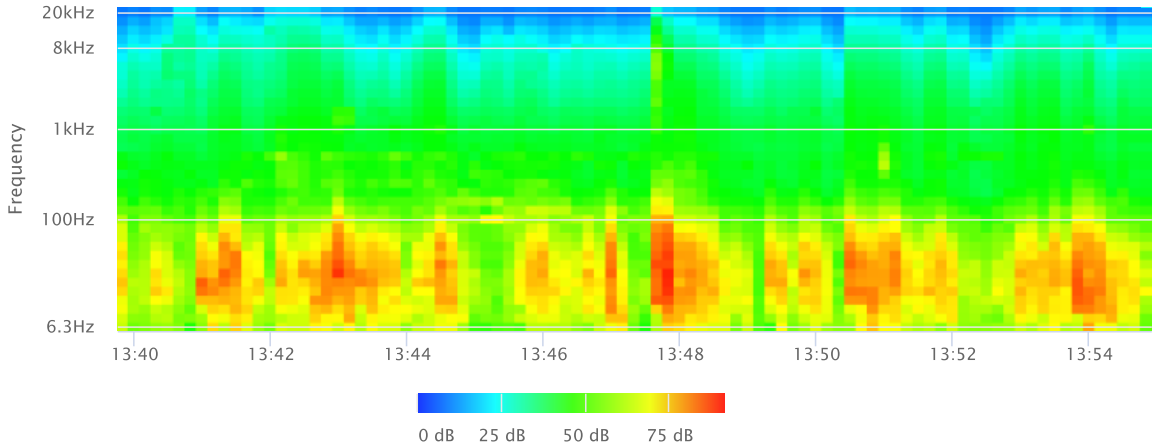
OBA 1/1 Lmin



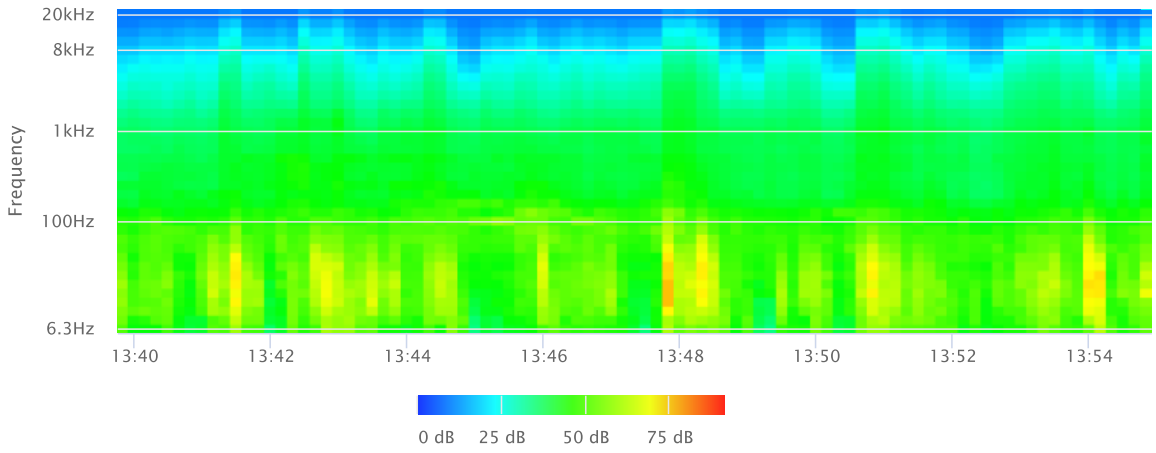
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:40
13:42
13:44
13:46
13:48
13:50
13:52
13:54
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: NWC Macy St & Foothill Boulevard Residential Project **Date:** January 26, 2024

Project #: 19696

Noise Measurement #: NM2 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 2512 Foothill Boulevard, San Bernardino, CA 92410

Site Description (Type of Existing Land Use and any other notable features): Measurement Site: Just east of N Dallas Avenue and west of motel use.

Adjacent: N Dallas Ave to west use with motel use further west, motel to east, and Foothhill Blvd to south with mobile home park further south.

Weather: sunny <5% cloud. Sunset 5:13PM **Settings:** SLOW FAST

Temperature: 66 deg F **Wind:** 9 mph **Humidity:** 46% **Terrain:** Flat

Start Time: 2:24 PM **End Time:** 2:39 PM **Run Time:**

Leq: 61.4 dB **Primary Noise Source:** Traffic noise from the 26 vehicles traveling along N Dallas Ave during measurement.

Lmax 75.8 dB Traffic ambiance from vehicles traveling along Foothill Blvd Ave & other roads.

L2 69.6 dB **Secondary Noise Sources:** Some bird song. Some residential ambiance. Garden power tools in operation,

L8 65.7 dB weeding of parking lot. Leaf rustle from 9mph breeze through treees & vegetation.

L25 61.4 dB

L50 58.0 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:	1/26/2024		

Noise Measurement
Field Data

PHOTOS:

NM2 looking E towards motel Room #4, 2512 Foothill Blvd, San Bernardino.

NM2 looking S down N Dallas Ave towards Foothill Blvd intersection (~200' S).

Summary	
File Name on Meter	LxT_Data.395.s
File Name on PC	LxT_0003099-20240126 142446-LxT_Data.395.ldbin
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	NM2 34° 6'26.93"N 117°20'40.92"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.

Measurement	
Start	2024-01-26 14:24:46
Stop	2024-01-26 14:39:46
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-01-26 14:23:59
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	122.6 dB

Results			
LAeq		61.4	
LAE		90.9	
EA		137.201	µPa²h
EA8		4.390	mPa²h
EA40		21.952	mPa²h
LApeak (max)	2024-01-26 14:39:11	109.1	dB
LASmax	2024-01-26 14:39:11	75.8	dB
LASmin	2024-01-26 14:28:00	49.6	dB

		Statistics	
LCeq	81.9 dB	**LA2.00**	69.6 dB
LAeq	61.4 dB	**LA8.00**	65.7 dB
LCeq - LAeq	20.6 dB	**LA25.00**	61.4 dB
LAleq	66.7 dB	**LA50.00**	58.0 dB
LAeq	61.4 dB	**LA66.60**	55.9 dB
LAleq - LAeq	5.3 dB	**LA90.00**	52.9 dB
Overload Count	0		
Overload Duration	0.0 s		
OBA Overload Count	0		
OBA Overload Duration	0.0 s		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.395.s	Computer's File Name	LxT_0003099-20240126 142446-LxT_Data.395.ldl
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	NM2 34° 6'26.93"N 117°20'40.92"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.		
Start Time	2024-01-26 14:24:46	Duration	0:15:00.0
End Time	2024-01-26 14:39:46	Run Time	0:15:00.0
		Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	61.4 dB		
LAE	90.9 dB	SEA	--- dB
EA	137.2 µPa²h	LAFTM5	68.2 dB
EA8	4.4 mPa²h		
EA40	22.0 mPa²h		
LA_{peak}	109.1 dB	2024-01-26 14:39:11	
LAS_{max}	75.8 dB	2024-01-26 14:39:11	
LAS_{min}	49.6 dB	2024-01-26 14:28:00	
LA_{eq}	61.4 dB		
LC_{eq}	81.9 dB	LC_{eq} - LA_{eq}	20.6 dB
LAI_{eq}	66.7 dB	LAI_{eq} - LA_{eq}	5.3 dB

Exceedances	Count	Duration
LAS > 65.0 dB	28	0:02:04.1
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

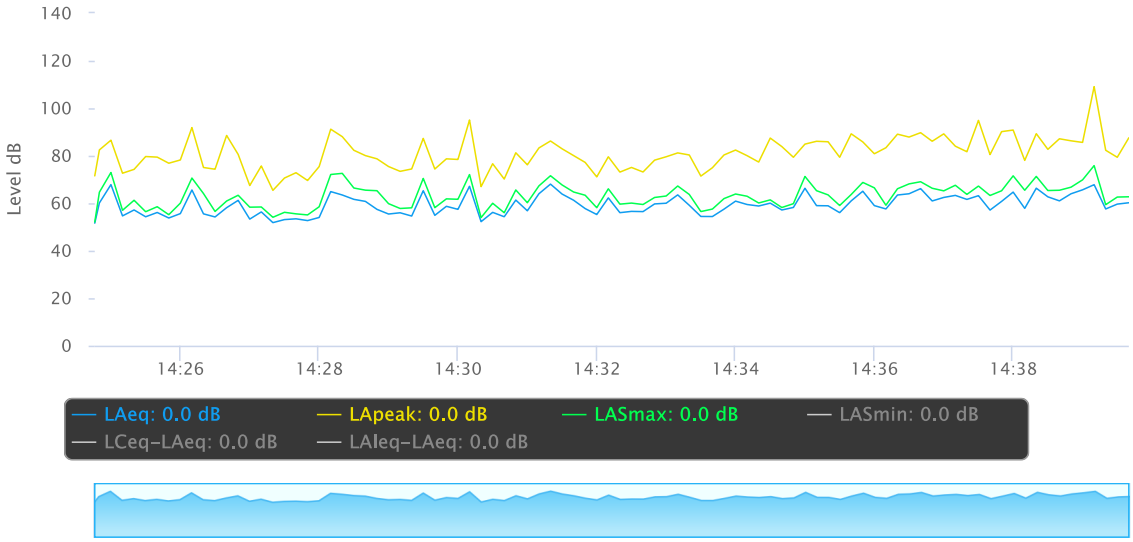
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	61.4 dB		81.9 dB		--- dB	
$L_{S(max)}$	75.8 dB	2024-01-26 14:39:11	--- dB		--- dB	
$L_{S(min)}$	49.6 dB	2024-01-26 14:28:00	--- dB		--- dB	
$L_{Peak(max)}$	109.1 dB	2024-01-26 14:39:11	--- dB		--- dB	

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

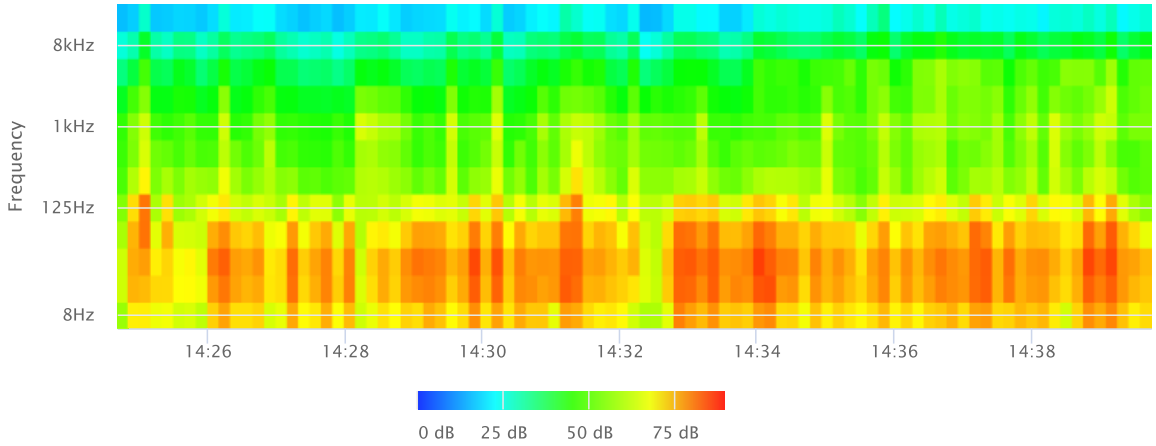
Statistics

LAS 2.0	69.6 dB
LAS 8.0	65.7 dB
LAS 25.0	61.4 dB
LAS 50.0	58.0 dB
LAS 66.6	55.9 dB
LAS 90.0	52.9 dB

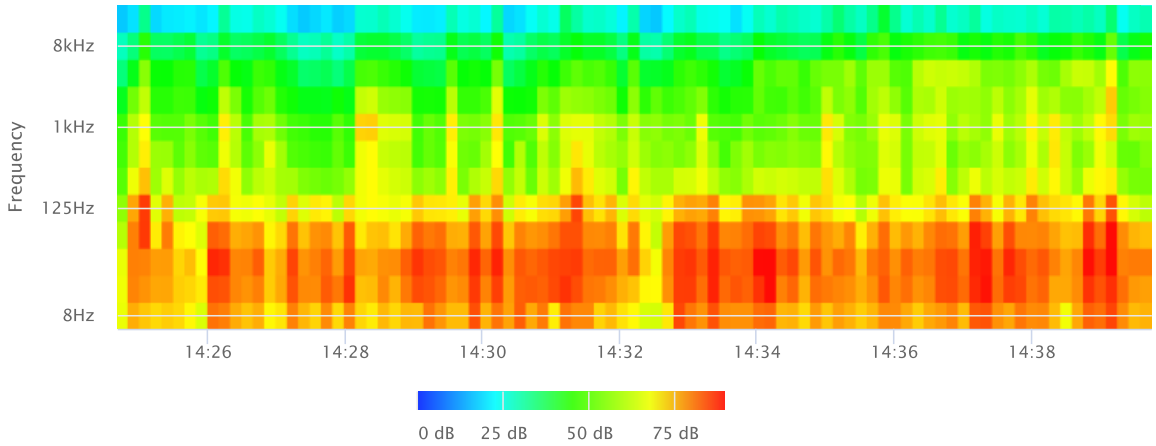
Time History



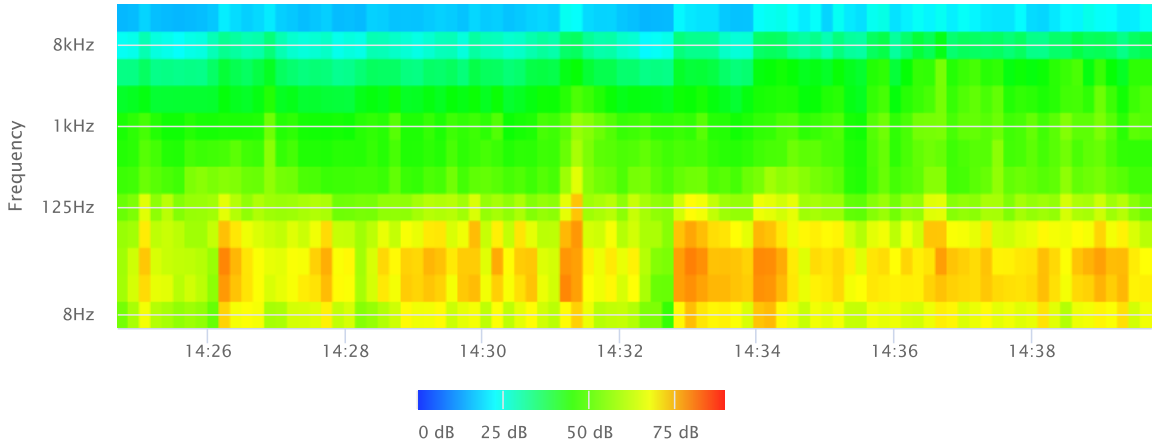
OBA 1/1 Leq



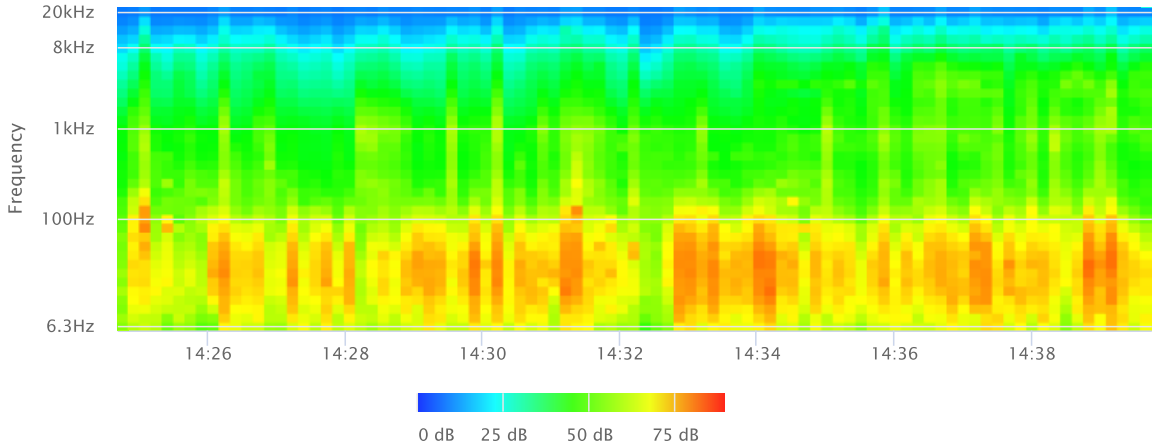
OBA 1/1 Lmax



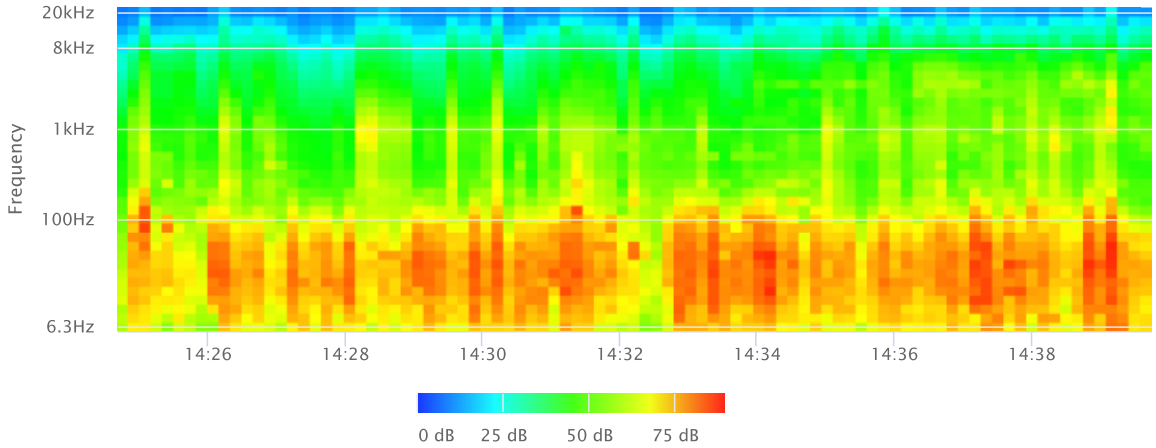
OBA 1/1 Lmin



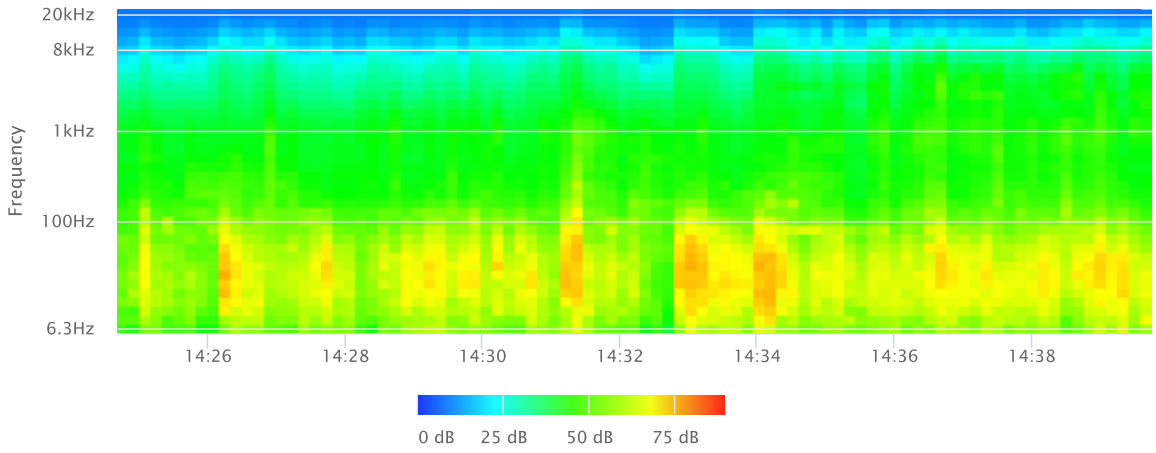
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
14:26
14:28
14:30
14:32
14:34
14:36
14:38
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: NWC Macy St & Foothill Boulevard Residential Project **Date:** January 26, 2024

Project #: 19696

Noise Measurement #: NM3 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 2505 W foothill Boulevard, San Bernardino, CA 92410

Site Description (Type of Existing Land Use and any other notable features): Meaurement Site: Just south of the project site and Foothill Blvd and north of mobile home park. Adjacent: Foothill Blvd to north with vacant project site further north, mobile home park to south. Active train tracks (running N-S) to the E.

Weather: sunny <5% cloud. Sunset 5:13PM **Settings:** SLOW FAST

Temperature: 66 deg F **Wind:** 9 mph **Humidity:** 46% **Terrain:** Flat

Start Time: 2:52 PM **End Time:** 3:07 PM **Run Time:**

Leq:	73.6	dB	**Primary Noise Source:** Traffic noise from the 324 vehicles passing microphone traveling along Foothill Blvd during measurement. Traffic ambiance from other roads.
Lmax	83.8	dB	
L2	79.9	dB	**Secondary Noise Sources:** Some bird song. Some residential ambiance.
L8	78.0	dB	Leaf rustle from 9mph breeze through trees & vegetation.
L25	74.9	dB	
L50	71.8	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:	1/26/2024		

Noise Measurement
Field Data

PHOTOS:

NM3 looking E up Foothill Blvd towards Foothill Blvd & N Macy St intersection (~530' E). Sequoia Plaza Mobile Home Park on the right.

NM3 looking W down Foothill Blvd towards Foothill Blvd & N Dallas Ave intersection (~490' W). Sequoia Plaza Mobile Home Park on the left.

Summary	
File Name on Meter	LxT_Data.396.s
File Name on PC	LxT_0003099-20240126 145251-LxT_Data.396.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	NM3 34° 6'23.83"N 117°20'35.20"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.

Measurement	
Start	2024-01-26 14:52:51
Stop	2024-01-26 15:07:51
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-01-26 14:52:27
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	122.6 dB

Results		
LA_{eq}	73.6	
LAE	103.2	
EA	2.300292	mPa^2h
EA8	73.60935	mPa^2h
EA40	368.0468	mPa^2h
$LA_{peak\ (max)}$	2024-01-26 15:00:04	99.5 dB
LAS_{max}	2024-01-26 15:01:44	83.8 dB
LAS_{min}	2024-01-26 15:04:55	51.4 dB

		Statistics	
LC_{eq}	82.4 dB	**LA2.00**	79.9 dB
LA_{eq}	73.6 dB	**LA8.00**	78.0 dB
LC_{eq} - LA_{eq}	8.8 dB	**LA25.00**	74.9 dB
LAI_{eq}	75.6 dB	**LA50.00**	71.8 dB
LA_{eq}	73.6 dB	**LA66.60**	69.0 dB
LAI_{eq} - LA_{eq}	2.0 dB	**LA90.00**	62.2 dB
Overload Count	0		
Overload Duration	0.0 s		
OBA Overload Count	0		
OBA Overload Duration	0.0 s		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.396.s	Computer's File Name	LxT_0003099-20240126 145251-LxT_Data.396.ldl
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	NM3 34° 6'23.83"N 117°20'35.20"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.		
Start Time	2024-01-26 14:52:51	Duration	0:15:00.0
End Time	2024-01-26 15:07:51	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	73.6 dB		
LAE	103.2 dB	SEA	--- dB
EA	2.3 mPa²h	LAFTM5	78.1 dB
EA8	73.6 mPa²h		
EA40	368.0 mPa²h		
LA_{peak}	99.5 dB	2024-01-26 15:00:04	
LAS_{max}	83.8 dB	2024-01-26 15:01:44	
LAS_{min}	51.4 dB	2024-01-26 15:04:55	
LA_{eq}	73.6 dB		
LC_{eq}	82.4 dB	LC_{eq} - LA_{eq}	8.8 dB
LAI_{eq}	75.6 dB	LAI_{eq} - LA_{eq}	2.0 dB

Exceedances	Count	Duration
LAS > 65.0 dB	16	0:12:55.3
LAS > 85.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

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

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

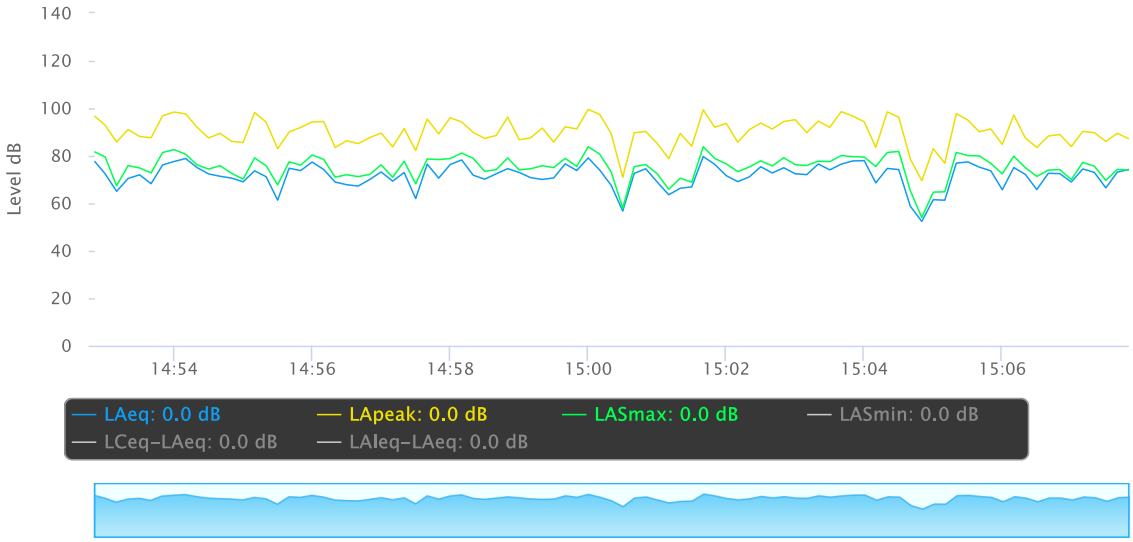
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	73.6 dB		82.4 dB		--- dB	
$L_{S(max)}$	83.8 dB	2024-01-26 15:01:44	--- dB		--- dB	
$L_{S(min)}$	51.4 dB	2024-01-26 15:04:55	--- dB		--- dB	
$L_{Peak(max)}$	99.5 dB	2024-01-26 15:00:04	--- dB		--- dB	

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

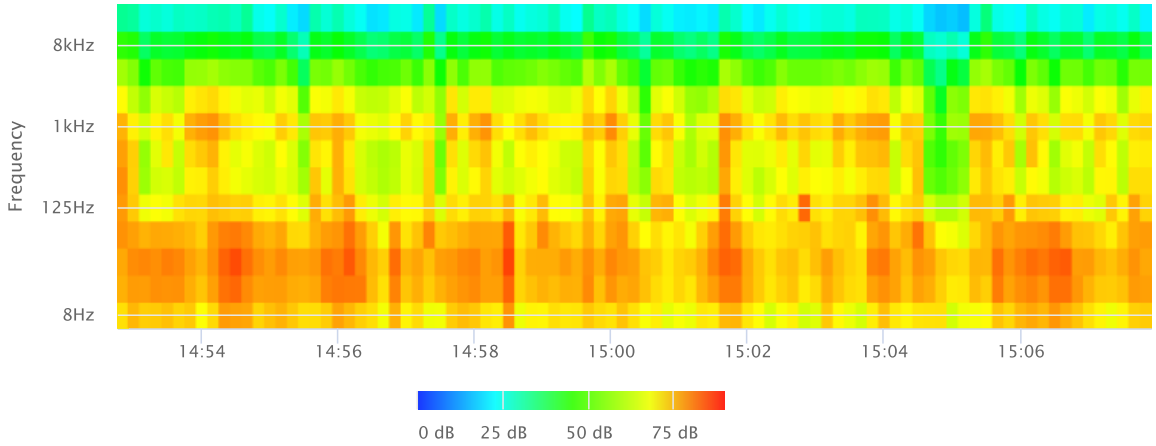
Statistics

LAS 2.0	79.9 dB
LAS 8.0	78.0 dB
LAS 25.0	74.9 dB
LAS 50.0	71.8 dB
LAS 66.6	69.0 dB
LAS 90.0	62.2 dB

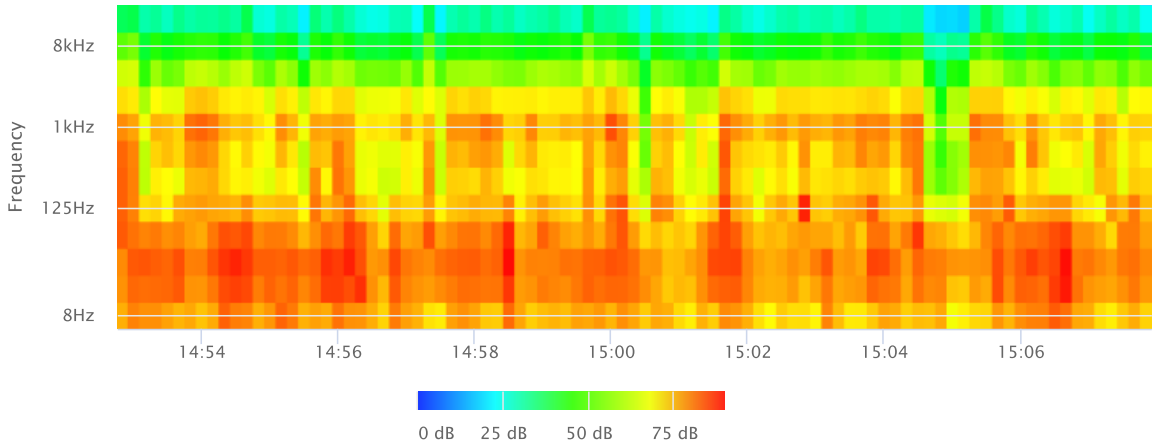
Time History



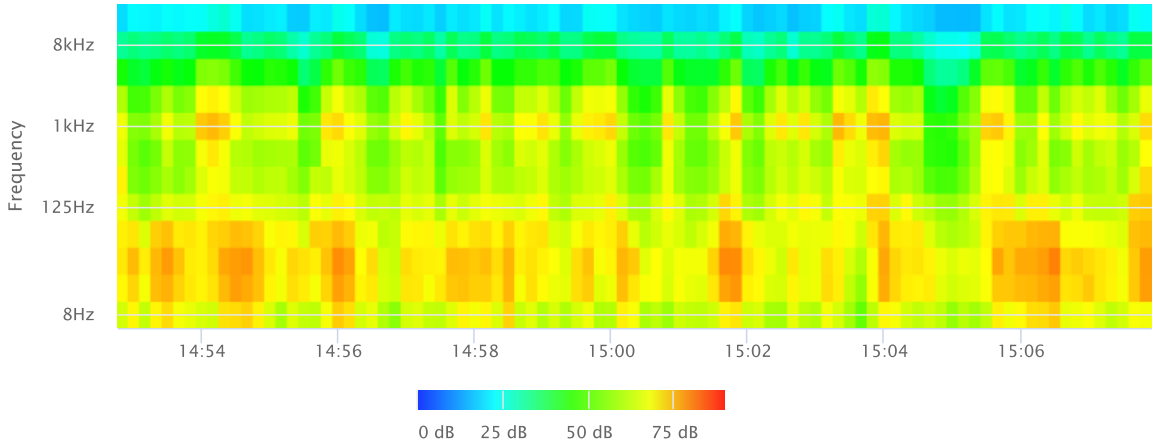
OBA 1/1 Leq



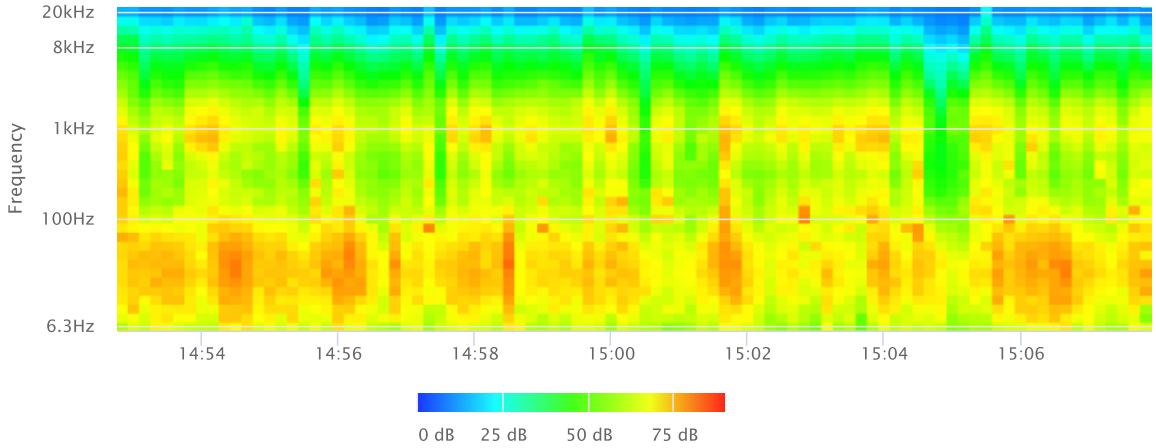
OBA 1/1 Lmax



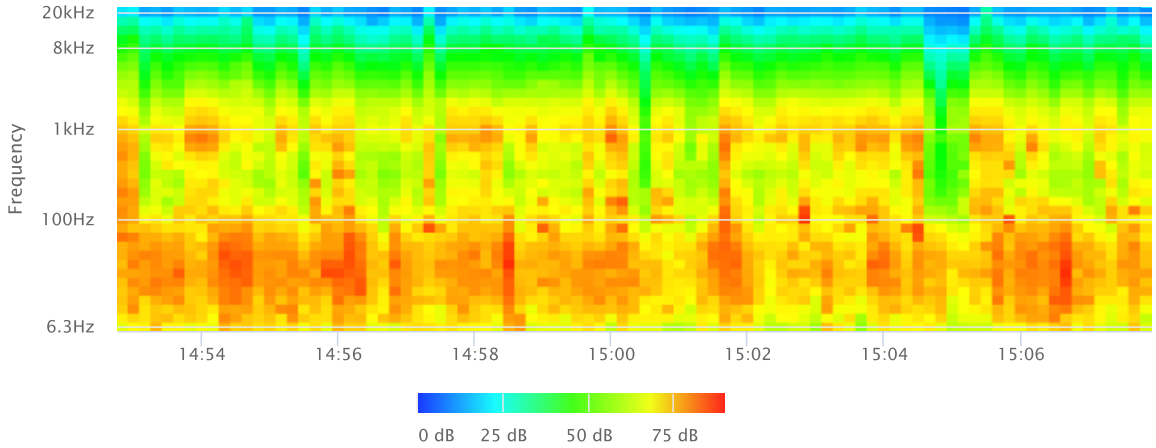
OBA 1/1 Lmin



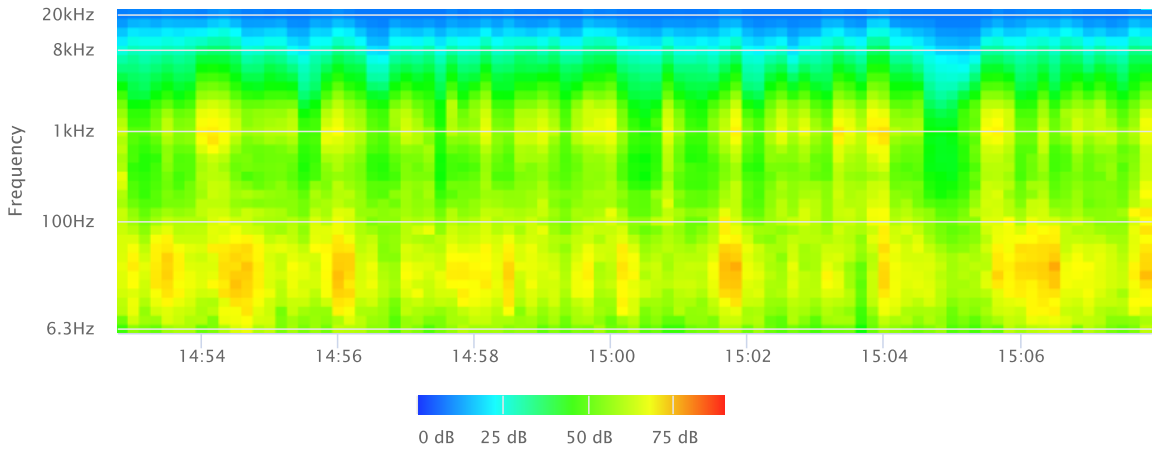
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
14:54
14:56
14:58
15:00
15:02
15:04
15:06
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: NWC Macy St & Foothill Boulevard Residential Project **Date:** January 26, 2024

Project #: 19696

Noise Measurement #: NM4 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 2325 Foothill Boulevard, San Bernardino, CA 92410

Site Description (Type of Existing Land Use and any other notable features): Measueement Site: Just south of Foothill Blvd near commercial storage use and single-family residential. Adjacent: Foothill Blvd to north, commercial storage use to southwest, single-family residential to southeast, and active train tracks (running N-S) to the west.

Weather: sunny <5% cloud. Sunset 5:13PM **Settings:** SLOW FAST

Temperature: 66 deg F **Wind:** 9 mph **Humidity:** 46% **Terrain:** Flat

Start Time: 3:32 PM **End Time:** 3:47 PM **Run Time:**

Leq: 71.9 dB

Lmax 81.1 dB

L2 77.9 dB

L8 76.0 dB

L25 73.6 dB

L50 69.7 dB

Primary Noise Source: Traffic noise from the 304 vehicles passing microphone traveling along Foothill Blvd during measurement. Traffic ambiance from other roads.

Secondary Noise Sources: Some bird song. Some residential ambiance. (No barking dog). Leaf rustle from 9mph breeze through trees & vegetation.

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:	1/26/2024		

Noise Measurement
Field Data

PHOTOS:

NM4 looking ENE across Foothill Blvd towards Foothill Blvd & N Macy St intersection (traffic lights ~120' ENE).

NM4 looking W down Foothill Blvd across entrance/exit to storage buildings 2325 Foothill Blvd, San Bernardino.

Summary	
File Name on Meter	LxT_Data.397.s
File Name on PC	LxT_0003099-20240126 153223-LxT_Data.397.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	NM4 34° 6'24.04"N 117°20'23.41"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.

Measurement	
Start	2024-01-26 15:32:23
Stop	2024-01-26 15:47:23
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-01-26 15:31:46
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	122.6 dB

Results			
LAeq	71.9		
LAE	101.4		
EA	1.54574	mPa²h	
EA8	49.46368	mPa²h	
EA40	247.3184	mPa²h	
LApeak (max)	2024-01-26 15:33:29	100.6	dB
LASmax	2024-01-26 15:33:33	81.1	dB
LASmin	2024-01-26 15:40:01	50.9	dB

			Statistics	
LCeq	82.3	dB	**LA2.00**	77.9 dB
LAeq	71.9	dB	**LA8.00**	76.0 dB
LCeq - LAeq	10.4	dB	**LA25.00**	73.6 dB
LAleq	73.5	dB	**LA50.00**	69.7 dB
LAeq	71.9	dB	**LA66.60**	66.9 dB
LAleq - LAeq	1.6	dB	**LA90.00**	60.7 dB
Overload Count	0			
Overload Duration	0.0	s		
OBA Overload Count	0			
OBA Overload Duration	0.0	s		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.397.s	Computer's File Name	LxT_0003099-20240126 153223-LxT_Data.397.ldl
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	NM4 34° 6'24.04"N 117°20'23.41"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.		
Start Time	2024-01-26 15:32:23	Duration	0:15:00.0
End Time	2024-01-26 15:47:23	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	71.9 dB		
LAE	101.4 dB	SEA	--- dB
EA	1.5 mPa²h	LAFTM5	75.7 dB
EA8	49.5 mPa²h		
EA40	247.3 mPa²h		
LA_{peak}	100.6 dB	2024-01-26 15:33:29	
LAS_{max}	81.1 dB	2024-01-26 15:33:33	
LAS_{min}	50.9 dB	2024-01-26 15:40:01	
LA_{eq}	71.9 dB		
LC_{eq}	82.3 dB	LC_{eq} - LA_{eq}	10.4 dB
LAI_{eq}	73.5 dB	LAI_{eq} - LA_{eq}	1.6 dB

Exceedances

	Count	Duration
LAS > 65.0 dB	17	0:12:06.4
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}	71.9 dB		82.3 dB		--- dB	
$L_{S(max)}$	81.1 dB	2024-01-26 15:33:33	--- dB		--- dB	
$L_{S(min)}$	50.9 dB	2024-01-26 15:40:01	--- dB		--- dB	
$L_{Peak(max)}$	100.6 dB	2024-01-26 15:33:29	--- dB		--- dB	

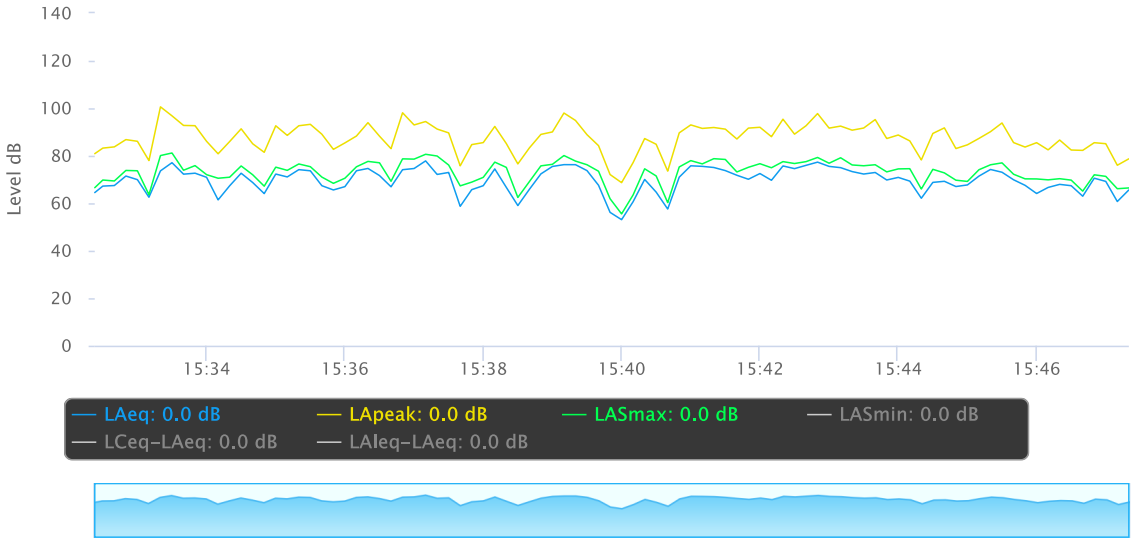
Overloads

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

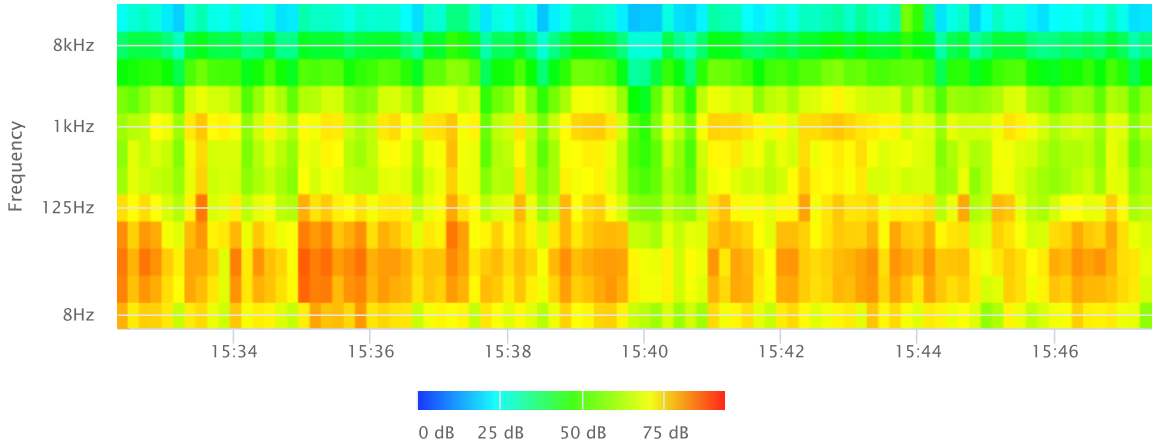
Statistics

LAS 2.0	77.9 dB
LAS 8.0	76.0 dB
LAS 25.0	73.6 dB
LAS 50.0	69.7 dB
LAS 66.6	66.9 dB
LAS 90.0	60.7 dB

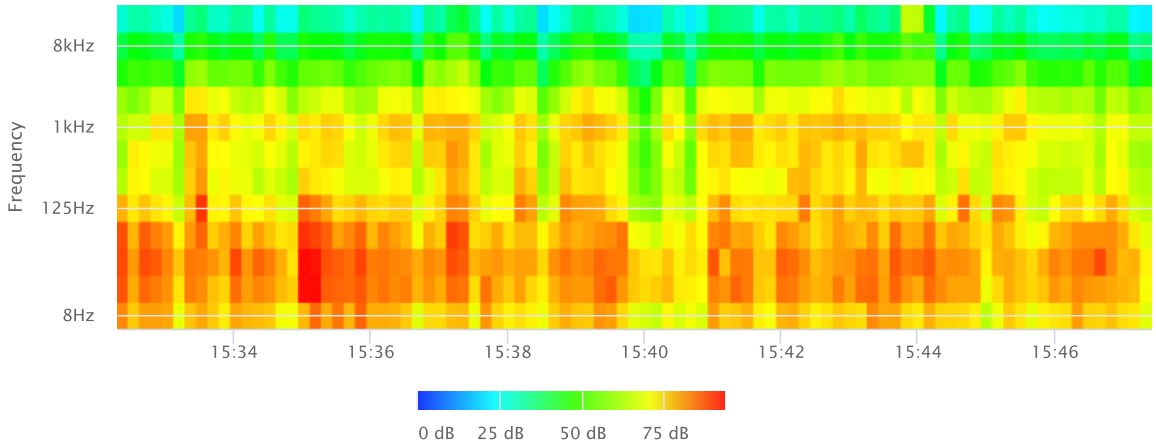
Time History



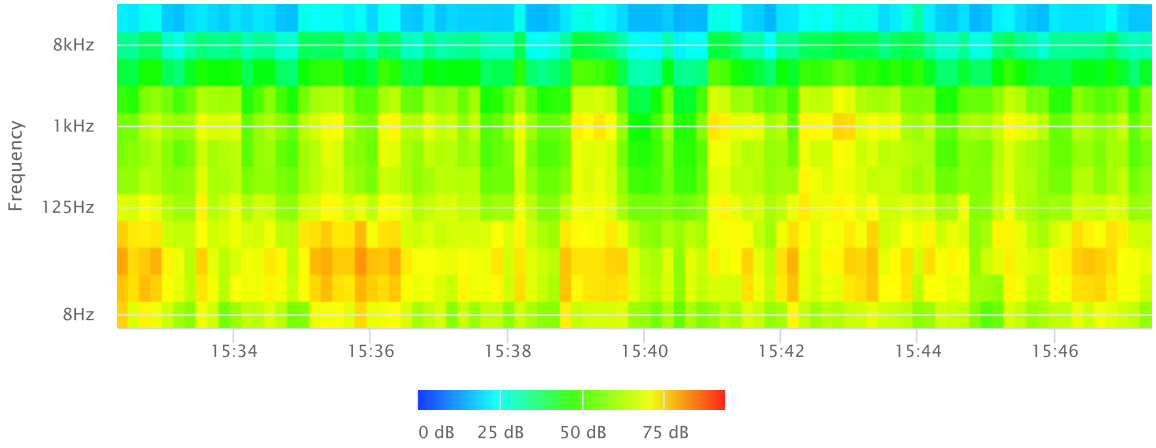
OBA 1/1 Leq



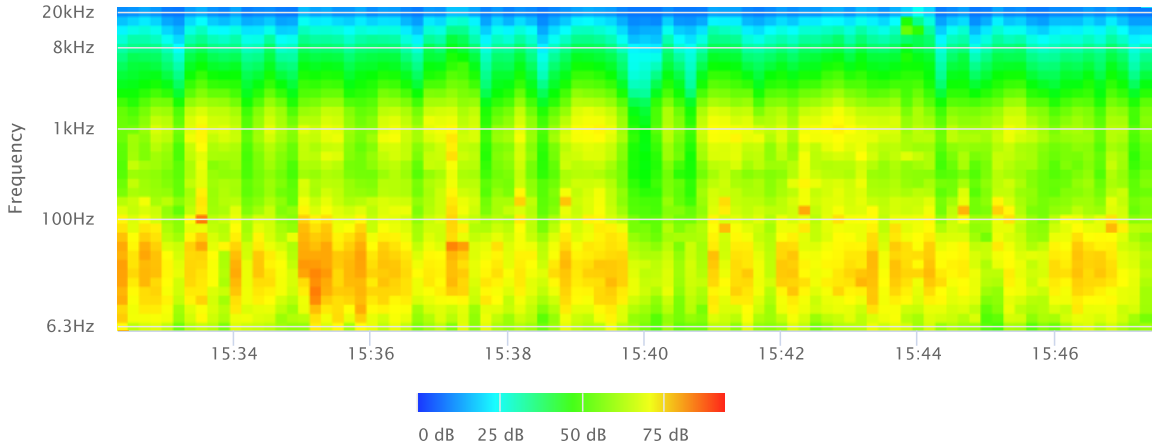
OBA 1/1 Lmax



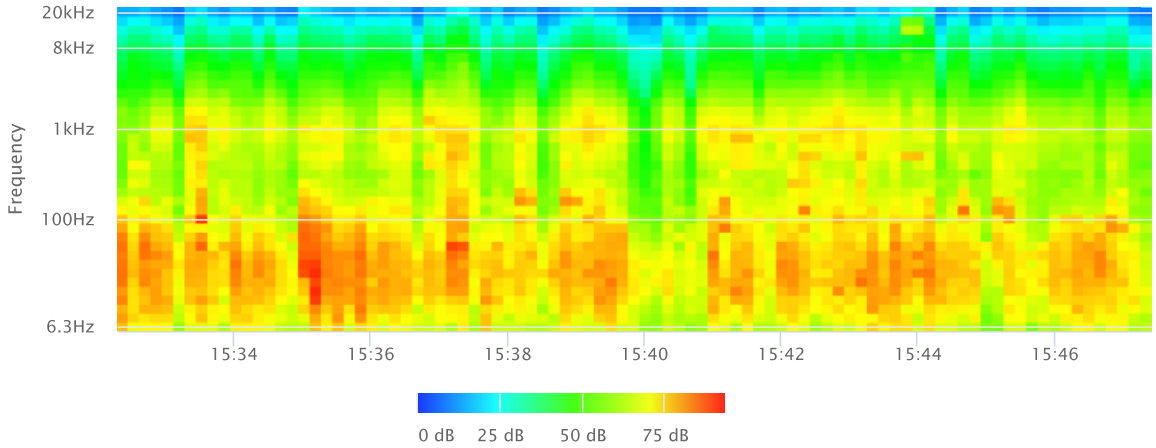
OBA 1/1 Lmin



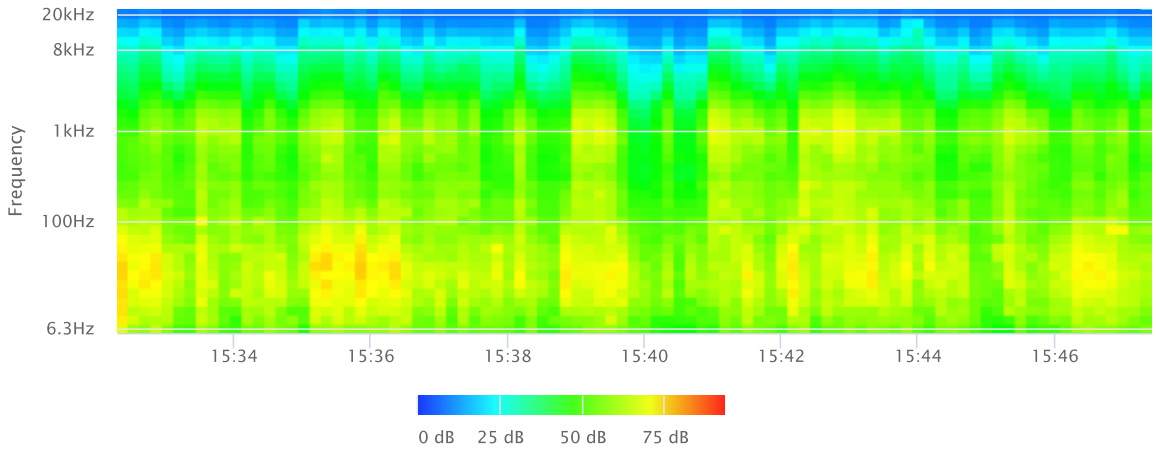
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
15:34
15:36
15:38
15:40
15:42
15:44
15:46
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: NWC Macy St & Foothill Boulevard Residential Project **Date:** January 26, 2024

Project #: 19696

Noise Measurement #: NM5 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 475 Terrace Road, San Bernardino, CA 92410

Site Description (Type of Existing Land Use and any other notable features): Meaurement Site: On eastern side of Terrace Road with vacant land to west and single family residential to east. Adjacent: Terrace Rd to west with vacant land and active train tracks further west, single-family residential to east, and Foothill Blvd to south past vacant land.

Weather: sunny <5% cloud. Sunset 5:13PM **Settings:** SLOW FAST

Temperature: 66 deg F **Wind:** 9 mph **Humidity:** 46% **Terrain:** Flat

Start Time: 4:04 PM **End Time:** 4:19 PM **Run Time:**

Leq:	55.8	dB	**Primary Noise Source:** Traffic ambiance from vehicles traveling along Foothill Blvd.
Lmax	71.9	dB	Traffic ambiance from other roads.
L2	62.9	dB	**Secondary Noise Sources:** Some bird song. Some residential ambiance.
L8	58.0	dB	Leaf rustle from 9mph breeze through trees & vegetation.
L25	55.3	dB	
L50	53.7	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:	1/26/2024		

Noise Measurement
Field Data

PHOTOS:

NM5 looking NE from Terrace Road towards residence 475 Terrace Road, San Bernardino.

NM5 looking SSE down Terrace Road towards Terrace Road & Foothill Boulevard intersection (~480' SSE).

Summary	
File Name on Meter	LxT_Data.398.s
File Name on PC	LxT_0003099-20240126 160434-LxT_Data.398.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	NM5 34° 6'29.67"N 117°20'15.12"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.

Measurement	
Start	2024-01-26 16:04:34
Stop	2024-01-26 16:19:34
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-01-26 16:04:08
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	C Weighting
OBA Max Spectrum	At LMax
Overload	122.6 dB

Results			
LAeq	55.8		
LAE	85.4		
EA	38.35359	µPa²h	
EA8	1.227315	mPa²h	
EA40	6.136574	mPa²h	
LApeak (max)	2024-01-26 16:15:57	91.6	dB
LASmax	2024-01-26 16:11:55	71.9	dB
LASmin	2024-01-26 16:16:55	48.8	dB

			Statistics		
LCeq	81.7	dB	**LA2.00**	62.9	dB
LAeq	55.8	dB	**LA8.00**	58.0	dB
LCeq - LAeq	25.8	dB	**LA25.00**	55.3	dB
LAleq	60.4	dB	**LA50.00**	53.7	dB
LAeq	55.8	dB	**LA66.60**	52.8	dB
LAleq - LAeq	4.6	dB	**LA90.00**	51.3	dB
Overload Count	1				
Overload Duration	2.0	s			
OBA Overload Count	1				
OBA Overload Duration	2.0	s			

Measurement Report

Report Summary

Meter's File Name	LxT_Data.398.s	Computer's File Name	LxT_0003099-20240126 160434-LxT_Data.398.ldl
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	NM5 34° 6'29.67"N 117°20'15.12"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini Project#19696 NWC Macy St & Foothill Blvd Residential Project, San Bernardino.		
Start Time	2024-01-26 16:04:34	Duration	0:15:00.0
End Time	2024-01-26 16:19:34	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	55.8 dB		
LAE	85.4 dB	SEA	--- dB
EA	38.4 µPa²h	LAFTM5	62.1 dB
EA8	1.2 mPa²h		
EA40	6.1 mPa²h		
LA_{peak}	91.6 dB	2024-01-26 16:15:57	
LAS_{max}	71.9 dB	2024-01-26 16:11:55	
LAS_{min}	48.8 dB	2024-01-26 16:16:55	
LA_{eq}	55.8 dB		
LC_{eq}	81.7 dB	LC_{eq} - LA_{eq}	25.8 dB
LAI_{eq}	60.4 dB	LAI_{eq} - LA_{eq}	4.6 dB

Exceedances

	Count	Duration
LAS > 65.0 dB	4	0:00:13.6
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}	55.8 dB		81.7 dB		--- dB	
$L_{S(max)}$	71.9 dB	2024-01-26 16:11:55	--- dB		--- dB	
$L_{S(min)}$	48.8 dB	2024-01-26 16:16:55	--- dB		--- dB	
$L_{Peak(max)}$	91.6 dB	2024-01-26 16:15:57	--- dB		--- dB	

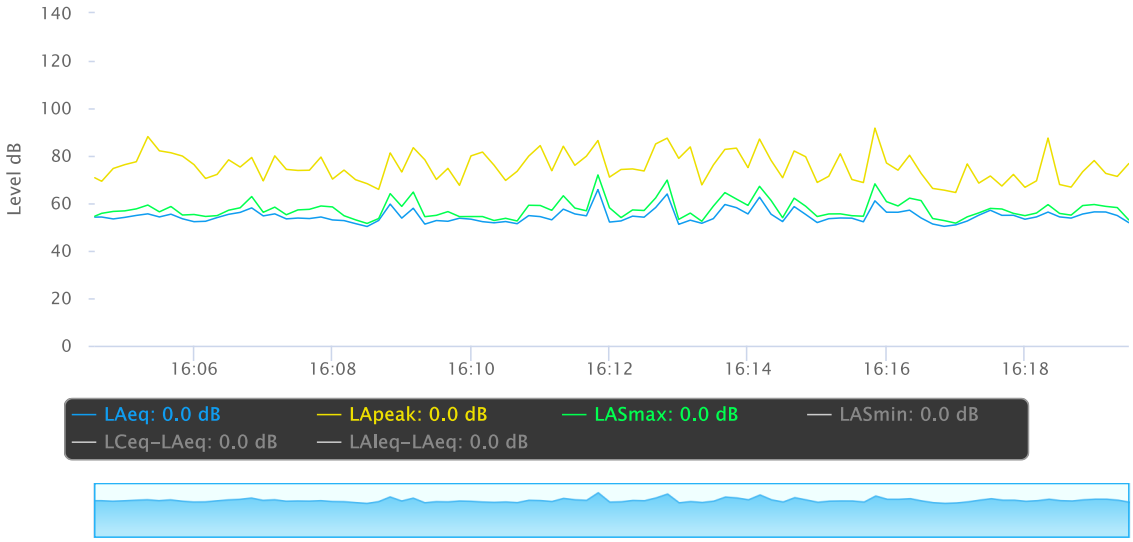
Overloads

Count	Duration	OBA Count	OBA Duration
1	0:00:02.0	1	0:00:02.0

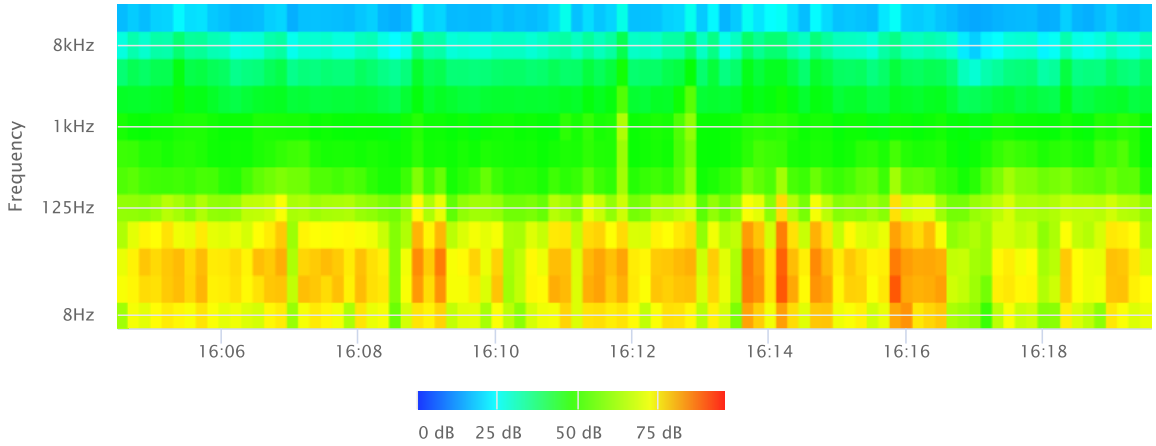
Statistics

LAS 2.0	62.9 dB
LAS 8.0	58.0 dB
LAS 25.0	55.3 dB
LAS 50.0	53.7 dB
LAS 66.6	52.8 dB
LAS 90.0	51.3 dB

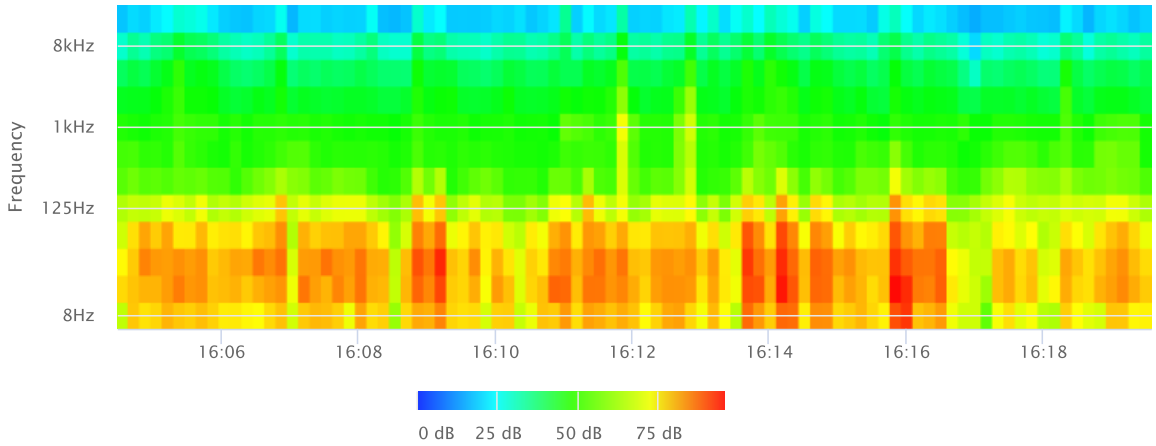
Time History



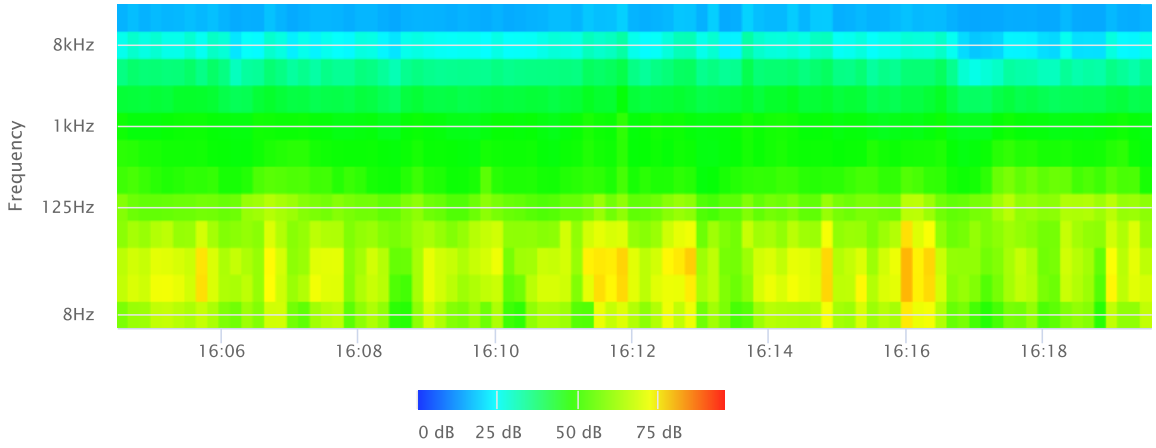
OBA 1/1 Leq



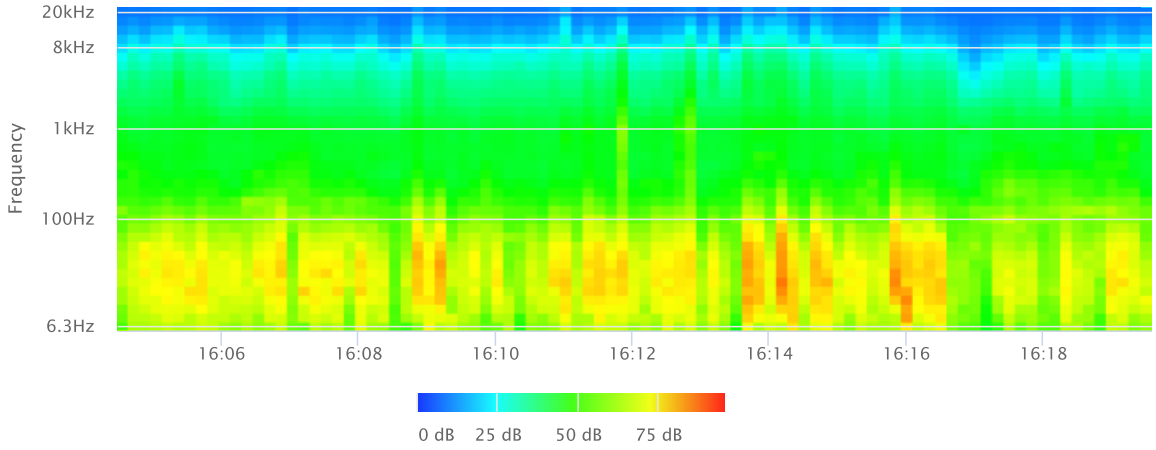
OBA 1/1 Lmax



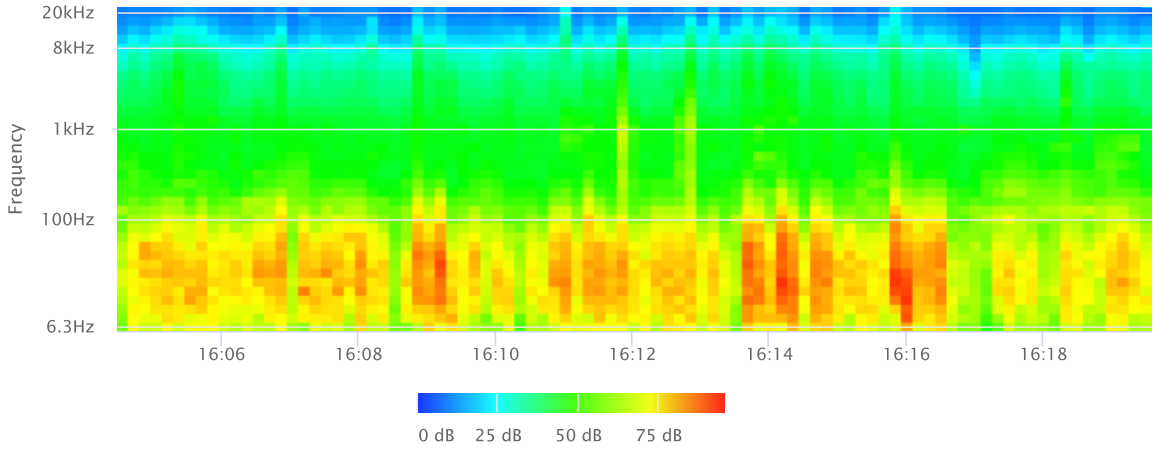
OBA 1/1 Lmin



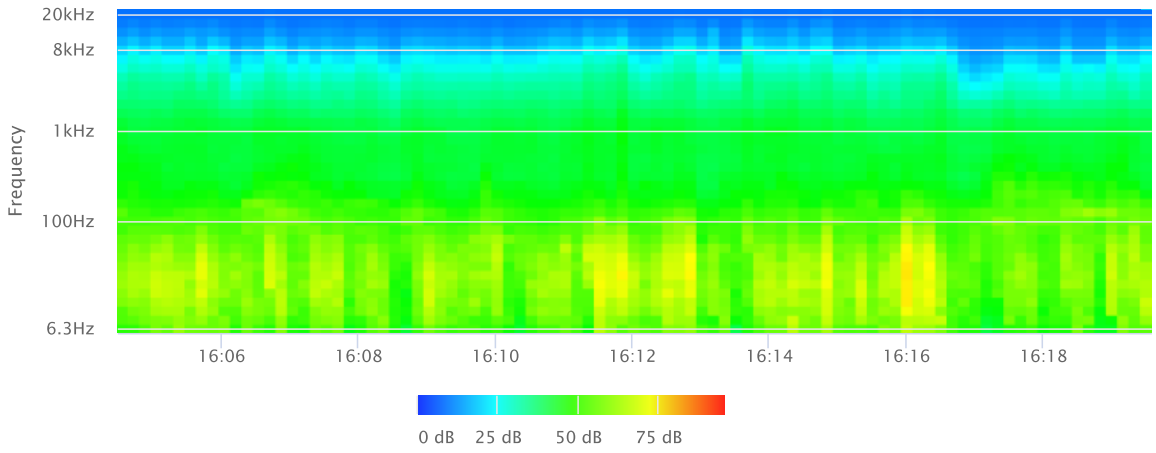
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


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

Noise Measurement
Field Data

Project Name: NWC Macy St & Foothill Boulevard Residential Project **Date:** Apr 30 - May 01, 2024

Project #: 19696

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

Nearest Address or Cross Street: 2301 Spruce Street, San Bernardino, CA 92410

Site Description (Type of Existing Land Use and any other notable features): Project Site: Empty vegetated land, Foothill Blvd to the S, N Dallas Ave to the W, N Macy St to the E . Adjacent: Active train tracks running N-S to the E, various businesses E-W along Foothill Blvd, elsewhere residential.

Weather: Clear skies, sun by day. Sunset/rise 7:33PM/ 5:59AM **Settings:** SLOW FAST

Temperature: 60-80 deg F **Wind:** 0-8 mph **Humidity:** 40-80% **Terrain:** Flat

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

Leq:	60.6 dB	**Primary Noise Source:**	Trains travelling on track 125' SE of LTNM1. Traffic noise from N Macy Street.
Lmax	86.5 dB		Traffic ambiance from vehicles travelling along Foothill Blvd & other roads.
L2	70.2 dB	**Secondary Noise Sources:**	Bird song by day, crickets at night. Residential ambiance. Pedestrians.
L8	65.3 dB		Some homeless. Leaf rustle from breeze through trees & vegetation.
L25	56.7 dB		
L50	51.8 dB		

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:	3/31/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	4/30/2024		

Noise Measurement
Field Data

PHOTOS:

LTNM1 looking NNE along N Macy Street, wooden fence to backyard of residence 2301 Spruce Street, San Bernardino on the left. Train track on the right on other side of N Macy Street, track graded below natural ground level.

LTNM1 looking SW along N Macy Street towards Foothill Boulevard intersection, (710' SW, stop sign). Train tracks on the left graded below natural ground level, travelling under Foothill Boulevard.

Measurement Report

Report Summary

Meter's File Name	LxT_Data.078.s	Computer's File Name	LxT_0003855-20240430 150000-LxT_Data.078.ldbin
Meter	LxT1 0003855		
Firmware	2.404		
User	Ian Edward Gallagher	Location	LTNM1 34° 6'30.70"N 117°20'24.16"W
Job Description	24 hour noise measurement (24 x 1 hours)		
Note	Ganddini 19696 NWC Macy St & Foothill Blvd Residential Project (San Bernardino)		
Start Time	2024-04-30 15:00:00	Duration	24:00:00.0
End Time	2024-05-01 15:00:00	Run Time	24:00:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	60.6 dB		
LAE	109.9 dB	SEA	--- dB
EA	10.9 mPa²h	LAFTM5	66.1 dB
EA8	3.6 mPa²h		
EA40	18.2 mPa²h		
LA_{peak}	116.9 dB	2024-04-30 22:16:14	
LAS_{max}	86.5 dB	2024-05-01 05:34:45	
LAS_{min}	34.8 dB	2024-05-01 02:28:05	
LA_{eq}	60.6 dB		
LC_{eq}	72.5 dB	LC_{eq} - LA_{eq}	12.0 dB
LAI_{eq}	63.5 dB	LAI_{eq} - LA_{eq}	3.0 dB

Exceedances	Count	Duration
LAS > 65.0 dB	1586	2:30:28.6
LAS > 85.0 dB	3	0:00:05.4
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

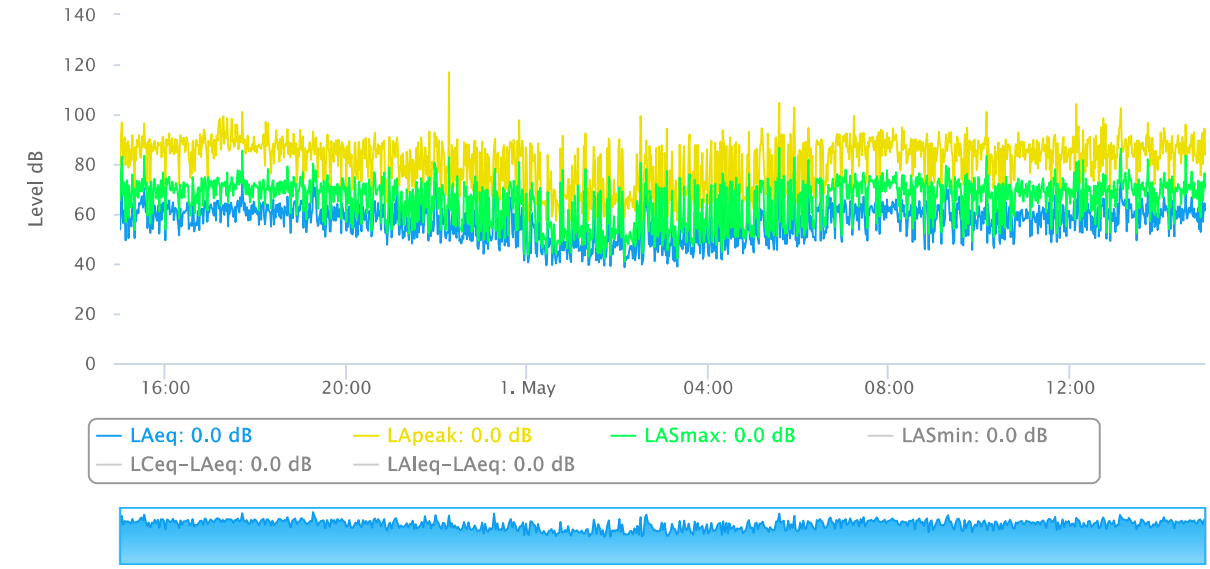
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	60.6 dB		72.5 dB		--- dB	
$L_{S(max)}$	86.5 dB	2024-05-01 05:34:45	--- dB		--- dB	
$L_{S(min)}$	34.8 dB	2024-05-01 02:28:05	--- dB		--- dB	
$L_{Peak(max)}$	116.9 dB	2024-04-30 22:16:14	--- dB		--- dB	

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

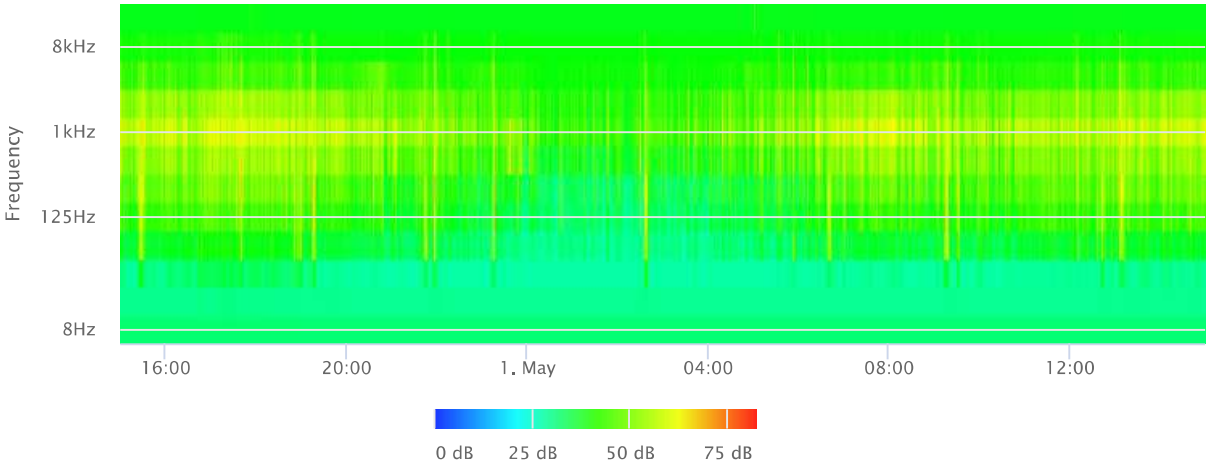
Statistics

LAS 2.0	70.2 dB
LAS 8.0	65.3 dB
LAS 25.0	56.7 dB
LAS 50.0	51.8 dB
LAS 90.0	43.9 dB
LAS 99.0	37.9 dB

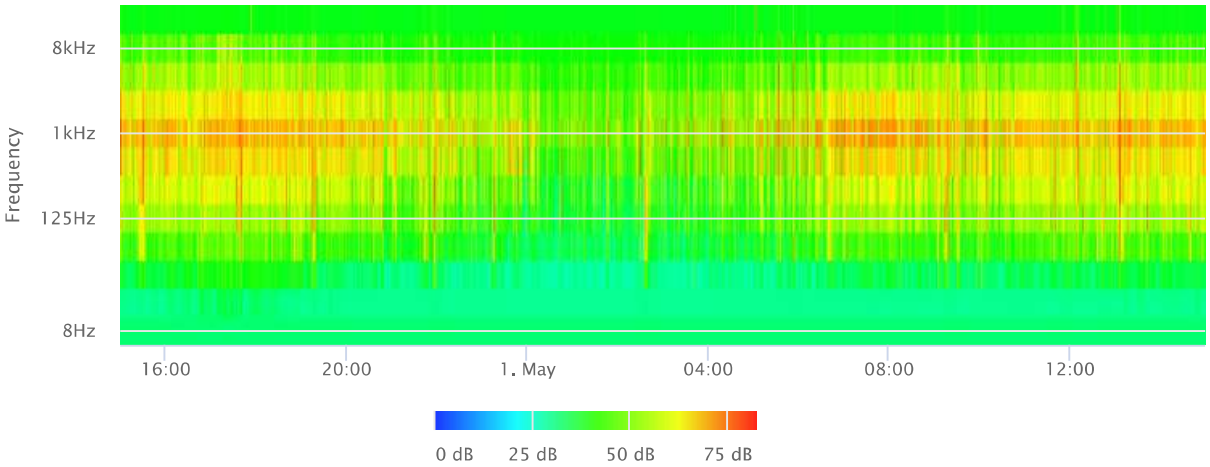
Time History



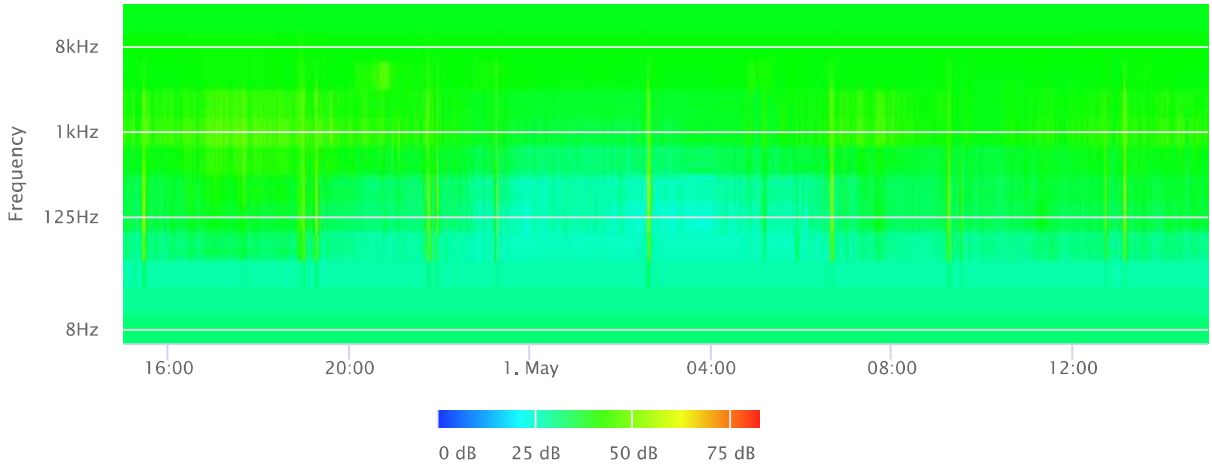
OBA 1/1 Leq



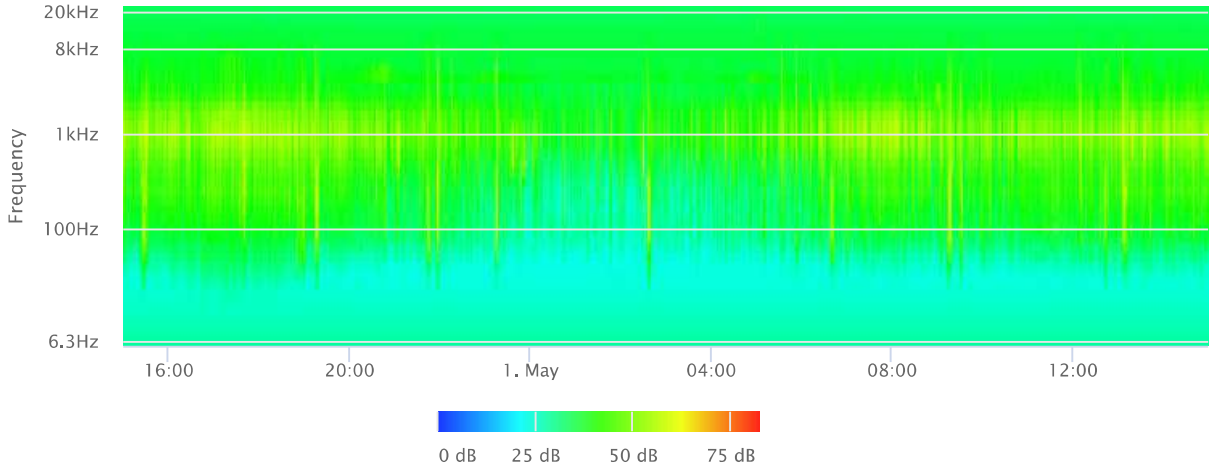
OBA 1/1 Lmax



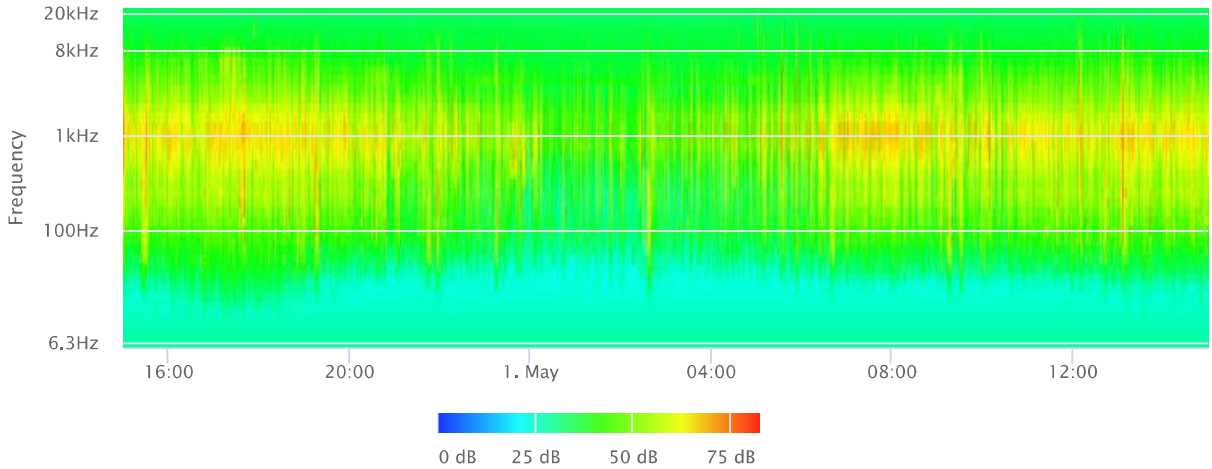
OBA 1/1 Lmin



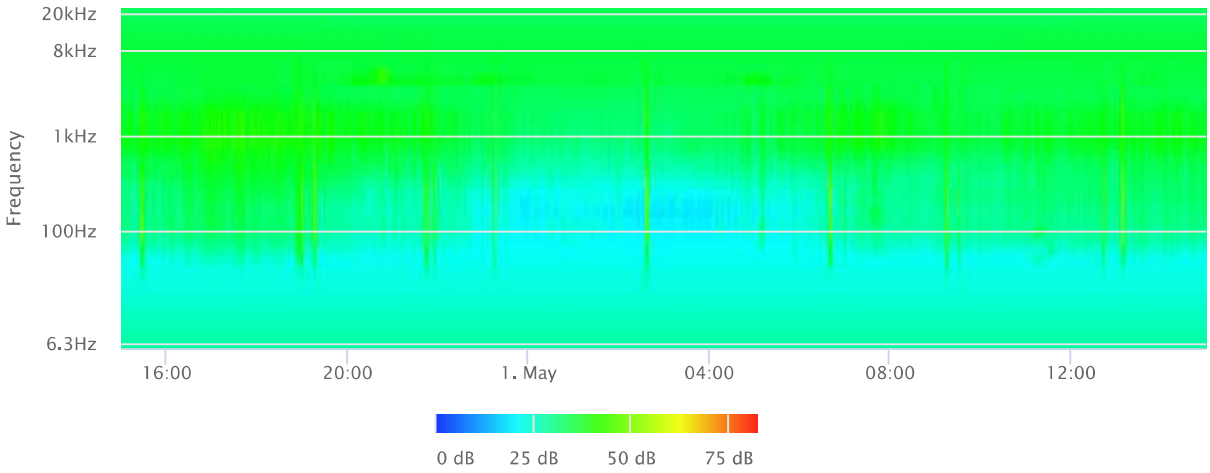
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


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

APPENDIX D

CONSTRUCTION NOISE MODELING

Receptor - Residential to North (2431 Spruce Street, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Concrete/Industrial Saw	1	90	306	20	0.2	-15.7	-7.0	74.3	67.3
Rubber Tired Dozers	2	82	306	40	0.80	-15.7	-1.0	66.3	65.3
Excavators	3	81	306	40	1.20	-15.7	0.8	65.3	66.1
								Log Sum	71.1
Site Preparation									
Rubber Tired Dozers	3	82	306	40	1.2	-15.7	0.8	66.3	67.1
Tractors/Loaders/Backhoes	4	84	306	40	1.60	-15.7	2.0	68.3	70.3
								Log Sum	72.0
Grading									
Rubber Tired Dozers	1	82	306	40	0.40	-15.7	-4.0	66.3	62.3
Tractors/Loaders/Backhoes	2	84	306	40	0.80	-15.7	-1.0	68.3	67.3
Graders	1	85	306	40	0.40	-15.7	-4.0	69.3	65.3
Excavators	2	81	306	40	0.80	-15.7	-1.0	65.3	64.3
Scrapers	2	84	306	40	0.80	-15.7	-1.0	68.3	67.3
								Log Sum	72.7
Building Construction									
Cranes	1	81	306	16	0.16	-15.7	-8.0	65.3	57.3
Forklifts[2]	3	48	306	40	1.20	-15.7	0.8	32.3	33.1
Generator Sets	1	81	306	50	0.50	-15.7	-3.0	65.3	62.3
Welders	1	74	306	40	0.40	-15.7	-4.0	58.3	54.3
Tractors/Loaders/Backhoes	3	84	306	40	1.20	-15.7	0.8	68.3	69.1
								Log Sum	70.2
Paving									
Pavers	2	77	306	50	1.00	-15.7	0.0	61.3	61.3
Paving Equipment	2	77	306	50	1.00	-15.7	0.0	61.3	61.3
Rollers	2	80	306	20	0.40	-15.7	-4.0	64.3	60.3
								Log Sum	65.7
Architectural Coating									
Air Compressors	1	78	306	40	0.40	-15.7	-4.0	62.3	58.3
								Log Sum	58.3

Notes:

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

(2) Source: SoundPLAN reference list.

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

Receptor - Residential to Northeast (505 Terrace Road, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Concrete/Industrial Saw	1	90	1162	20	0.2	-27.3	-7.0	62.7	55.7
Rubber Tired Dozers	2	82	1162	40	0.80	-27.3	-1.0	54.7	53.7
Excavators	3	81	1162	40	1.20	-27.3	0.8	53.7	54.5
								Log Sum	59.5
Site Preparation									
Rubber Tired Dozers	3	82	1162	40	1.2	-27.3	0.8	54.7	55.5
Tractors/Loaders/Backhoes	4	84	1162	40	1.60	-27.3	2.0	56.7	58.7
								Log Sum	60.4
Grading									
Rubber Tired Dozers	1	82	1162	40	0.40	-27.3	-4.0	54.7	50.7
Tractors/Loaders/Backhoes	2	84	1162	40	0.80	-27.3	-1.0	56.7	55.7
Graders	1	85	1162	40	0.40	-27.3	-4.0	57.7	53.7
Excavators	2	81	1162	40	0.80	-27.3	-1.0	53.7	52.7
Scrapers	2	84	1162	40	0.80	-27.3	-1.0	56.7	55.7
								Log Sum	61.1
Building Construction									
Cranes	1	81	1162	16	0.16	-27.3	-8.0	53.7	45.7
Forklifts[2]	3	48	1162	40	1.20	-27.3	0.8	20.7	21.5
Generator Sets	1	81	1162	50	0.50	-27.3	-3.0	53.7	50.7
Welders	1	74	1162	40	0.40	-27.3	-4.0	46.7	42.7
Tractors/Loaders/Backhoes	3	84	1162	40	1.20	-27.3	0.8	56.7	57.5
								Log Sum	58.6
Paving									
Pavers	2	77	1162	50	1.00	-27.3	0.0	49.7	49.7
Paving Equipment	2	77	1162	50	1.00	-27.3	0.0	49.7	49.7
Rollers	2	80	1162	20	0.40	-27.3	-4.0	52.7	48.7
								Log Sum	54.1
Architectural Coating									
Air Compressors	1	78	1162	40	0.40	-27.3	-4.0	50.7	46.7
								Log Sum	46.7

Notes:

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

(2) Source: SoundPLAN reference list.

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

Receptor - Residential to East (475 Terrace Road, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Concrete/Industrial Saw	1	90	1638	20	0.2	-30.3	-7.0	59.7	52.7
Rubber Tired Dozers	2	82	1638	40	0.80	-30.3	-1.0	51.7	50.7
Excavators	3	81	1638	40	1.20	-30.3	0.8	50.7	51.5
								Log Sum	56.5
Site Preparation									
Rubber Tired Dozers	3	82	1638	40	1.2	-30.3	0.8	51.7	52.5
Tractors/Loaders/Backhoes	4	84	1638	40	1.60	-30.3	2.0	53.7	55.7
								Log Sum	57.4
Grading									
Rubber Tired Dozers	1	82	1638	40	0.40	-30.3	-4.0	51.7	47.7
Tractors/Loaders/Backhoes	2	84	1638	40	0.80	-30.3	-1.0	53.7	52.7
Graders	1	85	1638	40	0.40	-30.3	-4.0	54.7	50.7
Excavators	2	81	1638	40	0.80	-30.3	-1.0	50.7	49.7
Scrapers	2	84	1638	40	0.80	-30.3	-1.0	53.7	52.7
								Log Sum	58.1
Building Construction									
Cranes	1	81	1638	16	0.16	-30.3	-8.0	50.7	42.7
Forklifts[2]	3	48	1638	40	1.20	-30.3	0.8	17.7	18.5
Generator Sets	1	81	1638	50	0.50	-30.3	-3.0	50.7	47.7
Welders	1	74	1638	40	0.40	-30.3	-4.0	43.7	39.7
Tractors/Loaders/Backhoes	3	84	1638	40	1.20	-30.3	0.8	53.7	54.5
								Log Sum	55.7
Paving									
Pavers	2	77	1638	50	1.00	-30.3	0.0	46.7	46.7
Paving Equipment	2	77	1638	50	1.00	-30.3	0.0	46.7	46.7
Rollers	2	80	1638	20	0.40	-30.3	-4.0	49.7	45.7
								Log Sum	51.2
Architectural Coating									
Air Compressors	1	78	1638	40	0.40	-30.3	-4.0	47.7	43.7
								Log Sum	43.7

Notes:

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

(2) Source: SoundPLAN reference list.

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

Receptor - Residential to Southeast (398 N Macy Street, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Concrete/Industrial Saw	1	90	1005	20	0.2	-26.1	-7.0	63.9	56.9
Rubber Tired Dozers	2	82	1005	40	0.80	-26.1	-1.0	55.9	55.0
Excavators	3	81	1005	40	1.20	-26.1	0.8	54.9	55.7
								Log Sum	60.7
Site Preparation									
Rubber Tired Dozers	3	82	1005	40	1.2	-26.1	0.8	55.9	56.7
Tractors/Loaders/Backhoes	4	84	1005	40	1.60	-26.1	2.0	57.9	60.0
								Log Sum	61.7
Grading									
Rubber Tired Dozers	1	82	1005	40	0.40	-26.1	-4.0	55.9	52.0
Tractors/Loaders/Backhoes	2	84	1005	40	0.80	-26.1	-1.0	57.9	57.0
Graders	1	85	1005	40	0.40	-26.1	-4.0	58.9	55.0
Excavators	2	81	1005	40	0.80	-26.1	-1.0	54.9	54.0
Scrapers	2	84	1005	40	0.80	-26.1	-1.0	57.9	57.0
								Log Sum	62.3
Building Construction									
Cranes	1	81	1005	16	0.16	-26.1	-8.0	54.9	47.0
Forklifts[2]	3	48	1005	40	1.20	-26.1	0.8	21.9	22.7
Generator Sets	1	81	1005	50	0.50	-26.1	-3.0	54.9	51.9
Welders	1	74	1005	40	0.40	-26.1	-4.0	47.9	44.0
Tractors/Loaders/Backhoes	3	84	1005	40	1.20	-26.1	0.8	57.9	58.7
								Log Sum	59.9
Paving									
Pavers	2	77	1005	50	1.00	-26.1	0.0	50.9	50.9
Paving Equipment	2	77	1005	50	1.00	-26.1	0.0	50.9	50.9
Rollers	2	80	1005	20	0.40	-26.1	-4.0	53.9	50.0
								Log Sum	55.4
Architectural Coating									
Air Compressors	1	78	1005	40	0.40	-26.1	-4.0	51.9	48.0
								Log Sum	48.0

Notes:

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

(2) Source: SoundPLAN reference list.

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

Receptor - Residential to South (Sequia Plaza Mobile Home Park, 2505 W Foothill Boulevard, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Concrete/Industrial Saw	1	90	425	20	0.2	-18.6	-7.0	71.4	64.4
Rubber Tired Dozers	2	82	425	40	0.80	-18.6	-1.0	63.4	62.4
Excavators	3	81	425	40	1.20	-18.6	0.8	62.4	63.2
								Log Sum	68.2
Site Preparation									
Rubber Tired Dozers	3	82	425	40	1.2	-18.6	0.8	63.4	64.2
Tractors/Loaders/Backhoes	4	84	425	40	1.60	-18.6	2.0	65.4	67.5
								Log Sum	69.1
Grading									
Rubber Tired Dozers	1	82	425	40	0.40	-18.6	-4.0	63.4	59.4
Tractors/Loaders/Backhoes	2	84	425	40	0.80	-18.6	-1.0	65.4	64.4
Graders	1	85	425	40	0.40	-18.6	-4.0	66.4	62.4
Excavators	2	81	425	40	0.80	-18.6	-1.0	62.4	61.4
Scrapers	2	84	425	40	0.80	-18.6	-1.0	65.4	64.4
								Log Sum	69.8
Building Construction									
Cranes	1	81	425	16	0.16	-18.6	-8.0	62.4	54.5
Forklifts[2]	3	48	425	40	1.20	-18.6	0.8	29.4	30.2
Generator Sets	1	81	425	50	0.50	-18.6	-3.0	62.4	59.4
Welders	1	74	425	40	0.40	-18.6	-4.0	55.4	51.4
Tractors/Loaders/Backhoes	3	84	425	40	1.20	-18.6	0.8	65.4	66.2
								Log Sum	67.4
Paving									
Pavers	2	77	425	50	1.00	-18.6	0.0	58.4	58.4
Paving Equipment	2	77	425	50	1.00	-18.6	0.0	58.4	58.4
Rollers	2	80	425	20	0.40	-18.6	-4.0	61.4	57.4
								Log Sum	62.9
Architectural Coating									
Air Compressors	1	78	425	40	0.40	-18.6	-4.0	59.4	55.4
								Log Sum	55.4

Notes:

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

(2) Source: SoundPLAN reference list.

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

Receptor - Motel to West (San Bernardino Motel, 2528 Foothill Boulevard, San Bernardino)

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Distance to Receptor[3]	Item Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
Demolition									
Concrete/Industrial Saw	1	90	590	20	0.2	-21.4	-7.0	68.6	61.6
Rubber Tired Dozers	2	82	590	40	0.80	-21.4	-1.0	60.6	59.6
Excavators	3	81	590	40	1.20	-21.4	0.8	59.6	60.4
								Log Sum	65.4
Site Preparation									
Rubber Tired Dozers	3	82	590	40	1.2	-21.4	0.8	60.6	61.4
Tractors/Loaders/Backhoes	4	84	590	40	1.60	-21.4	2.0	62.6	64.6
								Log Sum	66.3
Grading									
Rubber Tired Dozers	1	82	590	40	0.40	-21.4	-4.0	60.6	56.6
Tractors/Loaders/Backhoes	2	84	590	40	0.80	-21.4	-1.0	62.6	61.6
Graders	1	85	590	40	0.40	-21.4	-4.0	63.6	59.6
Excavators	2	81	590	40	0.80	-21.4	-1.0	59.6	58.6
Scrapers	2	84	590	40	0.80	-21.4	-1.0	62.6	61.6
								Log Sum	67.0
Building Construction									
Cranes	1	81	590	16	0.16	-21.4	-8.0	59.6	51.6
Forklifts[2]	3	48	590	40	1.20	-21.4	0.8	26.6	27.4
Generator Sets	1	81	590	50	0.50	-21.4	-3.0	59.6	56.6
Welders	1	74	590	40	0.40	-21.4	-4.0	52.6	48.6
Tractors/Loaders/Backhoes	3	84	590	40	1.20	-21.4	0.8	62.6	63.4
								Log Sum	64.5
Paving									
Pavers	2	77	590	50	1.00	-21.4	0.0	55.6	55.6
Paving Equipment	2	77	590	50	1.00	-21.4	0.0	55.6	55.6
Rollers	2	80	590	20	0.40	-21.4	-4.0	58.6	54.6
								Log Sum	60.0
Architectural Coating									
Air Compressors	1	78	590	40	0.40	-21.4	-4.0	56.6	52.6
								Log Sum	52.6

Notes:

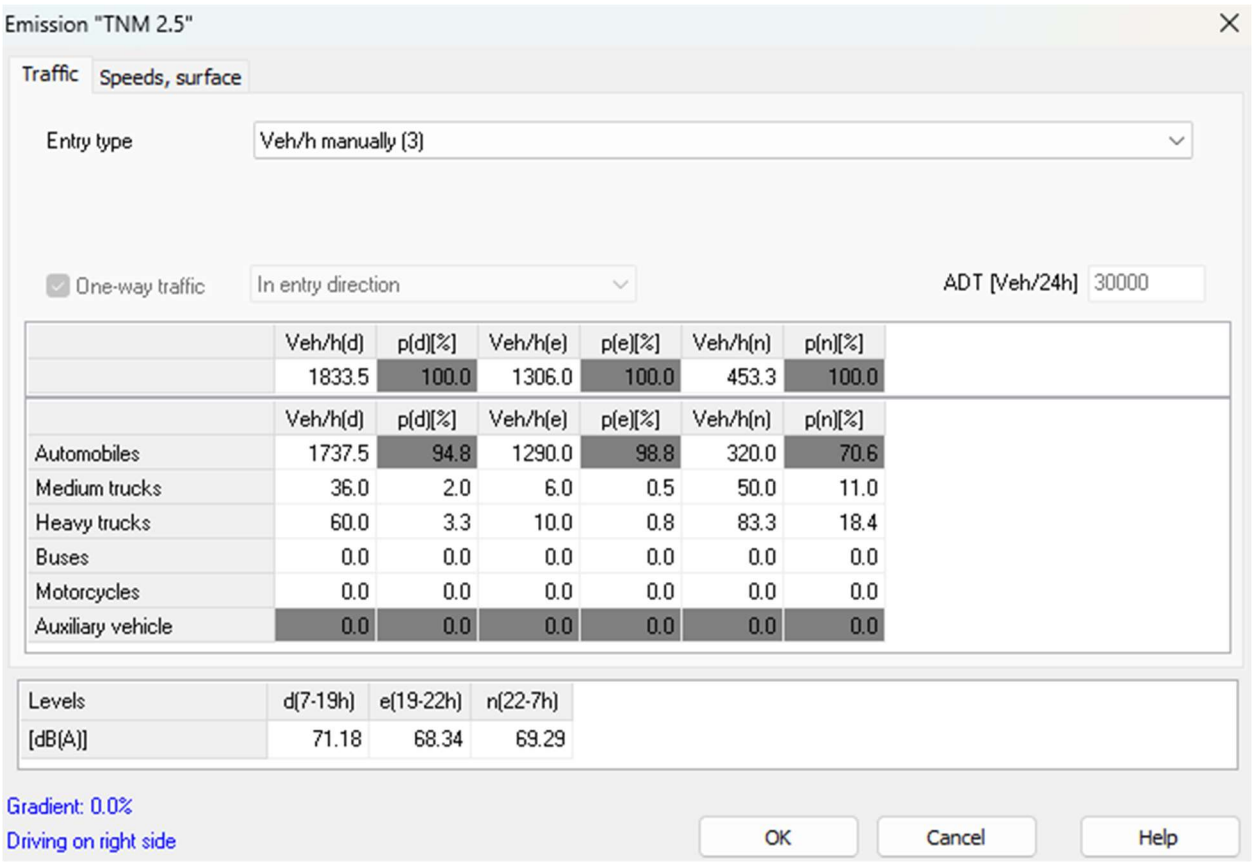
(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006)

(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

SOUNDPLAN INPUT AND OUTPUT


Emission "TNM 2.5"
Traffic
Speeds, surface
Entry type
Veh/h manually (3)
One-way traffic
In entry direction
ADT [Veh/24h]
30000
Veh/h(d) p(d)[%] Veh/h(e) p(e)[%] Veh/h(n) p(n)[%]
1833.5 100.0 1306.0 100.0 453.3 100.0
Veh/h(d) p(d)[%] Veh/h(e) p(e)[%] Veh/h(n) p(n)[%]
Automobiles 1737.5 94.8 1290.0 98.8 320.0 70.6
Medium trucks 36.0 2.0 6.0 0.5 50.0 11.0
Heavy trucks 60.0 3.3 10.0 0.8 83.3 18.4
Buses 0.0 0.0 0.0 0.0 0.0 0.0
Motorcycles 0.0 0.0 0.0 0.0 0.0 0.0
Auxiliary vehicle 0.0 0.0 0.0 0.0 0.0 0.0
Levels d(7-19h) e(19-22h) n(22-7h)
[dB(A)] 71.18 68.34 69.29
Gradient: 0.0%
Driving on right side
OK
Cancel
Help

Noise emissions of industry sources

Source name	Reference	Level			Corrections		
		Day	Evening	Night	Cwall	CI	CT
		dB(A)	dB(A)	dB(A)	dB	dB	dB
1	Lw/	85.6	85.6	85.6	-	-	-
2	Lw/	83.8	83.8	83.8	-	-	-

Receiver list

No.	Receiver name	Building side	Floor	Limit Lden dB(A)	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)	Difference Lden dB	Conflict Lden dB
1	2	-	EG	-	69.0	62.7	-6.3	-
			1.OG	-	71.4	71.4	0.0	-
2		-	EG	-	69.4	63.6	-5.8	-
			1.OG	-	71.7	71.7	0.0	-
3	3	-	EG	-	70.0	64.0	-6.1	-
			1.OG	-	72.2	72.2	0.0	-
4	4	-	EG	-	63.1	62.8	-0.3	-
			1.OG	-	64.3	64.1	-0.2	-
5	5	-	EG	-	62.8	62.8	0.0	-
			1.OG	-	64.7	64.7	0.0	-

APPENDIX F

FHWA WORKSHEETS

Existing Traffic Noise

1	:Id	
Pepper Avenue	:Road	
North of Foothill Boulevard	:Segment	

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	11700
Speed	45
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	677.59	14.04	23.40	503.04	2.34	3.90	124.74	19.50	32.50
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
NOISE CALCULATIONS									
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14
ADJUSTMENTS									
Flow	21.47	4.64	6.85	20.18	-3.15	-0.93	14.12	6.06	8.28
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	65.75	57.19	63.93	64.45	49.41	56.14	58.40	58.61	65.35
	DAY LEQ	68.29		EVENING LEQ	65.17		NIGHT LEQ	66.86	

F	CNEL	73.59	
	DAY LEQ	68.29	

Day hour	89.00
Absorptive?	no
Use hour?	no
GRADE dB	0.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

1	:Id	
Pepper Avenue	:Road	
North of Foothill Boulevard	:Segment	

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	11960
Speed	45
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	692.65	14.35	23.92	514.22	2.39	3.99	127.51	19.93	33.22
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
NOISE CALCULATIONS									
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14
ADJUSTMENTS									
Flow	21.57	4.73	6.95	20.27	-3.05	-0.83	14.22	6.16	8.38
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	65.84	57.28	64.02	64.55	49.50	56.24	58.49	58.71	65.45
	DAY LEQ	68.39		EVENING LEQ	65.26		NIGHT LEQ	66.95	

CNEL	73.68
DAY LEQ	68.39

Day hour	89.00
Absorptive?	no
Use hour?	no
GRADE dB	0.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

2	:Id	
Pepper Avenue	:Road	
South of Foothill Boulevard	:Segment	

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	13000
Speed	45
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	752.88	15.60	26.00	558.93	2.60	4.33	138.60	21.67	36.11
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
NOISE CALCULATIONS									
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14
ADJUSTMENTS									
Flow	21.93	5.09	7.31	20.64	-2.69	-0.47	14.58	6.52	8.74
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.20	57.65	64.38	64.91	49.86	56.60	58.85	59.07	65.81
	DAY LEQ	68.75		EVENING LEQ	65.63		NIGHT LEQ	67.31	

CNEL	74.05
DAY LEQ	68.75

Day hour	90.00
Absorptive?	no
Use hour?	no
GRADE dB	1.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

2	:Id
Pepper Avenue	:Road
South of Foothill Boulevard	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	13260
Speed	45
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	767.94	15.91	26.52	570.11	2.65	4.42	141.38	22.10	36.83
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
NOISE CALCULATIONS									
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14
ADJUSTMENTS									
Flow	22.02	5.18	7.40	20.72	-2.60	-0.38	14.67	6.61	8.82
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.29	57.73	64.47	65.00	49.95	56.69	58.94	59.16	65.90
	DAY LEQ	68.84		EVENING LEQ	65.71		NIGHT LEQ	67.40	

CNEL	**74.13**
DAY LEQ	68.84

Day hour	90.00
Absorptive?	no
Use hour?	no
GRADE dB	1.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

3	:Id
Meridian Avenue	:Road
North of Foothill Boulevard	:Segment

Vehicle Distribution (Light Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.56	13.96	10.49	97.40
Medium Trucks	48.91	2.17	48.91	1.84
Heavy Trucks	47.30	5.41	47.30	0.74

ADT	7800
Speed	40
Distance	30
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	478.37	5.85	2.28	353.52	1.04	1.04	88.55	7.80	3.03
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	20.47	1.34	-2.76	19.16	-6.16	-6.15	13.15	2.59	-1.51
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	64.98	54.81	55.55	63.67	47.30	52.16	57.65	56.06	56.80
	DAY LEQ	65.81		EVENING LEQ	64.06		NIGHT LEQ	61.66	

CNEL	69.24
DAY LEQ	65.81

Day hour	91.00
Absorptive?	no
Use hour?	no
GRADE dB	2.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside light truck mix.

Existing Plus Project Traffic Noise

3	:Id	Vehicle Distribution (Light Truck Mix)				ADT	7850
Meridian Avenue	:Road	Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	Speed	40
North of Foothill Boulevard	:Segment	Automobiles	75.56	13.96	10.49	97.40	Distance	30
		Medium Trucks	48.91	2.17	48.91	1.84	Left Angle	-90
		Heavy Trucks	47.30	5.41	47.30	0.74	Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	481.44	5.89	2.29	355.79	1.04	1.05	89.12	7.85	3.05
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	20.50	1.37	-2.73	19.19	-6.14	-6.12	13.17	2.62	-1.48
Distance	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	65.01	54.83	55.58	63.69	47.32	52.18	57.68	56.08	56.83
	DAY LEQ	65.84		EVENING LEQ	64.08		NIGHT LEQ	61.68	

CNEL	69.27	Day hour	91.00
DAY LEQ	65.84	Absorptive?	no
		Use hour?	no
		GRADE dB	2.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside light truck mix.

Existing Traffic Noise

4	:Id
Dallas Avenue	:Road
North of Foothill Boulevard	:Segment

Vehicle Distribution (Light Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.56	13.96	10.49	97.40
Medium Trucks	48.91	2.17	48.91	1.84
Heavy Trucks	47.30	5.41	47.30	0.74

ADT	800
Speed	25
Distance	20
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	49.06	0.60	0.23	36.26	0.11	0.11	9.08	0.80	0.31
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
NOISE CALCULATIONS									
Reference levels	59.44	71.09	77.24	59.44	71.09	77.24	59.44	71.09	77.24
ADJUSTMENTS									
Flow	12.62	-6.50	-10.61	11.31	-14.01	-14.00	5.30	-5.25	-9.36
Distance	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	50.97	43.49	45.54	49.66	35.98	42.15	43.65	44.74	46.79
	DAY LEQ	52.63		EVENING LEQ	50.52		NIGHT LEQ	50.03	

CNEL	57.11
DAY LEQ	52.63

Day hour	92.00
Absorptive?	no
Use hour?	no
GRADE dB	3.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside light truck mix.

Existing Plus Project Traffic Noise

4	:Id
Dallas Avenue	:Road
North of Foothill Boulevard	:Segment

Vehicle Distribution (Light Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.56	13.96	10.49	97.40
Medium Trucks	48.91	2.17	48.91	1.84
Heavy Trucks	47.30	5.41	47.30	0.74

ADT	850
Speed	25
Distance	20
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	52.13	0.64	0.25	38.52	0.11	0.11	9.65	0.85	0.33
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
NOISE CALCULATIONS									
Reference levels	59.44	71.09	77.24	59.44	71.09	77.24	59.44	71.09	77.24
ADJUSTMENTS									
Flow	12.89	-6.24	-10.34	11.57	-13.75	-13.74	5.56	-4.99	-9.09
Distance	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91	3.91
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	51.24	43.76	45.81	49.92	36.25	42.41	43.91	45.01	47.06
	DAY LEQ	52.89		EVENING LEQ	50.79		NIGHT LEQ	50.30	

CNEL	57.37
DAY LEQ	52.89

Day hour	92.00
Absorptive?	no
Use hour?	no
GRADE dB	3.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside light truck mix.

Existing Traffic Noise

5	:Id
Rancho Avenue	:Road
South of Foothill Boulevard	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	10800
Speed	35
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	625.47	12.96	21.60	464.34	2.16	3.60	115.15	18.00	30.00
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
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
NOISE CALCULATIONS									
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05
ADJUSTMENTS									
Flow	22.22	5.38	7.60	20.92	-2.40	-0.18	14.87	6.81	9.02
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	62.26	55.14	62.57	60.96	47.36	54.79	54.91	56.56	64.00
	DAY LEQ	65.82		EVENING LEQ	62.05		NIGHT LEQ	65.15	

CNEL	71.71
DAY LEQ	65.82

Day hour	93.00
Absorptive?	no
Use hour?	no
GRADE dB	4.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

5	:Id	Vehicle Distribution (Heavy Truck Mix)				ADT	10850
Rancho Avenue	:Road	Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	Speed	35
South of Foothill Boulevard	:Segment	Automobiles	75.54	14.02	10.43	92.00	Distance	50
		Medium Trucks	48.00	2.00	50.00	3.00	Left Angle	-90
		Heavy Trucks	48.00	2.00	50.00	5.00	Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	628.37	13.02	21.70	466.49	2.17	3.62	115.68	18.08	30.14
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
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
NOISE CALCULATIONS									
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05
ADJUSTMENTS									
Flow	22.24	5.40	7.62	20.94	-2.38	-0.16	14.89	6.83	9.04
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	62.28	55.16	62.59	60.98	47.38	54.81	54.93	56.58	64.02
	DAY LEQ	65.84		EVENING LEQ	62.07		NIGHT LEQ	65.17	

CNEL	71.73	Day hour	93.00
DAY LEQ	65.84	Absorptive?	no
		Use hour?	no
		GRADE dB	4.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

6	:Id	Vehicle Distribution (Heavy Truck Mix)				ADT	23000
Foothill Boulevard	:Road	Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	Speed	40
West of Pepper Avenue	:Segment	Automobiles	75.54	14.02	10.43	92.00	Distance	50
		Medium Trucks	48.00	2.00	50.00	3.00	Left Angle	-90
		Heavy Trucks	48.00	2.00	50.00	5.00	Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1332.02	27.60	46.00	988.88	4.60	7.67	245.22	38.33	63.89
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.92	8.08	10.30	23.62	0.30	2.52	17.57	9.51	11.73
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	67.21	59.33	66.39	65.91	51.54	58.61	59.86	60.75	67.82
	DAY LEQ	70.20		EVENING LEQ	66.79		NIGHT LEQ	69.14	

CNEL	75.79	Day hour	94.00
DAY LEQ	70.20	Absorptive?	no
		Use hour?	no
		GRADE dB	5.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

6	:Id	
Foothill Boulevard	:Road	
West of Pepper Avenue	:Segment	

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	23150
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1340.71	27.78	46.30	995.33	4.63	7.72	246.82	38.58	64.31
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.95	8.11	10.33	23.65	0.33	2.55	17.60	9.54	11.76
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	67.24	59.35	66.42	65.94	51.57	58.64	59.89	60.78	67.85
	DAY LEQ	70.23		EVENING LEQ	66.82		NIGHT LEQ	69.17	

CNEL	75.81
DAY LEQ	70.23

Day hour	94.00
Absorptive?	no
Use hour?	no
GRADE dB	5.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

7	:Id
Foothill Boulevard	:Road
Pepper Avenue to Meridian Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	20300
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1175.65	24.36	40.60	872.79	4.06	6.77	216.43	33.83	56.39
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.38	7.54	9.76	23.08	-0.24	1.98	17.03	8.97	11.19
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.67	58.78	65.85	65.37	51.00	58.07	59.32	60.21	67.27
	DAY LEQ	69.66		EVENING LEQ	66.25		NIGHT LEQ	68.60	

CNEL	75.24
DAY LEQ	69.66

Day hour	95.00
Absorptive?	no
Use hour?	no
GRADE dB	6.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

7	:Id
Foothill Boulevard	:Road
Pepper Avenue to Meridian Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	20970
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1214.46	25.16	41.94	901.60	4.19	6.99	223.58	34.95	58.25
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.52	7.68	9.90	23.22	-0.10	2.12	17.17	9.11	11.33
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.81	58.92	65.99	65.51	51.14	58.21	59.46	60.35	67.42
	DAY LEQ	69.80		EVENING LEQ	66.39		NIGHT LEQ	68.74	

CNEL	75.38
DAY LEQ	69.80

Day hour	95.00
Absorptive?	no
Use hour?	no
GRADE dB	6.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

8	:Id
Foothill Boulevard	:Road
Meridian Avenue to Dallas Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	18600
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1077.20	22.32	37.20	799.70	3.72	6.20	198.31	31.00	51.67
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.00	7.16	9.38	22.70	-0.62	1.60	16.65	8.59	10.81
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.29	58.40	65.47	64.99	50.62	57.69	58.94	59.83	66.90
	DAY LEQ	69.28		EVENING LEQ	65.87		NIGHT LEQ	68.22	

CNEL	74.86
DAY LEQ	69.28

Day hour	96.00
Absorptive?	no
Use hour?	no
GRADE dB	7.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

8	:Id
Foothill Boulevard	:Road
Meridian Avenue to Dallas Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	19320
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1118.90	23.18	38.64	830.66	3.86	6.44	205.99	32.20	53.67
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.16	7.33	9.54	22.87	-0.46	1.76	16.81	8.75	10.97
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.45	58.57	65.63	65.16	50.79	57.85	59.10	59.99	67.06
	DAY LEQ	69.44		EVENING LEQ	66.03		NIGHT LEQ	68.38	

CNEL	75.03
DAY LEQ	69.44

Day hour	96.00
Absorptive?	no
Use hour?	no
GRADE dB	7.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

9	:Id
Foothill Boulevard	:Road
Dallas Avenue to Macy Street	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	16200
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	938.21	19.44	32.40	696.51	3.24	5.40	172.72	27.00	45.00
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	23.40	6.56	8.78	22.10	-1.22	1.00	16.05	7.99	10.21
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	65.69	57.80	64.87	64.39	50.02	57.09	58.34	59.23	66.30
	DAY LEQ	68.68		EVENING LEQ	65.27		NIGHT LEQ	67.62	

CNEL	74.26
DAY LEQ	68.68

Day hour	97.00
Absorptive?	no
Use hour?	no
GRADE dB	8.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

9	:Id
Foothill Boulevard	:Road
Dallas Avenue to Macy Street	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	16560
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	959.06	19.87	33.12	711.99	3.31	5.52	176.56	27.60	46.00
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	23.49	6.66	8.87	22.20	-1.13	1.09	16.14	8.08	10.30
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	65.78	57.90	64.96	64.49	50.12	57.18	58.43	59.33	66.39
	DAY LEQ	68.77		EVENING LEQ	65.36		NIGHT LEQ	67.72	

F	CNEL	74.36	
	DAY LEQ	68.77	

Day hour	97.00
Absorptive?	no
Use hour?	no
GRADE dB	8.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

10	:Id
Foothill Boulevard	:Road
Macy Street to Rancho Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	17500
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1013.50	21.00	35.00	752.41	3.50	5.83	186.58	29.17	48.61
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	23.73	6.90	9.11	22.44	-0.89	1.33	16.38	8.32	10.54
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.02	58.14	65.20	64.73	50.36	57.42	58.67	59.57	66.63
	DAY LEQ	69.01		EVENING LEQ	65.60		NIGHT LEQ	67.95	

CNEL	74.60
DAY LEQ	69.01

Day hour	98.00
Absorptive?	no
Use hour?	no
GRADE dB	9.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

10	:Id
Foothill Boulevard	:Road
Macy Street to Rancho Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	17760
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1028.55	21.31	35.52	763.59	3.55	5.92	189.35	29.60	49.33
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	23.80	6.96	9.18	22.50	-0.82	1.40	16.45	8.39	10.60
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.09	58.20	65.27	64.79	50.42	57.49	58.74	59.63	66.69
	DAY LEQ	69.08		EVENING LEQ	65.66		NIGHT LEQ	68.02	

CNEL	74.66
DAY LEQ	69.08

Day hour	98.00
Absorptive?	no
Use hour?	no
GRADE dB	9.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Traffic Noise

11	:Id	
Foothill Boulevard	:Road	
East of Rancho Avenue	:Segment	

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	21600
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1250.94	25.92	43.20	928.68	4.32	7.20	230.29	36.00	60.00
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.65	7.81	10.03	23.35	0.03	2.25	17.30	9.24	11.46
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.94	59.05	66.12	65.64	51.27	58.34	59.59	60.48	67.54
	DAY LEQ	69.93		EVENING LEQ	66.51		NIGHT LEQ	68.87	

CNEL	75.51
DAY LEQ	69.93

Day hour	99.00
Absorptive?	no
Use hour?	no
GRADE dB	10.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

Existing Plus Project Traffic Noise

11	:Id
Foothill Boulevard	:Road
East of Rancho Avenue	:Segment

Vehicle Distribution (Heavy Truck Mix)				
Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow
Automobiles	75.54	14.02	10.43	92.00
Medium Trucks	48.00	2.00	50.00	3.00
Heavy Trucks	48.00	2.00	50.00	5.00

ADT	21810
Speed	40
Distance	50
Left Angle	-90
Right Angle	90

	Daytime			Evening			Night		
Noise Parameters	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks	Autos	Medium Trucks	Heavy Trucks
INPUT PARAMETERS									
Vehicles per hour	1263.10	26.17	43.62	937.71	4.36	7.27	232.53	36.35	60.58
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
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
NOISE CALCULATIONS									
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16
ADJUSTMENTS									
Flow	24.69	7.85	10.07	23.39	0.07	2.29	17.34	9.28	11.50
Distance	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07	-0.07
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00
LEQ	66.98	59.09	66.16	65.68	51.31	58.38	59.63	60.52	67.59
	DAY LEQ	69.97		EVENING LEQ	66.56		NIGHT LEQ	68.91	

CNEL	75.56
DAY LEQ	69.97

Day hour	99.00
Absorptive?	no
Use hour?	no
GRADE dB	10.00

Notes:

(1) FHWA Traffic Noise Prediction Model FHWA-RD-77-108

(2) Vehicle percentages based on County of Riverside heavy truck mix.

APPENDIX G

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project	Date:	4/16/24
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to 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 =	2.00	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 =	9.281	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project	Date:	4/16/24
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Commercial to West		
Address:	San Bernardino Motel, 2528 Foothill Boulevard, San Bernardino		

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 =	38.00	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 =	0.112	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project		Date: 4/16/24
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Commercial to West		
Address:	San Bernardino Motel, 2528 Foothill Boulevard, San Bernardino		
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 =	38.00	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 =	0.047	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project	Date:	4/16/24
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to South		
Address:	Sequoia Plaza Mobile Home Park, 2505 W Foothill Boulevard, San Bernardino		

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 =	125.00	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 =	0.019	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project	Date:	4/16/24
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to South		
Address:	Sequoia Plaza Mobile Home Park, 2505 W Foothill Boulevard, San Bernardino		

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 =	125.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

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

RESULTS

PPV =	0.008	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project		Date: 4/16/24
Source:	Vibratory Roller		
Scenario:	With BMPs Included		
Location:	Residential Uses to 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 =	26.00	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 =	0.198	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19696 NWC Macy Street and Foothill Boulevard Residential Project		Date: 4/16/24
Source:	Large Bulldozer		
Scenario:	With BMPs Included		
Location:	Residential Uses to 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 =	15.00	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 =	0.191	IN/SEC	OUTPUT IN BLUE

Construction Annoyance Vibration Calculations

Source: Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment Manual (September 2018).

Eq. 7-3: $Lvdistance = Lvref - 30\log(D/25)$

Lvdistance = the rms velocity level adjsuted for distance, VdB
Lvref = the source reference vibration level at 25 feet, VdB
D = distance from the equipment to th receiver, ft.

Large Bulldozer:

Lvdistance = 87 - 30 log (2/25) = 119.91 VdB

Lvdistance = 87 - 30 log (38/25) = 81.5 VdB

Lvdistance = 87 - 30 log (125/25) = 66.03 VdB

Lvdistance = 87 - 30 log (80/25) = 71.85 VdB

Vibratory Roller:

Lvdistance = 94 - 30 log (2/25) = 126.91 VdB

Lvdistance = 94 - 30 log (38/25) = 88.5 VdB

Lvdistance = 94 - 30 log (125/25) = 73.03 VdB

Lvdistance = 94 - 30 log (136/25) = 71.93 VdB

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