SPARTAN KEYES PARK MASTER PLAN NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project proposes to demolish the existing buildings and to construct the Spartan Keyes Park at the northeast corner of the Keyes Street/South Third Street intersection in San José, California. The project consists of a 14,850-square-foot (sf) multipurpose court, a 3,600-sf multipurpose turf area, a 5,380-sf children's play area with equipment, picnic area, plaza, concrete walkway, and fencing. There is one candidate City Landmark building in the southwest corner of the project site that would be protected with no proposed use at this time.

This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses ambient noise conditions in the project vicinity; and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate project impacts to a less-than-significant level.

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 the 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 p.m. to 10:00 p.m.) and a 10 dB addition to nocturnal (10:00 p.m. to 7:00 a.m.) noise levels. The *Day/Night Average Sound Level* (*DNL* or L_{dn}) 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 to 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 to 62 dBA DNL with open windows and 65 to 70 dBA DNL if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 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

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.

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 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60 to 70 dBA. Between a DNL of 70 to 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 to 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.

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, April 2020.

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.

Regulatory Background – Noise

This section describes the relevant guidelines, policies, and standards established by Federal Agencies, State Agencies, Santa Clara County, and the City of San José. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State of California

State CEQA Guidelines. The California Environmental Quality Act (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;

(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.

Santa Clara County

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

4.3.2.1 Noise Compatibility Policies

N-1 The Community Noise Equivalent Level (CNEL) method of representing noise levels shall be used to determine if a specific land use is consistent with the CLUP.

N-2 In addition to the other policies herein, the Noise Compatibility Policies presented in Table 4-1 shall be used to determine if a specific land use is consistent with this CLUP.

N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (not shown in this report).

N-6 Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. Table 4-1 presents acceptable noise levels for other land uses in the vicinity of the Airport.

Table 4 - 1

NOISE COMPATIBILITY POLICIES

LAND USE CATEGORY	CNEL					
	55-60	60-65	65-70	70-75	75-80	80-85
Residential – low density Single-family, duplex, mobile homes	*	**	***	****	****	****
Residential – multi-family, condominiums, townhouses	*	**	***	****	****	****
Transient lodging - motels, hotels	*	*	**	****	****	****
Schools, libraries, indoor religious assemblies, hospitals, nursing homes	*	***	****	****	****	****
Auditoriums, concert halls, amphitheaters	*	***	***	****	****	****
Sports arena, outdoor spectator sports, parking	*	*	*	**	***	****
Playgrounds, neighborhood parks	*	*	***	****	****	****
Golf courses, riding stables, water recreation, cemeteries	*	*	*	**	***	****
Office buildings, business commercial and professional, retail	*	*	**	***	****	****
Industrial, manufacturing, utilities, agriculture	*	*	*	***	***	****
* Generally 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. Mobile homes may not be acceptable in these areas. Some outdoor activities might be adversely affected.					
** Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Outdoor activities may be adversely affected. Residential: Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.					
*** Generally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor activities are likely to be adversely affected.					
**** Unacceptable	New construction or development shall not be undertaken.					

Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

Source: Comprehensive Land Use Plan Santa Clara County, Norman Y Mineta San José International Airport, May 25, 2011, Amended May 23, 2019.

City of San José

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-1.2 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-1.7 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.

EC-1.11 Require safe and compatible land uses within the Norman Y. Mineta San José International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise.

Regulatory Background – Vibration

City of San José

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 the northeast corner of the Keyes Street/South Third Street intersection in the City of San José. The site is bound by a multi-family residential building to the north and light industrial uses to the east. To the south, opposite Keyes Street, and to the west, opposite South Third Street are light industrial uses.

The noise environment at the site and in the surrounding area results primarily from local vehicular traffic along Keyes Street and South Third Street. Intermittent aircraft associated with San José Mineta International Airport also contribute to the noise environment.

A noise monitoring survey consisting of two long-term (LT-1 and LT-2) and two short-term (ST-1 and ST-2) noise measurements was conducted between Monday, April 1, 2024, and Thursday, April 4, 2024. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 35 feet north of the centerline of Keyes Street. Hourly average noise levels at LT-1 typically ranged from 67 to 74 dBA L_{eq} during

daytime hours (7:00 a.m. and 10:00 p.m.) and from 59 to 69 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level on Tuesday, April 1, 2024, and Wednesday, April 2, 2024, was 72 to 73 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures A1 through A4 of Appendix A.

LT-2 was made in the northwestern corner of the project site, approximately 30 feet east of the centerline of South Third Street. Hourly average noise levels at LT-2 typically ranged from 63 to 76 dBA L_{eq} during daytime hours and from 54 to 69 dBA L_{eq} during nighttime hours. The day-night average noise level on Tuesday, April 1, 2024, and Wednesday, April 2, 2024, was 69 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figures A5 through A8 of Appendix A.

Short-term noise measurements ST-1 and ST-2 were made on Monday, April 1, 2024, between 1:00 p.m. and 1:30 p.m. Table 4 summarizes the noise measurement results measured at each location.

ST-1 was made along the eastern boundary of the project site, approximately 120 feet north of the centerline of Keyes Street. The dominant noise sources at ST-1 were traffic noise along Keyes Street and jets associated with San José Mineta International Airport. Traffic noise along Keyes Street included a heavy truck (66 dBA), passenger cars (57 to 68 dBA), and a bus (67 dBA). Jets generated noise levels of 66 to 76 dBA at ST-1. The maximum noise level measured at ST-1 was caused by a heavy truck scraping the curb of the street (83 dBA). The 10-minute L_{eq} measured at ST-1 was 64 dBA.

ST-2 was made at LT-2, approximately 30 feet east of the centerline of South Third Street. Traffic noise along Keyes Street and jets were the dominant noise sources at ST-2. Traffic noise from Keyes Street was generated by a heavy truck (55 dBA) and passenger cars (50 to 55 dBA). Jets generated noise levels of 64 to 74 dBA at ST-2. The 10-minute L_{eq} measured at ST-2 was 61 dBA.

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

Noise Measurement Location	Date, Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: ~120 feet north of the Keyes Street centerline	4/1/2024, 13:00-13:10	83	74	65	60	53	64
ST-2: ~30 feet east of the South Third Street centerline	4/1/2024, 13:20-13:30	74	72	66	55	51	61

FIGURE 1 Aerial Image of the Project Site and Surrounding Area with the Noise Measurement Locations Identified

Source: Google Earth, 2024.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

Significance Criteria

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

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

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

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

Impact 1a: **Temporary Construction Noise.** Construction of the proposed project would expose existing residential land uses located within 500 feet of the project site to a temporary increase in noise levels for a period of less than one year. This would be a **less-than-significant** impact.

The project applicant proposes to demolish the existing buildings on the project site. The construction schedule assumed that the earliest possible start date would be early July 2024, and the project is expected to be completed by mid-June 2025 (less than a 12-month period). Construction phases would include demolition, site preparation, excavation/grading, building exterior, architectural coating, and paving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

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 that is 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.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. For the proposed project, pile driving, which generates excessive noise levels, is not expected. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5) from the equipment. Table 6 shows the hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction are about 71 to 89 dBA L_{eq} for a public park, 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 results in lower construction noise levels at distant receptors.

Equipment expected to be used in each construction phase are summarized in Table 7, along with the quantity of each type of equipment and the reference noise level at 50 feet, assuming the operation of the two loudest pieces of construction equipment for each construction phase.

Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming the two loudest pieces of equipment would operate simultaneously, as recommended by the FTA for construction noise evaluations. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Table 7 also summarizes the construction noise levels for the two loudest pieces of equipment propagated to the surrounding receiving land uses.

To assess construction noise impacts at the receiving property lines of existing noise-sensitive receptors, the worst-case hourly average noise level, which is calculated by combining all pieces of equipment per phase, was propagated from the geometrical center of the project site to the nearest property lines of the surrounding land uses. These noise level estimates are shown in Table 8. Noise levels in Table 8 do not assume reductions due to intervening buildings or existing barriers.

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
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 50 feet

Phase of Construction	Total Number of Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet, dBA L_{eq}
Demolition	20	Concrete/Industrial Saw (2)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (3)[a]	85
Site Preparation	2	Grader (1)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)[a]	84
Grading/Excavation	4	Grader (1)[a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2) [a]	84
Trenching/Foundation	4	Tractor/Loader/Backhoe (1) [a] Excavator (1)[a]	82
Building – Exterior	200	Crane (1) Forklift (1) Generator Set (1) [a] Tractor/Loader/Backhoe (1)[a] Welder (3) Scissor Lift (1)	82
Building – Interior	10	Air Compressor (1) [a] Scissor Lift (1)[a]	74
Paving	10	Cement and Mortar Mixer (1) Paver (1) Paving Equipment (1)[a] Roller (1) Tractor/Loader/Backhoe (1)[a] Rubber-Wheeled Roller (1)	84

[a] Denotes two loudest pieces of construction equipment per phase.

TABLE 8 Estimated Construction Noise Levels for the Proposed Project at the Receiving Property Lines in the Project Vicinity

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	North Residences (80ft)	East Light Industrial (255ft)	South Light Industrial (140ft)	West Light Industrial (270ft)
Demolition	85	74	80	74
Site Preparation	81	70	76	70
Grading/Excavation	82	72	77	71
Trenching/Foundation	78	68	73	67
Building – Exterior	79	69	74	69
Building – Interior	71	61	66	60
Paving	82	72	77	71

Note: Assumes simultaneous operation of all construction equipment per phase.

As shown in Tables 7 and 8, construction noise levels would intermittently range from 74 to 85 dBA L_{eq} when activities occur 50 feet from nearby receptors. When focused near the center of the project site, construction noise levels would typically range from 71 to 85 dBA L_{eq} at the adjacent residential building and from 60 to 80 dBA L_{eq} at the surrounding light industrial uses.

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. The Municipal Code requires that reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity. While the project site is located within 500 feet of existing residential uses and within 200 feet of existing nonresidential uses, total construction is expected to last for a period of less than one year. In accordance with Policy EC-1.7 of the City's General Plan, this would be considered a less-than-significant impact.

Project construction operations shall use best available noise suppression devices and techniques including, but not limited to the following noise reduction measures:

- Limit construction hours to between 7:00 a.m. and 7:00 p.m., Monday through Friday, unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence. Construction outside of these hours may be approved through a development permit based on a site-specific "construction noise mitigation plan" and a finding by the Director of PBCE that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential uses.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Prohibit unnecessary idling of internal combustion engines.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.

- Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

Mitigation Measure 1a: No further mitigation required.

Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards. The proposed project would not result in a substantial permanent noise level increase at receptors in the project vicinity and would not generate noise levels in excess of General Plan thresholds. 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 nearby 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.

Policy EC-1.3 limits noise levels produced by new nonresidential land uses to 55 dBA DNL at the property line of adjacent residential land uses. Additionally, the City's Municipal Code restricts noise levels to 60 dBA at the property lines of nonresidential uses. While exceeding Municipal Code noise levels would not result in a significant impact under CEQA, these thresholds shall be considered for design recommendation purposes.

Project Traffic Increase

A traffic study was not required since parking would not be included as part of the proposed project. Therefore, the proposed project would generate peak hour project trips insignificant compared to the peak hour volumes along the surrounding roadways, and the project's contribution would not be measurable or detectable (0 dBA DNL increase). The project would not result in a permanent noise increase of 3 dBA DNL or more at noise-sensitive receptors in the project vicinity. This is a less-than-significant impact.

Mechanical Equipment

The retrofit building for future vendor would likely include mechanical equipment, such as heating, ventilation, and air conditioning (HVAC) units. Details pertaining to the future vendor are not available at this time; however, a retail use of this size typically generate noise levels up to 66 dBA at five feet. Due to the outdoor dining areas to the north and to the east of the proposed vendor

building and sidewalks located to the west and to the south, the likely location for the proposed HVAC equipment would be the roof.

Noise levels generated by the HVAC unit were propagated to the property lines of the surrounding land uses, assuming the HVAC unit is positioned 10 feet from the edge of the nearest building façade. These noise levels are summarized in Table 9. The noise level estimates in Table 9 assume a minimum attenuation of 5 dBA at each of the surrounding land uses due to the elevation of the units and the minimum setback of 10 feet from the edge of the roof.

Mechanical equipment due to the proposed project would not exceed ambient conditions or the City's 55 dBA DNL threshold at receiving residential property lines. For all existing receptors, the noise level increase due to mechanical equipment noise would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

TABLE 9 Estimated Operational Noise Levels for the Rooftop HVAC Unit

Receptor	Distance from Equipment, feet	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	120	35[a]	42[a]	0
East Light Industrial Uses	390	35[a]	42[a]	0
South Light Industrial Uses	75	38[a]	46[a]	0
West Light Industrial Uses	105	35[a]	41[a]	0

[a] Minimum attenuation of 5 dBA is assumed for the elevation of the rooftop and the setback of the HVAC units being a minimum of 10 feet from the nearest building façade.

Sports and Park Operational Noise

The proposed park would include two children's playground equipment sets, outdoor picnic and dining areas, multipurpose turf, an outdoor fitness area, and a multipurpose court where pickup and league games are expected. Park hours would run from one hour before sunrise to one hour after sunset and would include field lighting until 9:00 p.m. Additionally, six movie nights are planned during summer months that would last until 8:30 p.m. Amplified sound is only expected at the project site during movie nights. The park would also be used to accommodate local events, such as farmers markets, and educational gatherings, which would include noise sources such as raised conversations.

Based on measurements made by *Illingworth & Rodkin, Inc. (I&R)* at similar neighborhood parks in the Bay Area, the following noise source levels are used in this report:

- Basketball activities – average hourly noise levels of 65 dBA L_{eq} on busy courts at 30 feet from the center of the court, with maximum noise levels from whistles up to 81 dBA L_{max};

- Soccer and football activities – average hourly noise levels of 60 dBA L_{eq} at 100 feet from the center of the field, with maximum noise levels from whistles up to 67 dBA L_{max};
- Playground activities – average hourly noise levels of 49 to 57 dBA L_{eq} for neighborhood play areas with up to 10 kids at a time at a distance of 50 feet from the center of the playground, with maximum noise levels from whistles and shouting up to 75 dBA L_{max};
- Amplified sound – average hourly noise levels of 72 dBA L_{eq} at a distance of 50 feet from the speaker;
- Local events and educational gatherings – average hourly noise levels of 64 dBA L_{eq} at a distance of 50 feet from the center of the gatherings for events with up to 300 people.

Busy activities on the multipurpose court typically do not occur every hour during park hours, but on days when league games occur, constant league play and busy pickup games could occur for up to six hours each day between 7:00 a.m. and 9:00 p.m. Assuming these credible worst-case conditions, which would involve soccer or football league games for up to six hours, activities on the multipurpose court would generate day-night average noise levels up to 54 dBA DNL at 100 feet. As part of the project, local events, such as farmers markets, or educational gatherings would not occur on the same days as league games.

The north residential development has an existing wall along the shared property line with the proposed project, which ranges in height from four to eight feet. The applicant would install a wall along the northern boundary of the project site near the shared property, which would overlap with the existing wall at the locations where the existing wall is below six-feet-tall. The planned wall would be continuous from grade to top, with no cracks or gaps, and have a minimum surface density of three lbs/ft^2 (e.g., one-inch-nominal thickness wood fence boards, ½-inch laminated glass, concrete masonry units (CMU)). The planned wall would extend beyond the gaps in the existing wall, which are below six-feet tall, by about one to two feet to ensure there would be no cracks or gaps in the barrier structure where noise could pass through. This would effectively break the line-of-sight between the project site activities and north receptors, resulting in up to 5 dBA of noise attenuation at the center of the nearest outdoor residential courtyard on the adjoining the site to the north that faces the project site and up to 7 dBA of attenuation for the ground-level residential units located along the southern façade of the adjoining building. This attenuation is assumed for all sports and park operational activities.

As part of the proposed project, all amplified sound (i.e., music and speech) would adhere to the performance standard of 69 dBA L_{eq} at 50 feet from the speakers. Further, the speakers would be positioned away from the northern residential building since this noise source would be directional. These design criteria are applied in this analysis.

Noise levels generated by worst-case usage of the multipurpose court when propagated from the center of the court to the property lines of the surrounding land uses is summarized in Table 10, with the 7 dBA attenuation applied to the north residences.

TABLE 10 Estimated Operational Noise Levels for the Multipurpose Court

Receptor	Distance from Center of Court, feet	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	75	56[a]	50[a]	0
East Light Industrial Uses	155	56	50	0
South Light Industrial Uses	140	57	51	0
West Light Industrial Uses	370	49	43	0

[a] Conservative 7 dBA attenuation applied to north residences for the six to eight-foot tall barrier along the property line.

Worst-hour multipurpose court activities would not exceed ambient conditions or the City's 55 dBA DNL threshold at receiving residential property lines. For all existing receptors in the project vicinity, the noise level increase due to noise from the multipurpose court would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

Neighborhood parks are typically used by five to 10 children at a given time, and in this assessment, this level of activity is assumed at each of the proposed playgrounds. Assuming up to 20 children at play between the two playgrounds, the day-night average noise level would be up to 48 dBA DNL at 50 feet. Noise levels generated by worst-case usage of the playgrounds when propagated from the center of each equipment to the property lines of the surrounding land uses is summarized in Table 11. The conservative 7 dBA attenuation is applied to noise levels in Table 11 for the north residences.

Worst-hour activities for the playgrounds only and in combination with the multipurpose court would not produce noise levels that would exceed ambient conditions or the City's 55 dBA DNL threshold at receiving residential property lines. For all existing receptors, the noise level increase due to noise from the playgrounds and the multipurpose court would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

TABLE 11 Estimated Operational Noise Levels for the Playgrounds

Receptor	West Playground			East Playground			Combined Noise		
	Distance from Center of Equipment, feet	Hourly L_{eq}, dBA	DNL, dBA	Distance from Center of Equipment, feet	Hourly L_{eq}, dBA	DNL, dBA	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	40	52[a]	43[a]	50	50[a]	41[a]	54[b] 58[c]	45[b] 51[c]	0[b,c]
East Light Industrial Uses	350	40	31	260	43	34	45[b] 57[c]	36[b] 51[c]	0[b,c]
South Light Industrial Uses	170	46	37	160	47	38	50[b] 58[c]	41[b] 52[c]	0[b,c]
West Light Industrial Uses	170	46	37	260	43	34	48[b] 51[c]	39[b] 46[c]	0[b,c]

[a] Conservative 7 dBA attenuation applied to north residences for the six to eight-foot tall barrier along the property line.
[b] Combined hourly average noise levels and day-night average noise levels include noise generated at both playgrounds.
[c] Combined hourly average noise levels and day-night average noise levels include noise generated at both playgrounds plus maximum basketball activities from the multipurpose court and mechanical equipment noise.

Assuming source levels for amplified sound to be 69 dBA L_{eq} at 50 feet from the speakers and assuming amplified sound would only occur during movie nights, which would last for up to three hours between 5:30 p.m. and 8:30 p.m. during the summer months only, the day-night average noise level at 50 feet would be 61 dBA DNL.

Noise levels generated by amplified sound during movie nights when propagated from the center of the multipurpose turf to the property lines of the surrounding land uses is summarized in Table 12. It is assumed that the playground activities and multipurpose courts would not be used during movie nights when amplified sound would be used. Additionally, a conservative 7 dBA attenuation is applied in Table 12 for the north residences due to the six to eight-foot tall noise barrier along the northern boundary.

TABLE 12 Estimated Amplified Sound Noise Levels for the Multipurpose Turf

Receptor	Distance from Center of Turf, feet	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	100	56[a]	48[a]	0
East Light Industrial Uses	155	59	51	0
South Light Industrial Uses	140	60	52	0
West Light Industrial Uses	370	52	44	0

[a] Conservative 7 dBA attenuation applied to north residences for the six to eight-foot tall barrier along the property line.

Amplified sound associated with movie night at the multipurpose turf would not exceed ambient conditions or the City's 55 dBA DNL threshold at adjacent residential property line. For all existing receptors, the noise level increase due to noise from amplified sound would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

Local events, such as farmers markets, could last for up to five hours between 7:00 a.m. and 9:00 p.m., and educational events would last for up to four hours during daytime hours. The day-night average noise level at 50 feet would be 57 dBA DNL.

Noise levels generated by activities during local events and educational events when propagated from the center of the multipurpose turf to the property lines of the surrounding land uses is summarized in Table 13. Additionally, a conservative 7 dBA attenuation is applied in Table 13 for the north residences due to the six-to-eight-feet-tall noise barrier along the northern boundary.

Noise levels associated with local events and educational gatherings on the multipurpose turf would not exceed ambient conditions or the City's 55 dBA DNL threshold at receiving residential property lines. For all existing receptors, the noise level increase due to noise from the local events and educational gatherings would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

TABLE 13 Estimated Noise Levels for Local Events and Educational Gatherings

Receptor	Distance from Center of Turf, feet	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	100	51[a]	44[a]	0
East Light Industrial Uses	155	54	47	0
South Light Industrial Uses	140	55	48	0
West Light Industrial Uses	370	47	40	0

[a] Conservative 7 dBA attenuation applied to north residences for the six-to-eight-feet-tall barrier along the property line.

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., mechanical equipment and park activities) would not result in a measurable or detectable increase in the project vicinity (0 dBA DNL increase). Therefore, the proposed project would not result in a substantial increase over ambient noise levels in the project vicinity.

As shown in Tables 9 through 13, the City's 55 dBA DNL threshold would not be exceeded by the project-generated activities at the surrounding residential uses. This would be a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 2: Exposure to Excessive Groundborne Vibration. Construction-related vibration levels would potentially exceed applicable vibration thresholds at nearby sensitive land uses. This is a **less-than-significant** impact with the incorporation of project conditions of approval for construction vibration.

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. Pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

According to Policy EC-2.3 of the City of San José 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. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José. Vibration levels exceeding these thresholds would be capable of cosmetically damaging adjacent buildings. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is

defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls.

Table 14 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 14 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. According to the City's Historic Resource Inventory,[1] the property to the south of Keyes Street and to the east are part of the Candidate Martha Gardens Packing/Packaging District, which is identified as historical. Additionally, there is one candidate City Landmark building in the southwest corner of the project site that would be protected with no proposed use at this time. Each of these buildings would be subject to the City's conservative 0.08 in/sec PPV threshold for historic buildings.

TABLE 14 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	59	26
Hydromill (slurry wall)	in soil	0.008	4	2
	in rock	0.017	7	3
Vibratory Roller		0.210	61	27
Hoe Ram		0.089	28	13
Large bulldozer		0.089	28	13
Caisson drilling		0.089	28	13
Loaded trucks		0.076	24	11
Jackhammer		0.035	12	6
Small bulldozer		0.003	2	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., March 2024.

Vibration levels are highest close to the source and then attenuate with increasing distance at the rate $\left({}^{D_{ref}}/_{D}\right)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line.

[1] www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/historic-preservation/historic-resources-inventory

Further, construction vibration impacts are assessed based on damage to buildings on receiving land uses, not receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels are different than the distances used to propagate construction noise levels (shown in Table 8). Table 15 summarizes the construction vibration levels estimated at the nearest façades of the surrounding off-site buildings based on distances measured from the nearest on-site locations where heavy vibration-generating equipment is expected to be used.

Project construction activities would not exceed the conservative 0.08 in/sec PPV threshold at the nearest off-site historical buildings. However, the candidate City Landmark building located in the southwest corner of the project site would be exposed to construction activities within 5 feet of the building, which would result in vibration levels up to 1.2 in/sec PPV. Further, vibration levels would potentially exceed the 0.2 in/sec PPV threshold at the adjacent residential apartment building when construction activities occur within 27 feet of the nearest building façade. A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[2] The findings of this study have been applied to buildings affected by construction-generated vibrations.[3] As reported in USBM RI 8507[3] and reproduced by Dowding,[4] Figure 2 presents the damage probability, in terms of "threshold damage" (described above as cosmetic damage), "minor damage," and "major damage," at varying vibration levels.

As shown in Figure 2, maximum vibration levels of 1.2 in/sec PPV would result in about a 20% chance of cosmetic damage and a less than 3% chance of minor damage, while 0.2 in/sec PPV or lower would result in less than 3% chance of cosmetic damage and no minor damage. No major damage would be expected at the buildings immediately adjoining the project site or on the project site.

[2] 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.

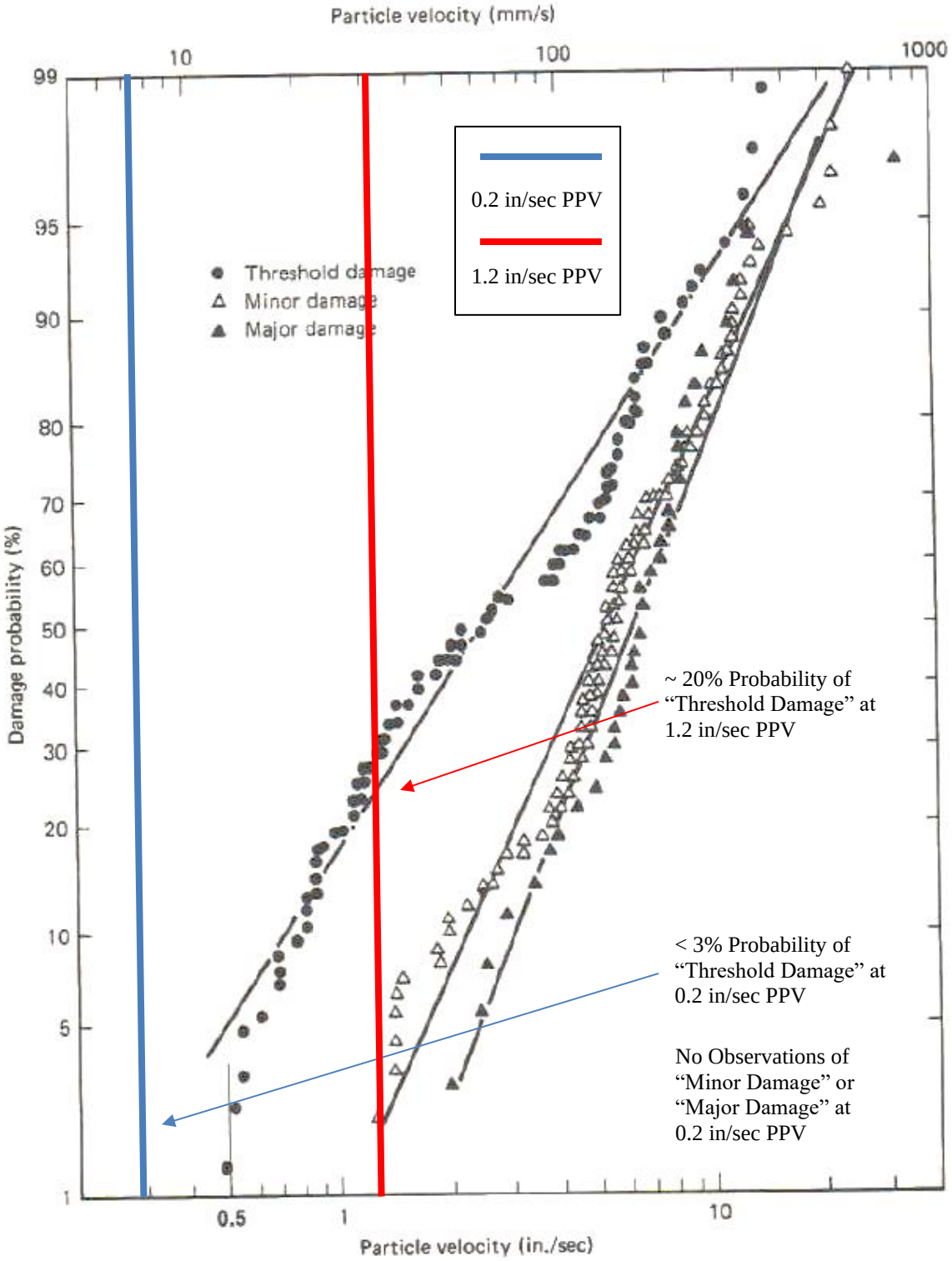
[3] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

TABLE 15 Construction Vibration Levels Estimated at the Nearest On- and Off-Site Structures

Equipment		PPV (in/sec)				
		North Residences (25ft)	**Historical East Light Industrial (80ft)**	**Historical South Light Industrial (65ft)**	**West Light Industrial (90ft)**	**On-Site Building in SW Corner (5ft)**
Clam shovel drop		**0.202**	0.056	0.071	0.049	**1.186**
Hydromill (slurry wall)	in soil	0.008	0.002	0.003	0.002	0.047
	in rock	0.017	0.005	0.006	0.004	**0.100**
Vibratory Roller		**0.210**	0.058	0.073	0.051	**1.233**
Hoe Ram		0.089	0.025	0.031	0.022	**0.523**
Large bulldozer		0.089	0.025	0.031	0.022	**0.523**
Caisson drilling		0.089	0.025	0.031	0.022	**0.523**
Loaded trucks		0.076	0.021	0.027	0.019	**0.446**
Jackhammer		0.035	0.010	0.012	0.009	**0.206**
Small bulldozer		0.003	0.001	0.001	0.001	0.018

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., May 2024.

FIGURE 2 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

Neither cosmetic, minor, or major damage would occur at buildings located 30 feet or more from the project site. At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). 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.

In summary, the construction of the project would potentially generate vibration levels exceeding the General Plan threshold of 0.08 in/sec PPV at the on-site historical building and 0.2 in/sec PPV at conventional buildings adjoining the project site. This would be a potentially significant impact.

The project applicant shall incorporate the following measures as project conditions of approval to reduce vibration levels as much as possible at the on-site historical building, restore the integrity of the on-site historical building, and reduce vibration levels to below 0.2 in/sec PPV at the adjoining building, which is comprised of modern engineered materials. All measures shall be in accordance with industry-accepted standard methods. The project conditions of approval shall include, but not be limited to, the following measures:

- Avoid using vibratory rollers and clam shovel drops within 30 feet of the existing residential building to the north.

- Avoid dropping heavy equipment and use alternative methods for breaking up existing pavement, such as a pavement grinder, instead of dropping heavy objects, within 30 feet of the existing residential building to the north.

- The applicant and contractor shall implement a Construction Vibration Monitoring Plan to document conditions prior to, during, and after vibration-generating demolition and construction activities at the on-site historical building. All monitoring plan tasks shall be undertaken under the direction of a licensed Professional Engineer in the State of California. Initial placement of sensors, data, and corrective actions shall be reviewed by a licensed Professional Structural Engineer in the State of California. The Construction Vibration Monitoring Plan shall be submitted to the Building and Planning Division subject to satisfaction of the Community Development Director, or his/her designee, prior to issuance of any demolition, grading, or building permits, whichever occurs first, and shall incorporate the following measures:

    - A list of all heavy construction equipment to be used for this project known to produce high vibration levels (e.g., tracked vehicles, vibratory compaction, jackhammers, hoe rams, clam shovel drop, and vibratory roller, etc.) shall be submitted to the City by the contractor, as well as a list of smaller equipment (less than 18,000 pounds) to be used near the on-site historical building.

- Smaller equipment (less than 18,000 pounds) shall be used near the on-site historical building to minimize vibration levels. For example, a smaller vibratory roller similar to a Caterpillar model CP433E vibratory compactor could be used when compacting materials within 60 feet of the on-site historical building. The smaller equipment intended to implement this requirement shall be individually identified among the list of equipment required under the above condition as the subset of equipment allowed for use at the property lines.

- Avoid dropping heavy equipment and using vibratory rollers within 60 feet of the sensitive on-site structure. Use alternative methods for breaking up existing pavement, such as a pavement grinder, instead of dropping heavy objects, within 60 feet of the on-site historical building. Select demolition methods that do not involve large impact tools, such as hoe-rams, within 60 feet of the on-site historical building. Portable jackhammers, saws, or grinders shall be used to minimize impacts to the ground.

- Additionally, the construction vibration monitoring plan shall include, but not be limited to, the following measures to address any potential cosmetic damage:

    - A description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations.

    - A list of all construction equipment to be used and the anticipated time of duration shall be submitted by the contractor.

    - Document conditions the on-site historical structure, where access is granted, prior to, during, and after vibration-generating construction activities. Perform a photo survey, elevation survey, and crack monitoring survey prior to any construction activity, at the end of each phase of construction, and after project completion, and shall include internal and external crack monitoring in structures, settlement, and distress, and shall document the condition of foundations, walls and other structural elements in the interior and exterior of said structures. Where the crack survey identifies damage to adjacent buildings, the applicant shall be responsible for any repairs.

    - A plan to identify where and when to monitor would be conducted. If vibration levels exceed the limits, suspend construction and implement contingency measures to either lower vibration levels or secure the affected structures.

    - The applicant or their designated contractor shall identify a “disturbance coordinator” responsible for registering and investigating claims of excessive vibration. The disturbance coordinator shall determine the cause of the complaint and shall require that measures be implemented to reduce

the vibration impact. The applicant or their designated contractor shall conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

- A completed monitoring report and findings of the crack surveys and any repairs done shall be made available to the Director of Planning, Building and Code Enforcement, or the Director's designee prior to final building inspection for the demolition and final occupancy.

Implementation of these measures would reduce the vibration activities during construction by limiting the use of heavy vibration-generating equipment and requiring alternative approaches to ground disturbing activities. Where construction vibration levels exceed City thresholds and result in damage to the sensitive buildings, additional measures would be incorporated to restore the sensitive buildings to preconstruction conditions, as required. Accordingly, the project would have a less-than-significant impact from generation of groundborne vibration with the implementation of mitigation.

Mitigation Measure 2: **No further mitigation required.**

Impact 3: **Excessive Aircraft Noise.** The project site is located approximately 3 miles from Mineta San José International Airport, and the noise environment attributable to aircraft is considered normally acceptable under the Santa Clara County ALUC noise compatibility policies for neighborhood parks. This is a **less-than-significant** impact.

Mineta San José International Airport is a public-use airport located approximately 3 miles northwest of the project site. According to the City's Airport Master Plan Environmental Impact Report,[4] the project site lies right around the 60 dBA CNEL/DNL contour line (see Figure 3). According to Policy EC-1.11 of the City's General Plan, the required safe and compatible threshold for exterior noise levels due to aircraft would be at or below 65 dBA CNEL/DNL. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

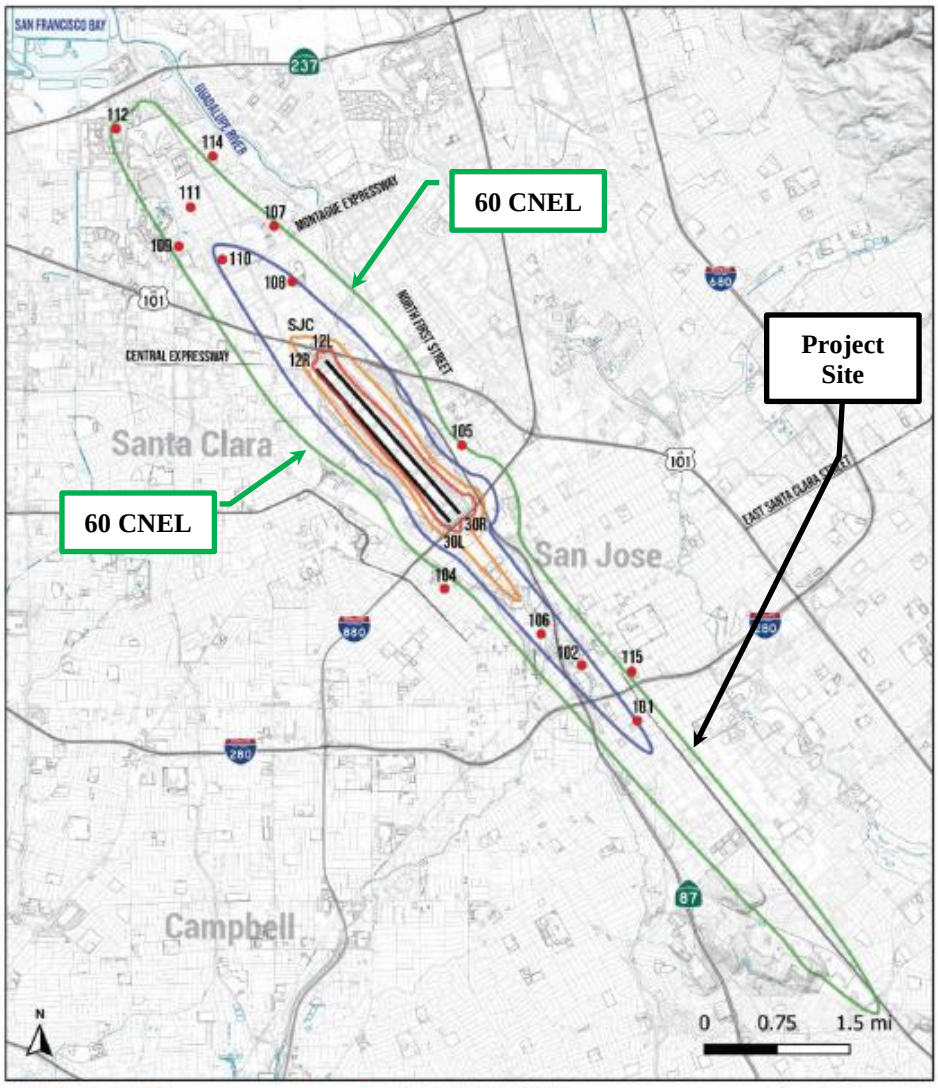
Mitigation Measure 3: **None required.**

[4] David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.

FIGURE 3 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

SAN JOSE INTERNATIONAL AIRPORT | Environmental Impact Report FINAL | October 2019



NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

- Noise Monitoring Station
- 101 Site ID
- Runway
- 75 dBA and Greater CNEL Contour
- 70 dBA and Greater CNEL Contour
- 65 dBA and Greater CNEL Contour
- 60 dBA and Greater CNEL Contour

Figure 5 Scenario 2: With Project 2037 Noise Contour Map

Source: BridgeNet International 2019

Cumulative Impacts

Cumulative noise impacts would include either cumulative traffic noise increases under future conditions or temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA DNL or greater for future levels exceeding 60 dBA DNL or was 5 dBA DNL or greater for future levels at or below 60 dBA DNL; and 2) if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA DNL or more attributable solely to the proposed project.

The traffic study was not required for the proposed project. Therefore, the project is not expected to result in a significant cumulative traffic noise increase. This is a less-than-significant impact.

From the City's website,[5] the nearest planned or approved project (802 South First Street) would be more than 1,500 feet from the project site. This project site would not share any receptors with the proposed Spartan Keyes project site. Therefore, there would not be a cumulative construction impact associated with the proposed project.

[5] https://gis.sanjoseca.gov/maps/devprojects/

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels for LT-1, Monday, April 1, 2024

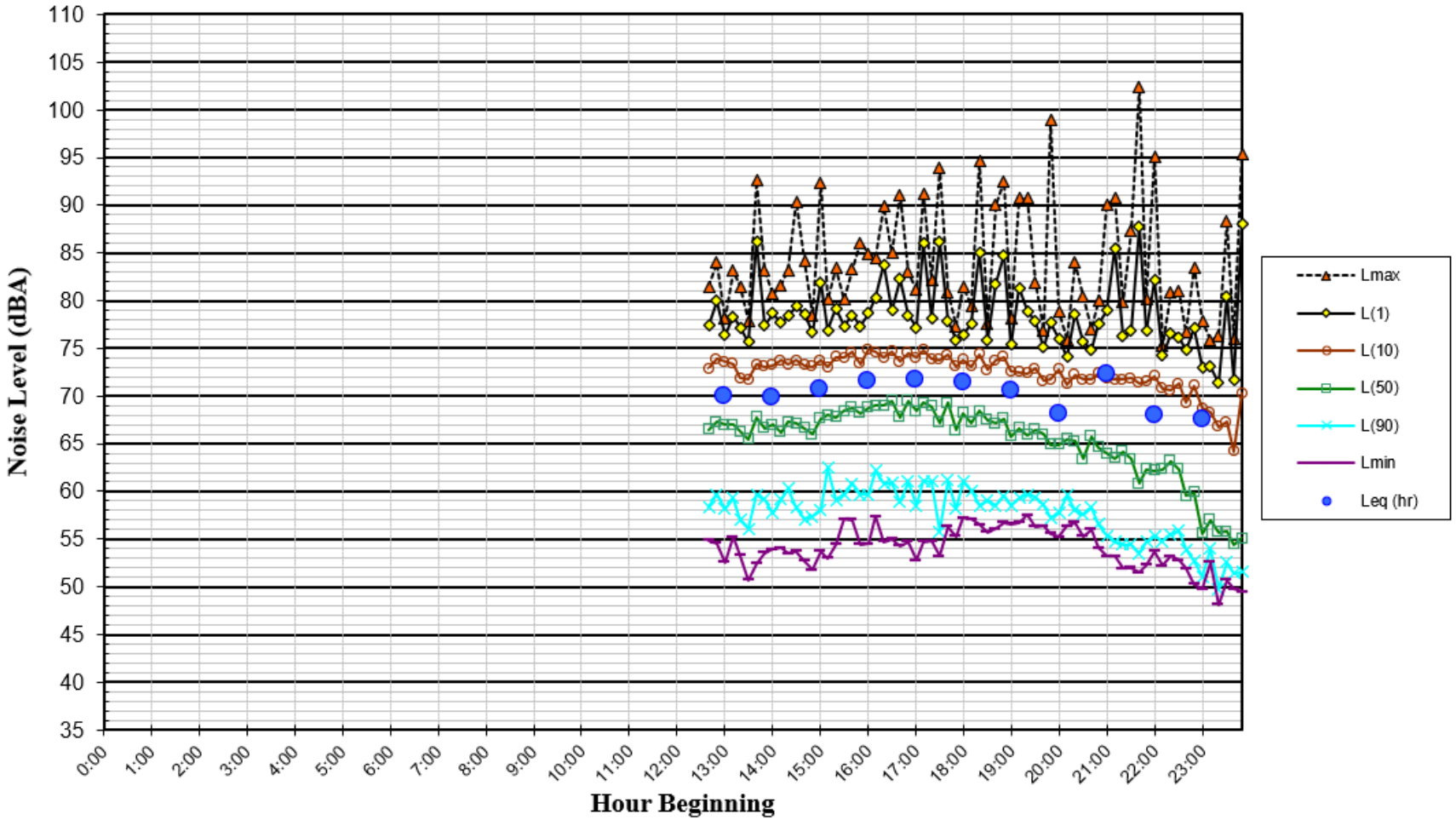


FIGURE A2 Daily Trend in Noise Levels for LT-1, Tuesday, April 2, 2024

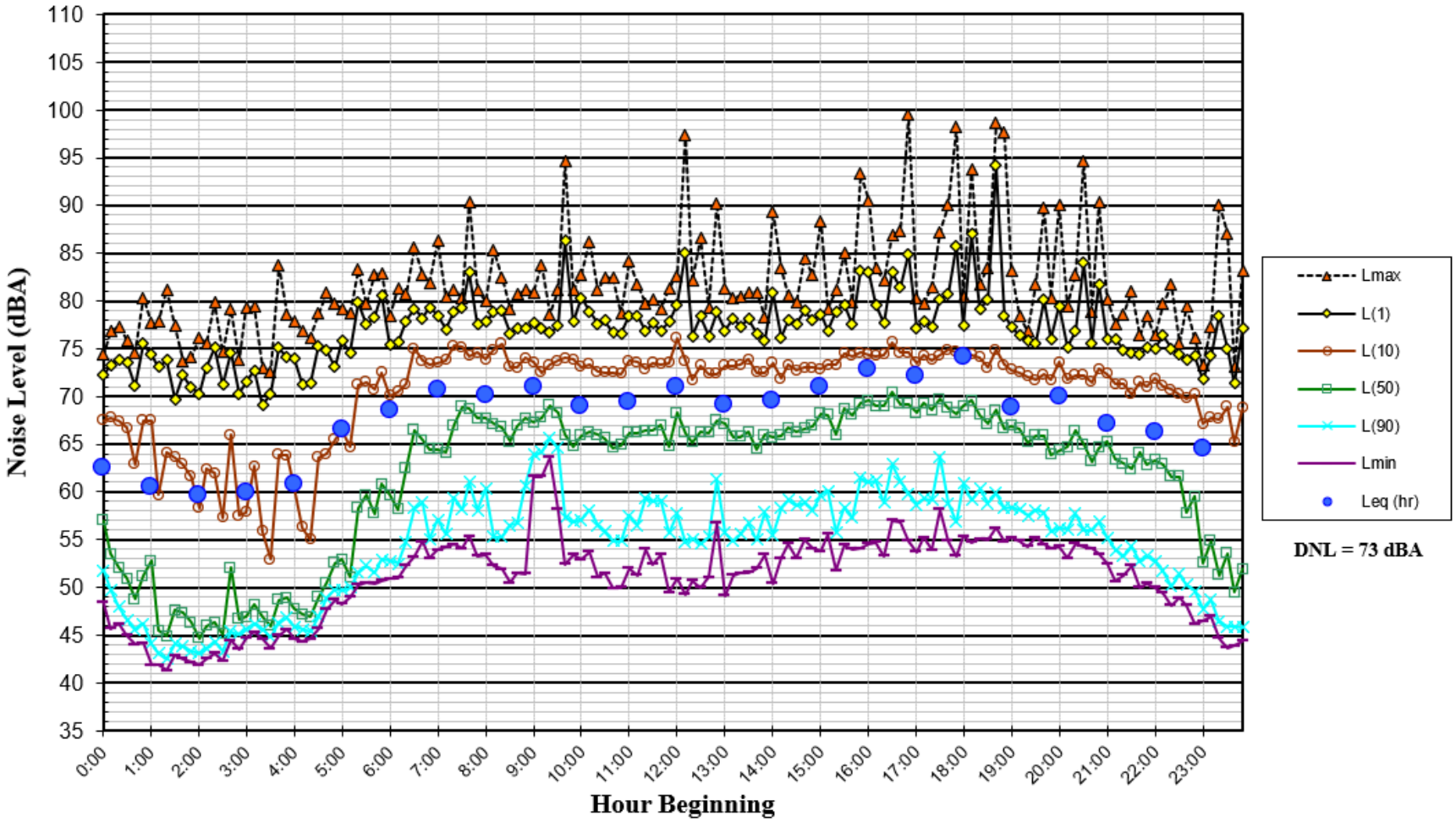


FIGURE A3 Daily Trend in Noise Levels for LT-1, Wednesday, April 3, 2024

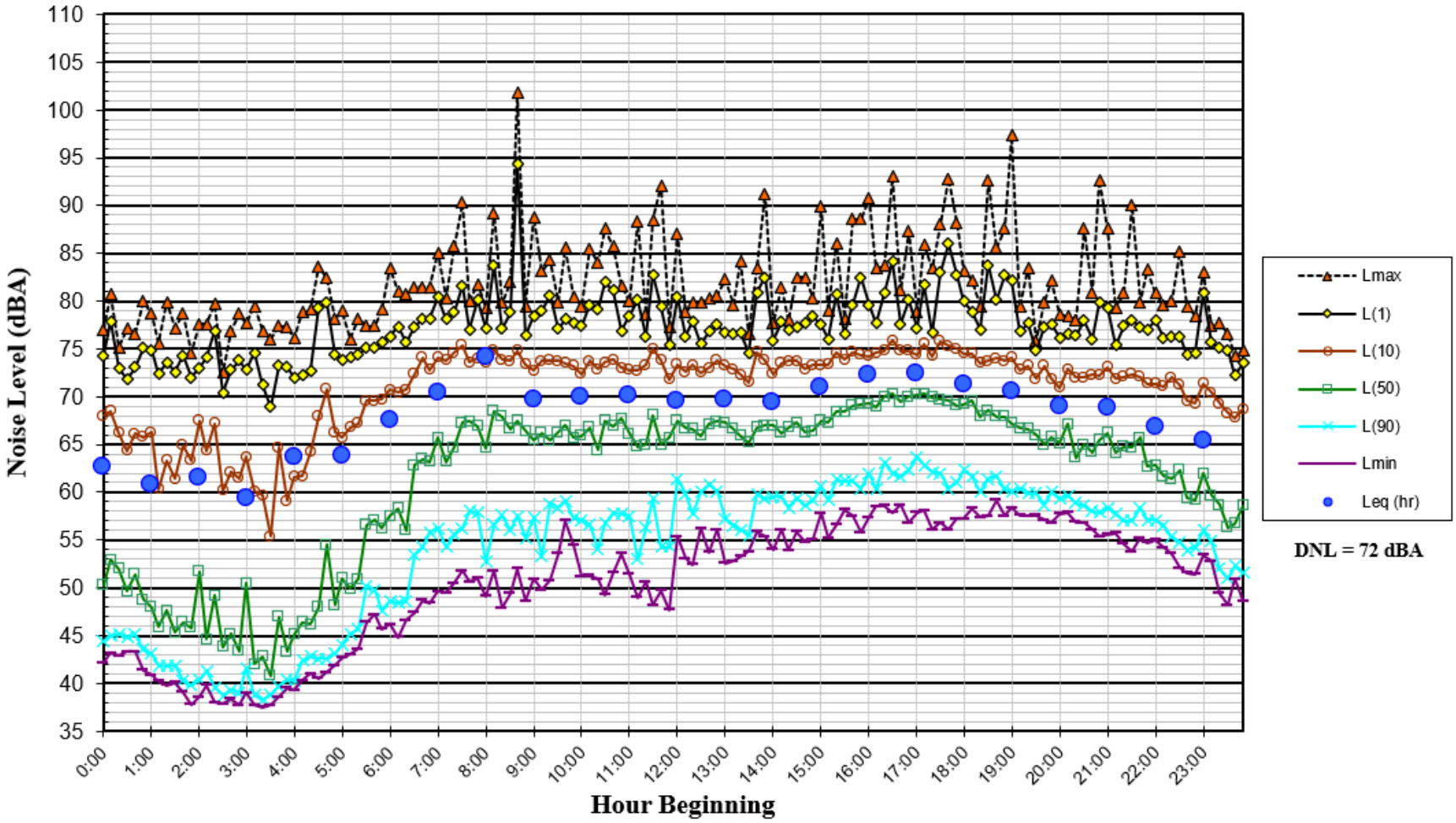


FIGURE A4 Daily Trend in Noise Levels for LT-1, Thursday, April 4, 2024

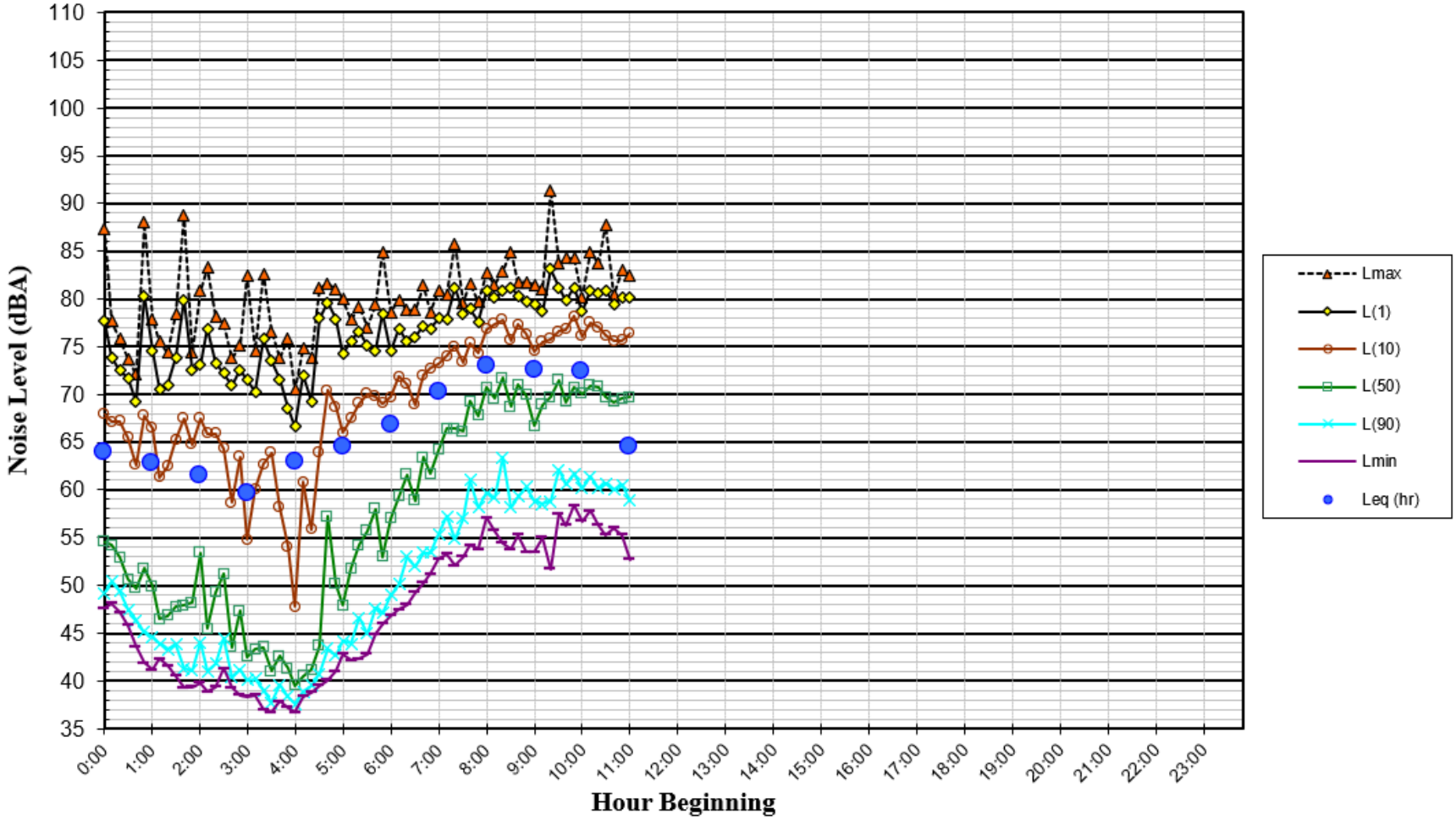


FIGURE A5 Daily Trend in Noise Levels for LT-2, Monday, April 1, 2024

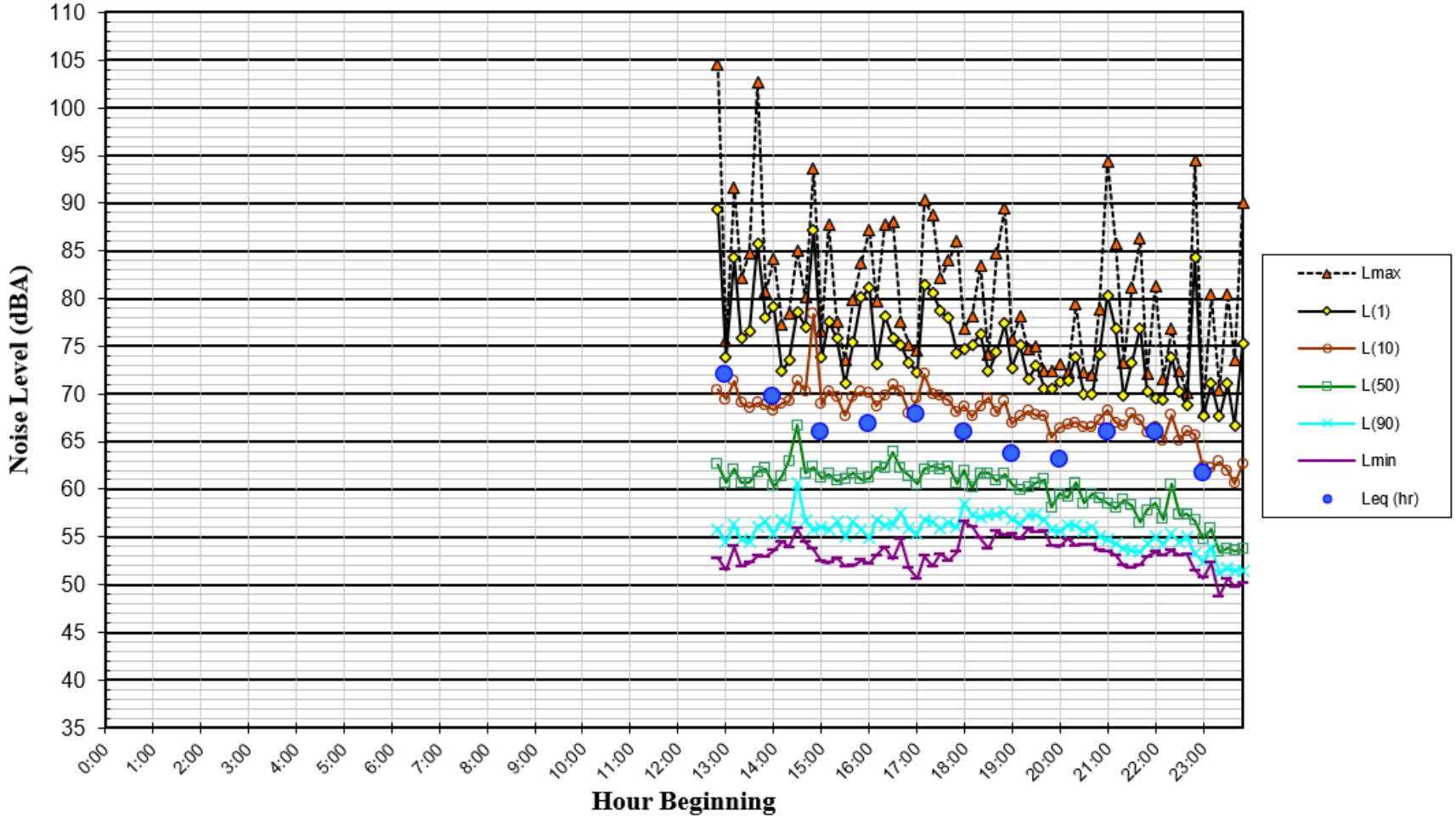


FIGURE A6 Daily Trend in Noise Levels for LT-2, Tuesday, April 2, 2024

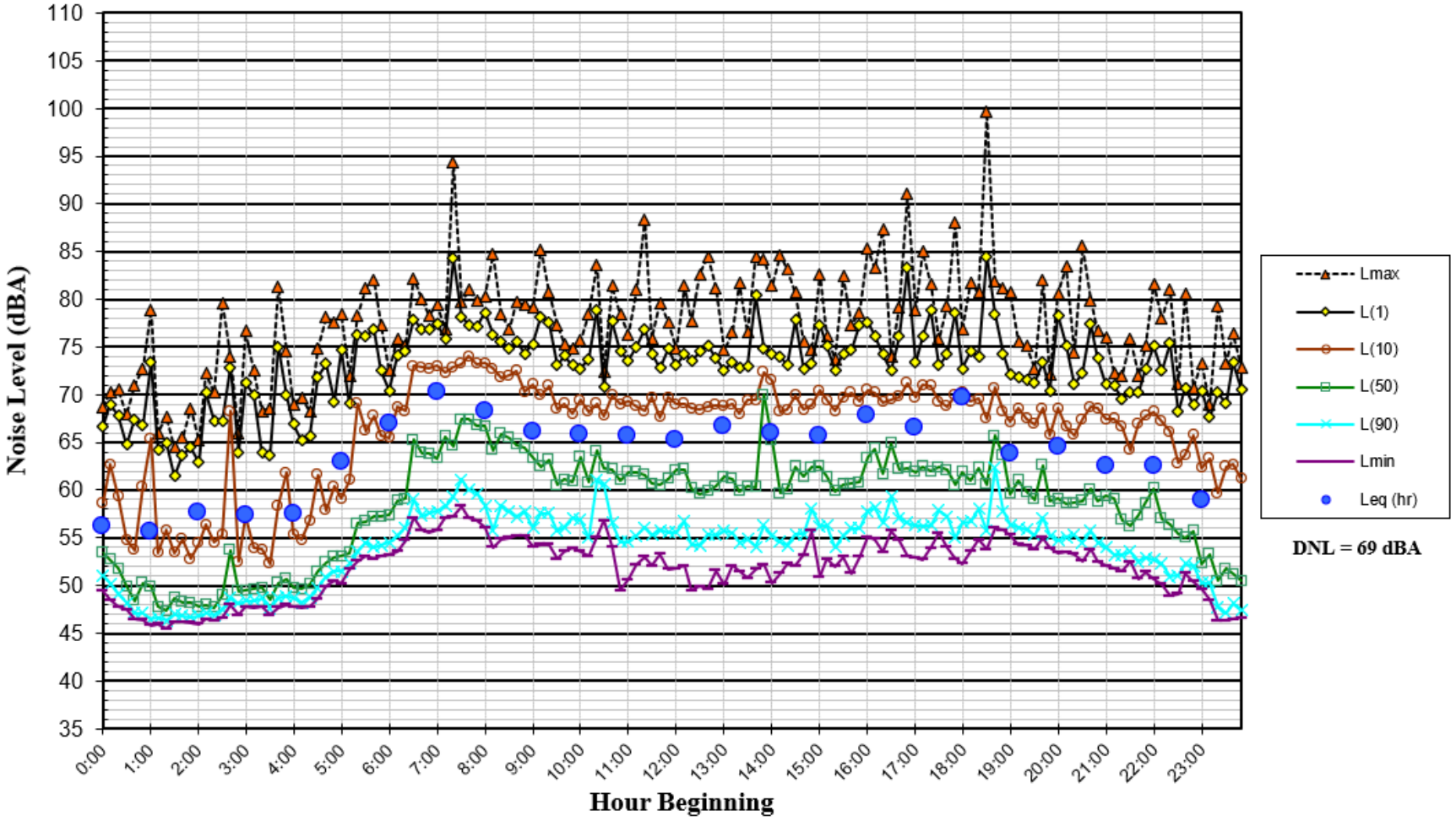


FIGURE A7 Daily Trend in Noise Levels for LT-2, Wednesday, April 3, 2024

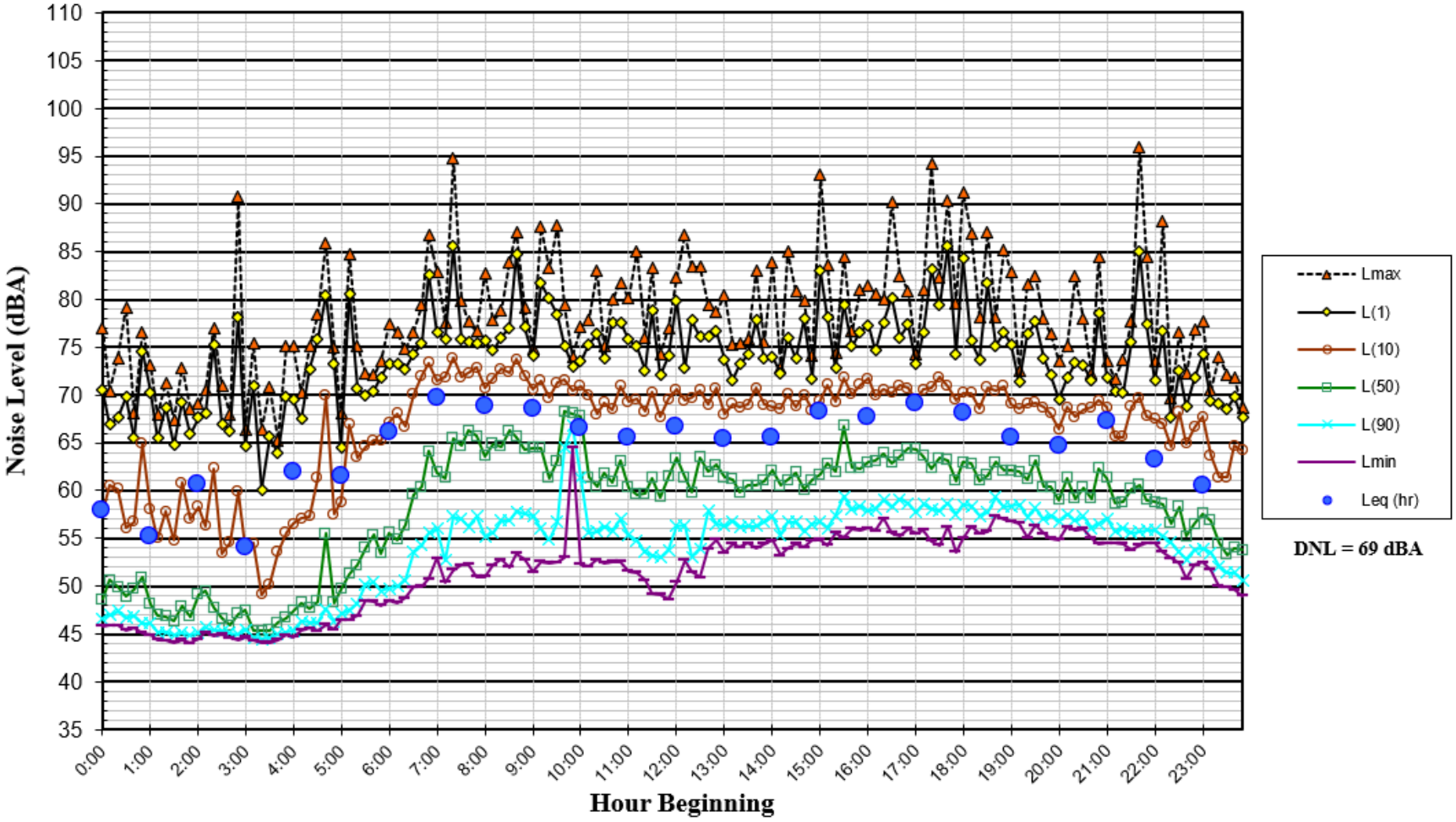
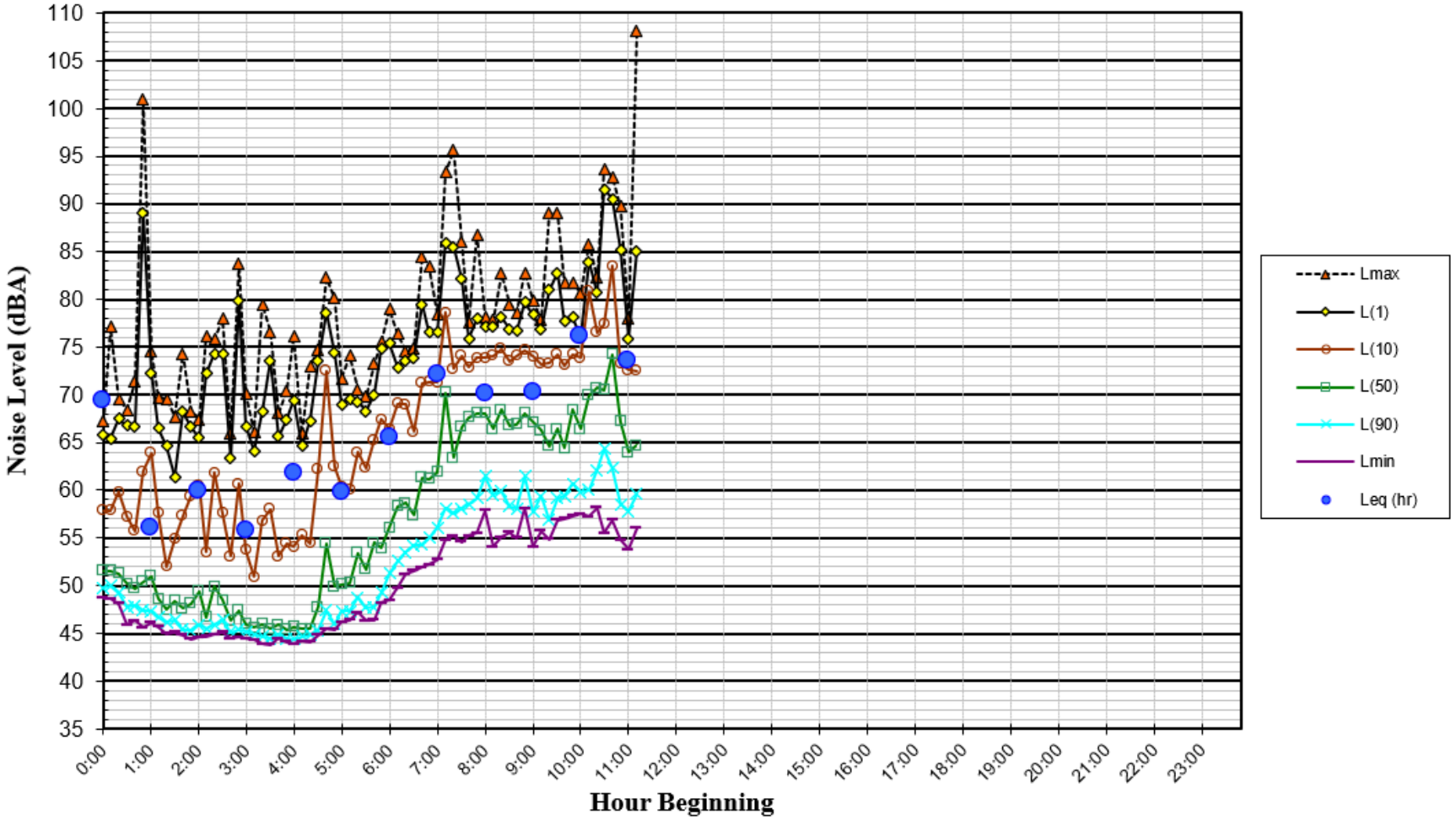



FIGURE A8 Daily Trend in Noise Levels for LT-2, Thursday, April 4, 2024