SAN BERNARDINO/WABASH RESIDENTIAL PROJECT NOISE IMPACT ANALYSIS

City of Redlands

June 9, 2022

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

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City of Redlands

June 9, 2022

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Project No. 19504

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EXECUTIVE SUMMARY

The 37.9-acre project site is located at southwest corner of San Bernardino Avenue and Wabash Avenue in the City of Redlands, California. The project site is currently vacant and zoned residential estate (R-E).

The proposed project involves construction of 98 single family dwelling units.

Construction Impacts

Modeled unmitigated construction noise levels are expected to range reach a maximum of 62.9 dBA L_{eq} at the nearest existing residential property line to the west, 68.6 dBA L_{eq} at the nearest existing residential property line to the south, 62.6 dBA L_{eq} at the nearest existing residential property line to the east, and 66.5 dBA L_{eq} at the nearest existing recreational property line to the north of the project site.

The City's Municipal Code Section 8.06.120 (G) and 8.06090 limit the hours of construction to between the hours of 7:00 AM and 6:00 PM, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. Per the EIR prepared for the City of Redlands General Plan (2019), a substantial temporary increase in ambient noise levels from construction noise would be considered less than significant if construction activities comply with the City's Noise Control Ordinance in the Municipal Code, Section 8.06.090. Project construction will not occur outside of the hours outlined as "exempt" in City's Municipal Code Sections 8.06.120 (G) and 8.06090 and therefore, will not result in a generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

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

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

Construction Noise - Best Management Practices

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

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

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

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

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

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

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per City's Municipal Code Sections 8.06.120 (G) and 8.06090.

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

The City's General Plan 2035 identifies a potentially substantial increase as either an increase of four or more dB, if the resulting noise level would exceed the clearly compatible standards, or any increase of 6 dB. To determine if project traffic would result in a substantial increase in ambient noise levels, noise associated with project generated vehicle trips were modeled for the existing and existing plus project conditions utilizing FHWA Traffic Noise Prediction Model FHWA-RD-77-108 methodology.

Other than one modeled roadway segment, project generated vehicle trips are anticipated to increase roadway noise between approximately 0 to 3 dBA CNEL. Therefore, a change in noise level along these modeled roadway segments would not be audible and would be considered less than significant. The modeled roadway segment of Capri Avenue east of Granite Street is anticipated to have an increase of 6 dB. However, the modeled existing plus project noise level along the roadway segment of Capri Avenue east of Granite Street is 52 dBA CNEL, which is below the City's 60 dBA CNEL exterior "clearly compatible" noise level standard for single-family residential uses. Furthermore, this segment has very low existing daily traffic as the majority of the land adjacent to this roadway segment is that of the vacant project site. As the development proposed by the project is consistent with the City's General Plan existing land use designation, the noise level increase along this segment was already anticipated and accounted for in the City's General Plan. Therefore, a change in noise level would not be readily noticeable and would be less than significant. No mitigation is required.

Transportation Noise Impacts to the Proposed Project

Per General Plan Action 7-A.135 all projects that have noise exposure levels that exceed the City Land Use Compatibility standards, require site planning and architecture to incorporate noise-attenuating features. General Plan Action 7-A.137 requires mitigation to be designed to meet the allowable outdoor and indoor noise exposure standards provided in City of Redlands Interior and Exterior Noise Standards. Per the City of Redlands General Plan, noise levels of up to 60 dBA CNEL are considered "clearly compatible"; and noise levels between 60 and 75 dBA CNEL are considered "normally incompatible" for single-family, multi-family, and mobile home residential uses.

Future noise levels at backyards proposed adjacent to either Wabash Avenue or San Bernardino Avenue are expected to range between 53 and 60 dBA CNEL and will not exceed the City's outdoor exterior noise standard of 60 dBA CNEL. This impact is less than significant. No mitigation is required.

As shown in Figure 7, future noise levels at proposed single-family structures adjacent to Wabash Avenue or San Bernardino Avenue are expected to range between 57-60 dBA CNEL at the first floor building facade and between 63 to 66 dBA CNEL at the second story building facade. Upgraded windows and sliding glass doors with an STC rating of 24 are being installed in the northern and eastern facades of the home located at the southwest corner of Wabash Avenue and San Bernardino Avenue to ensure that interior noise levels do not exceed 45 dBA CNEL. This impact would be less than significant. No mitigation is required.

Best Management Practice – Noise

1. In order to ensure that interior noise levels are acceptable (45 dBA, CNEL) north and east facing windows and doors at the southwest corner of Wabash Avenue and San Bernardino Avenue will have an STC rating of at least 24 to ensure that interior noise levels do not exceed 45 dBA CNEL.

Groundborne Vibration Impacts

Caltrans identifies a PPV level of 0.3 as the threshold at which there is a risk to "architectural" damage to older residential structures. Existing residential structures are located as close as approximately 66 feet to the east of the project site. Therefore, construction related groundborne vibration will not exceed the residential threshold of 0.3 PPV in/sec at residential structures in the vicinity of the project site. The project does not

propose any non-construction related sources of ground-borne vibration. Temporary vibration levels associated with project construction would be less than significant. No mitigation is required.

Annoyance - Groundborne vibration becomes distinctly perceptible to sensitive receptors at a level of 0.04 in/sec PPV. The City of Redlands has prohibited the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property; or at one hundred fifty feet (150') from the source if on a public space or public right-of-way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS. Therefore, related annoyance could occur at the residential structures to the west, south and east of the project site. However, perceptibility of construction vibration would be temporary and would only occur while vibratory equipment is utilized within 150 feet of the existing structures. This impact would be less than significant. No mitigation is required.

1. INTRODUCTION

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

PURPOSE AND OBJECTIVES

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

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

PROJECT LOCATION

The 37.9-acre project site is located at southwest corner of San Bernardino Avenue and Wabash Avenue in the City of Redlands, California. The project site is currently vacant and zoned residential estate (R-E). A vicinity map showing the project location is provided on Figure 1.

PROJECT DESCRIPTION

The proposed project involves construction of 98 single family dwelling units. Figure 2 illustrates the project site plan.

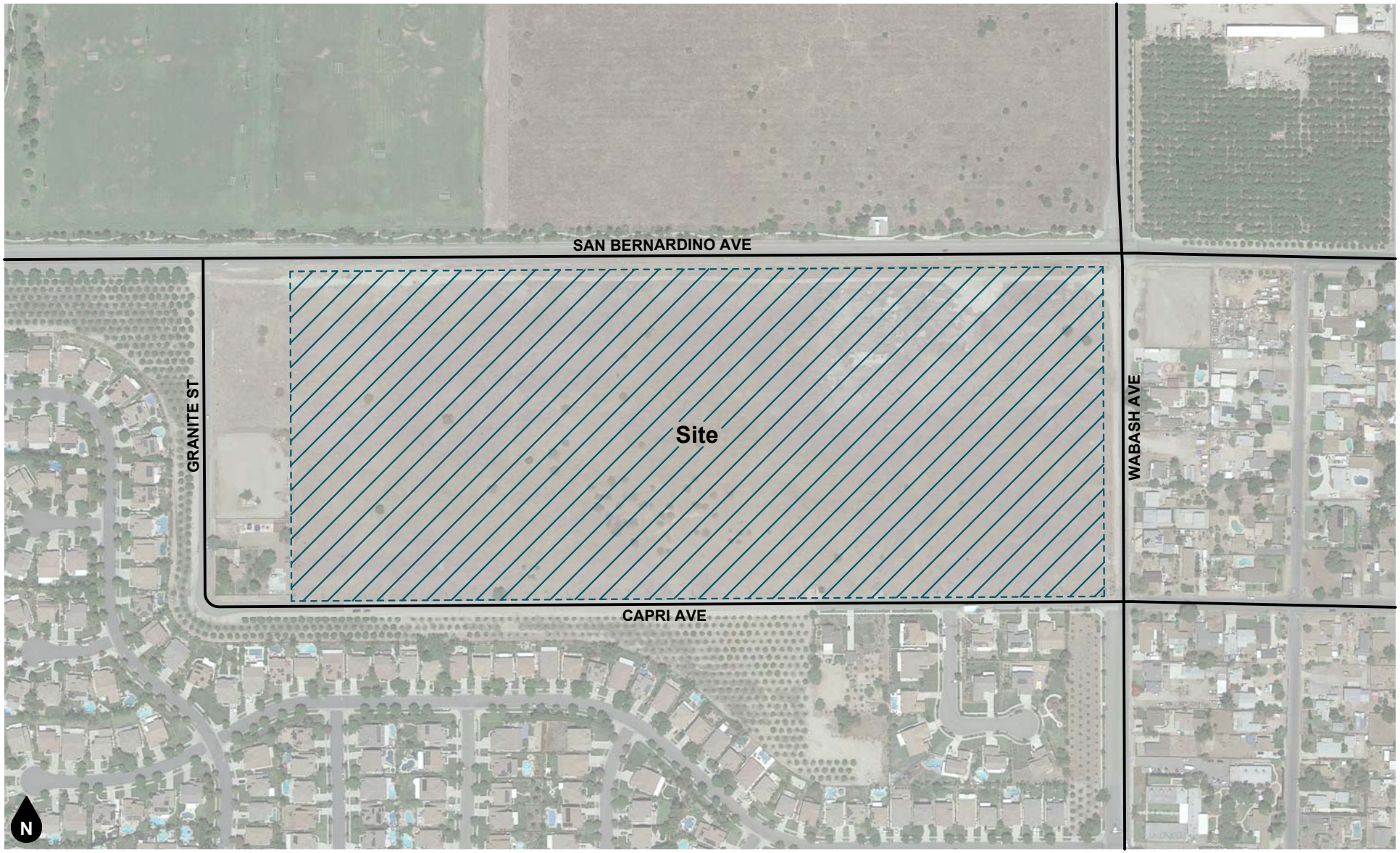


Figure 1
Project Location Map

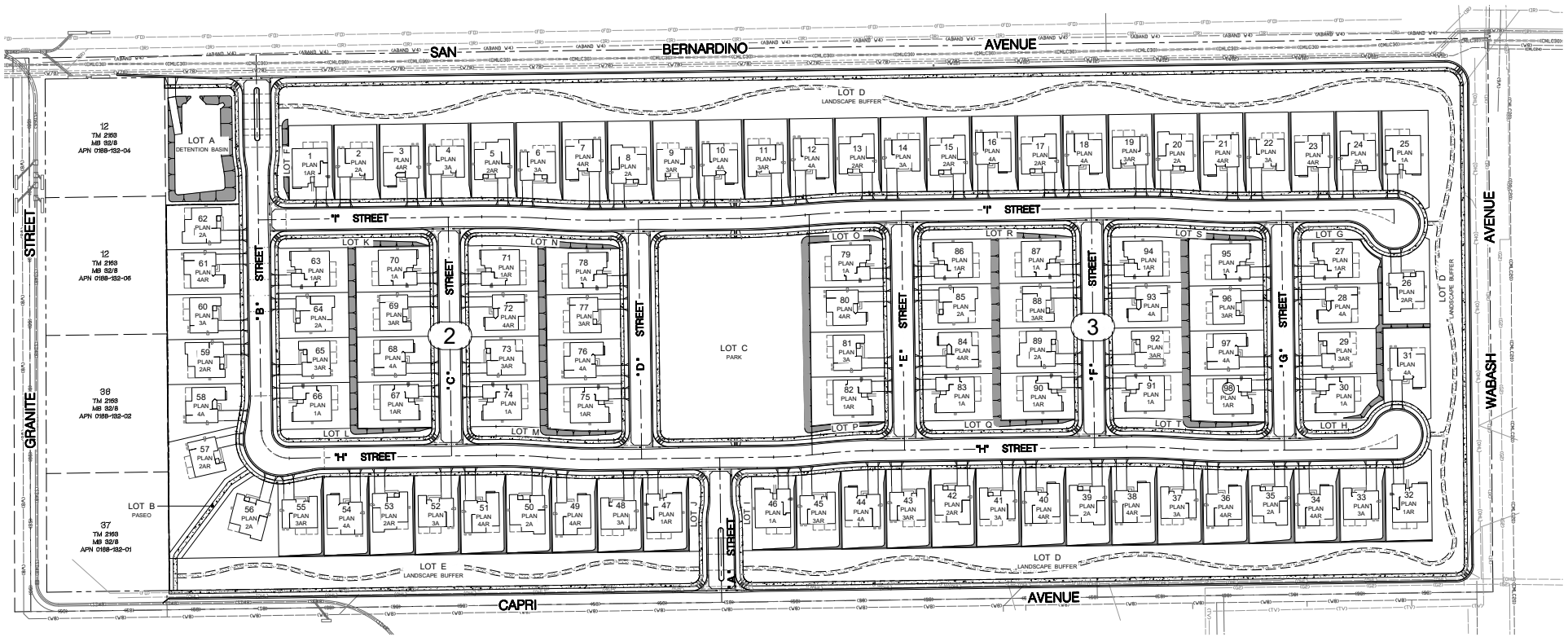


Figure 2
Site Plan

2. NOISE AND VIBRATION FUNDAMENTALS

NOISE FUNDAMENTALS

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

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

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

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

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

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

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

VIBRATION FUNDAMENTALS

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

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

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

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

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

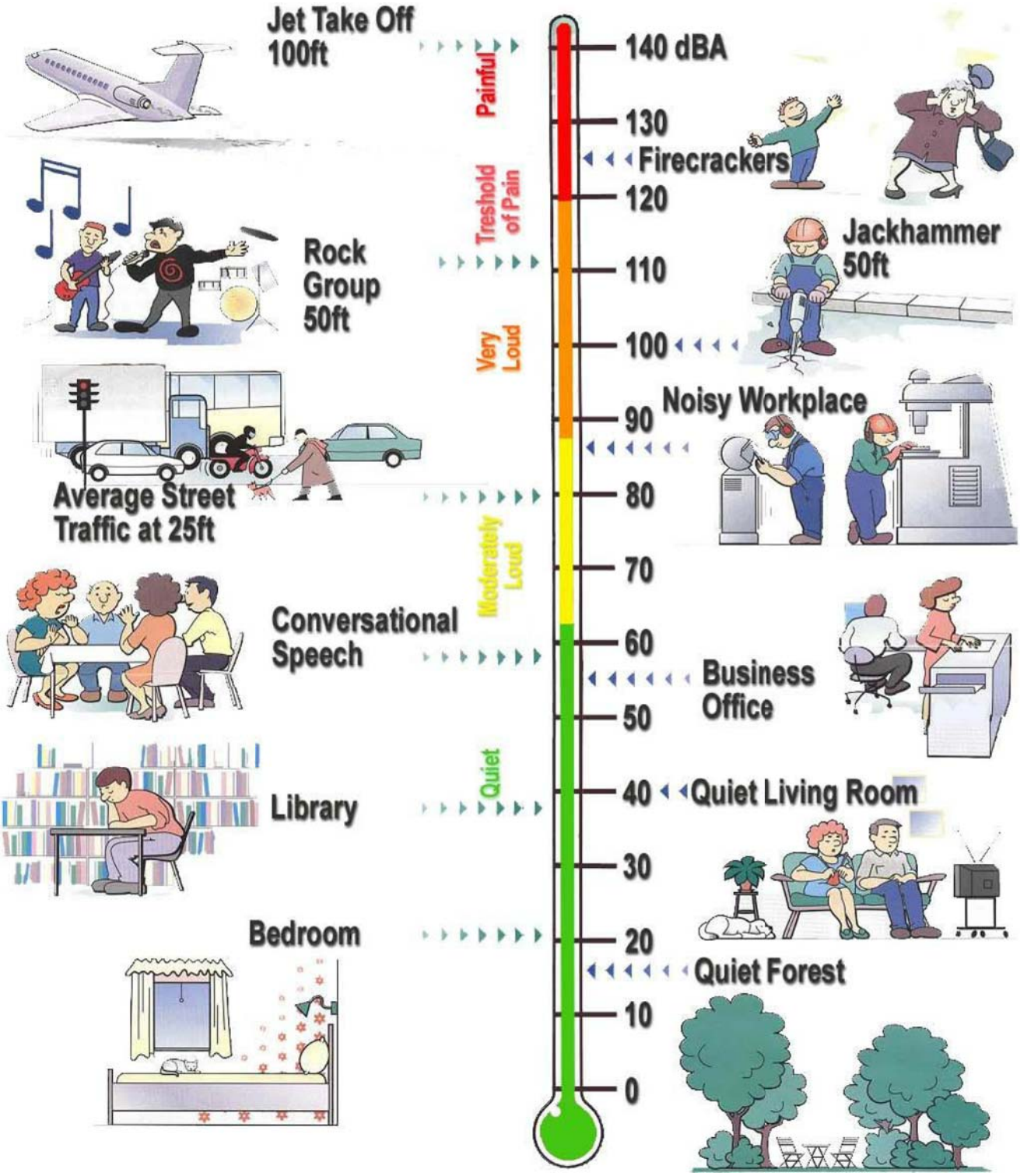
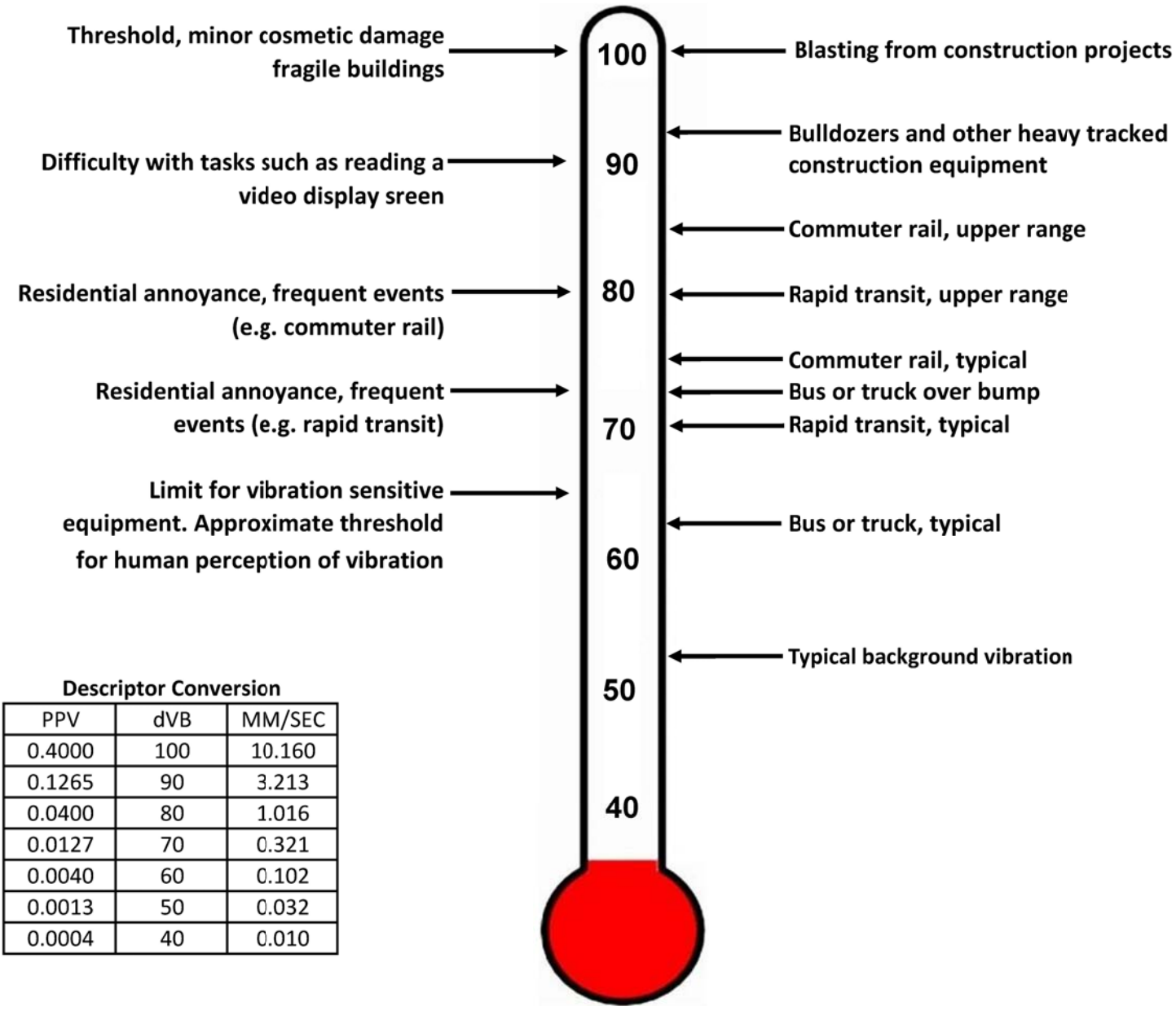


Figure 3
Weighted Sound Levels in Common Environments

Source: Bruel & Kjaer 2001



Descriptor Conversion

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

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

Figure 4
Typical Levels of Groundborne Vibration

3. EXISTING NOISE ENVIRONMENT

EXISTING LAND USES AND SENSITIVE RECEPTORS

The project site is bordered by San Bernardino Avenue to the north; Wabash Avenue to the east; Capri Avenue to the south; and a single-family residential dwelling unit and vacant land 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 single-family detached residential uses located adjacent to the west and as close as approximately 60 feet to the south (across Capri Avenue) and 55 feet to the east (across Wabash Avenue). In addition, the Redlands Sports Complex is located approximately 100 feet to the north (across San Bernardino Avenue) of the project site.

AMBIENT NOISE MEASUREMENTS

An American National Standards Institute (ANSI Section S1.4 2014 Class 1) Larson Davis model LxT sound level meter was used to document existing ambient noise levels. In order to document existing ambient noise levels in the project area, five (5) 15-minute daytime noise measurements were taken between 10:40 AM and 1:38 PM on April 20, 2022. Field worksheets and noise measurement output data are included in Appendix C.

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

- STNM1: represents the existing noise environment of the single-family residence located adjacent to the west of the project site boundary (1501 Granite Street, Redlands). The noise meter was placed near the eastern property line of the single-family residence and along the western project boundary.

- STNM2: represents the existing noise environment of the single-family residential homes to the south of the project site along Capri Avenue (1622 Capri Avenue, Redlands). The noise meter was placed near the northern property line of the single-family residence along the southern side of Capri Avenue.

- STNM3: represents the existing noise environment of the single-family residential homes to the east of the project site along Wabash Avenue (1380 Wabash Avenue, Redlands). The noise meter was placed near the western property line of the single-family residence along the eastern side of Wabash Avenue.

- STNM4: represents the existing noise environment of the southern portion of the Redlands Sports along San Bernardino Avenue (1790 Dearborn Street, Redlands). The noise meter was placed near the southern boundary of the Redlands Sports Park along the northern side of San Bernardino Avenue.

- STNM5: represents the existing noise environment of the single-family residence located adjacent to the west of the project site boundary (1501 Granite Street, Redlands). The noise meter was placed just southeast of the residence along the northern boundary of Capri Avenue.[1]

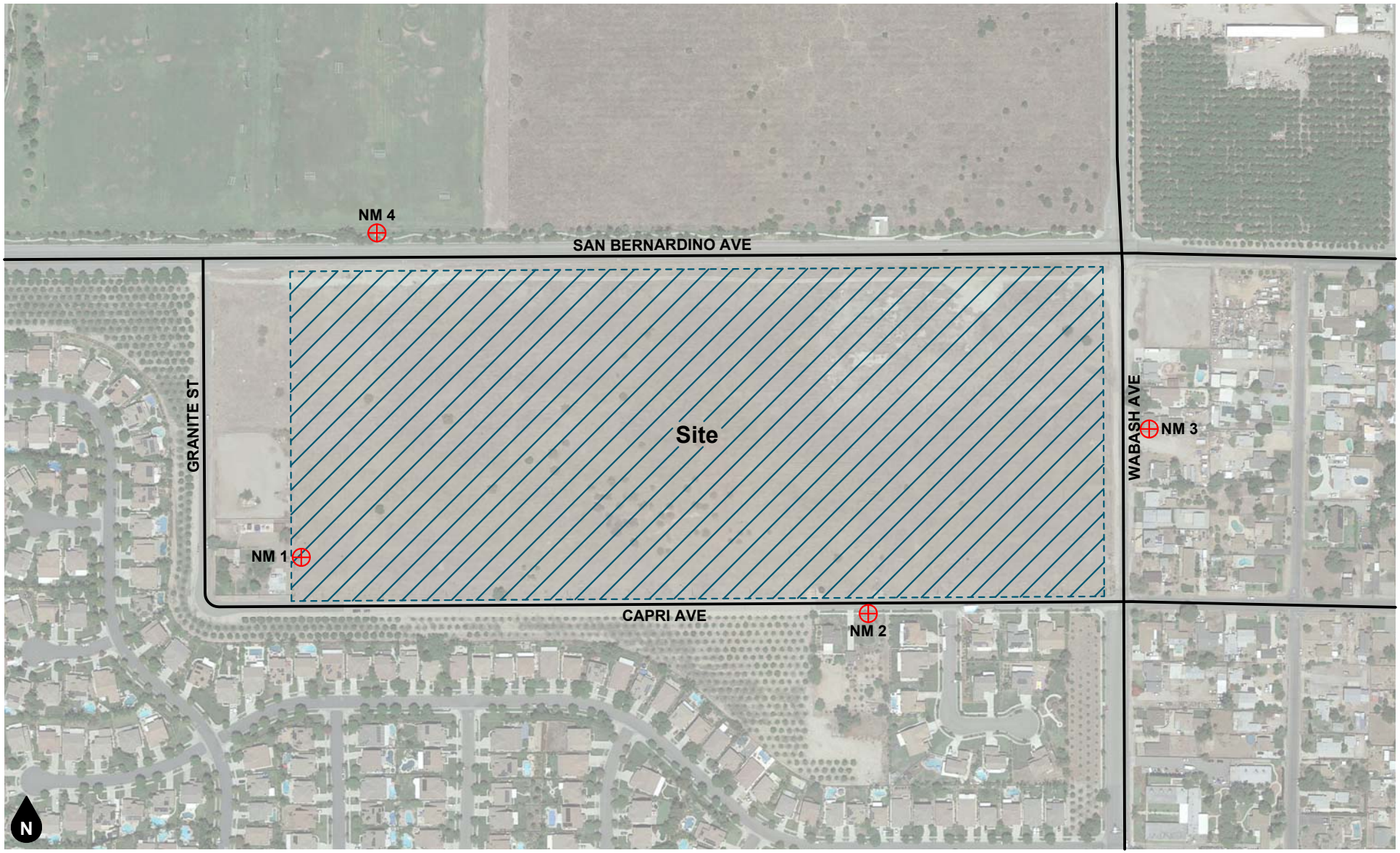
Table 1 provides a summary of the short-term ambient noise data. Short-term ambient noise levels were measured between 51.3 and 66.8 dBA L_{eq}. The dominant noise source was vehicle traffic associated with Capri Avenue, Wabash Avenue, San Bernardino Avenue and other surrounding roadways and barking dogs.

[1] Both STNM1 and STNM5 were taken as representative noise measurements for the residential use adjacent to the west of the project site (1501 Granite Street, Redlands). As shown on Figure 5, the noise meter for STNM1 was placed further away from Capri Avenue in close proximity to the residence's backyard; however, the backyard associated with the residence had many barking dogs at the time STNM1 was taken. Therefore, to be conservative, another measurement (STNM5), was taken near this residence, but closer to Capri Avenue when the dogs were no longer barking.

Table 1
Short-Term Noise Measurement Summary (dBA)

Daytime Measurements[1,2]								
Site Location	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
STNM1	10:40 AM	53.0	63.6	36.4	58.3	57.1	54.8	51.1
STNM2	11:13 AM	43.8	62.2	37.7	49.2	45.8	42.9	41.3
STNM3	11:50 AM	66.8	79.8	41.8	76.5	72.9	65.5	55.0
STNM4	12:41 PM	65.6	79.2	39.4	74.7	71.1	65.4	55.1
STNM5	1:23 PM	51.3	66.2	37.7	60.1	56.2	50.7	46.2

Notes:
(1) See Figure 5 for noise measurement locations. Each noise measurement was performed over a 15-minute duration.
(2) Noise measurements performed on April 20, 2022.



Legend

⊕ Noise Measurement Location

NM 1

Figure 5
Noise Measurement Location Map

4. REGULATORY SETTING

FEDERAL REGULATION

Federal Noise Control Act of 1972

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

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

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

STATE REGULATIONS

State of California General Plan Guidelines 2017

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

The OPR Guidelines include a Noise and Land Use Compatibility Matrix which identifies acceptable and unacceptable community noise exposure limits for various land use categories. Where the "normally acceptable" range is used, it is defined as the highest noise level that should be considered for the construction of the buildings which do not incorporate any special acoustical treatment or noise mitigation. The "conditionally acceptable" or "normally unacceptable" ranges include conditions calling for detailed acoustical study prior to the construction or operation of the proposed project. The City of Redlands has adopted their own version of the State Land Use Compatibility Guidelines for land use planning and to assess potential transportation noise impacts to proposed land uses (see Table 2).

California Department of Transportation (Caltrans)

The California Department of Transportation has published one of the seminal works for the analysis of ground-borne noise and vibration relating to transportation- and construction-induced vibrations and although the project is not subject to these regulations, it serves as useful tools to evaluate vibration impacts.

As shown in Table 3, the threshold at which there is a risk to "architectural" damage to historic and some older buildings is a peak particle velocity (PPV) of 0.25, at older residential structures a PPV of 0.3, and at new residential structures a PPV of 0.5. Table 4 shows that a PPV of 0.04 is the threshold at which groundborne vibration becomes distinctly perceptible in regards to annoyance. Therefore, these guidelines recommend that a standard of 0.3 inches per second (in/sec) PPV not be exceeded for the protection of older residential structures (California Department of Transportation, 2020).

Local Regulations

City of Redlands General Plan 2035

The City of Redlands has adopted a modified version of the State of California Noise Land Use Compatibility Matrix (see Table 2). This Matrix establishes standards for outdoor noise levels that are clearly compatible, normally compatible, and normally incompatible for a variety of land uses. For example, for single-family residential uses, noise levels of up to 60 dBA CNEL are "clearly compatible". Additional City of Redlands General Plan goals and policies which apply to the proposed project are presented below.

Policies

Principles

7-P.41 Ensure that new development is compatible with the noise environment by continuing to use potential noise exposure as a criterion in land use planning.

Actions

7-A.135 Use the noise and land use compatibility matrix (see Table 2) and Future Noise Contours map (General Plan Figure 7-9) as criteria to determine the acceptability of a given land use, including the improvement/construction of streets, railroads, freeways, and highways. Do not permit new noise-sensitive uses—including schools, hospitals, places of worship, and homes—where noise levels are "normally unacceptable" or higher if alternative locations are available for the uses in the City.

7-A.136 Require a noise analysis be conducted for all development proposals located where projected noise exposure would be other than "clearly" or "normally compatible" as specified in Table 2.

7-A.137 For all projects that have noise exposure levels that exceed the standards in Table 2, require site planning and architecture to incorporate noise-attenuating features. With mitigation, development should meet the allowable outdoor and indoor noise exposure standards in Table 5. When a building's openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation shall be provided.

Measure U Policies

9.0e Use the criteria specified in Table 2 to assess the compatibility of proposed land uses with the projected noise environment, and apply the noise standards in Table 5, which prescribe interior and exterior noise standards in relation to specific land uses. Do not approve projects that would not comply with the standards in Tables 2 and 5.

9.0i Require construction of barriers to mitigate sound emissions where necessary or where feasible and encourage use of walls and berms to protect residential or other noise sensitive land uses that are adjacent to major roads, commercial, or industrial areas.

9.0s Require mitigation to ensure that indoor noise levels for residential living spaces do not exceed 45 dB LDN/CNEL due to combined effect of all exterior noise sources.

9.0v Consider the following impacts as possibly "significant":

- An increase in exposure of 4 or more dB if the resulting noise level would exceed that described as clearly compatible for the affected land use, as established in Tables 4 and 5;
- Any increase of 6 dB or more, due to potential for adverse community response.

9.0w Limit hours of construction or demolition work where site-related noise is audible beyond the site boundary.

City of Redlands Municipal Code

Chapter 8.06 of the City's Municipal Code establishes the City's noise standards and regulations.

Section 8.06.070 Exterior Noise Limits.

Exterior noise standards for categories of land uses identified in Table 6, unless otherwise specifically indicated, apply to all such property within a designated zone. Specifically, no person shall operate, or cause to be operated, any source of sound at any location within the City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property to exceed:

1. The noise standard for that land use specified in Table 6 for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard specified in Table 6 above of this section plus five (5) dB for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard specified in Table 6 above of this section plus ten (10) dB for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard specified in Table 6 above of this section plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or
5. The noise standard specified in Table 6 above of this section plus twenty (20) dB or the maximum measured ambient level, for any period of time.

If the measured ambient level exceeds the allowable noise exposure standard within any of the first four (4) noise limit categories above, the allowable noise exposure standard shall be adjusted in five (5) dB increments in each category as appropriate to encompass or reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Section 8.06.080 Interior Noise Standards.

No person shall operate or cause to be operated any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving occupied building to exceed the standards presented in Table 7 as follows:

1. The noise standard for that land use specified in Table 7 for a cumulative period of more than five (5) minutes in any hour.

2. The noise standard for that land use specified in Table 7 plus five (5) dB for a cumulative period of more than one minute in any hour.
3. The noise standard for that land use specified in Table 7 plus ten (10) dB for the maximum measured ambient noise level for any period of time.

If the measured ambient level exceeds the allowable exterior noise exposure standard in 8.06.070 of this chapter, the allowable interior noise exposure level shall be adjusted in five (5) dB increments as appropriate to reflect the ambient noise level.

Section 8.06.090 Noise Disturbances Prohibited.

The following acts, and the causing or permitting thereof, are declared to be in violation of the Noise Ordinance:

F. Construction and/or Demolition: Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between weekday hours of six o'clock (6:00) PM and seven o'clock (7:00) AM, including Saturdays or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work by public service utilities, the City or another governmental entity. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

G. Vibration: Operating or permitting the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right of way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS. As such, this noise study uses the City of Redlands Municipal Code vibration perception threshold of 0.01 in/sec RMS to assess the potential vibration impacts due to Project construction. Structural damage would not occur at this level.

K. Noise Sensitive Zones: Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in 8.06.070A of this chapter and subsection 8.06.070B of this chapter, or so as to interfere with the functions of such activity or annoy the occupants in the activity, provided that conspicuous signs are displayed indicating the presence of the zone.

Section 8.06.120 Exemptions.

Construction Activity: This chapter shall not apply to noise sources associated with new construction, remodeling, rehabilitation or grading of any property provided such activities take place between the hours of seven o'clock (7:00) AM and six o'clock (6:00) PM on weekdays, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. All motorized equipment used in such activity shall be equipped with functioning mufflers.

Further, all mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

The Ordinance also prohibits the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right-of-way.

Table 2
City of Redlands Noise/Land Use Compatibility Matrix[1]

Land Use Categories		Community Noise Equivalent Level (CNEL)						
Categories	Uses	< 60	65	70	75	80	85 >	
RESIDENTIAL	Single Family, Duplex, Multi-Family	A	C	C	C	D	D	D
RESIDENTIAL	Mobile Homes	A	C	C	C	D	D	D
COMMERCIAL- Regional, District	Hotels, Motels, Transient Lodging	A	A	B	B	C	C	D
COMMERCIAL- Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theater	A	A	A	A	B	B	C
COMMERCIAL INDUSTRIAL INSTITUTIONAL	Office Buildings, Research and Development, Professional Offices, City Office Building	A	A	A	B	B	C	D
COMMERCIAL- Recreation INSTITUTIONAL- Civic Center	Amphitheater, Concert Hall, Auditorium, Meeting Hall	B	B	C	C	D	D	D
COMMERCIAL- Recreation	Children's Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club	A	A	A	A	B	B	B
COMMERCIAL- General, Special INDUSTRIAL INSTITUTIONAL	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
INSTITUTIONAL- General	Hospital, Church, Library, School Classroom	A	A	B	C	C	D	D
OPEN SPACE	Parks	A	A	A	B	C	D	D
OPEN SPACE	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	A	B	C	C
AGRICULTURE	Agriculture	A	A	A	A	A	A	A

Zone A:	Clearly Compatible	Specified land use is satisfactory, based up the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.
Zone B:	Normally Compatible	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional constuction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.
Zone C:	Normally Incompatible	New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise reduction features included in the design.
Zone D:	Clearly Incompatible	New construction or development should generally not be undertaken.

(1) Source: City of Redlands General Plan Healthy Community Element (GP Table 9.1), 2010.

Table 3
Guideline Vibration Damage Potential Threshold Criteria

Structure Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 7 Table 19, April 2020.

Notes:

(1) Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 4
Guideline Vibration Annoyance Potential Criteria

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

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

Notes:

(1) Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 5
City of Redlands Interior and Exterior Noise Standards

Land Use Categories	Community Noise Equivalent Level (CNEL)	
	Interior[1]	Exterior[2]
Residential		
Single Family, Duplex, Multiple Family	45 [3]	60
Mobile Home	-	60 [4]
Commercial. Industrial, Institutional		
Hotel, Motel, Transient Lodging	45	65 [5]
Commercial Retail, Bank, Restaurant	55	-
Office Building, Research & Development, Professional Offices, City Office Building	50	-
Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	-
Gymnasium (Multipurpose)	50	-
Sports Club	55	-
Manufacturing, Warehousing, Wholesale, Utilities	60	-
Movie Theaters	45	-
Institutional		
Hospitals, Schools, Classrooms	45	60
Open Space		
Parks	-	60

Souce: City of Redlands General Plan 2035 Healthy Communit Element (GP Table 7-11), 2010.

Notes:

* CNEL (Community Noise Equivalent Level) - The average equivalent A-Weighted sound level during a 24 hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 PM to 10:00 PM and ten decibels to sound levels at night after 10:00 PM and before 7:00 AM.

(1) Indoor environment excluding bathrooms, toilets, closest, corridors.

(2) Outdoor environment limited to private yard of single-family as measured at the property line; multi-family private patio or balcony which is served by a means of exit from inside; mobile home park; hospital patio; park picnic area; school playground; hotel and recreational area.

(3) Noise level requirement with open windows, if they are used to meet natural ventilation requirement.

(4) Exterior noise level should be such that interior level will not exceed 45 CNEL.

(5) Except those areas affected by aircraft noise.

Table 6
City of Redlands Exterior Noise Standards

Maximum Permissible Sound Levels By Receiving Land Use		
Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	10:00 PM - 7:00 AM	50
	7:00 AM – 10:00 PM	60
Multi-family residential districts; public space; institutional	10:00 PM - 7:00 AM	50
	7:00 AM - 10:00 PM	60
Commercial	10:00 PM - 7:00 AM	60
	7:00 AM - 10:00 PM	65
Industrial	Anytime	75

Source: City of Redlands Municipal Code Section 8.06.070.

Table 7
City of Redlands Interior Noise Standards

Maximum Permissible Sound Levels By Receiving Land Use		
Multi-family residential districts; institutional; hotels	Any time	45
Commercial	Any time	50
Industrial	Any time	60

Source: City of Redlands Municipal Code Section 8.06.080.

5. ANALYTICAL METHODOLOGY AND MODEL PARAMETERS

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

CONSTRUCTION NOISE MODELING

Construction noise associated with the proposed project was calculated at the sensitive receptor locations, utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Construction noise levels were calculated for each phase based on the equipment assumptions provided in the Air Quality Analysis prepared for the project (Lilburn 2022). For construction noise purposes, the distance measured from the project site to sensitive receptors was assumed to be the acoustical center of the project site to the property line of residential properties with existing residential buildings. Sound emission levels associated with typical construction equipment as well as typical usage factors provided in Table 8 were utilized for modeling purposes. Construction noise worksheets are provided in Appendix D.

FEDERAL HIGHWAY ADMINISTRATION (FHWA) TRAFFIC NOISE PREDICTION MODEL

Increases in ambient noise levels due to project generated vehicle traffic were modeled utilizing a computer program that replicates the FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

The FHWA Traffic Noise Prediction Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emissions Levels.[2] Adjustments are then made to the REMEL to account for: total average daily traffic volumes, roadway classification (i.e., collector, secondary, major or arterial), the roadway active width (i.e., distance between the center of the outermost travel lanes on each side of the roadway), travel speed, truck mix (i.e., percentage of automobiles, medium trucks, and heavy trucks in the traffic volume), roadway grade and site conditions (hard or soft ground surface relating to the absorption of the ground, pavement, or landscaping). Research conducted by Caltrans identifies that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model.[3] Therefore, surfaces adjacent to all modeled roadways were assumed to have a "soft site". Possible reductions in noise levels due to intervening topography and buildings were not accounted for in this analysis.

Existing and Existing Plus Project average daily traffic volumes were calculated from the PM peak hour intersection volumes provided in the project's traffic impact analysis (Michael Baker 2021). The City of Redlands and the County of San Bernardino do not have published vehicle/truck mixes and D/E/N splits for use in acoustical studies; therefore, the vehicle/truck mixes and D/E/N splits for use in acoustical studies published by the Riverside County Department of Industrial Hygiene were utilized for noise modeling. Existing Plus Project vehicle mixes were calculated by adding the proposed project trips to existing conditions. FHWA spreadsheets are included in Appendix E.

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 stationary noise sources (e.g., parking lots, drive-thru menus, car wash equipment, vacuums, etc.). The SoundPLAN software utilizes

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

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

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 F.

Roadway segments that are located adjacent to the proposed project site include San Bernardino Avenue, Wabash Avenue, and Capri Avenue. Per the City of Redlands General Plan 2035 Roadway Classification Map, San Bernardino Avenue and Wabash Avenue are both classified as Minor Arterial roadways and Capri Avenue is a Local roadway. Capri Avenue is not an acoustically significant roadway and was not modeled.

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. As shown in Table 3.15-I of the Revised Draft Environmental Impact Report for the Redlands General Plan Update and Climate Action Plan Chapter 3.15: Transportation (July 2017), a 3-lane minor arterial roadway has an LOS C capacity of 19,800 vehicles per day (San Bernardino Avenue), and a 2-lane minor arterial roadway has a LOS C capacity of 13,200 vehicles per day (Wabash Avenue). N The City of Redlands and the County of San Bernardino do not have published vehicle/truck mixes and D/E/N splits for use in acoustical studies; therefore, the vehicle/truck mixes and D/E/N splits for use in acoustical studies published by the Riverside County Department of Industrial Hygiene were utilized for noise modeling. Existing Plus Project vehicle mixes were calculated by adding the proposed project trips to existing conditions. SoundPlan input and output sheets are provided in Appendix F.

Table 8 (1 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

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

Table 8 (2 of 2)
CA/T Equipment Noise Emissions and Acoustical Usage Factor Database

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

Notes:

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

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

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

6. IMPACT ANALYSIS

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

IMPACTS RELATED TO CONSTRUCTION NOISE

Construction activities will occur in phases including grading, building construction, paving, and architectural coating. Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant. Construction activities are anticipated to begin no sooner than the beginning of February 2023 and be completed by early December 2026.

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. The existing surrounding single-family residential uses to the east, south, and west and the sports park to the north may be affected by short-term noise impacts associated with construction noise.

Construction noise associated with the proposed project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the proposed construction activity. Construction noise levels were calculated for each phase. Anticipated noise levels during each construction phase are presented in Table 9. Worksheets for each phase are included as Appendix D.

Modeled unmitigated construction noise levels reached a maximum of 62.9 dBA L_{eq} at the nearest existing residential property line to the west, 68.6 dBA L_{eq} at the nearest existing residential property line to the south, 62.6 dBA L_{eq} at the nearest existing residential property line to the east, and 66.5 dBA L_{eq} at the nearest existing sports park property line to the north of the project site.

Table 9 also includes a comparison of existing noise levels and project construction noise levels. STNM5 was chosen to represent noise levels at the property line of the single-family residential use to the west, STNM2 was chosen to represent noise levels at the property line of the single-family residential uses to the south, STNM3 was chosen to represent noise levels at the property line of the single-family residential uses to the east, and STNM4 was chosen to represent noise levels at the property line of the sports park to the north of the project site. The expected duration of each phase and the loudest sound level at the nearest sensitive receptor (single-family residential use to the south) is presented below:

Phase	Number of Days	Maximum Leq
Demolition	50	68
Site Preparation	30	67.2
Grading	75	68.8
Building Construction	740	65.5
Paving	55	61
Architectural Coating	55	53.5

The City's Municipal Code Section 8.06.120 (G) and 8.06090 limit the hours of construction to between the hours of 7:00 AM and 6:00 PM, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. Per the EIR prepared for the City of Redlands General Plan (2019), a substantial temporary increase in ambient noise levels from construction noise would be considered less than significant if construction activities comply with the City's Noise Control Ordinance in the Municipal Code, Section

8.06.090. Project construction will not occur outside of the hours outlined as "exempt" in City's Municipal Code Sections 8.06.120 (G) and 8.06090; and therefore, will not result in a generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

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

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

Construction Noise - Best Management Practices

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

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

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

11. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

12. 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.

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

14. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per City's Municipal Code Sections 8.06.120 (G) and 8.06090.

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[4] As shown in the CalEEMod output files provided in the Air Quality Analysis prepared for the proposed project (Lilburn, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 358 vehicle trips per day (260 for worker trips and 98 for vendor trips). Given the project site's proximity to the 210 and 10 Freeways, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

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

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

During operation, the proposed project is expected to generate approximately 1,021 average daily trips with 73 trips occurring during the AM peak-hour and 100 trips occurring during the PM peak-hour. Project generated traffic noise levels along affected road segments was estimated utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. The modeling is theoretical and did not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Existing and Existing Plus Project modeled noise levels are provided for comparative purposes to show the difference in noise levels with and without project conditions. Roadway input parameters including average daily traffic volumes (ADTs), speeds, and vehicle distribution data is shown in Table 10.

As shown in Table 10, modeled Existing traffic noise levels range between 46.3-75.8 dBA CNEL at the right-of-way of each modeled roadway segment; and the modeled Existing Plus Project traffic noise levels range between 51.1-76 dBA CNEL at the right-of-way of each modeled roadway segment.

The City's General Plan 2035 identifies a potentially substantial increase as either an increase of four or more dB, if the resulting noise level would exceed the clearly compatible standards as identified in Table 2, or any increase of 6 dB.

Table 11 shows that other than the roadway segment of Capri Avenue east of Granite Street, all of the modeled roadway segments are anticipated to change the noise a nominal amount (approximately 0 to 3 dBA CNEL). The modeled roadway segment of Capri Avenue east of Granite Street is anticipated to have an increase of 6 dB. However, the modeled existing plus project noise level along the roadway segment of Capri Avenue east of Granite Street is 52 dBA CNEL, which is below the City's 60 dBA CNEL exterior "clearly compatible" noise level standard for single-family residential uses. Furthermore, this segment has very low existing daily traffic as the majority of the land adjacent to this roadway segment is that of the vacant project site. As the development proposed by the project is consistent with the City's General Plan existing land use designation, the noise level increase along this segment was already anticipated and accounted for in the City's General Plan. Therefore, a change in noise level would not be readily noticeable and would be less than significant. No mitigation is required.

Transportation Noise Impacts to the Proposed Project

Per General Plan Action 7-A.135 all projects that have noise exposure levels that exceed the standards in Table 2, require site planning and architecture to incorporate noise-attenuating features. General Plan Action 7-A-13 requires mitigation to be designed to meet the allowable outdoor and indoor noise exposure standards in Table 5. When a building's openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation shall be provided. Per the City of Redlands General Plan, noise levels of up to 60 dBA CNEL are considered "clearly compatible"; and noise levels between 60 and 75 dBA CNEL are considered "normally incompatible" for single-family, multi-family, and mobile home residential uses.

As shown in Figure 6, future noise levels at backyards proposed adjacent to either Wabash Avenue or San Bernardino Avenue are expected to range between 53 and 60 dBA CNEL and will not exceed the City's outdoor exterior noise standard of 60 dBA CNEL. This impact is less than significant. No mitigation is required.

As shown in Figure 7, future noise levels at proposed single-family structures adjacent to Wabash Avenue or San Bernardino Avenue are expected to range between 57-60 dBA CNEL at the first floor building facade and between 63 to 66 dBA CNEL at the second story building facade. Upgraded windows and sliding glass doors with an STC rating of 24 are being installed in the northern and eastern facades of the home located at the southwest corner of Wabash Avenue and San Bernardino Avenue to ensure that interior noise levels do not exceed 45 dBA CNEL. This impact would be less than significant. No mitigation is required.

Best Management Practice – Noise

1. In order to ensure that interior noise levels are acceptable (45 dBA, CNEL) north and east facing windows and doors at the southwest corner of Wabash Avenue and San Bernardino Avenue will have an STC rating of at least 24 to ensure that interior noise levels do not exceed 45 dBA CNEL.

GROUNDBORNE VIBRATION IMPACTS

There are several types of construction equipment that can cause vibration levels high enough to annoy persons in the vicinity and/or result in architectural or structural damage to nearby structures and improvements. For example, as shown in Table 12, a vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; 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 PPV. It should be noted that these vibration levels are reference levels and may vary slightly depending upon soil type and specific usage of each piece of equipment.

Architectural Damage

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

Table 2 identifies a PPV level of 0.3 as the threshold at which there is a risk to "architectural" damage to older residential structures. As shown in Table 13, construction related groundborne vibration will not exceed the residential threshold of 0.3 PPV in/sec at residential structures in the vicinity of the project site. Potential impacts related to architectural damage would be less than significant. Vibration worksheets are provided in Appendix G.

Annoyance to Persons

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

As shown in Table 3, vibration becomes distinctly perceptible to people in buildings at a PPV of 0.04. The City of Redlands has prohibited the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property; or at one hundred fifty feet (150') from the source if on a public space or public right-of-way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS.

To assess the impact in terms of the City's vibration perception, the threshold of 0.01 inches per second (in/sec) RMS was converted to a PPV (0.014 in/sec) using the conversion factor of 0.71 which is provided in the Caltrans Transportation and Construction Vibration Guidance Manual (April 2020). Therefore, if a vibratory roller is used within 150 feet of an existing structure or if a large bulldozer is used within 85 feet of an existing structure, there will be some potential for vibration related annoyance.

Therefore, as shown in Table 13, vibration related annoyance could occur at the residential structures to the west, south and east of the project site. However, perceptibility of construction vibration would be temporary and would only occur while vibratory equipment is utilized within 150 feet of the existing structures. This impact would be less than significant. No mitigation is required.

Table 9
Construction Noise Levels (dBA L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[1]	Unmitigated Noise Levels (dBA Leq)[2]
Demolition	Residential to west (1501 Granite Street)	51.3	62.1
	Residential to south (1622 Capri Avenue)	43.8	68.0
	Residential to east (1380 Wabash Avenue)	66.8	61.8
	Sports Park to north (1790 Dearborn Street)	65.6	65.7
Site Preparation	Residential to west (1501 Granite Street)	51.3	61.4
	Residential to south (1622 Capri Avenue)	43.8	67.2
	Residential to east (1380 Wabash Avenue)	66.8	61.0
	Sports Park to north (1790 Dearborn Street)	65.6	64.9
Grading	Residential to west (1501 Granite Street)	51.3	62.9
	Residential to south (1622 Capri Avenue)	43.8	68.8
	Residential to east (1380 Wabash Avenue)	66.8	62.6
	Sports Park to north (1790 Dearborn Street)	65.6	66.5
Building Construction	Residential to west (1501 Granite Street)	51.3	59.6
	Residential to south (1622 Capri Avenue)	43.8	65.5
	Residential to east (1380 Wabash Avenue)	66.8	59.3
	Sports Park to north (1790 Dearborn Street)	65.6	63.2
Paving	Residential to west (1501 Granite Street)	51.3	55.1
	Residential to south (1622 Capri Avenue)	43.8	61.0
	Residential to east (1380 Wabash Avenue)	66.8	54.8
	Sports Park to north (1790 Dearborn Street)	65.6	58.7
Architectural Coating	Residential to west (1501 Granite Street)	51.3	47.7
	Residential to south (1622 Capri Avenue)	43.8	53.5
	Residential to east (1380 Wabash Avenue)	66.8	47.3
	Sports Park to north (1790 Dearborn Street)	65.6	51.2

Notes:

(1) See Table 1 for measured ambient noise. STNM5 was used for residential receptors to the west, STNM2 was used for residential receptors to the south, STNM3 was used for residential receptors to the east, and STNM4 was used for recreational facility receptors to the north of the project site.

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

Table 10
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		
San Bernardino Avenue	West of Orange Street	13,300	13,600	45	Soft
	East of Orange Street	13,900	14,600	45	Soft
	West of Judson Street	7,800	8,500	45	Soft
	Judson Street to Dearborn Street	7,400	8,300	45	Soft
	Dearborn Street to Granite Street	6,100	7,100	45	Soft
	East of Granite Street	5,900	6,600	45	Soft
	West of Wabash Avenue	5,700	5,800	45	Soft
Capri Avenue	East of Granite Street	100	400	25	Soft
	West of Wabash Avenue	100	200	25	Soft
Orange Street	North of San Bernardino Avenue	15,100	15,200	40	Soft
	South of San Bernardino Avenue	13,300	13,600	40	Soft
Judson Street	South of San Bernardino Avenue	3,300	3,400	35	Soft
Dearborn Street	South of San Bernardino Avenue	3,600	3,700	40	Soft
	North of Lugonia Avenue	4,000	4,100	40	Soft
	South of Lugonia Avenue	4,200	4,200	30	Soft
Granite Street	South of San Bernardino Avenue	200	400	25	Soft
Wabash Avenue	San Bernardino Avenue to Capri Avenue	4,800	4,900	35	Soft
	Capri Avenue to Lugonia Avenue	5,700	5,900	35	Soft
	South of Lugonia Avenue	10,000	10,200	40	Soft

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

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

Notes:

(1) Existing and Existing Plus Project average daily traffic volumes were calculated from the PM peak hour intersection volumes provided in the project's traffic impact analysis (Michael Baker 2021).

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

Table 11
Change 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 4 dB or More
San Bernardino Avenue	West of Orange Street	36	75.57	75.67	0.10	Yes	No
	East of Orange Street	36	75.76	75.98	0.22	Yes	No
	West of Judson Street	36	73.26	73.63	0.37	Yes	No
	Judson Street to Dearborn Street	36	73.03	73.52	0.49	Yes	No
	Dearborn Street to Granite Street	36	72.19	72.85	0.66	Yes	No
	East of Granite Street	36	72.04	72.53	0.49	Yes	No
	West of Wabash Avenue	36	71.89	71.97	0.08	Yes	No
Capri Avenue	East of Granite Street	30	46.32	52.34	6.02	No	Yes
	West of Wabash Avenue	30	49.33	51.09	1.76	No	No
Orange Street	North of San Bernardino Avenue	36	75.39	75.41	0.02	Yes	No
	South of San Bernardino Avenue	36	74.83	74.93	0.10	Yes	No
Judson Street	South of San Bernardino Avenue	36	67.99	68.12	0.13	Yes	No
Dearborn Street	South of San Bernardino Avenue	32	65.61	65.72	0.11	Yes	No
	North of Lugonia Avenue	32	66.06	66.17	0.11	Yes	No
	South of Lugonia Avenue	32	63.74	63.74	0.00	Yes	No
Granite Street	South of San Bernardino Avenue	30	49.33	52.34	3.01	No	No
Wabash Avenue	San Bernardino Avenue to Capri Avenue	36	69.61	69.70	0.09	Yes	No
	Capri Avenue to Lugonia Avenue	36	70.36	70.51	0.15	Yes	No
	South of Lugonia Avenue	36	73.60	73.68	0.08	Yes	No

Notes:

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

(2) Distance from the roadway centerline to the roadway right-of-way (ROW) ROW distances were estimated based on the Illustrative Street Sections provided in the City of Redlands General Plan 2035 (December 2017).

(3) Per the City of Redlands clearly compatible standard for single-family detached residential dwelling units (see Table 2).

Table 12
Construction Equipment Vibration Source Levels

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

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

Table 13
Construction Vibration Levels at the Nearest Receptors

Receptor Location	Distance from Property Line to Nearest Structure (feet)	Equipment	Vibration Level (PPV in/sec)	Threshold Exceeded?[1]
Residential to West	114	Vibratory Roller	0.022	No
	114	Large Bulldozer	0.009	No
Residential to South	70	Vibratory Roller	0.045	No
	70	Large Bulldozer	0.019	No
Residential to East	66	Vibratory Roller	0.049	No
	66	Large Bulldozer	0.021	No

Notes:

(1) Caltrans identifies the threshold at which there is a risk to "architectural" damage to non-engineered timber and masonry buildings as a PPV of 0.3 in/sec (see Table 3).

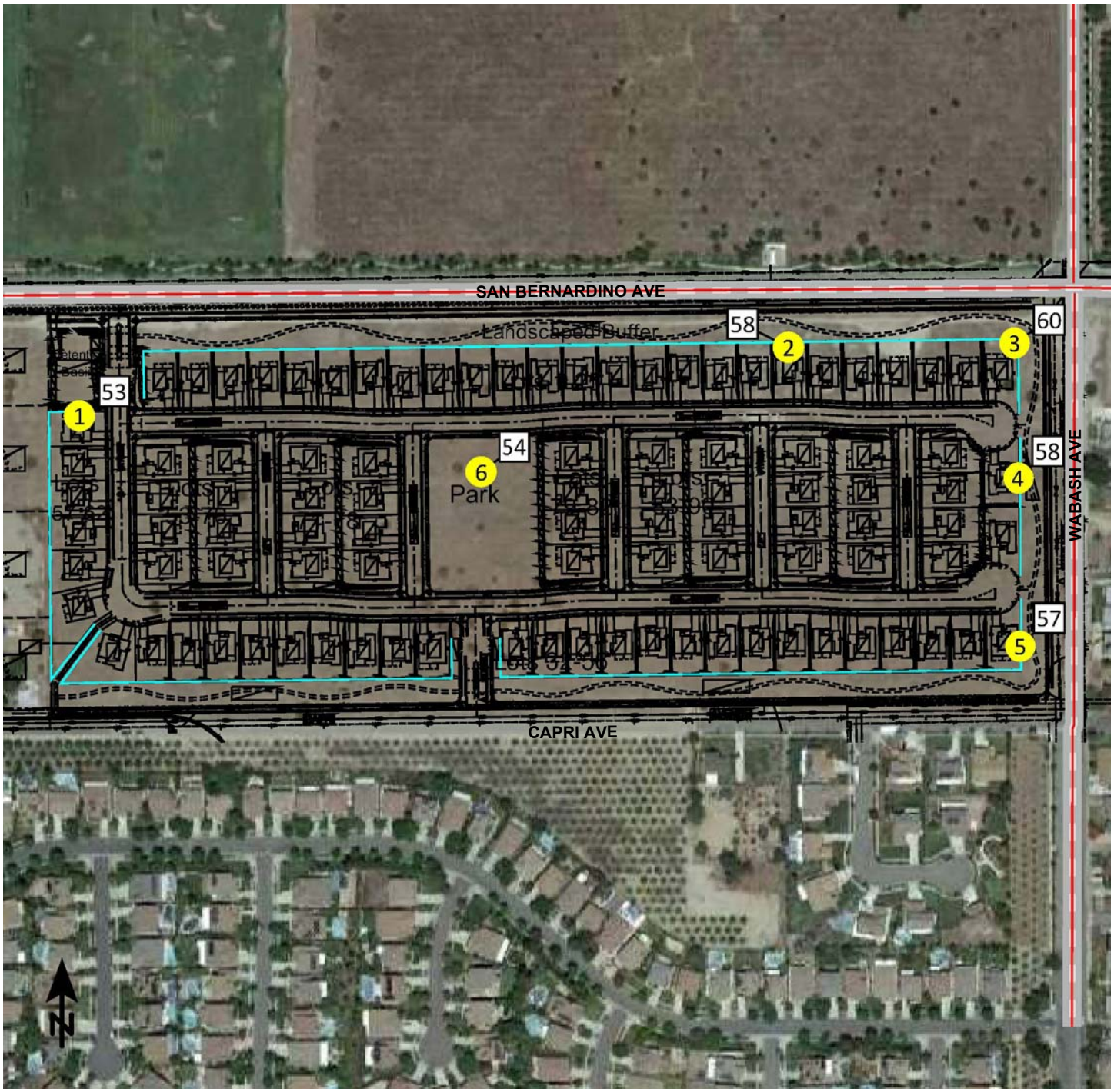


Figure 6
Future Traffic Noise Levels

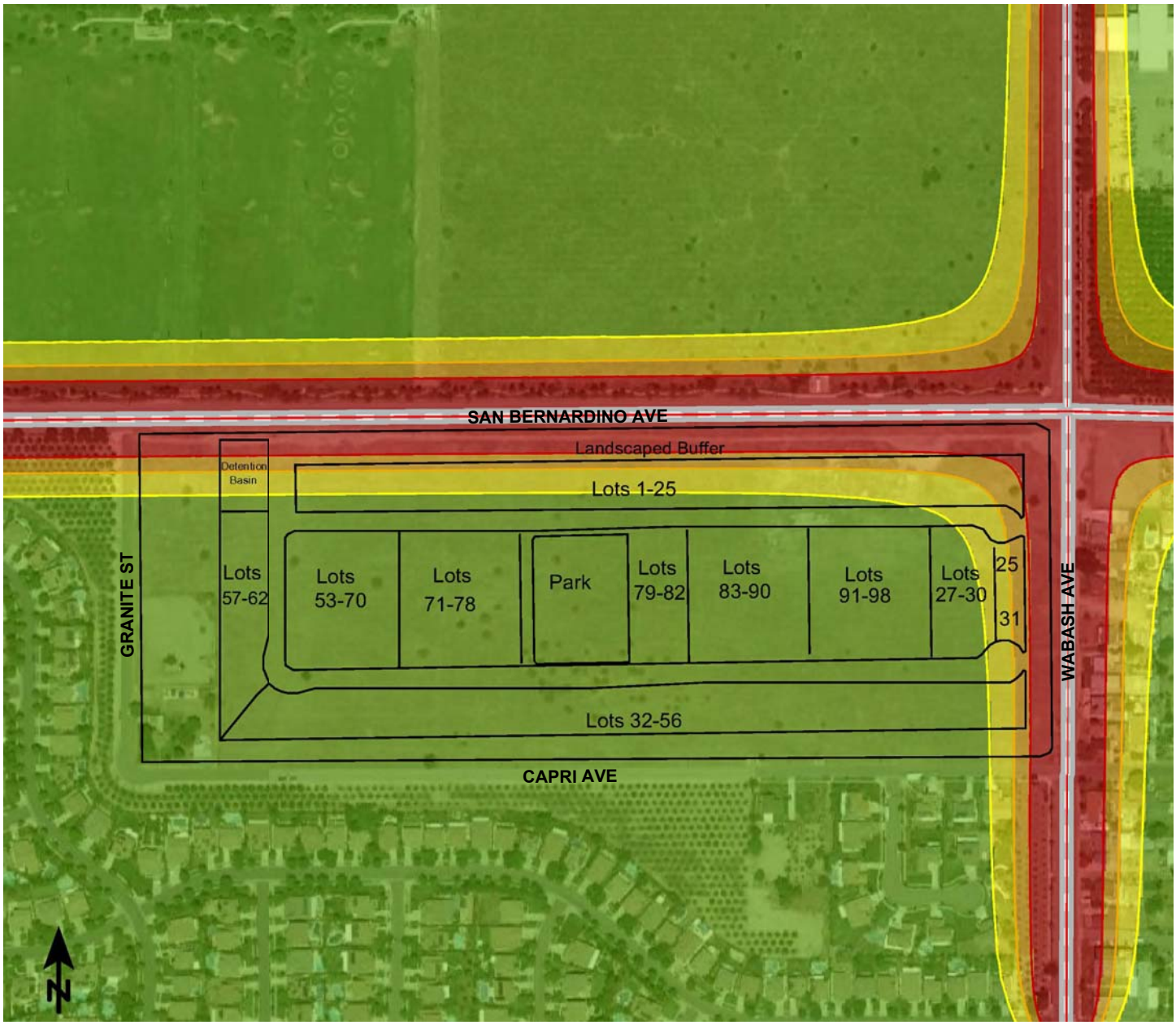


Figure 7
Future Traffic Noise Level Contours

7. CEQA THRESHOLDS & IMPACTS EVALUATION

CALIFORNIA ENVIRONMENTAL QUALITY ACT THRESHOLDS

The California Environmental Quality Act Guidelines (Appendix G) establishes thresholds for noise impact analysis. This noise study includes analysis of noise and vibration impacts necessary to assess the project in light of the following Appendix G Checklist Thresholds.

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?

Substantial increases in ambient noise levels are usually associated with project construction noise (temporary) and project operational noise (permanent).

Project Construction Noise: Construction noise sources are regulated within the City of Redlands Municipal Code Section 8.06.120 (G) and 8.06.090 which limit the hours of construction to between the hours of 7:00 AM and 6:00 PM, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. Per the EIR prepared for the City of Redlands General Plan (2019), a substantial temporary increase in ambient noise levels from construction noise would be considered less than significant if construction activities comply with the City's Noise Control Ordinance in the Municipal Code, Section 8.06.090.

Project Operational Noise (permanent): On-site operational noise is usually only evaluated for commercial and industrial projects. Quantitative analysis of on-site operational noise is typically not conducted for residential projects as they usually do not include stationary noise sources that could result in substantial increases in ambient noise levels resulting in violation of established standards. Therefore, the evaluation of project operational noise in this study is limited to the potential impacts associated with project generated vehicle traffic (off-site noise). Depending upon how many units are proposed and the existing noise environment, project generated vehicle trips could result in substantial increases in noise levels.

Per the City's General Plan 2035 and for purposes of this analysis, increases in noise levels associated with project generated vehicle traffic will be considered substantial if they either cause an increase of four or more dB if the resulting noise level would exceed the clearly compatible standards, as identified in Tables 2 and 5, or any increase of 6 dB.

b) Generate excessive groundborne vibration or groundborne noise levels?

As shown in Table 3, the threshold at which there is a risk to "architectural" damage to historic and some older buildings is a peak particle velocity (PPV) of 0.25, at older residential structures a PPV of 0.3, and at new residential structures a PPV of 0.5. Table 4 shows that a PPV of 0.04 is the threshold at which groundborne vibration becomes distinctly perceptible in regards to annoyance. Impacts would be significant if construction activities result in groundborne vibration of 0.25 PPV or higher at a sensitive receptor.

City of Redlands

Per Section 8.05.090(F) of the City's Municipal Code, operating or permitting the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right of way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS. As such, this noise study uses the City

of Redlands Municipal Code vibration perception threshold of 0.01 in/sec RMS to assess the potential vibration impacts due to Project construction. Structural damage would not occur at this level.

CALIFORNIA ENVIRONMENTAL QUALITY ACT IMPACT ANALYSIS

Will the project result in the:

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

Less Than Significant Impact:

On-Site Construction Noise

Construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. Construction activities will occur in phases including grading, building construction, paving, and architectural coating. Assumptions for the phasing, duration, and required equipment for the construction of the proposed project were obtained from the project applicant. Construction activities are anticipated to begin no sooner than the beginning of February 2023 and be completed by early December 2026.

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

Modeled unmitigated construction noise levels when combined with existing measured noise reached a maximum of 62.9 dBA L_{eq} at the nearest existing residential property line to the west, 68.6 dBA L_{eq} at the nearest existing residential property line to the south, 62.6 dBA L_{eq} at the nearest existing residential property line to the east, and 66.5 dBA L_{eq} at the nearest existing sports park property line to the north of the project site.

The City's Municipal Code Section 8.06.120 (G) and 8.06090 limit the hours of construction to between the hours of 7:00 AM and 6:00 PM, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. Per the EIR prepared for the City of Redlands General Plan (2019), a substantial temporary increase in ambient noise levels from construction noise would be considered less than significant if construction activities comply with the City's Noise Control Ordinance in the Municipal Code, Section 8.06.090. Project construction will not occur outside of the hours outlined as "exempt" in City's Municipal Code Sections 8.06.120 (G) and 8.06090 and therefore, will not result in a generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance.

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

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

Construction Noise - Best Management Practices

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

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

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

4. Equipment staging in areas shall be located to create the greatest distance between construction-related noise/vibration sources and existing sensitive receptors.

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

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

7. Haul truck deliveries will not occur outside of the hours presented as exempt for construction per City's Municipal Code Sections 8.06.120 (G) and 8.06090.

Off-Site Construction Noise

Construction truck trips would occur throughout the construction period. According to the FHWA, the traffic volumes need to be doubled in order to increase noise levels by 3 dBA CNEL.[5] As shown in the CalEEMod output files provided in the Air Quality Analysis prepared for the proposed project (Lilburn, 2022) the greatest number of construction-related vehicle trips per day would be during building construction at up to 358 vehicle trips per day (260 for worker trips and 98 for vendor trips). Given the project site's proximity to the 210 and 10 Freeways, it is anticipated that vendor and/or haul truck traffic would take the most direct route to the appropriate freeway ramps. Therefore, the addition of project vendor/haul trucks and worker vehicles per day along off-site roadway segments would not be anticipated to result in a doubling of traffic volumes. Off-site project generated construction vehicle trips would result in a negligible noise level increase and would not result in a substantial increase in ambient noise levels. Impacts would be less than significant. No mitigation measures are required.

On-Site Operational Noise

During operation, the proposed project is expected to generate approximately 1,021 average daily trips with 73 trips occurring during the AM peak-hour and 100 trips occurring during the PM peak-hour. Project generated traffic noise levels along affected road segments was estimated utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108.

The City's General Plan 2035 identifies a potentially substantial increase as either an increase of four or more dB, if the resulting noise level would exceed the clearly compatible standards as identified in Table 2, or any increase of 6 dB. Table 11 shows that other than the roadway segment of Capri Avenue east of Granite Street, all of the modeled roadway segments are anticipated to change the noise a nominal amount (approximately 0 to 3 dBA CNEL). The modeled roadway segment of Capri Avenue east of Granite Street is anticipated to have an increase of 6 dB. However, the modeled existing plus project noise level along the roadway segment of Capri Avenue east of Granite Street is 52 dBA CNEL, which is below the City's 60 dBA CNEL exterior "clearly

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

compatible" noise level standard for single-family residential uses. Furthermore, this segment has very low existing daily traffic as the majority of the land adjacent to this roadway segment is that of the vacant project site. As the development proposed by the project is consistent with the City's General Plan existing land use designation, the noise level increase along this segment was already anticipated and accounted for in the City's General Plan. Therefore, a change in noise level would not be readily noticeable and would be less than significant. No mitigation is required.

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

Less Than Significant Impact:

There are several types of construction equipment that can cause vibration levels high enough to cause architectural damage and/or annoyance to persons in the vicinity. For example, as shown in Table 12, a vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; and operation of a large bulldozer (0.089 PPV) at a distance of 25 feet (two of the most vibratory pieces of construction equipment).

The Caltrans Transportation and Construction Vibration Guidance Manual (2020) provides a comprehensive discussion regarding groundborne vibration and the appropriate thresholds to use to assess the potential for damage. As shown in Table 3, the threshold at which there is a risk of "architectural" damage to historic structures is a peak particle velocity (PPV) of 0.25 in/sec, and a PPV of 0.3 in/sec at older residential structures. There is a risk of architectural damage at newer residential structures and modern commercial/industrial buildings at a PPV of 0.5 in/sec. In addition, vibration becomes strongly perceptible to people in buildings at a PPV of 0.1 (Table 4); however, the City of Redlands has prohibited the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property; or at one hundred fifty feet (150') from the source if on a public space or public right-of-way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS.

The closest existing off-site structure is the residential dwelling unit located approximately 66 feet to the east of the project's eastern property line. Groundborne vibration associated with project construction may reach up to a PPV of 0.049 in/sec at the nearest residential structure to the east of the project site and will not exceed the 0.3 PPV (in./sec.) damage potential threshold for residential structures. Impacts would be less than significant.

To assess the impact in terms of the City's vibration perception, the threshold of 0.01 inches per second (in/sec) RMS was converted to a PPV (0.014 in/sec) using the conversion factor of 0.71 which is provided in the Caltrans Transportation and Construction Vibration Guidance Manual (April 2020). Therefore, if a vibratory roller is used within 150 feet of an existing structure or if a large bulldozer is used within 85 feet of an existing structure, there will be some potential for vibration related annoyance. As the closest existing off-site structures are located approximately 66 feet to the east, 70 feet to the south, and 114 feet to the west of the project site property lines, vibration related annoyance could occur at the residential structures in the vicinity of the project site. However, perceptibility of construction vibration would be temporary and would only occur while vibratory equipment is utilized within 150 feet of the existing structures. This impact would be less than significant. No mitigation is required.

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

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

Less Than Significant Impact:

The closest airport to the project site is the Redlands Municipal Airport with associated airport runways located as close as approximately 0.54 miles north of the project site. The Redlands Municipal Airport noise contours provided in the Redlands Municipal Airport Land Use Compatibly Plan (revised May 6, 2003) shows that the proposed project is outside the 60 dBA CNEL noise contour for the airport. The project site is located in Airport Compatibility Zone D, which, as per Table 2A of the Redlands Municipal Airport Land Use Compatibly Plan has no limit on the densities allowed for residential uses. Therefore, the proposed project would not expose people residing or working in the area to excessive noise levels. The impact is less than significant, and no mitigation is required.

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APPENDICES

Appendix A List of Acronyms
Appendix B Glossary
Appendix C Noise Measurement Field Worksheets
Appendix D Construction Noise Calculations
Appendix E FHWA Worksheets
Appendix F SoundPLAN Worksheets
Appendix G Vibration Worksheets

APPENDIX A

LIST OF ACRONYMS

Term	Definition
ADT	Average Daily Traffic
ANSI	American National Standard Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
D/E/N	Day / Evening / Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
dBA/DD	Decibel per Double Distance
dBA L_{eq}	Average Noise Level over a Period of Time
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, respectively, of the time period
DNL	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for '"x" period of time
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
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: San Bernardino & Wabash Residential Project, City of Redlands **Date:** April 20, 2022

Project #: 19504

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

Nearest Address or Cross Street: 1603 Capri Ave, Redlands, CA 92374

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by San Bernardino Ave to north, Wabash Ave to east, Capri Ave to south, & a single-family residence & vacant land to west. Noise Measurement Site: Vacant project site to north & east, single-family residential to west, & Capri Avenue to south.

Weather: Clear skies, hazy sunshine. **Settings:** SLOW FAST

Temperature: 58 deg F **Wind:** 6 mph **Humidity:** 53% **Terrain:** Flat

Start Time: 10:40 AM **End Time:** 10:55 AM **Run Time:**

Leq: 53 dB **Primary Noise Source:** Persistent barking dog in backyard of residence 1603 Capri Ave.

Lmax 63.6 dB Distant traffic ambiance.

L2 58.3 dB **Secondary Noise Sources:** Bird song, some residential ambiance, leaf rustle from 6 mph breeze.

L8 57.1 dB Overhead air traffic from nearby airport.

L25 54.8 dB

L50 51.1 dB

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	4/20/2022		

Noise Measurement
Field Data

PHOTOS:

STNM1 looking SSW towards backyard fence of residence 1603 Capri Avenue.

STNM1 looking N towards E San Bernardino Ave.

Summary	
File Name on Meter	LxT_Data.017.s
File Name on PC	LxT_0003099-20220420 104035-LxT_Data.017.ldbin
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM1 34° 4'30.86"N 117° 8'44.43"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands (persistent barking dog at residence 1603 Capri Avenue).

Measurement	
Start	2022-04-20 10:40:35
Stop	2022-04-20 10:55:35
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-04-20 10:36:37
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	124.5 dB

Results				
LAeq	53.0			
LAE	82.5			
EA	19.823	µPa²h		
EA8	634.320	µPa²h		
EA40	3.172	mPa²h		
LZpeak (max)	2022-04-20 10:42:47		92.7	dB
LASmax	2022-04-20 10:54:40		63.6	dB
LASmin	2022-04-20 10:52:44		36.4	dB

			Statistics		
LCeq	60.8	dB	**LA2.00**	58.3	dB
LAeq	53.0	dB	**LA8.00**	57.1	dB
LCeq - LAeq	7.9	dB	**LA25.00**	54.8	dB
LAleq	62.0	dB	**LA50.00**	51.1	dB
LAeq	53.0	dB	**LA66.60**	47.8	dB
LAleq - LAeq	9.0	dB	**LA90.00**	42.3	dB
Overload Count	0				

Measurement Report

Report Summary

Meter's File Name	LxT_Data.017.s	Computer's File Name	LxT_0003099-2
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNN
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands (persistent barking dog at residence 1603 Capri Avenue).		
Start Time	2022-04-20 10:40:35	Duration	0:15:00.0
End Time	2022-04-20 10:55:35	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	53.0 dB		
LAE	82.5 dB	SEA	--- dB
EA	19.8 µPa²h	LAFTM5	63.5 dB
EA8	634.3 µPa²h		
EA40	3.2 mPa²h		
LZ_{peak}	92.7 dB	2022-04-20 10:42:47	
LAS_{max}	63.6 dB	2022-04-20 10:54:40	
LAS_{min}	36.4 dB	2022-04-20 10:52:44	
LA_{eq}	53.0 dB		
LC_{eq}	60.8 dB	LC_{eq} - LA_{eq}	7.9 dB
LAI_{eq}	62.0 dB	LAI_{eq} - LA_{eq}	9.0 dB

Exceedances

	Count	Duration
LAS > 65.0 dB	0	0:00:00.0
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 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}	53.0 dB		60.8 dB		--- dB	
$Ls_{(max)}$	63.6 dB	2022-04-20 10:54:40	--- dB		--- dB	
$LS_{(min)}$	36.4 dB	2022-04-20 10:52:44	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		92.7 dB	2022-04-20 10:42:47

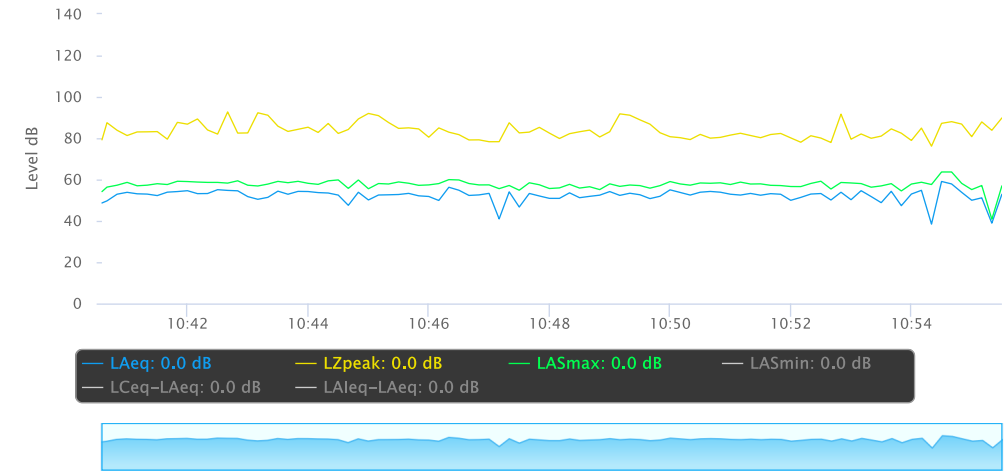
Overloads

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

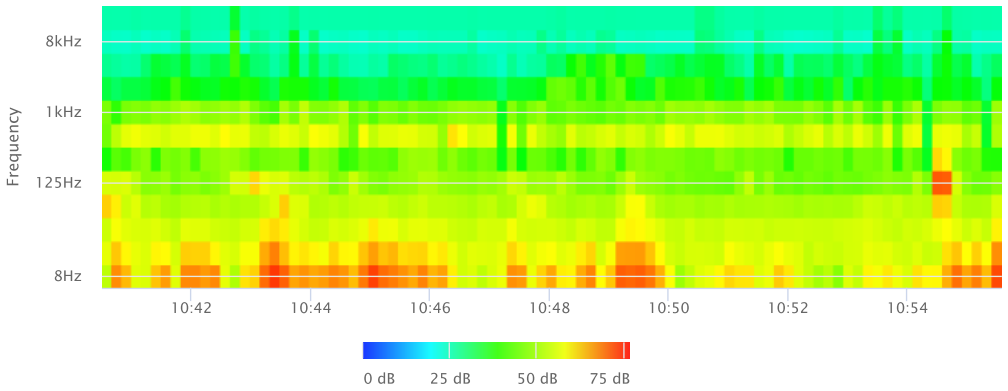
Statistics

LAS 2.0	58.3 dB
LAS 8.0	57.1 dB
LAS 25.0	54.8 dB
LAS 50.0	51.1 dB
LAS 66.6	47.8 dB
LAS 90.0	42.3 dB

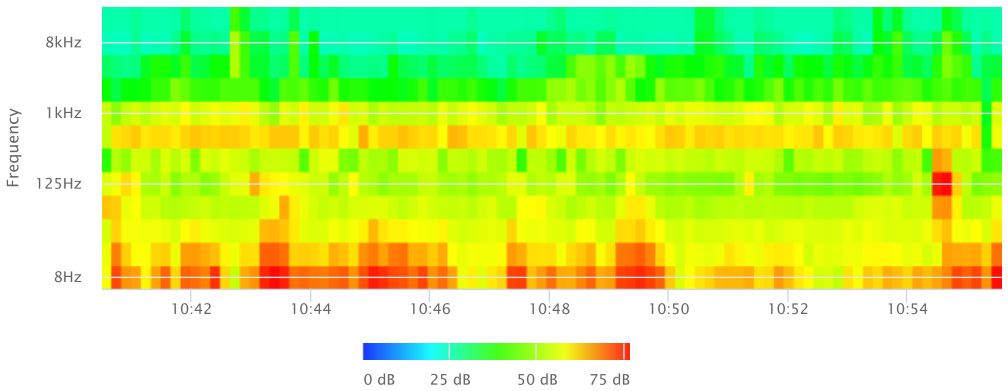
Time History



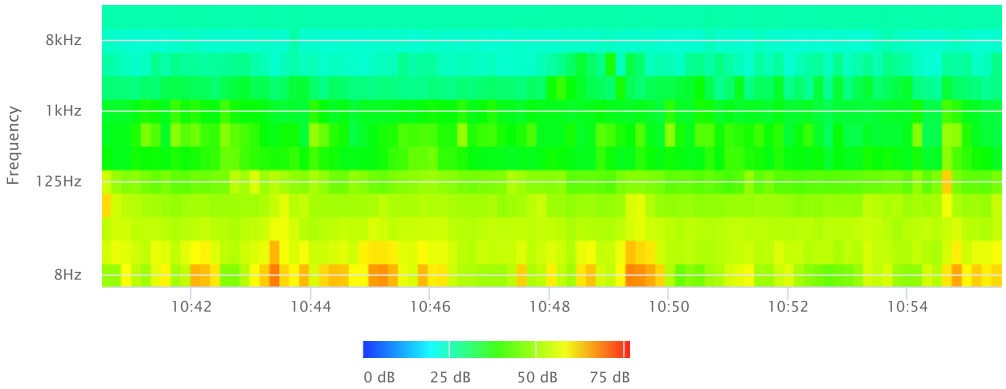
OBA 1/1 Leq



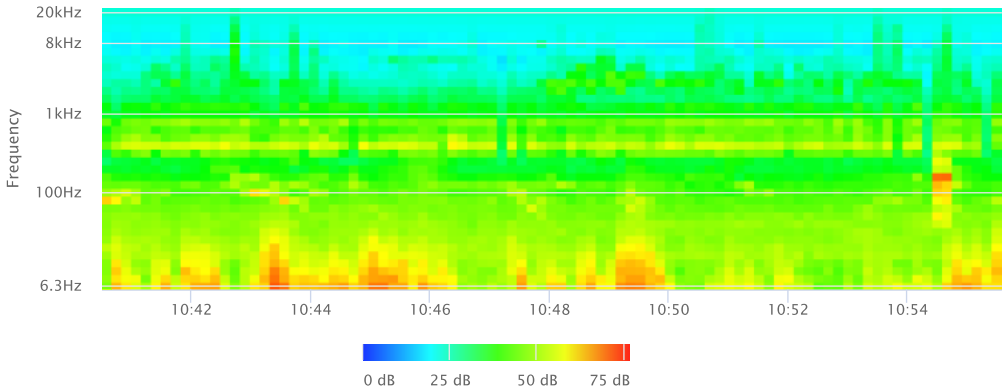
OBA 1/1 Lmax



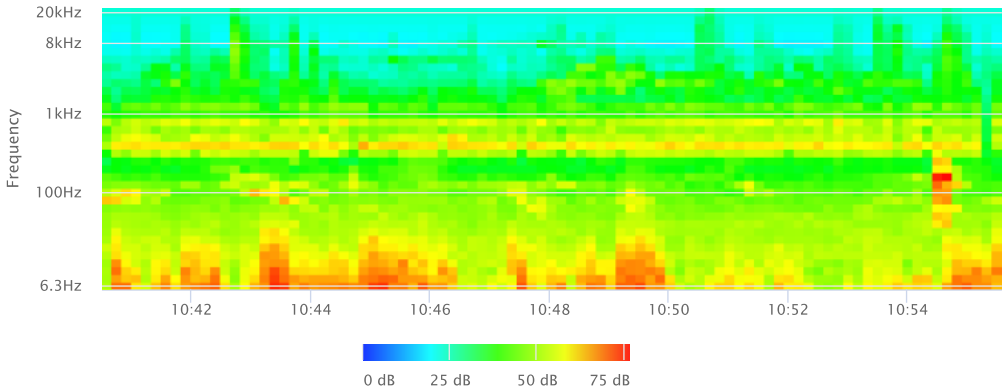
OBA 1/1 Lmin



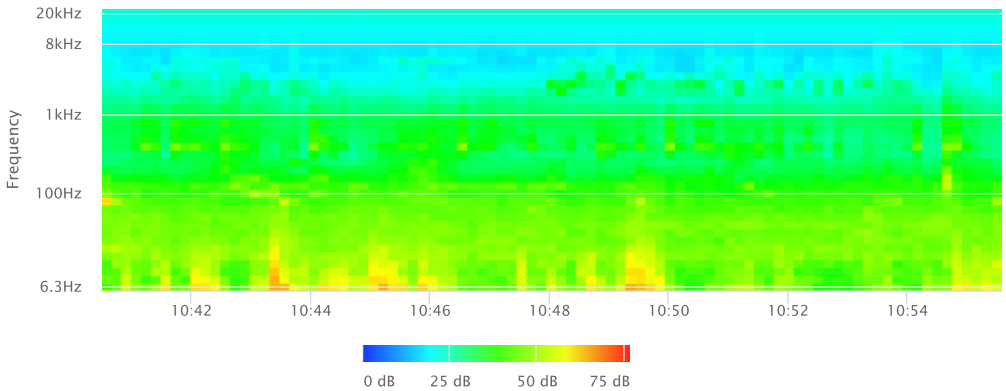
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin



Noise Measurement
Field Data

Project Name: San Bernardino & Wabash Residential Project, City of Redlands **Date:** April 20, 2022

Project #: 19504

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

Nearest Address or Cross Street: 1622 Capri Ave, Redlands, CA 92374

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by San Bernardino Ave to north, Wabash Ave to east, Capri Ave to south, & a single-family residence & vacant land to west. Noise Measurement Site: Capri Ave to north w/ vacant project site further north & single-family residential uses to south.

Weather: Clear skies, hazy sunshine. **Settings:** SLOW FAST

Temperature: 60 deg F **Wind:** 6 mph **Humidity:** 53% **Terrain:** Flat

Start Time: 11:13 AM **End Time:** 11:28 AM **Run Time:**

Leq: 43.8 dB **Primary Noise Source:** Distant traffic ambiance. One vehicle passed microphone, traveling along

Lmax 62.2 dB Capri Ave 11:28 AM L(max).

L2 49.2 dB **Secondary Noise Sources:** Bird song, some residential ambiance, leaf rustle from 6 mph breeze.

L8 45.8 dB Overhead air traffic from nearby airport.

L25 42.9 dB

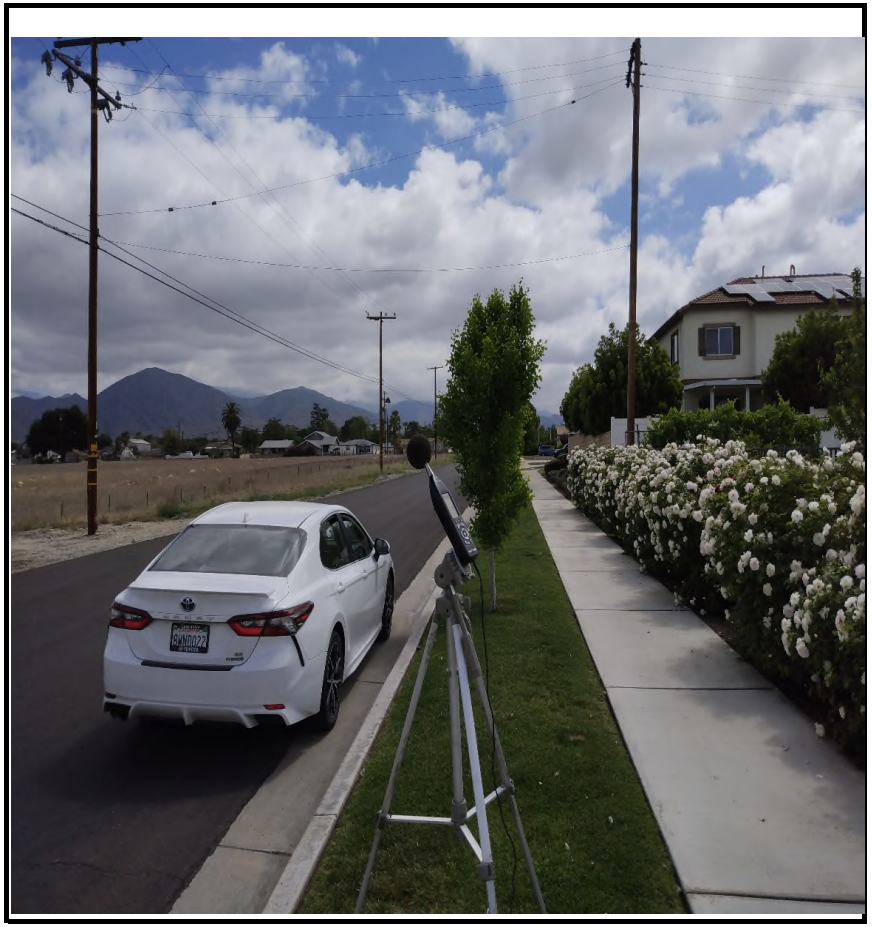
L50 41.3 dB

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:	4/20/2022		

Noise Measurement
Field Data

PHOTOS:

STNM2 looking SW towards frontyard of residence 1622 Capri Avenue, Redlands.



STNM2 looking E down Capri Avenue towards Wabash Avenue intersection.

Summary	
File Name on Meter	LxT_Data.018.s
File Name on PC	LxT_0003099-20220420 111341-LxT_Data.018.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM2 34° 4'29.88"N 117° 8'27.76"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands

Measurement	
Start	2022-04-20 11:13:41
Stop	2022-04-20 11:28:41
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-04-20 11:13:19
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	122.8 dB

Results			
LAeq	43.8		
LAE	73.3		
EA	2.380875	µPa²h	
EA8	76.188	µPa²h	
EA40	380.94	µPa²h	
LZpeak (max)	2022-04-20 11:18:57	95.2	dB
LASmax	2022-04-20 11:28:05	62.2	dB
LASmin	2022-04-20 11:19:31	37.7	dB

		Statistics	
LCeq	60.8 dB	**LA2.00**	49.2 dB
LAeq	43.8 dB	**LA8.00**	45.8 dB
LCeq - LAeq	17.0 dB	**LA25.00**	42.9 dB
LAleq	46.8 dB	**LA50.00**	41.3 dB
LAeq	43.8 dB	**LA66.60**	40.5 dB
LAleq - LAeq	3.0 dB	**LA90.00**	39.1 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.018.s	Computer's File Name	LxT_0003099-20220420 111341-LxT_Data.018.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM2 34° 4'29.88"N 117° 8'27.76"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands		
Start Time	2022-04-20 11:13:41	Duration	0:15:00.0
End Time	2022-04-20 11:28:41	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	43.8 dB		
LAE	73.3 dB	SEA	--- dB
EA	2.4 µPa²h	LAFTM5	48.3 dB
EA8	76.2 µPa²h		
EA40	380.9 µPa²h		
LZ_{peak}	95.2 dB	2022-04-20 11:18:57	
LAS_{max}	62.2 dB	2022-04-20 11:28:05	
LAS_{min}	37.7 dB	2022-04-20 11:19:31	
LA_{eq}	43.8 dB		
LC_{eq}	60.8 dB	LC_{eq} - LA_{eq}	17.0 dB
LAI_{eq}	46.8 dB	LAI_{eq} - LA_{eq}	3.0 dB

Exceedances

	Count	Duration
LAS > 65.0 dB	0	0:00:00.0
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 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}	43.8 dB		60.8 dB		--- dB	
$L_{S(max)}$	62.2 dB	2022-04-20 11:28:05	--- dB		--- dB	
$L_{S(min)}$	37.7 dB	2022-04-20 11:19:31	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		95.2 dB	2022-04-20 11:18:57

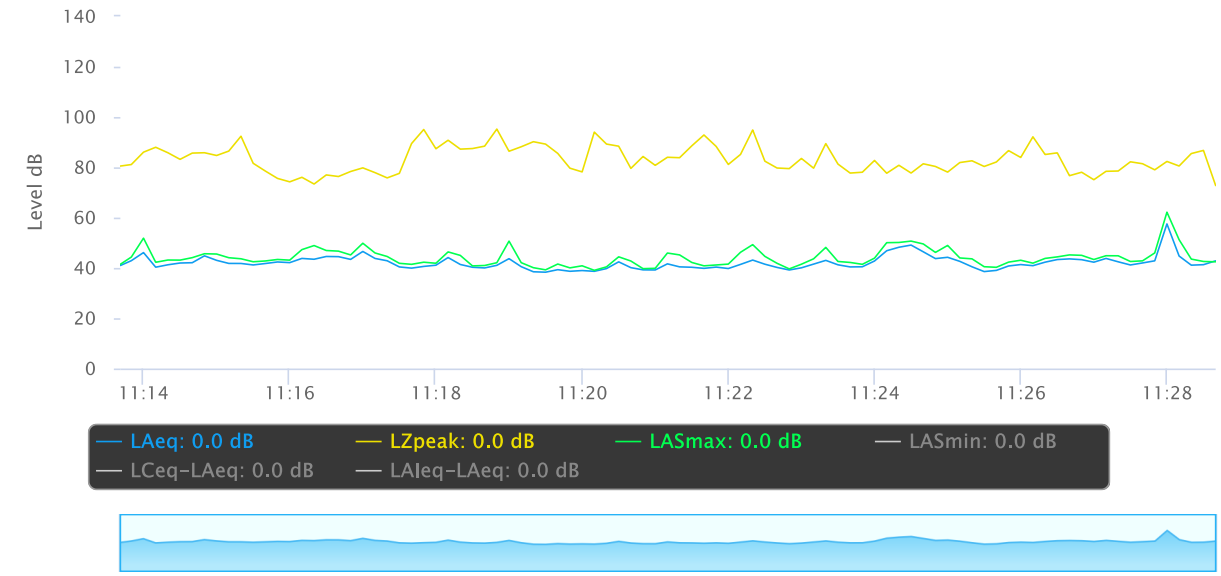
Overloads

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

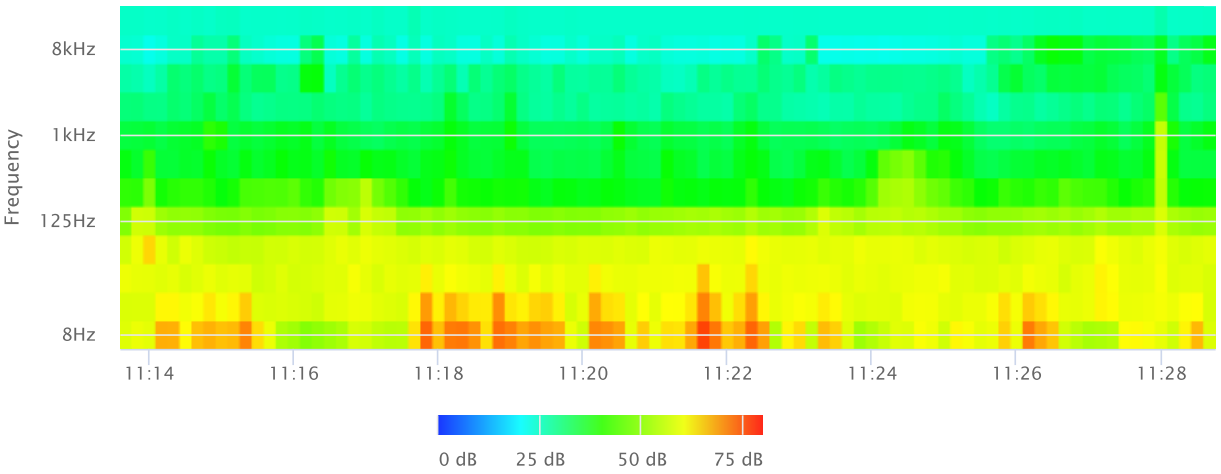
Statistics

LAS 2.0	49.2 dB
LAS 8.0	45.8 dB
LAS 25.0	42.9 dB
LAS 50.0	41.3 dB
LAS 66.6	40.5 dB
LAS 90.0	39.1 dB

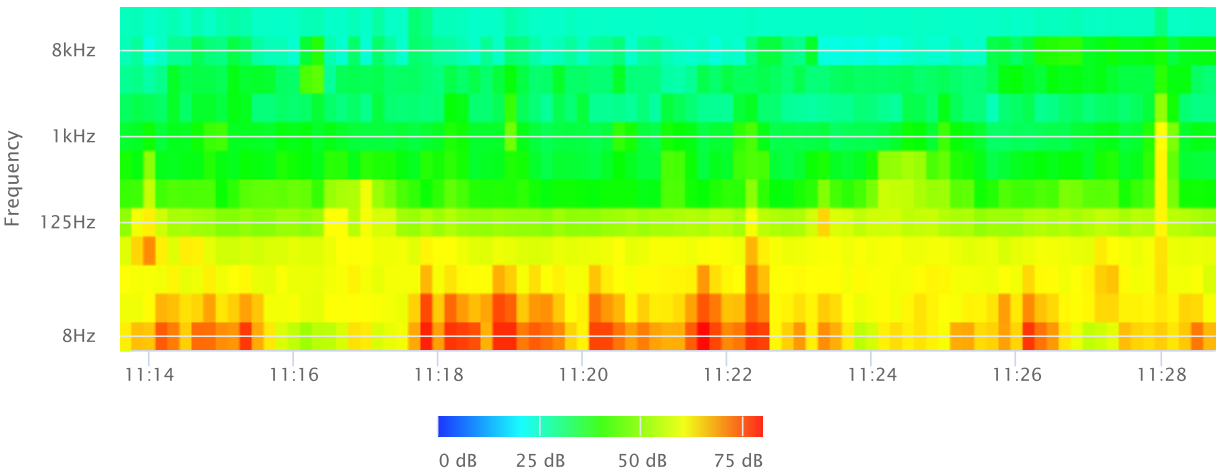
Time History



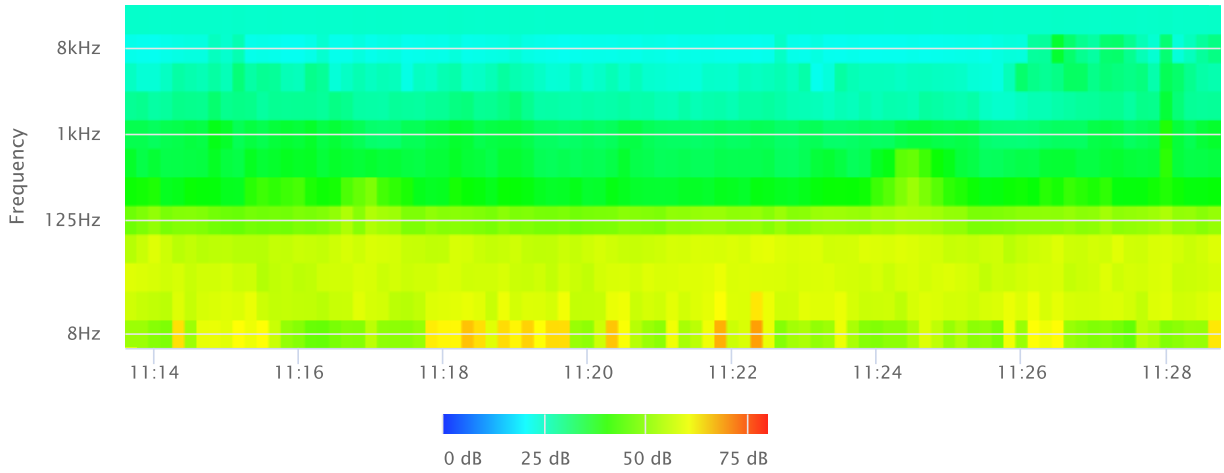
OBA 1/1 Leq



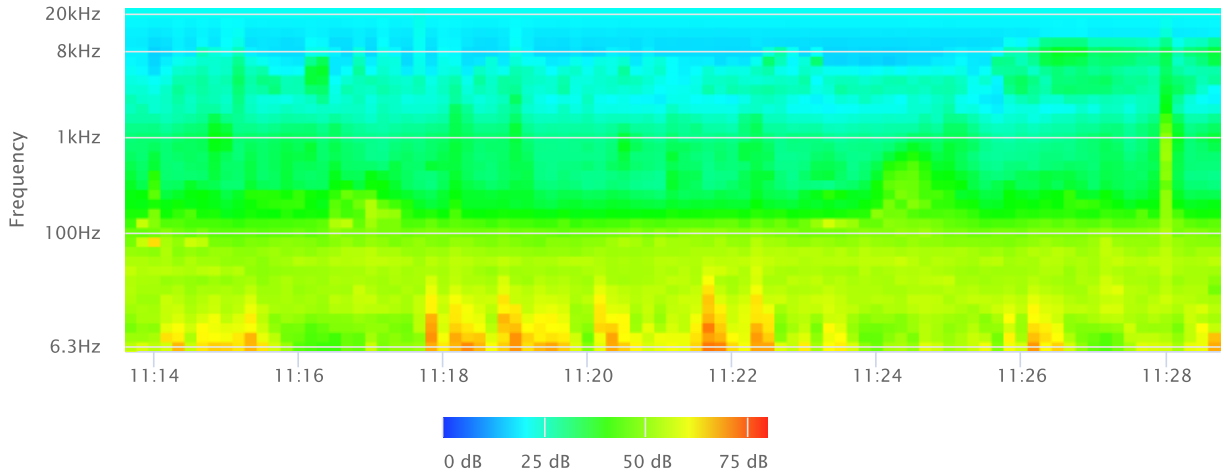
OBA 1/1 Lmax



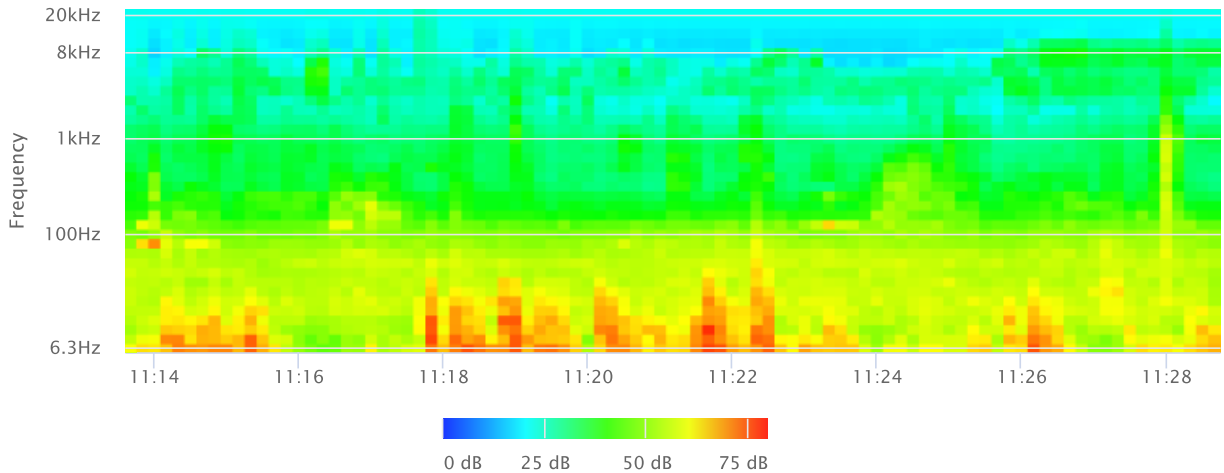
OBA 1/1 Lmin



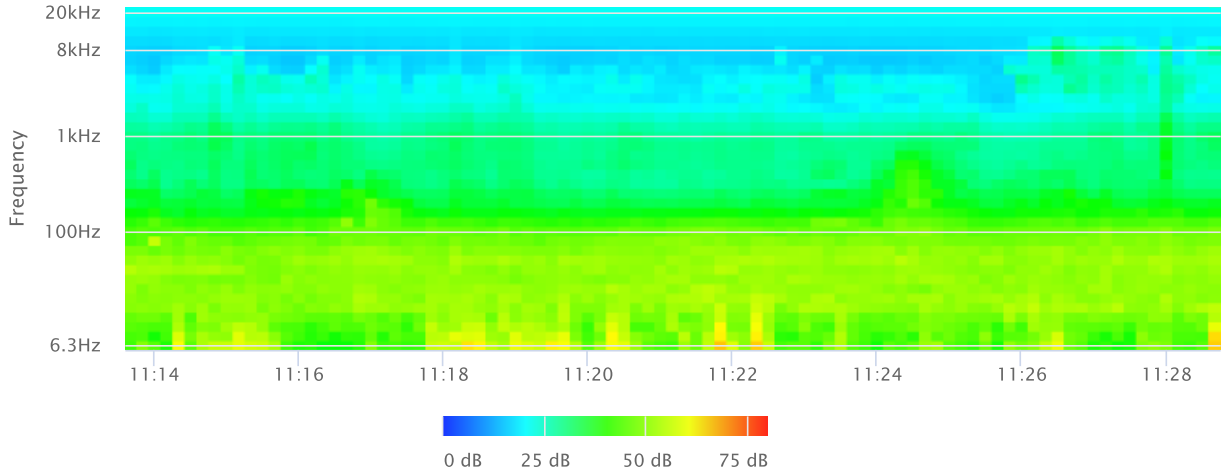
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
11:14
11:16
11:18
11:20
11:22
11:24
11:26
11:28
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: San Bernardino & Wabash Residential Project, City of Redlands **Date:** April 20, 2022

Project #: 19504

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

Nearest Address or Cross Street: 1380 Wabash Ave, Redlands, CA 92374

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by San Bernardino Ave to north, Wabash Ave to east, Capri Ave to south, & a single-family residence & vacant land to west. Noise Measurement Site: Wabash Ave to west w/ vacant project site further west & single-family residential to east.

Weather: Clear skies, hazy sunshine. **Settings:** SLOW FAST

Temperature: 60 deg F **Wind:** 6 mph **Humidity:** 53% **Terrain:** Flat

Start Time: 11:50 AM **End Time:** 12:05 PM **Run Time:**

Leq: 66.8 dB

Lmax 79.8 dB

L2 76.5 dB

L8 72.9 dB

L25 65.5 dB

L50 55.0 dB

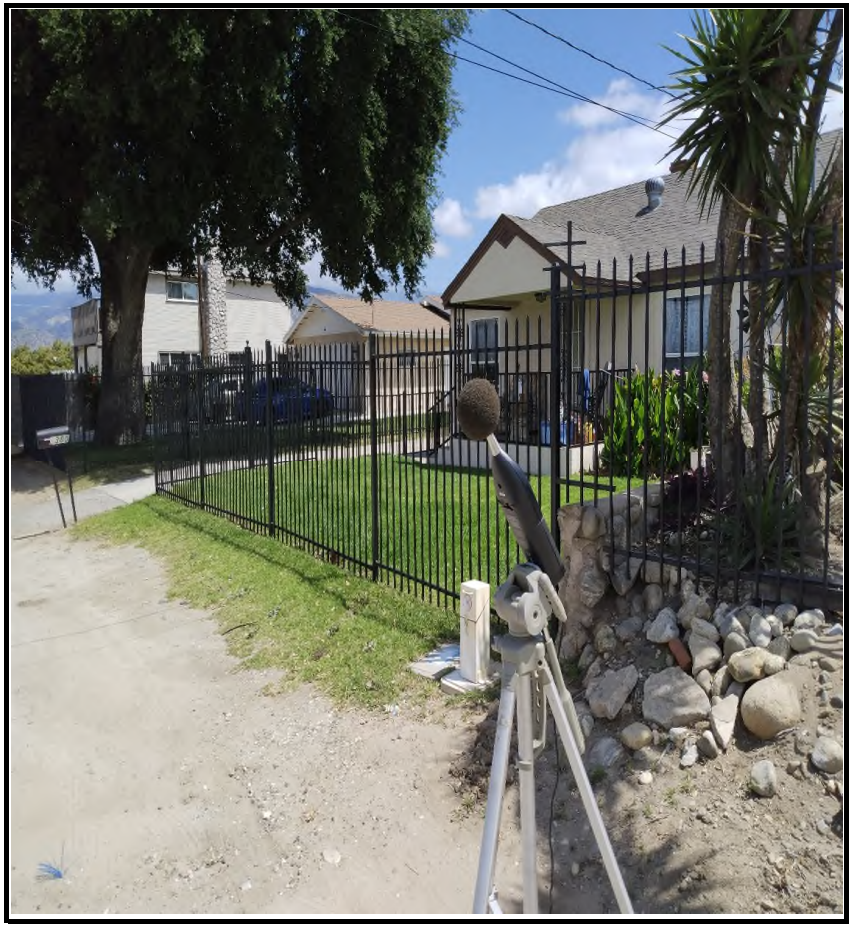
Primary Noise Source: 48 vehicles passed microphone traveling along Wabash Ave during 15 minute measurement. Traffic ambiance from other roads.

Secondary Noise Sources: Bird song, some residential ambiance, leaf rustle from 6 mph breeze. Overhead air traffic from nearby airport.

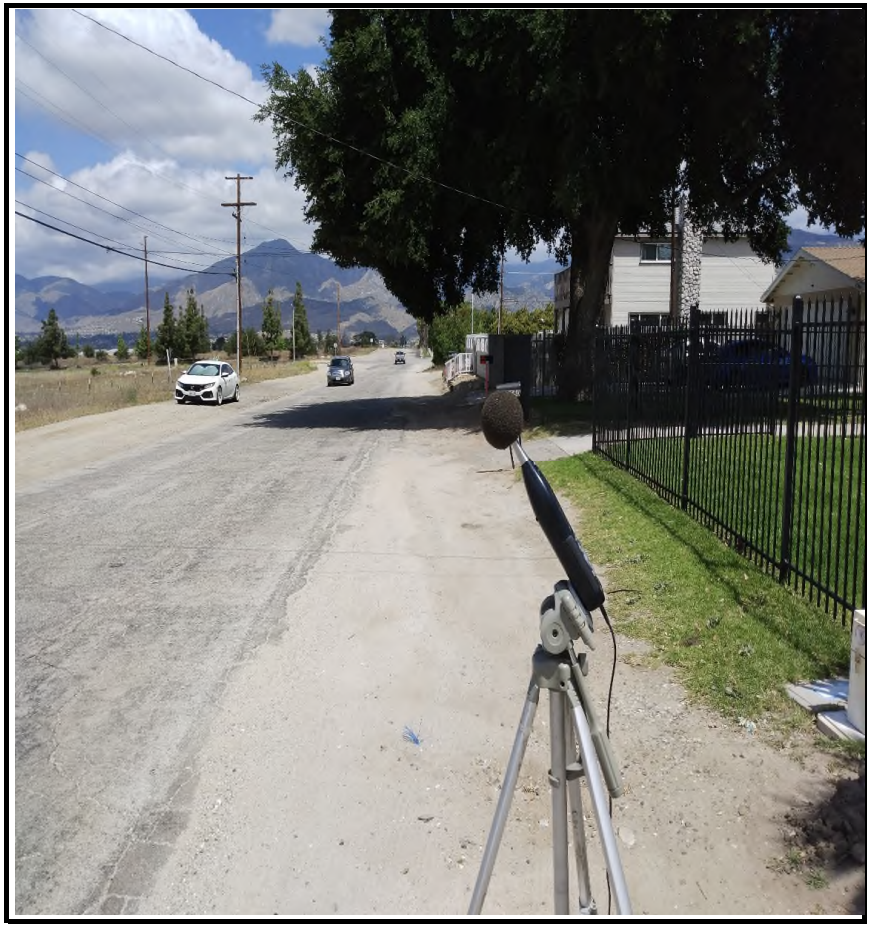
NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CA 250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	CA 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	11/17/2021	**FACTORY CALIBRATION DATE:**	11/18/2021
FIELD CALIBRATION DATE:	4/20/2022		

Noise Measurement
Field Data

PHOTOS:



STNM3 looking NE towards front yard of resisence 1380 Wabash Ave, Redlands.



STNM3 looking N along Wabash Ave towards E San Bernardino Intersection.

Summary	
File Name on Meter	LxT_Data.019.s
File Name on PC	LxT_0003099-20220420 115057-LxT_Data.019.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM3 34° 4'34.34"N 117° 8'19.67"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands

Measurement	
Start	2022-04-20 11:50:57
Stop	2022-04-20 12:05:57
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-04-20 11:50:46
Post-Calibration	None

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

Results			
LAeq	66.8		
LAE	96.4		
EA	479.6858	µPa²h	
EA8	15.34995	mPa²h	
EA40	76.74973	mPa²h	
LZpeak (max)	2022-04-20 11:51:28	106.0	dB
LASmax	2022-04-20 11:58:46	79.8	dB
LASmin	2022-04-20 11:59:32	41.8	dB

			Statistics		
LCeq	72.6	dB	**LA2.00**	76.5	dB
LAeq	66.8	dB	**LA8.00**	72.9	dB
LCeq - LAeq	5.8	dB	**LA25.00**	65.5	dB
LAIeq	70.5	dB	**LA50.00**	55.0	dB
LAeq	66.8	dB	**LA66.60**	48.8	dB
LAIeq - LAeq	3.7	dB	**LA90.00**	43.8	dB
Overload Count	0				

Measurement Report

Report Summary

Meter's File Name	LxT_Data.019.s	Computer's File Name	LxT_0003099-20220420 115057-LxT_Data.019.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM3 34° 4'34.34"N 117° 8'19.67"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands		
Start Time	2022-04-20 11:50:57	Duration	0:15:00.0
End Time	2022-04-20 12:05:57	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	66.8 dB		
LAE	96.4 dB	SEA	--- dB
EA	479.7 µPa²h	LAFTM5	73.4 dB
EA8	15.3 mPa²h		
EA40	76.7 mPa²h		
LZ_{peak}	106.0 dB	2022-04-20 11:51:28	
LAS_{max}	79.8 dB	2022-04-20 11:58:46	
LAS_{min}	41.8 dB	2022-04-20 11:59:32	
LA_{eq}	66.8 dB		
LC_{eq}	72.6 dB	LC_{eq} - LA_{eq}	5.8 dB
LAI_{eq}	70.5 dB	LAI_{eq} - LA_{eq}	3.7 dB

Exceedances	Count	Duration
LAS > 65.0 dB	41	0:04:30.1
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 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

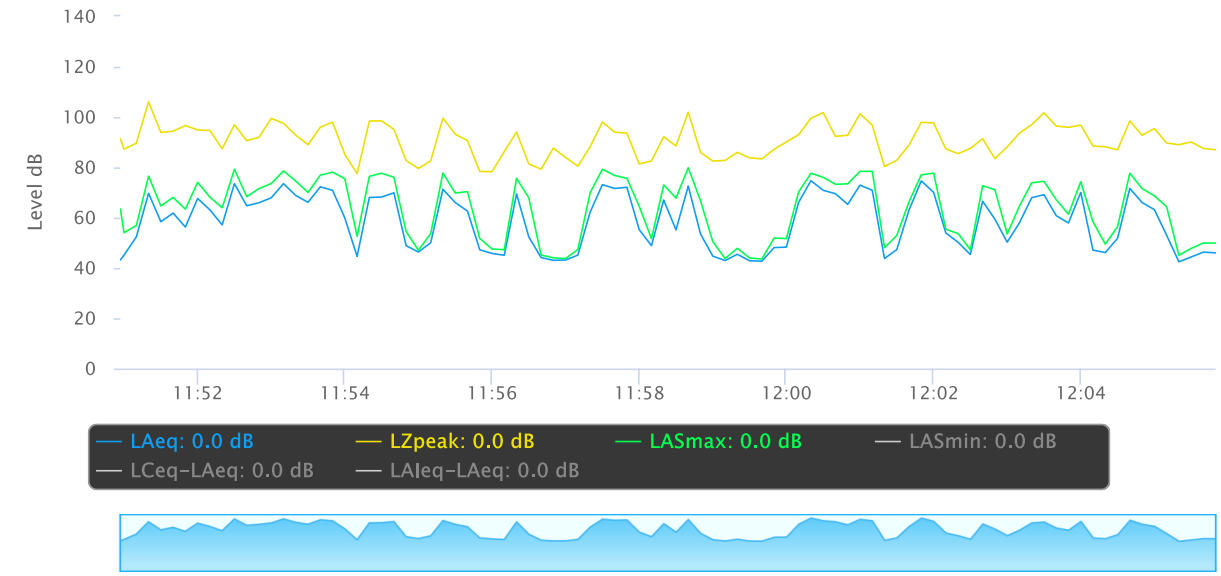
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	66.8 dB		72.6 dB		--- dB	
$L_{S(max)}$	79.8 dB	2022-04-20 11:58:46	--- dB		--- dB	
$L_{S(min)}$	41.8 dB	2022-04-20 11:59:32	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		106.0 dB	2022-04-20 11:51:28

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

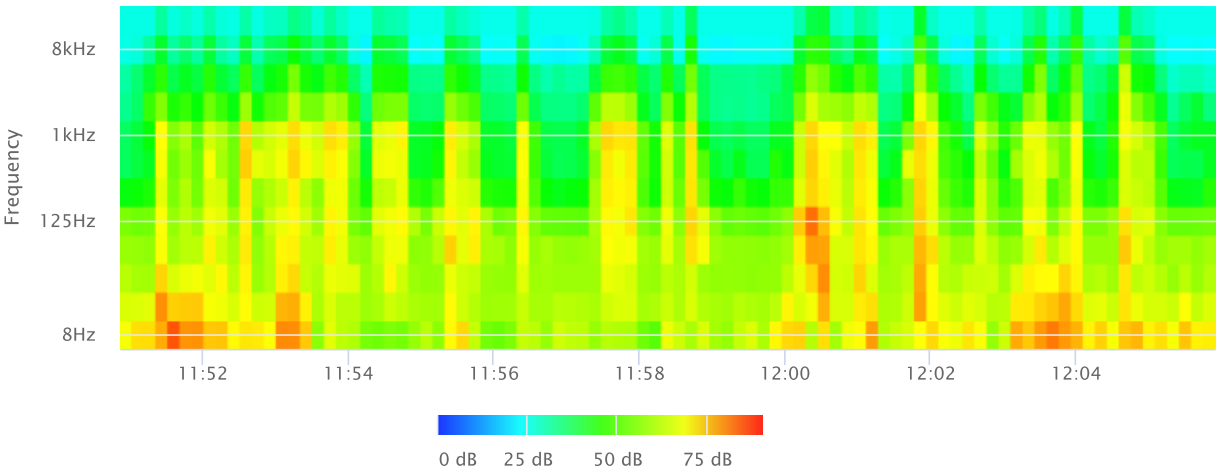
Statistics

LAS 2.0	76.5 dB
LAS 8.0	72.9 dB
LAS 25.0	65.5 dB
LAS 50.0	55.0 dB
LAS 66.6	48.8 dB
LAS 90.0	43.8 dB

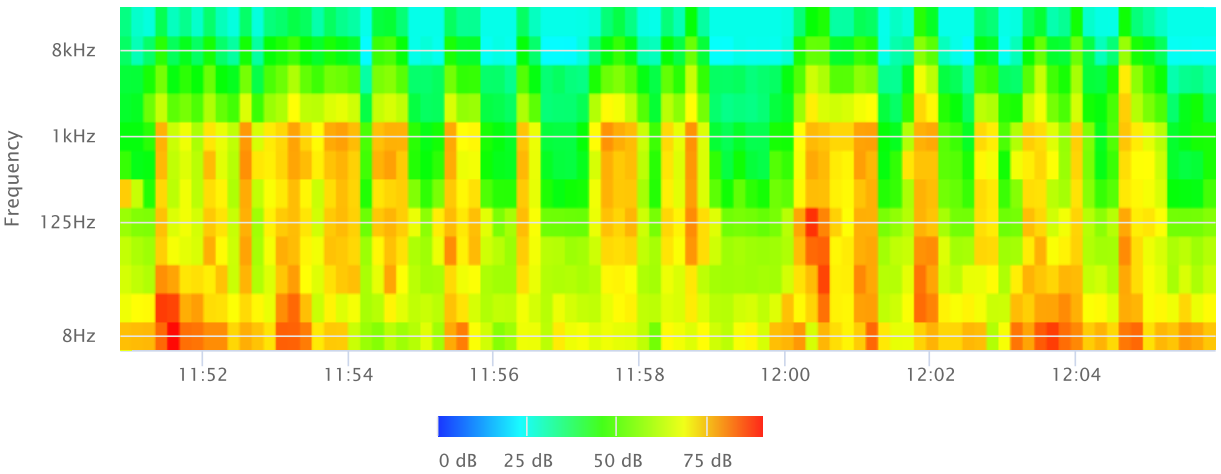
Time History



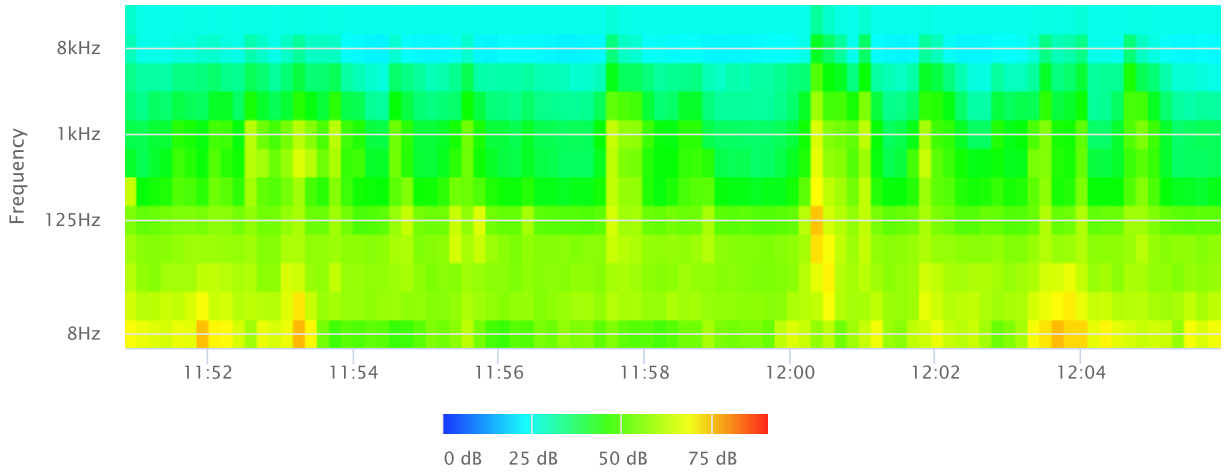
OBA 1/1 Leq



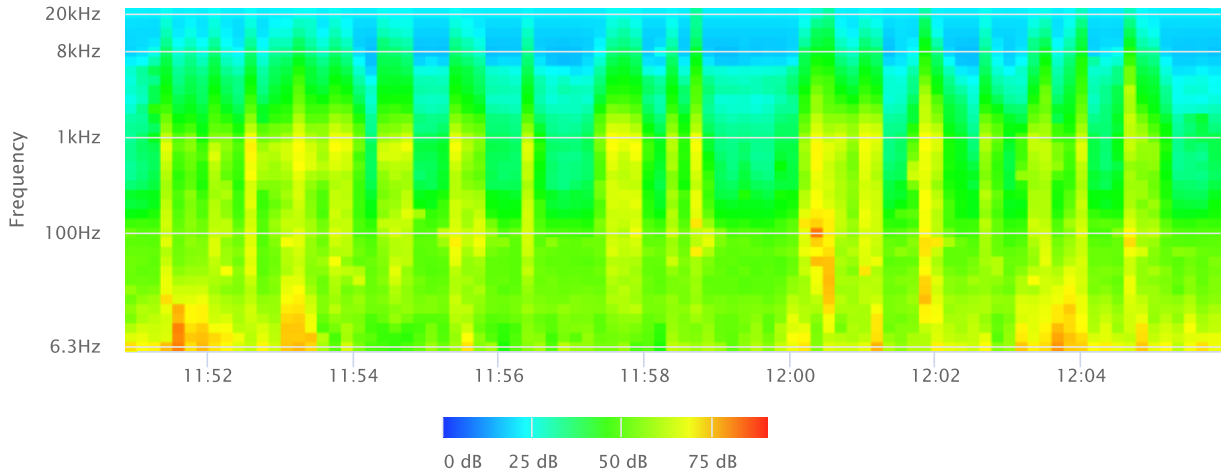
OBA 1/1 Lmax



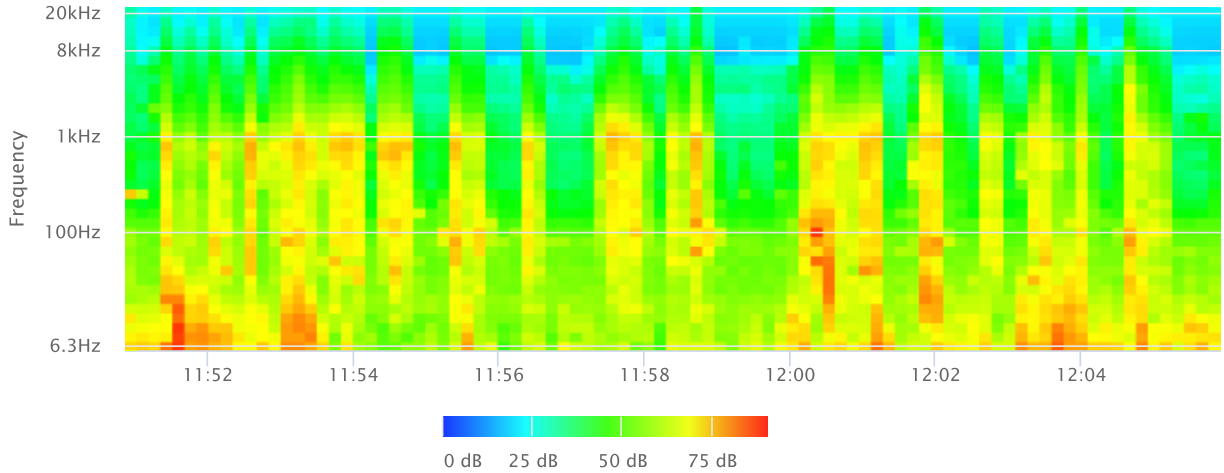
OBA 1/1 Lmin



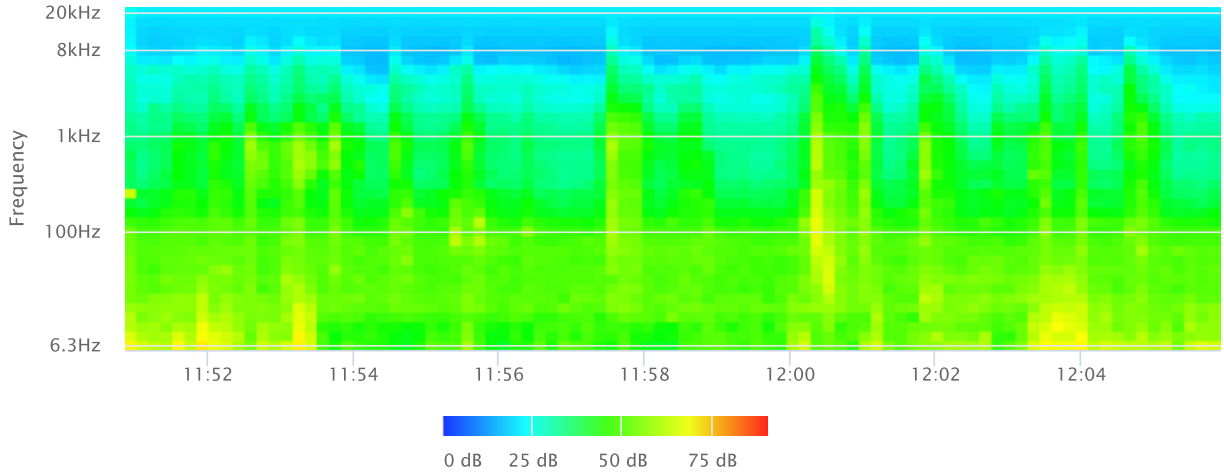
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
11:52
11:54
11:56
11:58
12:00
12:02
12:04
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: San Bernardino & Wabash Residential Project, City of Redlands **Date:** April 20, 2022

Project #: 19504

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

Nearest Address or Cross Street: E San Bernardino Ave & Granite Street , Redlands, CA 92374

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by San Bernardino Ave to north, Wabash Ave to east, Capri Ave to south, & a single-family residence & vacant land to west. Noise Measurement Site: San Bernardino Ave to south w/ vacant project site further south & Redlands Sports Park to north.

Weather: Clear skies, hazy sunshine. **Settings:** SLOW FAST

Temperature: 62 deg F **Wind:** 6 mph **Humidity:** 53% **Terrain:** Flat

Start Time: 12:41 PM **End Time:** 12:56 PM **Run Time:**

Leq: 65.6 dB

Lmax 79.2 dB

L2 74.7 dB

L8 71.1 dB

L25 65.4 dB

L50 55.1 dB

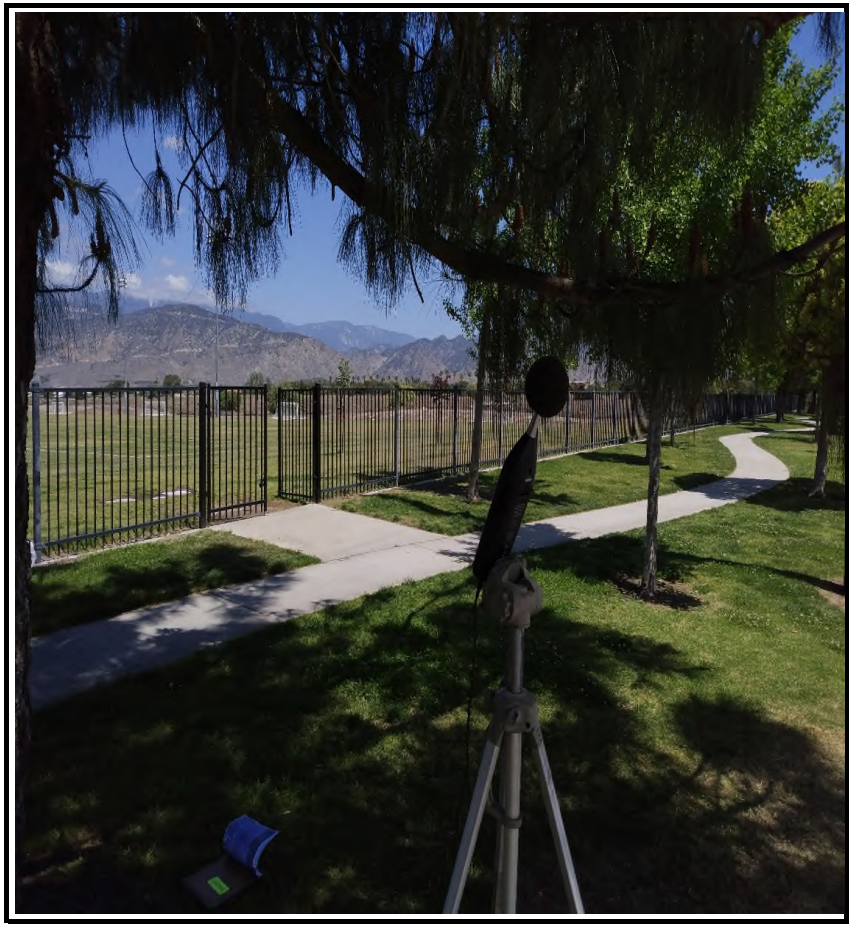
Primary Noise Source: 54 vehicles passed microphone traveling along E San Bernardino Ave during 15 minute measurement. Traffic ambiance from other roads.

Secondary Noise Sources: Bird song, leaf rustle from 6 mph breeze. Overhead air traffic from nearby airport.

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:	4/20/2022		

Noise Measurement
Field Data

PHOTOS:



STNM4 looking NE towards pedestrian entrance into Redlands Sports Park.

STNM4 looking WSW across E San Bernardino Ave towards Granite St intersection.

Summary	
File Name on Meter	LxT_Data.020.s
File Name on PC	LxT_0003099-20220420 124128-LxT_Data.020.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM4 34° 4'39.08"N 117° 8'42.15"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands

Measurement	
Start	2022-04-20 12:41:28
Stop	2022-04-20 12:56:28
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-04-20 12:31:58
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	123.1 dB

Results		
LA_{eq}	65.6	
LAE	95.1	
EA	362.1579	µPa²h
EA8	11.58905	mPa²h
EA40	57.94526	mPa²h
$LZ_{peak\ (max)}$	2022-04-20 12:51:37	102.0 dB
LAS_{max}	2022-04-20 12:53:34	79.2 dB
LAS_{min}	2022-04-20 12:41:43	39.4 dB

		Statistics	
LC_{eq}	70.1 dB	**LA2.00**	74.7 dB
LA_{eq}	65.6 dB	**LA8.00**	71.1 dB
LC_{eq} - LA_{eq}	4.5 dB	**LA25.00**	65.4 dB
LAI_{eq}	67.5 dB	**LA50.00**	55.1 dB
LA_{eq}	65.6 dB	**LA66.60**	49.2 dB
LAI_{eq} - LA_{eq}	1.9 dB	**LA90.00**	41.6 dB
Overload Count	0		

Measurement Report

Report Summary

Meter's File Name	LxT_Data.020.s	Computer's File Name	LxT_0003099-20220420 124128-LxT_Data.020.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM4 34° 4'39.08"N 117° 8'42.15"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands		
Start Time	2022-04-20 12:41:28	Duration	0:15:00.0
End Time	2022-04-20 12:56:28	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	65.6 dB		
LAE	95.1 dB	SEA	--- dB
EA	362.2 µPa²h	LAFTM5	71.0 dB
EA8	11.6 mPa²h		
EA40	57.9 mPa²h		
LZ_{peak}	102.0 dB	2022-04-20 12:51:37	
LAS_{max}	79.2 dB	2022-04-20 12:53:34	
LAS_{min}	39.4 dB	2022-04-20 12:41:43	
LA_{eq}	65.6 dB		
LC_{eq}	70.1 dB	LC_{eq} - LA_{eq}	4.5 dB
LAI_{eq}	67.5 dB	LAI_{eq} - LA_{eq}	1.9 dB

Exceedances	Count	Duration
LAS > 65.0 dB	40	0:04:29.6
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 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

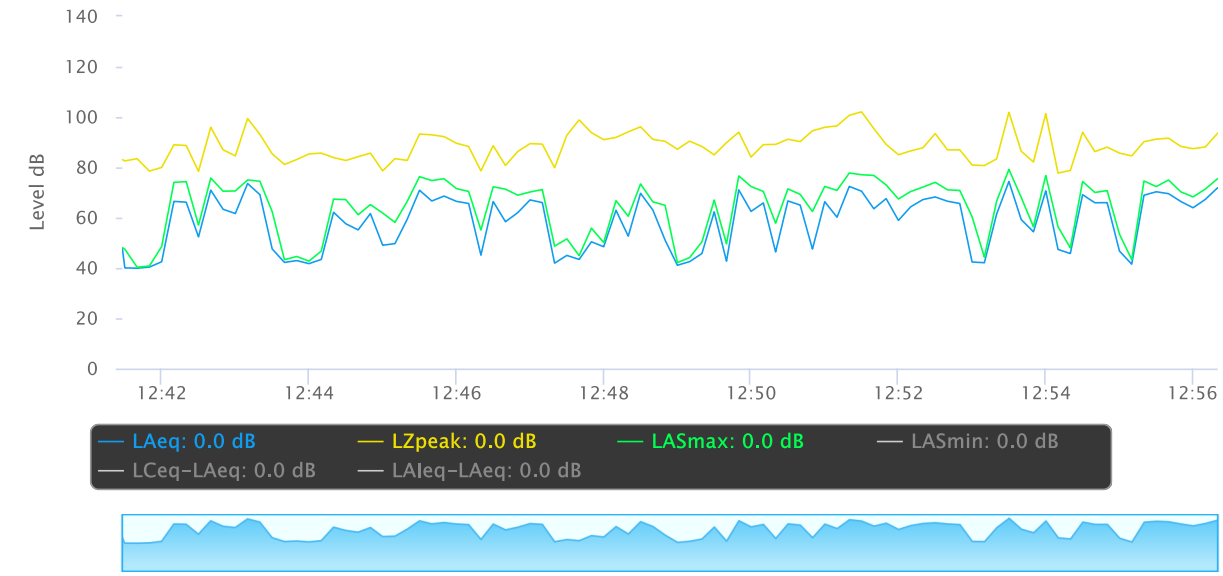
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	65.6 dB		70.1 dB		--- dB	
$L_{S(max)}$	79.2 dB	2022-04-20 12:53:34	--- dB		--- dB	
$L_{S(min)}$	39.4 dB	2022-04-20 12:41:43	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		102.0 dB	2022-04-20 12:51:37

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

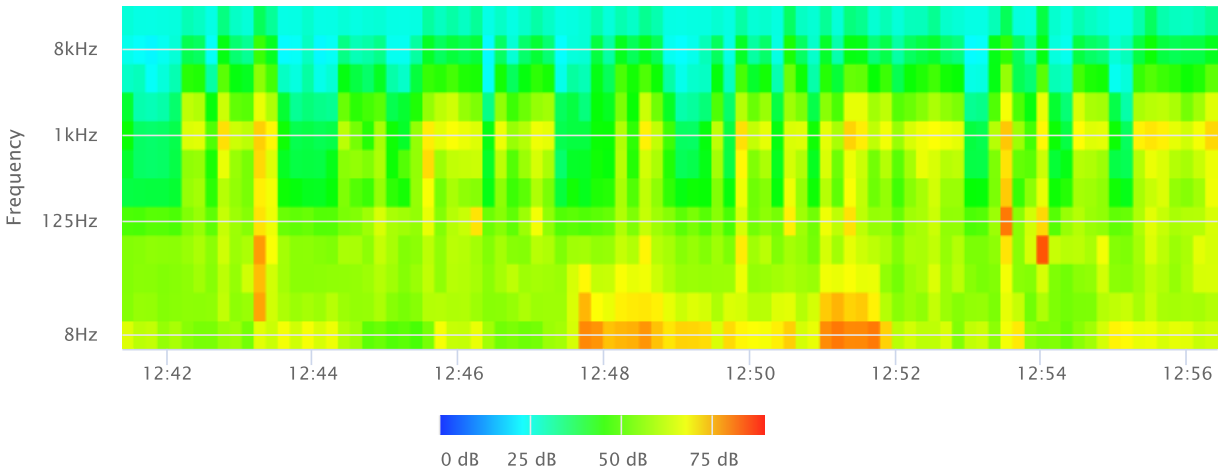
Statistics

LAS 2.0	74.7 dB
LAS 8.0	71.1 dB
LAS 25.0	65.4 dB
LAS 50.0	55.1 dB
LAS 66.6	49.2 dB
LAS 90.0	41.6 dB

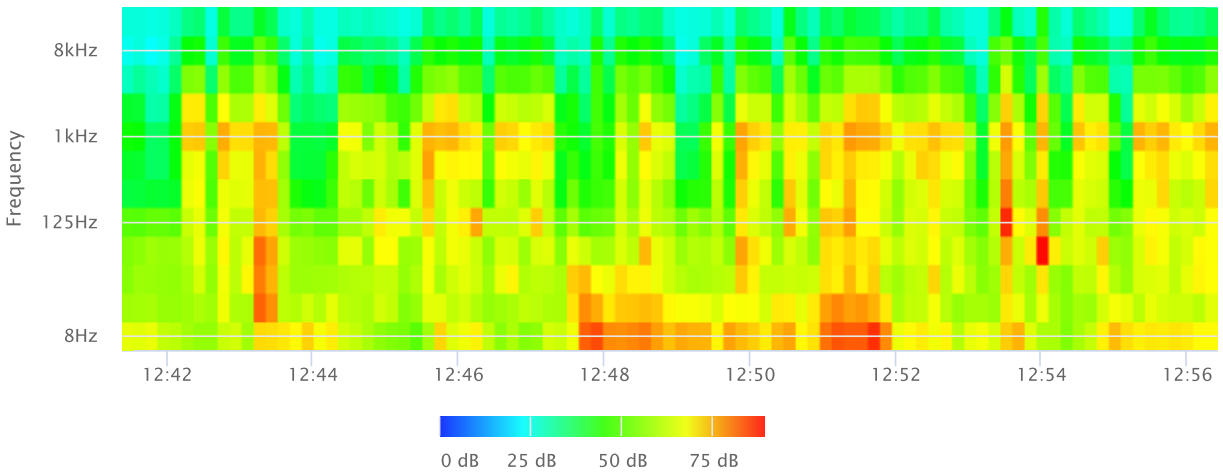
Time History



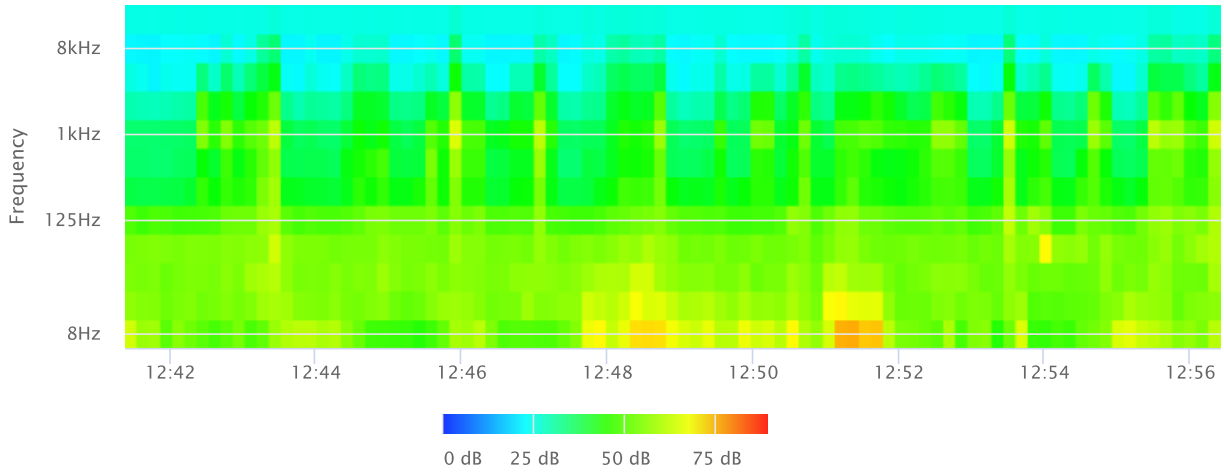
OBA 1/1 Leq



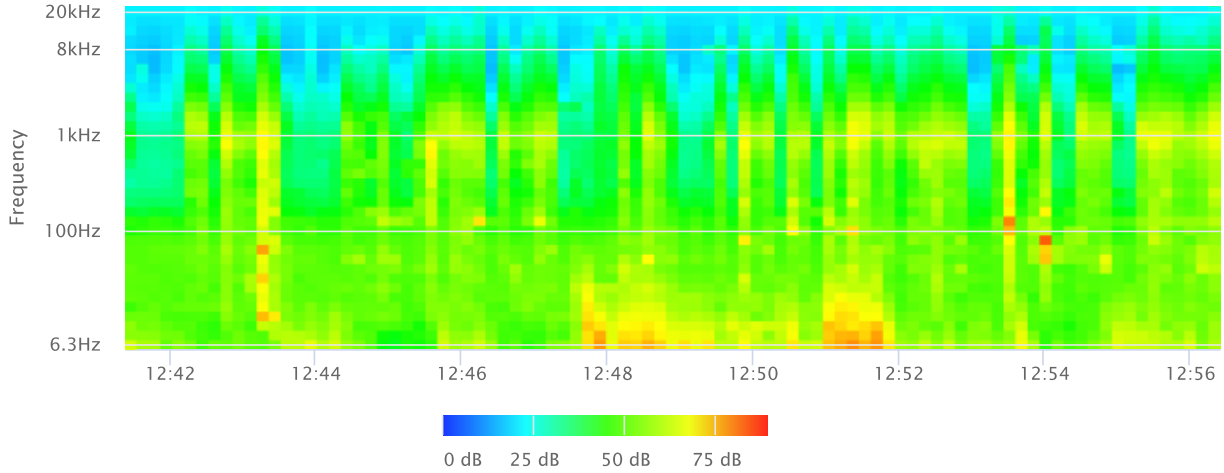
OBA 1/1 Lmax



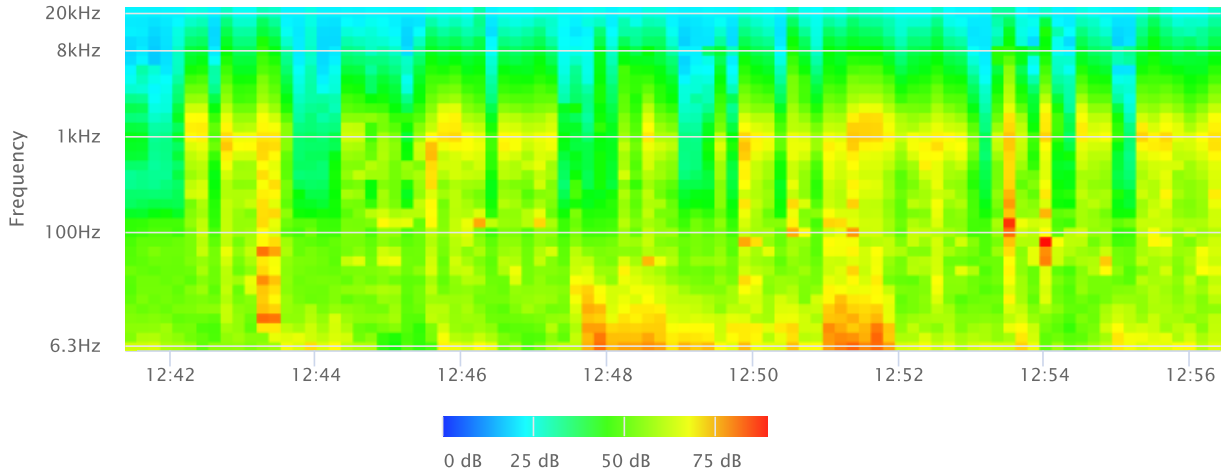
OBA 1/1 Lmin



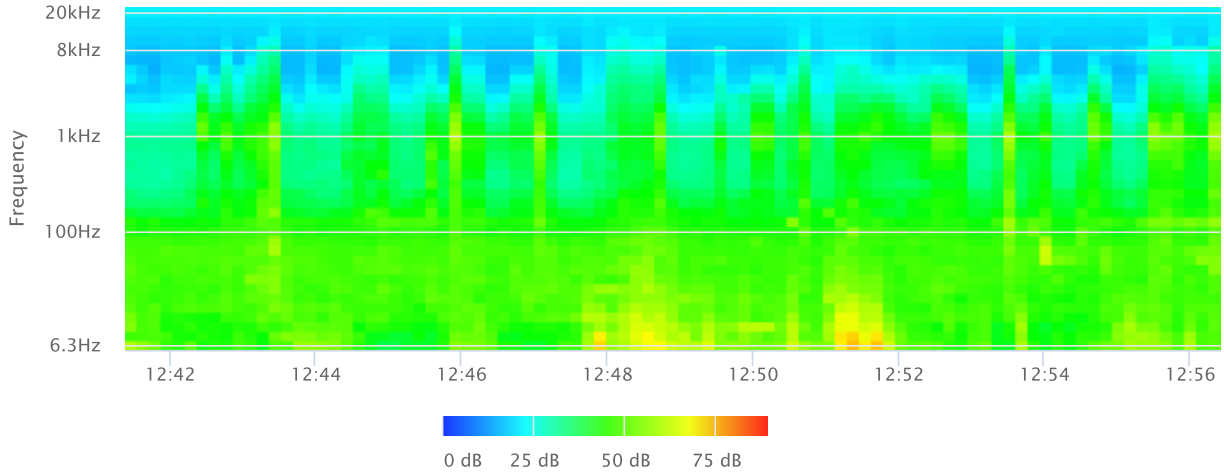
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
12:42
12:44
12:46
12:48
12:50
12:52
12:54
12:56
0 dB
25 dB
50 dB
75 dB

Noise Measurement
Field Data

Project Name: San Bernardino & Wabash Residential Project, City of Redlands **Date:** April 20, 2022

Project #: 19504

Noise Measurement #: STNM5 Run Time: 15 minutes (1 x 15 minutes) **Technician:** Ian Edward Gallagher

Nearest Address or Cross Street: 1603 Capri Ave , Redlands, CA 92374

Site Description (Type of Existing Land Use and any other notable features): Project Site: Vacant lot bordered by San Bernardino Ave to north, Wabash Ave to east, Capri Ave to south, & a single-family residence & vacant land to west. Noise Measurement Site: Capri Ave to south, vacant project site to northeast, single-famiy residence to northwest (taken near to STNM1 as dogs were no longer barking at this time).

Weather: Clear skies, hazy sunshine. **Settings:** SLOW FAST

Temperature: 58 deg F **Wind:** 6 mph **Humidity:** 53% **Terrain:** Flat

Start Time: 1:23 PM **End Time:** 1:38 PM **Run Time:**

Leq: 51.3 dB **Primary Noise Source:** Distant traffic ambiance. Barking dog at residence 1603 Capri Ave now silent.

Lmax 66.2 dB

L2 60.1 dB **Secondary Noise Sources:** Bird song, some residential ambiance, leaf rustle from 6 mph breeze

L8 56.2 dB breeze. Overhead air traffic from nearby airport.

L25 46.2 dB

L50 46.2 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:	4/20/2022		

Noise Measurement
Field Data

PHOTOS:

STNM5 looking WNW towads SE corner of residence 1603 Capri Avenue, Redlands.

STNM5 looking E down Capri Avenue towards Wabash Avenue intersection.

Summary	
File Name on Meter	LxT_Data.021.s
File Name on PC	LxT_0003099-20220420 132304-LxT_Data.021.ldbin
Serial Number	3099
Model	SoundTrack LxT®
Firmware Version	2.404
User	Ian Edward Gallagher
Location	STNM5 34° 4'30.17"N 117° 8'44.35"W
Job Description	15 minute noise measurement (1 x 15 minutes)
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands

Measurement	
Start	2022-04-20 13:23:04
Stop	2022-04-20 13:38:04
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2022-04-20 13:22:46
Post-Calibration	None

Overall Settings	
RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	122.9 dB

Results					
LAeq		51.3			
LAE		80.8			
EA		13.51313	µPa²h		
EA8		432.4201	µPa²h		
EA40		2.1621	mPa²h		
LZpeak (max)	2022-04-20 13:35:58	106.0	dB		
LASmax	2022-04-20 13:25:26	66.2	dB		
LASmin	2022-04-20 13:29:42	37.7	dB		
				Statistics	
LCeq		66.8	dB	**LA2.00**	60.1 dB
LAeq		51.3	dB	**LA8.00**	56.2 dB
LCeq - LAeq		15.5	dB	**LA25.00**	50.7 dB
LAleq		54.5	dB	**LA50.00**	46.2 dB
LAeq		51.3	dB	**LA66.60**	43.6 dB
LAleq - LAeq		3.2	dB	**LA90.00**	40.0 dB
Overload Count		0			

Measurement Report

Report Summary

Meter's File Name	LxT_Data.021.s	Computer's File Name	LxT_0003099-20220420 132304-LxT_Data.021.ldbin
Meter	LxT1 0003099		
Firmware	2.404		
User	Ian Edward Gallagher	Location	STNM5 34° 4'30.17"N 117° 8'44.35"W
Job Description	15 minute noise measurement (1 x 15 minutes)		
Note	Ganddini 19504 San Bernardino & Wabash Residential Project, City of Redlands		
Start Time	2022-04-20 13:23:04	Duration	0:15:00.0
End Time	2022-04-20 13:38:04	Run Time	0:15:00.0
Pause Time	0:00:00.0		

Results

Overall Metrics

LA_{eq}	51.3 dB		
LAE	80.8 dB	SEA	--- dB
EA	13.5 µPa²h	LAFTM5	56.8 dB
EA8	432.4 µPa²h		
EA40	2.2 mPa²h		
LZ_{peak}	106.0 dB	2022-04-20 13:35:58	
LAS_{max}	66.2 dB	2022-04-20 13:25:26	
LAS_{min}	37.7 dB	2022-04-20 13:29:42	
LA_{eq}	51.3 dB		
LC_{eq}	66.8 dB	LC_{eq} - LA_{eq}	15.5 dB
LAI_{eq}	54.5 dB	LAI_{eq} - LA_{eq}	3.2 dB

Exceedances	Count	Duration
LAS > 65.0 dB	2	0:00:03.1
LAS > 85.0 dB	0	0:00:00.0
LZpeak > 135.0 dB	0	0:00:00.0
LZpeak > 137.0 dB	0	0:00:00.0
LZpeak > 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

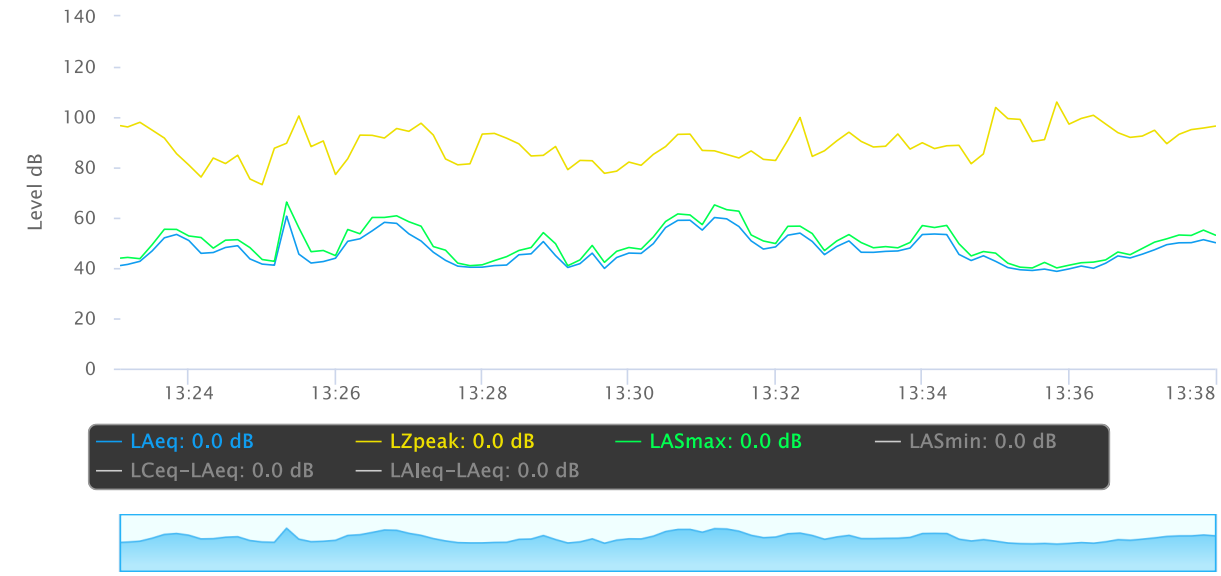
Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	51.3 dB		66.8 dB		--- dB	
$L_{S(max)}$	66.2 dB	2022-04-20 13:25:26	--- dB		--- dB	
$L_{S(min)}$	37.7 dB	2022-04-20 13:29:42	--- dB		--- dB	
$L_{Peak(max)}$	--- dB		--- dB		106.0 dB	2022-04-20 13:35:58

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

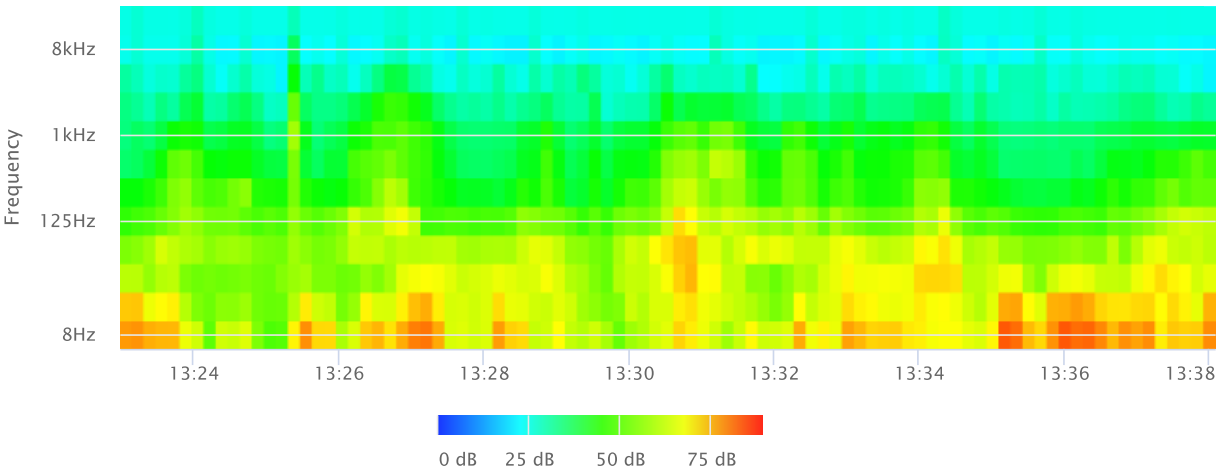
Statistics

LAS 2.0	60.1 dB
LAS 8.0	56.2 dB
LAS 25.0	50.7 dB
LAS 50.0	46.2 dB
LAS 66.6	43.6 dB
LAS 90.0	40.0 dB

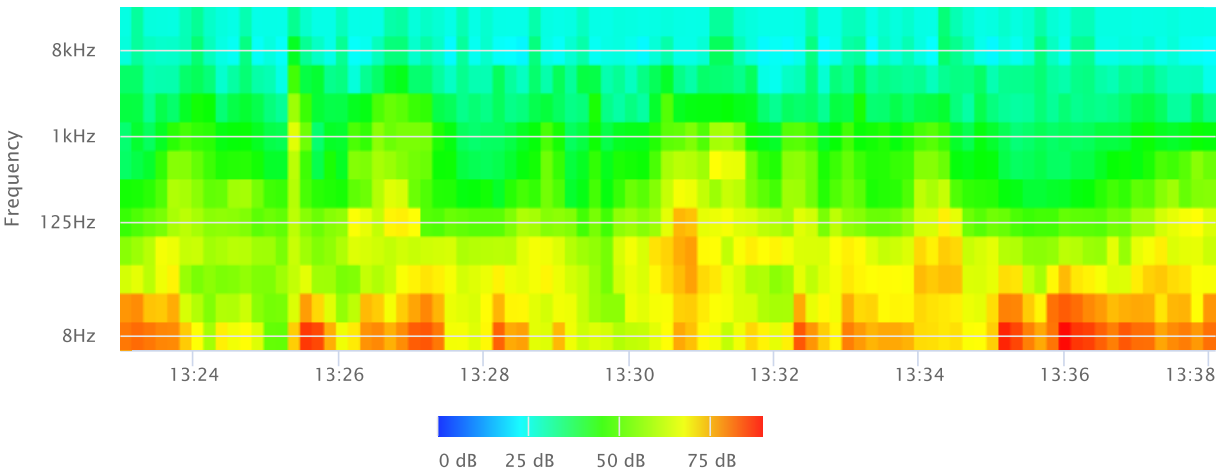
Time History



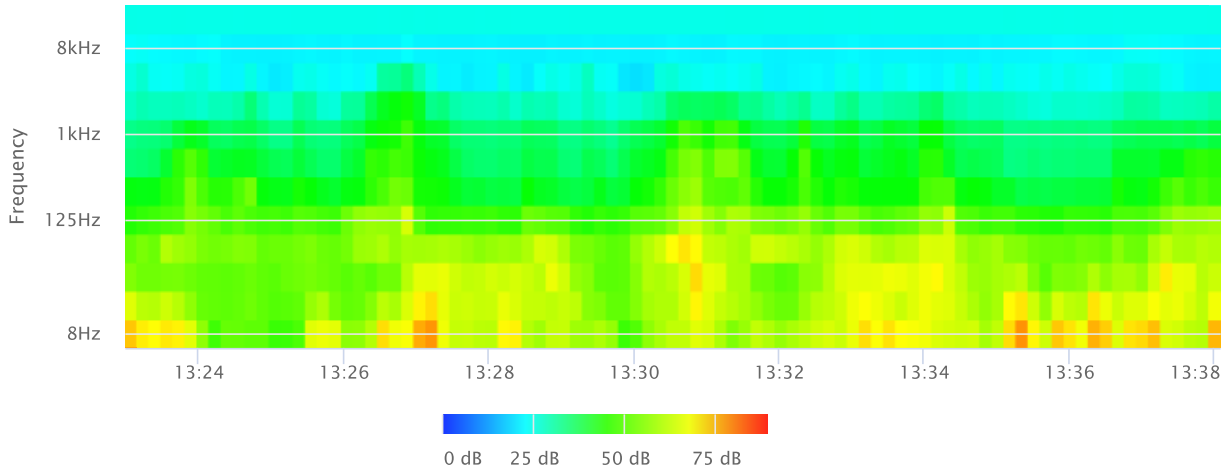
OBA 1/1 Leq



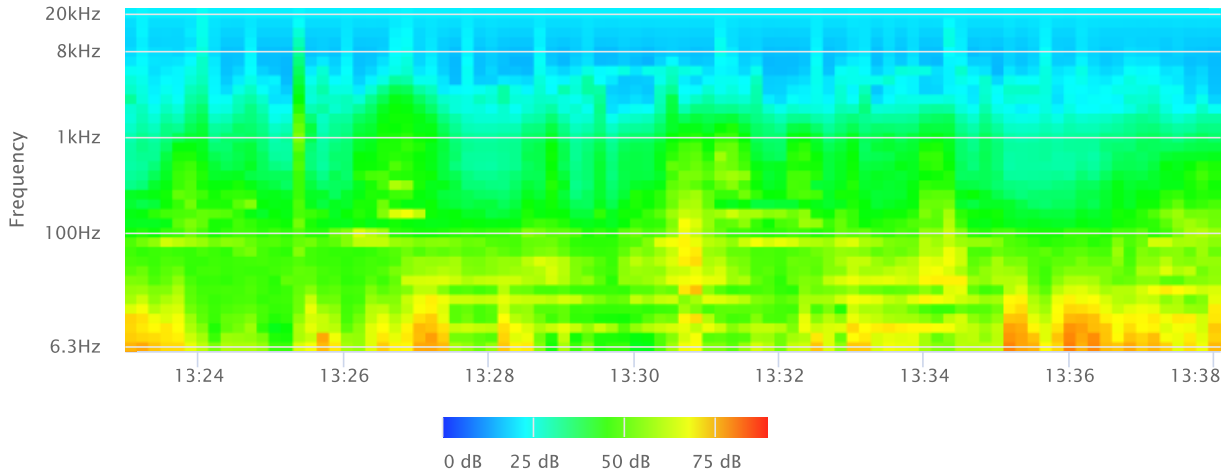
OBA 1/1 Lmax



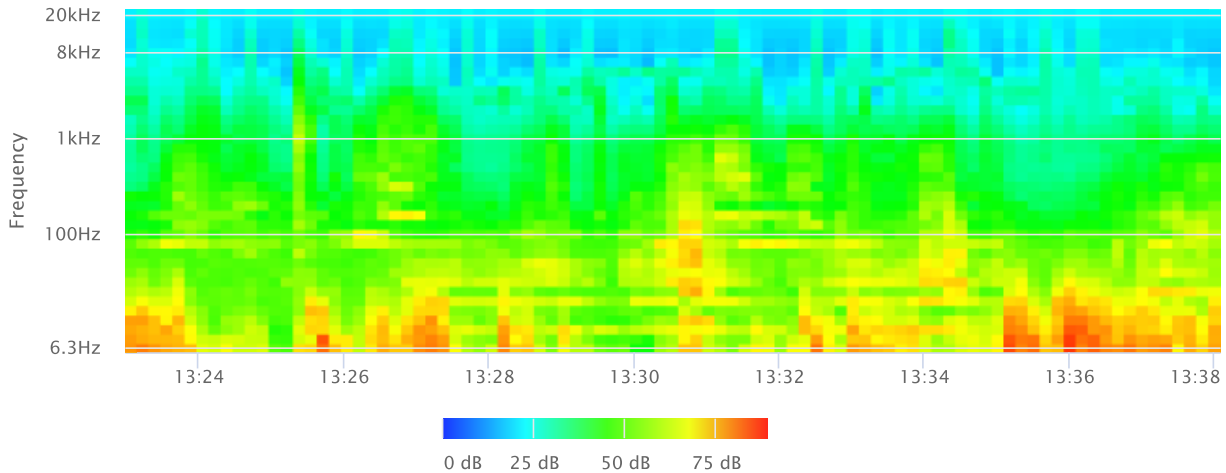
OBA 1/1 Lmin



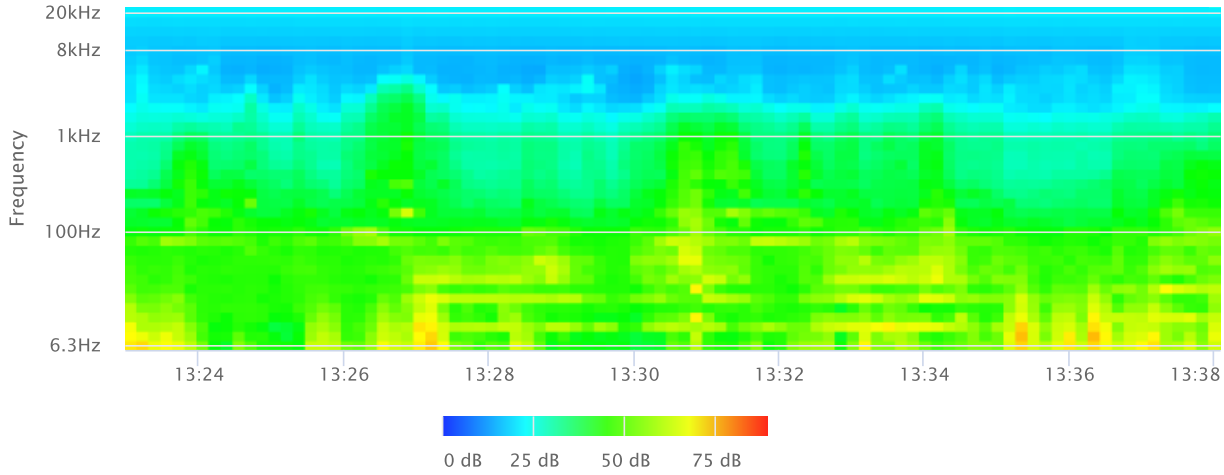
OBA 1/3 Leq



OBA 1/3 Lmax



OBA 1/3 Lmin


20kHz
8kHz
1kHz
100Hz
6.3Hz
Frequency
13:24
13:26
13:28
13:30
13:32
13:34
13:36
13:38
0 dB
25 dB
50 dB
75 dB

APPENDIX D

CONSTRUCTION NOISE CALCULATIONS

Receptor - Single-Family Residential to West

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	1041	20	0.20	-26.4	-7.0	63.6	56.6
Excavators	3	85	1041	40	1.20	-26.4	0.8	58.6	59.4
Rubber Tired Dozers	2	82	1041	40	0.80	-26.4	-1.0	55.6	54.7
							Log Sum	65.3	62.1
Site Preparation									
Rubber Tired Dozers	3	82	1041	40	1.20	-26.4	0.8	55.6	56.4
Tractors/Loaders/Backhoes	4	84	1041	40	1.60	-26.4	2.0	57.6	59.7
							Log Sum	59.8	61.4
Grading									
Grader	1	85	1041	40	0.40	-26.4	-4.0	58.6	54.7
Rubber Tired Dozers	1	82	1041	40	0.40	-26.4	-4.0	55.6	51.7
Excavators	2	85	1041	40	0.80	-26.4	-1.0	58.6	57.7
Scrapers	2	84	1041	40	0.80	-26.4	-1.0	57.6	56.7
Tractors/Loaders/Backhoes	2	84	1041	40	0.80	-26.4	-1.0	57.6	56.7
							Log Sum	64.7	62.9
Building Construction									
Cranes	1	81	1041	16	0.16	-26.4	-8.0	54.6	46.7
Forklifts [2]	3	48	1041	40	1.20	-26.4	0.8	21.6	22.4
Generator Sets	1	81	1041	50	0.50	-26.4	-3.0	54.6	51.6
Welders	1	74	1041	40	0.40	-26.4	-4.0	47.6	43.7
Tractors/Loaders/Backhoes	3	84	1041	40	1.20	-26.4	0.8	57.6	58.4
							Log Sum	60.9	59.6
Paving									
Pavers	2	77	1041	50	1.00	-26.4	0.0	50.6	50.6
Paving Equipment	2	77	1041	50	1.00	-26.4	0.0	50.6	50.6
Rollers	2	80	1041	20	0.40	-26.4	-4.0	53.6	49.7
							Log Sum	56.6	55.1
Architectural Coating									
Air Compressors	1	78	1041	40	0.40	-26.4	-4.0	51.6	47.7
							Log Sum	51.6	47.7

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

(2) Source: SoundPLAN reference list.

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

Receptor - Single-Family Residential to South

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	530	20	0.20	-20.5	-7.0	69.5	62.5
Excavators	3	85	530	40	1.20	-20.5	0.8	64.5	65.3
Rubber Tired Dozers	2	82	530	40	0.80	-20.5	-1.0	61.5	60.5
							Log Sum	71.2	68.0
Site Preparation									
Rubber Tired Dozers	3	82	530	40	1.20	-20.5	0.8	61.5	62.3
Tractors/Loaders/Backhoes	4	84	530	40	1.60	-20.5	2.0	63.5	65.5
							Log Sum	65.6	67.2
Grading									
Grader	1	85	530	40	0.40	-20.5	-4.0	64.5	60.5
Rubber Tired Dozers	1	82	530	40	0.40	-20.5	-4.0	61.5	57.5
Excavators	2	85	530	40	0.80	-20.5	-1.0	64.5	63.5
Scrapers	2	84	530	40	0.80	-20.5	-1.0	63.5	62.5
Tractors/Loaders/Backhoes	2	84	530	40	0.80	-20.5	-1.0	63.5	62.5
							Log Sum	70.6	68.8
Building Construction									
Cranes	1	81	530	16	0.16	-20.5	-8.0	60.5	52.5
Forklifts [2]	3	48	530	40	1.20	-20.5	0.8	27.5	28.3
Generator Sets	1	81	530	50	0.50	-20.5	-3.0	60.5	57.5
Welders	1	74	530	40	0.40	-20.5	-4.0	53.5	49.5
Tractors/Loaders/Backhoes	3	84	530	40	1.20	-20.5	0.8	63.5	64.3
							Log Sum	66.7	65.5
Paving									
Pavers	2	77	530	50	1.00	-20.5	0.0	56.5	56.5
Paving Equipment	2	77	530	50	1.00	-20.5	0.0	56.5	56.5
Rollers	2	80	530	20	0.40	-20.5	-4.0	59.5	55.5
							Log Sum	62.5	61.0
Architectural Coating									
Air Compressors	1	78	530	40	0.40	-20.5	-4.0	57.5	53.5
							Log Sum	57.5	53.5

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

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

Receptor - Single-Family Residential to East

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	1079	20	0.20	-26.7	-7.0	63.3	56.3
Excavators	3	85	1079	40	1.20	-26.7	0.8	58.3	59.1
Rubber Tired Dozers	2	82	1079	40	0.80	-26.7	-1.0	55.3	54.3
							Log Sum	65.0	61.8
Site Preparation									
Rubber Tired Dozers	3	82	1079	40	1.20	-26.7	0.8	55.3	56.1
Tractors/Loaders/Backhoes	4	84	1079	40	1.60	-26.7	2.0	57.3	59.4
							Log Sum	59.4	61.0
Grading									
Grader	1	85	1079	40	0.40	-26.7	-4.0	58.3	54.3
Rubber Tired Dozers	1	82	1079	40	0.40	-26.7	-4.0	55.3	51.3
Excavators	2	85	1079	40	0.80	-26.7	-1.0	58.3	57.3
Scrapers	2	84	1079	40	0.80	-26.7	-1.0	57.3	56.3
Tractors/Loaders/Backhoes	2	84	1079	40	0.80	-26.7	-1.0	57.3	56.3
							Log Sum	64.4	62.6
Building Construction									
Cranes	1	81	1079	16	0.16	-26.7	-8.0	54.3	46.4
Forklifts [2]	3	48	1079	40	1.20	-26.7	0.8	21.3	22.1
Generator Sets	1	81	1079	50	0.50	-26.7	-3.0	54.3	51.3
Welders	1	74	1079	40	0.40	-26.7	-4.0	47.3	43.3
Tractors/Loaders/Backhoes	3	84	1079	40	1.20	-26.7	0.8	57.3	58.1
							Log Sum	60.5	59.3
Paving									
Pavers	2	77	1079	50	1.00	-26.7	0.0	50.3	50.3
Paving Equipment	2	77	1079	50	1.00	-26.7	0.0	50.3	50.3
Rollers	2	80	1079	20	0.40	-26.7	-4.0	53.3	49.3
							Log Sum	56.3	54.8
Architectural Coating									
Air Compressors	1	78	1079	40	0.40	-26.7	-4.0	51.3	47.3
							Log Sum	51.3	47.3

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

(2) Source: SoundPLAN reference list.

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

Receptor - Recreational Facility to North

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	690	20	0.20	-22.8	-7.0	67.2	60.2
Excavators	3	85	690	40	1.20	-22.8	0.8	62.2	63.0
Rubber Tired Dozers	2	82	690	40	0.80	-22.8	-1.0	59.2	58.2
							Log Sum	68.9	65.7
Site Preparation									
Rubber Tired Dozers	3	82	690	40	1.20	-22.8	0.8	59.2	60.0
Tractors/Loaders/Backhoes	4	84	690	40	1.60	-22.8	2.0	61.2	63.2
							Log Sum	63.3	64.9
Grading									
Grader	1	85	690	40	0.40	-22.8	-4.0	62.2	58.2
Rubber Tired Dozers	1	82	690	40	0.40	-22.8	-4.0	59.2	55.2
Excavators	2	85	690	40	0.80	-22.8	-1.0	62.2	61.2
Scrapers	2	84	690	40	0.80	-22.8	-1.0	61.2	60.2
Tractors/Loaders/Backhoes	2	84	690	40	0.80	-22.8	-1.0	61.2	60.2
							Log Sum	68.3	66.5
Building Construction									
Cranes	1	81	690	16	0.16	-22.8	-8.0	58.2	50.2
Forklifts [2]	3	48	690	40	1.20	-22.8	0.8	25.2	26.0
Generator Sets	1	81	690	50	0.50	-22.8	-3.0	58.2	55.2
Welders	1	74	690	40	0.40	-22.8	-4.0	51.2	47.2
Tractors/Loaders/Backhoes	3	84	690	40	1.20	-22.8	0.8	61.2	62.0
							Log Sum	64.4	63.2
Paving									
Pavers	2	77	690	50	1.00	-22.8	0.0	54.2	54.2
Paving Equipment	2	77	690	50	1.00	-22.8	0.0	54.2	54.2
Rollers	2	80	690	20	0.40	-22.8	-4.0	57.2	53.2
							Log Sum	60.2	58.7
Architectural Coating									
Air Compressors	1	78	690	40	0.40	-22.8	-4.0	55.2	51.2
							Log Sum	55.2	51.2

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018) and the FHWA Roadway Construction Noise Model User's Guide (January 2006) (https://www.nrc.gov/docs/ML1805/ML18059A141.pdf)

(2) Source: SoundPLAN reference list.

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

APPENDIX E

FHWA WORKSHEETS

Existing Traffic Noise

1	:Id
San Bernardino Avenue	:Road
West of Orange 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	13300
Speed	45
Distance	36
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	770.26	15.96	26.60	571.83	2.66	4.43	141.80	22.17	36.94
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	22.03	5.19	7.41	20.73	-2.59	-0.37	14.68	6.62	8.84
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	67.73	59.17	65.91	66.44	51.39	58.13	60.38	60.60	67.34
	DAY LEQ	70.28		EVENING LEQ	67.15		NIGHT LEQ	68.84	

F	CNEL	75.57	
	DAY LEQ	70.28	

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	
San Bernardino Avenue	:Road	
West of Orange 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	13600
Speed	45
Distance	36
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	787.63	16.32	27.20	584.73	2.72	4.53	145.00	22.67	37.78
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	22.13	5.29	7.51	20.83	-2.49	-0.27	14.78	6.72	8.93
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	67.83	59.27	66.01	66.53	51.49	58.22	60.48	60.69	67.43
	DAY LEQ	70.37		EVENING LEQ	67.25		NIGHT LEQ	68.94	

CNEL	75.67
DAY LEQ	70.37

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
San Bernardino Avenue	:Road
East of Orange 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	13900
Speed	45
Distance	36
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	805.00	16.68	27.80	597.63	2.78	4.63	148.20	23.17	38.61
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	22.22	5.38	7.60	20.93	-2.40	-0.18	14.87	6.81	9.03
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	67.92	59.36	66.10	66.63	51.58	58.32	60.57	60.79	67.53
	DAY LEQ	70.47		EVENING LEQ	67.34		NIGHT LEQ	69.03	

CNEL	75.76
DAY LEQ	70.47

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	Vehicle Distribution (Heavy Truck Mix)				ADT	14600
		Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow		
San Bernardino Avenue	:Road						Speed	45
		Automobiles	75.54	14.02	10.43	92.00	Distance	36
East of Orange Avenue	:Segment	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	845.54	17.52	29.20	627.72	2.92	4.87	155.66	24.33	40.56
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	22.43	5.60	7.82	21.14	-2.18	0.03	15.08	7.02	9.24
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	68.13	59.58	66.31	66.84	51.79	58.53	60.79	61.00	67.74
	DAY LEQ	70.68		EVENING LEQ	67.56		NIGHT LEQ	69.24	

CNEL	75.98	Day hour	90.00
DAY LEQ	70.68	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	Vehicle Distribution (Heavy Truck Mix)				ADT	7800
San Bernardino 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	45
West of Judson Street	:Segment	Automobiles	75.54	14.02	10.43	92.00	Distance	36
		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	451.73	9.36	15.60	335.36	1.56	2.60	83.16	13.00	21.67
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	19.71	2.87	5.09	18.42	-4.91	-2.69	12.36	4.30	6.52
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.41	56.85	63.59	64.12	49.07	55.81	58.06	58.28	65.02
	DAY LEQ	67.96		EVENING LEQ	64.83		NIGHT LEQ	66.52	

CNEL	73.26	Day hour	91.00
DAY LEQ	67.96	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 heavy truck mix.

Existing Plus Project Traffic Noise

3	:Id	Vehicle Distribution (Heavy Truck Mix)				ADT	8500
		Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow		
San Bernardino Avenue	:Road						Speed	45
		Automobiles	75.54	14.02	10.43	92.00	Distance	36
West of Judson Street	:Segment	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	492.27	10.20	17.00	365.45	1.70	2.83	90.63	14.17	23.61
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	20.08	3.25	5.47	18.79	-4.53	-2.31	12.73	4.67	6.89
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.79	57.23	63.96	64.49	49.45	56.18	58.44	58.65	65.39
	DAY LEQ	68.33		EVENING LEQ	65.21		NIGHT LEQ	66.89	

CNEL	73.63	Day hour	91.00
DAY LEQ	68.33	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 heavy truck mix.

Existing Traffic Noise

4	:Id
San Bernardino Avenue	:Road
Judson Street to Dearborn 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	7400
Speed	45
Distance	36
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	428.56	8.88	14.80	318.16	1.48	2.47	78.90	12.33	20.56
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	19.48	2.65	4.86	18.19	-5.14	-2.92	12.13	4.07	6.29
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.18	56.63	63.36	63.89	48.84	55.58	57.83	58.05	64.79
	DAY LEQ	67.73		EVENING LEQ	64.60		NIGHT LEQ	66.29	

CNEL	73.03
DAY LEQ	67.73

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 heavy truck mix.

Existing Plus Project Traffic Noise

4	:Id
San Bernardino Avenue	:Road
Judson Street to Dearborn 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	8300
Speed	45
Distance	36
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	480.69	9.96	16.60	356.86	1.66	2.77	88.49	13.83	23.06
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	19.98	3.14	5.36	18.69	-4.64	-2.42	12.63	4.57	6.79
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.68	57.12	63.86	64.39	49.34	56.08	58.33	58.55	65.29
	DAY LEQ	68.23		EVENING LEQ	65.10		NIGHT LEQ	66.79	

CNEL	73.52
DAY LEQ	68.23

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 heavy truck mix.

Existing Traffic Noise

5	:Id
San Bernardino Avenue	:Road
Dearborn Street to Granite 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	6100
Speed	45
Distance	36
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	353.28	7.32	12.20	262.27	1.22	2.03	65.04	10.17	16.94
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	18.64	1.81	4.03	17.35	-5.97	-3.76	11.29	3.23	5.45
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	64.34	55.79	62.52	63.05	48.00	54.74	56.99	57.21	63.95
	DAY LEQ	66.89		EVENING LEQ	63.77		NIGHT LEQ	65.45	

CNEL	72.19
DAY LEQ	66.89

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	ADT	7100
San Bernardino Avenue	:Road	Speed	45
Dearborn Street to Granite Street	:Segment	Distance	36
		Left Angle	-90
		Right Angle	90

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

	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	411.19	8.52	14.20	305.26	1.42	2.37	75.70	11.83	19.72
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	19.30	2.47	4.68	18.01	-5.32	-3.10	11.95	3.89	6.11
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.00	56.45	63.18	63.71	48.66	55.40	57.65	57.87	64.61
	DAY LEQ	67.55		EVENING LEQ	64.42		NIGHT LEQ	66.11	

CNEL	72.85	Day hour	93.00
DAY LEQ	67.55	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	
San Bernardino Avenue	:Road	
East of Granite 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	5900
Speed	45
Distance	36
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	341.69	7.08	11.80	253.67	1.18	1.97	62.90	9.83	16.39
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	18.50	1.66	3.88	17.20	-6.12	-3.90	11.15	3.09	5.31
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	64.20	55.64	62.38	62.91	47.86	54.60	56.85	57.07	63.81
	DAY LEQ	66.75		EVENING LEQ	63.62		NIGHT LEQ	65.31	

CNEL	72.04
DAY LEQ	66.75

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 Plus Project Traffic Noise

6	:Id	
San Bernardino Avenue	:Road	
East of Granite 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	6600
Speed	45
Distance	36
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	382.23	7.92	13.20	283.76	1.32	2.20	70.37	11.00	18.33
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	18.99	2.15	4.37	17.69	-5.63	-3.41	11.64	3.58	5.79
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	64.69	56.13	62.87	63.39	48.35	55.08	57.34	57.55	64.29
	DAY LEQ	67.23		EVENING LEQ	64.11		NIGHT LEQ	65.80	

CNEL	72.53
DAY LEQ	67.23

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	Vehicle Distribution (Heavy Truck Mix)				ADT	5700
San Bernardino 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	45
West of Wabash Avenue	:Segment	Automobiles	75.54	14.02	10.43	92.00	Distance	36
		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	330.11	6.84	11.40	245.07	1.14	1.90	60.77	9.50	15.83
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	18.35	1.51	3.73	17.05	-6.27	-4.05	11.00	2.94	5.16
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	64.05	55.49	62.23	62.76	47.71	54.45	56.70	56.92	63.66
	DAY LEQ	66.60		EVENING LEQ	63.47		NIGHT LEQ	65.16	

CNEL	71.89	Day hour	95.00
DAY LEQ	66.60	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	
San Bernardino Avenue	:Road	
West of Wabash 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	5800
Speed	45
Distance	36
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	335.90	6.96	11.60	249.37	1.16	1.93	61.84	9.67	16.11
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	18.42	1.59	3.81	17.13	-6.19	-3.97	11.07	3.01	5.23
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	64.13	55.57	62.30	62.83	47.79	54.52	56.78	56.99	63.73
	DAY LEQ	66.67		EVENING LEQ	63.55		NIGHT LEQ	65.23	

CNEL	71.97
DAY LEQ	66.67

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
Capri Avenue	:Road
East of Granite Street	: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	100
Speed	25
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	6.13	0.07	0.03	4.53	0.01	0.01	1.14	0.10	0.04
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	3.59	-15.53	-19.64	2.28	-23.04	-23.03	-3.73	-14.29	-18.39
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	40.18	32.70	34.75	38.87	25.19	31.36	32.85	33.95	36.00
	DAY LEQ	41.84		EVENING LEQ	39.73		NIGHT LEQ	39.24	

CNEL	46.32
DAY LEQ	41.84

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 light truck mix.

Existing Plus Project Traffic Noise

8	:Id	Vehicle Distribution (Light Truck Mix)				ADT	400
Capri 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	25
East of Granite Street	: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	24.53	0.30	0.12	18.13	0.05	0.05	4.54	0.40	0.16
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	9.61	-9.51	-13.62	8.30	-17.02	-17.01	2.29	-8.26	-12.37
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	46.20	38.72	40.77	44.89	31.21	37.38	38.87	39.97	42.02
	DAY LEQ	47.86		EVENING LEQ	45.75		NIGHT LEQ	45.26	

CNEL	52.34	Day hour	96.00
DAY LEQ	47.86	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 light truck mix.

Existing Traffic Noise

9	:Id
Capri Avenue	:Road
West of Wabash Avenue	: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	200
Speed	25
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	12.27	0.15	0.06	9.06	0.03	0.03	2.27	0.20	0.08
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	6.60	-12.52	-16.63	5.29	-20.03	-20.02	-0.72	-11.28	-15.38
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	43.19	35.71	37.76	41.88	28.20	34.37	35.86	36.96	39.01
	DAY LEQ	44.85		EVENING LEQ	42.74		NIGHT LEQ	42.25	

CNEL	49.33
DAY LEQ	44.85

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 light truck mix.

Existing Plus Project Traffic Noise

9	:Id
Capri Avenue	:Road
West of Wabash Avenue	: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	300
Speed	25
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	18.40	0.22	0.09	13.60	0.04	0.04	3.41	0.30	0.12
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	8.36	-10.76	-14.86	7.05	-18.27	-18.26	1.04	-9.51	-13.62
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	44.95	37.47	39.52	43.64	29.96	36.13	37.63	38.72	40.77
	DAY LEQ	46.61		EVENING LEQ	44.50		NIGHT LEQ	44.01	

F	CNEL	51.09	
	DAY LEQ	46.61	

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 light truck mix.

Existing Traffic Noise

10	:Id
Orange Street	:Road
North of San Bernardino 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	15100
Speed	40
Distance	36
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	874.50	18.12	30.20	649.22	3.02	5.03	160.99	25.17	41.94
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	23.09	6.26	8.47	21.80	-1.53	0.69	15.74	7.68	9.90
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	75.39
DAY LEQ	69.80

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
Orange Street	:Road
North of San Bernardino 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	15200
Speed	40
Distance	36
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	880.29	18.24	30.40	653.52	3.04	5.07	162.06	25.33	42.22
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	23.12	6.28	8.50	21.83	-1.50	0.72	15.77	7.71	9.93
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	66.84	58.95	66.02	65.54	51.17	58.24	59.49	60.38	67.45
	DAY LEQ	69.83		EVENING LEQ	66.42		NIGHT LEQ	68.77	

CNEL	75.41
DAY LEQ	69.83

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
Orange Street	:Road
South of San Bernardino 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	13300
Speed	40
Distance	36
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	770.26	15.96	26.60	571.83	2.66	4.43	141.80	22.17	36.94
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	22.54	5.70	7.92	21.25	-2.08	0.14	15.19	7.13	9.35
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	66.26	58.37	65.44	64.96	50.59	57.66	58.91	59.80	66.87
	DAY LEQ	69.25		EVENING LEQ	65.84		NIGHT LEQ	68.19	

CNEL	74.83
DAY LEQ	69.25

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	Vehicle Distribution (Heavy Truck Mix)				ADT	13600
Orange Street	: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
South of San Bernardino Avenue	:Segment	Automobiles	75.54	14.02	10.43	92.00	Distance	36
		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	787.63	16.32	27.20	584.73	2.72	4.53	145.00	22.67	37.78
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	22.64	5.80	8.02	21.34	-1.98	0.24	15.29	7.23	9.45
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	66.35	58.47	65.54	65.06	50.69	57.75	59.00	59.90	66.96
	DAY LEQ	69.34		EVENING LEQ	65.93		NIGHT LEQ	68.29	

CNEL	74.93	Day hour	99.00
DAY LEQ	69.34	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 Traffic Noise

12	:Id
Judson Street	:Road
South of San Bernardino 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	3300
Speed	35
Distance	36
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	191.12	3.96	6.60	141.88	0.66	1.10	35.18	5.50	9.17
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	17.07	0.23	2.45	15.77	-7.55	-5.33	9.72	1.66	3.88
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	58.53	51.42	58.85	57.24	43.63	51.07	51.18	52.84	60.28
	DAY LEQ	62.09		EVENING LEQ	58.33		NIGHT LEQ	61.43	

CNEL	67.99
DAY LEQ	62.09

Day hour	0.00
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

12	:Id
Judson Street	:Road
South of San Bernardino 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	3400
Speed	35
Distance	36
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	196.91	4.08	6.80	146.18	0.68	1.13	36.25	5.67	9.44
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	17.20	0.36	2.58	15.90	-7.42	-5.20	9.85	1.79	4.01
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	58.66	51.54	58.98	57.37	43.76	51.20	51.31	52.97	60.41
	DAY LEQ	62.22		EVENING LEQ	58.46		NIGHT LEQ	61.56	

CNEL	68.12
DAY LEQ	62.22

Day hour	0.00
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

13 :Id

Dearborn Street :Road

South of San Bernardino Avenue :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	3600
Speed	40
Distance	32
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	220.79	2.70	1.05	163.16	0.48	0.48	40.87	3.60	1.40
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	17.11	-2.01	-6.11	15.80	-9.52	-9.51	9.79	-0.76	-4.86
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
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	61.34	51.17	51.91	60.03	43.66	48.52	54.02	52.42	53.16
	DAY LEQ	62.17		EVENING LEQ	60.42		NIGHT LEQ	58.02	

CNEL	65.61
DAY LEQ	62.17

Day hour	0.00
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 light truck mix.

Existing Plus Project Traffic Noise

13	:Id
Dearborn Street	:Road
South of San Bernardino Avenue	: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	3700
Speed	40
Distance	32
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	226.92	2.77	1.08	167.70	0.49	0.49	42.00	3.70	1.44
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	17.23	-1.89	-6.00	15.92	-9.40	-9.39	9.91	-0.64	-4.75
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
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	61.46	51.29	52.03	60.15	43.78	48.64	54.13	52.54	53.28
	DAY LEQ	62.29		EVENING LEQ	60.54		NIGHT LEQ	58.14	

CNEL	65.72
DAY LEQ	62.29

Day hour	0.00
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 light truck mix.

Existing Traffic Noise

14	:Id	Vehicle Distribution (Light Truck Mix)				ADT	4000
		Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	
Dearborn Street	:Road	Automobiles	75.56	13.96	10.49	97.40	Speed 40
North of Lugonia Avenue	:Segment	Medium Trucks	48.91	2.17	48.91	1.84	Distance 32
		Heavy Trucks	47.30	5.41	47.30	0.74	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	245.32	3.00	1.17	181.29	0.53	0.53	45.41	4.00	1.56
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	17.57	-1.56	-5.66	16.26	-9.06	-9.05	10.25	-0.31	-4.41
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
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	61.80	51.63	52.37	60.49	44.12	48.97	54.47	52.87	53.62
	DAY LEQ	62.63		EVENING LEQ	60.87		NIGHT LEQ	58.48	

CNEL	66.06	Day hour	0.00
DAY LEQ	62.63	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 light truck mix.

Existing Plus Project Traffic Noise

14	:Id
Dearborn Street	:Road
North of Lugonia Avenue	: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	4100
Speed	40
Distance	32
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	251.45	3.07	1.20	185.83	0.55	0.55	46.55	4.10	1.59
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	17.68	-1.45	-5.55	16.36	-8.96	-8.95	10.35	-0.20	-4.30
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
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	61.91	51.73	52.48	60.59	44.22	49.08	54.58	52.98	53.73
	DAY LEQ	62.73		EVENING LEQ	60.98		NIGHT LEQ	58.58	

CNEL	66.17
DAY LEQ	62.73

Day hour	0.00
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 light truck mix.

Existing Traffic Noise

15	:Id	Vehicle Distribution (Light Truck Mix)				ADT	4200
Dearborn Street	:Road	Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	Speed	30
South of Lugonia Avenue	:Segment	Automobiles	75.56	13.96	10.49	97.40	Distance	32
		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	257.58	3.15	1.23	190.36	0.56	0.56	47.68	4.20	1.63
Speed in MPH	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
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	62.51	73.11	78.76	62.51	73.11	78.76	62.51	73.11	78.76
ADJUSTMENTS									
Flow	19.03	-0.09	-4.20	17.72	-7.60	-7.59	11.71	1.16	-2.95
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
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	58.41	49.89	51.43	57.10	42.38	48.04	51.09	51.14	52.68
	DAY LEQ	59.69		EVENING LEQ	57.74		NIGHT LEQ	56.47	

CNEL	63.74	Day hour	0.00
DAY LEQ	59.69	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 light truck mix.

Existing Plus Project Traffic Noise

15	:Id	Vehicle Distribution (Light Truck Mix)				ADT	4200
Dearborn Street	:Road	Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	Speed	30
South of Lugonia Avenue	:Segment	Automobiles	75.56	13.96	10.49	97.40	Distance	32
		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	257.58	3.15	1.23	190.36	0.56	0.56	47.68	4.20	1.63
Speed in MPH	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
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	62.51	73.11	78.76	62.51	73.11	78.76	62.51	73.11	78.76
ADJUSTMENTS									
Flow	19.03	-0.09	-4.20	17.72	-7.60	-7.59	11.71	1.16	-2.95
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87
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	58.41	49.89	51.43	57.10	42.38	48.04	51.09	51.14	52.68
	DAY LEQ	59.69		EVENING LEQ	57.74		NIGHT LEQ	56.47	

CNEL	63.74	Day hour	0.00
DAY LEQ	59.69	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 light truck mix.

Existing Traffic Noise

16	:Id
Granite Street	:Road
South of San Bernardino Avenue	: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	200
Speed	25
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	12.27	0.15	0.06	9.06	0.03	0.03	2.27	0.20	0.08
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	6.60	-12.52	-16.63	5.29	-20.03	-20.02	-0.72	-11.28	-15.38
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	43.19	35.71	37.76	41.88	28.20	34.37	35.86	36.96	39.01
	DAY LEQ	44.85		EVENING LEQ	42.74		NIGHT LEQ	42.25	

CNEL	49.33
DAY LEQ	44.85

Day hour	0.00
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 light truck mix.

Existing Plus Project Traffic Noise

16	:Id
Granite Street	:Road
South of San Bernardino Avenue	: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	400
Speed	25
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	24.53	0.30	0.12	18.13	0.05	0.05	4.54	0.40	0.16
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	9.61	-9.51	-13.62	8.30	-17.02	-17.01	2.29	-8.26	-12.37
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	46.20	38.72	40.77	44.89	31.21	37.38	38.87	39.97	42.02
	DAY LEQ	47.86		EVENING LEQ	45.75		NIGHT LEQ	45.26	

CNEL	52.34
DAY LEQ	47.86

Day hour	0.00
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 light truck mix.

Existing Traffic Noise

			Vehicle Distribution (Heavy Truck Mix)					
17	:Id		Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	ADT 4800
Wabash Avenue	:Road		Automobiles	75.54	14.02	10.43	92.00	Speed 35
San Bernardino Avenue to Capri Avenue	:Segment		Medium Trucks	48.00	2.00	50.00	3.00	Distance 36
			Heavy Trucks	48.00	2.00	50.00	5.00	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	277.99	5.76	9.60	206.37	0.96	1.60	51.18	8.00	13.33
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	18.69	1.86	4.08	17.40	-5.92	-3.71	11.34	3.28	5.50
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	60.16	53.04	60.48	58.87	45.26	52.70	52.81	54.47	61.91
	DAY LEQ	63.72		EVENING LEQ	59.96		NIGHT LEQ	63.06	

CNEL	69.61	Day hour	0.00
DAY LEQ	63.72	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

17	:Id	
Wabash Avenue	:Road	
San Bernardino Avenue to Capri 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	4900
Speed	35
Distance	36
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	283.78	5.88	9.80	210.67	0.98	1.63	52.24	8.17	13.61
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	18.78	1.95	4.17	17.49	-5.83	-3.62	11.43	3.37	5.59
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	60.25	53.13	60.57	58.96	45.35	52.79	52.90	54.56	62.00
	DAY LEQ	63.81		EVENING LEQ	60.05		NIGHT LEQ	63.15	

CNEL	69.70
DAY LEQ	63.81

Day hour	0.00
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

18	:Id
Wabash Avenue	:Road
Capri Avenue to Lugonia 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	5700
Speed	35
Distance	36
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	330.11	6.84	11.40	245.07	1.14	1.90	60.77	9.50	15.83
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	19.44	2.60	4.82	18.15	-5.18	-2.96	12.09	4.03	6.25
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	60.91	53.79	61.23	59.61	46.01	53.44	53.56	55.22	62.65
	DAY LEQ	64.47		EVENING LEQ	60.70		NIGHT LEQ	63.80	

CNEL	70.36
DAY LEQ	64.47

Day hour	0.00
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

18	:Id
Wabash Avenue	:Road
Capri Avenue to Lugonia 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	5900
Speed	35
Distance	36
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	341.69	7.08	11.80	253.67	1.18	1.97	62.90	9.83	16.39
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	19.59	2.75	4.97	18.30	-5.03	-2.81	12.24	4.18	6.40
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	61.06	53.94	61.38	59.76	46.16	53.59	53.71	55.37	62.80
	DAY LEQ	64.62		EVENING LEQ	60.85		NIGHT LEQ	63.95	

CNEL	70.51
DAY LEQ	64.62

Day hour	0.00
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

19	:Id	Vehicle Distribution (Heavy Truck Mix)				ADT	10000
		Motor-Vehicle Type	Daytime % (7 AM - 7 PM)	Evening % (7 PM - 10 PM)	Night % (10 PM - 7 AM)	Total % of Traffic Flow	
Wabash Avenue	:Road	Automobiles	75.54	14.02	10.43	92.00	Speed 40
South of Lugonia Avenue	:Segment	Medium Trucks	48.00	2.00	50.00	3.00	Distance 36
		Heavy Trucks	48.00	2.00	50.00	5.00	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	579.14	12.00	20.00	429.95	2.00	3.33	106.62	16.67	27.78
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	21.30	4.47	6.68	20.01	-3.32	-1.10	13.95	5.89	8.11
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.02	57.13	64.20	63.72	49.35	56.42	57.67	58.56	65.63
	DAY LEQ	68.01		EVENING LEQ	64.60		NIGHT LEQ	66.95	

CNEL	73.60	Day hour	0.00
DAY LEQ	68.01	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

19	:Id	ADT	10200
Wabash Avenue	:Road	Speed	40
South of Lugonia Avenue	:Segment	Distance	36
		Left Angle	-90
		Right Angle	90

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

	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	590.72	12.24	20.40	438.55	2.04	3.40	108.75	17.00	28.33
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	21.39	4.55	6.77	20.09	-3.23	-1.01	14.04	5.98	8.20
Distance	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36
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	65.10	57.22	64.29	63.81	49.44	56.50	57.75	58.65	65.71
	DAY LEQ	68.09		EVENING LEQ	64.68		NIGHT LEQ	67.04	

CNEL	73.68	Day hour	0.00
DAY LEQ	68.09	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.

ADT'S BY LEG

FACTOR= 11.5 Note: Use 10 (LA County), 12 (Riverside County), or 11.5 (San Bernardino County)

Intersection	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NORTH LEG	SOUTH LEG	EAST LEG	WEST LEG
PROJECT ADTS																	
1 Orange Street (N/S) & San Bernardino Avenue (E/W)	0	0	19	3	0	0	0	19	0	11	11	2	65	100	300	700	300
2 Judson Street (N/S) & San Bernardino Avenue (E/W)	0	0	6	0	0	0	0	41	0	4	24	0	75	-	100	900	700
3 Dearborn Street (N/S) & San Bernardino Avenue (E/W)	0	0	6	0	0	0	0	47	0	4	28	0	85	-	100	1,000	900
4 Granite Street (N/S) & San Bernardino Avenue (E/W)	9	0	0	0	0	0	0	38	6	0	22	0	75	-	200	700	900
5 Wabash Avenue N/S) & San Bernardino Avenue (E/W)	3	0	0	0	0	0	0	0	2	0	0	0	5	-	100	-	100
6 Wabash Avenue (N/S) & Capri Avenue (E/W)	6	3	0	0	2	0	0	0	4	0	0	0	15	100	200	-	100
7 Dearborn Street (N/S) & Lugonia Avenue (E/W)	0	6	0	0	4	0	0	0	0	0	0	0	10	100	100	-	-
8 Wabash Ave (N/S) & Lugonia Ave/Mentone Blvd (E/W)	0	9	0	0	6	0	0	0	0	0	0	0	15	200	200	-	-
9 B Street (N/S) & San Bernardino Avenue (E/W)	22	0	2	0	0	0	0	0	38	2	0	0	64	-	700	-	700
10 A Street (N/S) & Capri Avenue (E/W)	0	0	0	4	0	9	16	0	0	0	0	4	33	400	-	100	300
													-	-	-	-	-
EXISTING ADTS																	
1 Orange Street (N/S) & San Bernardino Avenue (E/W)	70	401	66	178	469	53	116	521	102	49	294	100	2,419	15,100	13,300	13,900	13,300
2 Judson Street (N/S) & San Bernardino Avenue (E/W)	39	46	45	33	89	17	25	331	62	8	204	20	919	2,600	3,300	7,400	7,800
3 Dearborn Street (N/S) & San Bernardino Avenue (E/W)	59	101	15	55	67	18	83	277	68	0	143	39	925	4,200	3,600	6,100	7,500
4 Granite Street (N/S) & San Bernardino Avenue (E/W)	6	0	0	0	0	0	0	331	10	0	183	0	530	-	200	5,900	6,100
5 Wabash Avenue N/S) & San Bernardino Avenue (E/W)	116	32	21	22	45	8	7	109	191	13	64	6	634	1,400	4,800	2,700	5,700
6 Wabash Avenue (N/S) & Capri Avenue (E/W)	1	179	13	1	267	0	0	0	12	21	1	7	502	5,200	5,700	500	200
7 Dearborn Street (N/S) & Lugonia Avenue (E/W)	55	84	49	32	75	45	79	1052	75	30	666	36	2,278	4,000	4,200	21,400	22,700
8 Wabash Ave (N/S) & Lugonia Ave/Mentone Blvd (E/W)	141	170	102	227	253	32	22	676	146	58	472	92	2,391	9,200	10,000	18,700	17,100
9 B Street (N/S) & San Bernardino Avenue (E/W)	0	0	0	0	0	0	0	331	0	0	183	0	514	-	-	5,900	5,900
10 A Street (N/S) & Capri Avenue (E/W)	0	0	0	0	0	0	0	1	0	0	5	0	6	-	-	100	100
													-	-	-	-	-

APPENDIX F

SOUNDPLAN WORKSHEETS

Noise emissions of road traffic

Statio km	ADT Veh/24	Vehicles type	Vehicle name	Traffic values day Veh/h	evening Veh/h	night Veh/h	Speed km/h	Contr device	Cons Spee km/h	Affec veh. %	Road surface	Gradie Min / M %
San Bernardino Avenue							Traffic direction: In entry direction					
0+00(	13200	Total	-	807	575	200	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	765	568	141	72					
		Medium trucks	-	16	3	22	72					
		Heavy trucks	-	26	4	37	72					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+46	13200	Total	-	807	575	200	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	765	568	141	72					
		Medium trucks	-	16	3	22	72					
		Heavy trucks	-	26	4	37	72					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
1+80	-							-	-	-	-	-
0+00(	13200	Total	-	807	575	200	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	765	568	141	72					
		Medium trucks	-	16	3	22	72					
		Heavy trucks	-	26	4	37	72					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
Wabash Ave N							Traffic direction: In entry direction					
0+00(	12900	Total	-	788	562	195	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	747	555	138	56					
		Medium trucks	-	16	3	22	56					
		Heavy trucks	-	26	4	36	56					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+41(	-							-	-	-	-	-
0+00(	12900	Total	-	788	562	195	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	747	555	138	56					
		Medium trucks	-	16	3	22	56					
		Heavy trucks	-	26	4	36	56					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
Wabash Ave S							Traffic direction: In entry direction					
0+00(	13200	Total	-	807	575	200	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	765	568	141	72					
		Medium trucks	-	16	3	22	72					
		Heavy trucks	-	26	4	37	72					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+26	13200	Total	-	807	575	200	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	765	568	141	72					
		Medium trucks	-	16	3	22	72					
		Heavy trucks	-	26	4	37	72					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					
0+26	13200	Total	-	807	575	200	-	none	-	-	Average (of DGAC a	0.0
		Automobiles	-	765	568	141	72					
		Medium trucks	-	16	3	22	72					
		Heavy trucks	-	26	4	37	72					
		Buses	-	-	-	-	-					
		Motorcycles	-	-	-	-	-					
		Auxiliary vehicle	-	-	-	-	-					

Noise emissions of road traffic

Statio km	ADT Veh/24	Traffic values Vehicles type	Vehicle name	day Veh/h	evening Veh/h	night Veh/h	Speed km/h	Contr devic	Cons Spee km/h	Affec veh. %	Road surface	Gradie Min / M %
0+45(	-							-	-	-	-	-

Receiver list

No.	Receiver name	Building side	Floor	Limit Lden dB(A)	Level Lden dB(A)	Conflict Lden dB
1	1	-	1.Fl	-	53.4	-
2	2	-	1.Fl	-	57.7	-
3	3	-	1.Fl	-	60.2	-
4	4	-	1.Fl	-	57.8	-
5	5	-	1.Fl	-	56.6	-
6	6	-	1.Fl	-	53.8	-

Receiver list

No.	Receiver name	Building side	Floor	Limit Lden dB(A)	Level Lden dB(A)	Conflict Lden dB
1	2	-	1.Fl	-	57.5	-
			2.Fl	-	62.9	-
2		-	1.Fl	-	59.6	-
			2.Fl	-	64.7	-
3	3	-	1.Fl	-	59.9	-
			2.Fl	-	66.4	-
4	4	-	1.Fl	-	58.4	-
			2.Fl	-	64.7	-
5	5	-	1.Fl	-	56.9	-
			2.Fl	-	64.7	-

APPENDIX G

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19504 San Bernardino & Wabash Residential Project	Date:	4/13/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to West		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	114.00	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 =	0.022	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19504 San Bernardino & Wabash Residential Project		Date: 4/13/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to West		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment Type =	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	114.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.			
RESULTS			
PPV =	0.009	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19504 San Bernardino & Wabash Residential Project		Date: 4/13/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to South		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	70.00	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 =	0.045	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19504 San Bernardino & Wabash Residential Project		Date: 4/13/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to South		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	70.00	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:	19504 San Bernardino & Wabash Residential Project		Date: 4/13/22
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Residential to East		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	66.00	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 =	0.049	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	19504 San Bernardino & Wabash Residential Project		Date: 4/13/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Residential to East		
Address:			
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	66.00	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 =	0.021	IN/SEC	OUTPUT IN BLUE

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