420 SOUTH 2ND STREET AND 420 SOUTH 3RD STREET PROJECT ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The project proposes the construction of two mixed-used towers at 420 South 2nd Street (Towers A and B) and one mixed-use tower at 420 South 3rd Street (Tower C) in San José, California. The total project would include 473 residential units and approximately 10,000 square feet of retail space. Tower A would be 20 stories tall, while Towers B and C would each be 22 stories tall. Both sites would include subterranean parking garages with 289 parking spaces at 420 South 2nd Street and 105 parking spaces at 420 South 3rd Street.

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 the existing ambient noise environment at the project site and surrounding area; 2) the Plan Consistency Analysis section discusses noise and 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 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.

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

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

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

Regulatory Background – Noise

This section describes the relevant guidelines, policies, and standards established by Federal and 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, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

Federal

2018 Federal Transit Administration's Transit Noise and Vibration Impact Assessment Manual. 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 and to 90 dBA L_{eq} at commercial and industrial land uses.

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:

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

(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.

2019 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.

2019 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2019 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\,(1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

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 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 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

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

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

Normally Acceptable:

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

Conditionally Acceptable:

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

Unacceptable:

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

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

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

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 Mineta International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise.

Regulatory Background – Vibration

City of San José

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

EC-2.3 Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance

of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Existing Noise Environment

The project site is located at 420 South 2nd Street and 420 South 3rd Street in the downtown area of San José, California. The 420 South 2nd Street site is bound to the north by East San Salvador Street; to the south by existing residential uses; to the west by South 2nd Street; and to the east by 420 South 3rd Street. The 420 South 3rd Street site is bound to the north and to the south by existing residential uses; to the west by South 3rd Street; and to the east by existing commercial and residential buildings.

The existing noise environment at the site and in the surrounding area results primarily from local vehicular traffic along East San Salvador Street, South 2nd Street, and South 3rd Street. Interstate 280 (I-280) traffic and occasional aircraft associated with Mineta San José International Airport also contribute to ambient noise levels in the area.

A noise monitoring survey consisting of three long-term (LT-1 through LT-3) noise measurements was conducted at the site between Tuesday, February 1, 2022, and Thursday, February 3, 2022. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 30 feet east of the centerline of South 2nd Street. Hourly average noise levels at LT-1 typically ranged from 61 to 66 dBA L_{eq} during daytime hours (7:00 a.m. and 10:00 p.m.) and from 53 to 62 dBA L_{eq} during nighttime hours (10:00 p.m. and 7:00 a.m.). The day-night average noise level was 68 dBA DNL on Wednesday, February 2, 2022. The daily trend in noise levels at LT-1 is shown in Figures A1 through A3 of Appendix A.

Long-term noise measurement LT-2 was made approximately 25 feet north of the centerline of East San Salvador Street. Hourly average noise levels at LT-2 typically ranged from 59 to 68 dBA L_{eq} during daytime hours and from 52 to 66 dBA L_{eq} during nighttime hours. The day-night average noise level was 66 dBA DNL on Wednesday, February 2, 2022. The daily trend in noise levels at LT-2 is shown in Figures A4 through A6 of Appendix A.

Long-term noise measurement LT-3 was made approximately 20 feet west of the centerline of South 3rd Street. Hourly average noise levels at LT-3 typically ranged from 62 to 74 dBA L_{eq} during daytime hours and from 54 to 64 dBA L_{eq} during nighttime hours. The day-night average noise level was 68 dBA DNL on Wednesday, February 2, 2022. The daily trend in noise levels at LT-3 is shown in Figures A7 through A9 of Appendix A.

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

Source: Google Earth, 2022.

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 City's acceptable exterior noise level standard is 65 dBA DNL or less for the proposed public use area.
- The City's acceptable exterior noise level standard is 70 dBA DNL or less for the proposed commercial land uses.
- The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas of nonresidential uses during any hour of operation.

The future noise environment at the site would continue to result primarily from vehicular traffic along the local roadways, as well as nearby I-280. According to the traffic study completed for the *Downtown San José Strategy Plan 2040 EIR*,[2] the traffic noise level increase at the project site would be 2 dBA DNL under each of the 2040 cumulative buildout alternatives.

Future Exterior Noise Environment

The site plan shows a privately owned public space in the northwestern corner of project site 1 (Towers A and B), a common use residential outdoor space on the ground level at the rear of Tower A, and roof decks on Level 20 of Tower A and on Level 22 of Tower B. The site plan for Tower C shows a common use residential outdoor space on the ground level to the south of the building and a roof deck on Level 22 of the building. While the privately owned public space would fall in the neighborhood park category for exterior use, all other outdoor use areas would be considered common use residential areas subject to the City's 60 dBA DNL threshold.

The privately owned public space would have direct line-of-sight to East San Salvador Street and South 2nd Street, with the center of the outdoor space set back approximately 65 and 115 feet from

[2] City of San José, "Downtown San José Strategy Plan 2040 Environmental Impact Report," December 2018

the centerlines of East San Salvador Street and South 2nd Street, respectively. While the proposed towers would provide partial shielding, the future exterior noise levels at this open space would be up to 67 dBA DNL. This would exceed the City's 65 dBA DNL threshold for public open space; however, this plaza area is intended to be open to the public and incorporation of a barrier would diminish the aesthetic appeal. Since the future exterior noise levels would be considered conditionally acceptable, there would be no recommendations for additional attenuation, assuming approval by the City.

The common use residential outdoor space located to the south of Tower A would be well shielded from South 2nd Street and East San Salvador Street but would have direct line-of-sight to South 3rd Street, with the center of the space set back approximately 105 feet from the centerline of the roadway. At this distance and assuming partial shielding from Tower A and the adjacent existing building to the south, future exterior noise levels at the center of the common use residential outdoor space due to vehicular traffic would be 55 dBA DNL, which is below the City's residential threshold of 60 dBA DNL. It should also be noted that aircraft noise at the project site would result in noise levels 58 to 59 dBA, which would contribute to the future overall noise environment. However, as discussed in Impact 3 below, the project site lies outside the 60 dBA CNEL/DNL contour for aircraft (see Figure 5). Therefore, future overall noise levels would be about 60 dBA DNL, which would meet the City's threshold for residential uses.

The residential outdoor space located to the south of Tower C would be shielded from East San Salvador and South 4th Street but would have direct line-of-sight to South 3rd Street, with the center of the space set back approximately 135 feet from the centerline of the roadway. At this distance and assuming partial shielding from Tower C and the adjacent existing building to the south, future exterior noise levels at the center of the common use residential outdoor space would be below 55 dBA DNL, which is below the City's residential threshold of 60 dBA DNL.

The roof deck of Tower A would be located on the 20th floor in the northeastern corner of the building. Due to the orientation of this roof deck, the outdoor use area would be mostly shielded from South 2nd Street but would be exposed to East San Salvador Street, with the center set back approximately 65 feet from the centerline of the roadway. The roof decks of Towers B and C would be located on the 22nd floors in the northwestern and northeastern corners, respectively. The roof deck of Tower B would have direct exposure to South 2nd Street and East San Salvador Street, with the center set back approximately 80 and 130 feet from the centerlines, respectively. Due to the orientation of the Tower C roof deck, the outdoor use area would be mostly shielded from all surrounding roadways; however, the elevation of the roof deck and the small heights of the surrounding buildings would expose the outdoor use area to some traffic noise along East San Salvador Street, with the center set back approximately 200 feet from the centerline of the roadway. All three roof decks would be elevated more than 220 feet above the ground, which would provide a minimum attenuation of 20 dBA. Therefore, the future exterior noise levels at the centers of all three roof decks would be below 55 dBA DNL, which is below the City's residential threshold of 60 dBA DNL.

The future noise levels at the centers of the common use outdoor areas associated with the proposed residential buildings would meet the City's normally acceptable threshold of 60 dBA DNL. While the public use outdoor space would exceed the City's 65 dBA DNL threshold at the center, the

future exterior noise levels would fall within the conditionally acceptable range and would not require additional measures to reduce levels with the City's approval.

Future Interior Noise Environment

Residential Uses

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.

Residential units are located on floors two through 20 of Tower A and on floors two through 22 of Tower B. Units located along the northern façades of Towers A and B, facing East San Salvador Street, would be set back from the centerline of the roadway by approximately 45 to 105 feet. At these distances, the units facing East San Salvador Street would be exposed to future exterior noise levels ranging from 62 to 65 dBA DNL. Assuming windows to be partially open, future interior noise levels would be 47 to 50 dBA DNL. The east façade of Tower A, which would have direct line-of-sight to South 3rd Street, would be set back approximately 50 feet from the roadway centerline. At this distance, the units facing South 3rd Street would be exposed to future exterior noise levels up to 66 dBA DNL. Assuming windows to be partially open, future interior noise levels would be 51 dBA DNL. The west façades of Towers A and B, which would have direct line-of-sight to South 2nd Street, would be set back approximately 65 to 195 feet from the roadway centerline. At these distances, the units facing South 2nd Street would be exposed to future exterior noise levels ranging from 63 to 67 dBA DNL. Assuming windows to be partially open, future interior noise levels would be 48 to 52 dBA DNL.

Residential units are located on floors two through 22 of Tower C. Units along the east façade of Tower C, which would have direct line-of-sight to South 3rd Street, would be set back approximately 70 feet from the roadway centerline. At this distance, the units facing South 3rd Street would be exposed to future exterior noise levels up to 65 dBA DNL. Assuming windows to be partially open, future interior noise levels would be 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 for units facing East San Salvador Street, South 2nd Street, and South 3rd Street.

Commercial Uses

Ground-level commercial uses are proposed at each tower. Towers A and B would be set back 45 to 105 feet from the centerline of East San Salvador Street and 65 to 195 feet from the centerline of South 2nd Street. Additionally, Tower A would be setback approximately 50 feet from the centerline of South 3rd Street. At these distances, future daytime hourly average noise level during operational hours at the ground-level commercial uses would range from 55 to 70 dBA L_{eq}.

Tower C would be setback approximately 70 feet from the centerline of South 3rd Street. At this distance, future daytime hourly average noise level during operational hours at the ground-level commercial uses would range from 59 to 71 dBA L_{eq}.

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

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA DNL or less 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 sites, 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 along the western façade of Tower B would require windows and doors with a minimum rating of 30 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL. Standard construction materials with the incorporation of adequate forced-air mechanical ventilation at all other units would satisfy the City's residential interior noise requirements.

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 and to 50 dBA $L_{eq(1\text{-}hr)}$ or lower within commercial interiors. 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.

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 significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan or Municipal Code at existing noise-sensitive receptors surrounding the project site.

    - A significant noise impact would be identified if temporary construction-related activities would substantially increase ambient noise levels at sensitive receptors. The City of San José considers large or complex projects involving substantial noise-generating activities and lasting more than 12 months significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices. After a period of 12 months, a significant temporary noise impact would occur if construction noise levels would exceed 80 dBA L_{eq} at residential land uses near the site or 90 dBA L_{eq} at commercial land uses near the site.

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

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

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.08 in/sec PPV would have the potential to result in cosmetic damage to historic buildings, and groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

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

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction

activities. With the implementation of mitigation measures included in the *Downtown Strategy Plan*, this would be considered a **less-than-significant** impact.

The project applicant proposes to demolish the existing buildings on the project site. The construction schedule assumed that the earliest possible start date would be early August 2022. Each of the towers would be constructed individually, with total duration of Towers A, B, and C lasting 19, 22, and 21 months, respectively. Tower A is expected to be built first; however, it has not been confirmed whether Tower B or Tower C would follow. Both alternative schedules have been proposed. From a noise-standpoint, the order of construction would not alter the analysis or conclusions. Therefore, this discussion considers the construction of each individual tower and the impact on the surrounding receptors, regardless of the sequence of building construction. Construction phases for all three towers would include demolition, grading, trenching, building construction, architectural coating, and paving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

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

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project that is located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months. Project construction proposes work hours from 7:00 a.m. to 7:00 p.m. Monday through Saturday. The weekday hours fall within the City's allowable construction hours; however, work on Saturdays would require a permit from the City. However, since proposed construction would lie within the daytime hours, no nighttime work is expected.

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*.[1] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses and 90 dBA L_{eq} shall be enforced at commercial and 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 4) from the equipment. Table 5 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 mixed-use 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 result in lower construction noise levels at distant receptors.

Equipment expected to be used in each construction phase for Towers A, B, and C are summarized in Table 6, 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. Note that construction equipment type and quantities for all three towers would be the same but the phase durations would vary. This analysis assumes that the construction of each tower would not overlap.

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 4 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 5 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 6 Estimated Construction Noise Levels for Tower A at a Distance of 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	12 days[a,b]	Concrete/Industrial Saw (1)[c] Excavator (1) Rubber-Tired Dozer (1)[c]	83 dBA L_{eq}
Site Preparation	5 days[a,b]	Grader (1)[c] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)[c]	84 dBA L_{eq}
Shoring/Grading/ Excavation	170 days[a] 65 days[b]	Excavator (2)[c] Drill Rig (1) Forklift (1) Rubber-Tired Dozer (1)[c]	78 dBA L_{eq}
Trenching/Foundation	50 days[a] 55 days[b]	Tractor/Loader/Backhoe (1)[c] Excavator (2)[c] Crane (1) Welder (4)	83 dBA L_{eq}
Building – Exterior	157 days[a] 173 days[b]	Crane (1) Forklift (4)[c] Tractor/Loader/Backhoe (2)[c]	84 dBA L_{eq}
Building – Interior/ Architectural Coating	143 days[a] 158 days[b]	Air Compressor (3)[c] Aerial Lift (5)[c]	80 dBA L_{eq}
Paving	12 days[a] 14 days[b]	Cement & Mortar Mixer (1)[c] Paver (1) Paving Equipment (1)[c] Roller (1)	83 dBA L_{eq}

[a] Number of construction work days for Tower A.
[b] Number of construction work days for Towers B and C.
[c] Denotes two loudest pieces of construction equipment per phase.

Since construction of the three towers would not occur simultaneously, noise-sensitive receptors subject to direct line-of-sight to each tower would vary depending on the tower. Therefore, construction noise impacts are assessed based on each individual tower and the noise-sensitive receptors surrounding the specific tower. Noise levels calculated at 50 feet in Table 6 were propagated from the geometrical center of each tower to the receiving property lines of existing noise-sensitive receptors with direct line-of-sight to the specific construction site. The construction noise levels at the receiving property lines are summarized in Tables 7, 8, and 9 for construction of Towers A, B, and C, respectively. Noise levels in Tables 7, 8, and 9 do not assume reductions due to intervening buildings or existing barriers.

TABLE 7 Estimated Construction Noise Levels for Tower A at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	North Residences & Commercial (120ft)	South Residences (80ft)	West Future Residences (270ft)	East Residences & Commercial (135ft)
Demolition	75 dBA L_{eq}	79 dBA L_{eq}	68 dBA L_{eq}	74 dBA L_{eq}
Site Preparation	76 dBA L_{eq}	80 dBA L_{eq}	69 dBA L_{eq}	75 dBA L_{eq}
Shoring/Grading/ Excavation	70 dBA L_{eq}	74 dBA L_{eq}	63 dBA L_{eq}	69 dBA L_{eq}
Trenching/Foundation	75 dBA L_{eq}	79 dBA L_{eq}	68 dBA L_{eq}	74 dBA L_{eq}
Building –Exterior	76 dBA L_{eq}	79 dBA L_{eq}	69 dBA L_{eq}	75 dBA L_{eq}
Building – Interior/ Architectural Coating	72 dBA L_{eq}	76 dBA L_{eq}	65 dBA L_{eq}	71 dBA L_{eq}
Paving	76 dBA L_{eq}	79 dBA L_{eq}	69 dBA L_{eq}	75 dBA L_{eq}

TABLE 8 Estimated Construction Noise Levels for Tower B at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	North Residences & Commercial (185ft)	South Residences (70ft)	West Future Residences (135ft)	East Residences & Commercial (280ft)
Demolition	71 dBA L_{eq}	80 dBA L_{eq}	74 dBA L_{eq}	68 dBA L_{eq}
Site Preparation	72 dBA L_{eq}	81 dBA L_{eq}	75 dBA L_{eq}	69 dBA L_{eq}
Shoring/Grading/ Excavation	66 dBA L_{eq}	75 dBA L_{eq}	69 dBA L_{eq}	63 dBA L_{eq}
Trenching/Foundation	72 dBA L_{eq}	80 dBA L_{eq}	74 dBA L_{eq}	68 dBA L_{eq}
Building –Exterior	72 dBA L_{eq}	81 dBA L_{eq}	75 dBA L_{eq}	69 dBA L_{eq}
Building – Interior/ Architectural Coating	69 dBA L_{eq}	77 dBA L_{eq}	71 dBA L_{eq}	65 dBA L_{eq}
Paving	72 dBA L_{eq}	80 dBA L_{eq}	75 dBA L_{eq}	68 dBA L_{eq}

TABLE 9 Estimated Construction Noise Levels for Tower C at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	North Residences (70ft)	South Residences (65ft)	West Residences (155ft)	East Residences (80ft)
Demolition	80 dBA L_{eq}	80 dBA L_{eq}	73 dBA L_{eq}	79 dBA L_{eq}
Site Preparation	81 dBA L_{eq}	81 dBA L_{eq}	74 dBA L_{eq}	80 dBA L_{eq}
Shoring/Grading/ Excavation	75 dBA L_{eq}	75 dBA L_{eq}	68 dBA L_{eq}	74 dBA L_{eq}
Trenching/Foundation	80 dBA L_{eq}	81 dBA L_{eq}	73 dBA L_{eq}	79 dBA L_{eq}
Building –Exterior	81 dBA L_{eq}	81 dBA L_{eq}	74 dBA L_{eq}	79 dBA L_{eq}
Building – Interior/ Architectural Coating	77 dBA L_{eq}	78 dBA L_{eq}	70 dBA L_{eq}	76 dBA L_{eq}
Paving	80 dBA L_{eq}	81 dBA L_{eq}	73 dBA L_{eq}	79 dBA L_{eq}

As shown in Tables 6 through 9, construction noise levels would intermittently range from 80 to 86 dBA L_{eq} when activities occur approximately 50 feet from nearby receptors and would typically range from 63 to 81 dBA L_{eq} when focused near the center of each individual tower. Construction noise levels would exceed the exterior threshold of 80 dBA L_{eq} at surrounding residential land uses during demolition, trenching, building exterior, and paving, with much of the noise emanating from heavy equipment at or near ground level. Construction noise levels during the remaining grading and architectural coating would not produce noise levels exceeding 80 dBA L_{eq} at residential land uses or 90 dBA L_{eq} at commercial land uses in the project vicinity. However, project construction is expected to last for a total period of over seven years. Since project construction would last for a period of more than one year and considering that the project site is within 500 feet of existing residential uses and within 200 feet of existing commercial uses, this temporary construction impact would be considered significant in accordance with Policy EC-1.7 of the City's General Plan.

The proposed project falls within the *Downtown San José Strategy Plan 2040 EIR*[2] plan area, which included mitigation measures to reduce temporary construction noise levels at noise-sensitive receptors. The *Downtown San José Strategy Plan 2040 EIR* would enforce Policy EC-1.7. Pursuant to this General Plan Policy, 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 sites adjacent to operational businesses, residences, or other noise-sensitive land uses. A temporary 8-foot noise barrier shall be constructed along the south property line of the project site to shield adjacent residential land uses from ground-level construction equipment and activities. The noise barrier shall be solid over the face and at the base of the barrier in order to provide a 5 dBA noise reduction.

- 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.

- If complaints are received or excessive noise levels cannot be reduced using the measures above, erect a temporary noise control blanket barrier along surrounding building facades that face the construction sites.

- 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.

With the implementation of GP Policy EC-1.7, Zoning Code requirements, and the above measures provided in the *Downtown San José Strategy Plan 2040 EIR*, the temporary construction noise impact would be **less-than-significant**. No further mitigation would be required.

Mitigation Measure 1a: No further mitigation required.

Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards. The proposed project would not result in a substantial permanent noise level increase or exceed applicable standards at the noise-sensitive receptors in the project vicinity with the implementation of the City's standard permit condition and mitigation measures provided in the *Downtown San José Strategy Plan 2040 EIR* as a condition of approval. **This is a less-than-significant impact.**

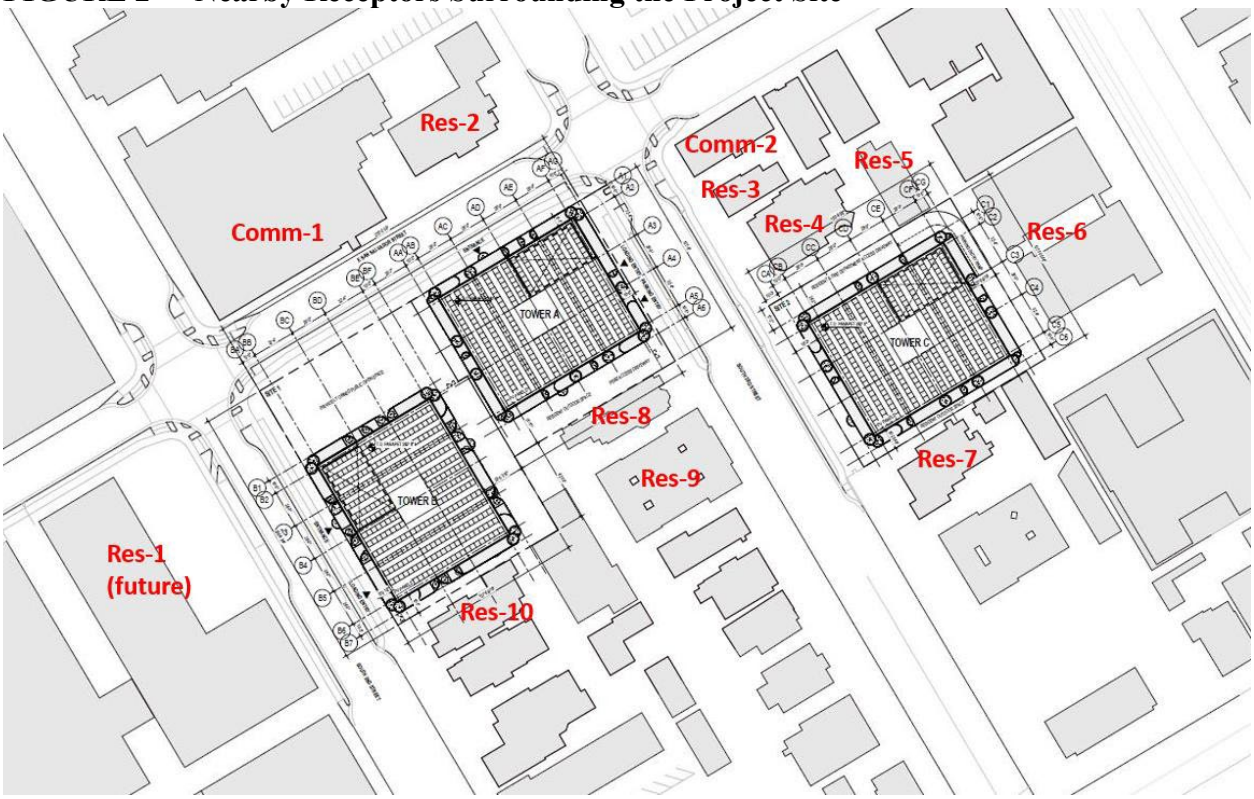
According to Policy EC-1.2 of the City's General Plan, a significant permanent noise increase would occur if the project would substantially increase noise levels at existing sensitive receptors in the project vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL at residences; or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater at residences. Noise levels at sensitive land uses exceed 60 dBA DNL; therefore, a significant impact would occur if traffic or operational noise due to the proposed project would permanently increase ambient levels by 3 dBA DNL.

Under the City's Noise Element, noise levels from nonresidential building equipment shall not exceed a noise level of 55 dBA DNL at receiving noise-sensitive land uses. While the proposed project does include a residential component, the mixed-use building equipment would be used by both the residential and commercial uses; conservatively, Policies EC-1.3 and EC-1.6 shall be enforced for the proposed project.

The City's General Plan does not include thresholds for equipment noise generated at residential buildings; however, the Municipal Code requires mechanical equipment noise to be maintained at or below 55 dBA at receiving residential properties when operational noise is generated at residential uses. While the Municipal Code does not include noise performance standards for Downtown Primary Commercial Zoning District developments, performance standards included in Section 20.40.600 of the Municipal Code are conservatively used in this study to provide a noise limit of 60 dBA at receiving commercial uses.

The surrounding land uses to Towers A, B, and C, which would be considered receptors for this analysis, are identified in Figure 2. Note, the existing commercial use located west of South 2nd Street is the site of a future residential mixed-use building, which is in the planning review phase currently. This analysis would treat this receptor as a future noise-sensitive residential land use since that would represent worst-case conditions. This receptor is identified in Figure 2 as Res-1 (future). Additionally, Res-6 and the site adjoining Res-6 to the south are expected to be future residential towers. The future Res-6 development is also in the planning review phase, but since it is currently a residential development, existing or future conditions would require the same analysis.

FIGURE 2 Nearby Receptors Surrounding the Project Site



Project Traffic Increase

The traffic study included peak hour turning movements for the existing traffic volumes and two existing plus project volume scenarios (maintaining one-way operations along downtown roadways and conversion to two-way operations) at four intersections in the vicinity of the project site. By comparing both existing plus project traffic scenarios to the existing scenario, the project's contribution to the overall noise level increase was determined to be 1 dBA DNL or less along each roadway segment in the project vicinity, as summarized in Table 10. Therefore, the project would not result in a permanent noise increase of 3 dBA DNL or more at noise-sensitive receptors in the project vicinity.

TABLE 10 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	
		Existing Plus Project One-Way Operations	Existing Plus Project Two-Way Operations
East San Salvador St.	West of South 2nd St.	0 dBA DNL	0 dBA DNL
	South 2nd St. to South 3rd St.	0 dBA DNL	0 dBA DNL
	East of South 3rd St.	0 dBA DNL	0 dBA DNL
East William St.	West of South 2nd St.	0 dBA DNL	0 dBA DNL
	South 2nd St. to South 3rd St.	0 dBA DNL	0 dBA DNL
	East of South 3rd St.	0 dBA DNL	0 dBA DNL
South 2nd St.	North of East San Salvador St.	0 dBA DNL	1 dBA DNL
	East San Salvador St. to East William St.	0 dBA DNL	1 dBA DNL
	South of East William St.	0 dBA DNL	1 dBA DNL
South 3rd St.	North of East San Salvador St.	0 dBA DNL	0 dBA DNL
	East San Salvador St. to East William St.	1 dBA DNL	1 dBA DNL
	South of East William St.	1 dBA DNL	1 dBA DNL

Mechanical Equipment

Mechanical and electrical equipment rooms would be located in the below-grade parking structures and ground levels of all three towers. Generator rooms are located in each tower on the second level. An enclosed domestic hot water (DHW) plant and mechanical room is located on level 20 of Tower A and on level 22 of Tower B. A mechanical, electric, and plumbing (MEP) room and mechanical room is located on level 22 Tower C. The rooftop of all three towers show photovoltaic (PV) arrays. The equipment rooms located underground, on the ground level, and on levels 20 and 22 would be well-shielded from the surrounding receptors by the building façade. Additionally, noise levels generated from solar panels on the rooftops would not be audible at the property lines of the surrounding receptors. Noise from the mechanical equipment rooms and the rooftop equipment would not be expected to generate noise levels of 55 dBA DNL at the surrounding residences or exceed 60 dBA DNL at the surrounding commercial properties. For all existing receptors, the noise

level increase due to equipment rooms underground, on the ground level, and on levels 20 and 22 and the rooftop solar panels would not be measurable or detectable (0 dBA DNL increase).

Emergency generators proposed for all three towers would have a capacity of 200 kW each. Generators of this size would typically generate noise levels up to 89 dBA at a distance of 50 feet with a standard weather enclosure. With the inclusion of Level 1 or Level 2 sound enclosures, noise levels could be reduced to 65 dBA at 50 feet from the generator room. Emergency generators are typically tested monthly for a period of one hour between 7:00 a.m. and 10:00 p.m. Further, it is assumed that the City's thresholds would not apply during emergency conditions when the generators may run continuously during daytime and nighttime hours. During the testing periods, the threshold would apply. The generator room for the Towers A and B would be located in the southeastern corners of the buildings on the second level. The generator room in Tower C would be located in the northeastern corner of the building on the second level. Assuming worst-case scenario conditions, testing for all three generators would occur in the same 24-hour period. The building wall assemblies and intervening buildings would provide additional attenuation; for purposes of assuming worst-case conditions, a conservative 20 dBA is assumed for this analysis. Table 11 summarizes the hourly average noise levels and day-night average noise levels expected at the property lines of the surrounding receptors, assuming sound enclosures and building façade attenuation are included for the generators. This is incorporated into the results of Table 11.

Based on the estimated noise levels in Table 11, emergency generator noise levels during monthly testing would not exceed the City's General Plan and Municipal Code thresholds at existing residential or commercial receptors in the project vicinity. However, Table 11 assumes sound enclosures would be used. The City's thresholds could potentially be exceeded with a standard weather enclosure only. For all existing receptors, the noise level increase due to monthly testing of the emergency generators noise would not be measurable or detectable (0 dBA DNL increase).

TABLE 11 Estimated Operational Noise Levels for the Monthly Tests of the Emergency Generator, with the Inclusion of Sound Enclosures

Receptor	Distance from Center of Tower A Generator Room	L_{eq} from Tower A Generator, dBA	Distance from Center of Tower B Generator Room	L_{eq} from Tower B Generator, dBA	Distance from Center of Tower C Generator Room	L_{eq} from Tower C Generator, dBA	Combined DNL, dBA	Noise Level Increase, dBA DNL
Res-1 (future)	320 feet	29[a]	175 feet	34[a]	555 feet	24[a]	22[a]	0
Comm-1	170 feet	34[a]	230 feet	32[a]	390 feet	27[a]	23[a]	0
Res-2	155 feet	35[a]	240 feet	31[a]	310 feet	29[a]	24[a]	0
Comm-2	115 feet	38[a]	290 feet	30[a]	130 feet	37[a]	27[a]	0
Res-3	105 feet	39[a]	280 feet	30[a]	115 feet	38[a]	28[a]	0
Res-4	100 feet	39[a]	260 feet	31[a]	45 feet	46[a]	33[a]	0
Res-5	220 feet	32[a]	370 feet	28[a]	35 feet	48[a]	34[a]	0
Res-6	275 feet	30[a]	435 feet	26[a]	35 feet	48[a]	34[a]	0
Res-7	205 feet	33[a]	285 feet	30[a]	95 feet	39[a]	27[a]	0
Res-8	45 feet	46[a]	50 feet	45[a]	210 feet	33[a]	35[a]	0
Res-9	80 feet	41[a]	50 feet	45[a]	210 feet	33[a]	33[a]	0
Res-10	165 feet	35[a]	30 feet	49[a]	340 feet	28[a]	36[a]	0

[a] A conservative 20 dBA reduction was applied to the noise levels due to the building façades.

Truck Loading and Unloading

Loading areas are located on the building interiors of each tower, with access to Tower B and Tower A along South 2nd Street and South 3rd Street, respectively. All surrounding residential and commercial land uses located to the north and to the south of these towers would be well shielded from truck loading activities. Assuming no garage door on the entrances of the loading areas, the receptors on the opposite sides of the streets would have direct line-of-sight to trucking maneuvering activities. For Tower A, the receptors subject to truck delivery noise would include Comm-2, Res-3, Res-4, and Res-5. Receptors subject to truck delivery noise in Tower B would include Res-1 (future). Access to the loading area at Tower C would be located along the northern façade of the building, and assuming no garage door on the entrance of the loading area, the receptors subject to truck delivery noise in Tower C would include Res-4 and Res-5.

The loading areas would be expected to have no more than two deliveries in a week by medium-sized trucks. Truck delivery 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. Medium-sized delivery 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.

It is assumed that all deliveries and on-site maintenance activities would occur during daytime hours between 7:00 a.m. and 10:00 p.m. Additionally, the building façades would provide partial shielding even for the receptors with direct line-of-sight. Conservatively, 10 dBA attenuation is assumed for this study. Table 12 summarizes the noise levels due to truck delivery noise at the receiving property lines of the receptors with direct line-of-sight to the loading areas of each tower.

Truck deliveries occurring at the proposed project sites are not expected to generate levels exceeding 55 dBA DNL or existing ambient conditions at the nearby noise-sensitive land uses. For all existing receptors, the noise level increase due to truck delivery noise would not be measurable or detectable (0 dBA DNL increase).

TABLE 12 Estimated Operational Noise Levels for Truck Deliveries

Receptor	Distance from Center of Tower A Loading Area	L_{eq} from Tower A Deliveries, dBA	Distance from Center of Tower B Loading Area	L_{eq} from Tower B Deliveries, dBA	Distance from Center of Tower C Loading Area	L_{eq} from Tower C Deliveries, dBA	Combined DNL, dBA	Noise Level Increase, dBA DNL
Res-1 (future)	N/A[b]		105 feet	49[a]	N/A[b]		38[a]	0
Comm-2	105 feet	49[a]	N/A[b]		N/A[b]		38[a]	0
Res-3	95 feet	49[a]	N/A[b]		N/A[b]		39[a]	0
Res-4	105 feet	49[a]	N/A[b]		40 feet	57[a]	47[a]	0
Res-5	215 feet	42[a]	N/A[b]		40 feet	57[a]	46[a]	0

[a] A conservative 10 dBA reduction was applied to the noise levels due to the building façades.
[b] Receptor would not be exposed to direct line-of-sight to the loading zone at this tower.

Total Combined Project-Generated Noise at the Tower Sites

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment, and truck loading/unloading activities) would result in an increase of 1 dBA DNL or less at all existing noise-sensitive receptors surrounding the project site. Therefore, the proposed project would not result in a substantial increase over ambient noise levels in the project vicinity. However, operational noise levels due to mechanical equipment could potentially exceed 55 dBA DNL at the nearest residential receptors.

A qualified acoustical consultant should review the final design plans to address any potential conflicts with the General Plan or Municipal Code. The City's standard permit condition shall be implemented as condition of approval for the proposed project. The standard permit condition states the following:

> A detailed acoustical study shall be prepared during final building design to evaluate the potential noise generated by building mechanical equipment and demonstrate the necessary noise control to meet the City's 55 dBA DNL goal. Noise control features such as sound attenuators, baffles, and barriers shall be identified and evaluated to demonstrate that mechanical equipment noise would not exceed 55 dBA DNL at noise-sensitive locations around the project site. The noise control features identified by the study shall be incorporated into the project prior to issuance of a building permit.

Additionally for noise-generating land uses, the *Downtown San José Strategy Plan 2040 EIR* states the following:

> The implementation of General Plan Policies EC-1.2, EC-1.3, and EC-1.9 would reduce potential impacts associated with new noise-producing land uses facilitated by the plan to a less-than-significant level. Policy EC-1.2 limits noise generation by requiring use of noise attenuation measures, such as acoustical enclosures and sound barriers, where feasible, to avoid substantial increases to ambient noise. General Plan Policy EC-1.3 would be implemented and would require new projects to mitigate noise generation to 55 dBA DNL at the property line. Lastly, General Plan Policy EC-1.9 would be implemented and would require that studies be conducted to mitigate loud intermittent noise sources associated with new projects.

With the implementation of the City's standard permit condition and the mitigation measure included in the *Downtown San José Strategy Plan 2040 EIR* as conditions of approval for the proposed project, this would be reduced to a less-than-significant impact.

Impact 2: **Exposure to Excessive Groundborne Vibration.** Construction-related vibration levels could potentially exceed applicable vibration thresholds at historical buildings and conventional buildings adjoining the project site. **This is a significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include

demolition, site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

Several historical buildings surround the project site, according to the City's Historic Resource Inventory.[3] Figure 3 shows an aerial shot taken from the Historic Resource Inventory and from the applicant, identifying the three project towers and the surrounding historical structures. Note, the existing historical structures located on the site southeast of Tower C is the site of a future residential tower that has been approved by the City. Since the existing historical structures are to be demolished as part of the approved future residential tower, these two buildings are not shown in Figure 3 and are not included in this analysis as historical buildings.

FIGURE 3 Nearby Historical Buildings Surrounding the Project Site

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. As discussed in detail below, vibration levels exceeding these thresholds would be capable of cosmetically damaging adjacent buildings. Cosmetic damage (also known as threshold damage) is defined as

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

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 13 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 13 also summarizes the distances to the 0.08 in/sec PPV threshold for historical buildings and to the 0.2 in/sec PPV threshold for all other buildings.

TABLE 13 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance[a] to Meet 0.08 in/sec PPV (feet)	Minimum Distance[a] to Meet 0.2 in/sec PPV (feet)
Clam shovel drop		0.202	60	30
Hydromill (slurry wall)	in soil	0.008	5	5
	in rock	0.017	10	5
Vibratory Roller		0.210	65	30
Hoe Ram		0.089	30	15
Large bulldozer		0.089	30	15
Caisson drilling		0.089	30	15
Loaded trucks		0.076	25	15
Jackhammer		0.035	15	10
Small bulldozer		0.003	5	5

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., May 2022.

[a] Conservatively, the minimum distances to the meet the thresholds were rounded up to the nearest 5-foot distance.

From project site 1, which includes Towers A and B, Hist 2, and Hist 4 through Hist 9 are located 70 feet or more from the nearest boundary of the construction site. The nearest boundary of project site 2, which includes Tower C, would be located 70 feet or more from Hist 1 through Hist 7 and Hist 9. These historical structures would, therefore, be exposed to vibration levels at or below 0.068 in/sec PPV, which is below the City's 0.08 in/sec PPV threshold. Additionally, the existing commercial building north of East San Salvador Street and the future residential tower west of South 2nd Street, which would consist of normal conventional construction materials, would be more than 70 feet from the nearest project boundary and would be exposed to vibration levels below the City's 0.2 in/sec PPV threshold.

Table 14 summarizes the vibration levels at the historical buildings and the conventional buildings immediately adjoining both construction sites. 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 (as shown in Table 14), which are different than the distances used to propagate construction noise levels (as shown in Tables 7, 8, and 9), were estimated under the assumption that each piece of equipment from Table 13 was operating along the nearest boundary of the project sites, which would represent the worst-case scenario.

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 of the historical or conventional buildings adjoining the project site. As shown in Table 13, the 0.08 in/sec PPV threshold would potentially be exceeded within about 65 feet of the surrounding buildings, and the 0.2 in/sec PPV threshold for conventional buildings would be exceeded within about 30 feet. Due to the close proximity of the buildings adjoining project site 1 (Towers A and B) and project site 2 (Tower C), which would be within 5 to 10 feet, the use of most construction equipment along the shared property line would potentially exceed the City's thresholds, as shown in Table 14.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[4] The findings of this study have been applied to buildings affected by construction-generated vibrations.[5] As reported in USBM RI 8507[4] and reproduced by Dowding,[5] Figure 4 presents the damage probability, in terms of "threshold damage," "minor damage," and "major damage," at varying vibration levels. Threshold damage, which is described as cosmetic damage in this report, would entail hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage would include hairline cracking in masonry or the loosening of plaster, and major structural damage would include wide cracking or shifting of foundation or bearing walls.

As shown in Figure 4, maximum vibration levels of 0.2 in/sec PPV or lower would result in virtually no measurable damage. With maximum vibration levels of 1.2 in/sec PPV, there would be about 20% chance of threshold or cosmetic damage, which no minor or major damage would be expected at the buildings immediately adjoining the project site.

Heavy vibration-generating construction equipment, such as vibratory rollers or clam shovel drops, would have the potential to produce vibration levels of 0.08 in/sec PPV or more at historic buildings within 65 feet of the project site and to produce vibration levels of 0.2 in/sec PPV or more at conventional buildings within 30 feet of the project site.

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

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

Neither cosmetic, minor, or major damage would occur at historical or conventional buildings located more than 65 feet 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.

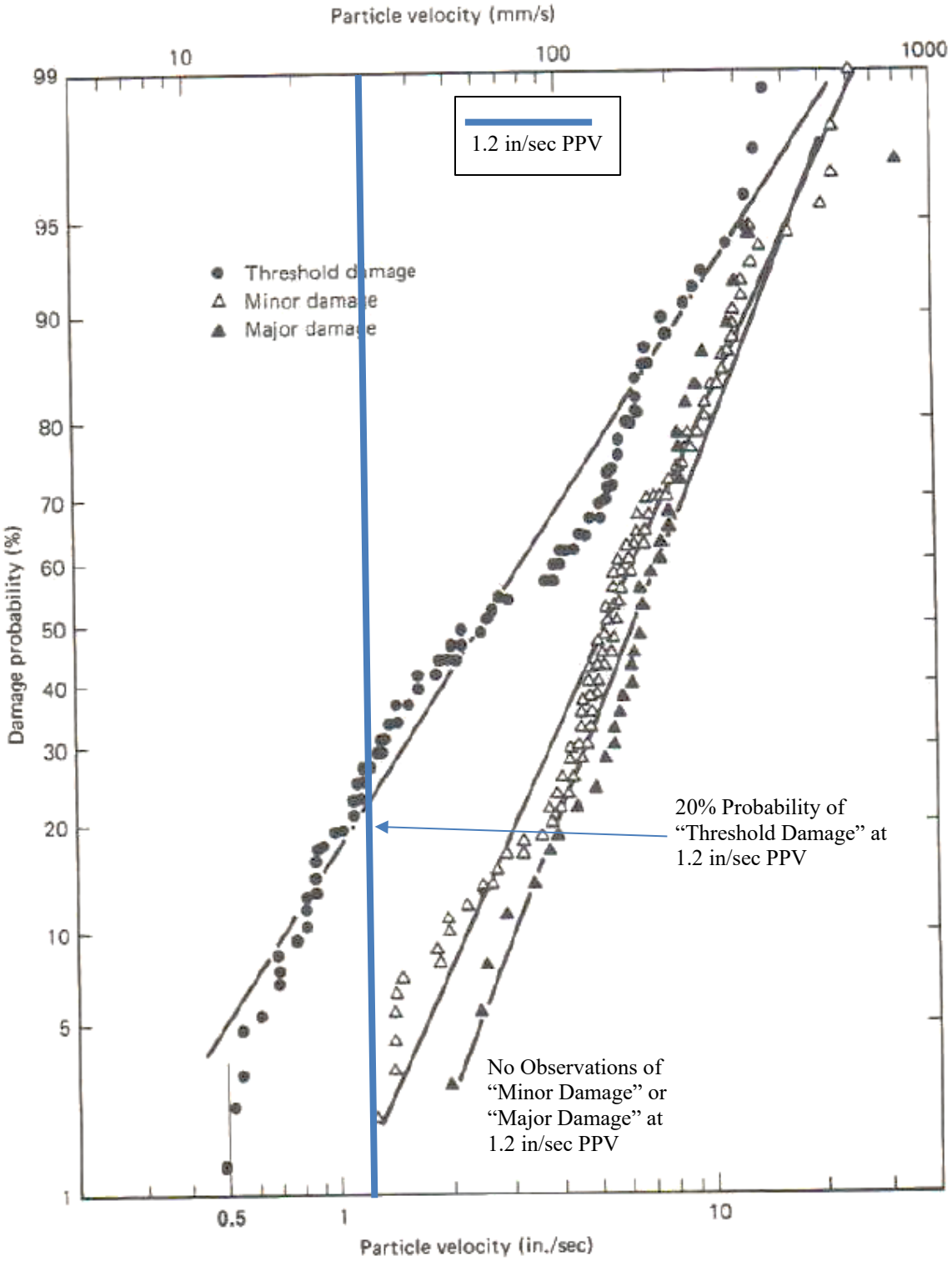
In summary, the construction of the project would generate vibration levels exceeding the General Plan threshold of 0.08 in/sec PPV at historic properties adjoining the site and 0.2 in/sec PPV at conventional buildings adjoining the sites. Such vibration levels would be capable of cosmetically damaging the adjacent buildings. This would be a significant impact.

TABLE 14 Vibration Source Levels for Construction Equipment

Equipment		PPV (in/sec) for Construction Occurring at Project Site 1 (Towers A and B)			PPV (in/sec) for Construction Occurring at Project Site 2 (Tower C)		
		Hist 1 Building (5ft)	Hist 3 Building (5ft)	Nearest Conventional Building (40ft)	Hist 8 Building (20ft)	East Conventional Building (15ft)	Hist 7 Building (70ft)
Clam shovel drop		**1.186**	**1.186**	0.120	**0.258**	**0.354**	0.065
Hydromill (slurry wall)	in soil	0.047	0.047	0.005	0.010	0.014	0.003
	in rock	**0.100**	**0.100**	0.010	0.022	0.030	0.005
Vibratory Roller		**1.233**	**1.233**	0.125	**0.268**	**0.368**	0.068
Hoe Ram		**0.523**	**0.523**	0.053	**0.114**	0.156	0.029
Large bulldozer		**0.523**	**0.523**	0.053	**0.114**	0.156	0.029
Caisson drilling		**0.523**	**0.523**	0.053	**0.114**	0.156	0.029
Loaded trucks		**0.446**	**0.446**	0.045	**0.097**	0.133	0.024
Jackhammer		**0.206**	**0.206**	0.021	0.045	0.061	0.011
Small bulldozer		0.018	0.018	0.002	0.004	0.005	0.001

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., May 2022.

FIGURE 4 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 shall implement the following measures, in addition to the best practices specified in Mitigation Measure 1a of this report, to minimize the impacts of groundborne vibration.

Construction Vibration Monitoring, Treatment, and Reporting Plan: The project proponent shall implement a construction vibration monitoring plan to document conditions prior to, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry-accepted standard methods. The construction vibration monitoring plan shall include, but not be limited to, the following measures:

- The report shall include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations.

- A list of all heavy construction equipment to be used for this project and the anticipated time duration of using the equipment that is known to produce high vibration levels (clam shovel drops, vibratory rollers, hoe rams, large bulldozers, caisson drillings, loaded trucks, jackhammers, etc.) shall be submitted to the Director of Planning or Director's designee of the Department of Planning, Building and Code Enforcement by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort required for continuous vibration monitoring. Phase demolition, earth-moving, and ground impacting operations so as not to occur during the same time period.

- Where possible, use of the heavy vibration-generating construction equipment shall be prohibited within 65 feet of any adjacent historical building and within 30 feet of any adjacent conventional building.

- Document conditions at all historic structures located within 65 feet of construction and at all conventional structures within 30 feet of construction prior to, during, and after vibration generating construction activities. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry-accepted standard methods. Specifically:

    - Vibration limits shall be applied to vibration-sensitive structures located within 65 feet of any construction activities identified as sources of high vibration levels.

    - Performance of a photo survey, elevation survey, and crack monitoring survey for each historic structure within 65 feet and for each conventional structure within 30 feet of construction activities. Surveys shall be performed prior to any construction activity, in regular intervals during construction, and after project completion, and shall include internal and external crack monitoring in structures, settlement, and distress, and shall document the condition of foundations, walls and other structural elements in the interior and exterior of said structures.

- Develop a vibration monitoring and construction contingency plan to identify structures where monitoring would be conducted, set up a vibration monitoring schedule, define structure-specific vibration limits, and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies shall be identified for when vibration levels approached the limits.

- At a minimum, vibration monitoring shall be conducted during demolition and excavation activities.

- If vibration levels approach limits, suspend construction and implement contingency measures to either lower vibration levels or secure the affected structures.

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

- Conduct a post-construction survey on structures where either monitoring has indicated high vibration levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities. The survey will be submitted to the City of San José Department of Parks, Recreation, and Neighborhood Services.

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

Impact 3: **Excessive Aircraft Noise.** The project site is located less than 2 miles from Norman Y. Mineta International Airport but the noise environment attributable to aircraft is considered normally acceptable under the Santa Clara County ALUC noise compatibility policies for office land uses. This is a **less-than-significant** impact.

Norman Y. Mineta San José International Airport is a public-use airport located approximately 2.2 miles northwest of the project site. According to the City's new Airport Master Plan Environmental Impact Report,[6] the project site lies right around or slightly outside of the 60 dBA CNEL/DNL contour line (see Figure 5). According to Policy EC-1.11 of the City's General Plan, the required safe and compatible threshold for exterior noise levels would be at or below 65 dBA CNEL/DNL for aircrafts. 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 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 5 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

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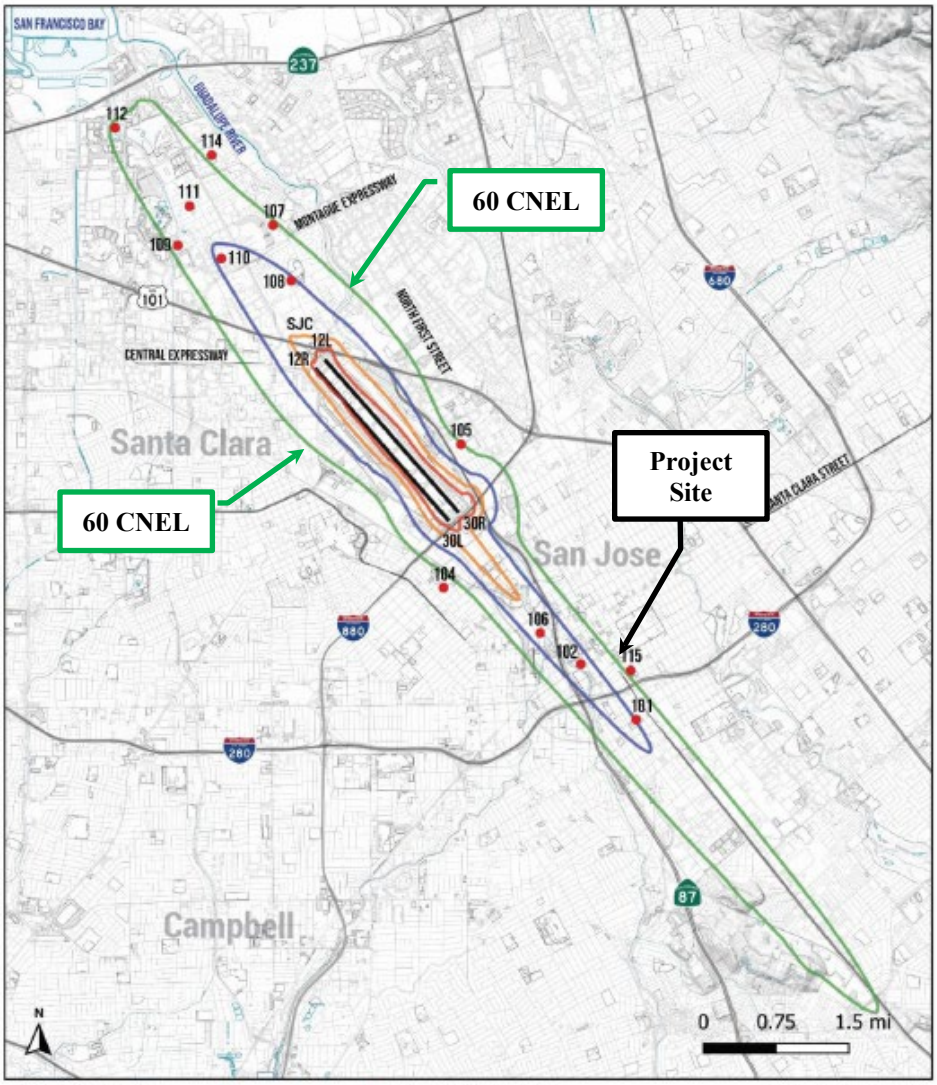

NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

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

Figure 5 Scenario 2: With Project 2037 Noise Contour Map

Source: BridgeNet International 2019

Cumulative Impacts

Cumulative noise impacts would include temporary construction noise from cumulative construction projects. Cumulative traffic noise increases due to the proposed project was studied in the *Downtown San José Strategy Plan 2040 EIR.*[2] Therefore, no further cumulative traffic noise increases would occur due to the proposed project.

From the City's website,[7] several planned or approved projects are located within 1,000 feet of the proposed project:

- **South 4th Metro Station** – this proposed residential project site adjoins the Tower C project site to the east and would include 218 residential units with 1,345 square feet of ground floor retail space and 12,381 square feet of rooftop dining. This project is currently in the planning review phase. The existing residences located to the north and south of the Tower C site and to the north of the South 4th Metro Station site would be sensitive receptors potentially exposed to construction activities at both sites. However, the construction schedules for both projects are unknown at this time, and cumulative construction is therefore not assumed.

- **The Mark** – this project is located at 459 South 4th Street, which adjoins the South 4th Metro Station site to the south, approximately 30 feet southeast of the Tower C site. The Mark would consist of 222 residential units and has been approved. While construction has not yet started, the Mark would likely be completed before Tower C construction starts. Cumulative construction is therefore not assumed.

- **Bo Town** – this mixed-use building is located at 409 South 2nd Street, which is the future residential building discussed in this report as a future sensitive receptor located west of the Tower A and Tower B project site. This project would consist of 29 stories with 520 residential units and 7,645 square feet of commercial space. This project is currently in the planning review phase, and the construction schedule has not been determined. Cumulative construction is therefore not assumed.

- **Valley Title** – this proposed office building is located at 345 South 2nd Street, which is approximately 100 feet northwest of the Tower A and Tower B project site. This project would consist of 20 stories with 1.39 million square feet of office space with ground floor retail. This project is currently in the planning review phase, and the construction schedule has not been determined. Cumulative construction is therefore not assumed.

- **Block 8** – this proposed office building is located at 282 South Market Street, which is approximately 825 feet northwest of the Tower A and Tower B project site. This project would consist of 18 stories of office space and 12,771 square feet of ground floor commercial space. This project has been approved and would not share receptors with direct line-of-sight to the project sites. Cumulative construction is therefore not assumed.

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

- **San José Stage/Home 2 Hotel** – this proposed hotel building is located at 490 South 1st Street, which is approximately 300 feet southwest of the Tower A and Tower B project site. This project would consist of 22,102 square feet of theatre space and 144 hotel rooms. This project is currently in the planning review phase and would not share receptors with direct line-of-sight to the project sites. Cumulative construction is therefore not assumed.

- **Gateway Tower** – this proposed residential building is located at 455 to 493 South 1st Street northeast corner of South Market Street and East William Street, which is approximately 470 feet southwest of the Tower A and Tower B project site. This project would construct 25 stories with 300 residential units and 4,850 square feet of ground floor retail. This project has been approved but would not share receptors with direct line-of-sight to the project sites. Cumulative construction is therefore not assumed.

Due to unknown construction schedules, it is assumed that construction schedules would not overlap or occur consecutively at this time. Therefore, cumulative construction activities are not expected. Additionally, each of the identified project sites with shared receptors to the 420 South 2nd Street and 420 South 3rd Steet project sites are located within the boundary of the *Downtown San José Strategy Plan 2040 EIR*. According to the Strategy Plan, implementation of the construction noise and vibration mitigation measures in combination with Policies EC-1.7 and EC-2.3 of the City's General Plan and the construction allowable hours identified in the City's Municipal Code would reduce construction occurring within the Plan Area to a less-than-significant impact. Each individual project includes measures to further reduce noise and vibration levels emanating from the individual sites. With the implementation of construction noise and vibration mitigation measures included in the *Downtown San José Strategy Plan 2040 EIR* and the construction noise and vibration mitigation measures from the individual projects, construction noise and vibration levels would be reduced as much as possible at all surrounding sensitive receptors during construction of each individual project. Therefore, potential cumulative construction impacts would be less-than-significant.

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels for LT-1 on Tuesday, February 1, 2022

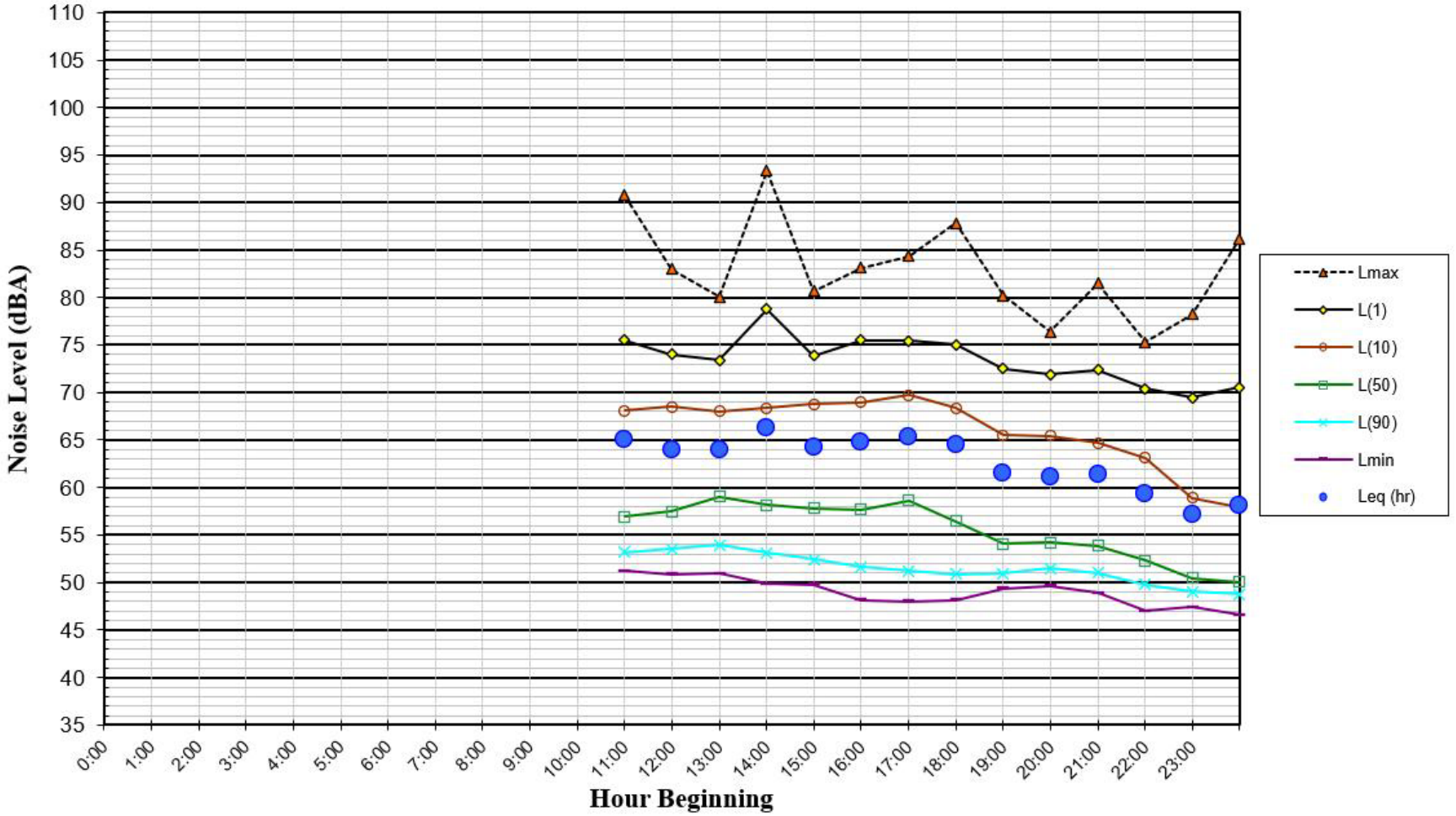

FIGURE A2 Daily Trend in Noise Levels for LT-1 on Wednesday, February 2, 2022

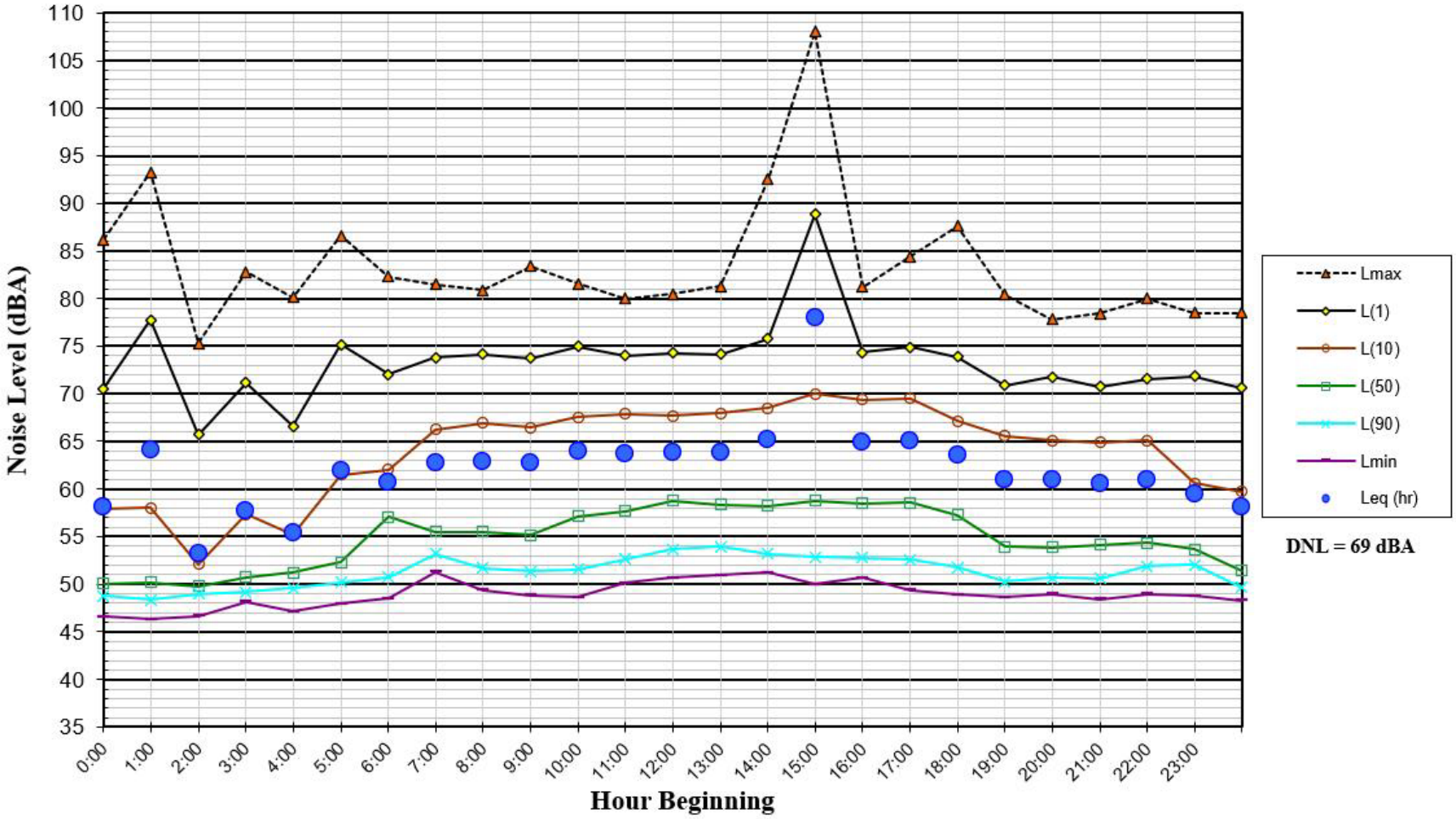

FIGURE A3 Daily Trend in Noise Levels for LT-1 on Thursday, February 3, 2022

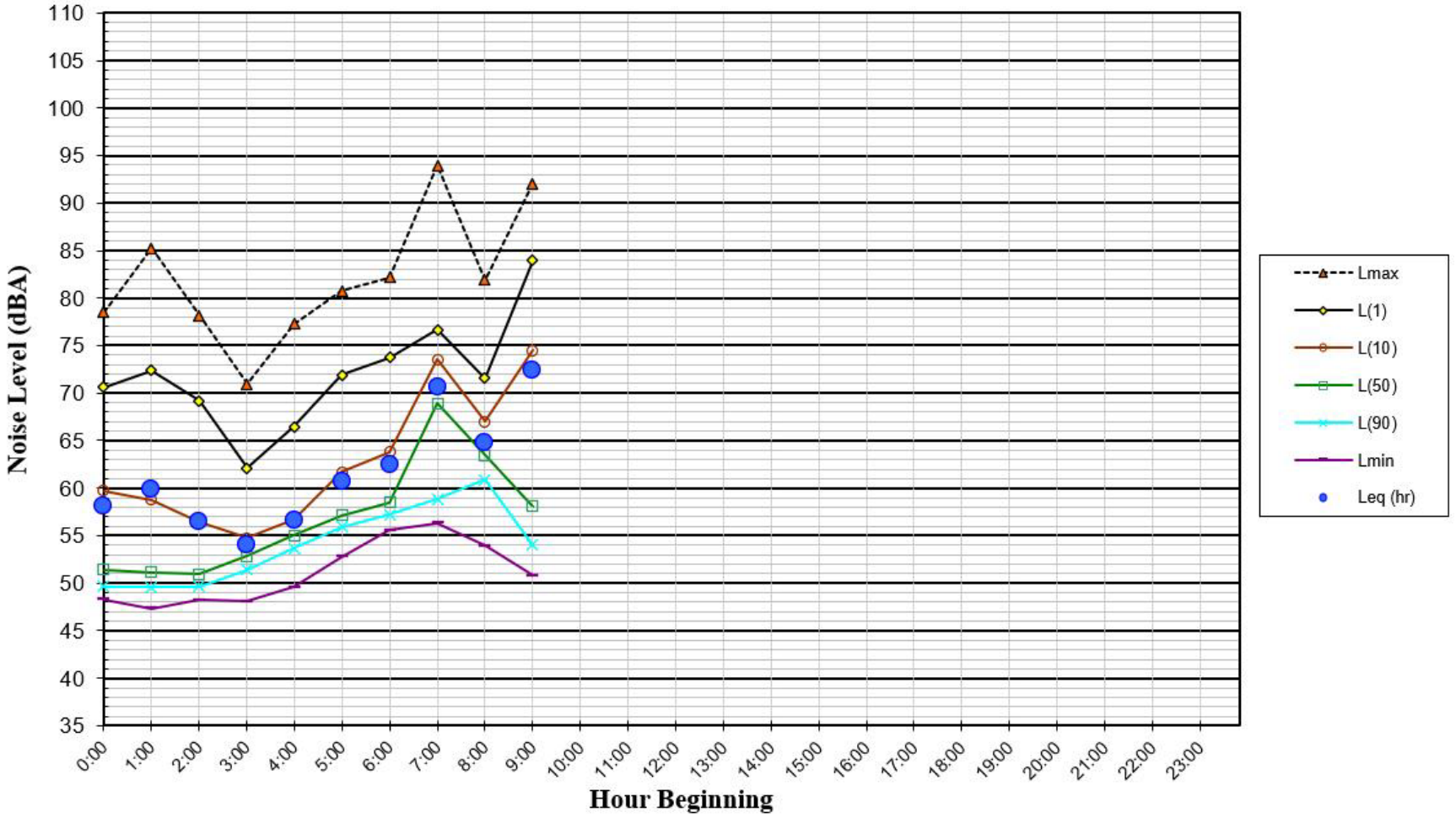

FIGURE A4 Daily Trend in Noise Levels for LT-2 on Tuesday, February 1, 2022

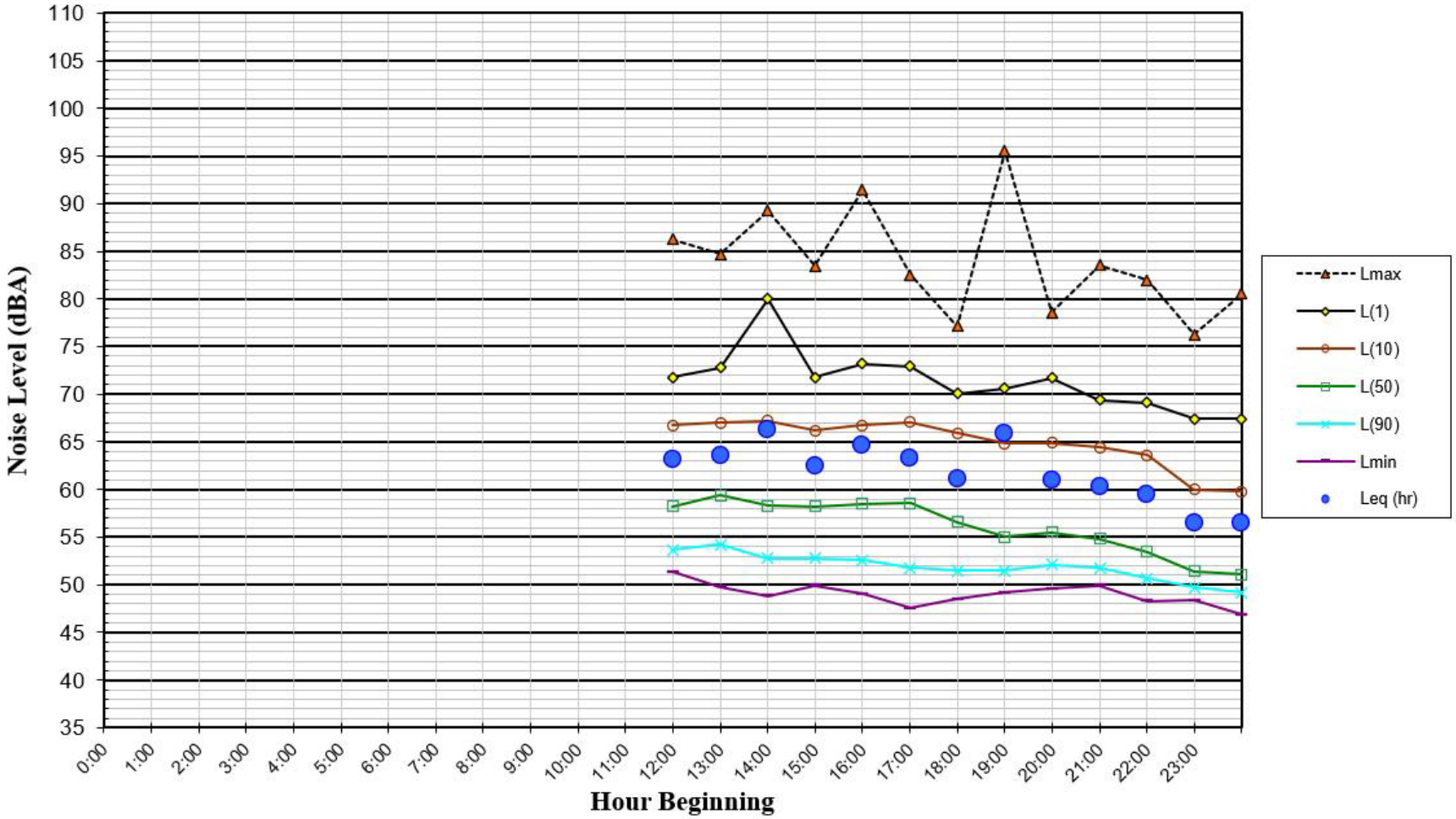

FIGURE A5 Daily Trend in Noise Levels for LT-2 on Wednesday, February 2, 2022

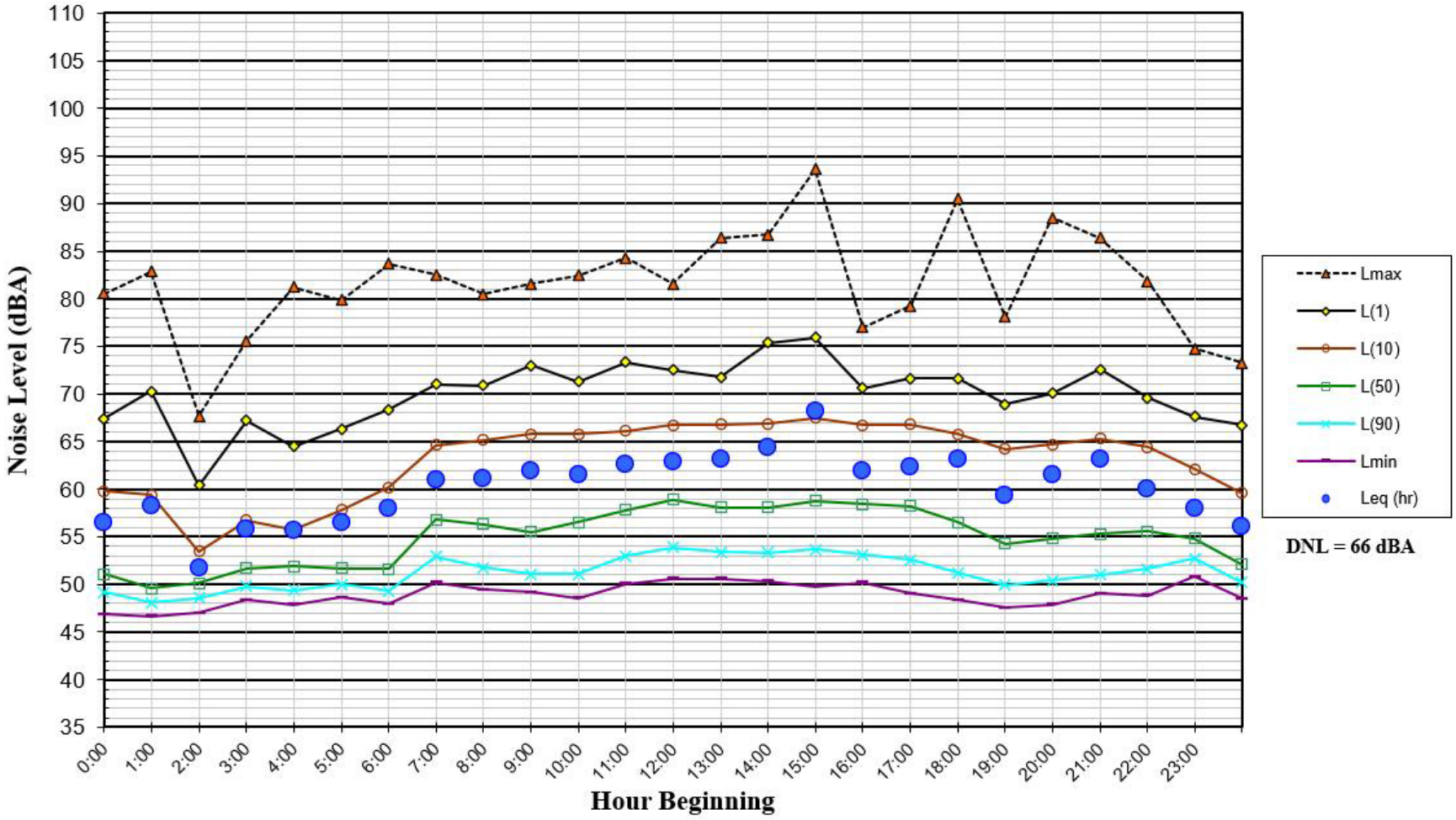

FIGURE A6 Daily Trend in Noise Levels for LT-2 on Thursday, February 3, 2022

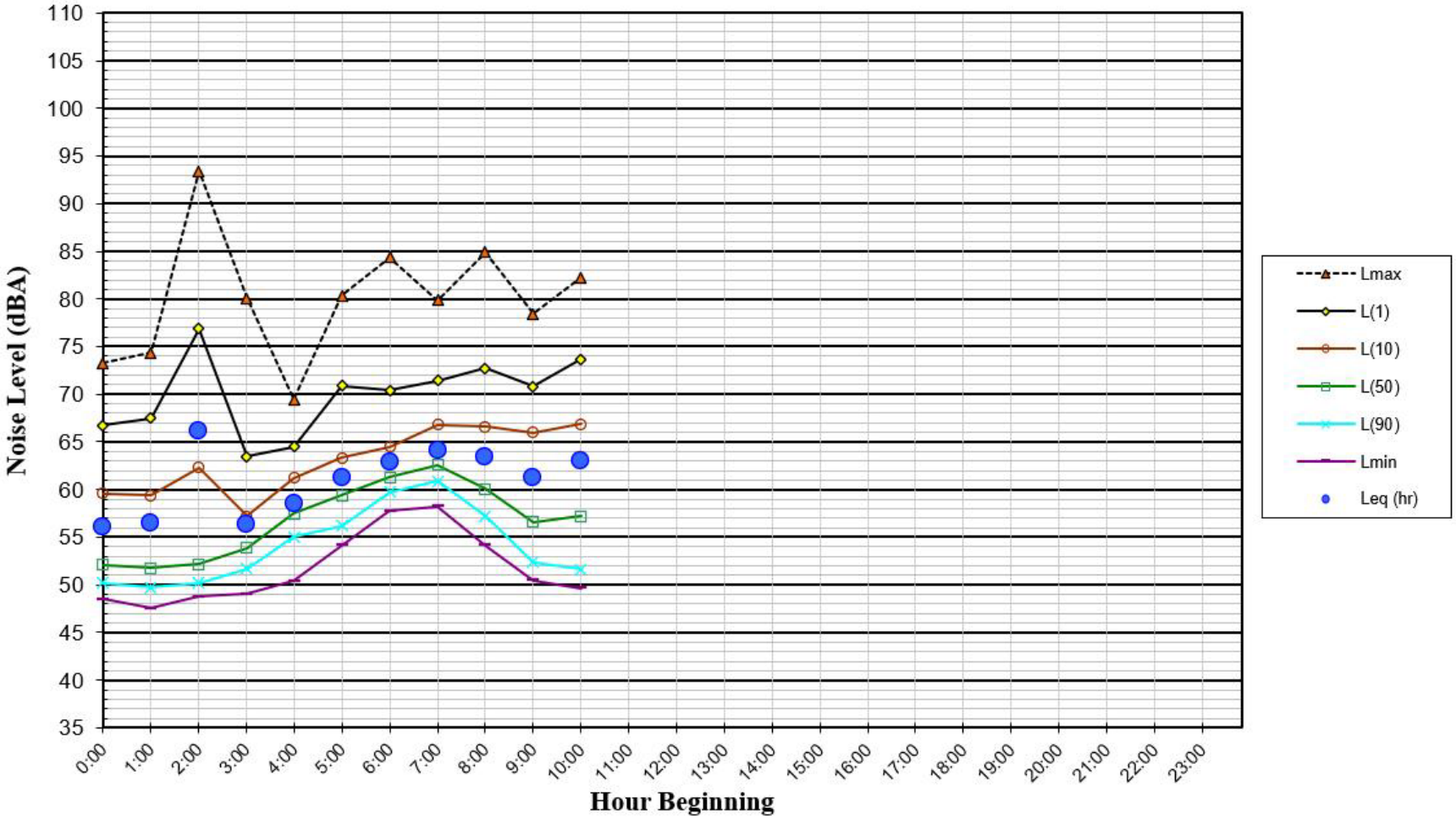

FIGURE A7 Daily Trend in Noise Levels for LT-3 on Tuesday, February 1, 2022

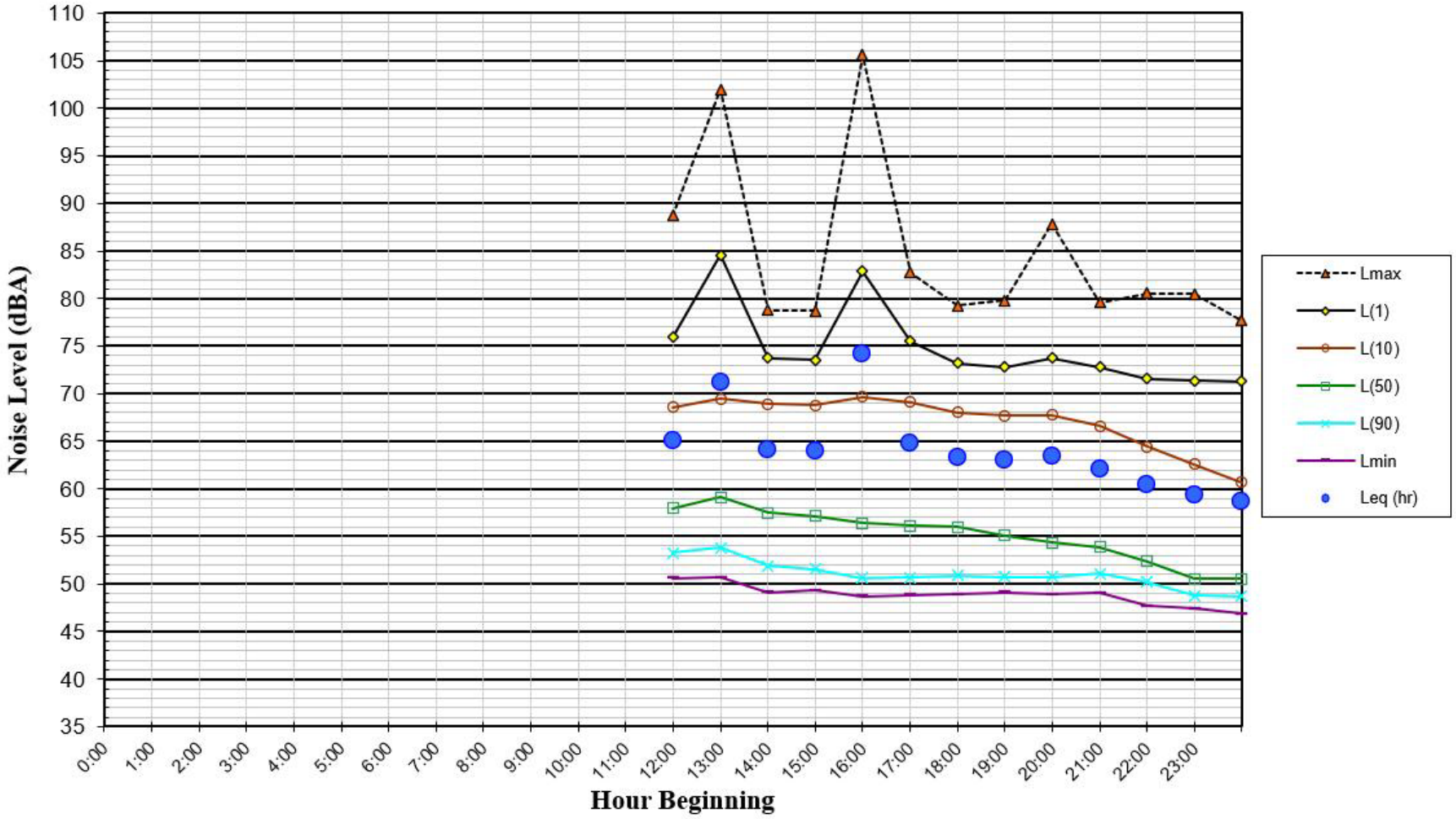

FIGURE A8 Daily Trend in Noise Levels for LT-3 on Wednesday, February 2, 2022

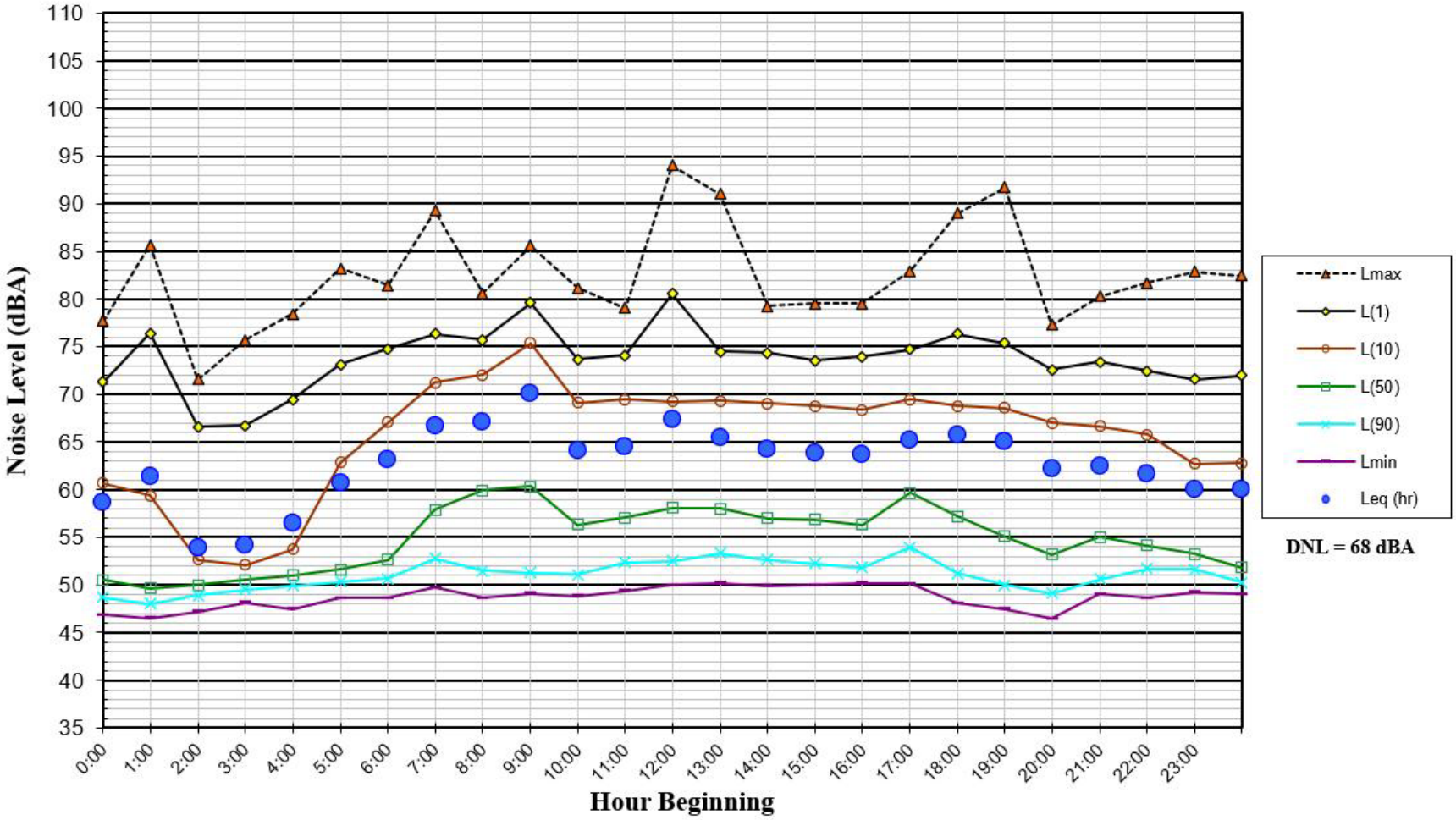

FIGURE A9 Daily Trend in Noise Levels for LT-3 on Thursday, February 3, 2022