APPENDIX G

Noise Impact Analysis

NOISE IMPACT ANALYSIS

FIRST STREET GREEN PROJECT

CITY OF LOS ALTOS, CALIFORNIA

LSA

August 2017

NOISE IMPACT ANALYSIS

FIRST STREET GREEN PROJECT

CITY OF LOS ALTOS, CALIFORNIA

Submitted to:

Sares-Regis
901 Mariners Island Boulevard, Suite 700
San Mateo, California 94404
(650) 377-5793

Prepared by:

LSA
7086 N. Maple Avenue, Suite 104
Fresno, California 93720
(559) 490-1210

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NOISE IMPACT ANALYSIS

INTRODUCTION

LSA Associates, Inc. (LSA) has completed a Noise Impact Analysis for the proposed First Street Green Project (project) located in the City of Los Altos (City). A project location map is included in Figure 1.

This Noise Impact Analysis examines potential impacts from noise sources in the project vicinity, including local roadways, though noise monitoring and analysis. Noise monitoring was conducted using the Larson Davis SoundTrack LxT sound level meter to assess the ambient noise environment on the project site. Construction and operational noise levels were analyzed. Once operational, the project would generate noise through stationary sources, such as heating and ventilation equipment, parking lot activities, and deliveries.

PROJECT DESCRIPTION

The proposed project would include the demolition of the existing buildings on the project site and would consist of a three-level office building with 80,000 square feet of office space and 960 square feet of café space, an approximately 22,000 square-foot park, and a three-level subterranean parking garage. The proposed project would include one of the two parking garage options: 1) parking would extend underneath the park and include multiple entrances to include a public and private entrance; or 2) all parking will take place underneath the building and will have a single private entrance, as shown in Figures 2 and 3, respectively. Both options were considered as part of the analysis. Project construction would commence in 2018 and would occur for approximately 24 months. The project would be operational in 2020.

The approximate 1.5-acre project site is located at 101 First Street, south of the intersection of Los Altos Avenue and Edith Avenue, in the northern part of the City. The project site is located in a developed area of the City and surrounding land uses include multi-family residential, commercial office, and commercial shopping uses, and a community park. The project site is bound to the north by the office buildings, to the east by multi-family residential buildings, commercial and retail to the south, and to the west by multi-family residential buildings, a public parking structure, a commercial building and a grocery store/retail shopping center.

BACKGROUND

This section provides background information on the evaluation of noise impacts including the characteristics of sound, measurement of sound, physiological effects of noise, and the regulatory framework for this analysis.

Characteristics of Sound

Noise is usually defined as unwanted sound and consists of any sound that may produce physio-logical or psychological damage and/or interfere with communication, work, rest, recreation, or sleep. To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low.

Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be measured precisely with instruments. The project analysis defines the noise environment of the project area in terms of sound intensity and the project's effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) are 10 times more intense than 1 dB; 20 dB are 100 times more intense than 1 dB; and 30 dB are 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dBA for each doubling of distance in a hard-site environment, and the sound decreases 4.5 dBA for each doubling of distance in a relatively flat environment with absorptive vegetation.

There are many ways to rate noise for various time periods, an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average level (L_{dn}) based on dBA. CNEL is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable.

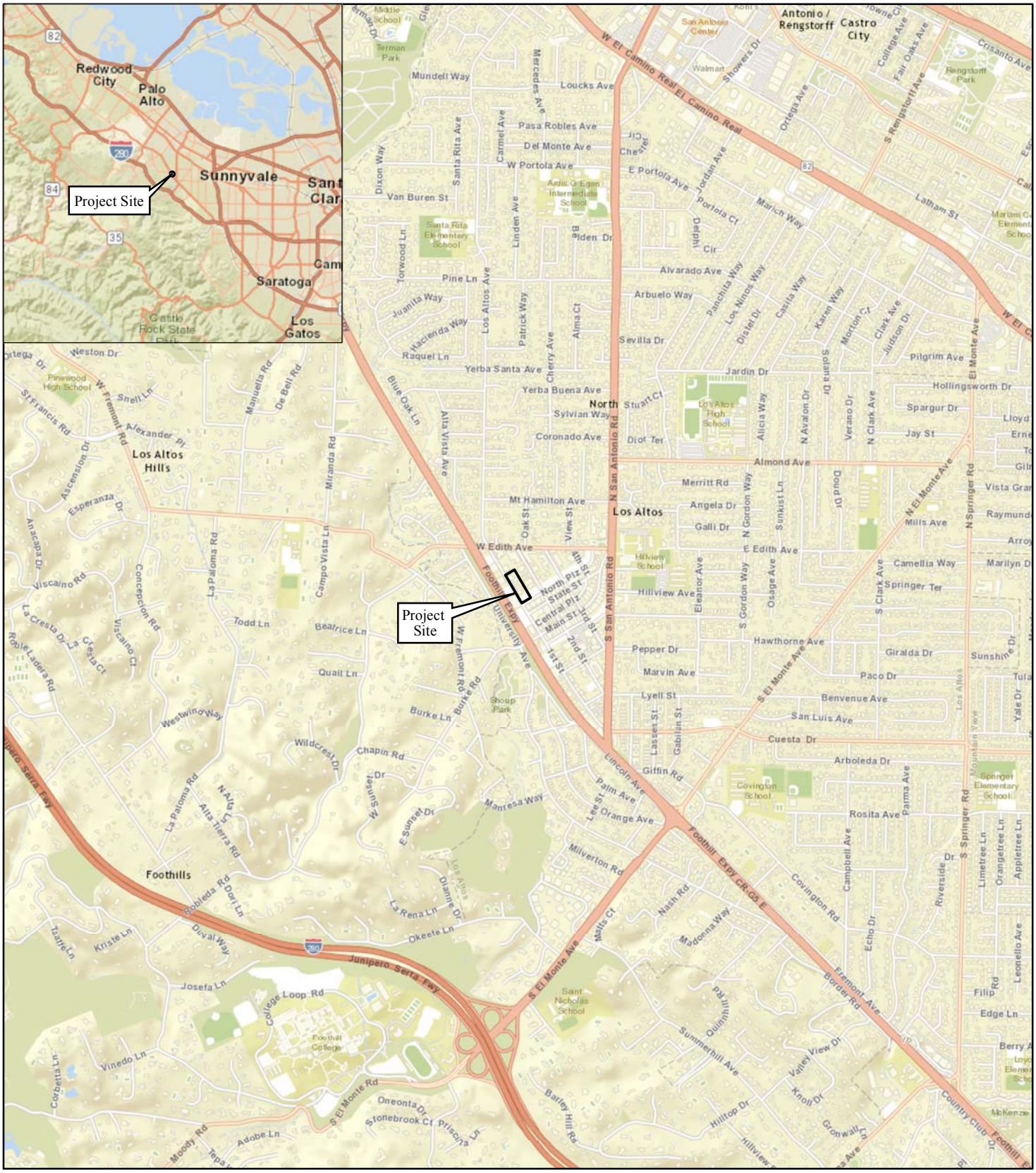

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FIGURE 1

0 1000 2000
FEET

SOURCE: ESRI World Street Map

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First Street Green Project
Los Altos, Santa Clara County, California
Regional Location and Project Site

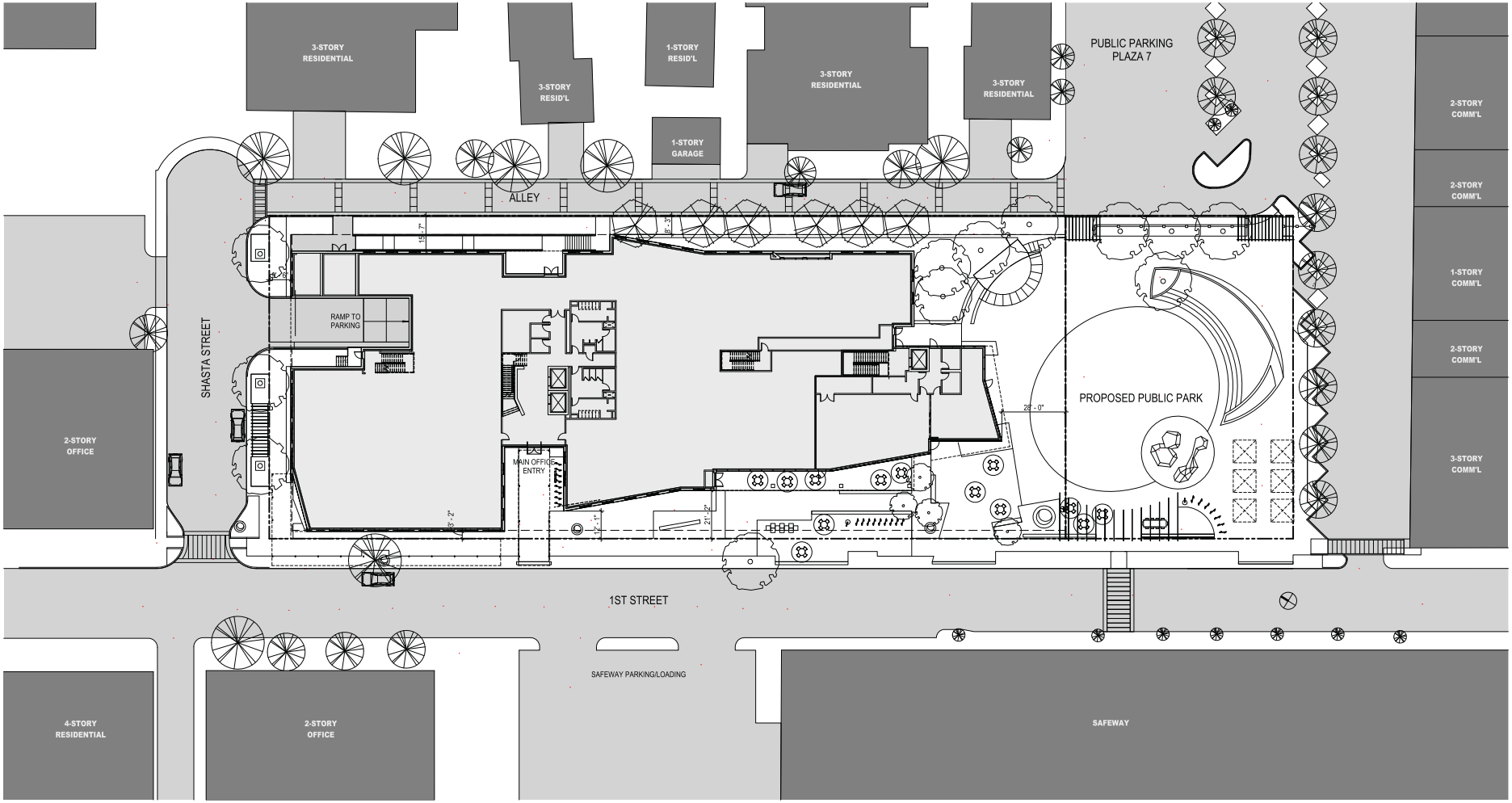

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FIGURE 2

NOT TO SCALE

First Street Green Project
Los Altos, Santa Clara County, California
Site Plan: Parking Option A

SOURCE: EHDD, 2017.

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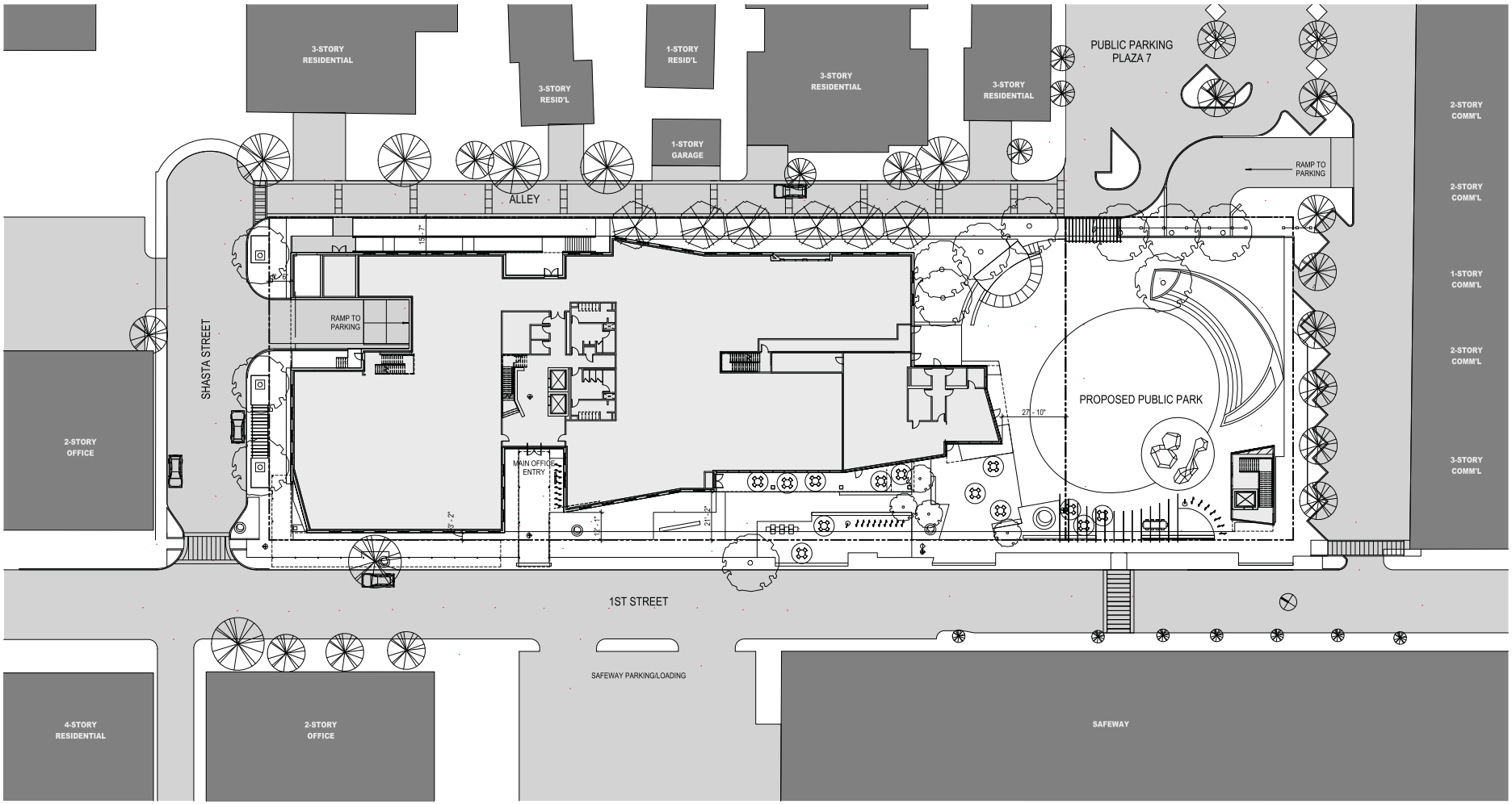

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FIGURE 3

NOT TO SCALE

First Street Green Project
Los Altos, Santa Clara County, California
Site Plan: Parking Option B

SOURCE: EHDD, 2017.

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Other noise rating scales that are important when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half of the time the noise level exceeds this level, and half of the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater since this level has been found to be the lowest audible change perceptible to humans in outdoor environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB, which is only noticeable in laboratory environments. The last category includes changes in noise levels of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure (typically more than 8 hours, as defined by the Occupational Safety and Health Administration [OSHA]) to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions (thereby, affecting blood pressure and functions of the heart and the nervous system). In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dB, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dB, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dB will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

Table 1 lists “Definitions of Acoustical Terms,” and Table 2 displays “Common Sound Levels and Their Noise Sources.”

Table 1: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
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 and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dB to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Source: Harris, Cyril M., *Handbook of Acoustical Measurements and Noise Control*, 1991.

Table 2: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Evaluation
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle a few feet away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Quiet	½ as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	¼ as loud
Large Transformer	45	Quiet	
Average Residence Without Stereo Playing	40	Faint	⅛ as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing
	0	Very Faint	

Source: Compiled by LSA Associates, Inc., 2015.

Characteristics of Groundborne Vibration

Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. As the vibration propagates from the foundation throughout the remainder of the building, the vibration of floors and walls may be perceptible from the rattling of windows or a rumbling noise. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. When assessing annoyance from groundborne noise, vibration is typically expressed as root mean square (rms) velocity in units of decibels of 1 micro-inch per second.

To distinguish vibration levels from noise levels, the unit is written as “VdB.” Human perception to vibration starts at levels as low as 67 VdB and sometimes lower. Annoyance due to vibration in residential settings starts at approximately 70 VdB. Groundborne vibrations are almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of the building, the motion does not provoke the same adverse human reaction.

Common sources of groundborne vibration include trains and construction activities such as blasting, pile driving and operating heavy earthmoving equipment. Typical vibration source levels from construction equipment are shown in Table 3. Although the table gives one level for each piece of equipment, it should be noted that there is a considerable variation in reported ground vibration

levels from construction activities. The data provides a reasonable estimate for a wide range of soil conditions. In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. For buildings considered of particular historical significance or that are particularly fragile structures, the damage threshold is approximately 96 VdB; the damage threshold for other structures is 100 VdB.[1]

Table 3: Typical Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft (in/sec)	Approximate VdB at 25 feet
Pile Driver	Upper range	1.518	112
(impact)	Typical	0.644	104
Pile Driver	Upper range	0.734	105
(sonic)	Typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill	In soil	0.008	66
(slurry wall)	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

Notes: PPV= peak particle velocity; in/sec= inches per second
Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment*. May.

Regulatory Framework

The federal, State, and local framework for noise standards is outlined below. The City of Los Altos has established standards in the General Plan and in the Municipal Code for land use projects that could potentially expose sensitive receptors to excessive noise levels.

U.S. Environmental Protection Agency

In 1972 Congress enacted the Noise Control Act. This act authorized the (U.S. EPA) to publish descriptive data on the effects of noise and establish levels of sound *requisite to protect the public welfare with an adequate margin of safety.* These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table 4. The U.S. EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

Table 4: Summary of U.S. EPA Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. March.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The U.S. EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

[1] Harris, C.M., 1998. *Handbook of Acoustical Measurements and Noise Control.*

The noise effects associated with an outdoor L_{dn} of 55 dBA are summarized in Table 5. At 55 dBA L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 11 feet, and no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

State of California

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the *State Noise Insulation Standard*, it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

Table 5: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 1.4 feet. 99 percent sentence intelligibility (average) at 3.2 feet. 95 percent sentence intelligibility (average) at 11.5 feet.
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below "vigorous action."
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency, 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. March.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City has adopted and modified the State's land use compatibility guidelines, as discussed below.

City of Los Altos General Plan

The City of Los Altos addresses Noise in the Natural Environment and Hazards Element of the General Plan.[2] The Natural Environment and Hazards Element sets noise and land use compatibility guidelines, as shown in Table 6 below. The Natural Environment and Hazards Element also contains

[2] Los Altos, City of. 2002. *Los Altos General Plan 2002-2020.* November.

goals and policies that seek to minimize the amount of noise to which the community is exposed and the amount of noise created by future development and urban activities. The following policies from the Natural Environment and Hazards Element are applicable to the proposed project.

- Policy 7.1: Ensure that new development can be made compatible with the noise environment by utilizing noise/land use compatibility standards and the Noise Contours Map as a guide for future development decisions.

- Policy 7.2: Enforce the following maximum acceptable noise levels for new construction of various noise-sensitive uses in an existing noise environment.

    - 60 dBA CNEL is the maximum acceptable outdoor noise exposure level for single-family residential areas.

    - 65 dBA CNEL is the maximum acceptable outdoor noise exposure level for multiple- family residential areas.

    - 70 dBA CNEL is the maximum acceptable outdoor noise exposure level for schools (public and private), libraries, churches, hospitals, nursing homes, parks, commercial, and recreation areas. Excepted from these standards are golf courses, stables, water recreation, and cemeteries.

- Policy 7.3: Work to achieve indoor noise levels not exceeding 45 dBA CNEL in the event that outdoor acceptable noise exposure levels cannot be achieved by various noise attenuation mitigation measures.

- Policy 7.6: Consider noise attenuation measures to reduce noise levels to City-adopted acceptable levels for any development along roadways.

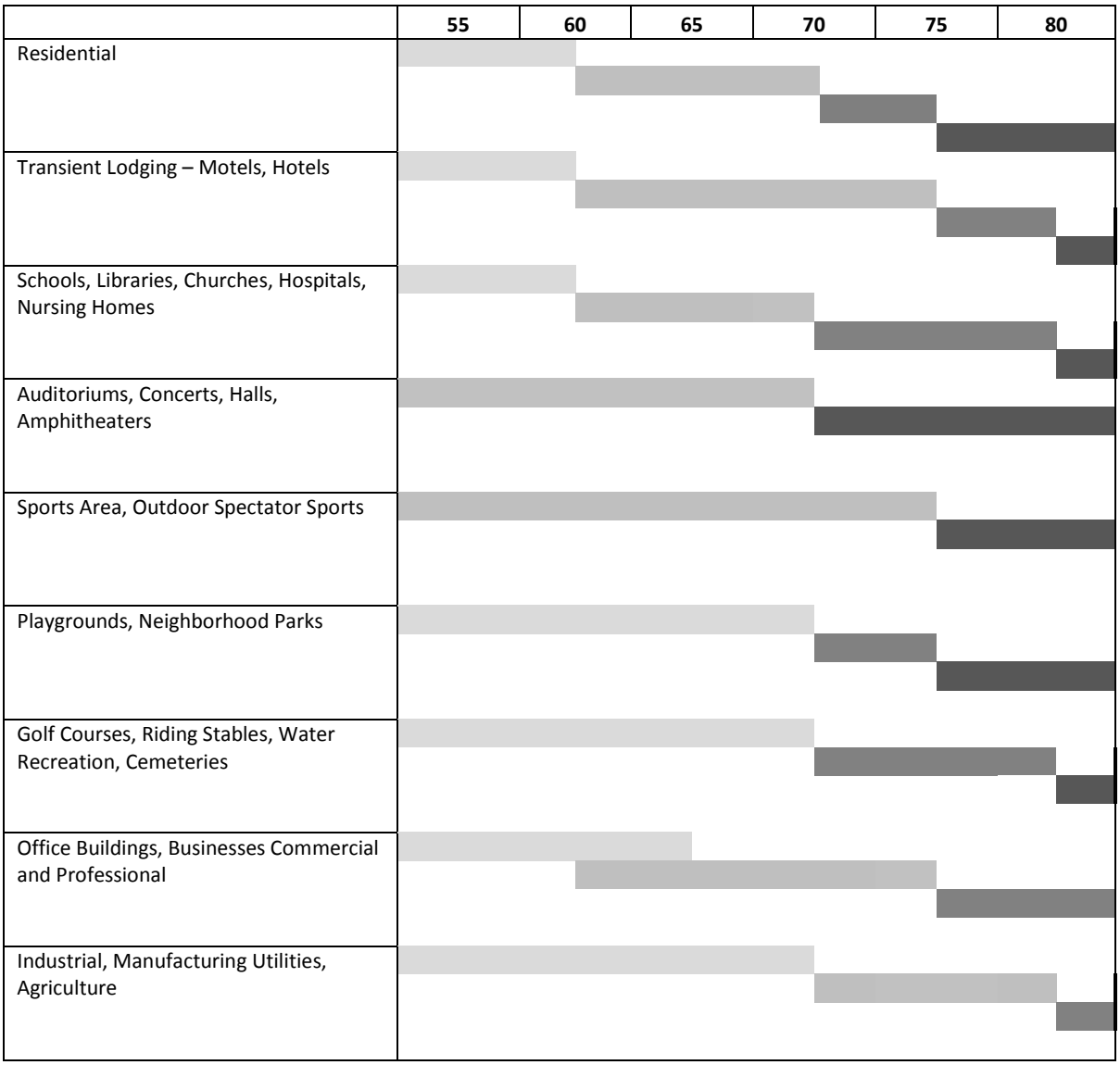
- Policy 7.7: Require the inclusion of design features in development and reuse/revitalization projects to reduce the impact of noise on residential development.

- Policy 7.8: Require an acoustical analysis for new construction and in areas with a higher than established noise levels.

- Policy 7.9: Minimize stationary noise sources and noise emanating from construction activities.

- Policy 7.10: Publicize and enforce local noise regulations to reduce nuisance noises related to private developments and residences.

Table 6: Community Noise Exposure L_{dn} or CNEL, dB



Normally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved meet conventional Title 24 construction standards. No special noise insulation requirements.
Conditionally Acceptable	New construction or development shall be undertaken only after a detailed noise analysis is made and noise reduction measures are identified and included in the project design.
Normally Unacceptable	New construction or development is discouraged. If new construction is proposed, a detailed analysis is required, noise reduction measures must be identified, and noise insulation features included in the design.
Clearly Unacceptable	New construction or development should not be undertaken.

Source: City of Los Altos, 2002.

City of Los Altos Municipal Code

The City of Los Altos addresses noise in Chapter 6.16 of the Municipal Code.[3]

6.16.050 - Exterior noise limits.

A. Maximum permissible sound levels by receiving land use.

1. 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, either incorporated or unincorporated, to exceed:

   a. The noise standard for that land use as specified in Table 7 for a cumulative period of more than thirty (30) minutes in any hour; or

   b. The noise standard plus five dB for a cumulative period of more than fifteen (15) minutes in any hour; or

   c. The noise standard plus ten (10) dB for a cumulative period of more than five minutes in any hour; or

   d. The noise standard plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or

   e. The noise standard plus twenty (20) dB or the maximum measured ambient for any period of time.

Table 7: Exterior Noise Limits

Receiving Land Use Category	Time Period	Noise Level (dBA)
All R1 Zoning Districts	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	45 55
All R3 and PCF Zoning Districts	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	50 55
All OA Zoning Districts	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	55 60
All C Zoning Districts	10:00 p.m. – 7:00 a.m. 7:00 a.m. – 10:00 p.m.	60 65

Source: City of Los Altos, 2017.

[3] Los Altos, City of. 2017. *Code of Ordinances*. March 9.

Section 6.16.070. Prohibited acts.

B. Specific prohibitions. The following acts, and the causing or permitting thereof, are declared to be in violation of this chapter:

1. Radios, television sets, musical instruments, and similar devices. Operating, playing, or permitting the operation or playing of any radio, television set, phonograph, drum, musical instrument, or similar device which produces or reproduces sound:

    a. Between the hours of 10:00 p.m. and 7:00 a.m. of the following day Monday through Friday or between 10:00 p.m. and 8:00 a.m. Saturday and Sunday in such a manner as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of Sections 6.16.050 or 6.16.060 of this chapter, except for activities for which a variance has been issued; or

    b. In such a manner as to exceed the levels set forth for public space in Table 7, measured at a distance of at least fifty (50) feet (fifteen (15) meters) from such device operating on a public right-of-way or public space;

2. Loudspeakers (amplified sound).

    a. Using or operating for any commercial purpose any loudspeaker, public address system, or similar device, between the hours of 10:00 p.m. and 7:00 a.m. of the following day, such that the sound therefrom creates a noise disturbance across a residential real property line or at any time violates the provisions of Section 6.16.050 of this chapter; or

    b. Using or operating for any noncommercial purpose any loudspeaker, public address system, or similar device, between the hours of 10:00 p.m. and 7:00 a.m. of the following day, such that the sound therefrom creates a noise disturbance across a residential real property boundary or violates the provisions of Section 6.16.050 of this chapter;

3. Street sales. Offering for sale, selling anything, or advertising by shouting, outcry, or the use of a noise-making device within any residential or commercial area or noise sensitive zone of the city, except by variance issued by the noise control office. The provisions of this section shall not be construed to prohibit the selling by outcry of merchandise, food, and beverage at licensed sporting events, parades, fairs, circuses, or other similar licensed public entertainment events;

5. Loading and unloading. Loading, unloading, opening, closing, or handling of boxes, crates, containers, building materials, or similar objects, between the hours of 10:00 p.m. and 7:00 a.m. of the following day, in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate the provisions of Section 6.16.050 of this chapter;

6. Construction and demolition.

    i. Single-family zoning districts. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or

demolition work on weekdays before 7:00 a.m. and after 5:30 p.m. and on Saturdays before 9:00 a.m. or after 3:00 p.m. or any time on Sundays or the city observed holidays of New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public utilities or by special exception. This section shall apply to operations on residentially zoned property only. This section shall not apply to the use of lawn or garden tools as specified in subsection (B)(11) of this section;

ii. All other zoning districts. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work on weekdays before 7:00 a.m. and after 7:00 p.m. and Saturdays before 9:00 a.m. or after 6:00 p.m. or any time on Sundays or the city observed holidays of New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day and Christmas Day, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by special exception. This section shall apply to operations on properties other than residentially zoned property. This section shall not apply to the use of lawn or garden tools as specified in subsection (B)(11) of this section;

b. Where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum noise levels at affected properties will not exceed those listed in the following schedules:

i. Mobile equipment. Maximum noise levels for the nonscheduled, intermittent, short-term operation (less than ten (10) days) of mobile equipment;

ii. Stationary equipment. Maximum noise levels for the respectively scheduled and relatively long-term operation (periods of ten (10) days or more) of stationary equipment:

Table 8: Maximum Noise Levels for Mobile and Stationary Equipment

	All R1 Zoning Districts	All PCF and R3 Zoning Districts	All OA and C Zoning Districts
Daily, except Sundays and legal holidays 7:00 a.m. – 7:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 7:00 p.m. – 7:00 a.m. and all day Sundays and legal holidays	50 dBA	55 dBA	60 dBA

Source: City of Los Altos, 2017.

c. Deliveries, start-up and closing down. The construction times above shall apply to deliveries of materials and equipment, and arrival of workers, start-up and closing down and departure activities on a job site.

7. 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 (150) feet (forty-six (46) meters) from the source if on a public space or public right-of-way;

12. Air-conditioning or air-handling equipment. Operating or permitting the operation of any air-conditioning or air-handling equipment in such a manner as to exceed any of the following sound levels without a variance:

Table 9: Maximum Noise Levels for Air Conditioning or Air-handling Equipment

	All PCF and R3 Zoning Districts	All OA and C Zoning Districts
Any point on a neighboring property line, five feet above grade level, no closer than three feet from any wall.	No standard	50
Center of a neighboring patio, five feet above grade level, no closer than three feet from any wall.	45	45
Outside the neighboring living area window nearest the equipment location, not more than three feet from the window opening, but at least three feet from any other surface.	55	45

Source: City of Los Altos, 2017.

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

This section describes the existing noise environment in the project site vicinity. Noise monitoring, traffic modeling, and noise modeling were used to quantify existing and future noise levels at the project site.

Ambient Noise Levels

Certain areas within Los Altos are subject to high noise levels. The primary noise source impacting Los Altos results from transportation-related activities, especially along major transportation corridors. Other noise sources not related to transportation include construction, business operation, recreational activities, and property maintenance.[4] Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust systems. Airport related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The San Jose International Airport is the closest airport and is located approximately 18 miles southwest of the project site. Aircraft noise is occasionally audible at the project site; however, no portion of the project site lies within the 65 dBA CNEL noise contours of the airport.

To assess existing noise levels, LSA conducted two short-term noise measurements on the project site on May 18, 2017. The short-term 15-minute noise measurements were recorded at different

[4] Los Altos, City of, 2002, op. cit.

locations on-site between 3:15 p.m. and 3:47 p.m. Noise measurements at these times show the typical baseline ambient noise level. LSA also conducted two long-term noise measurements at two locations on the project site between August 24, 2017 and August 27, 2017. The long-term noise measurements captured hourly L_{eq} data as well as CNEL data, which incorporates the nighttime hours. Noise measurement data collected during the short-term and long-term noise monitoring is summarized in Table 10.

Table 10: Ambient Noise Monitoring Results, dBA

Location Number	Location Description	Start Time	L_{eq}/ CNEL[a]	L_{max}[b]	L_{min}[c]	Primary Noise Sources
ST-1	Existing parking lot, southern corner of project site.	3:15 p.m.	60.0	76.1	48.2	Traffic on First Street, pedestrians in area, parking lot activity.
ST-2	Across from parking/loading docks of Safeway. Patio of 127 First Street.	3:32 p.m.	59.5	68.9	46.3	Traffic on First Street, loud passbys on Foothill Expressway.
LT-1 (weekday)	Alley between First and Second Streets, approximately 130 feet northwest of Plaza N.	2:00 p.m., August 24	74.0/ 70.5	89.3	45.3	Traffic
LT-1 (weekend)	Alley between First and Second Streets, approximately 130 feet northwest of Plaza N.	12:00 p.m., August 27	68.4/ 59.1	84.0	47.2	Traffic
LT-2 (weekday)	Alley between First and Second Streets, approximately 175 feet southeast of Shasta Street.	2:00 p.m., August 24	62.0/ 59.5	74.6	42.0	Traffic
LT-2 (weekend)	Alley between First and Second Streets, approximately 175 feet southeast of Shasta Street.	12:00 p.m., August 27	59.6/ 56.5	75.1	44.4	Traffic

[a] L_{eq} represents the average of the sound energy occurring over the measurement time period for the short-term noise measurements. CNEL is the Community Noise Equivalent Level (CNEL) which is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours).
[b] L_{max} is the highest sound level measured during the measurement time period.
[c] L_{min} is the lowest sound level measured during the measurement time period.
Source: LSA, 2017.

As shown in Table 10, the short-term noise measurements indicate that ambient noise in the project site vicinity ranges from approximately 59.5 dBA to 60.0 dBA L_{eq}. The long-term noise measurements ranged from 56.5 dBA to 70.5 dBA CNEL. Traffic on First Street was reported as the primary noise source. The noise measurements are discussed further below.

- Noise measurement ST-1 was taken at the southern corner of the project site. ST-1 indicated that ambient noise in the project vicinity is approximately 60.0 dBA L_{eq}.

- Noise measurement ST-2 was taken across from the parking/loading docks of Safeway, near the patio of 127 First Street. ST-2 indicated that ambient noise in the project vicinity is approximately 59.5 dBA L_{eq}.

- Noise measurement site LT-1 was located in the alley between First and Second Streets, approximately 130 feet northwest of Plaza N. This location was selected to quantify noise levels on the project site. Hourly average noise levels typically ranged from 68.4 dBA to 74.0 dBA L_{eq}. The day-night average noise levels at this location ranged from 59.1 dBA to 70.5 dBA CNEL.

- Noise measurement site LT-2 was located in the alley between First and Second Streets, approximately 175 feet southeast of Shasta Street. This location was selected to quantify noise levels on the project site. Hourly average noise levels typically ranged from 59.6 dBA to 62.0 dBA L_{eq}. The day-night average noise levels at this location ranged from 56.5 dBA to 59.5 dBA CNEL.

Existing Sensitive Land Uses in the Project Area

Certain land uses are considered more sensitive to noise than others. Examples of these include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. The project site is located within and area that is predominantly developed with commercial, retail uses and multi-family residential uses. The closest sensitive receptors include the multi-family residential uses located approximately 40 feet east of the project site.

METHODOLOGY

Evaluation of noise impacts associated with the proposed project includes the following:

- Determine the short-term construction noise levels at off-site noise sensitive uses and compare to the City's General Plan and Municipal Code Ordinance requirements;

- Determine the long-term noise levels at off-site noise sensitive uses and compare the levels to the City's pertinent noise standards; and

- Determine the required mitigation measures, such as mechanical ventilation or building facade enhancements, to reduce long-term, on-site noise impacts from all sources.

THRESHOLD OF SIGNIFICANCE

The proposed project would have a significant noise effect if it would substantially increase the ambient noise levels in the project vicinity or conflict with adopted environmental plans and goals of applicable regulatory agencies, including, as appropriate, the City of Los Altos. For the purposes of this analysis, the project would result in a significant noise impact if it would:

- Expose persons to or generate noise levels in excess of standards established in the City of Los Altos Noise Ordinance or policies in the Los Altos General Plan for construction and/or operation of the project;

- Expose persons to or generate excessive groundborne vibration or groundborne noise levels;

- Result in a substantial permanent increase of over 3 dBA in ambient noise levels in the project vicinity above levels existing without the project;

- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project and in excess of standards established in the General Plan or Noise Ordinance, or applicable standards of other agencies; or

- Result in noise impacts associated with proximity to nearby airports.

PROJECT IMPACTS

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site include the Natural Environment and Hazards Element of the City's General Plan and Municipal Code. The project would result in short-term noise impacts due to construction, and long-term impacts related to project operations, as described below.

Construction Noise

The proposed project is located adjacent to multi-family residential uses. Project construction would result in short-term noise impacts on these adjacent land uses. Maximum construction noise would be short-term, generally intermittent depending on the construction phase, and variable depending on receiver distance from the active construction zone. The duration of noise impacts generally would be from one day to several days depending on the phase of construction. The entire construction duration is expected to occur for approximately 24 months. The level and types of noise impacts that would occur during construction are described below.

Short-term noise impacts would occur during grading and site preparation activities. Table 11 lists maximum noise levels recommended for noise impact assessments for typical construction equipment, based on a distance of 50 feet between the equipment and a noise receptor. Construction-related short-term noise levels would be higher than existing ambient noise levels currently in the project area but would no longer occur once construction of the project is completed.

Table 11: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	74 to 84	80
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Cranes	79 to 86	82

Table 11: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	77 to 90	85
Tractors	77 to 82	80
Front-End Loaders	77 to 90	86
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 89	86
Trucks	81 to 87	86
Forklift	75 to 85	75
Welder/Torch	73 to 74	74

Source: Bolt, Beranek & Newman, 1987. *Noise Control for Buildings and Manufacturing Plants*.

Two types of short-term noise impacts could occur during construction of the proposed project. The first type involves construction crew commutes and the transport of construction equipment and materials to the site for the proposed project, which would incrementally increase noise levels on roads leading to the site. As shown in Table 11, there would be a relatively high single-event noise exposure potential at a maximum level of 87 dBA L_{max} with trucks passing at 50 feet.

The second type of short-term noise impact is related to noise generated during excavation, grading, and construction on the project site. Construction is performed in discrete steps, or phases, each with its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

Table 11 lists maximum noise levels recommended for noise impact assessments for typical construction equipment, based on a distance of 50 feet between the equipment and a noise receptor. Typical maximum noise levels can range up to 91 dBA L_{max} at 50 feet during the noisiest construction phases, when pile driving and rock drills are not used. It is not anticipated that construction of project would require the use of rock drills or pile drivers. The site preparation phase, including excavation and grading of the site, tends to generate the highest noise levels because earthmoving machinery is the noisiest construction equipment. Earthmoving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings.

The nearest sensitive receptors are the multi-family residential uses located approximately 40 feet east of the project site. Project construction would result in short-term noise impacts on these

adjacent uses. Based on the combination of equipment proposed by the project applicant, at a distance of 40 feet, the closest off-site sensitive receptors may be subject to short-term construction noise reaching 90 dBA L_{max} when construction is occurring at the project site boundary.

Based on this maximum noise level and assuming a crane, forklift, tractor, welder, and air compressor would be used at the same time during the nosiest phase of construction, the proposed project would result in construction noise levels of 86 dBA L_{eq}. This noise level would be higher than the peak L_{eq} measured at the nearest receptor locations of 74 dBA L_{eq}. However, although the total construction period would be about 2 years, construction equipment would operate at various locations within the 1.5 acre project site and would only generate this maximum noise level when operations are occur at the boundary of the project site closest to the receptor location.

Construction is permitted by the City when activities occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday. No construction activity is allowed on Sundays and holidays.

As discussed above, construction noise would result in a temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. As noted above, the City's ordinance indicates noise levels should be limited to 80 dBA when feasible; therefore, noise reduction measures should be implemented.

Implementation of the following measures during project construction would reduce potential construction-period noise impacts for the adjacent noise sensitive receptors:

- Equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards. Equipment should also utilize the best available noise control techniques (e.g., use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).

- Place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the active project site.

- Locate equipment staging in areas that would create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the active project site during all project construction.

- Install temporary noise barriers around stationary noise sources (such as compressors) and locate stationary noise sources as far from adjacent or nearby sensitive receptors as possible.

- Prohibit extended idling time of internal combustion engines.

- All noise producing construction activities shall be limited to the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday. No construction activity shall be allowed on Sundays and holidays.

- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler) and would determine and implement reasonable measures warranted to correct the problem.

Implementation of this multi-part measure would provide quantifiable reductions of construction noise levels, by generally lowering construction noise by 5 to 10 dBA, depending on effectiveness. The Federal Highway Administration (FHA) has identified best practices for calculating the estimated reduction from shielding.[5] Based on FHA documentation, the following reductions can be achieved:

- 3 dBA reduction for a noise barrier or other obstruction (like a dirt mound) that breaks the line-of-site between the noise source and the receptor.

- 8 dBA reduction if the noise source is completely enclosed or completely shielded with a solid barrier located close to the source. 5 dBA reduction if the enclosure and/or barrier have some gaps in it.

- 10 dBA reduction if the noise source is completely enclosed and completely shielded with a solid barrier located close to the source.

- 15 dBA reduction if a building stands between the noise source and receptor and completely shields the noise source.

- 5 dBA reduction if noise source is enclosed or shielded with heavy vinyl noise curtain material (e.g., SoundSeal BBC-13-2 or equivalent).

Implementation of these measures would reduce construction noise levels by 5 to 10 dBA, resulting in maximum construction noise levels ranging from approximately 80 to 85 dBA L_{max}. Implementation of these measures would be consistent with the City's requirement to implement feasible noise reduction measures when noise levels exceed 80 dBA. Additionally, the measure would restrict construction operations to the permissible hours established by the City. Therefore, with mitigation, construction noise impacts would be reduced to a less-than-significant level.

Vibration Impacts

Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. Vibration energy propagates from a source, through intervening soil and rock layers, to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as the motion of building surfaces, rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings radiating sound waves.

[5] Federal Highway Administration, *Roadway Construction Noise Model, User's Guide.* January 2006. Available online at www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf.

Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of groundborne vibration are construction activities (e.g., pavement breaking and operating heavy-duty earthmoving equipment), and occasional traffic on rough roads. In general, groundborne vibration from standard construction practices is only a potential issue when within 25 feet of sensitive uses. Groundborne vibration levels from construction activities very rarely reach levels that can damage structures; however, these levels are perceptible near the active construction site. With the exception of old buildings built prior to the 1950s or buildings of historic significance, potential structural damage from heavy construction activities rarely occurs. When roadways are smooth, vibration from traffic (even heavy trucks) is rarely perceptible.

The streets surrounding the project area are paved, smooth, and unlikely to cause significant groundborne vibration. In addition, the rubber tires and suspension systems of buses and other on-road vehicles make it unusual for on-road vehicles to cause groundborne noise or vibration problems. It is, therefore, assumed that no such vehicular vibration impacts would occur and, therefore, no vibration impact analysis of on-road vehicles is necessary. Additionally, once constructed, the proposed project would not contain uses that would generate groundborne vibration.

Construction Vibration

The proposed project is located adjacent to multi-family residential uses. This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and will assess the potential for building damages using vibration levels in PPV (in/sec) because vibration levels calculated in RMS are best for characterizing human response to building vibration, while vibration level in PPV is best used to characterize potential for damage. The Federal Transit Administration (FTA)) *Transit Noise and Vibration Impact Assessment*[6] guidelines indicate that a vibration level up to 102 VdB (an equivalent to 0.5 in/sec in PPV) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Table 12 shows the PPV and VdB values at 25 feet from a construction vibration source. As shown in Table 12, bulldozers and other heavy-tracked construction equipment (except for pile drivers and vibratory rollers) generate approximately 87 VdB of groundborne vibration when measured at 25 feet, based on the Transit Noise and Vibration Impact Assessment. At this level, groundborne vibration would result in potential annoyance to residences and workers, but would not cause any damage to the buildings. Construction vibration, similar to vibration from other sources, would not have any significant effects on outdoor activities (e.g., those outside of residences and commercial/office buildings in the project vicinity). Outdoor site preparation for the project is expected to use a bulldozer and loaded truck. The greatest levels of vibration are anticipated to occur during the site preparation phase. All other phases are expected to result in lower vibration

[6] Federal Transit Administration (FTA). 2006. Office of Planning and Environment. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. May.

levels. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary) because vibration impacts occur normally within the buildings. The formula for vibration transmission is provided below.

$$L_v dB\ (D) = L_v dB\ (25\ ft) - 30\ Log\ (D/25)$$

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Table 12: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 feet	
	PPV (in/sec)	L_V (VdB)[1]
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer[2]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks	**0.076**	**86**
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Sources: *Transit Noise and Vibration Impact Assessment* (FTA 2006).
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
[2] Equipment shown in **bold** is expected to be used on site.
µin/sec = micro-inches per second
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

For typical construction activity, the equipment with the highest vibration generation potential is the large bulldozer, which would generate 87 VdB at 25 feet. The closest residential structures are located 40 feet from the project construction boundary. Based on distance attenuation, the closest residences would experience vibration levels of up to 81 VdB (0.044 PPV [in/sec]). This vibration level at the closest residential structures from construction equipment or would not exceed the FTA threshold of 94 VdB (0.2 in/sec PPV) for building damage when bulldozers and loaded trucks operate within 50 feet of the project construction boundary. This level is also below the FTA's "barely perceptible" human response criteria of 0.04 PPV for transient sources of vibration events. Therefore, groundborne vibration impacts from project-related construction activities would be considered less-than-significant.

Long-Term Noise Impacts

The proposed project would include commercial uses in a developed area of the City. Operational noise can be categorized as mobile source noise and stationary source noise. Mobile source noise would be attributable to the additional trips that would be a result of the proposed project.

Stationary source noise includes noise generated by the commercial land uses, such as the heating, ventilation, and air conditioning (HVAC) equipment.

Mobile Source Noise

Motor vehicles with their distinctive noise characteristics are the dominant noise source in the project vicinity. The amount of noise varies according to many factors, such as volume of traffic, vehicle mix (percentage of cars and trucks), average traffic speed, and distance from the observer. Implementation of the proposed project would result in new daily trips on local roadways in the project site vicinity. The project would generate an estimated 1,175 net new average daily vehicle trips, with 114 trips occurring during the AM peak hour (between 7:00 a.m. and 9:00 a.m.) and 174 trips occurring during the PM peak hour (between 4:00 p.m. and 6:00 p.m.). Special events would occur occasionally in the public open space, which could increase the daily trip generation to approximately 1,667 net new daily trips. The project would not have on-site circulation as parking would be provided underground. The adjacent First Street carries approximately 4,020 average daily trips. A characteristic of sound is that a doubling of a noise source is required in order to result in a perceptible (3 dBA or greater) increase in the resulting noise level. Project daily trips would not result in a doubling of traffic volumes along any roadway segment in the project vicinity, and therefore would not result in a perceptible increase in traffic noise levels at receptors in the project vicinity.

Operational Noise

The proposed project would include an office building with a café, a park and a public plaza. In general, the Office Building would be open between the hours of 8:00 a.m. and 6:00 pm, Monday through Friday. The Café would have similar hours, and would also be open on Saturday and Sunday. The park and public plaza would host community events such as concerts, movie nights, farmer's markets, and arts-and-crafts festivals which would occur during the day on weekends and weekdays, with hours ranging up to 10:00 p.m.

The park and public plaza activities could result in increased noise levels associated with musical instruments and loudspeakers. The project does not include any programming of specific events or musical acts. The project also does not include any fixed speakers, amplifiers, or public address systems. However, the project incorporates a stage area and would include design features, such as specifications for future use of the site indicating that all amplified equipment would face away from residential uses. The project would construct a barrier behind the stage between the entertainment and residential uses, as shown in the project design renderings.

The degree to which noise levels associated with amplified music would attenuate at the nearest noise sensitive receptors would depend on the distance between the concert amplifier and receptors, intervening structures, the direction in which the amplifiers face, and wind speed and direction. Assuming the amplifiers are placed at the edge of the stage, the closest distance between the amplifiers and the nearest noise sensitive receptor would be the residences located 40 feet east of the project site, approximately 60 feet from the event stage.

Noise associated with musical instruments is allowed by the Municipal Code when activities occur between the hours of 7:00 a.m. and 10:00 p.m. Monday through Friday and between the hours of

8:00 a.m. and 10:00 p.m. Saturday and Sunday provided impacts remain below the standards presented in Table 7. In addition, noise associated with loudspeakers and amplified sound is permitted by the Municipal Code when activities occur between the hours of 7:00 a.m. and 10:00 p.m. daily. During the nighttime hours of 10:00 p.m. to 7:00 a.m. these activities are allowed if they do not create a disturbance at any neighboring property. For the purposes of this analysis, it is assumed that during nighttime hours, noise that is audible at an adjacent property would be considered creating a disturbance.

The nearest residential uses are located 60 feet away from the proposed stage are zoned R3-1, multiple-family. Based on the City's standards presented in Table 7, daytime noise level impacts at all R3 zoning districts are required to remain below the 55 dBA L_{eq} and 75 dBA L_{max} daytime standard. As shown in Table 10, existing noise levels at the adjacent sensitive receptors are 57.5 dBA L_{eq} on the weekend and 74.0 dBA L_{eq} during the weekdays. Therefore, compliance with the Municipal Code for amplified music would result in noise levels that are below ambient noise conditions.

To meet the 55 dBA L_{eq} standard at the closest receptor locations, assuming an increase of 6 dBA per halving of distance, noise levels generated by the musical instruments or amplified sound would need to be limited to a level of approximately 80 dBA L_{eq} when measured at 3 feet assuming that the source is facing the receptor.

As noted, the project only includes the development of a stage and amplifiers are not included in the project. Due to the varying noise levels that may be generated depending on the particular event, based on the number of instruments being used, type of music and most importantly speaker volume from the amplification equipment brought on-site by a particular event participant, precise noise levels associated with future events would vary. Therefore, the following measures shall be implemented:

- Prior to the use of amplifiers, the system shall be set up early enough to enable alignment and orientation to be optimized to minimize noise disturbance. A sound test prior to each event shall be conducted to ascertain the maximum level that can be set in order to meet the Noise Ordinance standards.

- During the first three events that utilize amplified speakers and are representative of typical future events, noise monitoring shall be conducted at adjacent receptor locations such that compliance with the noise ordinance be determined and verified. If it is discovered that noise level impacts exceed the City's exterior noise level requirements of the noise ordinance (55 dBA L_{eq}), additional noise reduction would be recommended by an acoustical engineer, which may include, but shall not limited to, speaker noise level restriction and/or additional or expanded noise barriers.

- All amplified sound shall be prohibited between the hours of 10:00 p.m. and 8:00 a.m., as any amplified music on the site could be audible at adjacent properties. With implementation of these measures, operational noise would not result in a substantial increase in noise levels.

Implementation of this multi part measure would insure that activities on the project site would be consistent with the noise ordinance. Compliance with the noise ordinance would require noise levels at adjacent residential receptors to be below 55 dBA L_{eq} which is consistent with existing noise levels in the project vicinity. Therefore, the activities associated with the operation of the stage would not result in a substantial increase in noise in the project vicinity.

Stationary Source Noise

Implementation of the proposed project would generate various on-site stationary noise sources, including HVAC equipment, parking lot activities, and deliveries.

The nearest off-site sensitive receptors in the vicinity of the project are the multi-family residences located approximately 50 feet east of the project site boundary.

HVAC Equipment. HVAC equipment could be a primary noise source associated with residential and commercial uses. HVAC equipment is often mounted on rooftops, located on the ground, or located within mechanical rooms. The noise sources could take the form of fans, pumps, air compressors, chillers, or cooling towers. HVAC operations would be required to meet all noise standards.

Precise details of HVAC equipment, including future location and sizing, are unknown at this time; therefore, for purposes of this analysis, 75 dBA at 3 feet was assumed to represent HVAC-related noise.[7] Some off-site noise-sensitive receptors would be within 50 feet of the proposed office buildings. Adjusted for distance to the nearest off-site sensitive receptors, the off-site residences would be exposed to a noise level of 51 dBA L_{max} generated by HVAC equipment.

It is assumed that, as a worst-case scenario, HVAC equipment would operate continuously through the day, evening, and night. In order to reduce noise levels associated with HVAC equipment, design considerations and shielding must be implemented to ensure that the HVAC equipment will be located, enclosed, shielded, or otherwise designed to create the greatest possible distance between HVAC-related noise sources and nearest off-site sensitive receptors. Placing HVAC equipment on the rooftop and/or including a parapet create a natural noise barrier that reduces noise levels from these HVAC units by 8 dBA or more, which would reduce the HVAC noise level to approximately 43 dBA L_{max}. Therefore, noise is anticipated to be below the City's noise level criterion. However, prior to the issuance of building permits, the City shall review HVAC system placement and product specifications to ensure noise levels would meet the performance standards outlined in the City's Noise Ordinance Section 6.16.010. Consistent with the ordinance, all HVAC units associated with the project shall not exceed 45 dBA at the center of a neighboring patio or 55 dBA outside the neighborhood living area window nearest the equipment location.

[7] Trane, 2002. *Sound Data and Application Guide for the New and Quieter Air-Cooled Series R Chille*r.

Parking Lot Activities. Parking lot noise, including engine sounds, car doors slamming, car alarms, loud music, and people conversing, would occur as a result of the proposed project at the project site and on nearby streets. Typical parking lot activities, such as people conversing or doors slamming, generates approximately 60 dBA to 70 dBA L_{max} at 50 feet. Existing sensitive receptors are located approximately 80 feet from the proposed parking garage entry. Adjusted for distance, the nearest off-site residences would be exposed to a noise level of 56 to 66 dBA L_{max} generated by parking lot activities. However, the parking garage is proposed to be provided via a subterranean parking garage. The parking garages would shield the residences from project-related parking lot noise. In addition, the proposed parking garages would replace the existing parking lots on the project site. The proposed project would not be expected to substantially increase parking lot noise over existing noise levels, and therefore, the proposed project would not result in significant parking lot noise.

Truck Delivery and Loading/Unloading. Additional on-site stationary noise sources would include delivery trucks and loading noise. Of the on-site stationary noise sources, noise generated by delivery truck activity would generate the highest maximum noise levels. Delivery truck loading and unloading activities would result in maximum noise levels from 75 dBA to 85 dBA L_{max} at 50 feet.

There are generally two types of loading that would occur on the site: small deliveries like parcels and packages, and large deliveries such as retail items or weekly food deliveries for dining facilities. The former are typically made via passenger car, van, or single-unit truck. These activities are potential noise sources that could affect noise-sensitive receptors in the project site vicinity. Loading docks are located on Shasta Avenue, near the existing off-site sensitive receptors; therefore, this analysis assumes a worst case scenario of noise levels from 75 to 85 dBA L_{max} at the closest off-site receptor. Loading dock and delivery noise is permitted by the Municipal Code when activities occur between the hours of 7:00 a.m. and 10:00 p.m.

Peak noise levels from loading and unloading would be intermittent and when averaged over a one hour period would be much lower than the peak noise levels. In addition, the existing uses on the project site currently generate loading dock and delivery noise. Currently there are approximately five trash pickup sites and implementation of the proposed project would consolidate to one trash pickup site. Therefore, the proposed project is not expected to result in an increase in loading- and delivery-related noise sources at the nearest off-site receptors.

Land Use Compatibility

The dominant source of noise in the project vicinity is traffic on First Street. As shown in Table 10, the short-term noise monitoring on the project site measured 59.5 dBA and 60.0 dBA L_{eq}. The City sets forth normally acceptable noise level standards for land use compatibility and outdoor noise exposure of new development. The normally acceptable exterior noise level for commercial and recreational uses is 70 dBA CNEL. As identified above, the short-term noise monitoring identified noise levels of 60.0 dBA L_{eq} which indicates noise levels on the site would be below 70 dBA CNEL. Therefore, the project noise environment is consistent with the City's noise standards.

Excessive Airport Noise

The proposed project is not located within 2 miles of a public or public use airport. The San Jose International Airport is the closest airport and is located approximately 18 miles southwest of the project site. Aircraft noise is occasionally audible at the project site; however, no portion of the project site lies within the 65 dBA CNEL noise contours of any public airport nor does any portion of the project site lie within 2 miles of any private airfield or heliport. Therefore, the proposed project would not result in the exposure of sensitive receptors to the excessive noise levels form aircraft noise sources.

CONCLUSION

As described in the analysis above, construction of the proposed project would result in short-term noise impacts on adjacent multi-family residential uses; however, construction noise would be short-term and implementation of the recommended measures for project construction would reduce the construction noise impacts to the extent feasible. In addition, the proposed project would not result in a substantial increase in traffic volumes, therefore, the proposed project would not result in generate a substantial long-term traffic noise level increase. Implementation of the proposed project would also generate various on-site stationary noise sources, including HVAC equipment, occasional event noise, parking lot activities, and loading dock operations. However, design considerations and shielding would reduce potential stationary source noise impacts to a less-than-significant level.

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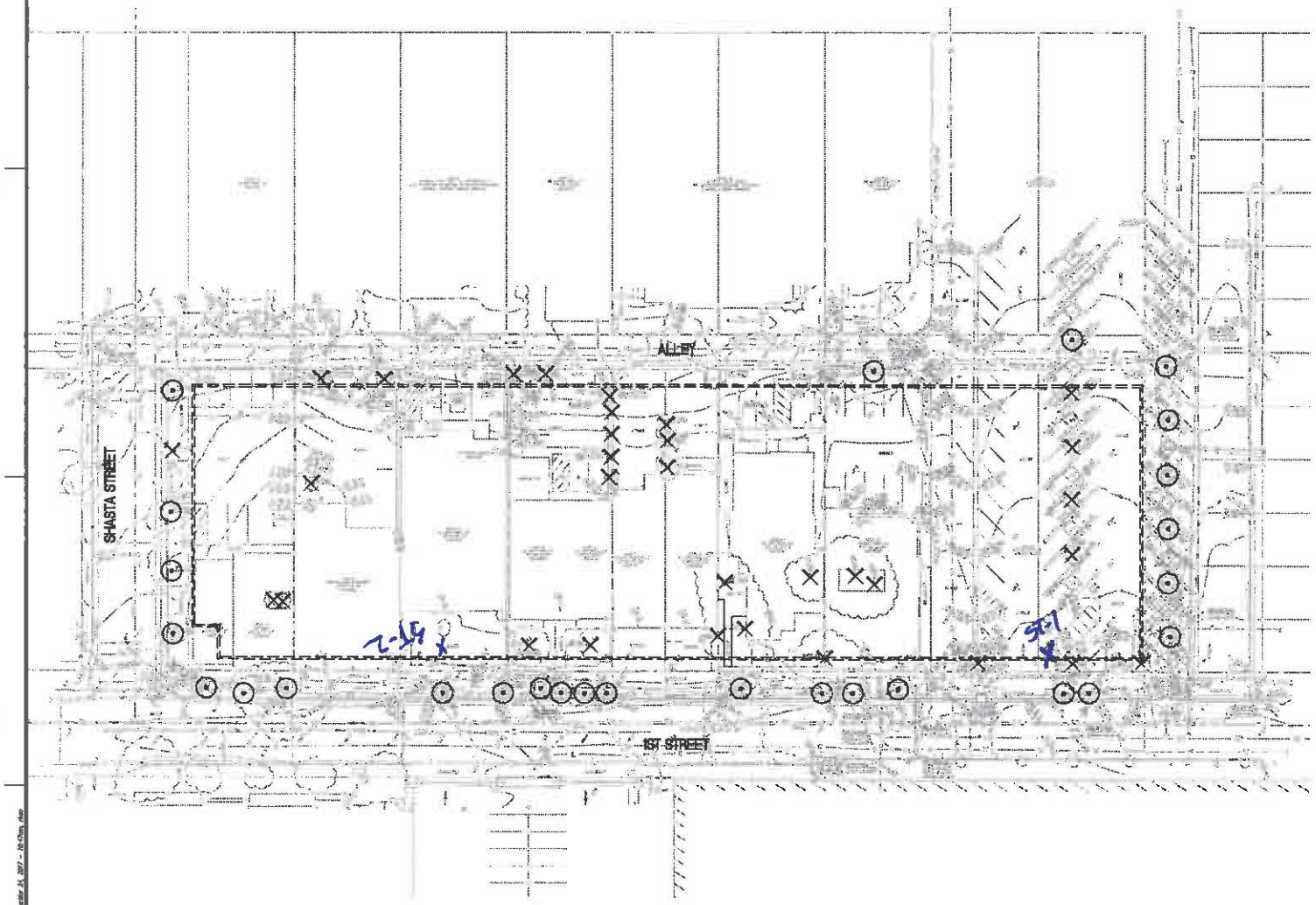
APPENDIX A

NOISE MEASUREMENT SHEETS



SANDIS SILICON VALLEY SCALE: 1"=20'

TREE DISPOSITION LEGEND

- X — REMOVE EXISTING TREE AND ROOTBALL, COORDINATE WITH LANDSCAPE ARCHITECT AND PROJECT ARBORIST PRIOR TO REMOVING ANY TREES.
- ⊙ — EXISTING TREE TO REMAIN, PROTECT IN PLACE. SEE LANDSCAPE PLANS AND ARBORIST REPORT FOR TREE PROTECTION DETAILS.
- = = — OUTLINE OF CANOPY LIMITS

TREE DISPOSITION NOTES

1. REFER TO LANDSCAPE PLANS, SPECIFICATIONS OR ARBORIST REPORT "AN INVENTORY OF THE EXISTING TREES" DATED 05/25/2016, PREPARED BY CONSULTING ARBORIST, MICHAEL L. BENCH, FOR TREE PROTECTION RECOMMENDATIONS AND MEASURES.

811 Know what's below. Call before you dig.

FIRST STREET GREEN

Los Altos Community Investments
115 First Street
Los Altos, California 94022

ehdd.
ARCHITECTURE INTERIORS PLANNING URBAN DESIGN
500 TREAT AVE. #201
SAN FRANCISCO
CALIFORNIA 94110
ARCH@EHDD.COM
T 415-285-9193
F 415-285-3866

SANDIS

Printing Date

Revisions and Description Date

Scale
1"=20'

Drawn by
LW

EHDD Job Number
15806

Sheet Title
TREE DISPOSITION PLAN

Sheet Number
C-3.0

Noise Measurement Survey

Project Number: _____
Project Name: 100 1st St.

Test Personnel: JT Stephens
Equipment: LD LxT

Site Number: ST-2 Date: 5/18/17

Time: From 3:32 p To 3:47 p

Site Location: Across from parking / loading docks of Safeway. Patio of 127 1st St

Primary Noise Sources: Traffic on 1st St, loud passbys on Foothill Expwy

Comments: No loading dock activity at the time of the commencement

Adjacent Roadways: 1st St.

File:	31
L_{eq}	59.5
L_{max}	68.9
L_{min}	46.3
L_2	64.4
L_8	63.3
L_{25}	59.6
L_{50}	57.2
L_{90}	55.0
L_{99}	50.6

Atmospheric Conditions	
Average Wind Velocity (mph)	7
Maximum Wind Velocity (mph)	15
Temperature (F)	78
Relative Humidity (%)	23%

Noise Measurement Survey

Project Number: _____
Project Name: 100 1st St.

Test Personnel: JT Stephens
Equipment: LD LxT

Site Number: ST-1 Date: 5/18/17

Time: From 3:15p To 3:30p

Site Location: Existing parking lot, southern corner of project site.

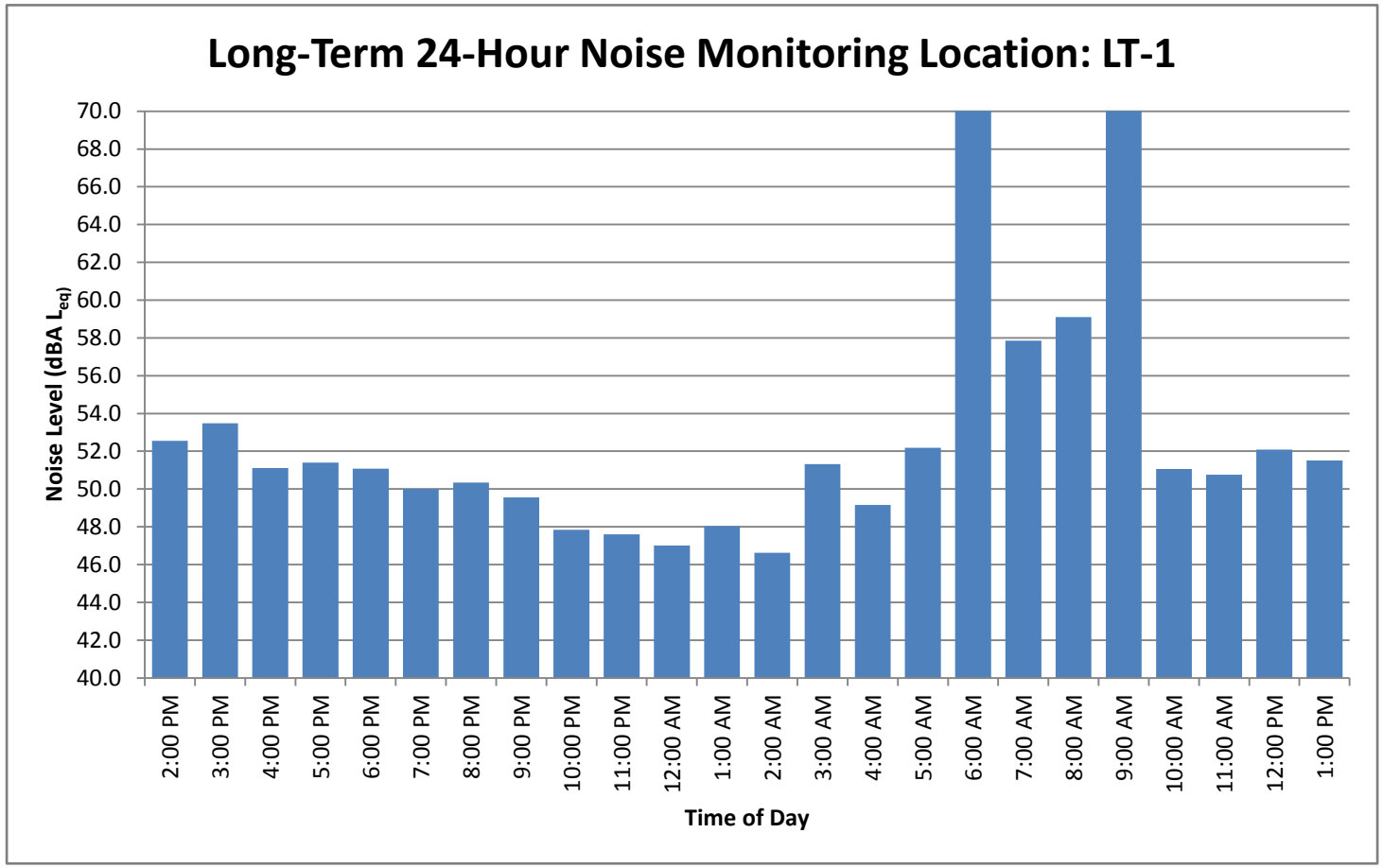
Primary Noise Sources: Traffic on First St., Pedestrians in area, parking lot activities.

Comments: Generally pretty quiet.

Adjacent Roadways: First St.

File:	33
L_{eq}	60.0
L_{max}	76.1
L_{min}	48.2
L_{1} 5	64.8
$L_{}$ 10	62.7
$L_{}$ 33	58.6
L_{50}	56.1
$L_{}$ 67	54.0
$L_{}$ 90	51.2

Atmospheric Conditions	
Average Wind Velocity (mph)	
Maximum Wind Velocity (mph)	
Temperature (F)	
Relative Humidity (%)	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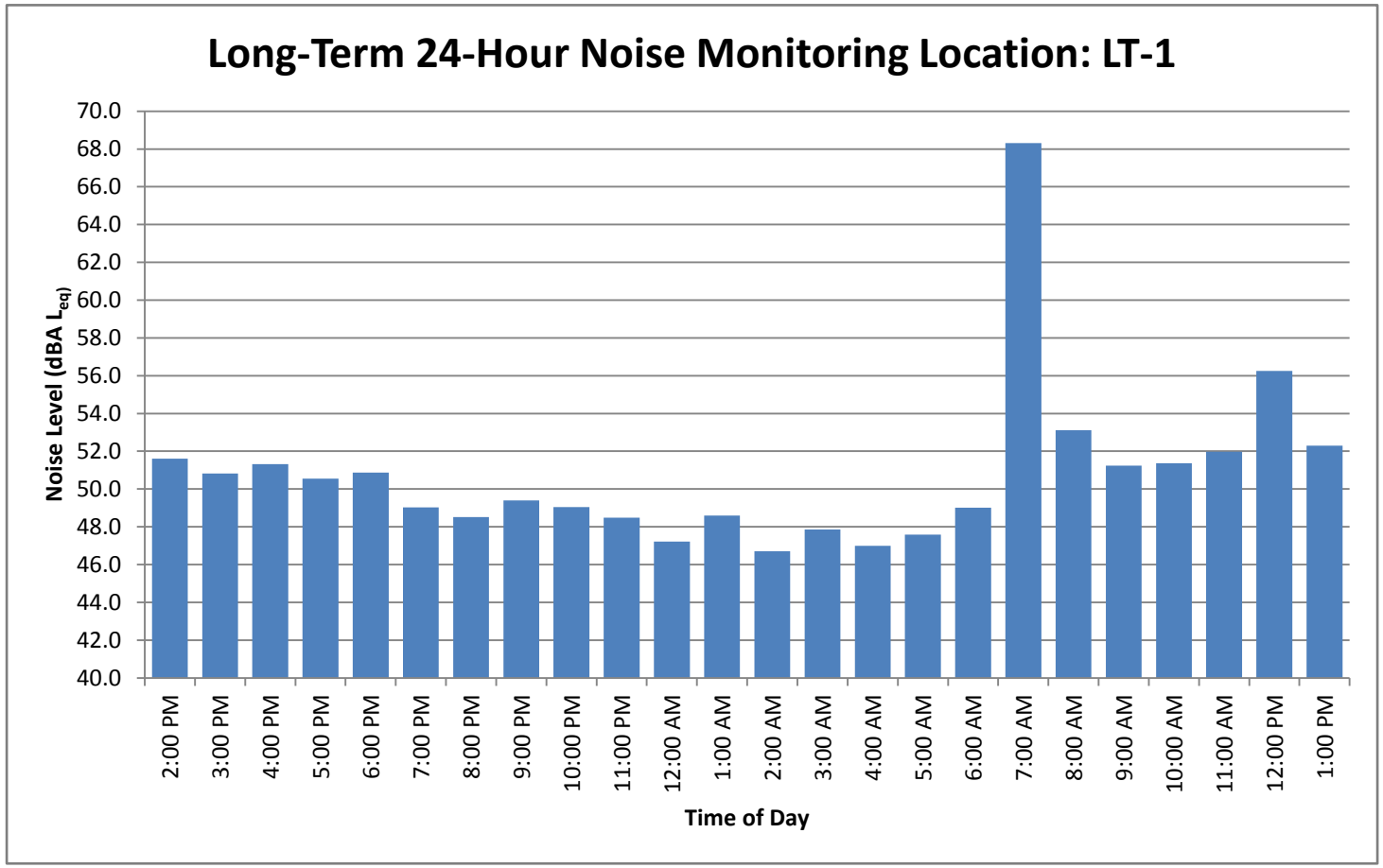
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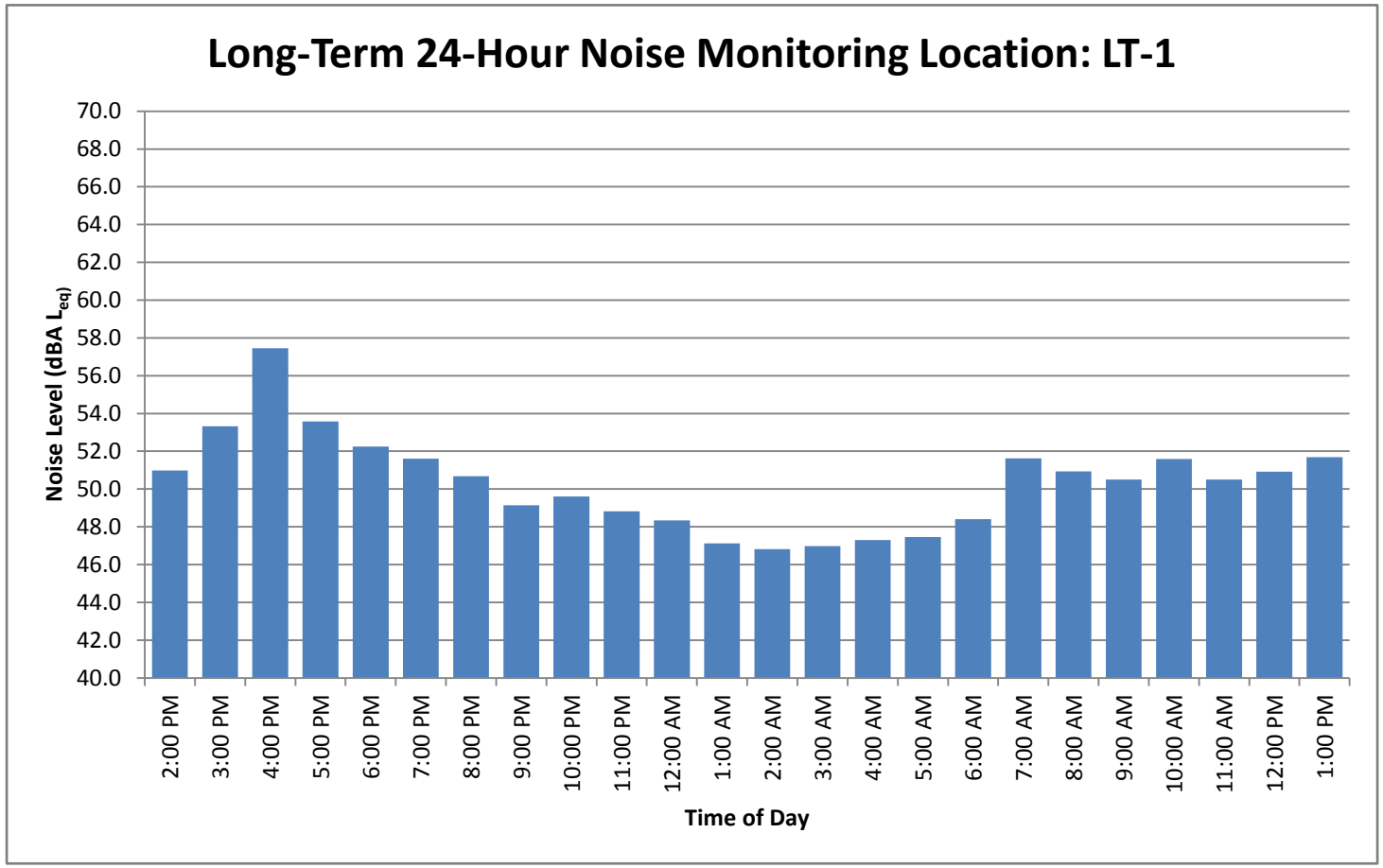
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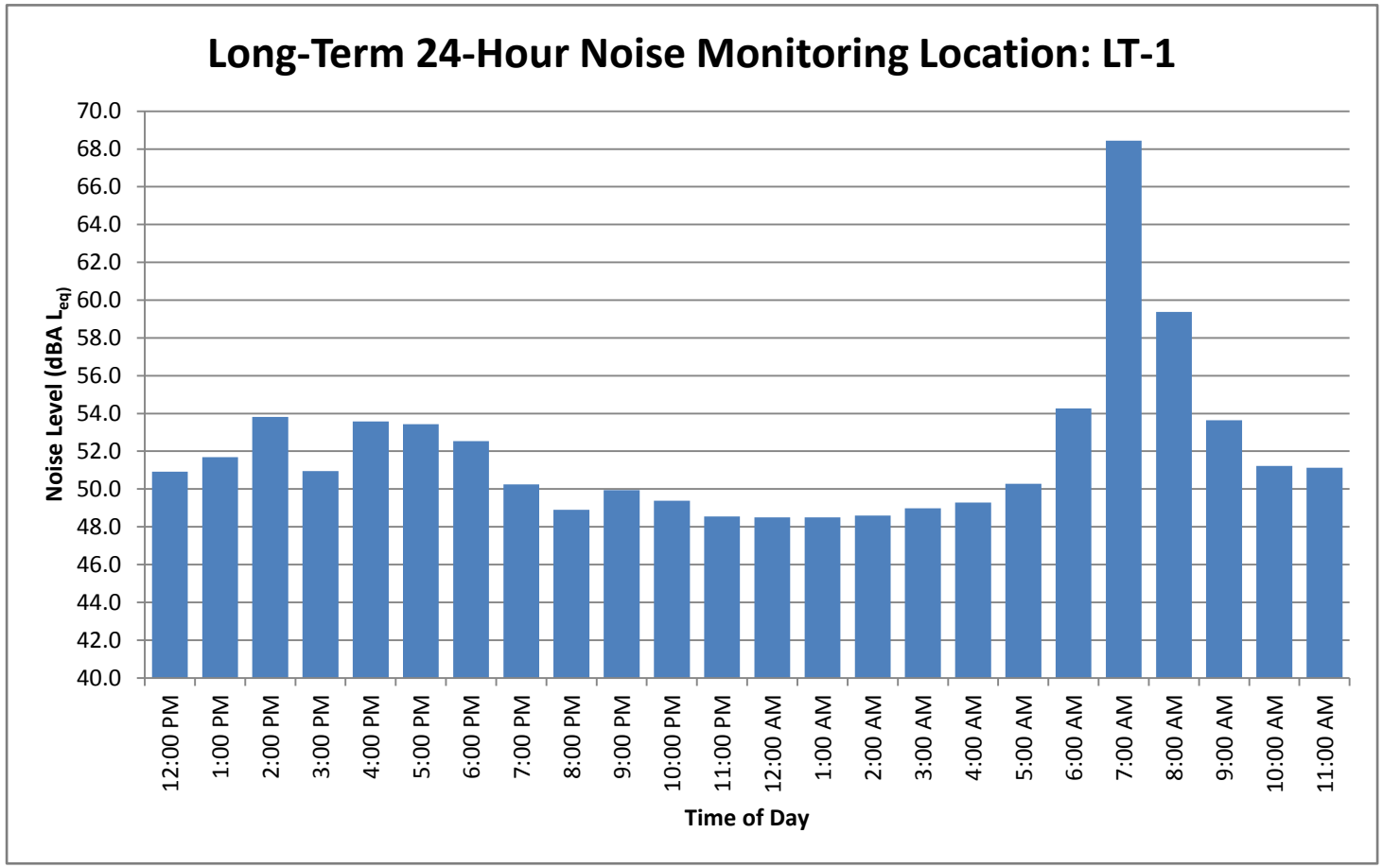
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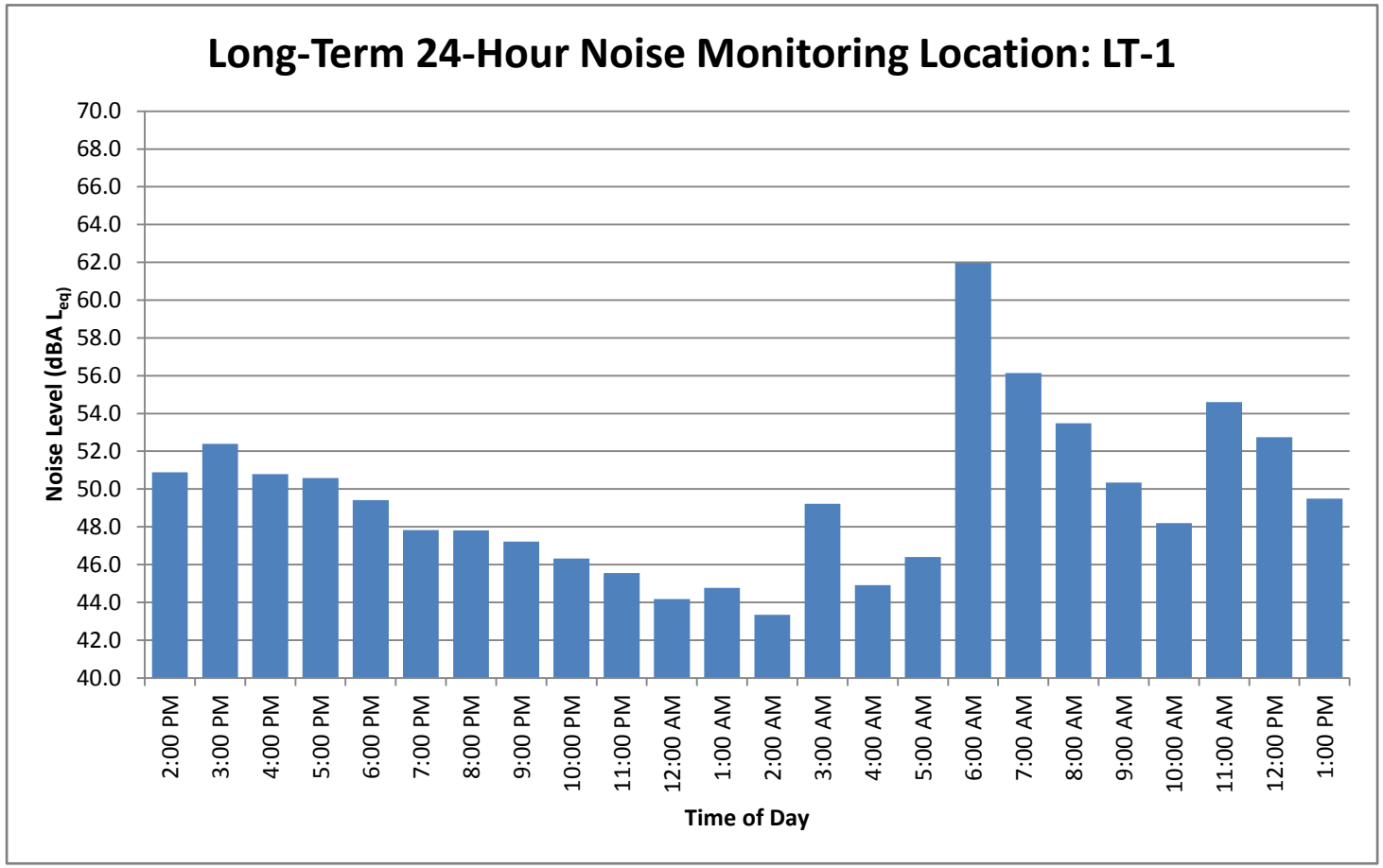
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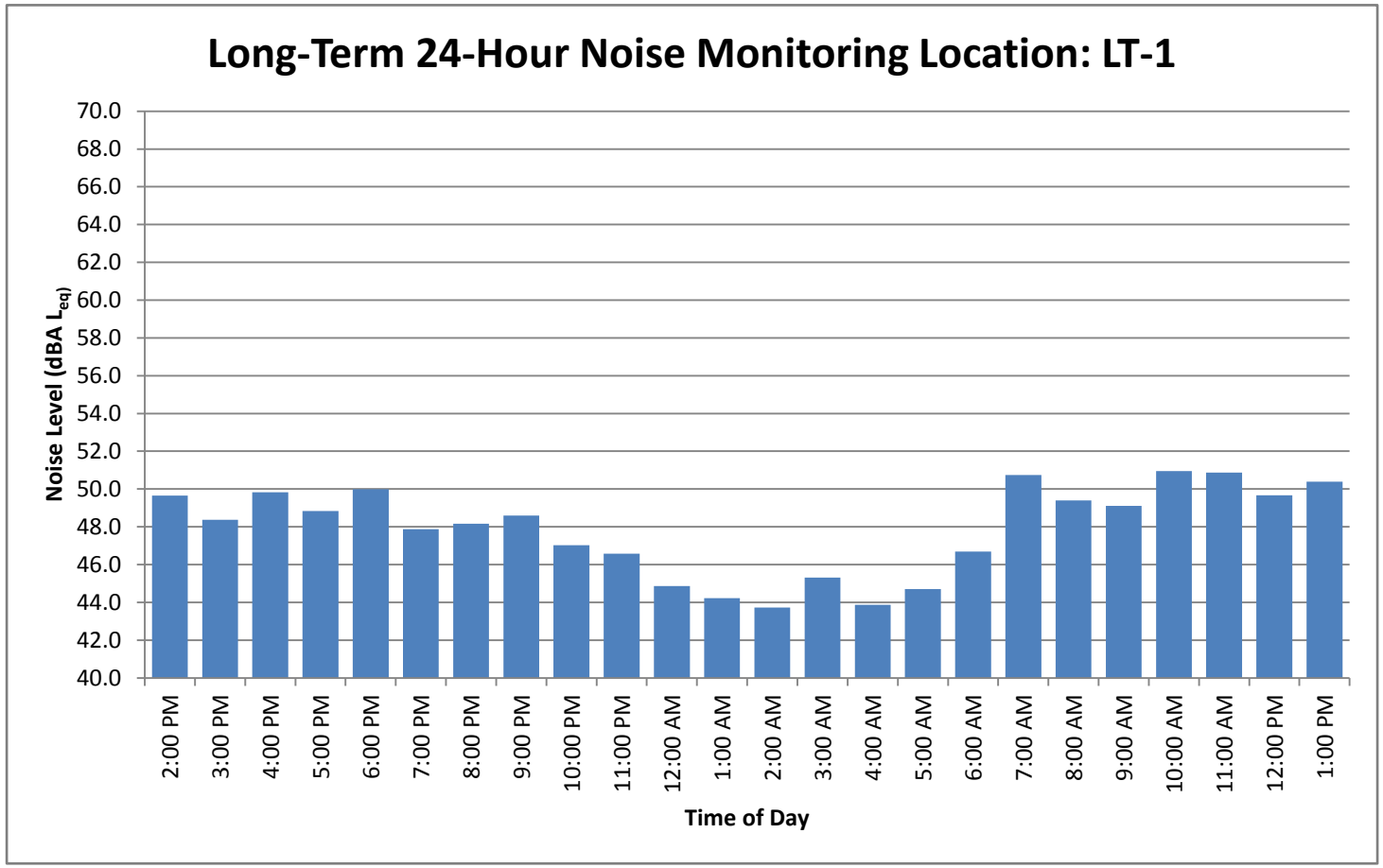
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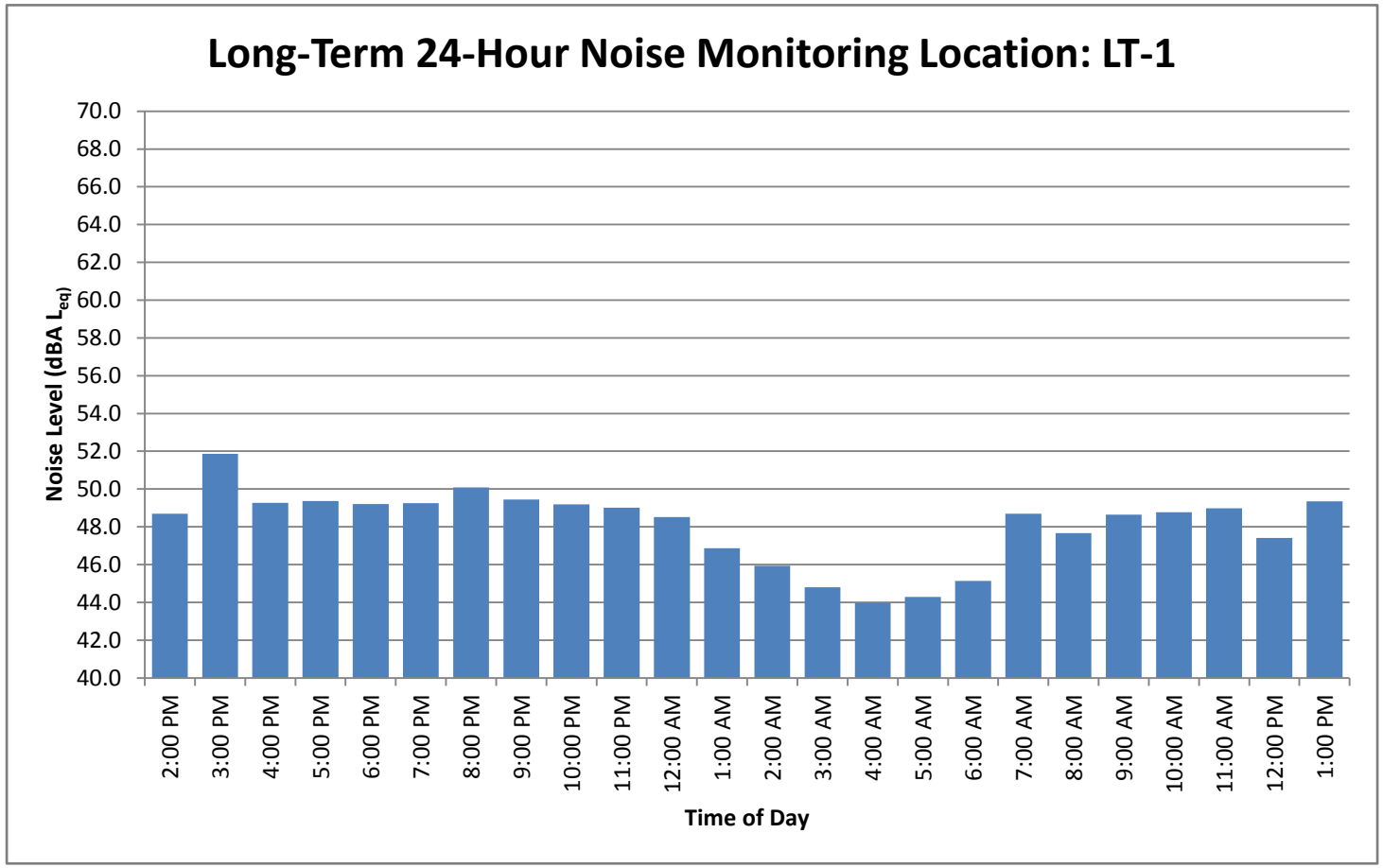
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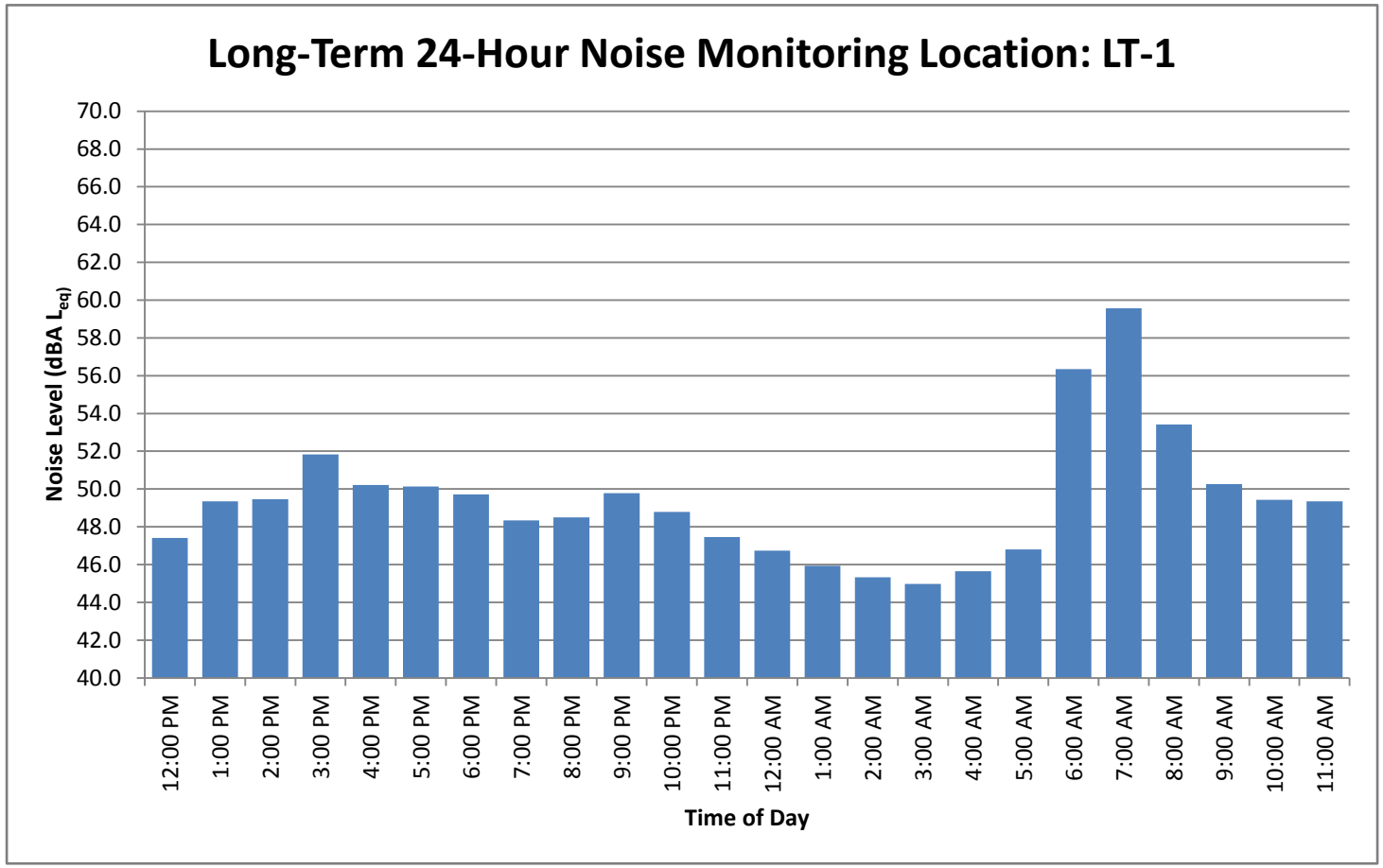
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