380 NORTH FIRST STREET RESIDENTIAL PROJECT NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project proposes to demolish the existing office building and surface parking lot in order to construct a new seven-story apartment building (approximately 116,255 square feet) with 118 rental units totaling 81,780 gross square feet. The building would include a leasing office, lobby, mail room, bike café , amenity space, and club room totaling 3,105 square feet for future residents. Non-residential uses in the building would include back-of house space and a three-level enclosed garage with one level below-grade.

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 three 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; 2) the Plan Consistency Analysis section discusses noise and vibration at the site in terms of land use compatibility utilizing policies in the City's General Plan; and, 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 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 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.

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.

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.

Railroad and light rail operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of railroad track. People’s response to ground vibration from rail vehicles has been correlated best with the average, root mean square

(RMS) velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1 x 10-6 in/sec RMS, which equals 0 VdB, and 1 in/sec equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans. Perceptible vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams and foot traffic. Construction activities, train operations, and street traffic are some of the most common external sources of vibration that can be perceptible inside residences. Table 4 illustrates some common sources of vibration and the association to human perception or the potential for structural damage.

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.

TABLE 4 Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB	Typical Events (50-foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment
		Heavy tracked vehicles (Bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	
		Commuter rail, upper range
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, occasional events		Commuter rail, typical Bus or truck over bump or on rough roads
Residential annoyance, frequent events	70	Rapid transit, typical
Approximate human threshold of perception to vibration		Buses, trucks and heavy street traffic
	60	
		Background vibration in residential settings in the absence of activity
Lower limit for equipment ultra-sensitive to vibration	50	

Source: Transit Noise and Vibration Impact Assessment, US Department of Transportation Federal Transit Administration, September 2018.

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.

Federal Government

Federal Transit Administration. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[1] which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, 85 dBA L_{eq} at commercial and office uses, and to 90 dBA L_{eq} at industrial land uses.

1 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

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.

2022 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.

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-1.1 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:

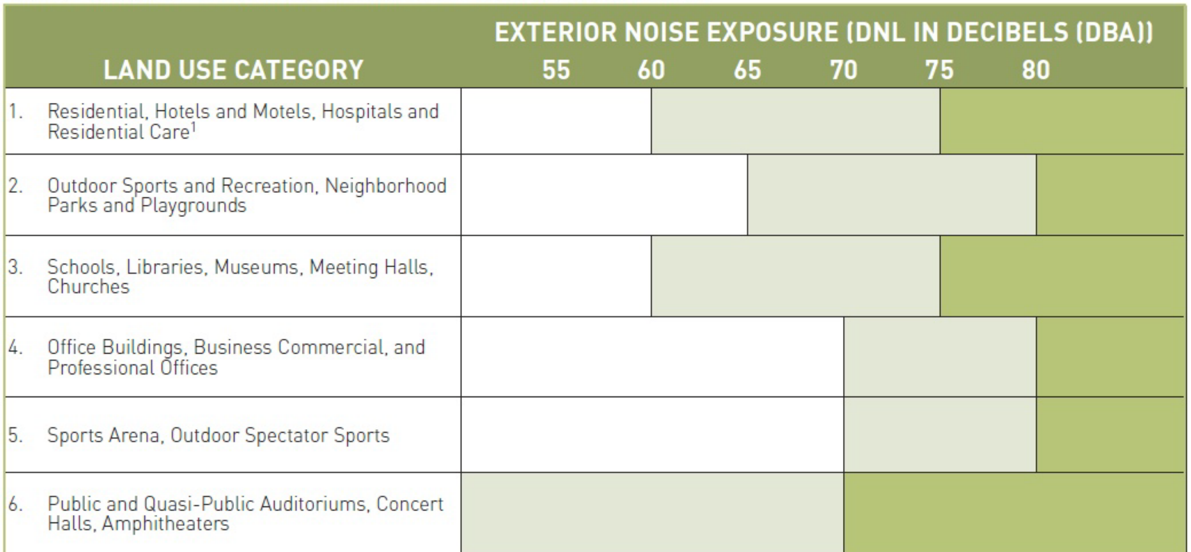
Interior Noise Levels

- 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 Norman Y. Mineta 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.

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



[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.

Source: Envision San José 2040 General Plan, Adopted November 1, 2011, As Amended on May 16, 2019.

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-1.7 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

Federal Government

Federal Transit Administration. The FTA has identified vibration impact criteria for sensitive buildings, residences, and institutional land uses near rail transit and railroads. These criteria are shown in Table 5. The thresholds for residential buildings where occupants sleep during nighttime hours are 72 VdB for frequent events (more than 70 events of the same source per day), 75 VdB for occasional events (30 to 70 vibration events of the same source per day), and 80 VdB for infrequent events (less than 30 vibration events of the same source per day).

TABLE 5 Groundborne Vibration Impact Criteria

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 µinch/sec, RMS)		
	Frequent Events[1]	**Occasional Events[2]**	**Infrequent Events[3]**
Category 1 Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2 Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3 Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research should always require detailed evaluation to define the acceptable vibration levels. Ensuring low vibration levels in a building requires special design of HVAC systems and stiffened floors.

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 380 North First in the City of San José. The site is bound by at-grade railroad tracks and a multi-family residential building to the north; Bassett Street to the south; North First Street to the west; and North Second Street to the east. Existing residential and commercial land uses are located to the west, opposite North First Street. Below-grade VTA light-rail tracks also border the site to the west. The Santa Clara County Law Library is located to the south, opposite Bassett Street. Additional residences are located to the east, opposite North Second Street.

The noise environment at the site and in the surrounding area results primarily from local vehicular traffic along North First Street and the below-grade VTA light-rail tracks. Traffic noise along nearby State Route 87 (SR 87), other surrounding roadways, and 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 Friday, September 8, 2023, and Tuesday, September 12, 2023. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made from the northeastern corner of the site, approximately 35 feet west of the centerline of North Second Steet and approximately 30 feet south of the edge of the adjoining railroad tracks. Hourly average noise levels on weekdays at LT-1 typically ranged from 56 to 65 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 46 to 61 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). On weekends, daytime hourly average noise levels typically ranged from 55 to 65 dBA L_{eq}, and nighttime hourly average noise levels typically ranged from 49 to 58 dBA L_{eq}. The day-night average noise level during the weekday 24-hour measurement period on Monday, September 11, 2023, was 63 dBA DNL. The weekend day-night average noise levels during the 24-hour measurement periods on Saturday, September 9, 2023, and Sunday, September 10, 2023, ranged from 62 to 63 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures A1 through A5 of Appendix A.

LT-2 was made from the existing residential and commercial building west of the project site, opposite North First Street. LT-2 was set back approximately 15 feet from the centerline of the southbound travel lanes of North First Street and approximately 25 feet south of the edge of the adjoining railroad tracks. Hourly average noise levels on weekdays at LT-2 typically ranged from 59 to 67 dBA L_{eq} during daytime hours and from 50 to 64 dBA L_{eq} during nighttime hours. On weekends, daytime hourly average noise levels typically ranged from 57 to 63 dBA L_{eq}, and nighttime hourly average noise levels typically ranged from 52 to 62 dBA L_{eq}. The day-night average noise level during the weekday 24-hour measurement period on Monday, September 11, 2023, was 67 dBA DNL. The weekend day-night average noise levels during the 24-hour measurement periods on Saturday, September 9, 2023, and Sunday, September 10, 2023, ranged from 65 to 66 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figures A6 through A10 of Appendix A.

Short-term noise measurements ST-1 and ST-2 were made on Friday, September 8, 2023, between 11:10 a.m. and 11:30 a.m. in 10-minute measurement periods. Table 6 summarizes the noise measurement results measured at each location.

ST-1 was made approximately 35 feet north of the centerline of Bassett Street, halfway between North First Street and North Second Street. The 10-minute L_{eq} measured at ST-1 was 77 dBA and did include train pass-bys. ST-2 was made at the rear of the existing parking lot, directly behind ST-1. ST-2 was approximately 65 feet from the edge of the adjoining railroad tracks. The 10-minute L_{eq} measured at ST-2 was 51 dBA and did not include train pass-bys.

TABLE 6 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: ~35 feet north of the Bassett Street centerline	9/8/2023, 11:10-11:20	99	92	74	63	50	77
ST-2: ~65 feet south of the edge of the adjoining railroad tracks	9/8/2023, 11:20-11:30	73	70	64	54	48	51

Existing Vibration Environment

Vibration measurements were made near the northwestern corner of the project site, at the approximate setback of the proposed building. As shown in Figure 1, V-1 was made approximately 55 feet from the edge of the at-grade railroad tracks to the north of the site and approximately 45 and 60 feet from the edge of the below-grade VTA tracks to the west of the site.

Six observed and recorded vibration measurements of individual VTA light-rail train activity were conducted on Friday, September 15, 2023, between 10:04 a.m. and 10:35 a.m. No railroad trains were observed along the tracks to the north of the site during the vibration survey. The instrumentation used to conduct the measurements included a Roland model R-07 solid state recorder and seismic grade, low noise accelerometers firmly fixed to the ground. This system was capable of accurately measuring very low vibration levels. Vibration levels were measured at ground level at a setback distance of approximately 45 and 60 feet from the edge of the nearest VTA tracks.

All measurements were made along the sidewalk at the setback of the western façade of the proposed building. Vibration levels ranged from 47 to 57 VdB, and the average was 49 VdB. Table 7 summarizes each of the six measurements made at V-1. Vibration levels were measured in the vertical axis because ground vibration is typically the most dominant on this axis. Vibration levels measured at V-1 during each of the train pass-by events can be seen in Figure A10 of Appendix A.

TABLE 7 Summary of Train Pass-by Vibration Measurements Made at V-1

Date, Time	Train Information				Distance from V-1	Vibration Level at V-1
	Type of Train	Track	Direction of Travel	Speed		
9/15/2023, 10:04 a.m.	VTA	Near	NB	10 mph	45 feet	57 VdB
9/15/2023, 10:15 a.m.	VTA	Near	NB	10 mph	45 feet	54 VdB
9/15/2023, 10:16 a.m.	VTA	Far	SB	10 mph	60 feet	47 VdB
9/15/2023, 10:20 a.m.	VTA	Near	NB	10 mph	455 feet	56 VdB
9/15/2023, 10:27 a.m.	VTA	Far	SB	10 mph	60 feet	48 VdB
9/15/2023, 10:33 a.m.	VTA	Far	SB	10 mph	60 feet	48 VdB

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

Source: Google Earth, 2023.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

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 applicable General Plan policies were presented in detail in the Regulatory Background section and are summarized below for the proposed project:

- The City's acceptable exterior noise level standard is 60 dBA DNL or less for the proposed residential land uses.

- The City's acceptable interior noise level standard is 45 dBA DNL or less for the proposed residential land uses.

The future noise environment at the site would continue to result primarily from vehicular traffic along North First Street, the below-grade VTA railroad tracks, nearby SR 87, and local roadways. The traffic study completed for the proposed projects included peak hour turning movements at four intersections in the project vicinity. Cumulative plus project traffic volumes were not included in the traffic study; however, background plus project traffic volumes, which include existing conditions, planned projects in the area, and the proposed project, were included in the study. By comparing these volumes to the existing traffic volumes, future volumes with the proposed project would result in a 2 dBA DNL increase over existing conditions. Considering the project vicinity is mostly built out with little to no room for expansion, this would adequately represent future conditions. This increase was applied throughout the project site to represent worst-case conditions.

Additionally, railroad train operations are expected to be consistent under future conditions and would not contribute to a measurable noise level increase.

Future Exterior Noise Environment

The site plan for the proposed project shows a roof deck on the seventh floor, about 69 feet above the ground. This roof deck would be located in the southwestern corner of the proposed building, with the center of the roof deck set back approximately 40 feet from the centerline of Bassett Street and approximately 45 feet from the centerline of the northbound lanes of North First Street. The elevation and setback of the center of the roof deck would provide a minimum attenuation of 10 dBA. Assuming this partial shielding, future exterior noise levels at the center of the roof deck would be below 60 dBA DNL. This would meet the City's normally acceptable threshold for residential uses.

Future Interior Noise Environment

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.

The western façade facing North First Street and the VTA tracks would be set back from the centerline of the northbound lanes of the roadway by approximately 25 feet. At this distance, the residential units facing North First Street and the VTA tracks would be exposed to future exterior noise levels would range from 68 to 70 dBA DNL. Assuming windows to be partially open, future interior noise levels in these units would be up to 55 dBA DNL.

The eastern façade facing North Second Street would be set back from the centerline of the roadway by approximately 40 feet. At this distance, the residential units facing North Second Street would be exposed to future exterior noise levels would range from 64 to 65 dBA DNL. Assuming windows to be partially open, future interior noise levels in these units would be up to 50 dBA DNL.

To meet the interior noise requirements set forth by the City of San José of 45 dBA DNL, implementation of noise insulation features would be required.

Recommended 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 at residential interiors:

- 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.

- Preliminary calculations indicate that residential units located along the western façade of the proposed building would require windows and doors with a minimum rating of 31 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

- Units located along the eastern façade would require standard construction materials with the incorporation of a suitable form of forced-air mechanical ventilation to meet the 45 dBA DNL threshold.

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

Conditions of Approval

The project applicant shall prepare final design plans that incorporate building design and acoustical treatments to ensure compliance with State Building Codes and City noise standards. A project-specific acoustical analysis shall be prepared to ensure that the design incorporates controls to reduce interior noise levels to 45 dBA DNL or lower within the residential units. The project applicant shall conform with any special building construction techniques requested by the City's Building Department, which may include sound-rated windows and doors, sound-rated wall constructions, and acoustical caulking.

Train Vibration and Land Use Compatibility

The FTA vibration impact assessment criteria (summarized in Table 5) were used to evaluate vibration levels produced by trains passing the project area under future conditions. The FTA vibration impact criteria are based on maximum overall levels for a single event. The impact criteria in Table 5 provide thresholds based on the number of train pass-bys in a given day: frequent events (more than 70 events of the same source per day), occasional events (30 to 70 vibration events of the same source per day), and infrequent events (less than 30 vibration events of the same source per day).

Future Vibration Environment

As shown in Table 7, six light-rail trains were measured in 30 minutes. This would result in more than 70 pass-by events in a day. Assuming the same train activity under future conditions, which would represent worst-case conditions, maximum vibration levels of 72 VdB for residential buildings where occupants sleep would be as the threshold for the proposed project.

VTA train pass-bys along the near and far tracks resulted in measured vibration levels of 47 to 57 VdB at the nearest building façade. Additionally, the tracks north of the site would continue to have very infrequent railroad activity that would not be subject to the FTA thresholds, as the guidance does not apply to vibrations occurring very infrequently. Therefore, the proposed building would be compatible with the future worst-case vibration environment at the project site.

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 more than one year. This would be a **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 September 2024, and the project is expected to be completed by early June 2026 (approximate 21-month period). Construction phases would include demolition, site preparation/grading, excavation/UG utilities, superstructure, building exterior, architectural coating, and landscaping/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.

While the City of San José does not establish noise level thresholds for construction activities, this analysis uses the noise limits established by the Federal Transit Administration (FTA) to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*.[2] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses, 85 dBA L_{eq} shall be enforced at commercial land uses, and 90 dBA L_{eq} shall be enforced at industrial land uses.

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 8) from the equipment. Table 9 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 72 to 88 dBA L_{eq} for residential buildings, 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 stage are summarized in Table 10, 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 11. Noise levels in Table 11 do not assume reductions due to intervening buildings or existing barriers.

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2 Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

TABLE 8 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 9 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 10 Estimated Construction Noise Levels for the Proposed Project at a Distance of 50 feet

Phase of Construction	Total Number of Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet, dBA L_{eq}
Demolition	12	Concrete/Industrial Saw (1)[a] Excavator (1) Skid Steer Loader (2) Tractor/Loader/Backhoe (1)[a] Off-Highway Truck – Water Truck (1) Sweeper/Scrubber (1)	85
Site Preparation/ Grading	8	Off-Highway Truck – Water Truck (1) Skid Steer Loader (1)[a] Tractor/Loader/Backhoe (1)[a] Sweeper/Scrubber (1)	81
Excavation/UG Utilities	30	Excavator (1) Skid Steer Loader (1) Off-Highway Truck – Water Truck (1) Other General Industrial Equip. (1)[a] Tractor/Loader/Backhoe (2) [a] Roller (1) Sweeper/Scrubber (1)	84
Superstructure	221	Tower Crane – Electric (1) Rough Terrain Forklift (1) Generator Set (2)[a] Air Compressor (3)[a]	79
Building – Exterior	128	Tower Crane – Electric (1) Rough Terrain Forklift (1) Compressor (1) [a] Cement and Mortar Mixer (1)[a]	77
Building – Interior	168	Air Compressor (3) [a]	74
Landscaping/Paving	63	Trencher (1)[a] Paver (1) Skid Steer Loader (1)[a] Roller (1) Rough Terrain Forklift (1)	79

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

TABLE 11 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 (115ft)	East Residences (210ft)	South Library (95ft)	West Residences & Commercial (240ft)
Demolition	79	74	81	73
Site Preparation/ Grading	75	70	77	69
Excavation/UG Utilities	79	74	81	73
Superstructure	76	71	78	70
Building – Exterior	72	66	73	65
Building – Interior	71	66	73	65
Landscaping/Paving	74	69	76	68

As shown in Tables 10 and 11, 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 65 to 79 dBA L_{eq} at the surrounding residential land uses and from 65 to 74 dBA L_{eq} at the nearest library and commercial uses.

All residential property lines would be 80 feet or more from the nearest project boundary. At this distance, construction noise levels would range from 74 to 82 dBA L_{eq}, assuming all equipment per phase operating simultaneously. Therefore, construction noise would potentially exceed the exterior threshold of 80 dBA L_{eq} at residential land uses by up to 2 dBA. Construction noise would not exceed the 85 dBA L_{eq} threshold at the nearest library or commercial land use.

The project site is located within 500 feet of existing residential uses and within 200 feet of existing nonresidential uses. Additionally, total construction is expected to last for a period of more than one year. This is a significant impact.

Mitigation Measure 1a:

Pursuant to this General Plan Policy EC-1.7, a construction noise logistics plan shall be prepared 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. Project construction operations shall use best available noise suppression devices and techniques including, but not limited to the following:

- 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.

- Construct solid plywood fences around ground level construction site adjacent to operational businesses, residences, or other noise-sensitive land uses. A temporary 8-foot noise barrier would provide 5 dBA attenuation for adjacent residential land uses when construction activities occur at the ground level.

- 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.

The heaviest noise-generating construction activities would occur at the ground level during the first year of construction. With the implementation of GP Policy EC-1.7, Municipal Code requirements, and the above measures, construction noise levels during the first year would be reduced to less than 80 dBA L_{eq}. After the first year, construction activities are not expected to exceed 80 dBA L_{eq} at the property line of the nearest residential uses. Therefore, the temporary construction noise impact would be reduced to a less-than-significant level.

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. Operational noise levels generated by the proposed project would not exceed 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.

While the City’s Noise Element does not include thresholds for residential buildings, the City’s Municipal Code has noise limits of 55 dBA at receiving residential uses, 60 dBA at receiving commercial uses, and 70 dBA at receiving industrial uses. Exceeding these limits would not be considered a significant impact under CEQA; however, it is recommended that these limits be considered for design features in the proposed building.

Project Traffic Increase

The traffic study included peak hour turning movements for existing traffic volumes and project trips at four intersections in the vicinity of the project site. The project trips were added to the existing volumes to estimated existing plus project traffic volumes. By comparing the existing plus project volumes to the existing volumes, the project's contribution to the overall noise increase is calculated. Table 12 summarizes the estimated noise level increase along each roadway segment included in the traffic report. As shown in Table 12, the project's contribution would be 1 dBA DNL or less along all segments in the project vicinity. 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.

TABLE 12 Estimated Noise Level Increases of Existing Plus Project Traffic Volumes Over Existing Volumes at Receptors in the Project Vicinity

Roadway	Segment	Estimated Noise Level Increase Over Existing Volumes, dBA DNL
North First Street	South of East Julian Street	0
	East Julian Street to Bassett Street	0
	North of Bassett Street	0
North Second Street	South of East Julian Street	0
	East Julian Street to Bassett Street	0
	North of Bassett Street	0
East Julian Street	West of North First Street	0
	North First Street to North Second Street	0
	East of North Second Street	0
Bassett Street	West of North First Street	0
	North First Street to North Second Street	1

Mechanical Equipment

The site plan shows a fire pump room within the ground-level parking structure in the northwestern corner of the proposed building, which would adequately shield surrounding receptors from the noise generated by the fire pump. A transformer would be located along the eastern façade in the northeastern corner of the building.

Transformers up to 1,000 kVA typically generate noise levels up to 64 dB, as measured at 1 meter (3.28 feet). Assuming the transformer runs continuously during daytime and nighttime hours, the day-night average noise level would be 70 dBA DNL at a distance of 1 meter (3.28 feet). The proposed building would adequately shield the library to the south and the receptors to the west from the transformer noise. However, the residences to the north and to the east would have direct line-of-sight to the transformer. Table 13 summarizes the transformer noise at the receptors with direct line-of-sight to the noise source, assuming no attenuation.

Noise levels generated by the ground-level transformer 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 ground-level mechanical equipment noise would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

TABLE 13 Estimated Operational Noise Levels for Ground-Level Transformer

Receptor	Distance from Equipment, feet	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	100	34	41	0
East Residences	85	36	42	0

Heating, ventilation, and air conditioning (HVAC) units are typically part of multi-family residential buildings. The roof plan shows HVAC units located along the center of the building, about 35 feet from the northern and southern edges of the rooftop and about 10 feet from the eastern and western edges of the rooftop. To the north and south of the HVAC units, potential solar array areas are also shown on the rooftop. This equipment would not generate noise levels measurable at the property lines of the project site.

HVAC units typically cycle on and off continuously throughout a 24-hour period. This means that, at any given time, multiple units could be operating simultaneously in a relatively small vicinity of the rooftop. Typical heating pumps would generate noise ranging from 56 to 66 dBA at a distance of 3 feet for residential buildings. Additionally, air handling units for buildings of this size typically generate noise levels up to 62 dBA at a distance of 20 feet. Assuming up to 10 air handling units and 10 heat pumps would operate simultaneously at any given time, combined noise levels generated by the rooftop equipment operating in the same general vicinity would be up to 72 dBA L_{eq} at 20 feet, and the combined day-night average noise level would be 79 dBA DNL at 20 feet.

Table 14 summarizes the noise levels generated by the HVAC equipment propagated to the property lines of the surrounding receptors. Each of the surrounding buildings would have two to four floors, with occupants located on these elevated floors. With setbacks of 35 feet from the northern and southern edges, a minimum 15 dBA attenuation would occur for the elevated occupants. Additional attenuation would occur for ground-level receptors, but conservatively, 15 dBA attenuation is applied in Table 14. For the elevated receptors to the east and west of the project site, a conservative 10 dBA attenuation is assumed since the equipment would be as close as 10 feet from the rooftop edge of the nearest façade.

TABLE 14 Estimated Operational Noise Levels for Rooftop Equipment

Receptor	Distance from Equipment, feet	Hourly L_{eq}, dBA	DNL, dBA	Noise Level Increase, dBA DNL
North Residences	95	44[a]	50[a]	0
East Residences	95	49[b]	55[b]	1
South Library	70	46[a]	53[a]	0
West Residences	105	48[b]	54[b]	0

[a] A conservative attenuation of 15 dBA is assumed for these receptors due to the elevation of the rooftop equipment and a 35-foot setback from the edge.
[b] A conservative attenuation of 10 dBA is assumed for these receptors due to the elevation of the rooftop equipment and a 10-foot setback from the edge.

Based on the estimated noise levels in Table 14, noise levels generated by mechanical equipment on the rooftop would not exceed the City's 55 dBA DNL threshold at receiving residential uses. For all existing receptors, the noise level increase due to mechanical equipment noise located on the rooftop would be 1 dBA DNL or less. This would be a less-than-significant impact.

Truck Loading and Unloading

The site plan shows a loading area along Bassett Street near the southeastern corner of the building. The proposed building would shield the receptors to the north, to the east, and to the west from all loading and unloading activities. The south library would have direct line-of-sight, however.

Truck maneuvering noise would include a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. For multi-family residences, medium-sized trucks would be expected at the proposed building. Medium-sized trucks typically generate maximum noise levels of 60 to 65 dBA at 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA at a distance of 50 feet.

Assuming up to one delivery associated with the residential building would occur in a day, the hourly average noise level during the loading hour would be up to 59 dBA L_{eq} at 50 feet, and the day-night average noise level would be 45 dBA DNL at 50 feet.

The distance from the center of the loading area to the nearest property line of the south library is 65 feet. At this distance, maximum noise levels would be up to 63 dBA. The hourly average noise level would be up to 57 dBA L_{eq}, and the day-night average noise level would be 43 dBA DNL.

Truck loading and unloading activities would not exceed the City's Municipal Code of 60 dBA at the property line of the south library, and the noise level increase due to truck loading and unloading activities would not be measurable or detectable (0 dBA DNL increase). This would be a less-than-significant impact.

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment, truck loading and unloading) would result in an increase of 1 dBA DNL or less at all existing noise-sensitive receptors in the project vicinity. Therefore, the proposed project would not result in a substantial increase over ambient noise levels in the project vicinity.

Operational noise levels due to mechanical equipment and truck loading and unloading at the proposed residential building would not exceed the City's 55 dBA DNL threshold at the surrounding residential receptors or the City's 60 dBA threshold at the surrounding library and commercial uses. Therefore, this is 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 potentially 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. 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 15 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 15 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,[3] the nearest historical structure is the north residential building, which is 85 feet from the project's northern boundary. At this distance, construction vibration levels would be below 0.06 in/sec PPV. Therefore, at this and all other historical buildings located farther from the project site, vibration levels due to construction activities at the site would not exceed 0.08 in/sec PPV.

TABLE 15 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., November 2023.

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. 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 11). Table 16 summarizes the construction vibration levels estimated at the nearest façades of the surrounding off-site buildings based on distances measured from the nearest project boundary.

Project construction activities would potentially generate vibration levels up to 1.2 in/sec PPV at the substation building and restrooms located just north of the project site. 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-

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

[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.

generated vibrations.[5] As reported in USBM RI 8507[4] and reproduced by Dowding,[5] 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 or lower would result in about 20% chance of cosmetic damage. No minor or major damage would be expected at the buildings immediately adjoining the project site.

TABLE 16 Vibration Source Levels for Construction Equipment

Equipment		PPV (in/sec)				
		Historical North Residences (85ft)	**East Residences (85ft)**	**South Library (55ft)**	**West Residences & Commercial (100ft)**	**North Substation & Restrooms (5ft)**
Clam shovel drop		0.053	0.053	0.085	0.044	**1.186**
Hydromill (slurry wall)	in soil	0.002	0.002	0.003	0.002	0.047
	in rock	0.004	0.004	0.007	0.004	0.100
Vibratory Roller		0.055	0.055	0.088	0.046	**1.233**
Hoe Ram		0.023	0.023	0.037	0.019	**0.523**
Large bulldozer		0.023	0.023	0.037	0.019	**0.523**
Caisson drilling		0.023	0.023	0.037	0.019	**0.523**
Loaded trucks		0.020	0.020	0.032	0.017	**0.446**
Jackhammer		0.009	0.009	0.015	0.008	**0.206**
Small bulldozer		0.001	0.001	0.001	0.001	0.018

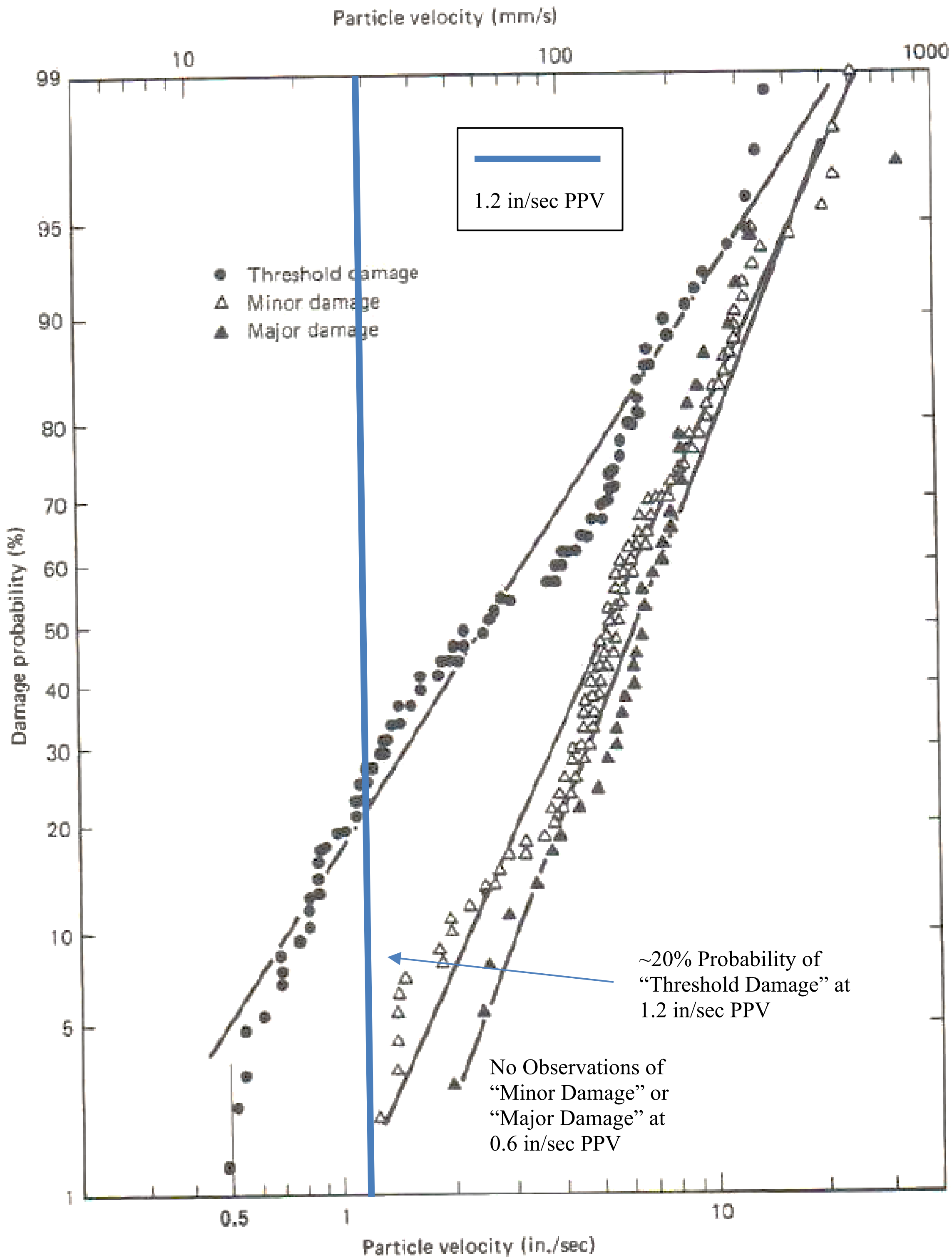
Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., November 2023.

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 0.2 in/sec PPV at conventional buildings adjoining the project site. This would be a potentially significant impact.

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

FIGURE 2 Probability of Cracking and Fatigue from Repetitive Loading



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

Mitigation Measure 2:

The project applicant shall implement a Construction Vibration Monitoring Plan to reduce vibration levels due to construction activities to at or below 0.2 in/sec PPV. All plan tasks shall be in accordance with industry-accepted standard methods. The construction vibration monitoring plan shall include, but not be limited to, 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. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort for reducing vibration levels below the thresholds.

- Place operating equipment on the construction site at least 10 feet from the project site boundaries shared with the existing substation and restroom buildings to the north.

- Smaller equipment to minimize vibration levels to below 0.2 in/sec PPV shall be used at the property lines adjoining adjacent buildings. For example, a smaller vibratory roller, such as the Caterpillar model CP433E vibratory compactor, could be used when compacting materials within 30 feet of the existing substation and restroom buildings to the north.

- Avoid using vibratory rollers and clam shovel drops within 30 feet of the existing substation and restroom buildings to the north.

- Select demolition methods not involving impact tools.

- 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 substation and restroom buildings to the north.

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

The implementation of these mitigation measures would reduce a potential impact to a less-than-significant level.

Impact 3: **Excessive Aircraft Noise.** The project site is located approximately 1.3 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 residential land uses. This is a **less-than-significant** impact.

Mineta San José International Airport is a public-use airport located approximately 2.3 miles or more northwest of the project site. According to the City's Airport Master Plan Environmental Impact Report,[6] the project site lies outside 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.

Assuming standard construction materials for aircraft noise below 60 dBA DNL, the future interior noise levels resulting from aircraft would be below 45 dBA DNL. Therefore, future interior noise at the proposed building would be compatible with aircraft noise. This would be a less-than-significant impact.

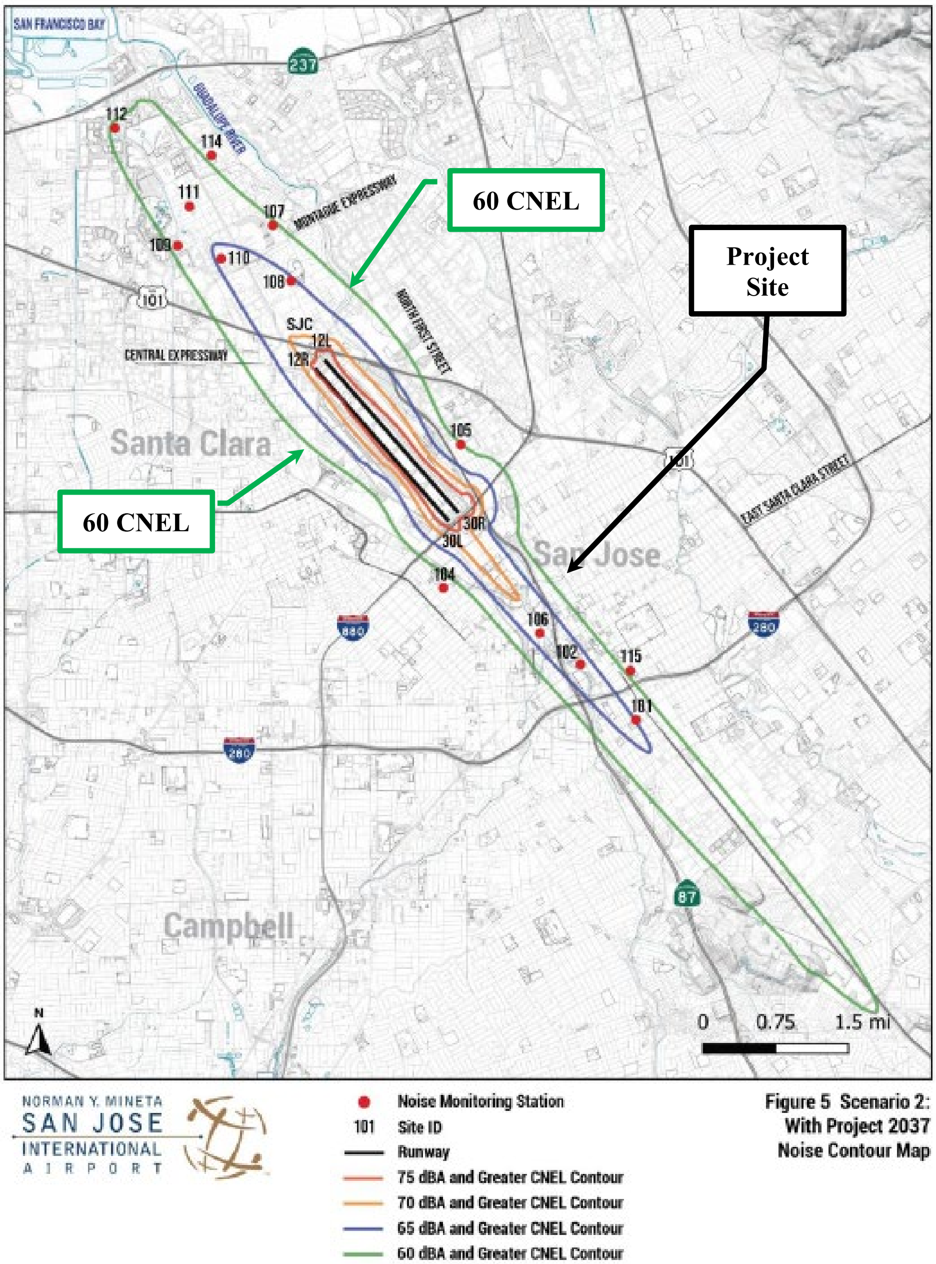
Mitigation Measure 3: **None required.**

[6] 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



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 did not include peak hour turning movements for the cumulative (no project) and cumulative plus project scenarios. Considering the peak AM trips would be 35 and the peak PM trips would 36 for the proposed project, these trips are insignificant compared to existing volumes. It is assumed that these peak hour trips would be insignificant under future cumulative conditions, as well. 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,[7] the planned or approved projects located within 1,000 feet of the proposed project site include the following:

- **The Kelsey Project** – this project site is located at 447 North First Street (about 625 feet from the project site) and would consist of a six-story residential building. This project has been approved and in the pre-construction review phase. The Kelsey Project and the 380 North First Street would not share any noise-sensitive receptors with direct line-of-sight to both construction sites. Additionally, the Kelsey Project would likely be constructed before 380 North First Street construction starts. This would not result in a cumulative construction impact.

- **Aviato** – this project site is located at 199 Bassett Street (about 845 feet from the project site) and would consist of an 18-story residential building with ground-level retail. This project has been approved but has not yet been constructed. The Aviato Project and the 380 North First Street would not share any noise-sensitive receptors with direct line-of-sight to both construction sites. Additionally, the Aviato Project would likely be constructed before 380 North First Street construction starts. This would not result in a cumulative construction impact.

- **Park View Towers** – this project site is located at 252 North First Street (about 805 feet from project site) and would consist of a two-towered residential building with 215 residential units, five townhomes, and 18,537 square feet of ground-floor retail. This project has been approved but has not yet been constructed. The Park View Towers Project and the 380 North First Street would not share any noise-sensitive receptors with direct line-of-sight to both construction sites. Additionally, the Park View Towers Project would likely be constructed before 380

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

North First Street construction starts. This would not result in a cumulative construction impact.

Since the proposed project site would not share noise-sensitive receptors with direct line-of-sight with any planned or approved projects, there would not be a cumulative construction impact associated with the proposed project.

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels for LT-1, Friday, September 8, 2023

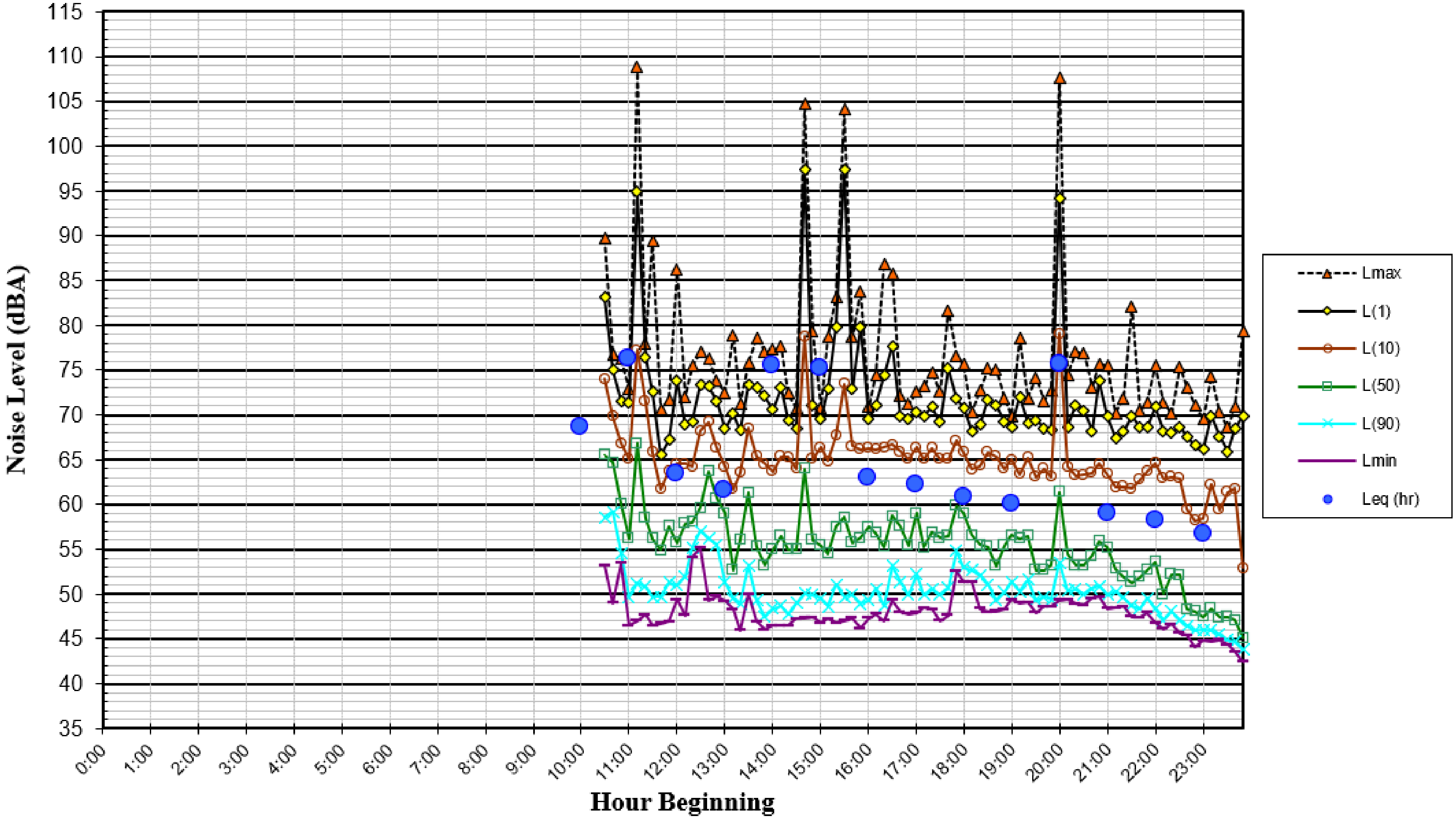


FIGURE A2 Daily Trend in Noise Levels for LT-1, Saturday, September 9, 2023

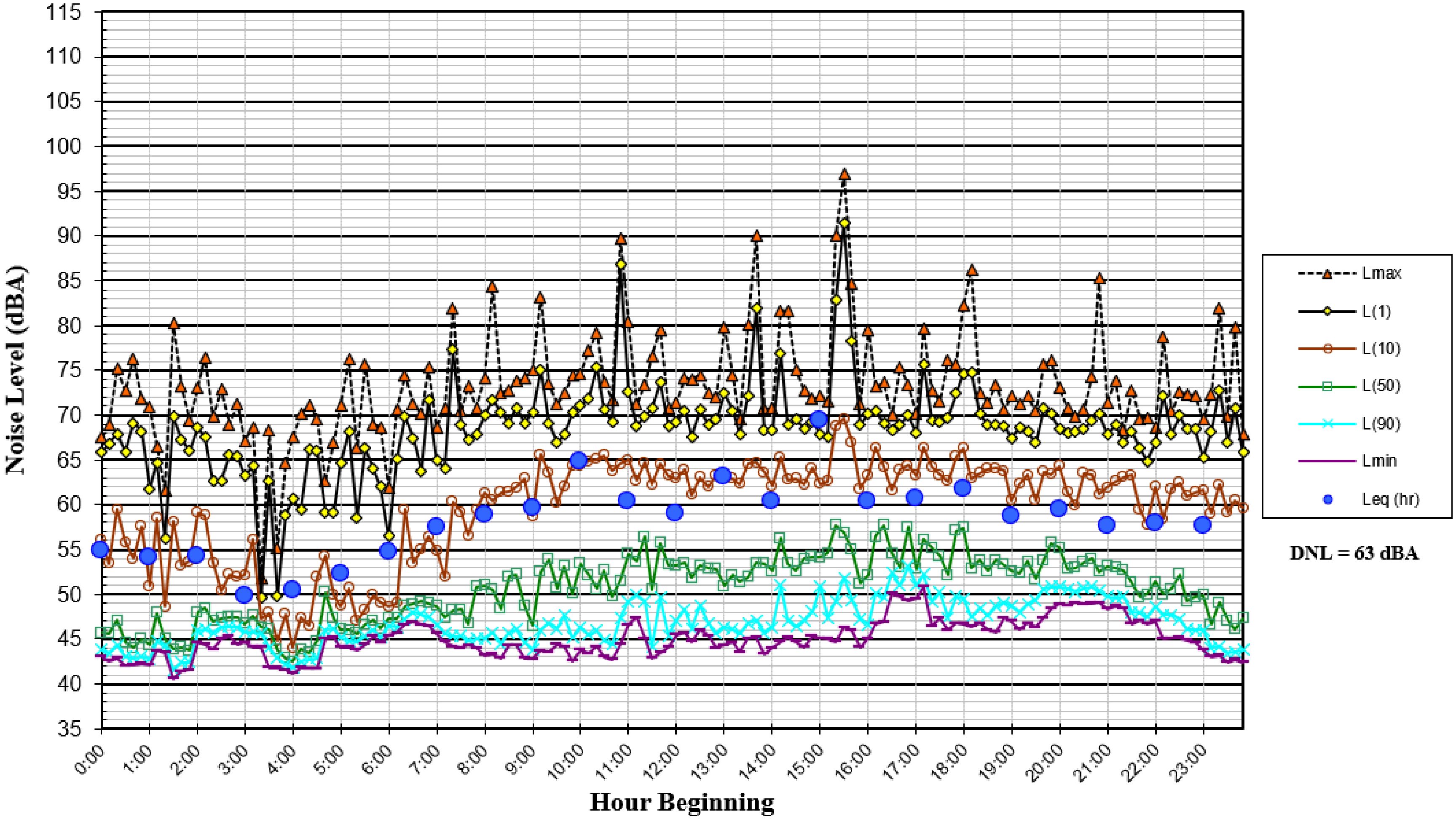


FIGURE A3 Daily Trend in Noise Levels for LT-1, Sunday, September 10, 2023

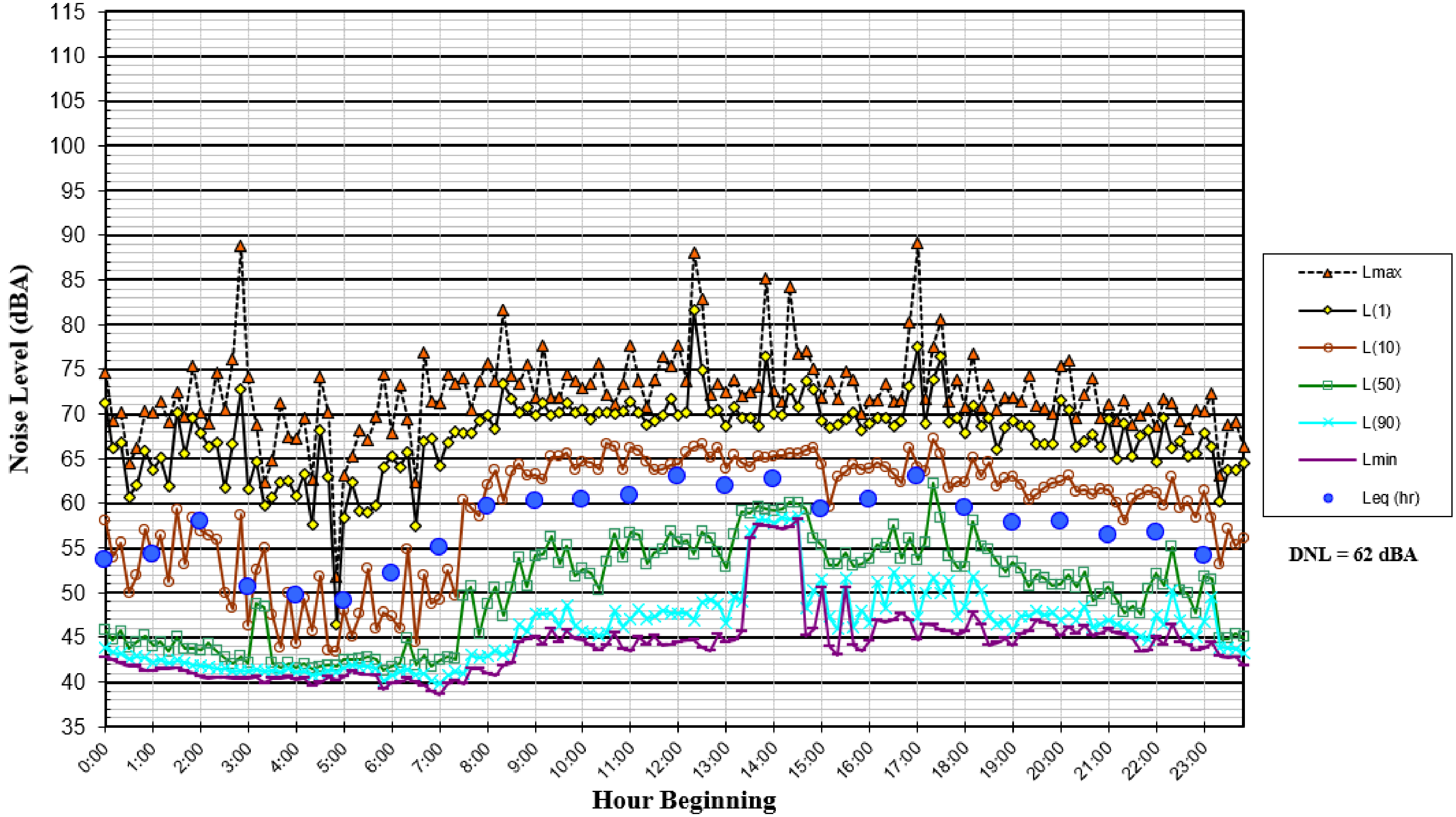


FIGURE A4 Daily Trend in Noise Levels for LT-1, Monday, September 11, 2023

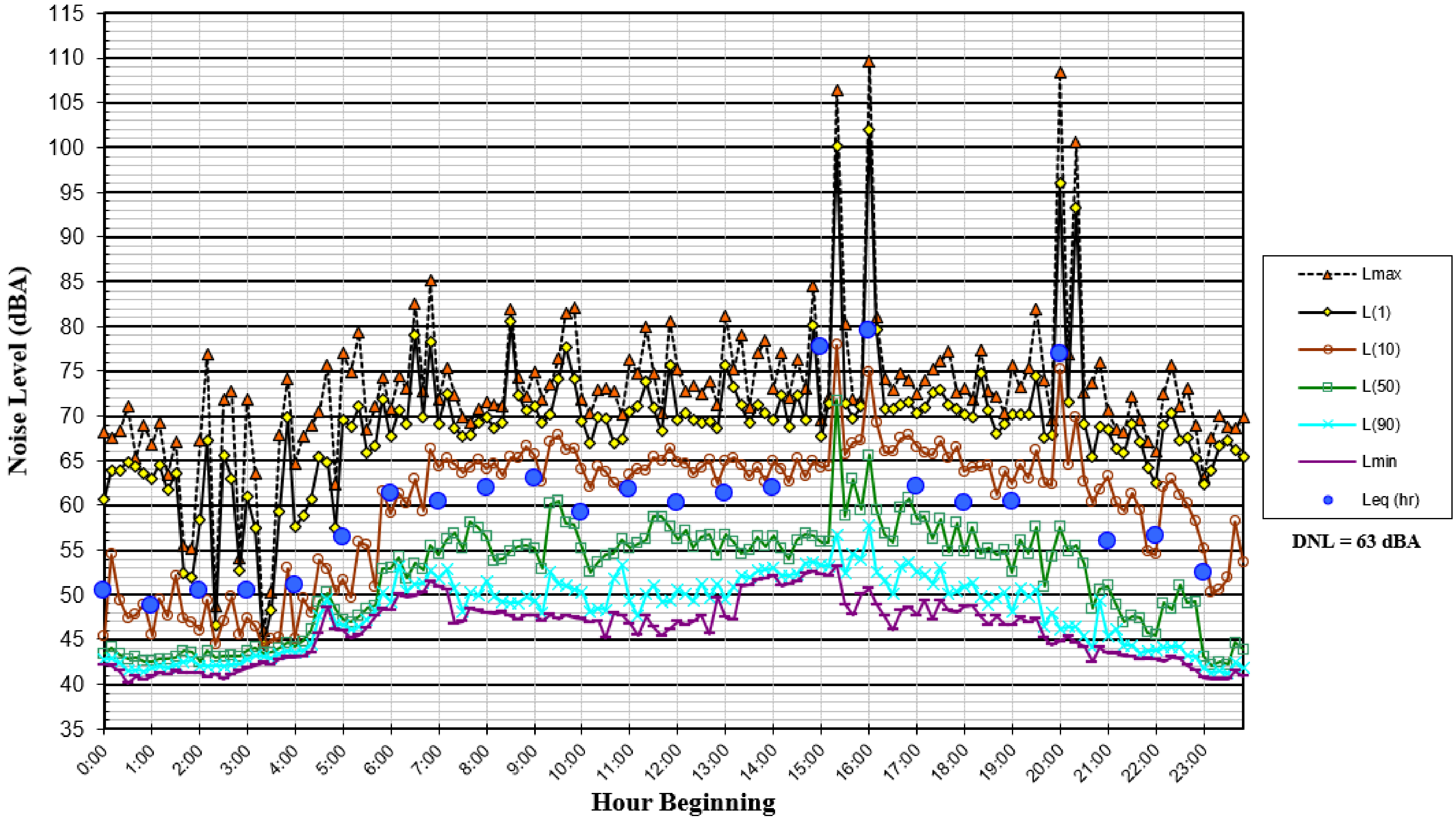


FIGURE A5 Daily Trend in Noise Levels for LT-1, Tuesday, September 12, 2023

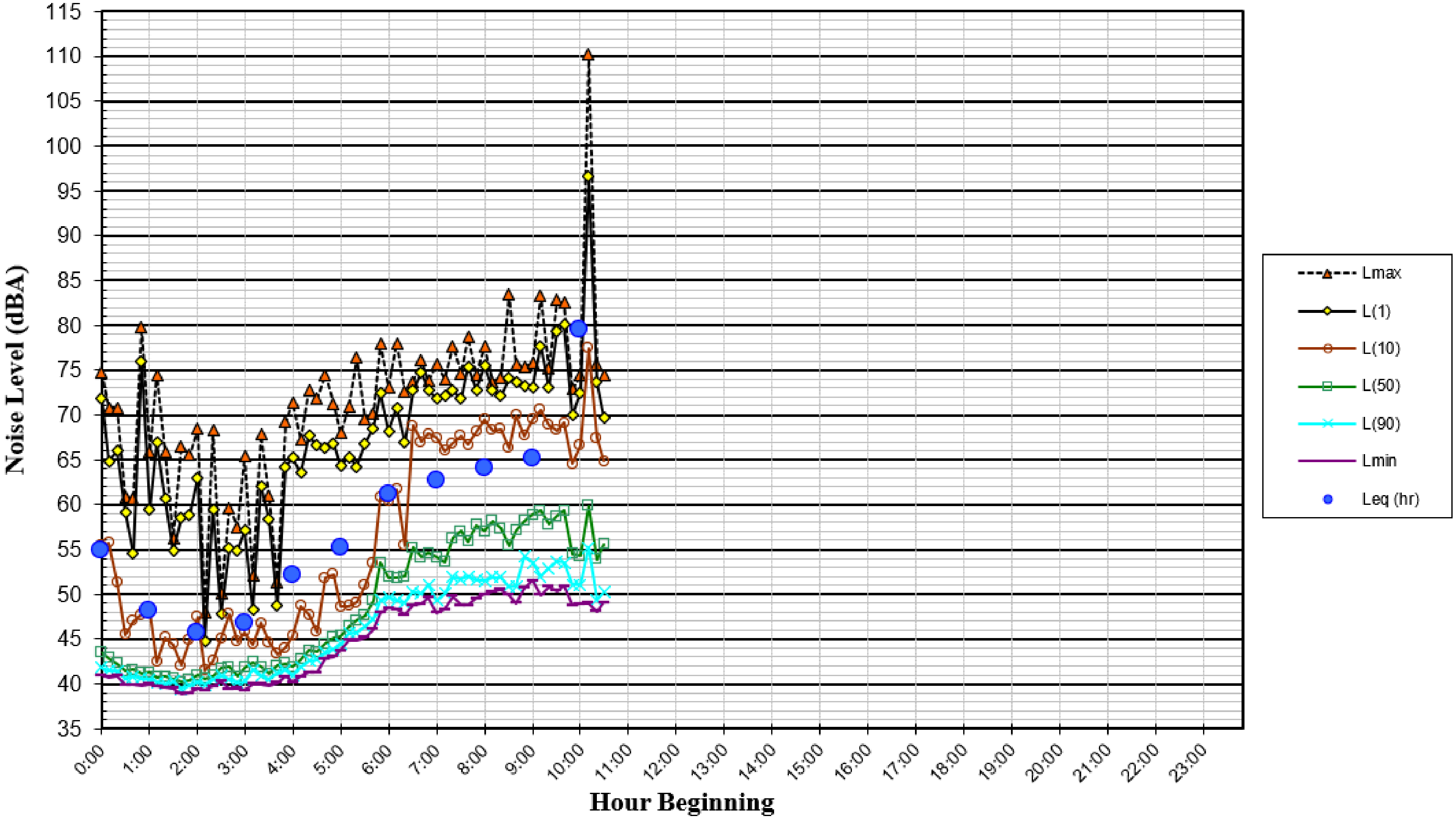


FIGURE A6 Daily Trend in Noise Levels for LT-2, Friday, September 8, 2023

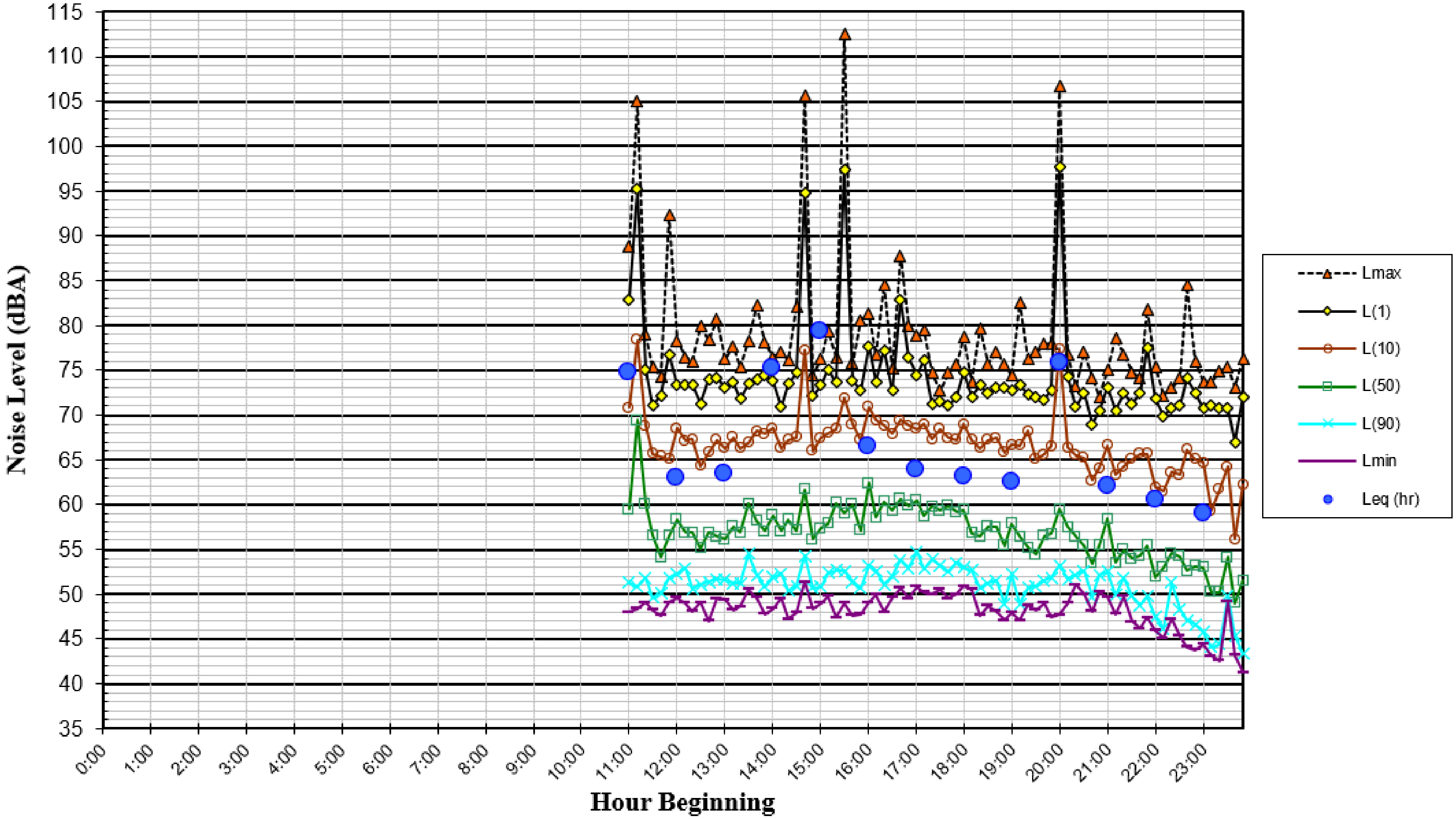
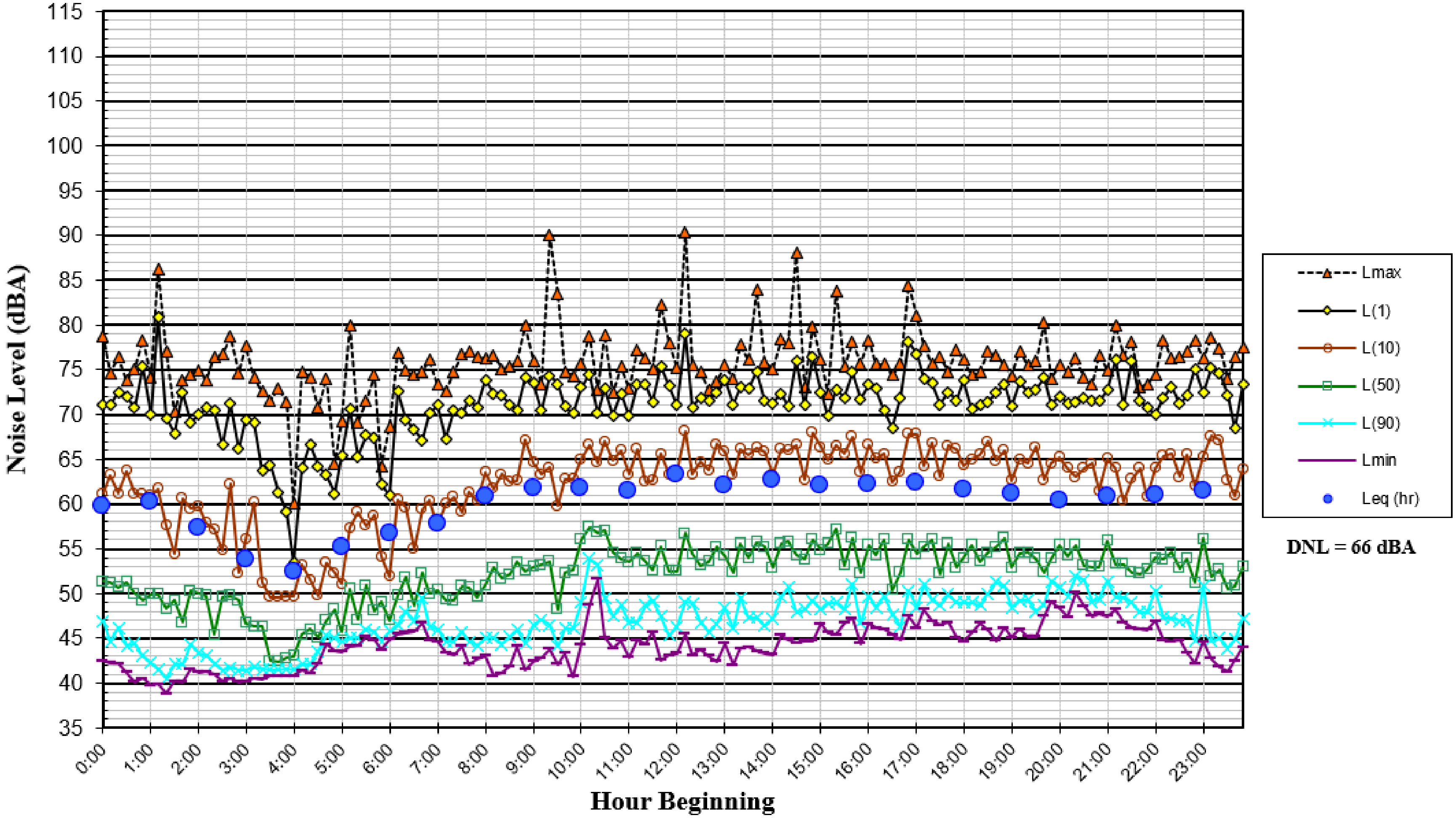


FIGURE A7 Daily Trend in Noise Levels for LT-2, Saturday, September 9, 2023



DNL = 66 dBA

FIGURE A8 Daily Trend in Noise Levels for LT-2, Sunday, September 10, 2023

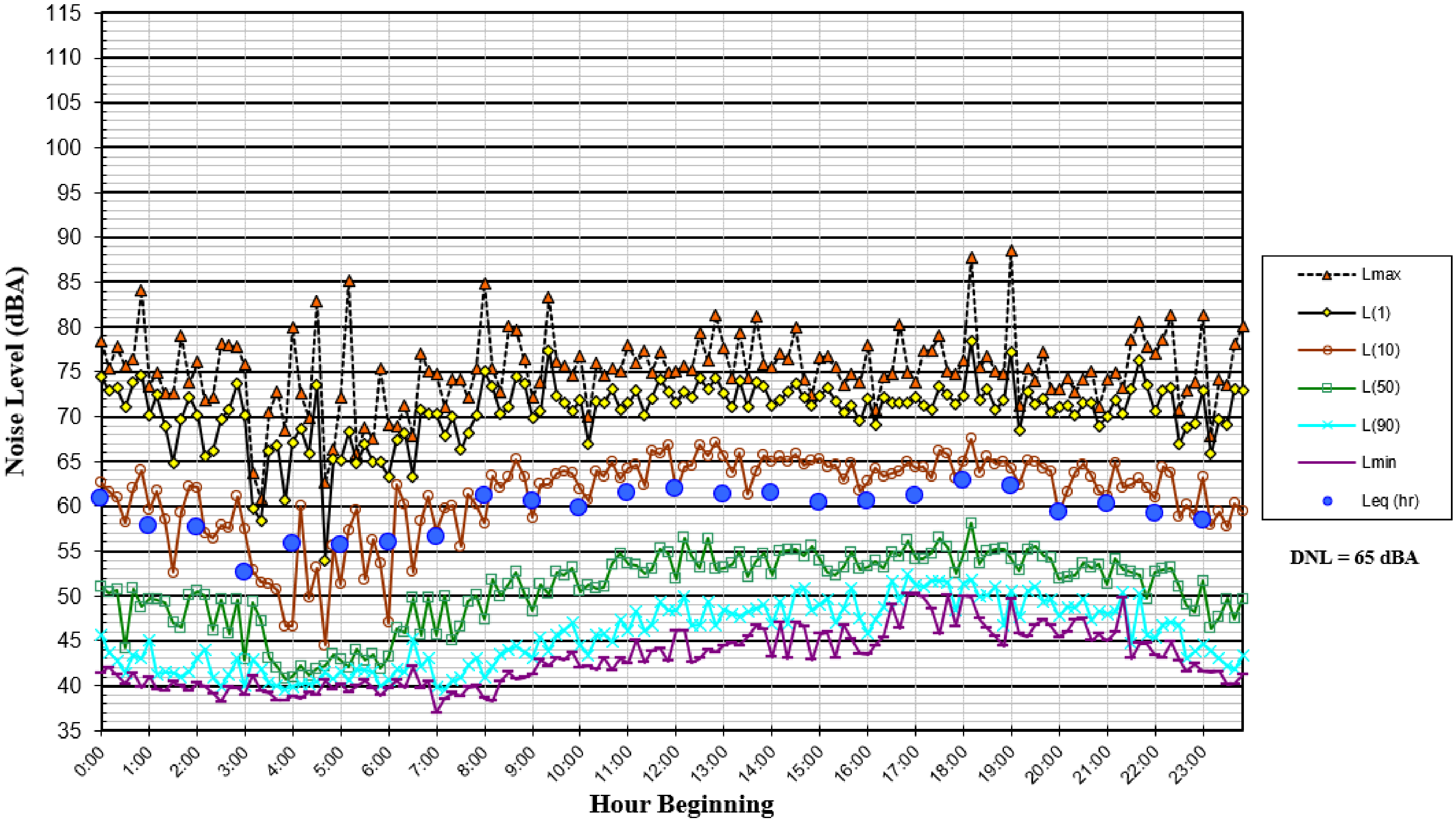
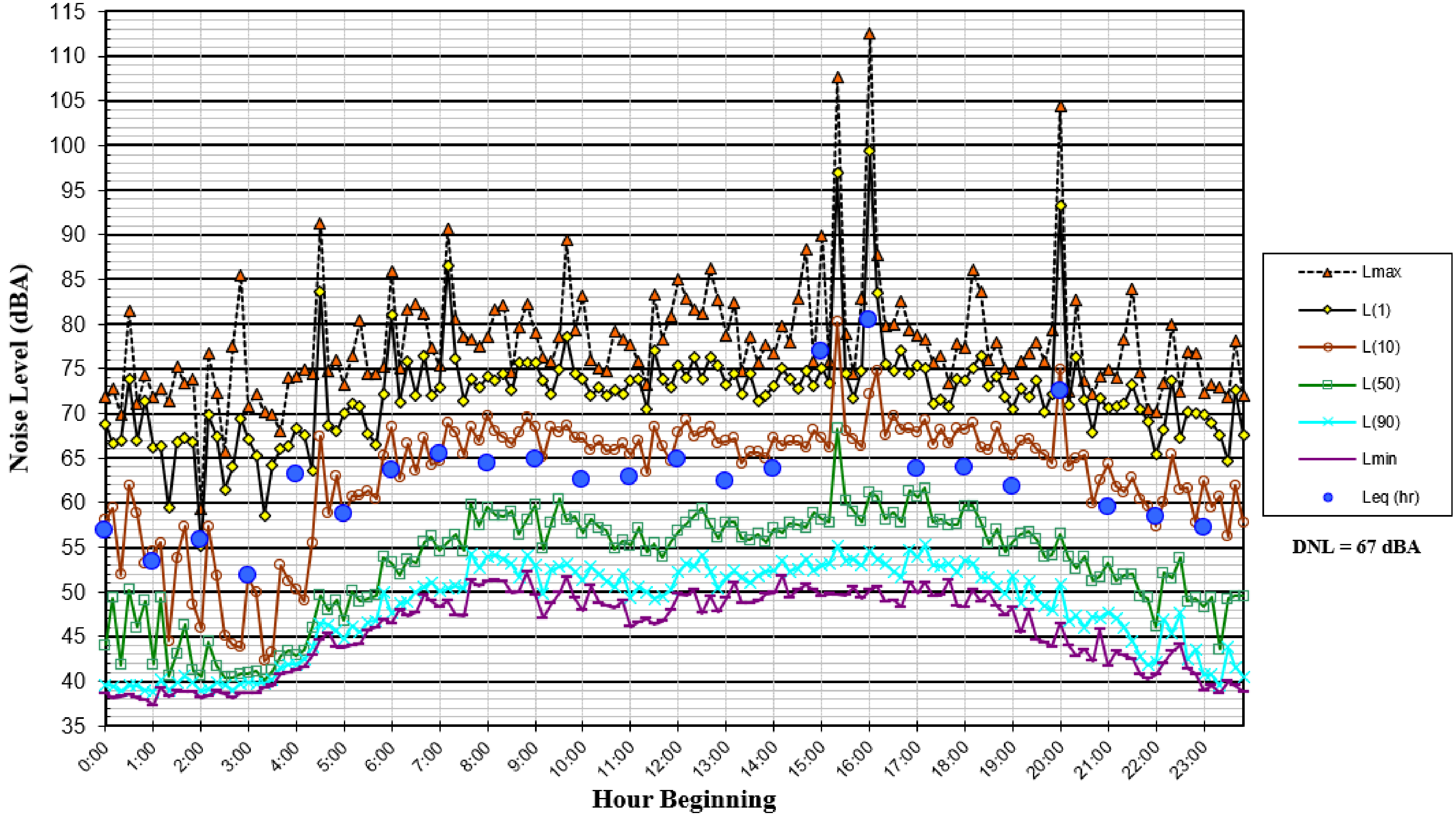


FIGURE A9 Daily Trend in Noise Levels for LT-2, Monday, September 11, 2023



DNL = 67 dBA

FIGURE A10 Daily Trend in Noise Levels for LT-2, Tuesday, September 12, 2023

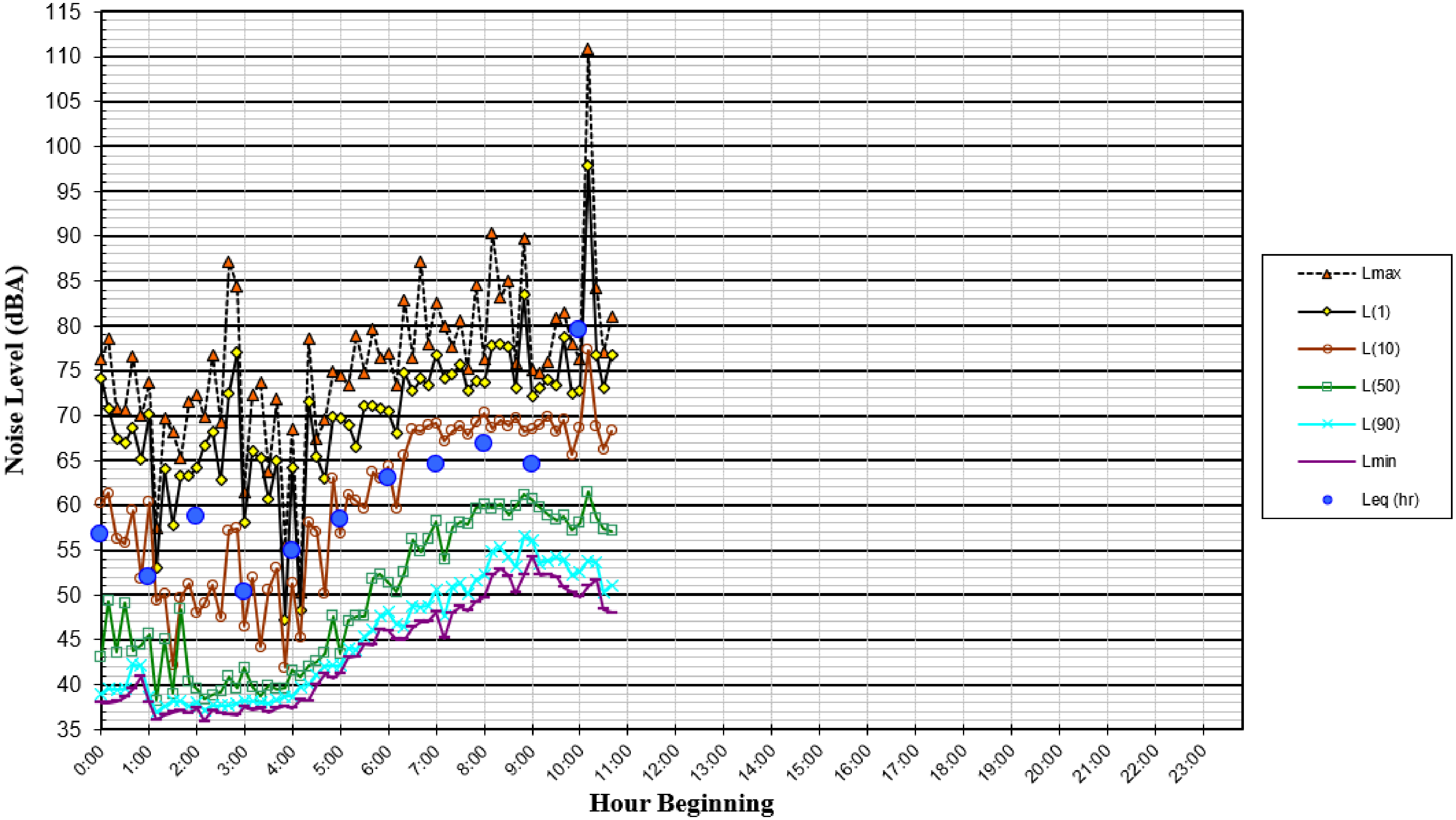


FIGURE A11 VTA Train Vibration Levels Measured at V-1