961-971 MERIDIAN AVENUE PROJECT NOISE AND VIBRATION ASSESSMENT

San José, California

November 20, 2019

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INTRODUCTION

A residential housing project is proposed at 961-971 Meridian Avenue in San José, California. As part of the project, the two existing single-family residences located on the site would be demolished and the 233-unit mixed-use residential building with 1,780 square feet of ground-level commercial use would be constructed. One level of below-grade parking and one level of ground-level parking is also included as part of the project. The project site would be accessed from Meridian Avenue.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) guidelines. The report is divided into four sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency Section discusses noise and land use compatibility utilizing policies in the City's General Plan; 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity; and 4) the NEPA Noise Assessment Section evaluates noise effects resulting from the project.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA

are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (L_{dn} or *DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60-70 dBA. Between a DNL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of 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. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting 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 frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which 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: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background - Noise

National Guidance. The U.S. Department of Housing and Urban Development (HUD) environmental noise regulations are set forth in 24CFR Part 51B (Code of Federal Regulations). The following exterior noise standards for new housing construction would be applicable to this project:

- 65 dBA L_{dn} or less – acceptable.

- Exceeding 65 dBA L_{dn} but not exceeding 75 dBA L_{dn} – normally unacceptable (appropriate sound attenuation measures must provide an additional 5 decibels of attenuation over that typically provided by standard construction in the 65 dBA L_{dn} to 70 dBA L_{dn} zone; 10 decibels additional attenuation in the 70 dBA L_{dn} to 75 dBA L_{dn} zone).

- Exceeding 75 dBA L_{dn} – unacceptable.

These noise standards also apply, "… at a location 2 meters from the building housing noise sensitive activities in the direction of the predominant noise source…" and "…at other locations where it is determined that quiet outdoor space is required in an area ancillary to the principal use on the site."

A goal of 45 dBA L_{dn} is set forth for interior noise levels and attenuation requirements are geared toward achieving that goal. It is assumed that with standard construction any building will provide sufficient attenuation to achieve an interior level of 45 dBA L_{dn} or less if the exterior level is 65 dBA L_{dn} or less. Where exterior noise levels range from 65 dBA L_{dn} to 70 dBA L_{dn}, the project must provide a minimum of 25 decibels of attenuation, and a minimum of 30 decibels of attenuation is required in the 70 dBA L_{dn} to 75 dBA L_{dn} zone. Where exterior noise levels range

from 75 dBA L_{dn} to 80 dBA L_{dn}, the project must provide a minimum of 35 decibels of attenuation to achieve an interior level of 45 dBA L_{dn} or less.

State CEQA Guidelines. CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels; or

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

Pursuant to recent court decisions, the impacts of site constraints, such as exposure of the proposed project to excessive levels of noise and vibration, are not included in the Impacts and Mitigation Section of this report. These items are discussed in a separate section addressing the project's consistency with the policies set forth in the City's General Plan.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise sensitive land uses of 3 dBA or greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA DNL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use.

2016 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

2016 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings, as set forth in the 2010 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). These standards were not altered in the 2016 revisions. Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. Both of the sections that pertain to this project are as follows:

5.507.4.1 Exterior noise transmission, prescriptive method. Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA DNL noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.

5.507.4.2 Performance method. For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan adopted by the Santa Clara County Airport Land Use Commission contains standards for projects within the vicinity of San José International Airport, which are relevant to this project:

4.3.2.1 Noise Compatibility Policies

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (2022 Aircraft Noise Contours).

Policy N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed use residential project or a multi-unit residential project. (Sound wall noise mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of San José. The following policies are applicable to the proposed project:

EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state, and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical

analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

    - For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

EC-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable;" or

- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

EC-1.3 Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses.

EC-1.6 Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

Table EC-1: Land Use Compatibility Guidelines for Community Noise in San José

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55	60	65	70	75	80
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]						
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds						
3. Schools, Libraries, Museums, Meeting Halls, Churches						
4. Office Buildings, Business Commercial, and Professional Offices						
5. Sports Arena, Outdoor Spectator Sports						
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters						

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally Acceptable:

- Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable:

- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable:

- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

Regulatory Background – Vibration

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations in the City of San José. The following policies are applicable to the proposed project:

EC-2.3 Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Existing Noise Environment

The project site is located at 961 and 971 Meridian Avenue in San José, California. Adjoining the site to the north and northwest is a single-family residence and a senior living building, respectively. To the west is a multi-family residential building, and to the south is a Montessori school. Additional multi-family residential buildings are located to the east, opposite Meridian Avenue.

A noise monitoring survey was performed in the project vicinity beginning on Tuesday, June 18, 2019 and concluding on Tuesday, June 25, 2019. The monitoring survey included two long-term (LT-1 and LT-2) noise measurements and two short-term (ST-1 and ST-2) noise measurements.

All measurement locations are shown in Figure 1. The existing noise environment at the project site results primarily from vehicular traffic along Meridian Avenue and the other nearby roadways. Aircraft flyovers associated with Mineta San José International Airport operations also affect the noise environment at the site.

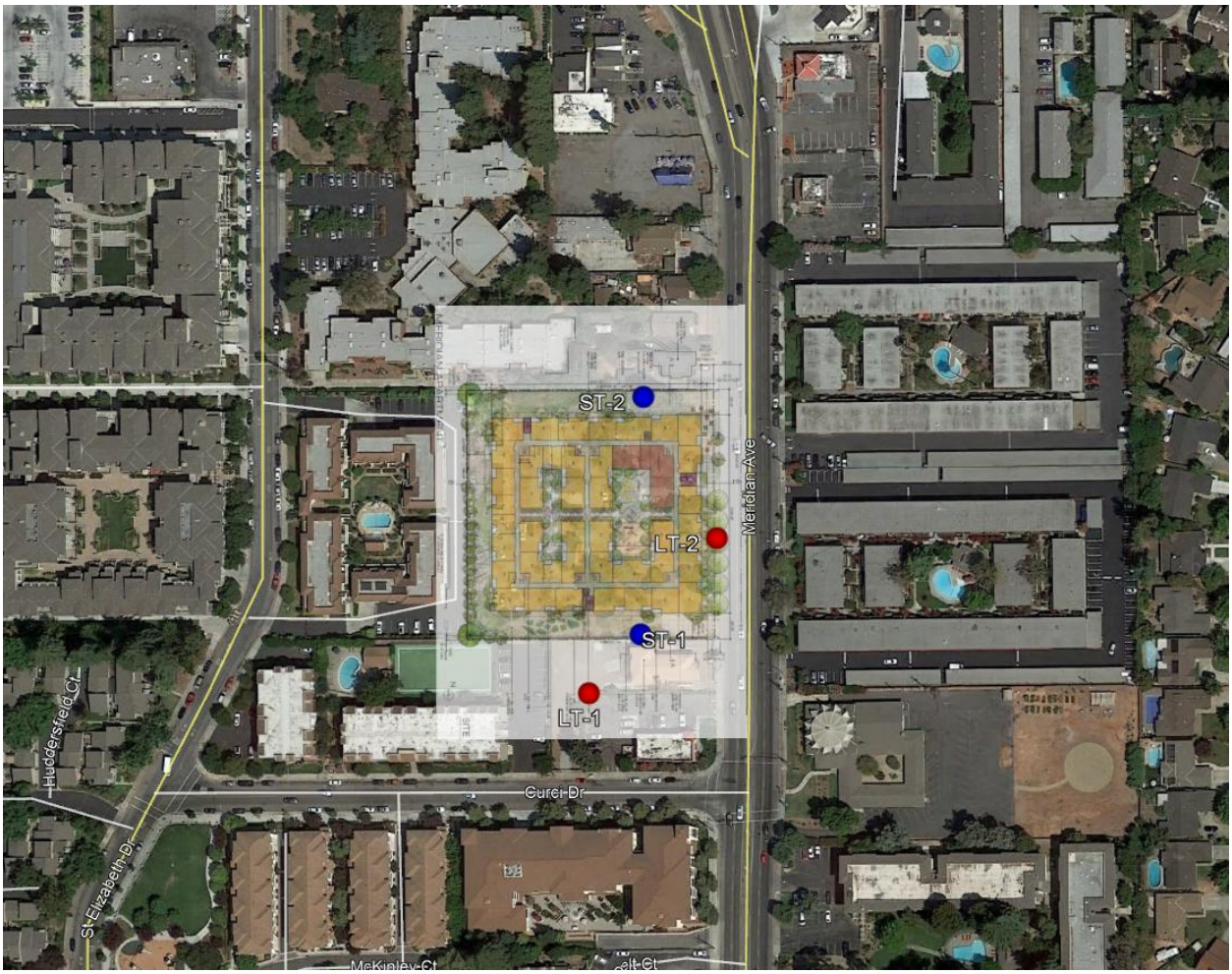
Long-term noise measurement LT-1 was made at the property line between the Montessori school and the fast food restaurant just south of the school. LT-1 was set back approximately 190 feet

from the centerline of Meridian Avenue and approximately 125 feet from the centerline of Curci Drive. Hourly average noise levels on weekdays typically ranged from 55 to 66 dBA L_{eq} during the day and from 47 to 66 dBA L_{eq} at night. On weekends, hourly average noise levels ranged from 54 to 68 dBA L_{eq} during the day and from 48 to 55 dBA L_{eq} at night. The day-night average noise level on weekdays ranged from 61 to 63 dBA DNL, while the weekend day-night average noise level ranged from 59 to 64 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures 2 through 9.

LT-2 was made in the front yard of 971 Meridian Avenue, approximately 35 feet from the centerline of the roadway. Hourly average noise levels at this location typically ranged from 69 to 76 dBA L_{eq} during the day on weekdays and weekends and from 60 to 73 dBA L_{eq} at night on weekdays and weekends. The day-night average noise level on weekdays was 75 dBA DNL and 73 to 74 dBA DNL on weekend days. The daily trend in noise levels at LT-2 is shown in Figures 10 through 17.

The short-term measurement results for ST-1 and ST-2 are summarized in Table 4. Short-term noise measurement ST-1 was made along the southern boundary of the site, which is shared with the Montessori school, and was positioned approximately 125 feet from the centerline of Meridian Avenue. This 10-minute measurement, concurrent with the long-term noise data, was made on Tuesday, June 18, 2019, between 12:20 p.m. and 12:30 p.m. Typical car pass-bys generated noise levels ranging from 55 to 65 dBA, while heavy trucks generated noise levels of 60 to 70 dBA. The 10-minute average noise level measured at ST-1 was 58 dBA $L_{eq(10\text{-}min)}$. Short-term noise measurement ST-2 was made on Tuesday, June 25, 2019, between 9:40 a.m. and 9:50 a.m. This measurement was taken approximately 130 feet west of the centerline of Meridian Avenue along the northern boundary of the project site. Typical car pass-bys generated noise levels ranging from 60 to 69 dBA, while buses generated noise levels of 59 to 62 dBA. One motorcycle pass-by was observed, with noise levels of 64 dBA, and one jet flew overhead during the 10-minute measurement, generating noise levels of 51 dBA. The 10-minute average noise level measured at ST-2 was 61 dBA $L_{eq(10\text{-}min)}$.

FIGURE 1 Noise Measurement Locations



Source: Google Earth 2019.

FIGURE 2 Daily Trend in Noise Levels at LT-1, Tuesday, June 18, 2019

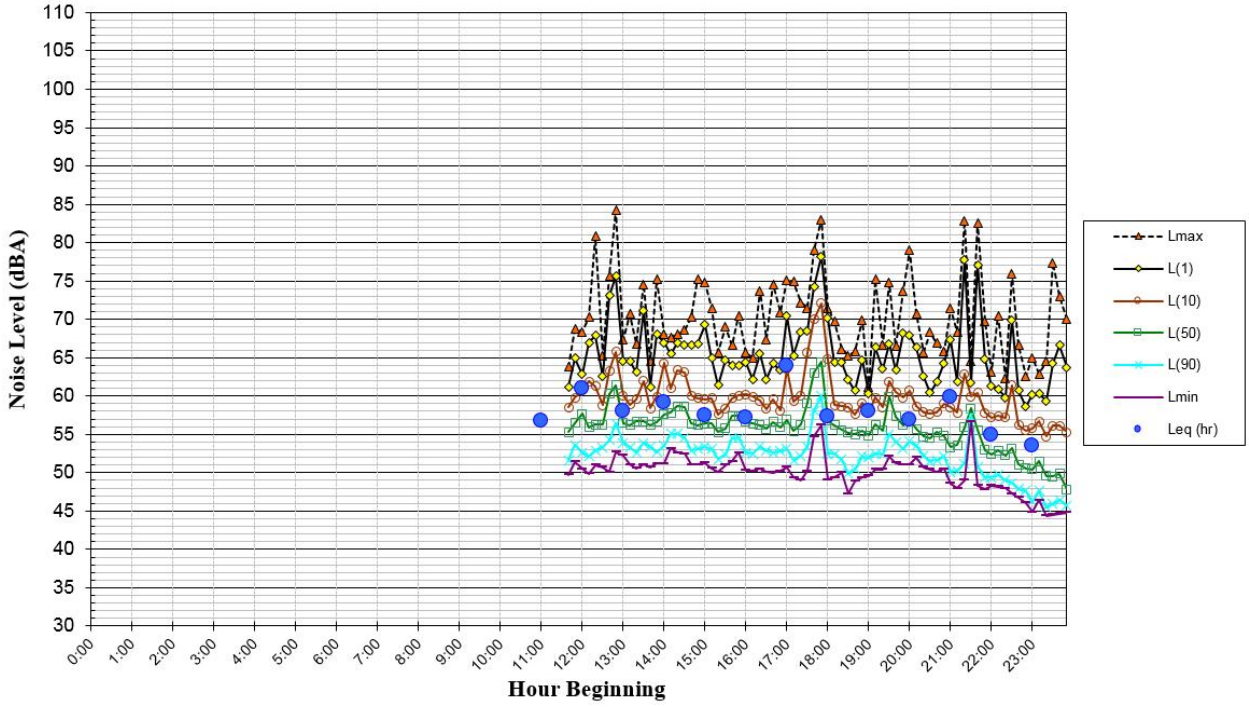


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday, June 19, 2019

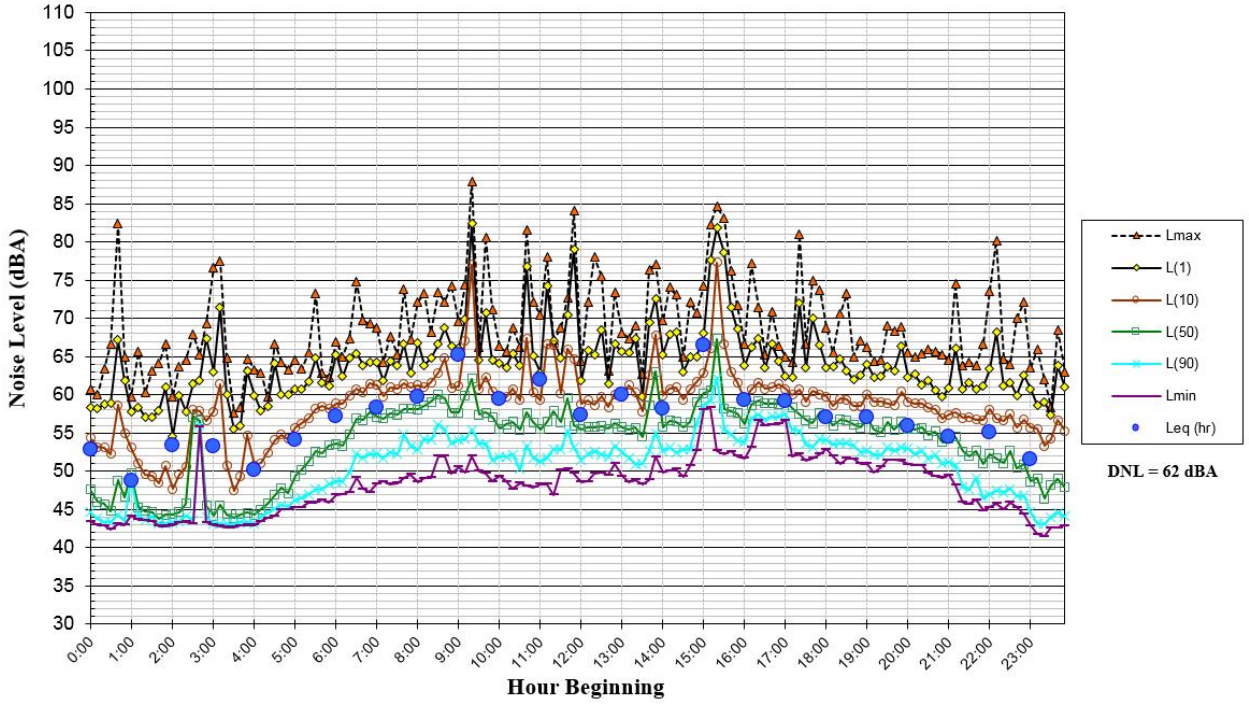


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday, June 20, 2019

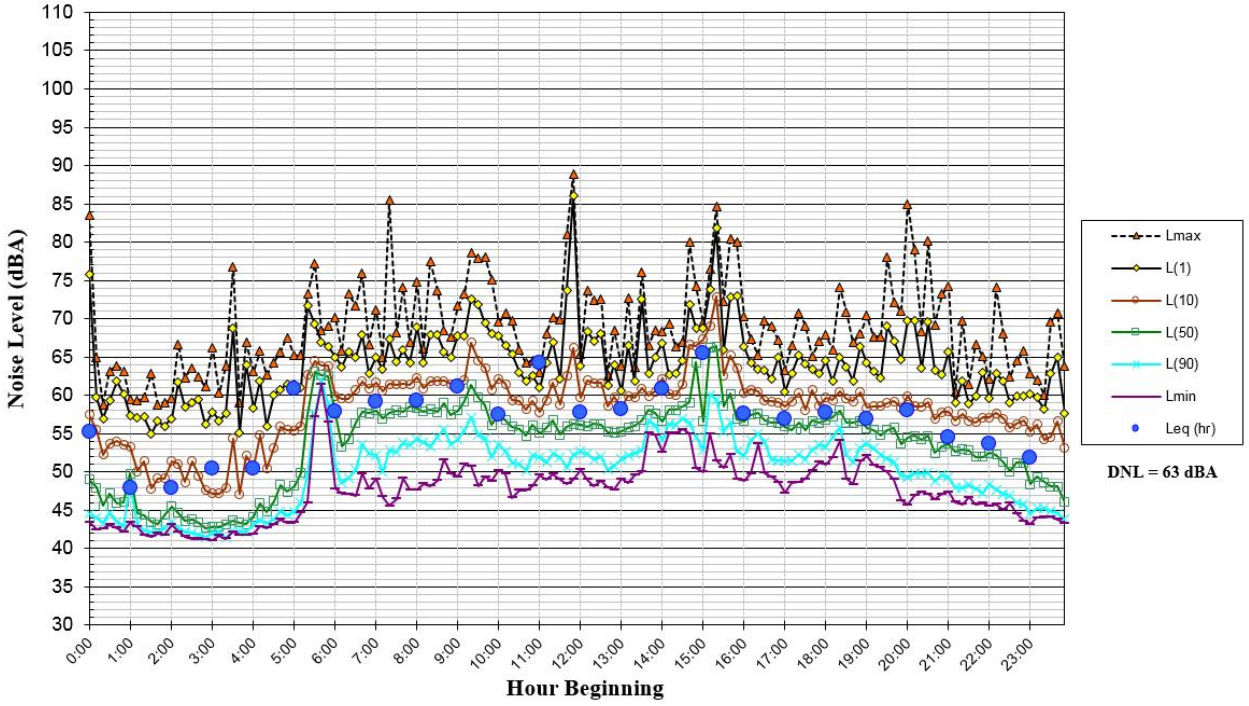


FIGURE 5 Daily Trend in Noise Levels at LT-1, Friday, June 21, 2019

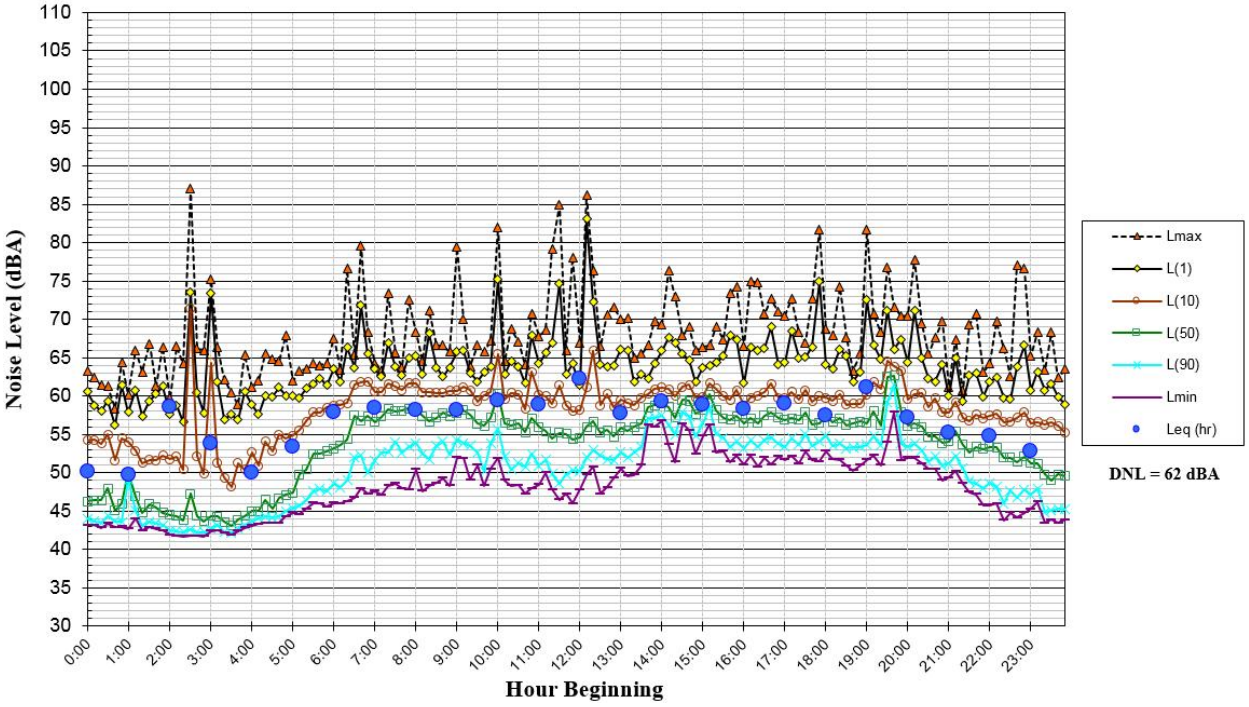


FIGURE 6 Daily Trend in Noise Levels at LT-1, Saturday, June 22, 2019

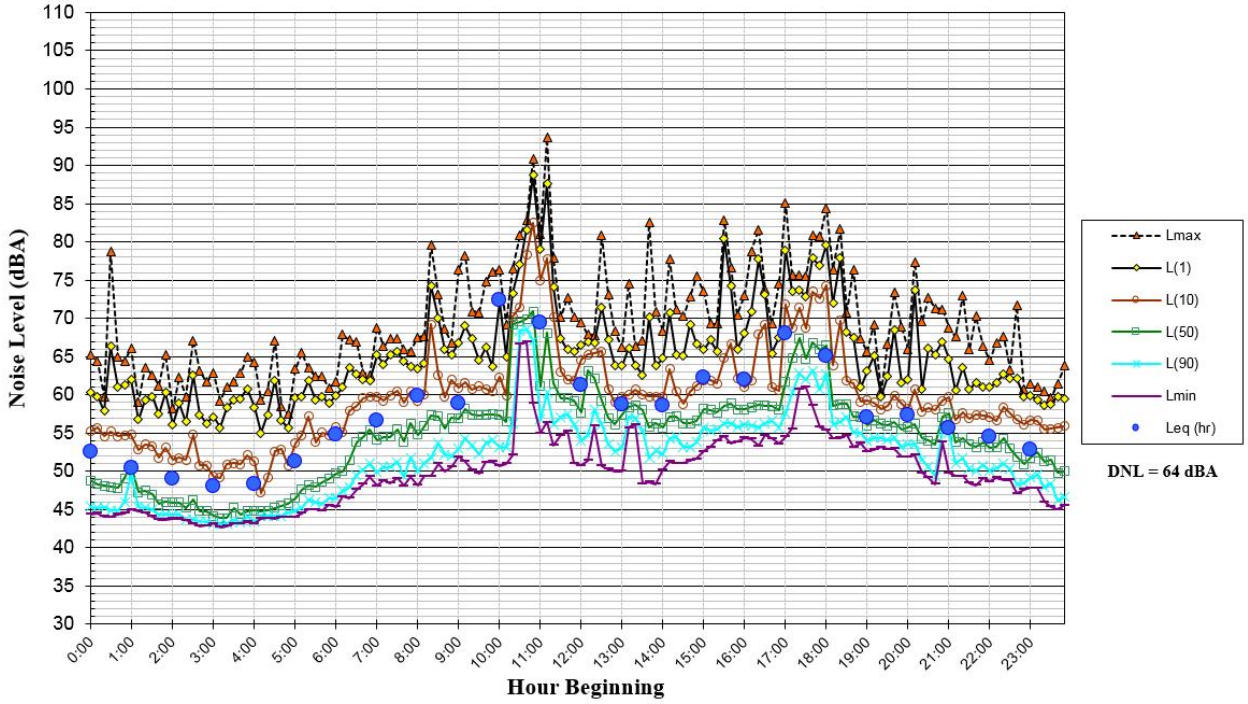


FIGURE 7 Daily Trend in Noise Levels at LT-1, Sunday, June 23, 2019

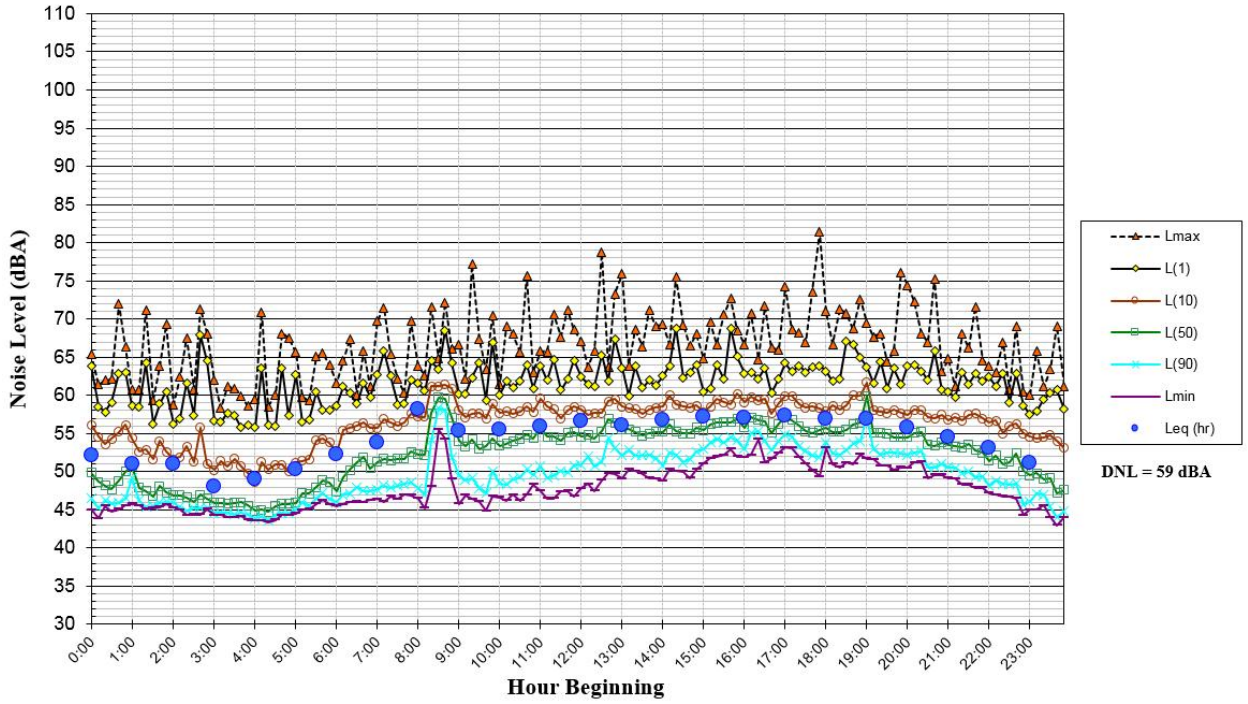


FIGURE 8 Daily Trend in Noise Levels at LT-1, Monday, June 24, 2019

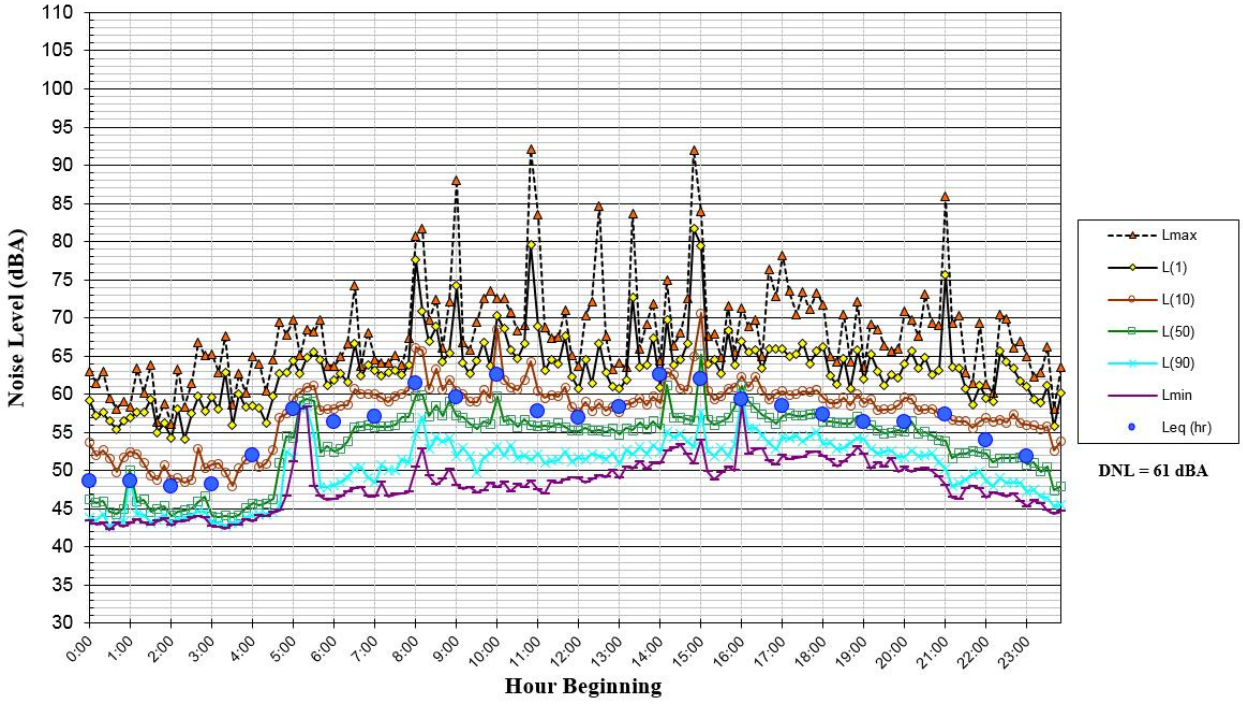


FIGURE 9 Daily Trend in Noise Levels at LT-1, Tuesday, June 25, 2019

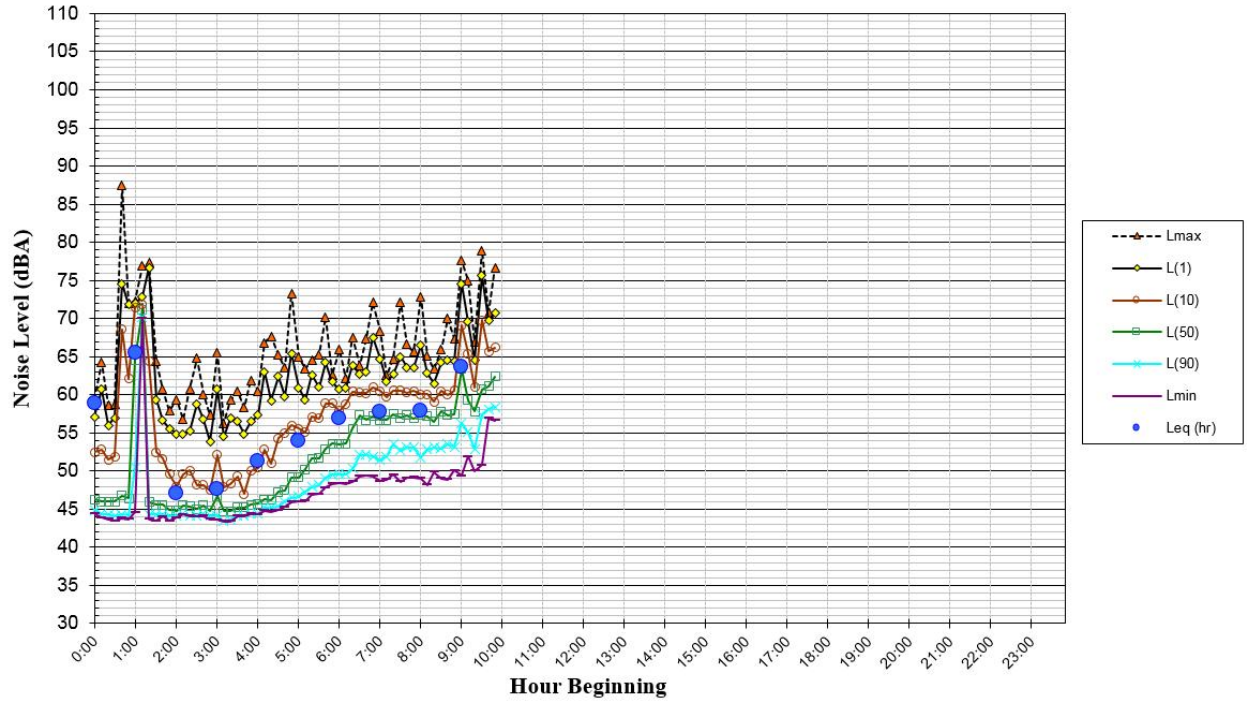


FIGURE 10 Daily Trend in Noise Levels at LT-2, Tuesday, June 18, 2019

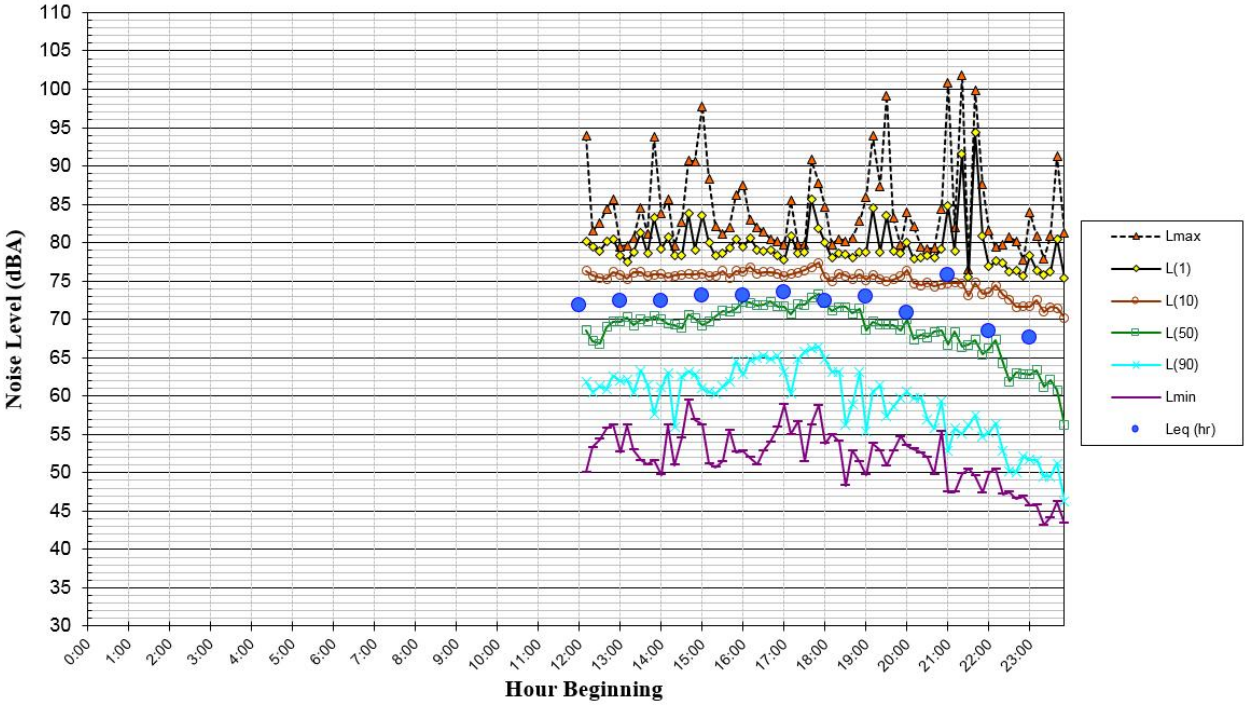


FIGURE 11 Daily Trend in Noise Levels at LT-2, Wednesday, June 19, 2019

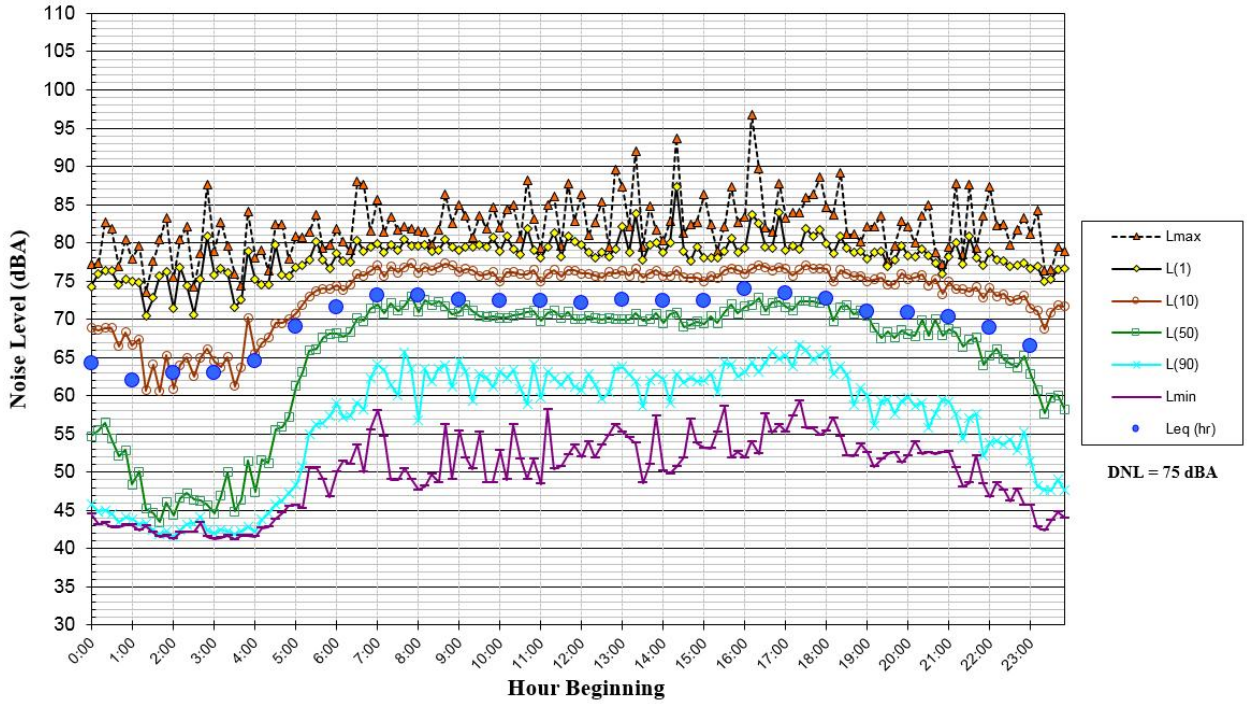


FIGURE 12 Daily Trend in Noise Levels at LT-2, Thursday, June 20, 2019

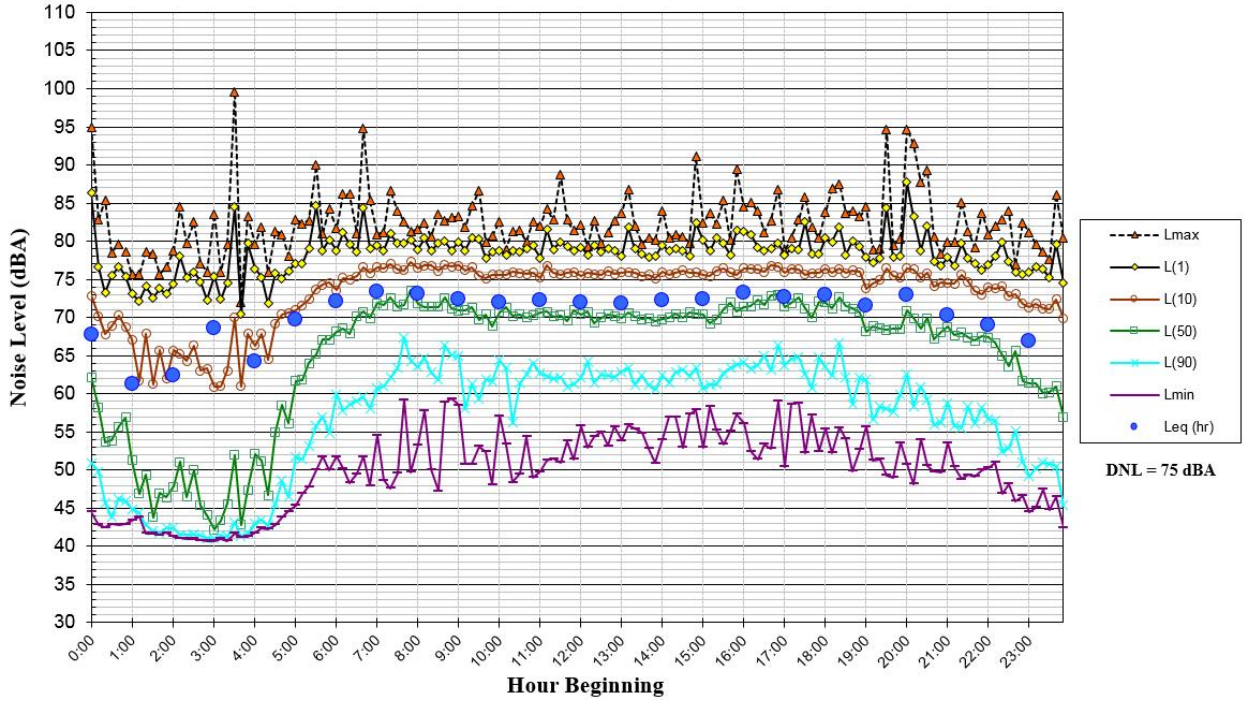


FIGURE 13 Daily Trend in Noise Levels at LT-2, Friday, June 21, 2019

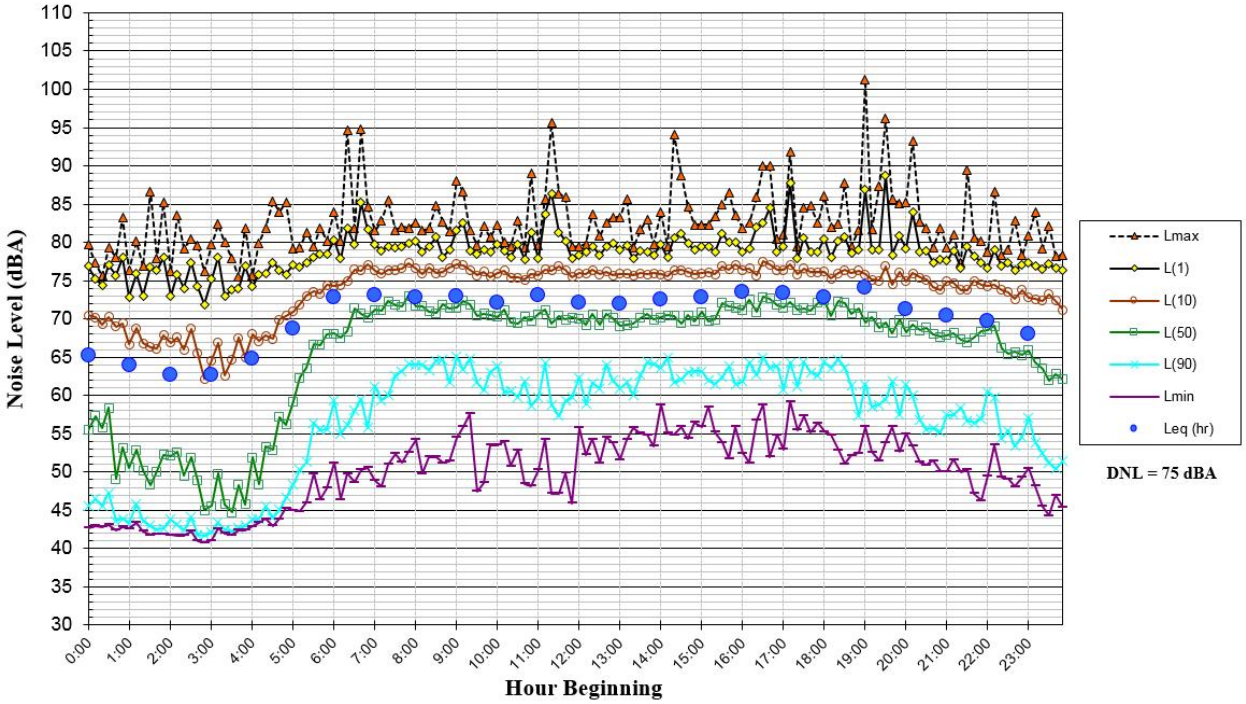


FIGURE 14 Daily Trend in Noise Levels at LT-2, Saturday, June 22, 2019

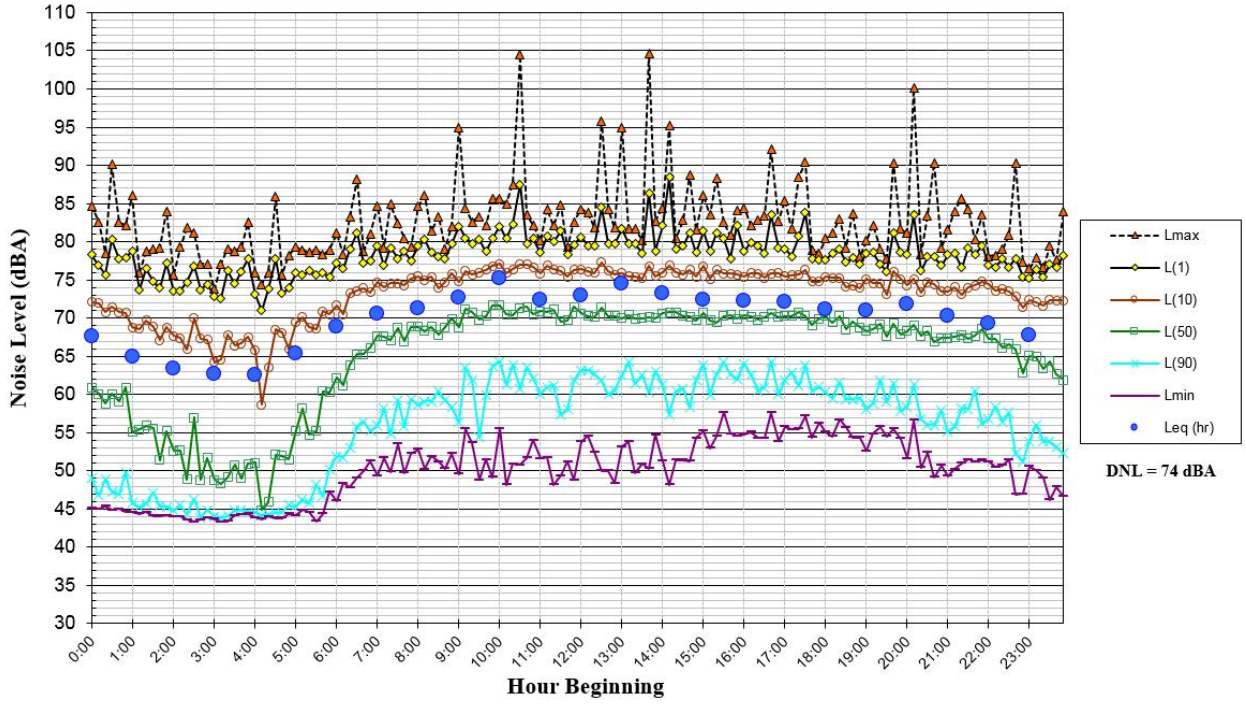


FIGURE 15 Daily Trend in Noise Levels at LT-2, Sunday, June 23, 2019

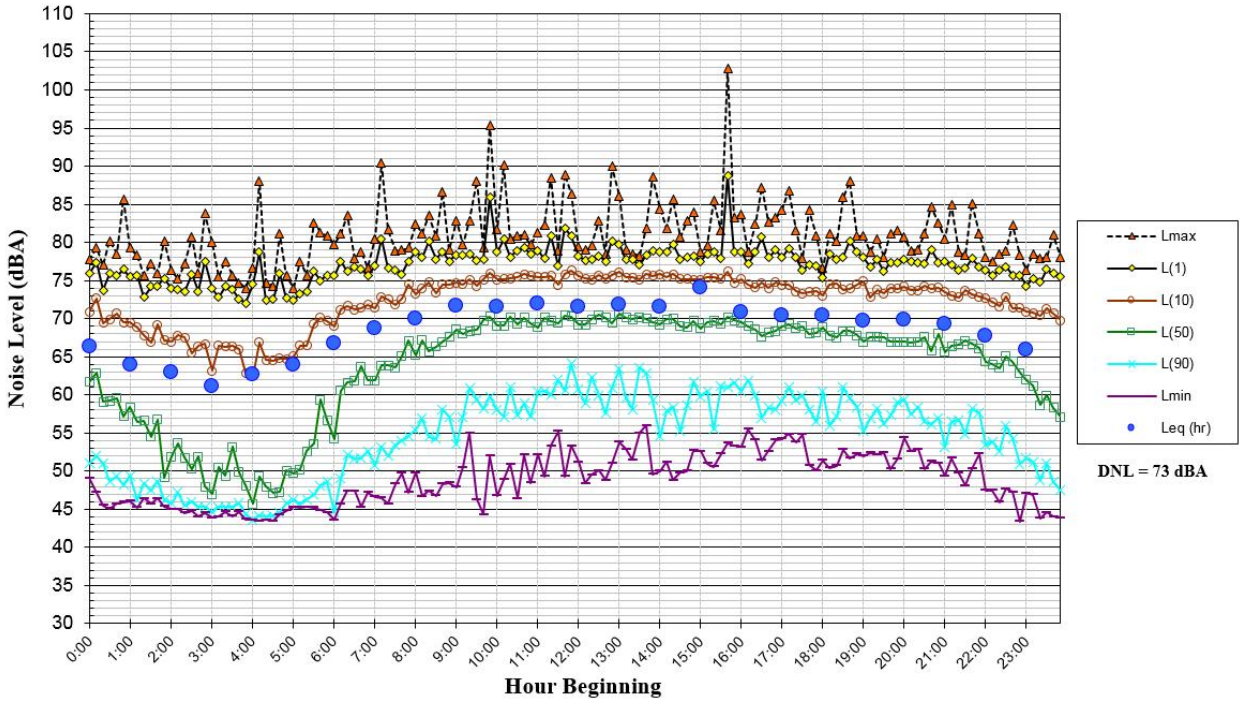


FIGURE 16 Daily Trend in Noise Levels at LT-2, Monday, June 24, 2019

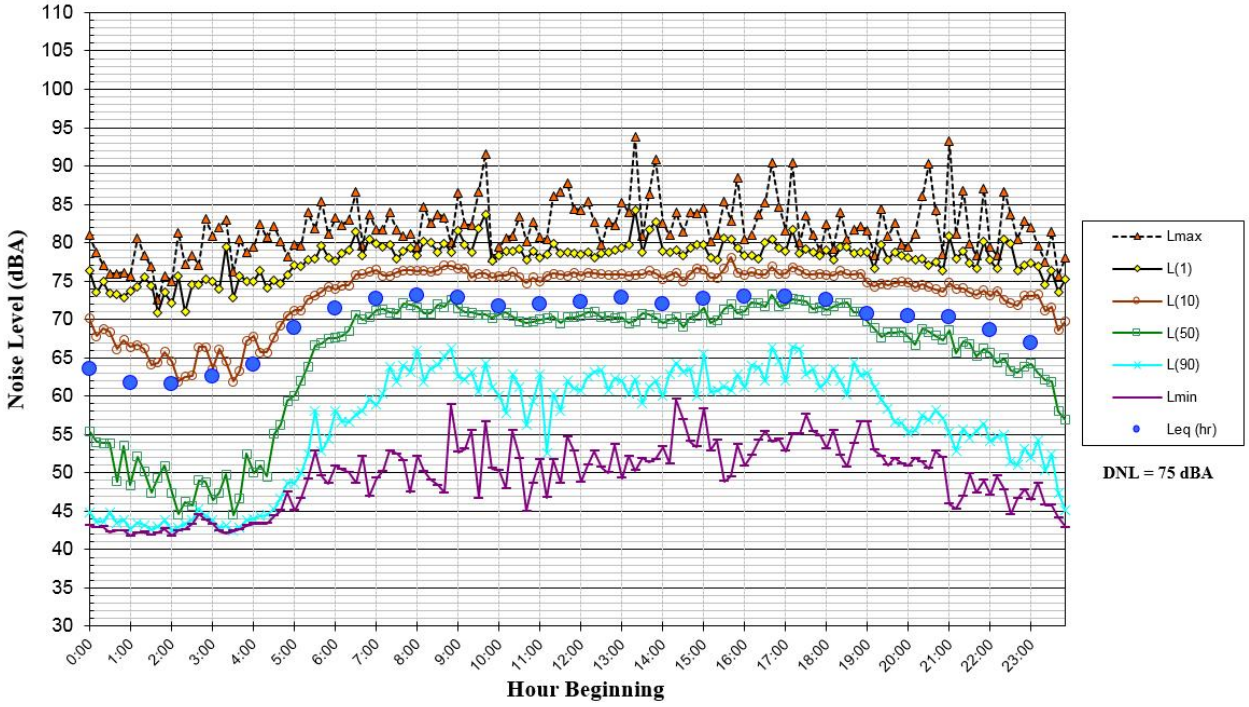


FIGURE 17 Daily Trend in Noise Levels at LT-2, Tuesday, June 25, 2019

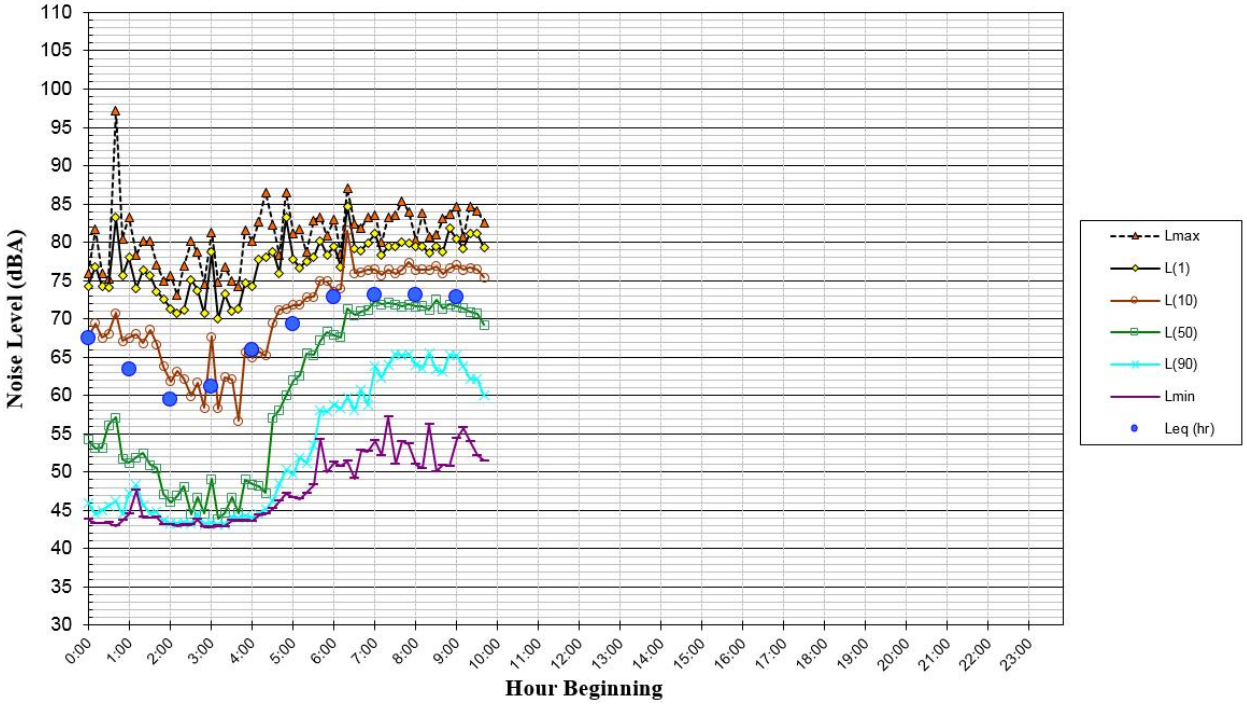


TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10\text{-}min)}$
ST-1: ~125 feet west of the centerline of Meridian Avenue (6/18/2019, 12:20-12:30 p.m.)	71	66	61	55	50	58
ST-2: ~130 feet west of the centerline of Meridian Avenue (6/25/2019, 9:40-9:50 a.m.)	77	70	63	58	50	61

GENERAL PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The future noise environment at the project site would continue to result primarily from vehicular traffic along the Meridian Avenue. A traffic report was completed for the proposed project on August 23, 2019 by *Hexagon Transportation Consultants, Inc*.[1] However, the traffic study did not include cumulative plus project traffic volumes. Therefore, to estimate future traffic noise levels, a review of the traffic volumes contained in the *Envision San José 2040 General Plan Comprehensive EIR*[2] was made. This review indicated that there would not be a measurable increase in traffic noise along Meridian Avenue by the year 2040, which is likely due to the area being mostly built out. The trips generated by the proposed project, which would be 69 during the peak AM hour and 88 during the peak PM hour, would be minimal compared to the existing traffic volumes along the surrounding roadways. Therefore, the project would not result a measurable traffic noise increase. For the purposes of a credible worst-case assessment, it was assumed that an increase of 1 to 2% in traffic volumes could occur along the surrounding roadways over the next 15 to 20 years. These projections assume a standard rate of growth in the City but are conservative for built-out areas where growth is not forecasted. As a result, future noise levels at the project site are conservatively estimated to increase by approximately 1 dBA over existing conditions. Therefore, future noise levels would range from 74 to 76 dBA DNL at a distance of 40 feet from the centerline of Meridian Avenue (LT-2).

Future Exterior Noise Environment

Residential Use

The exterior noise threshold established in the City's General Plan for new multi-family residential projects is 60 dBA DNL at usable outdoor activity areas, excluding private balconies and porches.

The site plan shows two podium-level courtyards, both of which are surrounded by the proposed building on all four sides. The centers of these common use areas would be set back by 145 and 240 feet, respectively, from the centerline of Meridian Avenue. With shielding provided by the proposed building, the future exterior noise levels at these outdoor use areas would be below 60 dBA DNL.

[1] Hexagon Transportation Consultants, Inc., "961-971 Meridian Ave," August 23, 2019.
[2] City of San José, "Envision San José 2040 General Plan," 2011.

The site plan also shows outdoor gardens and open space area surrounding the building on the ground level. An eight-foot tall precast concrete panel wall with screening vines would be located along the northern and southern property lines, with eight-foot tall ornamental vehicular swing gates and pedestrian gates connecting to the building on both sides. Assuming that these barriers would be continuous from ground to top, with no cracks or gaps, these barriers would provide adequate shielding for the outdoor gardens and open space area. The future exterior noise levels at these ground-level outdoor use areas, which are located 200 feet or more from the centerline of Meridian Avenue, would be below 60 dBA DNL. The outdoor use area associated with the residential component of the proposed project would be compatible with the future noise environment at the project site and would not require additional noise control measures.

Commercial Use

According to Table EC-1 of the City's General Plan, outdoor use areas associated with commercial uses should have an exterior noise threshold of 70 dBA DNL to be considered normally acceptable.

The commercial component of the proposed project would be located on the ground level of the northeastern corner of the building. An outdoor dining area is proposed as part of this commercial use. The center of the outdoor dining area would be approximately 50 feet from the centerline of Meridian Avenue. At this distance, future exterior noise levels would range from 73 to 75 dBA DNL. Since the outdoor seating area is designed to be open and easily accessible, a sound wall or fence would not be ideal and would take away from the aesthetic appeal of the space. Further, the seating area would be located in front of the door accessing the commercial retail. Surrounding the entrance with a barrier would be too restrictive and would deter customers. The future exterior noise environment would fall within the conditionally acceptable range of 70 to 80 dBA DNL; therefore, the optimal solution would be for the City of San José to allow for an exception of the outdoor use area to have a conditionally acceptable noise environment.

Future Interior Noise Environment

Residential Use

The City requires that interior noise levels be maintained at 45 dBA DNL or less for residential land uses.

The residential units located along the eastern building façade, which is adjacent to Meridian Avenue, would be set back approximately 60 feet from the centerline of the roadway. At this distance, the units along the eastern façade would be exposed to future exterior noise levels up to 72 to 74 dBA DNL.

Since the residential units are located on levels 2 through 6, the buildings located on the adjacent properties to the north and to the south would provide little to no shielding from traffic noise along Meridian Avenue. The units along the northern and southern façades would be set back from the centerline of Meridian Avenue by 60 to 315 feet. At these distances, the exterior-facing units along these building façades would be exposed to future exterior noise levels ranging from 64 to 74 dBA DNL.

The western façade would be mostly shielded from traffic noise along Meridian Avenue by the proposed building. The units along this façade would also be shielded from traffic noise along St. Elizabeth Drive by the adjacent multi-family residential building. The units located along the western building façade would be exposed to future exterior noise levels ranging from below 60 to 64 dBA DNL.

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Assuming windows to be partially open for ventilation, the interior noise levels for the proposed project would be up to 59 dBA DNL at the units along the eastern façade. This would exceed the 45 dBA DNL threshold for interior noise and require noise insulation features.

Commercial Use

The performance method enforced in the Cal Green Code requires that interior noise levels be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation at the proposed buildings.

The setback of the eastern building façade from the centerline of Meridian Avenue would be approximately 60 feet. At the nearest building façade facing the roadway, future hourly average noise levels during daytime hours would range from 68 to 75 dBA $L_{eq(1\text{-}hr)}$, and a day-night average noise level of up to 74 dBA DNL at the building exterior.

Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 50 dBA $L_{eq(1\text{-}hr)}$.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA DNL or less:

- The site plan shows window areas of up to 23% of the total wall space for the units facing Meridian Avenue. Preliminary calculations indicate that these residential units would require windows and doors with a minimum rating of 31 and 35 STC, respectively, to meet

the interior noise threshold of 45 dBA DNL. Residential units located along the western façade would require adequate forced-air mechanical ventilation with standard residential construction to meet the 45 dBA DNL interior noise threshold.

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- If substantive changes are made to the design of the project prior to building department submittal, a qualified acoustical consultant shall confirm the noise insulation recommendations based on the final site plans, building elevations, and floor plans of the proposed residential buildings. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA DNL or less.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site.

    - A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. The City of San José considers large or complex projects involving substantial noise-generating activities and lasting more than 12 months significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices.

    - A significant permanent noise level increase would occur if project-generated traffic would result in: a) a noise level increase of 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) a noise level increase of 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

    - A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan.

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

- A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise impact.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

Existing residences to the north, the Montessori school to the south, and the residences to the east, opposite Meridian Avenue, would have ambient noise levels dominated by Meridian Avenue. The existing daytime noise levels range from 69 to 76 dBA L_{eq}, as measured at LT-2. The ambient noise environment for the existing residences located to the west of the project site would set back from all surrounding roadways by 185 feet or more. The existing ambient noise levels at these receptors range from 54 to 68 dBA L_{eq} during daytime hours, as measured at LT-1.

The typical range of maximum instantaneous noise levels for the proposed project, based on the equipment list provided, would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5) from the equipment. Table 6 shows the average noise level ranges, by construction phase. Hourly average noise levels generated by construction are about 65 to 88 dBA L_{eq} for a residential development measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

A detailed list of equipment expected to be used for the proposed project construction and phasing information are summarized in Table 7. Additionally, construction noise levels calculated for each phase of construction assuming worst-case conditions, which would include each piece of equipment per phase operating simultaneously, are provided in Table 7. These noise level estimates were calculated by measuring from the center of the project site to the property line of the nearby receptors. These levels do not assume reductions due to intervening buildings.

As shown in Table 7, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more at various times throughout construction. Project construction is expected to last for a period of approximately 20 months. Since project construction would last for a period longer than one year and considering that the project site is within 500 feet of existing residences and within 200 feet of existing commercial uses, Policy EC-1.7 of the City's General Plan would consider this temporary construction impact to be significant.

TABLE 5 Construction Equipment 50-Foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

[1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

[3] Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
			North Res. (150ft)	East Res. (230ft)	West Res. (160ft)	South School (150ft)
Demolition	2/10/2021-2/24/2021	Concrete/Industrial Saw (1) Excavator (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (3)	78 dBA	74 dBA	78 dBA	78 dBA
Site Preparation	2/24/2021-3/1/2021	Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	75 dBA	71 dBA	75 dBA	75 dBA
Grading/Excavation	3/2/2021-3/7/2021	Scraper (1) Excavator (1) Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)	78 dBA	74 dBA	77 dBA	78 dBA
Trenching	3/8/2021-3/18/2021	Tractor/Loader/Backhoe (1) Excavator (1)	72 dBA	68 dBA	72 dBA	72 dBA
Building Exterior	3/19/2021-10/4/2021	Crane (1) Forklift (2) Generator Set (1) Tractor/Loader/Backhoe (1) Welder (3)	74 dBA	70 dBA	73 dBA	74 dBA
Building Interior/Architectural Coating	10/5/2021-10/5/2022	Air Compressor (1) Aerial Lift (1)	65 dBA	61 dBA	65 dBA	65 dBA
Paving	10/6/2022-10/16/2022	Cement and Mortar Mixer (1) Paver (1) Paving Equipment (1) Roller (2) Tractor/Loader/Backhoe (1)	76 dBA	73 dBA	76 dBA	76 dBA

Mitigation Measure 1a:

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Construction activities will be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work within 500 feet of residential land uses to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. Construction is prohibited on weekends at sites located within 500 feet of residential units. Further, the City shall require the construction crew to adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity.

Construction Best Management Practices

Develop a construction noise control plan, including, but not limited to, the following available controls:

- The contractor shall use "new technology" power construction equipment with state-of-the-art noise shielding and muffling devices. All internal combustion engines used on the project site shall be equipped with adequate mufflers and shall be in good mechanical condition to minimize noise created by faulty or poorly maintained engines or other components.

- The unnecessary idling of internal combustion engines shall be prohibited.

- Staging areas and stationary noise-generating equipment shall be located as far as possible from noise-sensitive receptors such as residential uses.

- The surrounding neighborhood shall be notified early and frequently of the construction activities.

- Utilize 'quiet' models of air compressors and other stationary noise sources where technology exists;

- Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment;

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment when located within 200 feet of adjoining sensitive land uses. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receptor and if the barrier is constructed in a manner that eliminates any cracks or gaps.

- If stationary noise-generating equipment must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used. Any enclosure openings or venting shall face away from sensitive receptors.

- Ensure that generators, compressors, and pumps are housed in acoustical enclosures.

- Locate cranes as far from adjoining noise-sensitive receptors as possible.

- During final grading, substitute graders for bulldozers, where feasible. Wheeled heavy equipment are quieter than track equipment and should be used where feasible.

- Substitute nail guns for manual hammering, where feasible.

- Substitute electrically-powered tools for noisier pneumatic tools, where feasible.

- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

- A "noise disturbance coordinator" shall be designated to respond to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaints (e.g., beginning work too early, bad muffler, etc.) and institute reasonable measures warranted to correct the problem. A telephone number for the disturbance coordinator would be conspicuously posted at the construction site.

With the implementation of GP Policy EC-1.7, Municipal Code requirements, and the above measures, the temporary construction noise impact would be reduced to a less-than-significant level.

Impact 1b: **Permanent Noise Level Increase.** The proposed project is not expected to cause a substantial permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

According to Policy EC-1.2 of the City's General Plan, a significant permanent noise increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or more where ambient noise levels exceed the "normally acceptable" noise level standard. Where ambient noise levels are at or below the "normally acceptable" noise level standard, noise level increases of 5 dBA DNL or more would be considered significant. The City's General Plan defines the "normally acceptable" outdoor noise level standard for the residential land uses to be 60 dBA DNL. Existing ambient levels, based on the measurements made in the project vicinity, exceed 60 dBA DNL. Therefore, a significant impact would occur if traffic due to the proposed project would permanently increase ambient levels by 3 dBA DNL. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway.

The traffic study prepared for the proposed project included peak hour project trips for five intersections in the project vicinity. These peak hour project trips were added to the peak hour turning movements for the existing traffic conditions to determine the peak hour turning movements for the existing plus project conditions. When the existing plus project conditions were compared to the existing traffic conditions, noise level increases of less than 1 dBA DNL was calculated along all the roadway segments included in the traffic report. The project would not result in doubling of the traffic, and therefore, the proposed project would not result in a permanent noise increase of 3 dBA DNL or more. This is a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 1c: Noise Levels in Excess of Standards. The proposed project would not generate noise in excess of standards established in the City's General Plan at the nearby sensitive receptors. However, the project could potentially exceed the City's Municipal Code threshold of 55 dBA DNL. Implementation of measures as a project condition of approval would ensure noise levels to be below 55 dBA DNL. **This is a less-than-significant impact.**

Mechanical Equipment

The City's General Plan does not include policies specifically addressing mechanical noise generated by residential land uses. However, the residential mechanical noise should be addressed with respect to the City's Municipal Code threshold of 55 dBA DNL to minimize disturbance to the existing and future residences surrounding the project site.

Multi-family residential buildings typically require various mechanical equipment, such as heating, ventilation, and air conditioners. The site plan shows a mechanical equipment room in the below-grade parking structure. On the ground level parking structure, a boiler room and two electrical rooms are shown. The walls of the building would adequately shield the equipment within these rooms from the surrounding receptors. Additionally, several future solar panel areas and condensing units with isolation pads are shown on the roof of the proposed building. Around the roof perimeter, the site plan shows a metal mechanical screen. While specific details pertaining to the height and material makeup of the screen, it should be assumed that the proposed screen is continuous from the ground of the roof to the top and that the height would be taller than the top of the tallest piece of equipment.

Solar panels would not generate measurable noise at the nearby existing residences; however, the condensing units could potentially generate noise levels up to 66 dBA at 3 feet. These types of units would cycle on and off throughout the daytime and nighttime hours. Therefore, multiple units clustered in the same general vicinity of the roof are usually operating simultaneously at any given time. Assuming up to 10 units would operate simultaneously, the mechanical equipment noise at the property plane of the adjacent residential land uses would range from 53 to 54 dBA DNL, with the inclusion of a 5 dBA noise reduction due to the screen. Since the surrounding structures are three stories or less, the noise-sensitive receptors at these properties would be exposed to day-night average noise levels due to mechanical equipment noise even lower. Therefore, mechanical equipment noise would not exceed 55 dBA DNL at the adjacent receptors.

For the residences located to the east, opposite Meridian Avenue, which are 125 feet from the nearest rooftop equipment, mechanical equipment noise levels would be at or below 45 dBA DNL.

It is expected that mechanical equipment noise for a project of this scale would be able to meet the City's applicable noise limits using standard noise control measures. As a project condition of approval, mechanical equipment shall be selected and designed to reduce excessive noise levels at the surrounding uses to meet the City's 55 dBA DNL noise level requirement at the nearby noise-sensitive land uses. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's Municipal Code noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors.

Truck Deliveries

Truck deliveries for the ground-level commercial uses on the project site would also have the potential to generate noise. The site plan shows a loading zone on the ground level located behind the commercial uses. This area would be accessed from Meridian Avenue in the northeast corner of the building. The center of the access driveway would be approximately 15 feet from the adjacent property line to the north, while the center of the loading zone would be approximately 50 feet from the property line. Additionally, the trash area would be located adjacent to this loading zone. An eight-foot precast concrete panel perimeter wall is also shown along the property line surrounding the building. This wall would provide up to 5 dBA reduction from the truck delivery noise.

While delivery and trash pickup times and frequency of these events were not provided at the time of this study, it is assumed that these activities, including maintenance activities would occur during daytime hours up to three times a week.

Small delivery and vendor trucks are expected to be used at the project site, and these types of trucks typically generate noise levels ranging from 65 to 70 dBA L_{max} at a distance of 50 feet. Assuming a 5 dBA noise level reduction due to the proposed eight-foot wall, the residences adjoining the site to the north would be exposed to maximum instantaneous noise levels ranging from 60 to 65 dBA L_{max}. Assuming up to two truck deliveries in a single day, lasting up to 20 minutes each, the proposed project would result in a day-night average noise level of 49 dBA DNL at the nearest residence to the north. In combination with the worst-case mechanical equipment noise, the day-night average noise level at the northern property line of the adjacent residence to the north would be 55 dBA DNL or less due to operational noise levels generated at the project site during truck delivery days. This would be a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities near the northern,

southern, and western boundaries of the project site would exceed 0.2 in/sec PPV. **This is a significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. While pile driving equipment can cause excessive vibration, it is not expected to be required for the proposed project.

According to Policy EC-2.3 of the City of San Jose General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction.

Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 8 also summarizes the distances to the 0.08 in/sec PPV threshold for historical buildings and to the 0.2 in/sec PPV threshold for all other buildings.

TABLE 8 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.08 in/sec PPV (feet)	Minimum Distance to Meet 0.2 in/sec PPV (feet)
Clam shovel drop		0.202	58	26
Hydromill (slurry wall)	in soil	0.008	3	1
	in rock	0.017	6	2
Vibratory Roller		0.210	60	27
Hoe Ram		0.089	28	12
Large bulldozer		0.089	28	12
Caisson drilling		0.089	28	12
Loaded trucks		0.076	24	10
Jackhammer		0.035	12	5
Small bulldozer		0.003	1	<1

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006, as modified by Illingworth & Rodkin, Inc., September 2019.

Based on the inventory of historically documented buildings in the City of San José,[3] there are no historical structures located within 200 feet of the project boundary. Therefore, vibration levels exceeding 0.2 in/sec PPV at the surrounding buildings would be considered a significant impact.

[3] http://www.sanjoseca.gov/DocumentCenter/View/35475

To the north, the single-family and senior living residential buildings would be approximately 15 to 25 feet from the project boundary, respectively. At 15 feet, the single-family residence would be exposed to vibration levels up to 0.37 in/sec PPV, while the senior living building would be exposed to levels up to 0.21 in/sec PPV. The Montessori school would be within 10 feet of the southern boundary of the project site, which would expose this structure to levels up to 0.58 in/sec PPV when construction activities occur near the shared property line. The multi-family residential building to the west is 25 feet from the project site and would be exposed to vibration levels up to 0.21 in/sec PPV. Opposite Meridian Avenue to the east, the multi-family buildings would be 100 feet from the project site. At this distance, vibration levels would be at or below 0.05 in/sec PPV. Therefore, the City's threshold of 0.2 in/sec PPV for non-historical buildings would be exceeded when construction activities at the project site occur along the northern, southern, and western property lines.

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)				
		North Res. (15ft)	North Senior Living (25ft)	South School (10ft)	West Res. (25ft)	East Res. (100ft)
Clam shovel drop		**0.354**	**0.202**	**0.553**	**0.202**	0.044
Hydromill (slurry wall)	in soil	0.014	0.008	0.022	0.008	0.002
	in rock	0.030	0.017	0.047	0.017	0.004
Vibratory Roller		**0.368**	**0.210**	**0.575**	**0.210**	0.046
Hoe Ram		0.156	0.089	**0.244**	0.089	0.019
Large bulldozer		0.156	0.089	**0.244**	0.089	0.019
Caisson drilling		0.156	0.089	**0.244**	0.089	0.019
Loaded trucks		0.133	0.076	**0.208**	0.076	0.017
Jackhammer		0.061	0.035	0.096	0.035	0.008
Small bulldozer		0.005	0.003	0.008	0.003	0.001

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006, as modified by Illingworth & Rodkin, Inc., June 2019.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[4] The findings of this study have been applied to buildings affected by construction-generated vibrations.[5] As reported in USBM RI 8507[5] and reproduced by Dowding,[6] Figure 18 presents the damage probability, in terms of "threshold damage," "minor damage," and "major damage," at varying vibration levels. Threshold damage, which is described as cosmetic damage in this report, would entail hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage would include hairline cracking in masonry or the loosening of plaster, and major structural damage would include wide cracking or shifting of foundation or bearing walls. As shown in Figure 18, maximum vibration levels of 1.2 in/sec PPV would result in an approximately 20% chance of threshold damage or cosmetic damage, while no minor or major damage would be expected with maximum

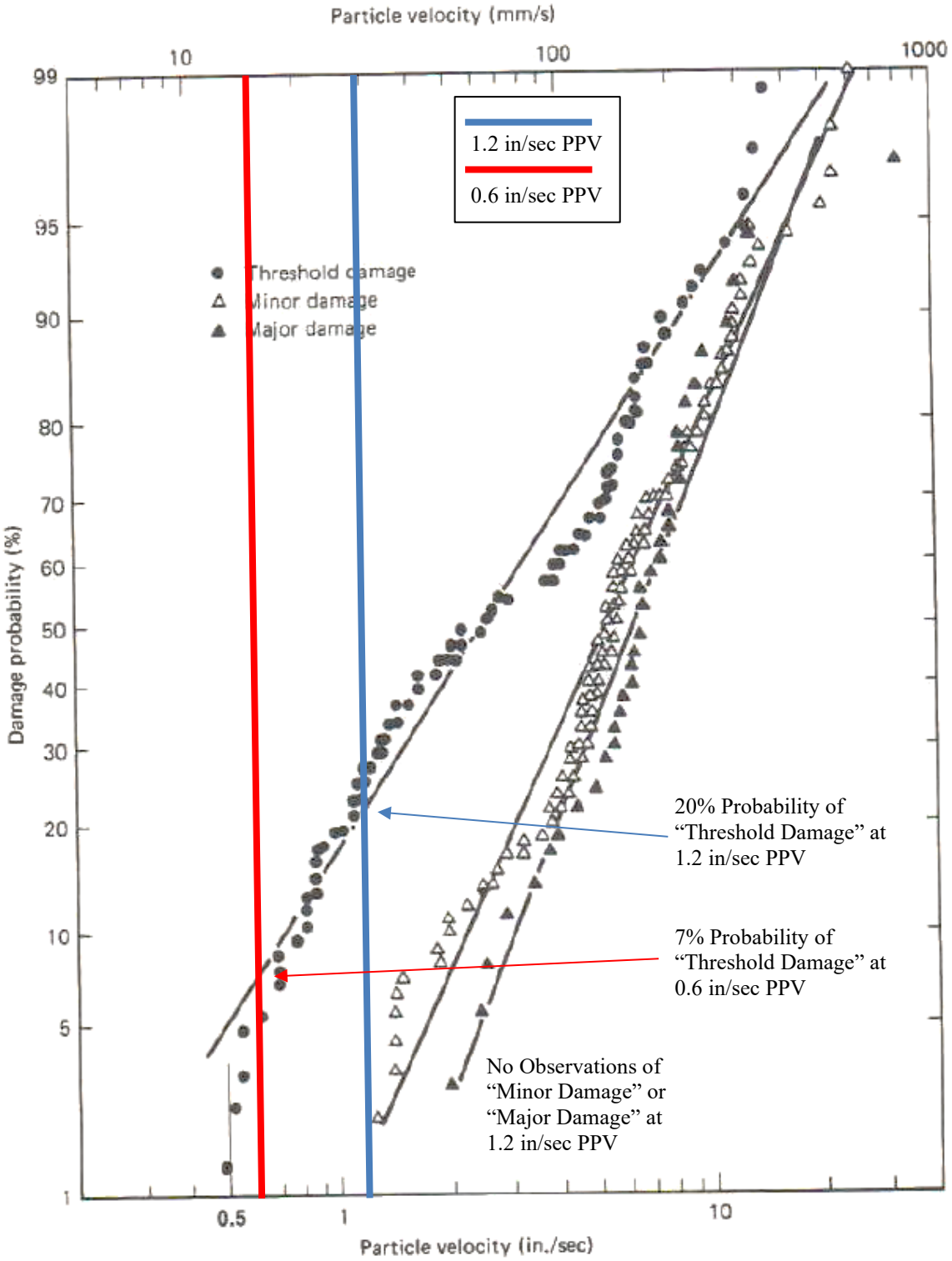
[4] Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration form Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.
[5] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

vibration levels of 1.2 in/sec PPV. At 0.6 in/sec PPV, no minor or major damage would be expected and there would be an approximate 7% chance of threshold damage or cosmetic damage.

Typical construction equipment, shown in Table 9, would have the potential to produce vibration levels of 0.2 in/sec PPV or more at the non-historical buildings surrounding the site. While no minor or major damage would occur at these conventional buildings, there is the potential to generate threshold or cosmetic damage at the surrounding buildings. This is a significant impact.

At these locations, and in other surrounding areas within 200 feet, vibration levels would potentially be perceptible. By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

FIGURE 18 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996 as modified by Illingworth & Rodkin, Inc., May 2018.

Mitigation Measure 2:

The following measures, in addition to the best practices specified in Mitigation Measure 1a of this report, are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- A list of all heavy construction equipment to be used for this project and the anticipated time duration of using the equipment that is known to produce high vibration levels (tracked vehicles, vibratory compaction, jackhammers, hoe rams, etc.) shall be submitted to the City by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort required for continuous vibration monitoring.

- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.

- Use smaller equipment to minimize vibration levels below the limits.

- Avoid using vibratory rollers and tampers near sensitive areas.

- Select demolition methods not involving impact tools.

- Modify/design or identify alternative construction methods to reduce vibration levels below the limits.

- Avoid dropping heavy objects or materials.

- A construction vibration-monitoring plan shall be implemented to document conditions at the adjacent properties prior to, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry accepted standard methods. The construction vibration monitoring plan should be implemented to include the following tasks:

    - Identification of sensitivity to groundborne vibration of the property. A vibration survey (generally described below) would need to be performed.

    - Performance of a photo survey, elevation survey, and crack monitoring survey for the adjacent buildings. Surveys shall be performed prior to, in regular intervals during, and after completion of vibration generating construction activities and shall include internal and external crack monitoring in the structure, settlement, and distress and shall document the condition of the foundation, walls and other structural elements in the interior and exterior of said structure.

    - Development of a vibration monitoring and construction contingency plan to identify where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct

photo, elevation, and crack surveys to document before and after construction. Construction contingencies would be identified for when vibration levels approach the limits.

- If vibration levels approach limits, suspend construction and implement contingencies to either lower vibration levels or secure the affected structure.

- Conduct a post-survey on the structure where either monitoring has indicated high levels or complaints of damage.

- The results of all vibration monitoring shall be summarized and submitted in a report shortly after substantial completion of each phase identified in the project schedule (within a week). The report will include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations. An explanation of all events that exceeded vibration limits will be included together with proper documentation supporting any such claims.

- Designate a person responsible for registering and investigating claims of excessive vibration. The contact information of such person shall be clearly posted on the construction site.

Implementation of this mitigation measure would reduce the impact to a less-than-significant level.

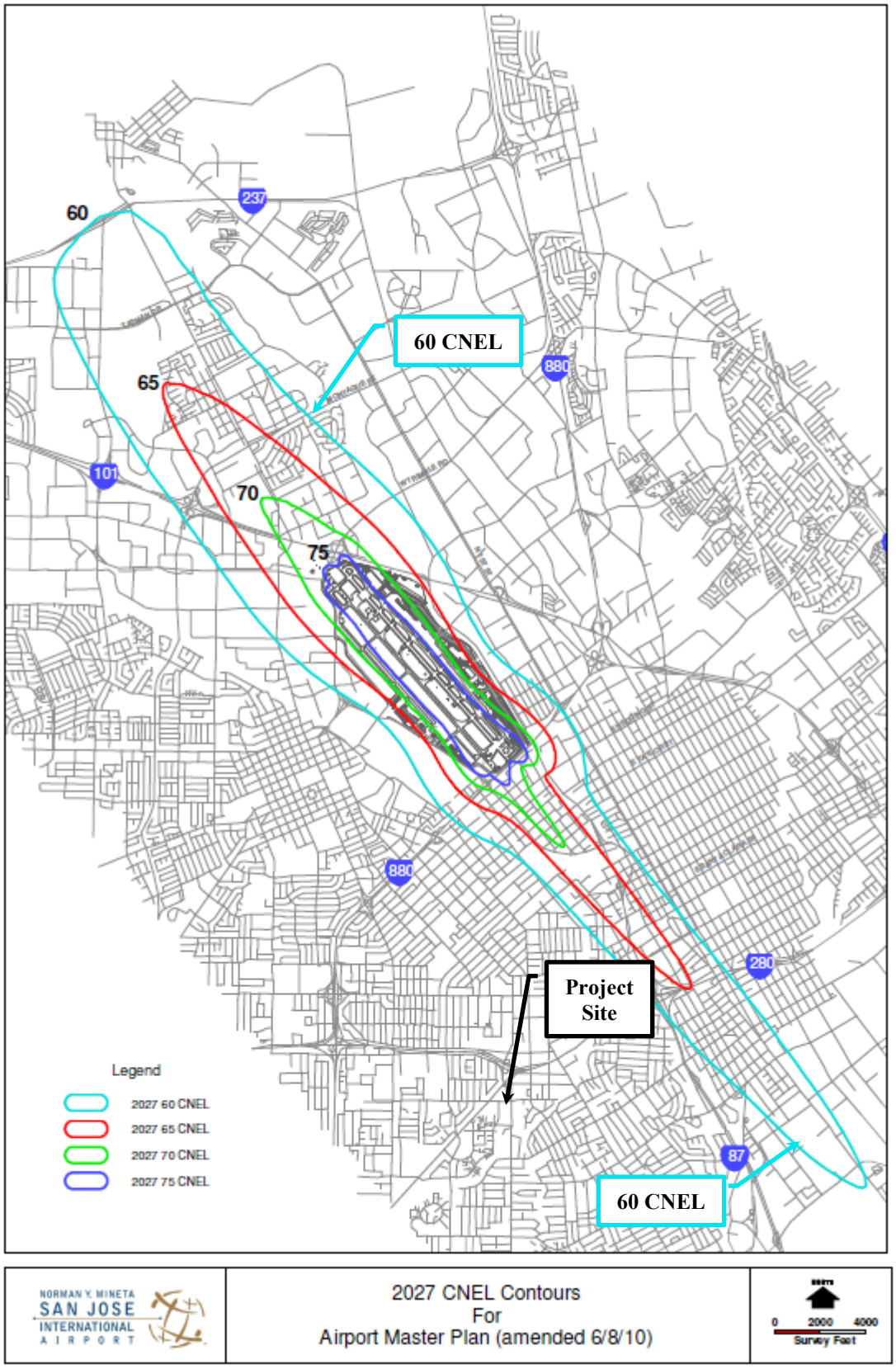
Impact 3: **Excessive Aircraft Noise.** The project site is located more than two miles from a public airport or public use airport and would not expose people residing or working in the project area to excessive aircraft noise levels with the implementation of forced-air mechanical ventilation. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 2.9 miles north of the project site. The project site lies outside the 60 dBA CNEL 2027 noise contour of the airport, according to the Norman Y. Mineta San José International Airport Master Plan Update Project[6] report published in February 2010 as an addendum to the Environmental Impact Report (see Figure 19). Future exterior noise levels due to aircraft from Norman Y. Mineta San José International Airport would not exceed 60 dBA CNEL/DNL. According to Policy EC-1.11 of the City's General Plan, the required safe and compatible threshold for exterior noise levels would be at or below 65 dBA CNEL/DNL for aircrafts. Assuming standard construction materials for aircraft noise below 60 dBA DNL, the future interior noise levels resulting from aircraft would below 45 dBA DNL. Therefore, future exterior and interior noise at the proposed building would be compatible with aircraft noise. This would be a less-than-significant impact.

Mitigation Measure 3: **None required.**

[6] City of San José, "Norman Y. Mineta San José International Airport Master Plan Update Project: Eighth Addendum to the Environmental Impact Report," City of San José Public Project File No. PP 10-024, February 10, 2010.

FIGURE 19 2027 CNEL Noise Contours for SJIA Relative to Project Site



NEPA NOISE ASSESSMENT

Significance Criteria

Pursuant to the HUD Guidelines, the noise exposure at least 10 years in the future must be considered in addition to the existing noise exposure. An adverse effect would result if noise levels at the project site would exceed HUD Compatibility Guidelines for acceptability. Exterior noise levels exceeding 65 dBA DNL at common outdoor use areas or interior noise levels exceeding 45 dBA DNL would result in an adverse effect.

Methodology

For the purposes of this assessment, the future exterior noise environment was calculated based on adjustments made to measured noise levels, which account for increased traffic volumes along local roadways. The transportation study completed by *Hexagon Transportation Consultants, Inc.*[1] for the proposed project did not include cumulative traffic volumes for scenarios 10 years or more in the future. Trips generated by the project would result in an immeasurable increase to the existing noise environment according to the volumes included in the traffic study. Additionally, the *Envision San José 2040 General Plan Comprehensive EIR*[2] indicated that future 2040 traffic volumes along Meridian Avenue would not result in a measurable increase in noise levels at the project site, which is likely due to the area being mostly built out. For the purposes of a credible worst-case assessment, it was assumed that an increase of 1 to 2% in traffic volumes could occur along the surrounding roadways over the next 15 to 20 years. These projections assume a standard rate of growth in the City but are conservative for built-out areas where growth is not forecasted. As a result, future noise levels at the project site are conservatively estimated to increase by approximately 1 dBA over existing conditions. The future noise levels would range from 74 to 76 dBA DNL at a distance of 40 feet from the centerline of Meridian Avenue (LT-2). At the building setback, which is 60 feet from the centerline of Meridian Avenue, the future noise levels would range from 72 to 74 dBA DNL.

Aircraft operations associated with Mineta San José International Airport, located about 2.9 miles from the project site, are audible as aircraft approach or depart the airport. A review of the 65 CNEL noise contour map (see Figure 19) established by the Santa Clara County ALUC indicates that the project site is located outside of the future Mineta San José International Airport 65 CNEL noise contour. Further, the project site is located well outside the 65 CNEL noise contours of the Reid-Hillview Airport and Moffett Federal Airfield, located approximately 5.3 and 9.7 miles, respectively, from the project site.

The HUD DNL Calculator (https://www.hudexchange.info/environmental-review/dnl-calculator/) was also used to approximate DNL noise levels at the site for the worst-case scenario, which was at the nearest building façade facing Meridian Avenue project traffic conditions in 20 years. With building setbacks of 60 feet from the centerline of the roadway, the results of the calculations are summarized below and in Appendix A. The HUD DNL Calculator predicted the future exterior noise levels measured at the nearest building façade adjacent to Meridian Avenue to be 72 dBA DNL when the existing plus project traffic volumes were increased by 1% for the next 20 years. This is consistent with the lower range of day-night average levels calculated based on the

measurements and estimated traffic noise increase discussed above. Since the measurements and estimated traffic noise increase ranging from 72 to 74 dBA DNL at the 60-foot building setback, these levels would be more conservative than the HUD DNL Calculator and are used in the following analysis.

The HUD DNL Calculator was not used for the residential outdoor use areas since the proposed building façades and eight-foot perimeter wall would provide shielding not accounted for in the HUD DNL Calculator.

Future Exterior Noise Environment

The outdoor use areas identified from the site plan include two podium-level courtyards surrounded by the building and ground-level open space, which would include a garden approximately 185 feet or more from the centerline of Meridian Avenue.

The centers of the podium-level courtyards would approximately 145 and 240 feet, respectively, from the centerline of Meridian Avenue. At these distances and considering the proposed building would provide adequate shielding Meridian Avenue, the future exterior noise levels at both proposed courtyards would be below 65 dBA DNL.

Surrounding the building on the ground-level would be space open for residents to use. This open space would include a garden area and other amenities for extended use. On the northern and southern sides of the building, the open space would be 185 feet or more from the centerline of Meridian Avenue. In addition to the building providing partial shielding on one side of the open space, the site plan shows an eight-foot perimeter wall made from precast concrete panels. This wall would connect to the proposed building on the northern and southern sides of the building by eight-foot ornamental vehicular swing gates and pedestrian gates. It is assumed that the wall and gates would be solid from ground to top, with no cracks or gaps. Therefore, the open space area would be adequately shielded from traffic noise along Meridian Avenue. The future exterior noise levels at the proposed open space would be below 65 dBA DNL.

Future Interior Noise Environment

The eastern façade of the proposed building would be set back from the centerline of Meridian Avenue by approximately 60 feet. At this distance, the exterior-facing units along this façade would be exposed to future exterior noise levels would range from 72 to 74 dBA DNL.

The northern and southern façades of the proposed building would be set back from the centerline of Meridian Avenue by approximately 60 to 315 feet. At these distances, the units along the northern and southern façades would be exposed to future exterior noise levels ranging from 64 to 74 dBA DNL.

The existing multi-family residential building located to the west of the project site would provide shielding from St. Elizabeth Drive. Therefore, the units along this façade would be exposed to future exterior noise levels ranging from below 60 to 64 dBA DNL.

Future noise levels at the project site would require that residential units be designed to control interior noise levels to 45 dBA DNL or less. As noted previously, HUD assumes that buildings of standard construction will provide sufficient attenuation to achieve an interior level of 45 dBA DNL or less if the exterior level is 65 dBA DNL or less (20 dBA of attenuation). Where exterior noise levels range from 65 dBA L_{dn} to 70 dBA DNL, the project must provide a minimum of 25 decibels of attenuation, and a minimum of 30 decibels of attenuation is required in the 70 dBA DNL to 75 dBA DNL zone.

Calculations were made to quantify the transmission loss provided by building elements in order to estimate interior noise levels resulting from exterior noise sources. Unit floor plans prepared by *Withee Malcolm Architects, LLP* (dated June 13, 2019) were reviewed, and the relative areas of building elements (walls and windows) were input into an acoustical model to calculate interior noise levels within individual rooms.

The exterior wall of the proposed residential units in both the family and senior buildings was assumed to be a standard 2x4 or 2x6 wood stud wall with insulation, a single layer of gypsum board attached to the inside of the studs, and a stucco exterior finish. This exterior wall construction has a rating of STC 46. Various windows and doors were then tested to determine the sound transmission class ratings for building elements necessary to achieve the improved sound insulation rating. HUD Figure 19 (Appendix B) provides a summary of the inputs used to complete the calculations of interior noise levels at residential units in each building with the future worst-case noise exposures.

The results of the calculations showed that windows and doors should have a minimum Sound Transmission Class (STC) rating of 31 STC and 35 STC, respectively. These windows and doors, in combination with the stucco exterior wall construction, would achieve an outdoor-to-indoor composite noise reduction of 32 to 34 decibels with the windows closed and would maintain interior noise levels below 45 dBA DNL with an adequate margin of safety. All units throughout the site are assumed to be mechanically ventilated so that windows can be kept closed at the occupant’s discretion to control noise intrusion indoors.

APPENDIX A: DNL Calculator Results

Road # 1 Name:	Meridian Ave		
Road #1			
Vehicle Type	**Cars** ☑	**Medium Trucks** ☑	**Heavy Trucks** ☑
Effective Distance	60	60	60
Distance to Stop Sign			
Average Speed	40	40	35
Average Daily Trips (ADT)	37177	379	379
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	69.9824	60.066	67.9248
Calculate Road #1 DNL	72.351	Reset	

APPENDIX B: HUD Figure 19

Figure 19
Description of Noise Attenuation Measures
(Acoustical Construction)

Part I

Project Name: 961-971 Meridian Avenue Project – Corner Unit, Master Bedroom (Worst-Case Traffic Noise Exposure)

Location: San Jose, California

Sponsor/Developer:

Noise Level (From NAG): 74 dBA DNL Attenuation Required: 30 dBA
Primary Noise Source(s): Meridian Avenue

Part II

1. For wall(s) facing and parallel to the noise source(s) (or closest to parallel:
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: Vinyl, dual-pane windows
   d. STC rating for window type: STC 31
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 22% and doors: 0%
   h. Combined STC rating for wall component: 38 dBA

2. For walls perpendicular to noise source(s):
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: N/A
   d. STC rating for window type: N/A
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 0% and doors: 0%
   h. Combined STC rating for wall component: 44 dBA

3. Roofing component (if overhead attenuation is required to aircraft noise):
   a. Description of roof construction: N/A
   b. STC rating (rated as if no skylights or other openings): N/A
   c. Description of skylights or overhead windows: N/A
   d. STC rating for skylights or overhead windows: N/A
   e. Percentage of roof composed of skylights or windows (per dwelling unit): N/A
   f. Percentage of roof composed of large uncapped openings such as chimneys: N/A
   g. Combined STC rating for roof component: N/A

4. Description of type of mechanical ventilation provided: Satisfactory forced-air mechanical ventilation system.

Prepared by:
Carrie J. Janello,
Senior Consultant
Date: August 26, 2019
Figure 19
Description of Noise Attenuation Measures

(Acoustical Construction)

Part I

Project Name: 961-971 Meridian Avenue Project – Corner Unit, Bedroom 3 (Worst-Case Traffic Noise Exposure)

Location: San Jose, California

Sponsor/Developer:

Noise Level (From NAG): 74 dBA DNL Attenuation Required: 30 dBA
Primary Noise Source(s): Meridian Avenue

Part II

1. For wall(s) facing and parallel to the noise source(s) (or closest to parallel:
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: Vinyl, dual-pane windows
   d. STC rating for window type: STC 31
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 23% and doors: 0%
   h. Combined STC rating for wall component: 37 dBA

2. For walls perpendicular to noise source(s):
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: N/A
   d. STC rating for window type: N/A
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 0% and doors: 0%
   h. Combined STC rating for wall component: 44 dBA

3. Roofing component (if overhead attenuation is required to aircraft noise):
   a. Description of roof construction: N/A
   b. STC rating (rated as if no skylights or other openings): N/A
   c. Description of skylights or overhead windows: N/A
   d. STC rating for skylights or overhead windows: N/A
   e. Percentage of roof composed of skylights or windows (per dwelling unit): N/A
   f. Percentage of roof composed of large uncapped openings such as chimneys: N/A
   g. Combined STC rating for roof component: N/A

4. Description of type of mechanical ventilation provided: Satisfactory forced-air mechanical ventilation system.

Prepared by:
Carrie J. Janello,
Senior Consultant
Date: August 26, 2019

(Acoustical Construction)

Part I

Project Name: 961-971 Meridian Avenue Project – Corner Unit, Living Room (Worst-Case Traffic Noise Exposure)

Location: San Jose, California

Sponsor/Developer:

Noise Level (From NAG): 74 dBA DNL Attenuation Required: 30 dBA
Primary Noise Source(s): Meridian Avenue

Part II

1. For wall(s) facing and parallel to the noise source(s) (or closest to parallel:
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: Vinyl, dual-pane windows
   d. STC rating for window type: STC 30
   e. Description of doors: Sliding glass or single-panel French
   f. STC rating for doors: 35
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 17% and doors: 18%
   h. Combined STC rating for wall component: 36 dBA

2. For walls perpendicular to noise source(s):
   a. Description of wall construction*: N/A
   b. STC rating for wall (rated for no windows or doors): N/A
   c. Description of windows: N/A
   d. STC rating for window type: N/A
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 0% and doors: 0%
   h. Combined STC rating for wall component: N/A

3. Roofing component (if overhead attenuation is required to aircraft noise):
   a. Description of roof construction: N/A
   b. STC rating (rated as if no skylights or other openings): N/A
   c. Description of skylights or overhead windows: N/A
   d. STC rating for skylights or overhead windows: N/A
   e. Percentage of roof composed of skylights or windows (per dwelling unit): N/A
   f. Percentage of roof composed of large uncapped openings such as chimneys: N/A
   g. Combined STC rating for roof component: N/A

4. Description of type of mechanical ventilation provided: Satisfactory forced-air mechanical ventilation system.

Prepared by:
Carrie J. Janello,
Senior Consultant
Date: August 26, 2019

(Acoustical Construction)

Part I

Project Name: 961-971 Meridian Avenue Project – Center Unit, Bedroom 2 (Worst-Case Traffic Noise Exposure)

Location: San Jose, California

Sponsor/Developer:

Noise Level (From NAG): 74 dBA DNL Attenuation Required: 30 dBA
Primary Noise Source(s): Meridian Avenue

Part II

1. For wall(s) facing and parallel to the noise source(s) (or closest to parallel:
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: Vinyl, dual-pane windows
   d. STC rating for window type: STC 31
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 24% and doors: 0%
   h. Combined STC rating for wall component: 37 dBA

2. For walls perpendicular to noise source(s):
   a. Description of wall construction*: Stucco exterior siding, insulated wood stud, and gypsum board interior
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: N/A
   d. STC rating for window type: N/A
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 0% and doors: 0%
   h. Combined STC rating for wall component: STC 44

3. Roofing component (if overhead attenuation is required to aircraft noise):
   a. Description of roof construction: N/A
   b. STC rating (rated as if no skylights or other openings): N/A
   c. Description of skylights or overhead windows: N/A
   d. STC rating for skylights or overhead windows: N/A
   e. Percentage of roof composed of skylights or windows (per dwelling unit): N/A
   f. Percentage of roof composed of large uncapped openings such as chimneys: N/A
   g. Combined STC rating for roof component: N/A

4. Description of type of mechanical ventilation provided: Satisfactory forced-air mechanical ventilation system.

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Date: August 26, 2019