Red Bluff Apartments

Noise Impact Study

City of Red Bluff, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This purpose of this noise impact study is to evaluate the potential noise impacts for the project study area and compare results to City and CEQA thresholds. The assessment was conducted and compared to the noise standards set forth by the Federal, State and Local agencies. Consistent with the California Environmental Quality Act (CEQA) and CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined to result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable agencies.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An evaluation of the existing ambient noise environment
- An analysis of stationary noise impacts from the project site to adjacent land uses
- Construction noise and vibration evaluation

1.2 Site Location and Study Area

The project site is located on the east side of South Jackson Street (APN:033-130-028), in the City of Red Bluff, CA as shown in Exhibit A. The land uses directly surrounding the project include multi family residential to the north and east with vacant land to the south and multi family residential to the east and single family residential across South Jackson Street.

1.3 Proposed Project Description

The Project proposes to develop a 61-unit affordable family apartment project on 2.7 acres of vacant land. The site plan used for this is illustrated in Exhibit B.

Exhibit A

Location Map

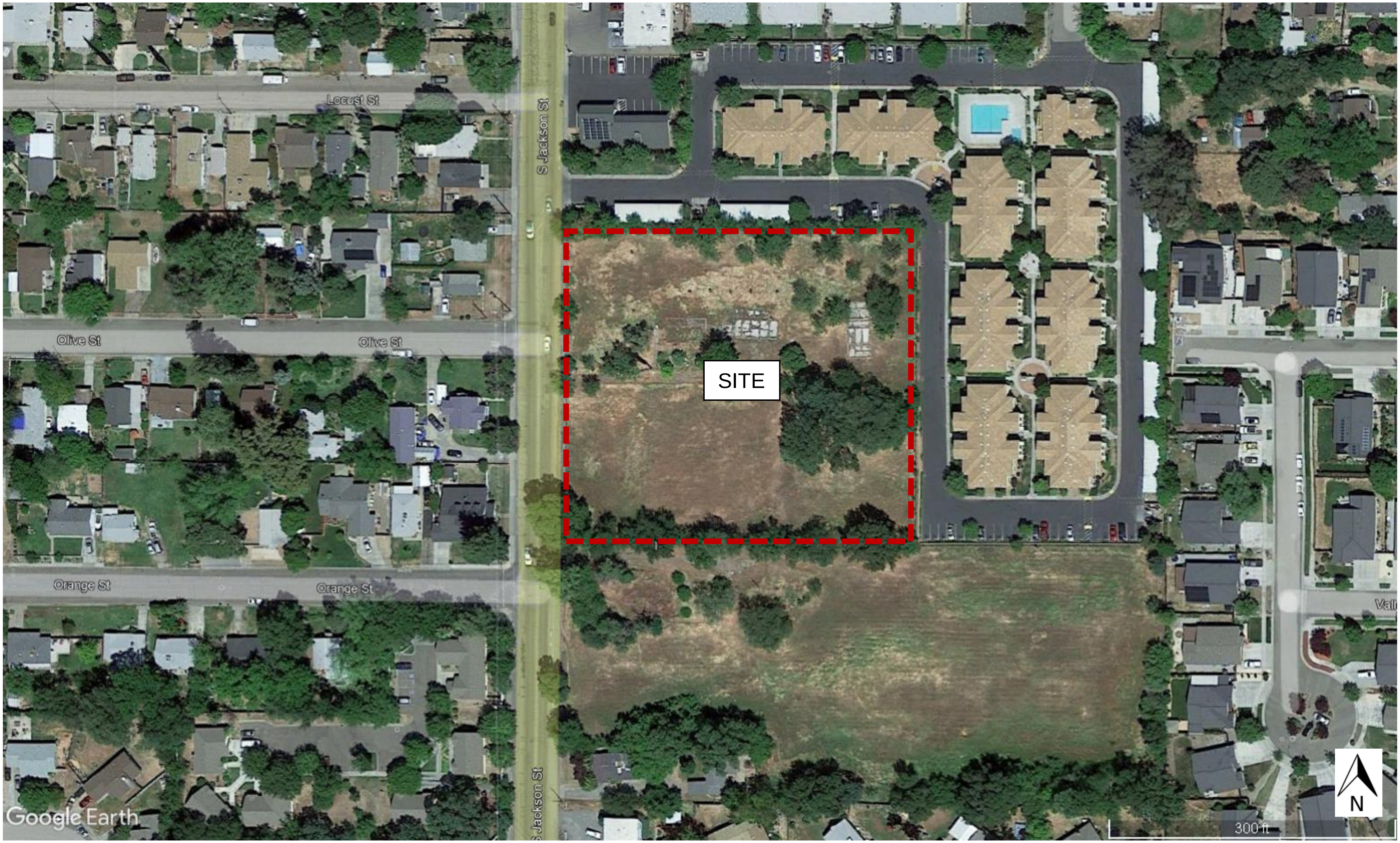
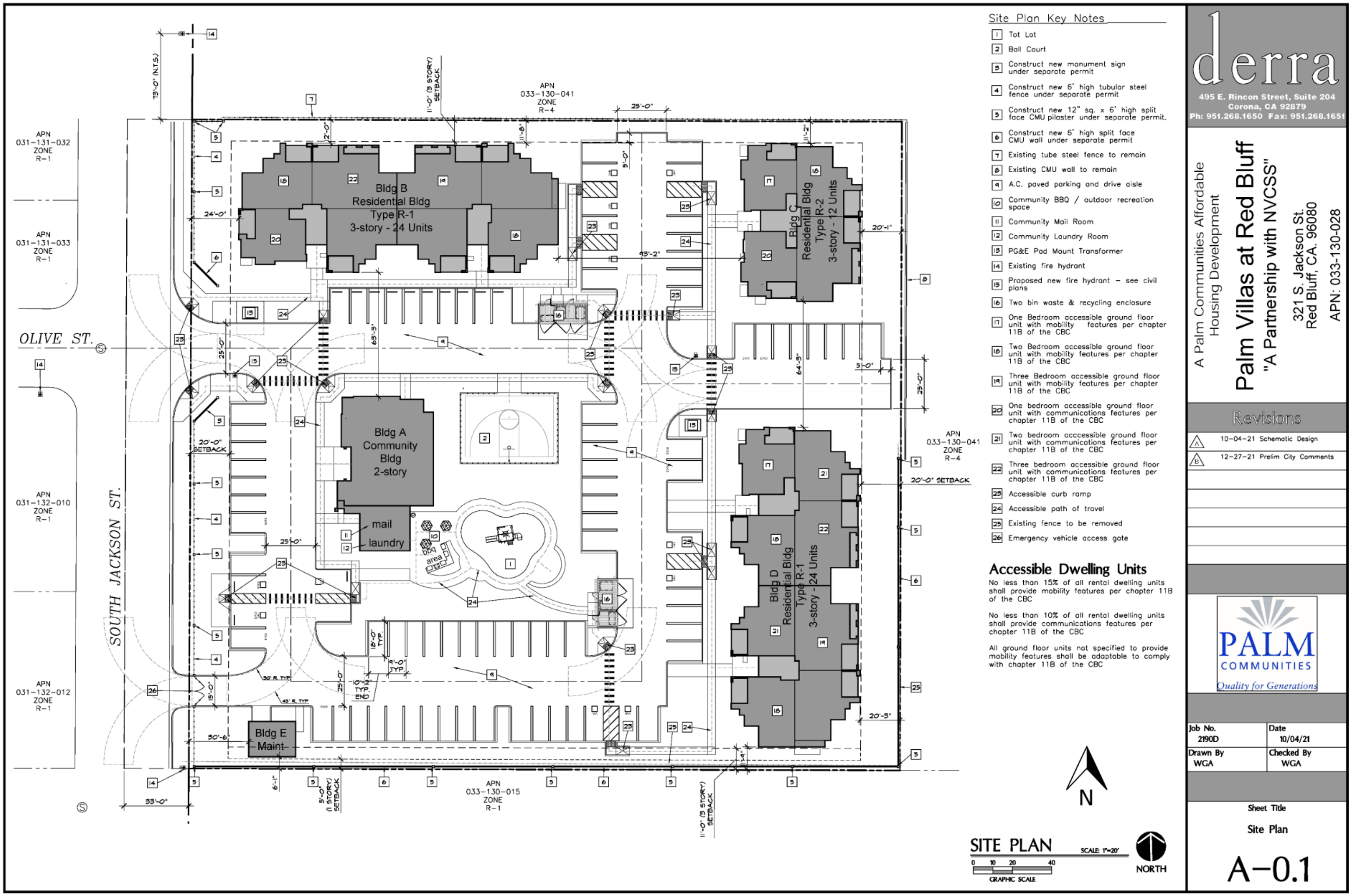


Exhibit B

Site Plan



2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used in the report.

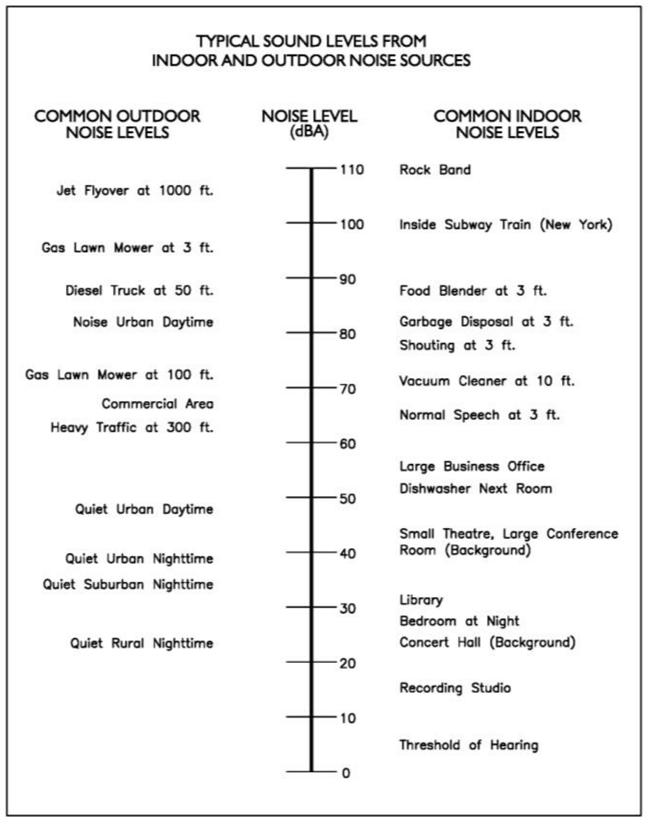
2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

Exhibit C: Typical A-Weighted Noise Levels



2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter ($\mu N/m^2$), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB. Exhibit C illustrates references sound levels for different noise sources.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA), a scale designed to account for the frequency-dependent sensitivity of the ear. Typically, the human ear can barely perceive a change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code, or other applicable regulations, which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90, and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2–3 axle) and heavy truck percentage (4 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity, and turbulence can further impact have far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of Red Bluff, California and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers. The Housing and Urban Development (HUD) is responsible for establishing noise regulations as it relates to exterior/interior noise levels for new HUD-assisted housing developments near high noise areas.

The federal government advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

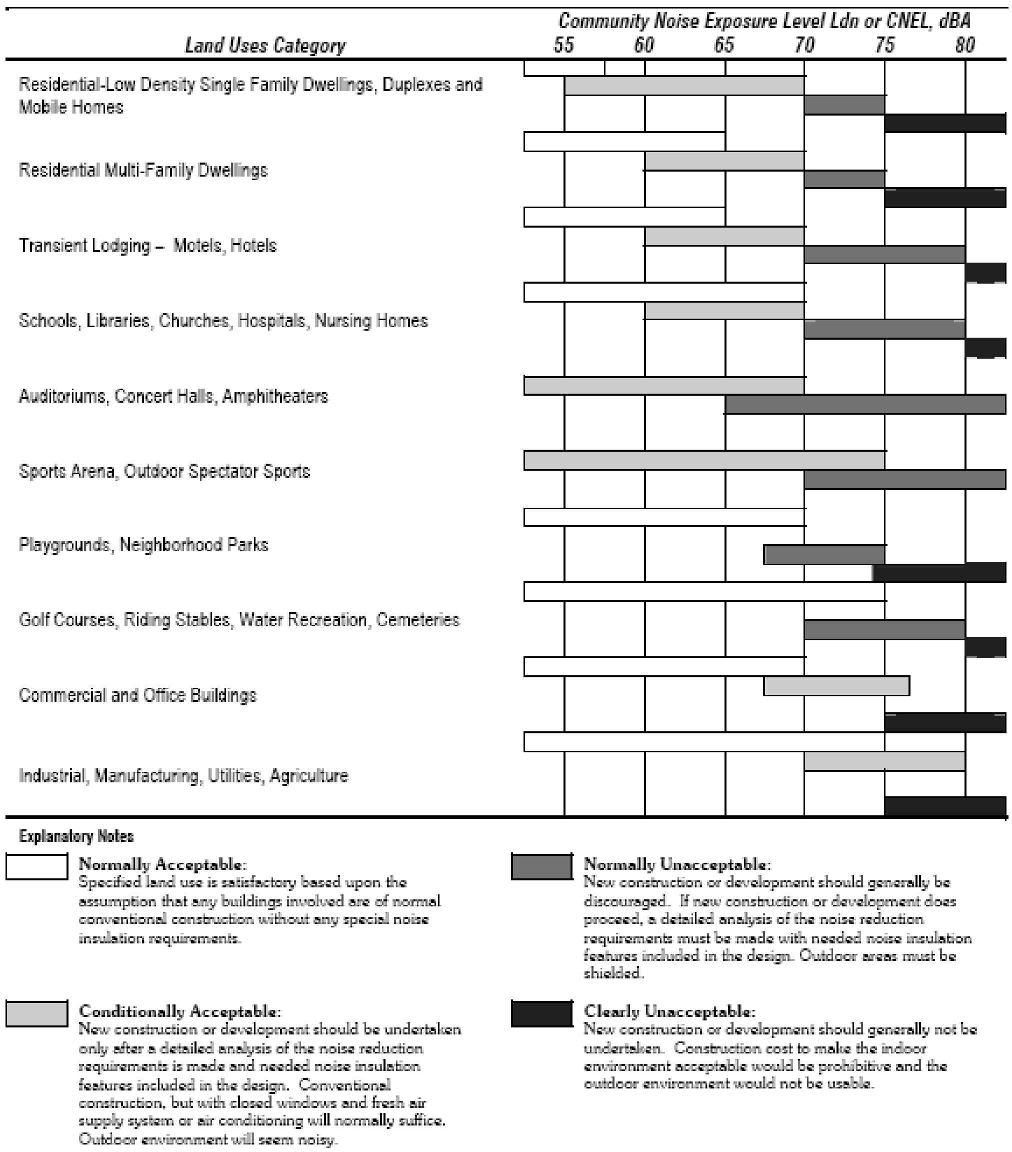
Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the “Land Use Compatibility for Community Noise Environments Matrix.” The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines



Source: California Office of Noise Control

4.3 City of Red Bluff Noise Regulations

The City of Red Bluff outlines their noise regulations and standards within the Noise Element of the City of Red Bluff General Plan.

AIRPORT/LAND USE NOISE COMPATIBILITY CRITERIA

	CNEL or LDN, DBA (1)				
LAND USE CATEGORY	50-55	55-60	60-65	65-70	70-75
Residential					
Single-Family Detached & Duplexes	+	0	--	-- --	-- --
Multi-Family & Transient Lodging	++	+	0	--	-- --
Mobile Homes	+	--	--	-- --	-- --
Public					
Schools, Libraries, Hospitals & Nursing Homes	+	0	--	--	-- --
Churches, Auditoriums & Concert Halls	+	0	0	--	-- --
Transportation, Parking & Cemeteries	++	++	++	+	0
Commercial & Industrial					
Office & Retail Trades	++	+	0	0	--
Commercial/Wholesale Trade Service & Warehousing, Light Industrial	++	++	+	0	0
General Manufacturing, Utilities & Extractive Industry	++	++	++	+	+

The City of Red Bluff does not have noise standards in regards to traffic noise and stationary equipment. Therefore, MD used the County of Tehama noise regulations and compares them to the existing condition.

4.4 County of Tehama Noise Regulations

The County of Tehama outlines their noise regulations and standards within the Municipal Code and the Noise Element of the County of Tehama General Plan.

County of Tehama General Plan

Applicable policies and standards governing environmental noise in the County are set forth in Chapter 9.0 pf the General Noise Element. In addition to the noise standards, the County has outlined goals, policies and implementation measures to reduce potential noise impacts and are presented below:

Goals, Policies, and Implementation Measures

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

Goal N-3: Protect those existing regions of the planning area whose noise environments are deemed acceptable, and also those locations throughout the community deemed "noise sensitive".

Policy N-3.1: The interior and exterior noise level standards for noise-sensitive areas of new uses affected by traffic or railroad noise sources in Tehama County are depicted in Table 9-6.

Table 9.6

Noise Standards for New Uses Affected by Traffic and Railroad Noise

New Land Use	Outdoor Activity Area Ldn	Interior - Ldn/PEAK Hour Leq1	Notes
All Residential	60-65	45	**2,3,4**
Transient Lodging	65	45	**5**
Hospitals & Nursing Homes	60	45	**6**
Theaters & Auditoriums	-	35	
Churches, Meeting Halls, Schools, Libraries, etc.	60	40	
Office Buildings	65	45	**7**
Commercial Buildings	65	50	**7**
Playgrounds, Park, etc.	70	50	**7**
Industry	65	50	**7**

Notes:
1. For traffic noise within Tehama County, Ldn and peak hour Leq values are estimated to be approximately similar. Interior noise level standards are applied within noise sensitive areas of the various land uses, with windows and doors in the closed positions.
2. For traffic noise within Tehama County, Ldn and peak hour Leq values are estimated to be approximately similar. Interior noise level standards are applied within noise sensitive areas of the various land uses, with windows and doors in the closed positions.
3. For multifamily residential uses, the exterior noise level standard shall be applied at the common outdoor recreation area, such as at pools, play areas, or tennis courts.
4. Where it is not possible to reduce noise in outdoor activity areas to 60 dB Ldn or less using a practical application of the best available noise reduction measures, an exterior noise level of up to 65 dB Ldn may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.
5. Outdoor activity areas of transient lodging facilities include swimming pool and picnic areas.
6. Hospitals are often noise generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
7. Only the exterior spaces of these uses designated for employee or customer relaxation have any degree of sensitivity to noise.

Implementation Measure N-3.1a

Work to develop a County traffic noise abatement program for the express purpose of reducing traffic noise exposure at existing residential uses which are affected by traffic noise levels in excess of the County's noise level standards. The program shall include the following specific aspects for noise abatement consideration where reasonable and feasible:

1. Noise barrier retrofits.
2. Truck usage restrictions.
3. Reduction of speed limits.
4. Use of quieter paving materials.
5. Building façade sound insulation.
6. Traffic calming.
7. Additional enforcement of speed limits and exhaust noise laws.
8. Signal timing.

Policy N-3.2: The County shall prohibit new noise-sensitive land uses in noise-impacted areas unless effective mitigation measures are incorporated into the project de-sign. Where the noise levels standards in Table 9-6 are predicted to be exceeded by new uses proposed within Tehama County, appropriate noise mitigation measures shall be included in the project design to reduce projected noise levels to a state of compliance with Table 9-7 standards.

Implementation Measure N-3.2a

Review new project development to ensure compliance with the standards depicted in Table 9-6 and Table 9-7.

Goal N-4: The County shall require review for discretionary industrial, commercial, or other noise-generating land uses for compatibility with adjacent and nearby noise-sensitive land uses.

Policy N-4.1: Review all development proposals to ensure that any new noise generating land uses are compatible with existing uses or appropriate measures are implemented to ensure that nearby noise sensitive land uses are not affected.

Policy N-4.2: The interior and exterior noise level standards for noise-sensitive areas of new uses affected by non-transportation noise sources within Tehama County are depicted in Table 9-7.

Implementation Measure N-4.2a

Review all development proposals to ensure compliance with Table 9-7, Noise Standards for New Uses Affected by Non Transportation Noise.

Table 9-7
Noise Standards for New Uses Affected by Non-Transportation Noise

New Land Use	Outdoor Activity Area - Leq		Interior - Leq	
	Day Time	**Nighttime**	**Day & Night**	**Notes**
All Residential	50	45	35	1,2,7
Transient Lodging	55	--	40	3
Hospitals & Nursing Homes	50	45	35	4
Theaters & Auditoriums	--	--	35	
Churches, Meeting Halls, Schools, Libraries, etc.	55	--	40	
Office Buildings	55	--	45	5,6
Commercial Buildings	55	--	45	5,6
Playgrounds, Park, etc.	65	--	--	6
Industry	65	65	50	5

Notes:
1. Outdoor activity areas for single family residential uses are defined as back yards. For large parcels or residences with no clearly defined outdoor activity area, the standard shall be applicable within a 100 foot radius of the residence.
2. For multi family residential uses, the exterior noise level standard shall be applied at the common outdoor recreation area, such as at pools, play areas or tennis courts. Where such areas are not provided, the standards shall be applied at individual patios and balconies of the development.
3. Outdoor activity areas of transient lodging facilities include swimming pool and picnic areas, and are not commonly used during nighttime hours.
4. Hospitals are often noise generating uses. The exterior noise level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
5. Only the exterior spaces of these uses designated for employee or customer relaxation have any degree of sensitivity to noise.
6. The outdoor activity areas of office, commercial and park uses are not typically utilized during nighttime hours.
7. It may not be possible to achieve compliance with this standard at residential uses located immediately adjacent to loading dock areas of commercial uses while trucks are unloading. The daytime and night-time noise level standards applicable to loading docks shall be 55 and 50 dB Leq, respectively.
General: The Table 9B standards shall be reduced by 5 dB for sounds consisting primarily of speech or mu '&c, and for recurring impulsive sounds.
If the existing ambient noise level exceeds the standards of Table 9B8 then the noise level standards shall be increased at 5 dB increments to encompass the ambient.

Construction Noise Regulations

Chapter 9 Implementation measure N-2.4a restricts construction activities to the hours as determined by the County's Noise Control Ordinance unless an exemption is received from the County to Cover special circumstances.

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to the City of Red Bluff and Caltrans (TeNS) technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on “A” and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

Noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed onsite noise sources. One (1) long-term 24-hour noise measurement was conducted at or near the project site and are illustrated in Exhibit E. Appendix A includes photos, field sheet, and measured noise data.

5.3 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP’s software utilizes algorithms (based on the inverse square law and reference equipment noise level data) 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.

The future worst-case noise level projections were modeled using default SoundPlan sound level data for the 87 on-site sources (Parking)of 1 car per hour. Input and output calculations are provided in Appendix C.

5.4 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Roadway volumes and percentages correspond to the project's traffic impact study as prepared by TJW Engineering (Red Bluff Apartments, Traffic Impact Analysis – April 6, 2022) and roadway classification. The referenced traffic data was applied to the model and is in Appendix D. The following outlines the key adjustments made to the REMEL for the roadway inputs:

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

Table 1 indicates the roadway parameters and vehicle distribution utilized for this study.

Table 1: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT	Existing Plus Project ADT	Speed (MPH)	Site Conditions
Jackson St	Lay Ave to Reed Ave	9,586	9,879	35	Soft
Major Arterial Vehicle Distribution (Truck Mix)[2]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		75.5	14.0	10.4	92.00
Medium Trucks		48.0	2.0	50.0	3.00
Heavy Trucks		48.0	2.0	50.0	5.00
Secondary and Collector Vehicle Distribution (Truck Mix)[2]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		75.5	14.0	10.5	97.42
Medium Trucks		48.9	2.2	48.9	1.84
Heavy Trucks		47.3	5.4	47.3	0.74

Notes:
[1] Per TIA (Traffic Impact Analysis, City of Red Bluff, CA – TJW Engineering, Inc., 04/2022)

The following outlines key adjustments to the REMEL for project site parameter inputs:

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

MD projected the traffic noise levels to the on-site receptors. The project noise calculation worksheet outputs are located in Appendix D.

5.5 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

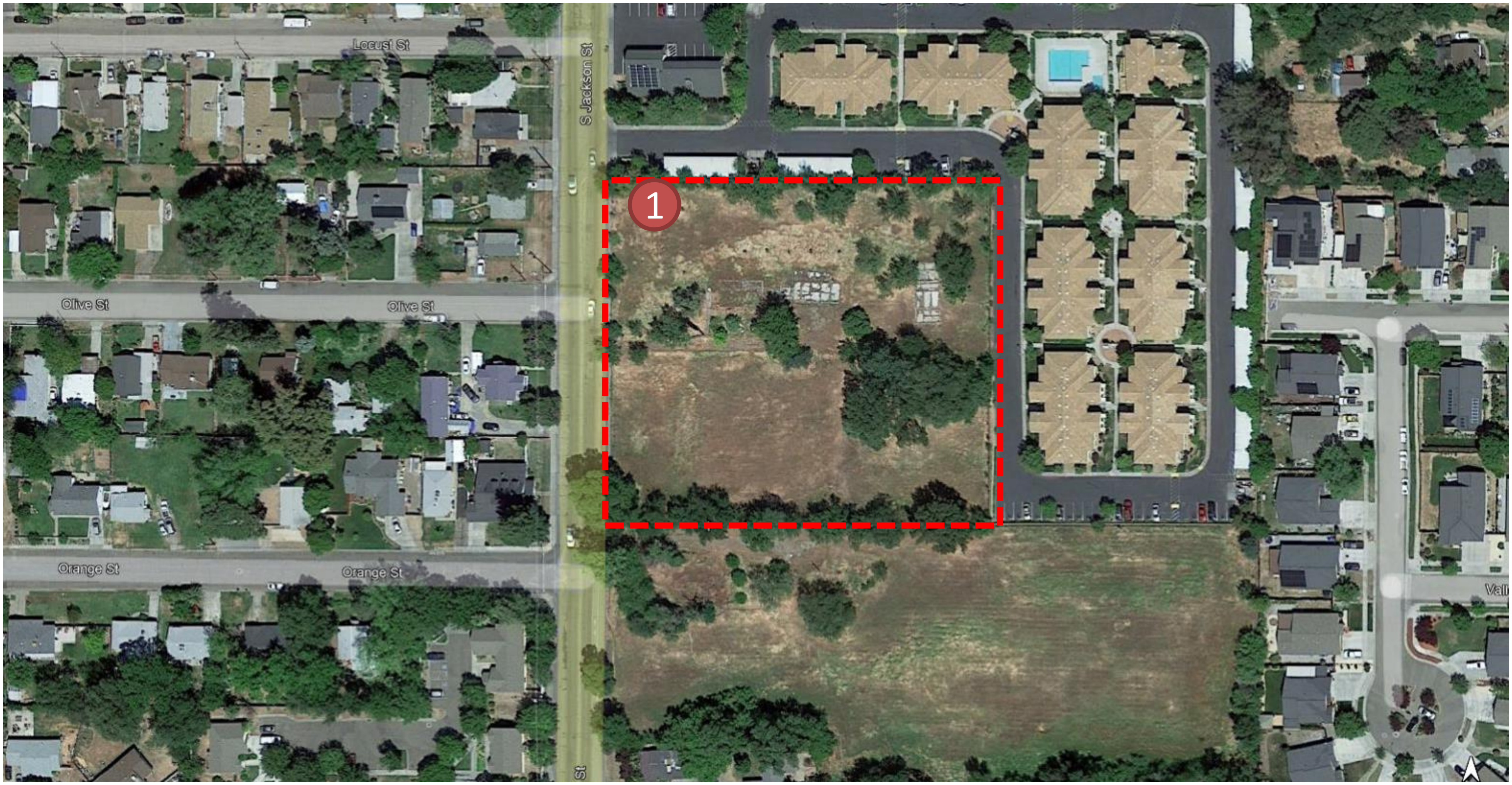
The project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading, concrete and building phases of construction. The construction noise calculation output worksheet is located in Appendix D. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 15 month time period. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

Exhibit E

Measurement Locations

= Long-Term Monitoring Location



6.0 Existing Noise Environment

A twenty-four hour (24) ambient noise measurement was conducted at the project site. Noise measurements were taken to determine the existing ambient noise levels. Noise data indicates that traffic along Jackson St is the primary sources of noise impacting the site and the surrounding area. The ambient data confirms that the existing noise levels exceed the County's noise ordinance for residential uses (58.6 dBA Leq). Therefore, this assessment will utilize the ambient noise data in addition to the limits set forth in the noise ordinance as a basis and compare levels to said data.

6.1 Long-Term Noise Measurement Results

The results of the long-term noise data are presented in Table 2.

Table 2: Long-Term Noise Measurement Data[1]

Date	Time	1-Hour dB(A)							
		L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}	L_{90}
3/3/2022	7AM-8AM	72.1	87.8	51.7	76.8	74.8	72.7	70.5	57.5
3/3/2022	8AM-9AM	70.2	85.9	49.8	74.9	72.9	70.8	68.6	55.6
3/3/2022	9AM-10AM	69.2	84.9	48.8	73.9	71.9	69.8	67.6	54.6
3/3/2022	10AM-11AM	69.1	84.8	48.7	73.8	71.8	69.7	67.5	54.5
3/3/2022	11AM-12PM	69.3	85.0	48.9	74.0	72.0	69.9	67.7	54.7
3/3/2022	12PM-1PM	69.4	85.1	49.0	74.1	72.1	70.0	67.8	54.8
3/3/2022	1PM-2PM	69.5	85.2	49.1	74.2	72.2	70.1	67.9	54.9
3/3/2022	2PM-3PM	69.8	85.5	49.4	74.5	72.5	70.4	68.2	55.2
3/3/2022	3PM-4PM	70.9	86.6	50.5	75.6	73.6	71.5	69.3	56.3
3/3/2022	4PM-5PM	72.5	88.2	52.1	77.2	75.2	73.1	70.9	57.9
3/3/2022	5PM-6PM	72.1	87.8	51.7	76.8	74.8	72.7	70.5	57.5
3/3/2022	6PM-7PM	70.4	86.1	50.0	75.1	73.1	71.0	68.8	55.8
3/3/2022	7PM-8PM	69.0	84.7	48.6	73.7	71.7	69.6	67.4	54.4
3/3/2022	8PM-9PM	67.9	83.6	47.5	72.6	70.6	68.5	66.3	53.3
3/3/2022	9PM-10PM	67.2	82.9	46.8	71.9	69.9	67.8	65.6	52.6
3/3/2022	10PM-11PM	66.2	81.9	45.8	70.9	68.9	66.8	64.6	51.6
3/3/2022	11PM-12AM	65.6	81.3	45.2	70.3	68.3	66.2	64.0	51.0
3/4/2022	12AM-1AM	64.1	79.8	43.7	68.8	66.8	64.7	62.5	49.5
3/4/2022	1AM-2AM	61.6	77.3	41.2	66.3	64.3	62.2	60.0	47.0
3/4/2022	2AM-3AM	60.4	76.1	40.0	65.1	63.1	61.0	58.8	45.8
3/4/2022	3AM-4AM	58.6	74.3	38.2	63.3	61.3	59.2	57.0	44.0
3/4/2022	4AM-5AM	59.6	75.3	39.2	64.3	62.3	60.2	58.0	45.0
3/4/2022	5AM-6AM	63.4	79.1	43.0	68.1	66.1	64.0	61.8	48.8
3/4/2022	6AM-7AM	69.8	85.5	49.4	74.5	72.5	70.4	68.2	55.2
Ldn		69.7							

Notes:

1. Long-term noise monitoring location (LT1) is illustrated in Exhibit E.
2. Quietest nighttime hour is highlighted in blue.

Noise data indicates the ambient noise level ranges between 58.6 dBA Leq to 72.5 dBA Leq over the entire 24-hour monitoring period. The measured Ldn is 69.7 dBA. Additional field notes and photographs are provided in Appendix A.

For this evaluation, MD has utilized the quietest hourly level and has compared the project's projected noise levels to the quietest hourly ambient. The quietest (lowest) relevant hourly level occurred from 3AM to 4AM (58.6 dBA, Leq(h)).

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts as a result of the project. The analysis details the estimated exterior/interior noise levels.

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed project.

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

Sensitive receptors that may be affected by project noise include existing multifamily residences to the north and east. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes the parking spaces will all have one car movement every hour.

A total of four (4) receptors were modeled to evaluate the proposed project's impact. A receptor is denoted by a yellow dot. All yellow dots represent a sensitive receptor such as an outdoor sensitive area (courtyard, patio, backyard, etc). Receptors 1 through 4 represent the nearest property lines.

This study compares the Project's operational noise levels to two (2) different noise assessment scenarios: 1) Project Only operational noise level projections, 2) Project plus ambient noise level projections.

Project Operational Noise Levels
Exhibit F shows the "project only" project noise levels at the property lines and/or sensitive receptor area. Operational noise levels at the adjacent uses are anticipated to range between 31 dBA to 45 dBA Leq.

The "project only" noise projections to the adjacent uses are below the County's 45 dBA nighttime residential noise limit, as outlined within the County's noise ordinance (see Section 4.1).

Project Plus Ambient Operational Noise Levels
Table 3 demonstrates the project plus the ambient (quietest measured hourly average level) noise levels. Project plus ambient noise level projections are anticipated to reach 59 dBA Leq at receptors (R1 – R4). The "project plus ambient" noise projections to the adjacent uses are above the County's 45 dBA residential limit as outlined within the County's noise ordinance (see Section 4.1).

Table 3: Worst-case Predicted Operational Leq (dBA) Noise Level[1]

Receptor[1]	Floor	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Nighttime (10PM - 7AM) Stationary Noise Limit (dBA, Leq)	Change in Noise Level as Result of Project
1	1	59	31	59	**45**	0
2	1		40	59		0
3	1		34	59		0
4	1		45	59		0

Notes:
1. Receptors 1 thru 4 represent the nearest property lines.
3. See Exhibit G for the operational noise level projections at said receptors.

As previously mentioned, the existing ambient condition already exceeds the County's 45 dBA limit (during the quietest nighttime measured hour). The project was therefore compared to the quietest existing condition for comparative purposes to the quietest measured hourly interval (3AM to 4AM) to show the change in noise level as a result of the proposed project. As shown in Table 4, the project will increase the worst-case noise level by approximately 0 dBA Leq at receptors (R1 – R4). It takes a change of 3 dBA to hear a noticeable difference. The increase in noise level is below the typical noticeable difference in change of noise levels.

Table 4 provides the characteristics associated with changes in noise levels.

Table 4: Change in Noise Level Characteristics[1]

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

The change in noise level at the residences would fall within the "Not Perceptible" acoustic characteristic.

7.1.2 Noise Impacts to On/Off-Site Receptors Due to Traffic

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated 50 feet from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. In addition, the noise contours for 60, 65 and 70 dBA CNEL were calculated. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions.

Existing Year (Plus Project): This scenario refers to existing year + project traffic noise conditions.

Table 5 compares the without and with project scenario and shows the change in traffic noise levels as a result of the proposed project. It takes a change of 3 dB or more to hear a perceptible difference. As demonstrated in Table 7, the project is anticipated to change the noise 0.2 dBA Ldn.

Traffic noise from the local roadway network was evaluated and compared to the County's noise ordinance. Per the County's Noise Ordinance (Table 9.6, General Plan, Noise Element), residential noise limit from traffic is 60 dBA Ldn at recreational areas and 45 dBA Ldn Interior. As shown in Table 5, Existing Plus Project traffic measured 56.9 dBA Ldn at the recreational area.

Although there is a nominal increase along the roadways, the proposed increase would still be below the 60 dBA Ldn at the on site recreational area.

Table 5: Existing Scenario - Noise Levels Along Roadways (dBA CNEL)

Existing Without Project Exterior Noise Levels

Roadway	Segment	CNEL at 146 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Jackson St	Lay Ave to Reed Ave	56.7	18	38	82	177

Existing With Project Exterior Noise Levels

Roadway	Segment	CNEL at 146 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Jackson St	Lay Ave to Reed Ave	56.9	18	39	84	180

Change in Existing Noise Levels as a Result of Project

Roadway[1]	Segment	CNEL at 50 Feet dBA[2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
Jackson St	Lay Ave to Reed Ave	56.7	56.9	0.2	No

Notes:
[1] Exterior noise levels calculated at 5 feet above ground level.
[2] Noise levels calculated from centerline of subject roadway.
[3.] Noise level projected 146 feet from centerline.

7.1.3 Future Interior Noise

To meet the County's interior noise standard of 45 Ldn, the project will require at least 18 dB of noise attenuation. Table 6 presents the project plus existing noise level at the nearest façade (Building B) and the required glass STC ratings to achieve an interior level of 45 dBA DNL.

Table 6: Projected Exterior and Interior Noise Levels

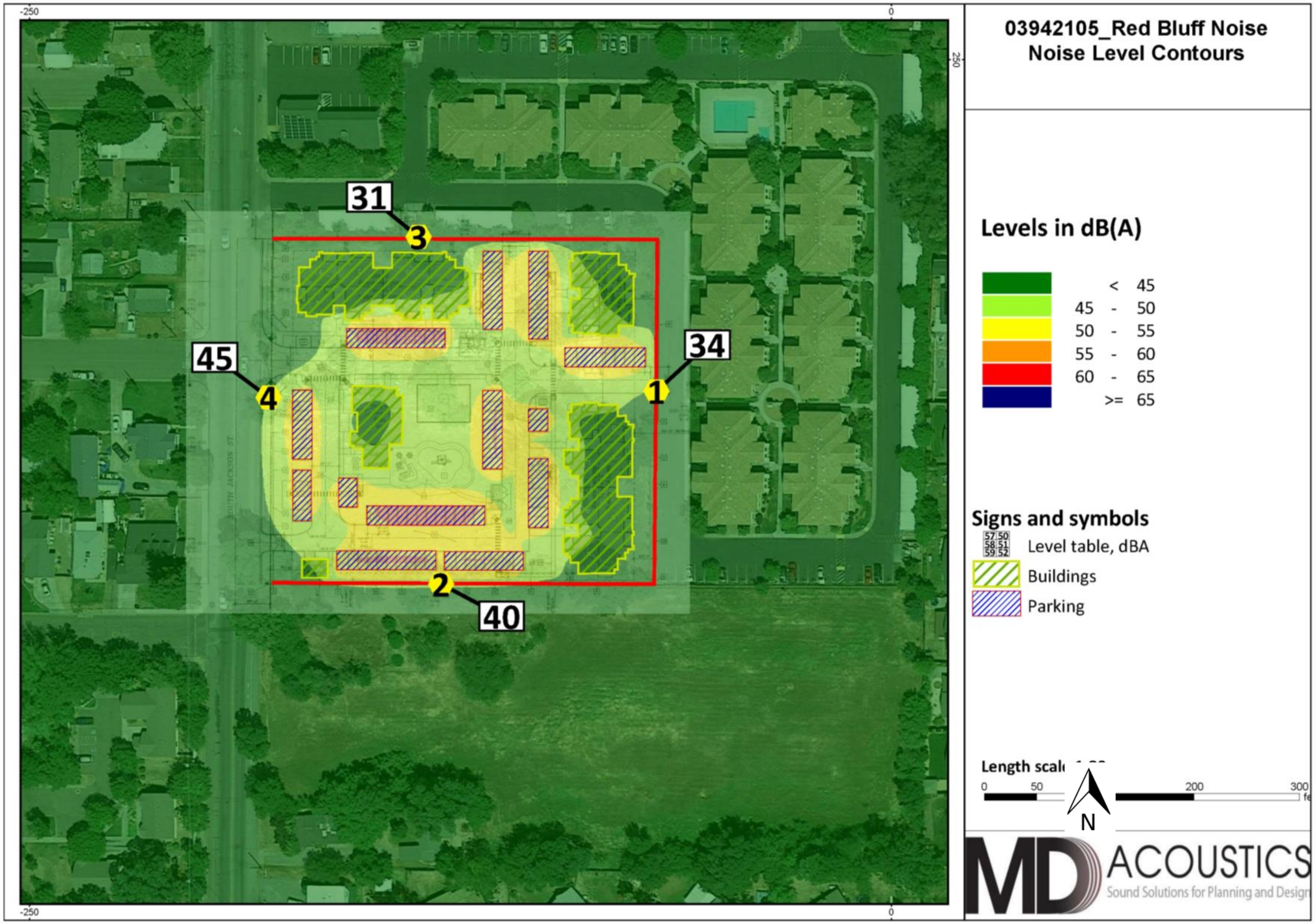
Location	Roadway Noise Source	Noise Level at Building Facade[1]	Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA DNL	Interior Noise Level w/ Typical Residential Windows (STC≥ 25)		STC Rating for Windows Facing Subject Roadway[4]
				Window Open[2]	Windows Closed[3]	
Facades facing Jackson St	Jackson St	63	18	51	43	23

Notes:
1. Noise level from FHWA Noise Projection Model.
2. A minimum of 12 dBA noise reduction is assumed with a "windows open" condition.
3. A minimum of 20 dBA noise reduction is assumed with a "windows closed" condition.
4. Indicates the required STC rating to meet the interior noise standard.

Projected existing plus project noise levels at the nearest façade (Building B) are anticipated to measure 63 dBA Ldn. Typical building construction would provide a 20 dBA noise reduction with a "windows closed" condition. Standard windows provide a STC 25 rating which would meet or exceed the needed STC rating. Therefore, interior noise levels are anticipated to measure 43 dBA which does not exceed the 45 dBA Ldn noise limit.

Exhibit F

Operational Noise Levels Leq



8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 7.

Table 7: Typical Construction Equipment Noise Levels[1]

Type	Lmax (dBA) at 50 Feet
Backhoe	80
Truck	88
Concrete Mixer	85
Pneumatic Tool	85
Pump	76
Saw, Electric	76
Air Compressor	81
Generator	81
Paver	89
Roller	74

Notes:
[1] Referenced Noise Levels from FTA noise and vibration manual.

Construction noise is considered a short-term impact and would be considered significant if construction activities are taken outside the allowable times as described in the County's Municipal Code (Chapter 9 measure N-2.4a). Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise. The impact is considered less than significant however construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of a grader, a dozer, an excavator, and a backhoe operating at 50 feet from the nearest sensitive receptor.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 212 feet have the potential to reach 70 dBA L_{eq} at the nearest sensitive receptors. Noise levels for the other construction phases would be lower and range between 68 - 69 dBA.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bulldozer. A large bulldozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

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

$$PPV_{equipment} = PPV_{ref} \, (100/D_{rec})^{n}$$

Where: PPV_{ref} = reference PPV at 100ft.
D_{rec} = distance from equipment to receiver in ft.
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 8 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 8: Guideline Vibration Damage Potential Threshold Criteria

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

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 9 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

<Table 9 Next Page>

Table 9: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 35 feet (distance residential structure from the property line), a large bulldozer would yield a worst-case 0.055 PPV (in/sec) which may be perceptible for short periods of time during grading along the eastern property line of the project site, but is below any threshold of damage. The impact is less than significant and no mitigation is required.

8.3 Construction Noise Mitigation Measures

1. Construction shall occur during the permissible hours (7AM to 10PM) as defined in Chapter 9 measure N-2.4a.
2. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.
3. The contractor shall locate equipment staging areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.
4. Idling equipment shall be turned off when not in use.
5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

County of Tehama: General Plan Noise Element. Chapter 9.

TJW Engineering, Red Bluff Apartments Traffic Impact Analysis, April 2022

Appendix A:
Photographs and Field Measurement Data

MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

AZ Office
4960 S. Gilbert Rd, Ste 1-461
Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

24-Hour Continuous Noise Measurement Datasheet

Project: Red Bluff
Site Address/Location: S Jackson St
Date: 3/3/2022 to 3/4/2022
Field Tech/Engineer: Jason Schuyler

Site Observations: Cloudy with light showers. Meter approximately 40 ft from center line of the road.

General Location:
Sound Meter: NTi XL2 **SN:** 5967
Settings: A-weighted, slow, 1-min, 24-hour duration
Meteorological Con.: 60degrees F, 2 to 5 mph wind, rain
Site ID: LT-1

Site Topo: Flat
Ground Type: Soft site, Open raw ground with a road

Noise Source(s) w/ Distance:
1 - C/L of Jackson is approx. 40ft away

Figure 1: LT-1 Monitoring Location

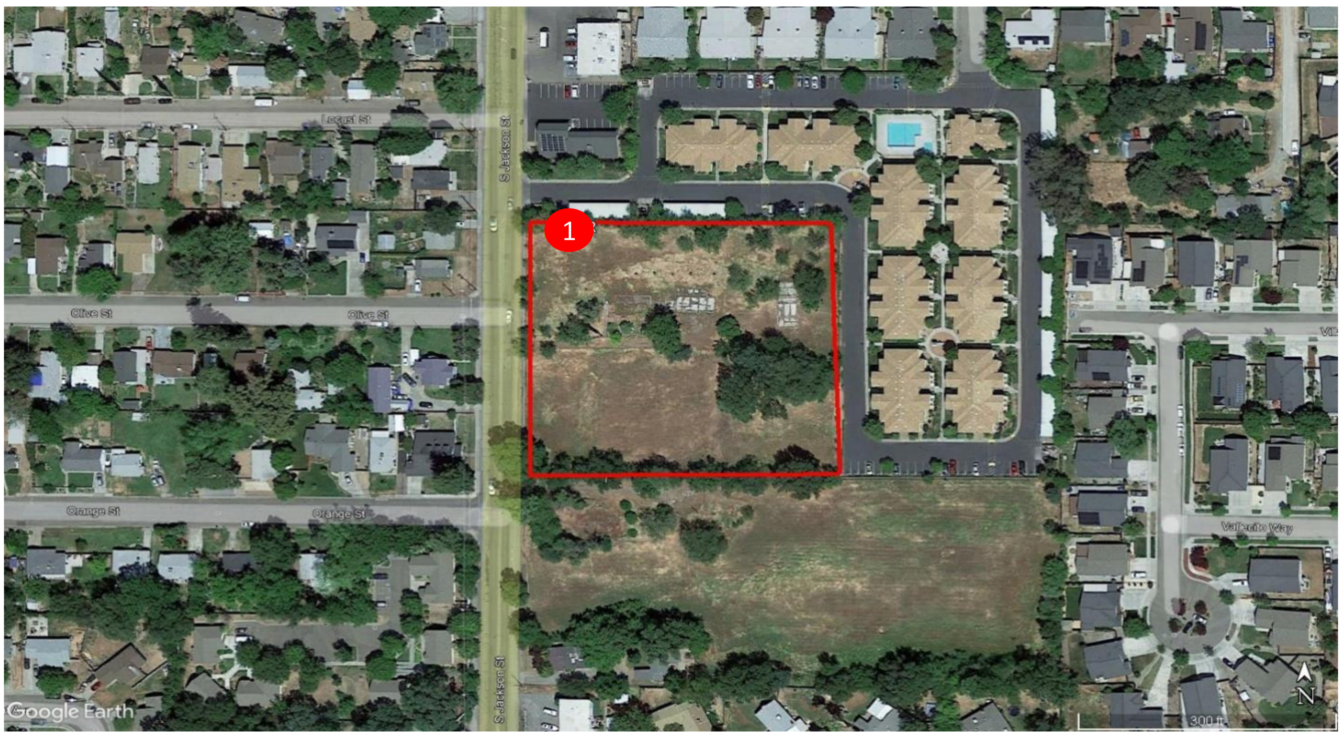


Figure 2: ST-1 Photo

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Chandler, AZ 85249

CA Office
1197 E Los Angeles Ave, C-256
Simi Valley, CA 93065

24-Hour Noise Measurement Datasheet - Cont.

Project: Red Bluff
Day: 1 of 1
Site Address/Location: S Jackson St
Site ID: LT-1

Date	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
3/3/2022	7:00 AM	8:00 AM	72.1	87.8	51.7	76.8	74.8	72.7	70.5	57.5
3/3/2022	8:00 AM	9:00 AM	70.2	85.9	49.8	74.9	72.9	70.8	68.6	55.6
3/3/2022	9:00 AM	10:00 AM	69.2	84.9	48.8	73.9	71.9	69.8	67.6	54.6
3/3/2022	10:00 AM	11:00 AM	69.1	84.8	48.7	73.8	71.8	69.7	67.5	54.5
3/3/2022	11:00 AM	12:00 PM	69.3	85.0	48.9	74.0	72.0	69.9	67.7	54.7
3/3/2022	12:00 PM	1:00 PM	69.4	85.1	49.0	74.1	72.1	70.0	67.8	54.8
3/3/2022	1:00 PM	2:00 PM	69.5	85.2	49.1	74.2	72.2	70.1	67.9	54.9
3/3/2022	2:00 PM	3:00 PM	69.8	85.5	49.4	74.5	72.5	70.4	68.2	55.2
3/3/2022	3:00 PM	4:00 PM	70.9	86.6	50.5	75.6	73.6	71.5	69.3	56.3
3/3/2022	4:00 PM	5:00 PM	72.5	88.2	52.1	77.2	75.2	73.1	70.9	57.9
3/3/2022	5:00 PM	6:00 PM	72.1	87.8	51.7	76.8	74.8	72.7	70.5	57.5
3/3/2022	6:00 PM	7:00 PM	70.4	86.1	50.0	75.1	73.1	71.0	68.8	55.8
3/3/2022	7:00 PM	8:00 PM	69.0	84.7	48.6	73.7	71.7	69.6	67.4	54.4
3/3/2022	8:00 PM	9:00 PM	67.9	83.6	47.5	72.6	70.6	68.5	66.3	53.3
3/3/2022	9:00 PM	10:00 PM	67.2	82.9	46.8	71.9	69.9	67.8	65.6	52.6
3/3/2022	10:00 PM	11:00 PM	66.2	81.9	45.8	70.9	68.9	66.8	64.6	51.6
3/3/2022	11:00 PM	12:00 AM	65.6	81.3	45.2	70.3	68.3	66.2	64.0	51.0
3/4/2022	12:00 AM	1:00 AM	64.1	79.8	43.7	68.8	66.8	64.7	62.5	49.5
3/4/2022	1:00 AM	2:00 AM	61.6	77.3	41.2	66.3	64.3	62.2	60.0	47.0
3/4/2022	2:00 AM	3:00 AM	60.4	76.1	40.0	65.1	63.1	61.0	58.8	45.8
3/4/2022	3:00 AM	4:00 AM	58.6	74.3	38.2	63.3	61.3	59.2	57.0	44.0
3/4/2022	4:00 AM	5:00 AM	59.6	75.3	39.2	64.3	62.3	60.2	58.0	45.0
3/4/2022	5:00 AM	6:00 AM	63.4	79.1	43.0	68.1	66.1	64.0	61.8	48.8
3/4/2022	6:00 AM	7:00 AM	69.8	85.5	49.4	74.5	72.5	70.4	68.2	55.2

Ldn: 69.7

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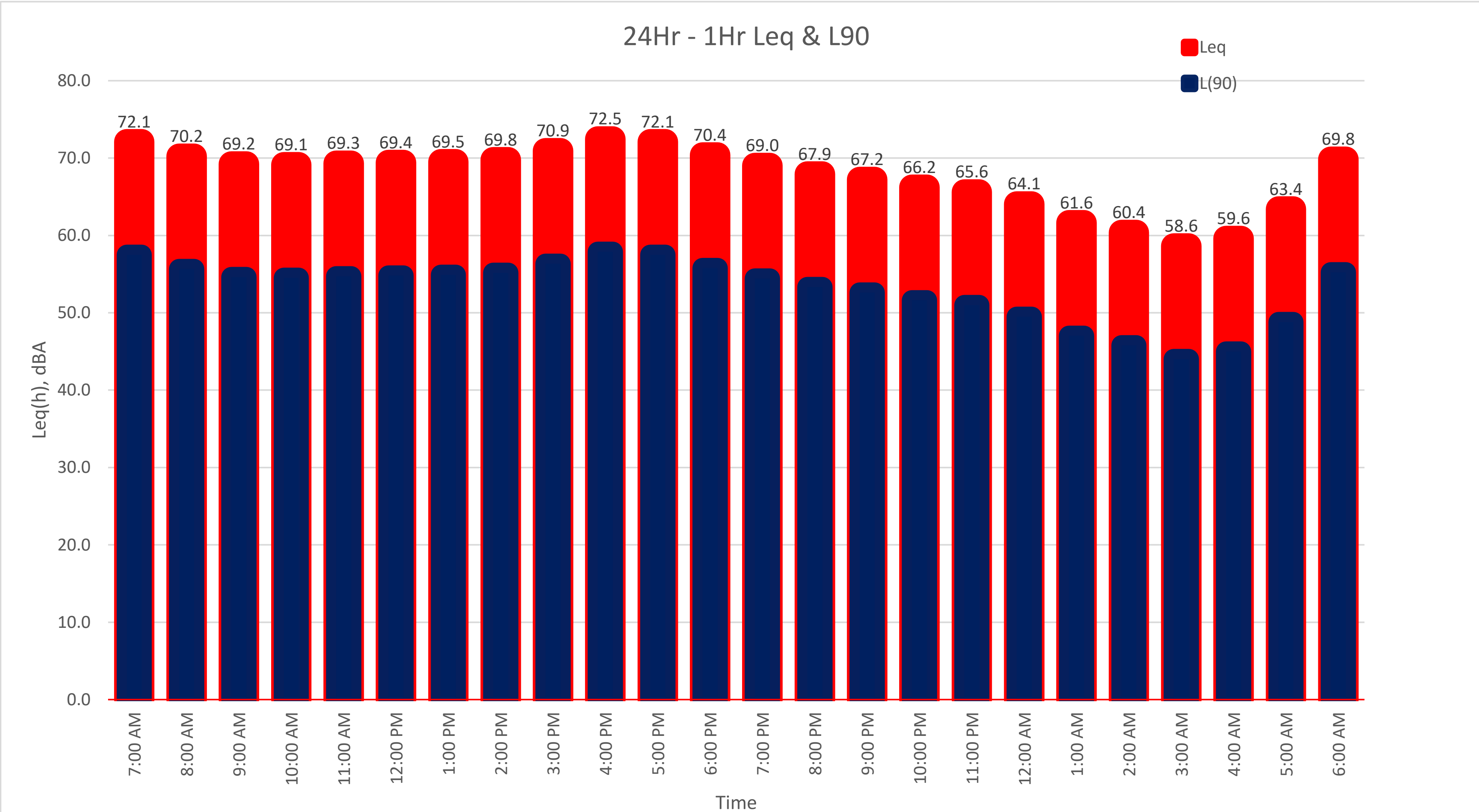
24-Hour Continuous Noise Measurement Datasheet - Cont.

Project: Red Bluff **Day:** 1 of 1
Site Address/Location: S Jackson St
Site ID: LT-1



Appendix B:

SoundPLAN Input/Outputs

Red Bluff Noise
Octave spectra of the sources in dB(A) - 001 - Red Bluff: Outdoor SP

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Parking	PLot	115.14			54.2	74.8	0.0	0.0		0	100%/24h	Typical spectrum	58.1	69.7	62.2	66.7	66.8	67.2	64.5	58.3	45.5
Parking	PLot	35.83			54.5	70.0	0.0	0.0		0	100%/24h	Typical spectrum	53.4	65.0	57.5	62.0	62.1	62.5	59.8	53.6	40.8
Parking	PLot	127.67			55.0	76.0	0.0	0.0		0	100%/24h	Typical spectrum	59.4	71.0	63.5	68.0	68.1	68.5	65.8	59.6	46.8
Parking	PLot	124.42			54.5	75.5	0.0	0.0		0	100%/24h	Typical spectrum	58.8	70.4	62.9	67.4	67.5	67.9	65.2	59.0	46.2
Parking	PLot	157.80			55.0	77.0	0.0	0.0		0	100%/24h	Typical spectrum	60.3	71.9	64.4	68.9	69.0	69.4	66.7	60.5	47.7
Parking	PLot	188.14			56.2	79.0	0.0	0.0		0	100%/24h	Typical spectrum	62.3	73.9	66.4	70.9	71.0	71.4	68.7	62.5	49.7
Parking	PLot	45.07			53.5	70.0	0.0	0.0		0	100%/24h	Typical spectrum	53.4	65.0	57.5	62.0	62.1	62.5	59.8	53.6	40.8
Parking	PLot	140.86			54.5	76.0	0.0	0.0		0	100%/24h	Typical spectrum	59.4	71.0	63.5	68.0	68.1	68.5	65.8	59.6	46.8
Parking	PLot	125.64			53.8	74.8	0.0	0.0		0	100%/24h	Typical spectrum	58.1	69.7	62.2	66.7	66.8	67.2	64.5	58.3	45.5
Parking	PLot	161.12			54.9	77.0	0.0	0.0		0	100%/24h	Typical spectrum	60.3	71.9	64.4	68.9	69.0	69.4	66.7	60.5	47.7
Parking	PLot	78.19			54.1	73.0	0.0	0.0		0	100%/24h	Typical spectrum	56.4	68.0	60.5	65.0	65.1	65.5	62.8	56.6	43.8
Parking	PLot	111.23			55.0	75.5	0.0	0.0		0	100%/24h	Typical spectrum	58.8	70.4	62.9	67.4	67.5	67.9	65.2	59.0	46.2
Parking	PLot	129.29			54.9	76.0	0.0	0.0		0	100%/24h	Typical spectrum	59.4	71.0	63.5	68.0	68.1	68.5	65.8	59.6	46.8

Red Bluff Noise
Contribution level - 001 - Red Bluff: Outdoor SP

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB
Receiver -68,154 Fl G Lr,lim dB(A) Leq,d 34.3 dB(A)					
Parking	Default parking lot noise	PLot		20.0	0.0
Parking	Default parking lot noise	PLot		20.3	0.0
Parking	Default parking lot noise	PLot		21.3	0.0
Parking	Default parking lot noise	PLot		33.3	0.0
Parking	Default parking lot noise	PLot		7.4	0.0
Parking	Default parking lot noise	PLot		5.7	0.0
Parking	Default parking lot noise	PLot		4.4	0.0
Parking	Default parking lot noise	PLot		20.2	0.0
Parking	Default parking lot noise	PLot		14.3	0.0
Parking	Default parking lot noise	PLot		13.0	0.0
Parking	Default parking lot noise	PLot		16.2	0.0
Parking	Default parking lot noise	PLot		13.4	0.0
Parking	Default parking lot noise	PLot		11.8	0.0
Receiver -131,98 Fl G Lr,lim dB(A) Leq,d 40.4 dB(A)					
Parking	Default parking lot noise	PLot		19.9	0.0
Parking	Default parking lot noise	PLot		17.1	0.0
Parking	Default parking lot noise	PLot		18.2	0.0
Parking	Default parking lot noise	PLot		17.5	0.0
Parking	Default parking lot noise	PLot		20.8	0.0
Parking	Default parking lot noise	PLot		21.0	0.0
Parking	Default parking lot noise	PLot		20.3	0.0
Parking	Default parking lot noise	PLot		23.7	0.0
Parking	Default parking lot noise	PLot		16.2	0.0
Parking	Default parking lot noise	PLot		24.7	0.0
Parking	Default parking lot noise	PLot		33.1	0.0
Parking	Default parking lot noise	PLot		36.1	0.0
Parking	Default parking lot noise	PLot		35.5	0.0
Receiver -137,199 Fl G Lr,lim dB(A) Leq,d 30.5 dB(A)					
Parking	Default parking lot noise	PLot		18.7	0.0
Parking	Default parking lot noise	PLot		26.7	0.0
Parking	Default parking lot noise	PLot		26.8	0.0
Parking	Default parking lot noise	PLot		13.7	0.0
Parking	Default parking lot noise	PLot		11.8	0.0
Parking	Default parking lot noise	PLot		7.2	0.0
Parking	Default parking lot noise	PLot		2.2	0.0
Parking	Default parking lot noise	PLot		12.5	0.0
Parking	Default parking lot noise	PLot		6.2	0.0
Parking	Default parking lot noise	PLot		9.2	0.0
Parking	Default parking lot noise	PLot		12.8	0.0
Parking	Default parking lot noise	PLot		9.4	0.0
Parking	Default parking lot noise	PLot		8.7	0.0
Receiver -181,152 Fl G Lr,lim dB(A) Leq,d 45.2 dB(A)					
Parking	Default parking lot noise	PLot		35.2	0.0

Source	Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
Parking	Default parking lot noise	PLot		23.5	0.0	
Parking	Default parking lot noise	PLot		25.7	0.0	
Parking	Default parking lot noise	PLot		22.0	0.0	
Parking	Default parking lot noise	PLot		43.6	0.0	
Parking	Default parking lot noise	PLot		33.1	0.0	
Parking	Default parking lot noise	PLot		28.2	0.0	
Parking	Default parking lot noise	PLot		21.2	0.0	
Parking	Default parking lot noise	PLot		12.3	0.0	
Parking	Default parking lot noise	PLot		19.0	0.0	
Parking	Default parking lot noise	PLot		31.3	0.0	
Parking	Default parking lot noise	PLot		30.9	0.0	
Parking	Default parking lot noise	PLot		25.8	0.0	

Red Bluff Noise
Contribution spectra - 001 - Red Bluff: Outdoor SP

Source	Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Receiver -68,154 Fl G Lr,lim dB(A) Leq,d 34.3 dB(A)																													
Parking	Leq,d	13.0	0.4	0.4	0.4	5.9	5.9	5.9	-6.1	-6.1	-6.1	-4.1	-4.1	-4.1	-4.1	-4.1	-4.1	-3.4	-3.4	-3.4	-7.7	-7.7	-7.7	-18.4	-18.4	-18.4	-42.9	-42.9	-42.9
Parking	Leq,d	14.3	-1.5	-1.5	-1.5	4.6	4.6	4.6	-6.9	-6.9	-6.9	3.3	3.3	3.3	1.5	1.5	1.5	1.1	1.1	1.1	-5.2	-5.2	-5.2	-17.4	-17.4	-17.4	-40.9	-40.9	-40.9
Parking	Leq,d	20.2	4.8	4.8	4.8	12.5	12.5	12.5	2.4	2.4	2.4	6.1	6.1	6.1	5.5	5.5	5.5	5.7	5.7	5.7	-0.7	-0.7	-0.7	-14.3	-14.3	-14.3	-40.8	-40.8	-40.8
Parking	Leq,d	11.8	-0.9	-0.9	-0.9	4.6	4.6	4.6	-7.3	-7.3	-7.3	-6.0	-6.0	-6.0	-4.2	-4.2	-4.2	-3.8	-3.8	-3.8	-9.4	-9.4	-9.4	-23.2	-23.2	-23.2	-54.6	-54.6	-54.6
Parking	Leq,d	13.4	-0.3	-0.3	-0.3	4.8	4.8	4.8	-7.3	-7.3	-7.3	-6.0	-6.0	-6.0	-0.2	-0.2	-0.2	2.0	2.0	2.0	-5.4	-5.4	-5.4	-22.8	-22.8	-22.8	-61.1	-61.1	-61.1
Parking	Leq,d	16.2	2.8	2.8	2.8	8.2	8.2	8.2	-3.9	-3.9	-3.9	-2.6	-2.6	-2.6	2.9	2.9	2.9	3.2	3.2	3.2	-3.9	-3.9	-3.9	-19.1	-19.1	-19.1	-52.3	-52.3	-52.3
Parking	Leq,d	4.4	-7.4	-7.4	-7.4	-2.3	-2.3	-2.3	-14.5	-14.5	-14.5	-13.3	-13.3	-13.3	-16.2	-16.2	-16.2	-13.8	-13.8	-13.8	-20.3	-20.3	-20.3	-33.0	-33.0	-33.0	-71.3	-71.3	-71.3
Parking	Leq,d	21.3	5.8	5.8	5.8	13.9	13.9	13.9	4.0	4.0	4.0	7.2	7.2	7.2	6.2	6.2	6.2	5.3	5.3	5.3	-0.9	-0.9	-0.9	-13.1	-13.1	-13.1	-37.4	-37.4	-37.4
Parking	Leq,d	20.3	4.0	4.0	4.0	13.1	13.1	13.1	4.0	4.0	4.0	6.7	6.7	6.7	4.6	4.6	4.6	3.6	3.6	3.6	-2.4	-2.4	-2.4	-15.9	-15.9	-15.9	-43.9	-43.9	-43.9
Parking	Leq,d	20.0	4.4	4.4	4.4	12.7	12.7	12.7	3.5	3.5	3.5	6.2	6.2	6.2	4.6	4.6	4.6	2.9	2.9	2.9	-2.4	-2.4	-2.4	-17.4	-17.4	-17.4	-49.3	-49.3	-49.3
Parking	Leq,d	5.7	-6.0	-6.0	-6.0	-1.1	-1.1	-1.1	-13.1	-13.1	-13.1	-11.8	-11.8	-11.8	-14.7	-14.7	-14.7	-12.7	-12.7	-12.7	-19.0	-19.0	-19.0	-33.8	-33.8	-33.8	-74.8	-74.8	-74.8
Parking	Leq,d	7.4	-4.6	-4.6	-4.6	0.7	0.7	0.7	-11.1	-11.1	-11.1	-9.6	-9.6	-9.6	-12.4	-12.4	-12.4	-12.1	-12.1	-12.1	-17.3	-17.3	-17.3	-31.5	-31.5	-31.5	-70.8	-70.8	-70.8
Parking	Leq,d	33.3	17.0	17.0	17.0	25.9	25.9	25.9	16.5	16.5	16.5	19.6	19.6	19.6	18.1	18.1	18.1	16.7	16.7	16.7	11.2	11.2	11.2	0.7	0.7	0.7	-16.8	-16.8	-16.8
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
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Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												

Red Bluff Noise
Contribution spectra - 001 - Red Bluff: Outdoor SP

Source	Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Remaining contrib. of src "Parking"	Leq,d																												
Receiver -131,98 Fl G Lr,lim dB(A) Leq,d 40.4 dB(A)																													
Parking	Leq,d	24.7	8.3	8.3	8.3	17.1	17.1	17.1	8.2	8.2	8.2	11.5	11.5	11.5	9.9	9.9	9.9	9.0	9.0	9.0	2.8	2.8	2.8	-9.8	-9.8	-9.8	-33.9	-33.9	-33.9
Parking	Leq,d	16.2	0.2	0.2	0.2	8.8	8.8	8.8	-0.6	-0.6	-0.6	2.2	2.2	2.2	1.2	1.2	1.2	0.0	0.0	0.0	-6.6	-6.6	-6.6	-20.4	-20.4	-20.4	-48.2	-48.2	-48.2
Parking	Leq,d	23.7	7.8	7.8	7.8	16.5	16.5	16.5	6.9	6.9	6.9	10.1	10.1	10.1	8.3	8.3	8.3	7.2	7.2	7.2	0.6	0.6	0.6	-12.3	-12.3	-12.3	-37.1	-37.1	-37.1
Parking	Leq,d	35.5	19.4	19.4	19.4	28.3	28.3	28.3	18.6	18.6	18.6	21.5	21.5	21.5	20.3	20.3	20.3	19.0	19.0	19.0	13.3	13.3	13.3	3.2	3.2	3.2	-12.9	-12.9	-12.9
Parking	Leq,d	36.1	19.8	19.8	19.8	28.8	28.8	28.8	19.2	19.2	19.2	22.3	22.3	22.3	21.0	21.0	21.0	19.8	19.8	19.8	14.1	14.1	14.1	3.7	3.7	3.7	-12.9	-12.9	-12.9
Parking	Leq,d	33.1	17.2	17.2	17.2	25.9	25.9	25.9	16.2	16.2	16.2	19.2	19.2	19.2	17.6	17.6	17.6	16.5	16.5	16.5	10.5	10.5	10.5	-0.7	-0.7	-0.7	-19.5	-19.5	-19.5
Parking	Leq,d	20.3	3.7	3.7	3.7	12.8	12.8	12.8	4.0	4.0	4.0	6.9	6.9	6.9	5.4	5.4	5.4	4.5	4.5	4.5	-1.9	-1.9	-1.9	-14.7	-14.7	-14.7	-38.6	-38.6	-38.6
Parking	Leq,d	18.2	3.2	3.2	3.2	11.0	11.0	11.0	1.3	1.3	1.3	4.1	4.1	4.1	2.0	2.0	2.0	2.1	2.1	2.1	-4.7	-4.7	-4.7	-21.6	-21.6	-21.6	-57.3	-57.3	-57.3
Parking	Leq,d	17.1	2.0	2.0	2.0	9.9	9.9	9.9	0.2	0.2	0.2	3.0	3.0	3.0	0.8	0.8	0.8	0.9	0.9	0.9	-6.0	-6.0	-6.0	-22.4	-22.4	-22.4	-57.6	-57.6	-57.6
Parking	Leq,d	19.9	3.3	3.3	3.3	12.0	12.0	12.0	3.4	3.4	3.4	6.2	6.2	6.2	6.0	6.0	6.0	5.1	5.1	5.1	-2.0	-2.0	-2.0	-17.6	-17.6	-17.6	-50.2	-50.2	-50.2
Parking	Leq,d	21.0	4.8	4.8	4.8	13.6	13.6	13.6	4.2	4.2	4.2	7.4	7.4	7.4	5.9	5.9	5.9	5.3	5.3	5.3	-1.3	-1.3	-1.3	-14.7	-14.7	-14.7	-41.6	-41.6	-41.6
Parking	Leq,d	20.8	5.0	5.0	5.0	13.6	13.6	13.6	4.2	4.2	4.2	7.0	7.0	7.0	5.3	5.3	5.3	4.3	4.3	4.3	-2.5	-2.5	-2.5	-16.8	-16.8	-16.8	-46.0	-46.0	-46.0
Parking	Leq,d	17.5	1.9	1.9	1.9	9.7	9.7	9.7	0.9	0.9	0.9	4.4	4.4	4.4	2.8	2.8	2.8	2.1	2.1	2.1	-5.1	-5.1	-5.1	-21.2	-21.2	-21.2	-55.4	-55.4	-55.4
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												

Source	Time slice	Sum dB(A)	50Hz dB(A)	63Hz dB(A)	80Hz dB(A)	100Hz dB(A)	125Hz dB(A)	160Hz dB(A)	200Hz dB(A)	250Hz dB(A)	315Hz dB(A)	400Hz dB(A)	500Hz dB(A)	630Hz dB(A)	800Hz dB(A)	1kHz dB(A)	1.25kHz dB(A)	1.6kHz dB(A)	2kHz dB(A)	2.5kHz dB(A)	3.15kHz dB(A)	4kHz dB(A)	5kHz dB(A)	6.3kHz dB(A)	8kHz dB(A)	10kHz dB(A)	12.5kHz dB(A)	16kHz dB(A)	20kHz dB(A)
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver -137,199 Fl G Lr,lim dB(A) Leq,d 30.5 dB(A)																													
Parking	Leq,d	9.2	-2.7	-2.7	-2.7	2.3	2.3	2.3	-10.3	-10.3	-10.3	-9.3	-9.3	-9.3	-11.4	-11.4	-11.4	-7.7	-7.7	-7.7	-10.9	-10.9	-10.9	-26.3	-26.3	-26.3	-60.3	-60.3	-60.3
Parking	Leq,d	6.2	-5.9	-5.9	-5.9	-0.4	-0.4	-0.4	-12.8	-12.8	-12.8	-11.9	-11.9	-11.9	-14.8	-14.8	-14.8	-13.6	-13.6	-13.6	-17.4	-17.4	-17.4	-29.2	-29.2	-29.2	-57.8	-57.8	-57.8
Parking	Leq,d	12.5	0.3	0.3	0.3	5.8	5.8	5.8	-6.7	-6.7	-6.7	-5.7	-5.7	-5.7	-8.1	-8.1	-8.1	-6.0	-6.0	-6.0	-9.2	-9.2	-9.2	-21.3	-21.3	-21.3	-49.0	-49.0	-49.0
Parking	Leq,d	8.7	-2.9	-2.9	-2.9	1.9	1.9	1.9	-10.9	-10.9	-10.9	-10.1	-10.1	-10.1	-12.9	-12.9	-12.9	-9.1	-9.1	-9.1	-13.3	-13.3	-13.3	-28.4	-28.4	-28.4	-66.4	-66.4	-66.4
Parking	Leq,d	9.4	-2.4	-2.4	-2.4	2.5	2.5	2.5	-10.1	-10.1	-10.1	-8.9	-8.9	-8.9	-11.1	-11.1	-11.1	-7.4	-7.4	-7.4	-12.6	-12.6	-12.6	-27.4	-27.4	-27.4	-64.3	-64.3	-64.3
Parking	Leq,d	12.8	1.0	1.0	1.0	6.1	6.1	6.1	-6.5	-6.5	-6.5	-5.6	-5.6	-5.6	-7.9	-7.9	-7.9	-6.6	-6.6	-6.6	-10.3	-10.3	-10.3	-23.8	-23.8	-23.8	-57.1	-57.1	-57.1
Parking	Leq,d	2.2	-10.1	-10.1	-10.1	-4.7	-4.7	-4.7	-17.0	-17.0	-17.0	-15.6	-15.6	-15.6	-16.2	-16.2	-16.2	-15.0	-15.0	-15.0	-19.6	-19.6	-19.6	-31.9	-31.9	-31.9	-64.2	-64.2	-64.2
Parking	Leq,d	26.8	8.8	8.8	8.8	17.8	17.8	17.8	9.4	9.4	9.4	13.6	13.6	13.6	13.5	13.5	13.5	14.4	14.4	14.4	9.1	9.1	9.1	-3.2	-3.2	-3.2	-28.7	-28.7	-28.7
Parking	Leq,d	26.7	9.6	9.6	9.6	18.4	18.4	18.4	9.2	9.2	9.2	13.1	13.1	13.1	12.4	12.4	12.4	14.0	14.0	14.0	8.8	8.8	8.8	-2.4	-2.4	-2.4	-24.2	-24.2	-24.2
Parking	Leq,d	18.7	5.7	5.7	5.7	11.2	11.2	11.2	-1.1	-1.1	-1.1	0.0	0.0	0.0	3.9	3.9	3.9	3.9	3.9	3.9	0.6	0.6	0.6	-11.0	-11.0	-11.0	-32.4	-32.4	-32.4
Parking	Leq,d	7.2	-4.8	-4.8	-4.8	0.4	0.4	0.4	-12.1	-12.1	-12.1	-10.2	-10.2	-10.2	-11.8	-11.8	-11.8	-10.5	-10.5	-10.5	-15.5	-15.5	-15.5	-29.5	-29.5	-29.5	-63.4	-63.4	-63.4
Parking	Leq,d	11.8	-0.4	-0.4	-0.4	5.1	5.1	5.1	-7.6	-7.6	-7.6	-6.6	-6.6	-6.6	-8.5	-8.5	-8.5	-6.6	-6.6	-6.6	-10.3	-10.3	-10.3	-23.2	-23.2	-23.2	-52.1	-52.1	-52.1
Parking	Leq,d	13.7	0.5	0.5	0.5	6.7	6.7	6.7	-5.4	-5.4	-5.4	-2.9	-2.9	-2.9	-5.0	-5.0	-5.0	-4.6	-4.6	-4.6	-2.3	-2.3	-2.3	-16.1	-16.1	-16.1	-47.3	-47.3	-47.3
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												

Red Bluff Noise
Contribution spectra - 001 - Red Bluff: Outdoor SP

Source	Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Receiver -181,152 Fl G Lr,lim dB(A) Leq,d 45.2 dB(A)																													
Parking	Leq,d	19.0	2.5	2.5	2.5	8.7	8.7	8.7	-3.5	-3.5	-3.5	-2.7	-2.7	-2.7	-4.6	-4.6	-4.6	10.8	10.8	10.8	5.5	5.5	5.5	-6.9	-6.9	-6.9	-47.1	-47.1	-47.1
Parking	Leq,d	12.3	-1.5	-1.5	-1.5	4.6	4.6	4.6	-9.0	-9.0	-9.0	-8.3	-8.3	-8.3	-3.9	-3.9	-3.9	-1.1	-1.1	-1.1	-2.6	-2.6	-2.6	-14.6	-14.6	-14.6	-55.0	-55.0	-55.0
Parking	Leq,d	21.2	5.0	5.0	5.0	11.3	11.3	11.3	-2.7	-2.7	-2.7	-2.0	-2.0	-2.0	4.8	4.8	4.8	12.4	12.4	12.4	7.8	7.8	7.8	-4.8	-4.8	-4.8	-40.7	-40.7	-40.7
Parking	Leq,d	25.8	7.8	7.8	7.8	16.5	16.5	16.5	2.6	2.6	2.6	5.8	5.8	5.8	11.1	11.1	11.1	16.4	16.4	16.4	11.6	11.6	11.6	-1.5	-1.5	-1.5	-33.8	-33.8	-33.8
Parking	Leq,d	30.9	12.3	12.3	12.3	21.6	21.6	21.6	8.2	8.2	8.2	11.9	11.9	11.9	17.1	17.1	17.1	20.9	20.9	20.9	16.8	16.8	16.8	5.4	5.4	5.4	-22.2	-22.2	-22.2
Parking	Leq,d	31.3	13.6	13.6	13.6	22.7	22.7	22.7	9.7	9.7	9.7	13.2	13.2	13.2	17.7	17.7	17.7	19.5	19.5	19.5	17.3	17.3	17.3	6.1	6.1	6.1	-19.8	-19.8	-19.8
Parking	Leq,d	28.2	9.5	9.5	9.5	19.0	19.0	19.0	7.4	7.4	7.4	11.4	11.4	11.4	15.5	15.5	15.5	17.2	17.2	17.2	13.7	13.7	13.7	4.2	4.2	4.2	-17.8	-17.8	-17.8
Parking	Leq,d	25.7	8.1	8.1	8.1	16.6	16.6	16.6	2.2	2.2	2.2	6.5	6.5	6.5	13.0	13.0	13.0	15.4	15.4	15.4	10.8	10.8	10.8	-2.9	-2.9	-2.9	-37.1	-37.1	-37.1
Parking	Leq,d	23.5	6.0	6.0	6.0	14.5	14.5	14.5	0.5	0.5	0.5	3.7	3.7	3.7	10.4	10.4	10.4	13.0	13.0	13.0	8.7	8.7	8.7	-4.2	-4.2	-4.2	-35.3	-35.3	-35.3
Parking	Leq,d	35.2	15.8	15.8	15.8	25.1	25.1	25.1	13.7	13.7	13.7	20.0	20.0	20.0	23.4	23.4	23.4	24.2	24.2	24.2	20.6	20.6	20.6	11.0	11.0	11.0	-11.1	-11.1	-11.1
Parking	Leq,d	33.1	14.3	14.3	14.3	23.8	23.8	23.8	12.5	12.5	12.5	16.8	16.8	16.8	20.3	20.3	20.3	22.0	22.0	22.0	18.8	18.8	18.8	9.8	9.8	9.8	-10.4	-10.4	-10.4
Parking	Leq,d	43.6	24.4	24.4	24.4	34.1	34.1	34.1	24.9	24.9	24.9	29.2	29.2	29.2	30.9	30.9	30.9	31.8	31.8	31.8	28.8	28.8	28.8	21.6	21.6	21.6	5.9	5.9	5.9
Parking	Leq,d	22.0	6.1	6.1	6.1	14.1	14.1	14.1	0.3	0.3	0.3	2.9	2.9	2.9	8.1	8.1	8.1	10.0	10.0	10.0	4.7	4.7	4.7	-9.3	-9.3	-9.3	-46.3	-46.3	-46.3
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												

Red Bluff Noise
Contribution spectra - 001 - Red Bluff: Outdoor SP

Source	Time slice	Sum dB(A)	50Hz dB(A)	63Hz dB(A)	80Hz dB(A)	100Hz dB(A)	125Hz dB(A)	160Hz dB(A)	200Hz dB(A)	250Hz dB(A)	315Hz dB(A)	400Hz dB(A)	500Hz dB(A)	630Hz dB(A)	800Hz dB(A)	1kHz dB(A)	1.25kHz dB(A)	1.6kHz dB(A)	2kHz dB(A)	2.5kHz dB(A)	3.15kHz dB(A)	4kHz dB(A)	5kHz dB(A)	6.3kHz dB(A)	8kHz dB(A)	10kHz dB(A)	12.5kHz dB(A)	16kHz dB(A)	20kHz dB(A)
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												
Remaining contrib. of src "Parking"	Leq,d																												

Appendix C:
Traffic Calculations

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	Red Bluff Apartments	JOB #:	0394-2021-05
ROADWAY:	Jackson St Lay Ave to Reed Ave - Existing	DATE:	19-Apr-22
LOCATION:	1ST FLOOR FAÇADE - Bldg B	ENGINEER:	R.Pearson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	9,586
SPEED =	35
PK HR % =	10
NEAR LANE/FAR LANE DIS	0
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	959

RECEIVER INPUT DATA

RECEIVER DISTANCE =		58
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		58
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	58.11	- -
MEDIUM TRUCKS	4.0	58.02	- -
HEAVY TRUCKS	8.0	58.05	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.8	59.9	58.1	52.1	60.7	61.3
MEDIUM TRUCKS	54.3	52.8	46.4	44.9	53.3	53.6
HEAVY TRUCKS	55.5	54.1	45.1	46.3	54.7	54.8
NOISE LEVELS (dBA)	63.3	61.5	58.6	53.7	62.3	62.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.8	59.9	58.1	52.1	60.7	61.3
MEDIUM TRUCKS	54.3	52.8	46.4	44.9	53.3	53.6
HEAVY TRUCKS	55.5	54.1	45.1	46.3	54.7	54.8
NOISE LEVELS (dBA)	63.3	61.5	58.6	53.7	62.3	62.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	19	41	88	190
LDN	18	38	82	177

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	Red Bluff Apartments	JOB #:	0394-2021-05
ROADWAY:	Jackson St Lay Ave to Reed Ave - Existing	DATE:	19-Apr-22
LOCATION:	1ST FLOOR FAÇADE - Bldg B	ENGINEER:	R.Pearson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	9,879
SPEED =	35
PK HR % =	10
NEAR LANE/FAR LANE DIS	0
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	988

RECEIVER INPUT DATA

RECEIVER DISTANCE =	58
DIST C/L TO WALL =	0
RECEIVER HEIGHT =	5.0
WALL DISTANCE FROM RECEIVER	58
PAD ELEVATION =	0.5
ROADWAY VIEW: LF ANGLE=	-90
RT ANGLE=	90
DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	58.11	- -
MEDIUM TRUCKS	4.0	58.02	- -
HEAVY TRUCKS	8.0	58.05	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.9	60.0	58.2	52.2	60.8	61.4
MEDIUM TRUCKS	54.4	52.9	46.5	45.0	53.5	53.7
HEAVY TRUCKS	55.7	54.2	45.2	46.5	54.8	54.9
NOISE LEVELS (dBA)	63.4	61.7	58.7	53.8	62.4	62.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	61.9	60.0	58.2	52.2	60.8	61.4
MEDIUM TRUCKS	54.4	52.9	46.5	45.0	53.5	53.7
HEAVY TRUCKS	55.7	54.2	45.2	46.5	54.8	54.9
NOISE LEVELS (dBA)	63.4	61.7	58.7	53.8	62.4	62.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	19	42	90	194
LDN	18	39	84	180

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	Red Bluff Apartments	JOB #:	0394-2021-05
ROADWAY:	Jackson St Lay Ave to Reed Ave - Existing	DATE:	19-Apr-22
LOCATION:	Pool Area	ENGINEER:	R.Pearson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	9,586
SPEED =	35
PK HR % =	10
NEAR LANE/FAR LANE DIS	0
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	959

RECEIVER INPUT DATA

RECEIVER DISTANCE =		146
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		146
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	146.04	- -
MEDIUM TRUCKS	4.0	146.01	- -
HEAVY TRUCKS	8.0	146.02	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	55.8	53.9	52.1	46.1	54.7	55.3
MEDIUM TRUCKS	48.3	46.8	40.4	38.8	47.3	47.5
HEAVY TRUCKS	49.5	48.1	39.1	40.3	48.7	48.8
NOISE LEVELS (dBA)	57.3	55.5	52.6	47.7	56.2	56.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	55.8	53.9	52.1	46.1	54.7	55.3
MEDIUM TRUCKS	48.3	46.8	40.4	38.8	47.3	47.5
HEAVY TRUCKS	49.5	48.1	39.1	40.3	48.7	48.8
NOISE LEVELS (dBA)	57.3	55.5	52.6	47.7	56.2	56.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	19	41	88	190
LDN	18	38	82	177

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	Red Bluff Apartments	JOB #:	0394-2021-05
ROADWAY:	Jackson St Lay Ave to Reed Ave - Existing	DATE:	19-Apr-22
LOCATION:	Pool Area	ENGINEER:	R.Pearson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	9,879
SPEED =	35
PK HR % =	10
NEAR LANE/FAR LANE DIS	0
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	988

RECEIVER INPUT DATA

RECEIVER DISTANCE =		146
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		146
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	146.04	- -
MEDIUM TRUCKS	4.0	146.01	- -
HEAVY TRUCKS	8.0	146.02	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	55.9	54.0	52.2	46.2	54.8	55.4
MEDIUM TRUCKS	48.4	46.9	40.5	39.0	47.4	47.7
HEAVY TRUCKS	49.7	48.2	39.2	40.4	48.8	48.9
NOISE LEVELS (dBA)	57.4	55.7	52.7	47.8	56.4	56.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	55.9	54.0	52.2	46.2	54.8	55.4
MEDIUM TRUCKS	48.4	46.9	40.5	39.0	47.4	47.7
HEAVY TRUCKS	49.7	48.2	39.2	40.4	48.8	48.9
NOISE LEVELS (dBA)	57.4	55.7	52.7	47.8	56.4	56.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	19	42	90	194
LDN	18	39	84	180

Appendix D:
Construction Noise Modeling Output

Activity	L_{eq} at 212 feet dBA	L_{Max} at 212 feet dBA
Grading	70	73
Building Construction	68	70
Paving	69	72

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	86
Air Compressors	86
Trucks	86

Grading

No.	Equipment Description	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Grader	86	1	40	212	0.5	0	70.3	66.3	4301751.81
2	Dozer	85	1	40	212	0.5	0	69.3	65.3	3417002.92
3	Tractor/Backhoe	80	2	40	212	0.5	0	67.3	63.3	2161102.4
							Lmax*	73	Leq	70
							Lw	104	Lw	102

Source: MD Acoustics, July 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**70**	**69**	**68**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**
60	18.3	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
70	21.3	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
80	24.4	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
90	27.4	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
100	30.5	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
110	33.5	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
120	36.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
130	39.6	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
140	42.7	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
150	45.7	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
160	48.8	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
170	51.8	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
180	54.9	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
190	57.9	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
200	61.0	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
210	64.0	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
220	67.1	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
230	70.1	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
240	73.1	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
250	76.2	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
260	79.2	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
270	82.3	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
280	85.3	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
290	88.4	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
300	91.4	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
310	94.5	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
320	97.5	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
330	100.6	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
340	103.6	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
350	106.7	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
360	109.7	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
370	112.8	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33

Building Construction

Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	Cranes	82	1	40	212	0.5	0	66.3	62.3	1712558.24
2	Forklift/Tractor	80	2	40	212	0.5	0	67.3	63.3	2161102.4
3	Generator	80	1	40	212	0.5	0	64.3	60.3	1080551.2
4	Tractor/Backhoe	80	1	40	212	0.5	0	64.3	60.3	1080551.2
							Lmax*	70	Leq	68
							Lw	102	Lw	99

Source: MD Acoustics, July 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**68**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**	**53**
60	18.3	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
70	21.3	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
80	24.4	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
90	27.4	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
100	30.5	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
110	33.5	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
120	36.6	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
130	39.6	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
140	42.7	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
150	45.7	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
160	48.8	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
170	51.8	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
180	54.9	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
190	57.9	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
200	61.0	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
210	64.0	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
220	67.1	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
230	70.1	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
240	73.1	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
250	76.2	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
260	79.2	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
270	82.3	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
280	85.3	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
290	88.4	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
300	91.4	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
310	94.5	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
320	97.5	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
330	100.6	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
340	103.6	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
350	106.7	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
360	109.7	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
370	112.8	0.5	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31

Paving

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
1	Pavers	86	1	40	212	0.5	0	70.3	66.3	4301751.81
2	Rollers	80	2	40	212	0.5	0	67.3	63.3	2161102.4
3	Paving Equipment	80	1	40	212	0.5	0	64.3	60.3	1080551.2
							Lmax*	**72**	**Leq**	**69**
							Lw	**104**	**Lw**	**100**

Source: MD Acoustics, July 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**69**	**68**	**67**	**66**	**65**	**64**	**63**	**62**	**61**	**60**	**59**	**58**	**57**	**56**	**55**	**54**
60	18.3	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
70	21.3	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
80	24.4	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
90	27.4	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
100	30.5	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
110	33.5	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
120	36.6	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
130	39.6	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
140	42.7	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
150	45.7	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
160	48.8	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
170	51.8	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
180	54.9	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
190	57.9	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
200	61.0	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
210	64.0	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
220	67.1	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
230	70.1	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
240	73.1	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
250	76.2	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
260	79.2	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
270	82.3	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
280	85.3	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
290	88.4	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
300	91.4	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
310	94.5	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
320	97.5	0.5	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34
330	100.6	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
340	103.6	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
350	106.7	0.5	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
360	109.7	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
370	112.8	0.5	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32

VIBRATION LEVEL IMPACT

Project:	Red Bluff Apt	Date: 4/19/22
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Project Site	
Address:	Red Bluff CA	

PPV = PPVref(25/D)^n (in/sec)

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	39.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

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

DATA OUT RESULTS

PPV =	**0.055**	IN/SEC	OUTPUT IN RED