APPENDIX D

Noise and Vibration Assessment

THE CARLYSLE MIXED-USE PROJECT ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The Carlysle mixed-use project proposes to demolish an existing single-story commercial structure and a surface parking lot in order to construct a 21-story mixed-use building at 51 Notre Dame Avenue in San José, California. The proposed building would include approximately 123,479 square feet of office uses on floors 5 through 9 and approximately 290 residential units on floors 10 through 21. Parking would be included on floors 2 through 4. The ground floor would consist of approximately 7,603 square feet of commercial retail space and the rooftop (floor 21) would consist of an outdoor pool area, lounge, fitness center, and additional residential units.

The project is bound by surface parking to the north, Notre Dame Avenue to the east, Carlysle Street to the south, and N. Almaden Boulevard to the west. Guadalupe Freeway (State Route 87) runs approximately 75 to 215 feet to the west. Land uses in the project vicinity include mixed-use buildings to the east, across Notre Dame Avenue, and to the south, across Carlysle 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 results of the ambient noise monitoring survey completed to document existing noise conditions; 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 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (*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 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA DNL with open windows and 65-70 dBA DNL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first

row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

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

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	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential 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 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.

State of California

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

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

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

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

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 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 north of Carlysle Street, between North Almaden Boulevard and Notre Dame Avenue, in the downtown area of San José, California. The site is surrounded by residential and commercial mixed-use buildings to the east and south and SR 87 to the west. A surface parking lot occupies the lot to the north and a multi-level parking garage is located to the southwest.

The existing noise environment at the site results primarily from vehicular traffic along SR 87. Secondary sources include local traffic along surrounding roadways and aircraft associated with Mineta San José International Airport.

A noise monitoring survey was performed in the project vicinity beginning on Tuesday, February 4, 2020 and concluding on Thursday, February 6, 2020. The monitoring survey included one long-term noise measurement (LT-1) and four short-term noise measurements (ST-1 through ST-4), as shown in Figure 1.

Long-term noise measurement LT-1 was made along the western boundary of the project site, at a distance of approximately 25 feet east of the centerline of North Almaden Boulevard and approximately 165 feet east of the centerline of the nearest through lane along SR 87. The measurement was made approximately 15 feet above ground level. Hourly average noise levels typically ranged from 67 to 71 dBA L_{eq} during the day and from 55 to 69 dBA L_{eq} at night. The day-night average noise level on Wednesday, February 5, 2020 was 72 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures 2 through 4.

Three short-term noise measurements (ST-1 through ST-3) were made over 10-minute periods, concurrent with the long-term measurement, on Tuesday, February 4, 2020, between 11:30 a.m. and 12:20 p.m. The fourth short-term noise measurement (ST-4) was made concurrent with LT-1 on Thursday, February 6, 2020, between 11:10 a.m. and 11:20 p.m. All short-term measurement results are summarized in Table 4.

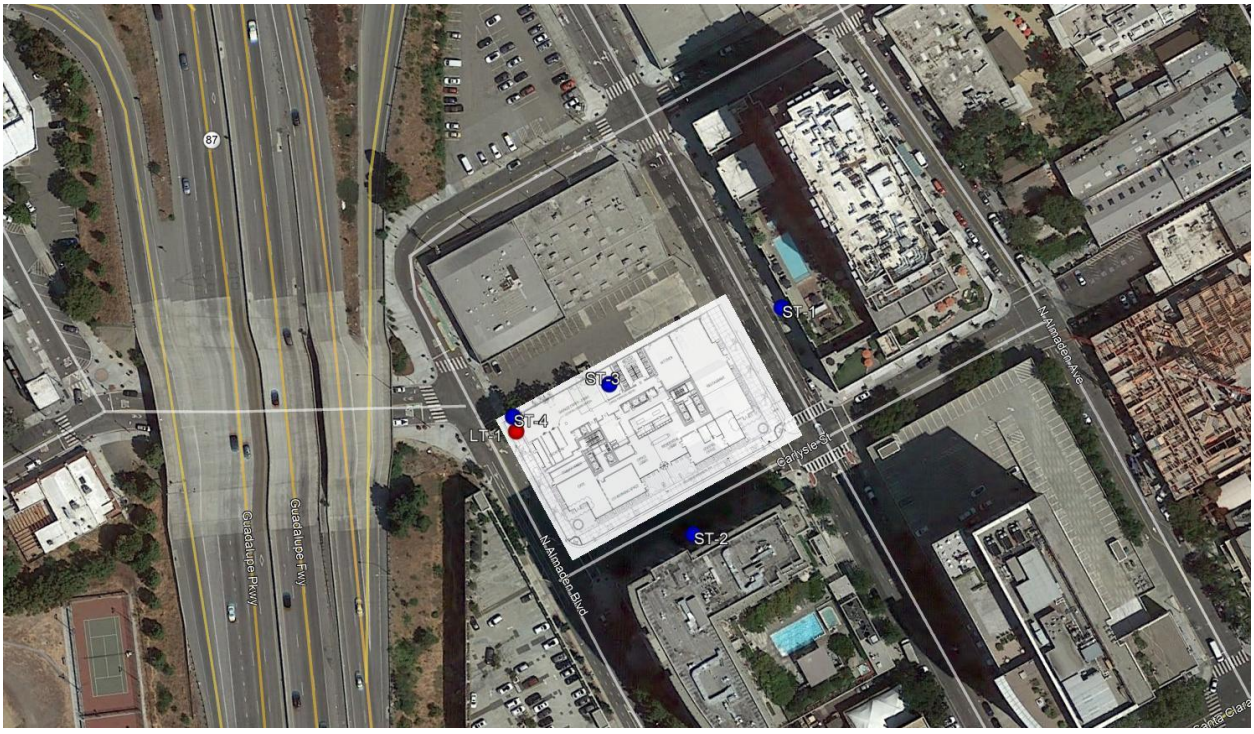
Short-term noise measurement ST-1 was made along the sidewalk east of Notre Dame Avenue to quantify ambient noise levels at the existing mixed-use building east of the project site. The measurement was made approximately 35 feet from the Notre Dame Avenue centerline. The dominant noise source was SR 87, which typically produced noise levels that ranged from 61 to 65 dBA. Notre Dame Avenue generated the majority of local roadway noise since it serves as the main access to the northbound on-ramp of SR 87. Intermittent noise levels associated with Notre Dame Avenue typically ranged from 68 to 74 dBA. Aircraft also contributed to the noise environment with noise levels up to 71 dBA L_{max} for smaller aircraft and up to 79 dBA L_{max} for larger aircraft.

ST-2 was made along the sidewalk south of Carlysle Street to quantify ambient noise levels at the existing mixed-use building south of the project site. The measurement was made approximately 25 feet from the Carlysle Street centerline. The dominant noise source was vehicular traffic along SR 87 with noise levels typically ranging from 60 to 65 dBA. Traffic along Carlysle Street was light compared to North Almaden Boulevard and Notre Dame Avenue with intermittent traffic noise levels ranging from 65 to 69 dBA. Aircraft produced noise levels that reached 68 dBA L_{max} for smaller aircraft and 78 dBA L_{max} for larger aircraft.

ST-3 was made near the center of the project site, approximately 130 feet east of the North Almaden Boulevard centerline and approximately 150 feet north of the Carlysle Street centerline. Traffic along SR 87 was the primary noise source with noise levels typically ranging from 62 to 67 dBA. Local roadway noise was audible but generally did not contribute to the noise levels produced by SR 87.

SR 87 is elevated in the vicinity of the project site. To estimate the noise level increase as receptor height above the ground increases along the western boundary of the site, ST-4 was made at two different heights in the vicinity of LT-1: 5 feet above ground level and 24 feet above ground level, which was in direct line-of-sight of SR 87. This allowed for simultaneous measurements to be made at 5 feet (ST-4), 15 feet (LT-1), and 24 feet (ST-4) above ground level. Overall, the noise levels from SR 87 in these partially shielded areas typically increased by 2 dBA with each 10 feet in elevation above the ground.

FIGURE 1 Noise Measurement Locations



Source: Google Earth, 2020.

TABLE 4 Summary of Short-Term Noise Measurement Data

Noise Measurement Location	Date, Time	Height	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10\text{-}min)}$
ST-1: Along Notre Dame Avenue	2/4/2020, 11:30-11:40	5 feet	82	77	71	66	63	68
ST-2: Along Carlysle Street	2/4/2020, 11:50-12:00	5 feet	78	75	67	64	62	66
ST-3: Center of project site	2/4/2020, 12:10-12:20	5 feet	69	68	66	64	63	65
ST-4: Along North Almaden Boulevard	2/6/2020, 11:10-11:20	5 feet	82	80	73	67	65	70
		24 feet	87	81	74	71	69	73
LT-1[a]: Along North Almaden Boulevard		15 feet	85	81	74	69	67	72

[a] This 10-minute measurement period taken from LT-1 coincided with the ST-4 measurements, showing the noise levels measured at three different heights at the same location.

FIGURE 2 Daily Trend in Noise Levels at LT-1, Tuesday, February 4, 2020

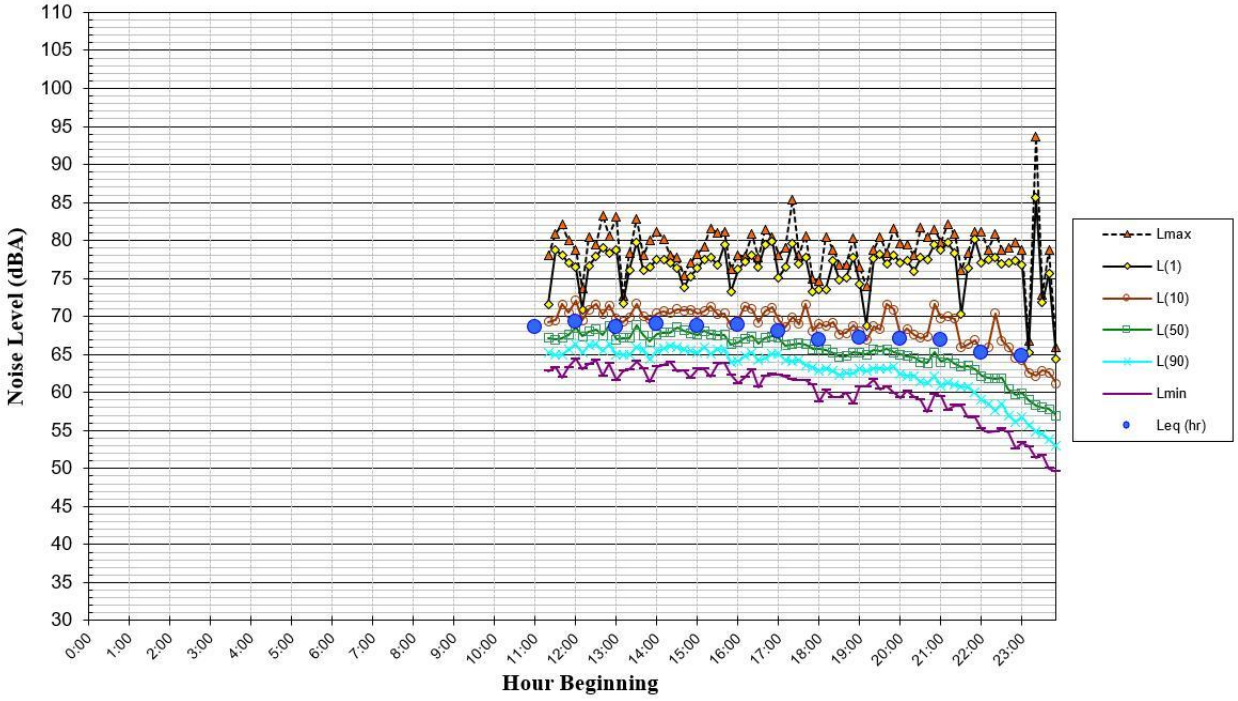


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday, February 5, 2020

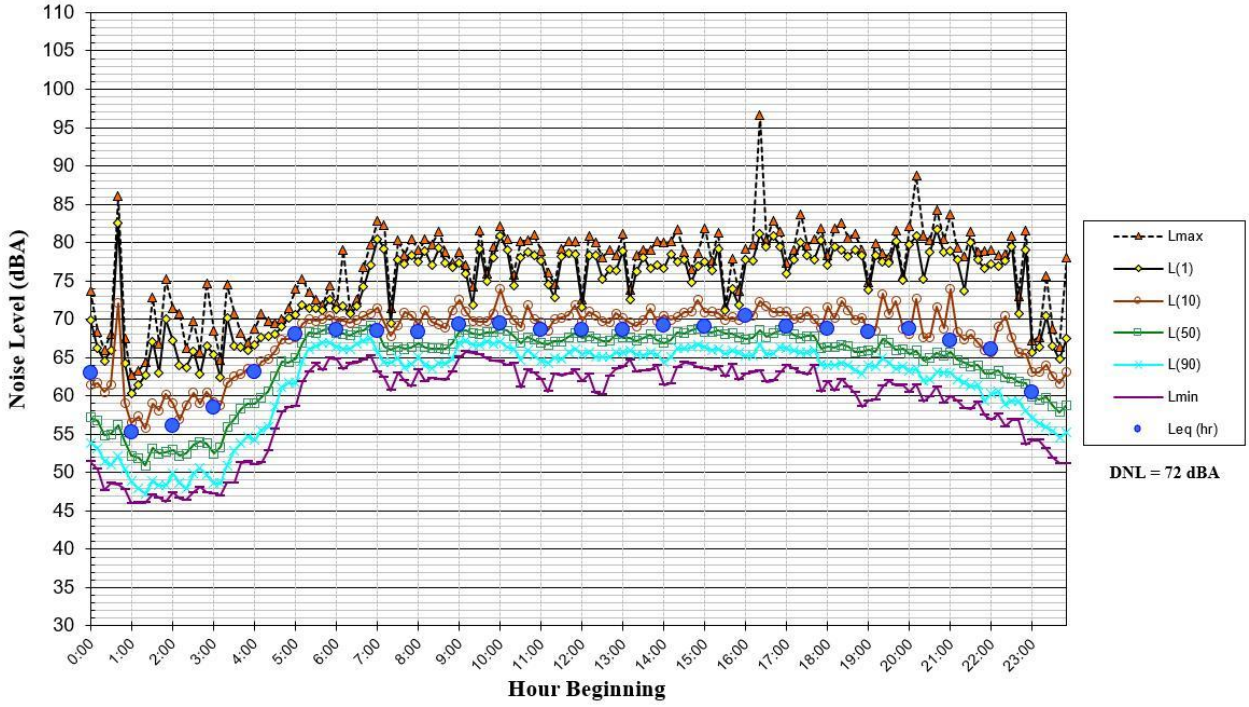
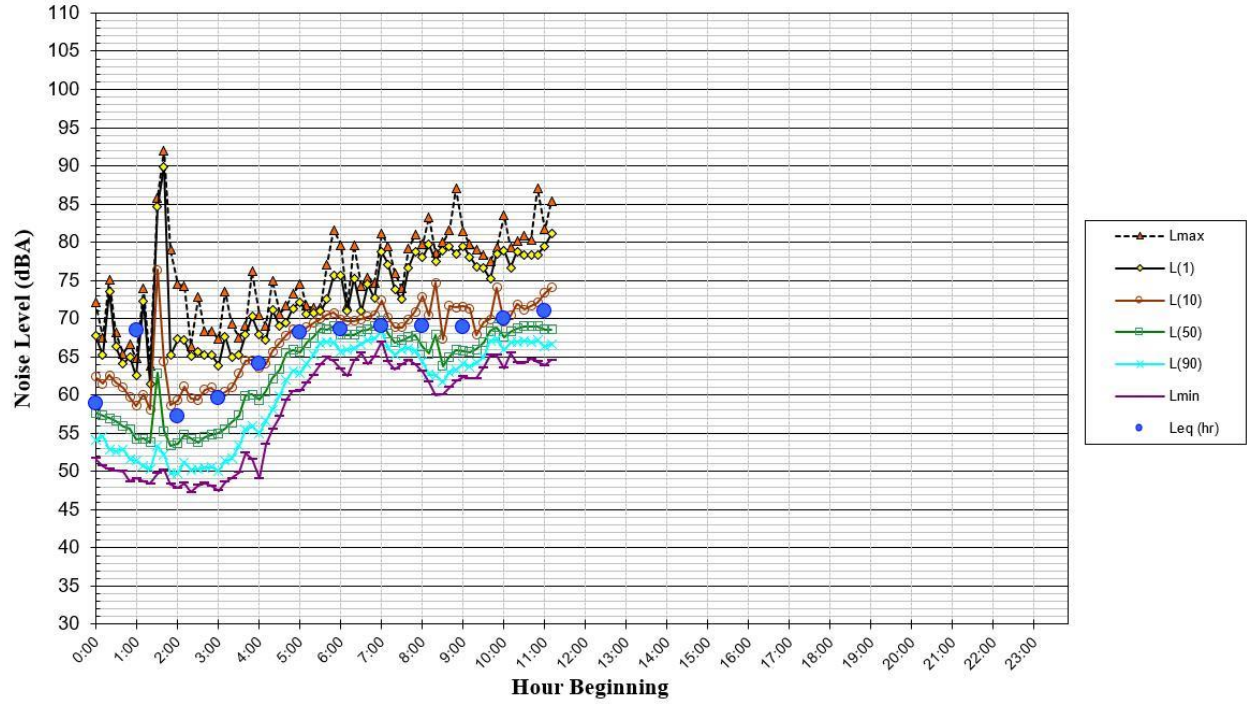


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday, February 6, 2020



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 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 project site would continue to result primarily from vehicular traffic along SR 87. A traffic report was completed for the proposed project in February 2020 by *Hexagon Transportation Consultants, Inc*. However, the traffic study did not include cumulative plus project traffic volumes. While the proposed project would fall within the boundaries of the *Downtown San José Strategy Plan 2040 EIR*,[1] the traffic volumes for the roadways surrounding the project site were not included as part of the Downtown Strategy Plan. However, cumulative 2040 peak hour traffic volumes for SR 87 were provided in the Downtown Strategy Plan. Under each of the cumulative buildout alternatives, a traffic noise increase of 1 dBA DNL was estimated along SR 87. This noise level increase was added to the ambient noise measurements made at the site to represent the worst-case scenario under future buildout conditions. Therefore, future noise levels are anticipated to be up to 73 dBA DNL along the western boundary of the project site, at a height of 15 feet above the ground.

As discussed in the Existing Noise Environment section of this report, the increase from 15 to 24 feet above the ground resulted in a noise level increase of 1 dBA. If this was applied to the peak hour noise level at 24 feet, the day-night average noise level would increase by 1 dBA DNL. Therefore, future noise levels are anticipated to be up to 74 dBA DNL along the western boundary of the project site, at a height of 24 feet above the ground.

1 City of San José, "Downtown San José Strategy Plan 2040 Environmental Impact Report," December 2018.

Future Exterior Noise Environment

The proposed project includes commercial retail uses on the ground floor, parking on floors two through four, commercial office space on floors five through nine, residential units on floors 10 through 20, and an amenity deck on the 21st floor.

Residential Land Uses

A common use residential terrace is shown on the 10th floor, and an outdoor pool area and lounge are shown on the amenity deck.

The 10th floor terrace is located along the northern building façade, halfway between the eastern and western façades. Due to the angle of the building with respect to SR 87, the terrace would have some direct line-of-sight to the highway. However, the proposed building and the elevation of the terrace above the ground (approximately 128 feet) would provide partial shielding. The center of the 10th floor terrace would be set back approximately 285 feet from the centerline of the nearest through lane of SR 87, and at this distance, assuming partial shielding from the building and the elevation above ground, the future exterior noise levels at the center of this outdoor use area would be 66 dBA DNL, with future noise levels reaching up to 70 dBA DNL at the edge of the terrace. Since most of the extended use would occur towards the center of the terrace, the future noise levels would exceed the City's normally acceptable threshold of 60 dBA DNL by 6 dBA DNL.

The rooftop pool and lounge areas would be located along the western building façade, approximately 234 feet above the ground. The setback of the western edge of these residential outdoor areas would range from approximately 170 to 220 feet from the centerline of the nearest through lane along SR 87. At these distances and assuming partial shielding due to the elevation of the outdoor areas, the future exterior noise levels at the rooftop pool and lounge areas would range from at or below 60 dBA DNL at distances of 5 feet or more from the western edge to 70 dBA DNL along the western edge. Since most of the extended use would occur towards the center of the pool and lounge areas, the future noise levels would meet the City's normally acceptable threshold of 60 dBA DNL and would not require further noise control.

While the rooftop areas proposed at the project site would be at or below the City's normally acceptable threshold of 60 dBA DNL, the 10th floor terrace would have future noise levels exceeding the limit by 6 dBA DNL. The noise levels at this outdoor use area would be within the City's conditionally acceptable range, and therefore, the City could allow this outdoor use space without additional noise-reducing measures. Assuming this would not be permitted, the 10th floor terrace would require measures to reduce exterior noise levels to at or below 60 dBA DNL.

Commercial Land Uses

Terraces associated with the office space are shown in the site plan on the fifth and sixth floors. Both terraces are located along the northern building façade, to the north of the residential terrace on the 10th floor. Each of the commercial terraces would have more exposure to SR 87 since the elevations are less than the 10th floor terrace and the building façade would provide less shielding. The centers of the fifth and sixth floor terraces would be set back from the centerline of the nearest through lane along SR 87 by approximately 275 feet each. At this distance, the future exterior noise levels at the center of these terraces would range from 71 to 72 dBA DNL, depending on the

elevation. This would exceed the City's exterior noise threshold for commercial uses by up to 2 dBA DNL.

The future exterior noise levels at both commercial-use terraces would exceed the City's normally acceptable threshold of 70 dBA DNL by 2 dBA DNL. Since these noise levels fall within the City's conditionally acceptable range, the City could allow these outdoor use spaces without noise-reducing measures. Assuming this would not be permitted, the fifth and sixth floor terraces would require measures to reduce exterior noise levels to at or below 70 dBA DNL.

Recommended Measures to Reduce Exterior Noise Levels

Methods available to reduce exterior noise levels at the commercial and residential terraces along the northern building façade include site planning alternatives (e.g., increased setbacks and using the proposed buildings as noise barriers), the construction of traditional noise barriers, or a combination of the above. For the proposed project, each terrace could be relocated to the eastern building façade, away from SR 87. That would reduce the future exterior noise levels to normally acceptable levels. Other options would be to redesign the project so the building completely surrounds each of the terraces, such as courtyards. Assuming these options would not be feasible, the optimal measure for noise reduction would be to construct a sound wall or a specially-designed barrier capable of reducing noise levels by up to 2 dBA at the commercial terraces and by up to 6 dBA at the residential terrace.

The height of the proposed sound wall or specially-designed fence would need to break the line-of-sight from the terraces to the traffic noise sources along SR 87. Due to the height of each terrace, a 5-foot sound wall or specially-designed fence would achieve the necessary noise level reduction. Each 5-foot barrier would be located along the perimeter of the specific terrace, as measured from the base elevations, and attach to the building on either end. To optimize noise level reduction, one solid wall, continuous from grade to top, with no cracks or gaps, would be recommended at each terrace level. Each barrier would consist of a minimum surface density of three lbs/ft^2. Clear barriers would be optimal in order to maintain aesthetic appeal (i.e., ½-inch laminated glass).

The final recommendations shall be confirmed when detailed site plans and grading plans are available. With the implementation of these proposed barriers, the exterior noise environment would be at or below 60 dBA DNL at the 10th floor residential terrace and at or below 70 dBA DNL at the fifth and sixth floor commercial terraces.

Future Interior Noise Environment

<u>Residential Land Uses</u>
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 10 through 21 of the proposed building. Units located along the western façade nearest to SR 87 would be set back from the centerline of the nearest through lane by 170 to 220 feet. At these distances, the units facing SR 87 would be exposed to future exterior noise levels ranging from 70 to 74 dBA DNL. Assuming windows to be partially open, future interior noise levels would range from 55 to 59 dBA DNL.

Units along the northern façade would have direct line-of-sight to SR 87, with setbacks from the centerline of the nearest through lane ranging from 170 to 375 feet. At these distances, these units would be exposed to future exterior noise levels ranging from 65 to 74 dBA DNL. Assuming windows to be partially open, future interior noise levels would range from 50 to 59 dBA DNL. Units located along the southern building façade would be partially shielded from the existing building located south of Carlysle Street. This building is 18-stories tall and would provide partial shielding for southern-facing units located on each floor of the proposed building. Exterior-facing units located along the southern building façade would be exposed to future noise levels ranging from 62 to 74 dBA DNL. Assuming windows to be partially open, future interior noise levels would range from 47 to 59 dBA DNL.

Units along the eastern façade would be shielded from traffic noise along SR 87 but would be exposed to traffic noise along local roadways. With elevations ranging from about 128 to 234 feet, units located along the eastern façade would be exposed to future exterior noise levels ranging from below 60 to 65 dBA DNL. Assuming windows to be partially open, future interior noise levels would range from below 45 to 50 dBA DNL.

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

Commercial Land Uses

Ground-level commercial retail uses and commercial offices on floors five through nine are proposed as part of the project. Daytime hourly average noise levels at the ground level of the building exterior would range from 68 to 72 dBA L_{eq} at the nearest façade to SR 87. On floors five through nine, the daytime hourly average noise levels would range from 69 to 73 dBA L_{eq}. All commercial uses would be exposed to day-night average noise levels ranging from 73 to 74 dBA DNL at the exterior of the nearest building façade facing SR 87.

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 $L_{eq(1\text{-}hr)}$.

Spaces where lower noise levels would be desired, such as private offices and conference rooms, may benefit from additional noise control in order to meet a lower, more desirable interior noise level. Additional noise control could be accomplished by selecting higher sound-rated windows (STC 34 or greater along exterior façades).

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 or to 50 dBA $L_{eq(1\text{-}hr)}$ at commercial interiors:

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

- Preliminary calculations indicate that residential units nearest to SR 87 along the western façade would require windows and doors with a minimum rating of 35 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

- Residential units located along the northern façade would require windows and doors with minimum STC ratings of 30 to 35 with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL. Units located along the southern façade would require windows and doors with minimum STC ratings of 28 to 35 with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the design phase pursuant to requirements set forth in the General Plan and State Building Code. The study will also establish appropriate criteria for noise levels inside the commercial spaces affected by environmental noise. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce residential interior noise levels to 45 dBA DNL or lower and to reduce commercial interior noise levels to 50 dBA $L_{eq(1\text{-}hr)}$ or less. Treatments would include, but are not limited to, sound-rated windows and doors, sound-rated wall and window constructions, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA DNL or less at residential uses and to 50 dBA $L_{eq(1\text{-}hr)}$ at commercial uses.

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

    - A significant permanent noise level increase would occur if 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 or Municipal Code.

- 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. **This is a significant impact.**

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

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project 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.

The ambient noise environment at the noise-sensitive receptors to the east and to the south of the project site would be represented by ST-1 and ST-2, respectively. During daytime hours, ST-1 was 68 dBA L_{eq}, while ST-2 was 66 dBA L_{eq}. Opposite the Carlysle Street/Notre Dame Avenue intersection for the project site is an existing commercial office building, which would be represented by ST-1 and ST-2, which ranged from 66 to 68 dBA L_{eq} during daytime hours. The existing commercial uses along North Almaden Boulevard, which includes the adjacent property to the north and the office building southwest of the project site attached to the parking garage, would be represented by LT-1 and ST-4, which ranged from 67 to 73 dBA L_{eq} during daytime hours.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The construction of the proposed project would involve demolition of existing structure and pavement, substantial excavation to create the basement level for mechanical equipment and to lay foundations, utilities, and building construction. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. For the proposed project, vibratory pile driving may be required for shoring trenches using sheet piles. Vibratory pile driving is assumed in this analysis.

Construction activities for individual projects are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 5 and 6. Table 5 shows the maximum noise level ranges for individual pieces of construction equipment, while Table 6 shows the hourly average noise level ranges, by construction phase for various types of construction projects. At 50 feet, maximum noise levels generated by vibratory pile driving would be 95 dBA L_{max}. Other project construction equipment

would typically range from 70 to 90 dBA L_{max} at a distance of 50 feet from the noise source. Most demolition and construction noise falls with the range of 80 to 90 dBA L_{eq} at a distance of 50 feet from the source.

Table 7 summarizes the equipment expected to be used during each phase of construction and the duration for each phase. For each phase, the equipment shown in Table 7 was used as inputs into the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) to predict the combined average noise level. To model worst-case conditions, it was assumed that all equipment per phase would be operating simultaneously. For construction noise, the use of multiple pieces of equipment simultaneously would add together as a collective noise source. While every piece of equipment per phase would likely be scattered throughout the site, the noise-sensitive receptors surrounding the site would be subject to the collective noise source generated by all equipment operating at once. Therefore, to assess construction noise impacts at the receiving property lines of noise-sensitive receptors, the collective worst-case hourly average noise level for each phase was centered at the geometrical center of the site and propagated to the nearest property line of the surrounding land uses. These noise level estimates are also shown in Table 7. These levels do not assume reductions due to intervening buildings or existing barriers.

The highest noise levels would be generated during the shoring/grading/excavation phase when a shoring pile rig, or vibratory pile driving, would occur. Pile driving, however, is only expected to occur for a total of 10 days. Therefore, the range of noise levels shown in Table 7 for the shoring/grading/excavation phase represents noise levels with and without pile driving activities. The foundation and erection of large buildings from steel structures could also cause considerable noise for fairly long durations. 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 can provide an additional 5 to 10 dBA noise reduction at distant receptors.

TABLE 5 Construction Equipment 50-Foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

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

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

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

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

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

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

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

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			East Res. (185ft)	South Res. (135ft)	North Comm. (70ft)	Southwest Comm. (220ft)	Southeast Comm. (230ft)
Demolition/Site Preparation	1/4/2021-1/8/2021	Concrete/Industrial Saw (1) Excavator (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)	76 dBA	78 dBA	84 dBA	74 dBA	74 dBA
Shoring/Grading/ Excavation	1/11/2021-2/5/2021	Excavator (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (3) Shoring Pile Rig (1)	75-83 dBA[a]	78-86 dBA[a]	83-91 dBA[a]	73-82 dBA[a]	73-81 dBA[a]
Below Slab Utilities	2/8/2021-2/19/2021	Tractor/Loader/Backhoe (2)	72 dBA	74 dBA	80 dBA	70 dBA	70 dBA
Foundation/Structure	2/22/2021-3/18/2022	Tractor/Loader/Backhoe (2) Concrete Pump (2)	73 dBA	75 dBA	81 dBA	71 dBA	71 dBA
Building Exterior	10/4/2021-8/8/2022	Crane (1) Forklift (4) Welder (4)	68-74 dBA[b]	71-77 dBA[b]	76-82 dBA[b]	66-72 dBA[b]	66-72 dBA[b]
Building Interior/Architectural Coating	5/17/2021-2/3/2023	Air Compressor (2) Aerial Lift (4)	67-75 dBA[c]	70-78 dBA[c]	76-83 dBA[c]	66-73 dBA[c]	65-73 dBA[c]

[a] Range of hourly average noise levels reflects the equipment in the Shoring/Grading/Excavation phase with and without the shoring pile rig.
[b] Range of hourly average noise levels reflects the Building Exterior phase only and in combination with the Foundation/Structure phase.
[c] Range of hourly average noise levels reflects the Building Interior/Architectural Coating phase only and in combination with the Building Exterior and Foundation/Structure phases.

As shown in Table 7, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more at various times throughout construction. Project construction is expected to last for a period of approximately 25 months. 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* 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 of the City's General Plan, which states the following:

> Construction operations within the City will be required to use available noise suppression devices and techniques and continue to 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.

Additionally, the City requires that reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity. Accordingly, the *Downtown San José Strategy Plan 2040 EIR* requires that all projects shall implement the following standard noise control measures:

- Construction will be limited to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday for any on-site or off-site work within 500 feet of any residential unit. 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 Planning, Building and Code Enforcement that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential uses.

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

- The unnecessary idling of internal combustion engines shall be prohibited. Staging areas and stationary noise-generating equipment shall be located as far as possible from noise-sensitive receptors such as residential uses (a minimum of 200 feet, where feasible).

- The surrounding neighborhood within 500 feet shall be notified early and frequently of the construction activities.

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

Adherence to the Municipal Code requirements would minimize impacts to neighboring properties from temporary increases in ambient noise levels resulting from future construction activities. Larger projects within the *Downtown San José Strategy Plan 2040 EIR* plan area that are expected to last over one year in duration, such as the proposed project, may result in a substantial temporary noise increase at adjacent land uses and would require a "construction noise logistics plan," in accordance with GP Policy EC-1.7. As stated in the *Downtown San José Strategy Plan 2040 EIR*, typical construction noise logistics plan would include, but not be limited to, the following measures to reduce construction noise levels as low as practical:

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

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

- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from adjacent land uses;

- Locate staging areas and construction material areas as far away as possible from adjacent land uses;

- Prohibit all unnecessary idling of internal combustion engines;

- If impact driving is proposed, multiple-pile drivers shall be considered to expedite construction. Although noise levels generated by multiple pile drivers would be higher than the noise generated by a single pile driver, the total duration of pile driving activities would be reduced;

- If impact pile driving is proposed, temporary noise control blanket barriers shall shroud pile drivers or be erected in a manner to shield the adjacent land uses. Such noise control blanket barriers can be rented and quickly erected;

- If impact pile driving is proposed, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile. Notify all adjacent land uses of the construction schedule in writing;

- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented. 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, Municipal Code requirements, and the above measures included in the *Downtown San José Strategy Plan 2040 EIR*, the temporary construction noise impact would be reduced to a less-than-significant level.

Mitigation Measure 1a: No further mitigation required.

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

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

The traffic study included peak hour turning movements for the existing traffic volumes and existing plus project traffic volumes at six intersections in the vicinity of the project site. By comparing the existing plus project traffic scenario to the existing scenario, the project's contribution to the overall noise level increase was determined to be 2 dBA DNL or less along each roadway segment in the project vicinity. 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. This is a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 1c: **Noise Levels in Excess of Standards.** The proposed project is not expected to generate noise in excess of standards established in the City's General Plan at the nearby residential receptors. This is a **less-than-significant impact**.

Mechanical Equipment

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. Noise-sensitive receptors surrounding the site would include existing residences to the east, opposite Notre Dame Avenue, and to the south of the site, opposite Carlysle Street. 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. Additionally, the Municipal Code states that noise levels generated at the project site would be limited to 60 dBA DNL at nearby commercial properties. While exceeding these zoning code noise standards would not be considered a significant impact, the exposure of the surrounding land uses to operational noise levels generated by the proposed project are also discussed here in comparison to these zoning code standards.

High-rise structures typically include various mechanical equipment for heating, ventilation, and air-conditioning needs. The site plan shows a boiler room, a chiller room, electrical rooms, and an emergency generator room on the basement level; a transformer room on the ground level; and mechanical rooms on the 21st floor, which includes the cooling tower open on the roof level. At the time of this analysis, the specific mechanical equipment had not been selected, nor were specific details, such as manufacturer's noise data for such equipment, available.

The equipment rooms located on the basement level would be underground and well-shielded from the surrounding noise-sensitive receptors. Noise from these mechanical equipment units, which includes the emergency generator, would not be expected to generate noise levels of 55 dBA DNL at the residences to the east or to the south. Further, the Municipal Code threshold of 60 dBA DNL for receiving commercial properties is not expected to be exceeded to the north, to the southwest, or to the southeast of the project site.

The ground-level transformer room, which would be located along the western building façade, would provide at least 20 dBA reduction due to the room enclosure. Typically, transformers up to 1,000 kVA generate noise levels up to 64 dB, as measured at 1 meter (3.28 feet). Assuming the transformer runs continuously during daytime and nighttime hours, the day-night average noise level would be 50 dBA DNL at a distance of 1 meter (3.28 feet) , which includes the 20 dBA reduction due to the wall assembly. The nearest receiving property line, which would be the commercial use adjoining the project site to the north, would be approximately 60 feet away. The nearest residential property line would be approximately 115 feet south of the transformer room. At these distances, the day-night average noise level would be well-below 50 dBA DNL.

The mechanical equipment rooms on the 21st floor would also provide at least 20 dBA reduction. These rooms would be located along the façade surrounding the terraces, facing north. Specific equipment housed in these rooms have not been identified; however, pool maintenance equipment or heating pumps and HVAC systems could be located in these rooms. Typical heating pumps would

generate noise ranging from 56 to 66 dBA at a distance of 3 feet. Assuming up to eight heating pumps would run simultaneously during a continuous 24-hour period, the day-night average noise levels would be up to 61 dBA DNL at a distance of 3 feet, which includes the 20 dBA reduction due to the wall assembly. Since the nearest residential building is also a high-rise of at least 18 stories, the mechanical equipment noise on the 21st floor would potentially affect the residences residing in the units located on the top floors of the receiving property. The nearest residential property plane would be approximately 115 feet east of the nearest mechanical room, and at this distance, the day-night average noise level would be well-below 50 dBA DNL and ambient noise levels due to transportation noise sources in the project vicinity. The nearest commercial use would be the adjacent property to the north; however, these uses are ground-level receptors, which would be approximately 215 feet below the mechanical equipment rooms located on the 21st floor. At this distance, noise levels would be below 50 dBA DNL.

The cooling tower, which would be exposed on the roof level, would be located along the northern façade. While the number of units and types of units were not available at the time of this study, the worst-case scenario would include up to five chillers generating a collective noise level of 56 dBA at 210 feet. The site plan shows residential units located along the eastern building façade of the proposed building, and these units would provide 20 dBA reduction for the residential uses located to the east. The distance from the cooling tower to the nearest residential property line would be approximately 115 feet. Assuming the equipment operates continuously over a 24-hour period, the day-night average noise levels would be below 50 dBA DNL at the nearest residential property plane, with the inclusion of the 20 dBA reduction from the eastern building façade.

The plane of the commercial property adjoins the mechanical room housing the cooling tower. As stated above, however, the receptors on the commercial property would be located on the ground level, approximately 215 feet from the cooling tower. The site plan does not identify screens; however, the mechanical equipment room identified on the 21st floor along the northern façade would imply some degree of shielding surrounding the cooling tower. Assuming the shielding would be solid from grade to top, with no cracks or gaps, a noise level reduction of 20 dBA is assumed. The day-night average noise level at the ground-level commercial receptors to the north would be less than 50 dBA DNL, which would not exceed the Municipal Code threshold of 60 dBA DNL for commercial use properties.

Mechanical equipment noise levels are not anticipated to exceed the General Plan threshold of 55 dBA DNL at noise-sensitive land uses near the project site. This is a less-than-significant impact.

The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts with the General Plan or Municipal Code. 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.

The implementation of this mitigation measure would reduce noise levels originating from the project site.

Truck Loading and Unloading

The site plan shows two loading spaces towards the northwestern corner of the project site, within the structure. The loading spaces would be accessed through the entrance to the ramp of the parking structure. Therefore, noise due to loading and unloading activities would be shielded from the surrounding noise-sensitive receptors. Due to the size of the commercial retail uses included in the proposed project, which would require truck deliveries, no more than four truck trips a week would be expected. Assuming these deliveries and on-site maintenance activities would occur during daytime hours between 7:00 a.m. and 10:00 p.m., a noise increase above existing conditions is not expected. Further, these trucks would access the project site from North Almaden Boulevard, which currently include truck traffic. Truck deliveries occurring at the proposed project site are not expected to generate levels exceeding 55 dBA DNL or existing ambient conditions at the nearby noise-sensitive land uses. This would be a less-than-significant impact.

Mitigation Measure 1c: No further mitigation required.

Impact 2: Exposure to Excessive Groundborne Vibration. Construction-related vibration levels could potentially exceed applicable vibration thresholds at nearby sensitive land uses, especially during vibratory pile driving. **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. Vibratory pile driving equipment, which can cause excessive vibration, is expected to be required for the proposed project.

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

Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as pile driving, 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. Vibratory pile driving typically generates vibration levels up to 0.170 in/sec PPV at 25 feet, with an upper range of 0.734 in/sec PPV at 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 8 also summarizes the distances to

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

TABLE 8 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.08 in/sec PPV (feet)	Minimum Distance to Meet 0.2 in/sec PPV (feet)
Pile Driver (Sonic)	Upper range	0.734	190	82
	Typical	0.170	50	22
Clam shovel drop		0.202	58	26
Hydromill (slurry wall)	in soil	0.008	3	1
	in rock	0.017	6	2
Vibratory Roller		0.210	60	27
Hoe Ram		0.089	28	12
Large bulldozer		0.089	28	12
Caisson drilling		0.089	28	12
Loaded trucks		0.076	24	10
Jackhammer		0.035	12	5
Small bulldozer		0.003	1	<1

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., March 2020.

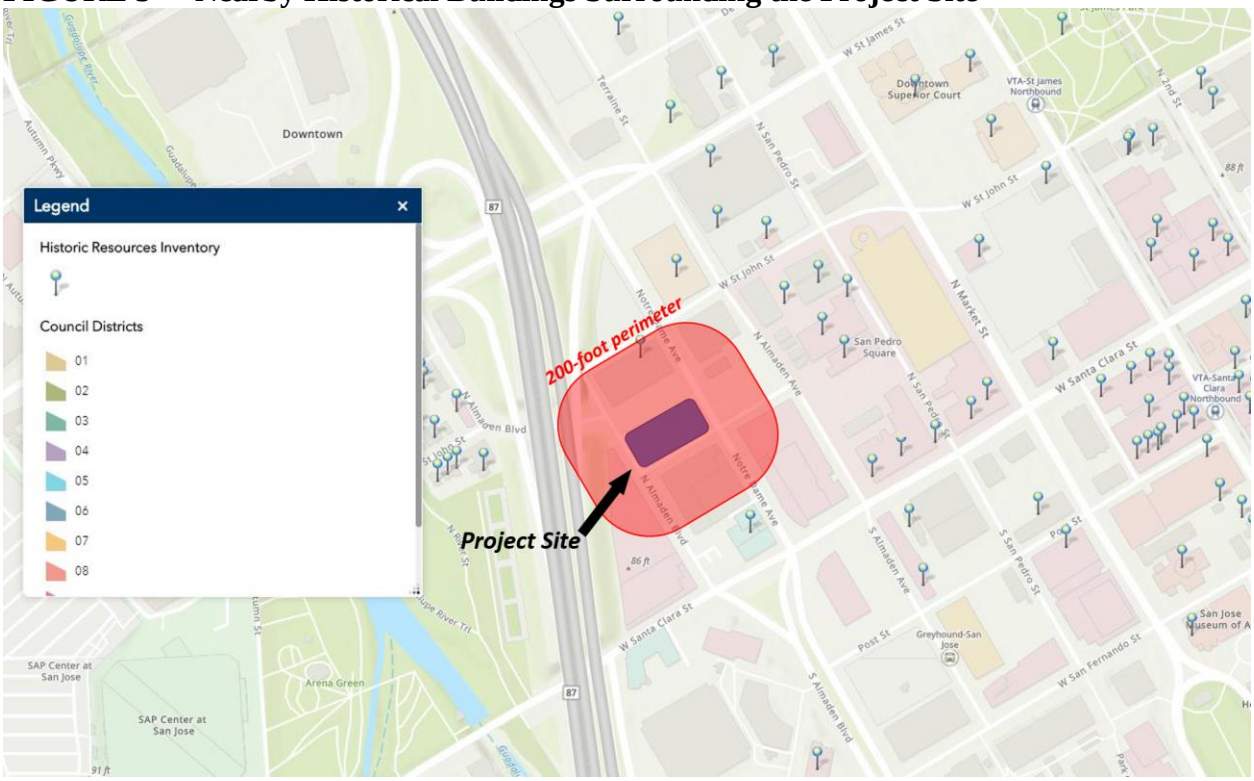
Based on the Historical Resources Inventory for the City of San José,[2] there are quite a few historical buildings in the project vicinity. Figure 5 identifies the project site on the City's Historical Resources Inventory map. The figure also highlights a 200-foot perimeter around the project site in red, which is the critical distance for vibratory pile driving noted in Table 8. The commercial building adjoining the site to the north is the only historical structure within 200 feet of the project site. The nearest building façade for this structure would be about 60 feet from the northern boundary of the project site. At this distance, vibration levels would range from 0.001 to 0.280 in/sec PPV. Construction equipment would generate vibration levels in excess of the City's 0.08 in/sec PPV vibration threshold.

Table 9 summarizes the vibration levels at the nearest historical building identified above and all nonhistorical buildings immediately surrounding the site. While construction noise sources increase based on all equipment operating simultaneously, construction vibration would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration source level, but a vibratory pile driver, 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 9), which are different than the distances used to propagate construction noise levels (as shown in Table 7), were estimated under the assumption that each piece of equipment from Table

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

8 was operating along the nearest boundary of the project site, which would represent the worst-case scenario.

FIGURE 5 Nearby Historical Buildings Surrounding the Project Site



As shown in Table 9, vibration levels could exceed the sensitive vibration threshold of 0.08 in/sec at the historical building when the vibratory pile driver is used near the shared property line. As previously stated, the historical building would potentially be exposed to vibration levels exceeding 0.08 in/sec PPV when the vibratory hammer is used within 200 feet of the nearest façade. Additionally, the historical building would potentially be exposed to vibration levels equaling 0.08 in/sec PPV when the vibratory roller is used along the shared property line. While this would not exceed the limit, use of a vibratory roller or any equipment similar to a vibratory roller should be used with caution near the northern boundary of the project site.

For the two residential buildings to the east and to the south of the site, as well as the commercial office building southwest of the site, vibratory pile driving could potentially exceed the City's 0.2 in/sec PPV threshold, while all other construction equipment would generate levels below 0.2 in/sec PPV. The office building to the southeast is not expected to be exposed to vibration levels exceeding 0.2 in/sec PPV. In addition to the historical building on the northern parcel, a second commercial building is located approximately 10 feet from the shared property line. At this distance, vibratory pile driving would potentially generate vibration levels up to 2.011 in/sec PPV. The clam shovel drop, vibratory roller, hoe ram, large bulldozer, caisson drilling, and loaded trucks could also generate vibration levels exceeding the 0.2 in/sec PPV when used along the northern boundary of the site.

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment		PPV (in/sec)					
		East Res. (65ft)	South Res. (50ft)	North Historical Building (60ft)	North Comm. (10ft)	Southwest Comm. (50ft)	Southeast Comm. (85ft)
Pile Driver (Sonic)	Upper range	**0.257**	**0.342**	**0.280**	**2.011**	**0.342**	0.191
	Typical	0.059	0.079	0.065	**0.466**	0.079	0.044
Clam shovel drop		0.071	0.094	0.077	**0.553**	0.094	0.053
Hydromill (slurry wall)	in soil	0.003	0.004	0.003	0.022	0.004	0.002
	in rock	0.006	0.008	0.006	0.047	0.008	0.004
Vibratory Roller		0.073	0.098	0.080	**0.575**	0.098	0.055
Hoe Ram		0.031	0.042	0.034	**0.244**	0.042	0.023
Large bulldozer		0.031	0.042	0.034	**0.244**	0.042	0.023
Caisson drilling		0.031	0.042	0.034	**0.244**	0.042	0.023
Loaded trucks		0.027	0.035	0.029	**0.208**	0.035	0.020
Jackhammer		0.012	0.016	0.013	0.013	0.016	0.009
Small bulldozer		0.001	0.001	0.001	0.001	0.001	0.0008

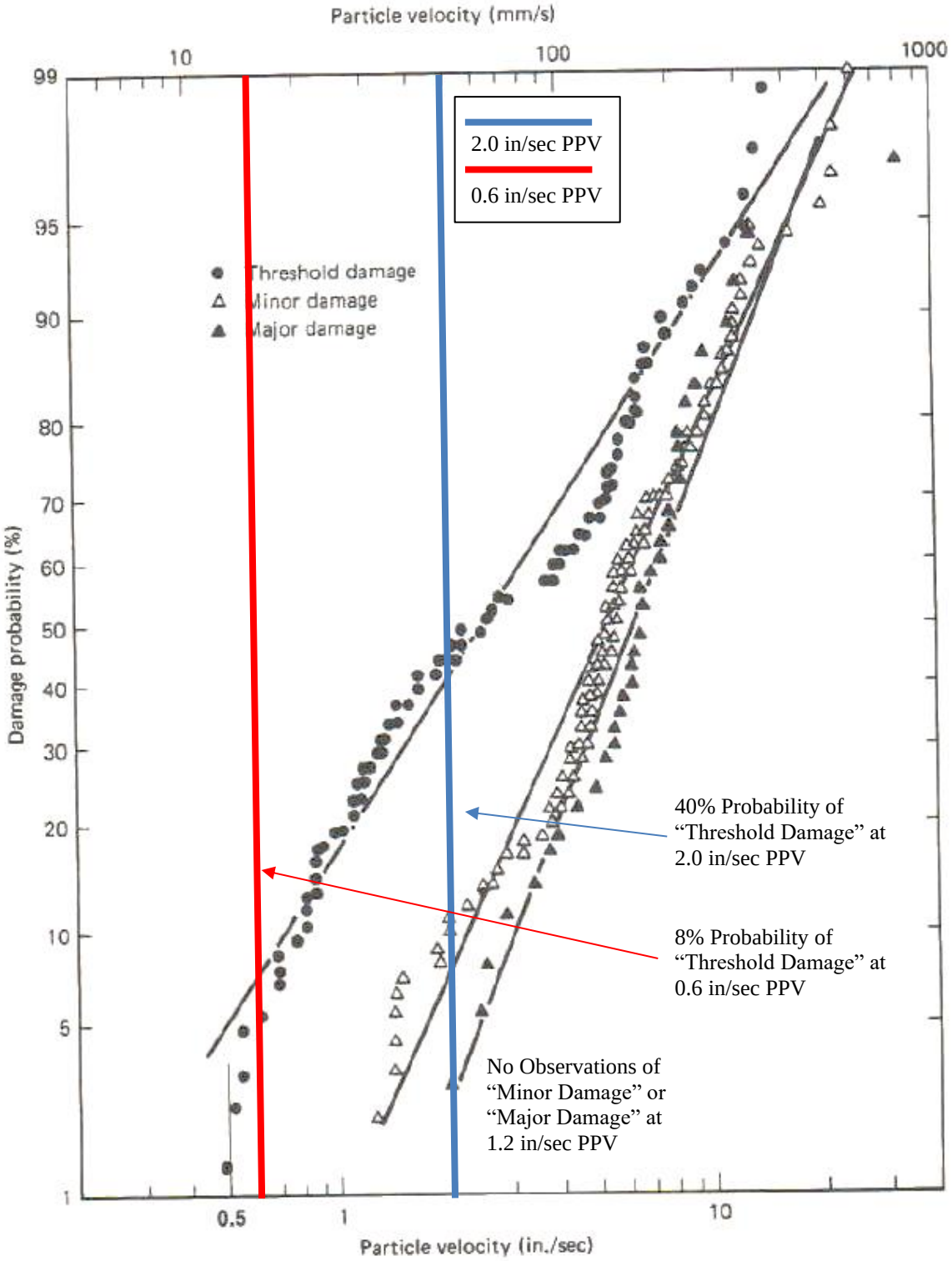
Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., March 2020.

A study completed by the U.S. Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[3] The findings of this study have been applied to buildings affected by construction-generated vibrations.[4] As reported in USBM RI 8507[3] and reproduced by Dowding,[4] Figure 6 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 6, maximum vibration levels of 2.0 in/sec PPV would result in a 40% chance of threshold damage or cosmetic damage, about 8% chance of minor damage, and about 3% chance of major damage. At 0.6 in/sec PPV, no minor or major damage would be expected, and there would be a about 8% chance of threshold damage or cosmetic damage.

[3] 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.

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

FIGURE 6 Probability of Cracking and Fatigue from Repetitive Loading



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

Vibratory pile driving could potentially exceed the threshold of 0.08 in/sec PPV for historical building and 0.2 in/sec PPV for non-historical buildings at buildings to the north, to the east, to the south, and to the southwest of the project. Additionally, the vibratory roller used along the northern boundary of the project site would potentially exceed the threshold of 0.08 in/sec PPV for historical building and 0.2 in/sec PPV for non-historical buildings at both structures adjoining the site to the north. Other construction equipment, including clam shovel drop, hoe ram, large bulldozer, caisson drilling, and loaded trucks would have the potential to produce vibration levels exceeding 0.2 in/sec PPV at the non-historical building to the north. This is a significant impact.

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

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 20 feet of any adjacent building.

- Document conditions at all structures located within 125 feet of construction and at historic structures historical structures located within 200 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 200 feet of any high impact construction activities, such as vibratory pile driving, and 75 feet of other construction activities identified as sources of high vibration levels.

  - Performance of a photo survey, elevation survey, and crack monitoring survey for each structure of normal construction within 125 feet of any high impact construction activities and/or within 30 feet of other construction activities identified as sources of high vibration levels and each historic structure within 200 feet of vibratory pile driving activities and/or within 75 feet of other 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.

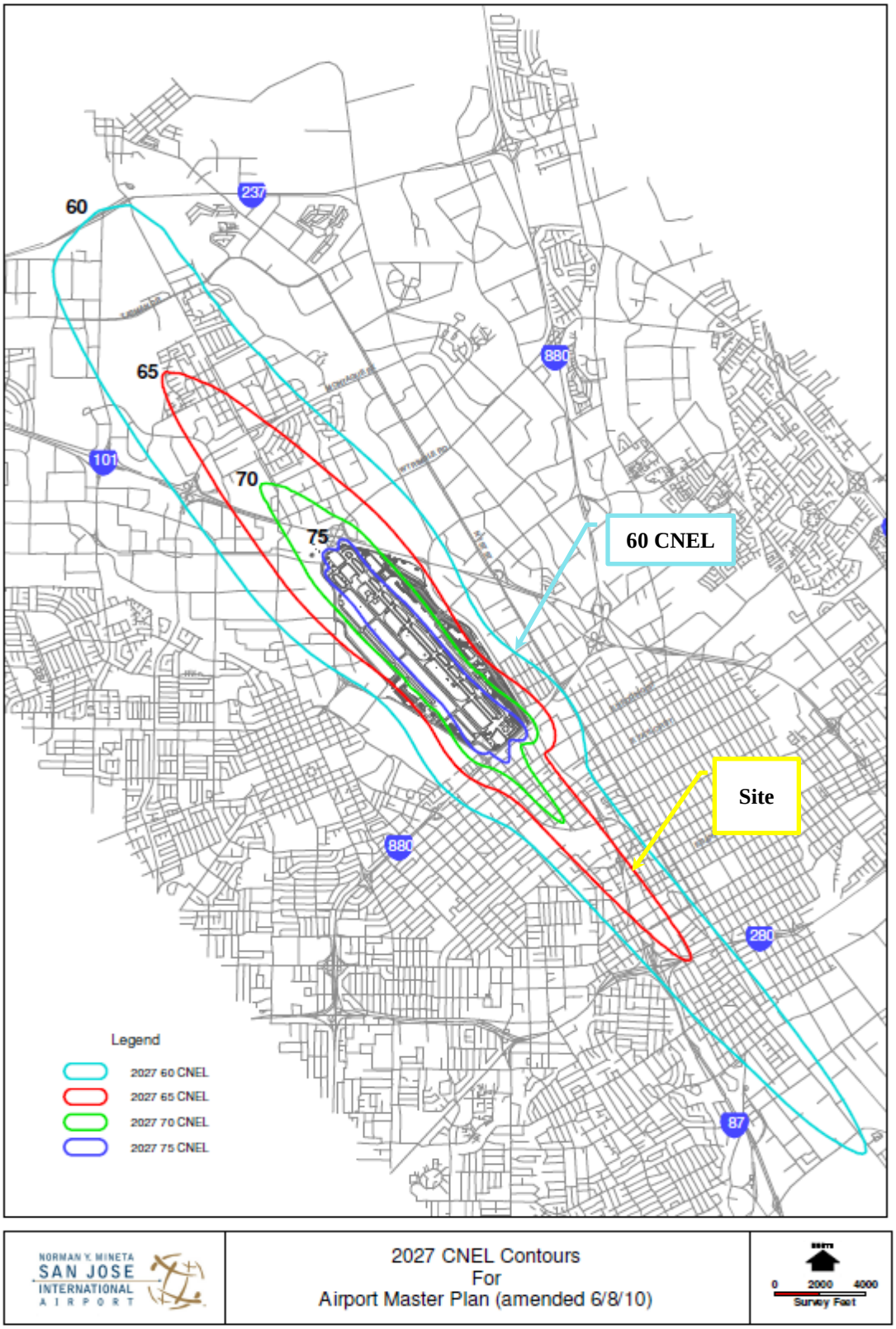
Norman Y. Mineta San José International Airport is a public-use airport located approximately 1.5 miles northwest of the project site. The project site lies near the 65 dBA CNEL 2027 noise contour for the airport, according to the Norman Y. Mineta San José International Airport Master Plan Update Project[5] report published in May 2018 as an addendum to the Environmental Impact Report (see Figure 7). Future exterior noise levels due to aircraft from Norman Y. Mineta San José International Airport would be about 65 dBA CNEL at the project site. 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 ranging from 60 to 65 dBA DNL, the future interior noise levels resulting from aircraft would range from 45 to 50 dBA DNL. Therefore, to meet the 45 dBA DNL threshold for residential land uses, the proposed project would require a suitable form of forced-air mechanical ventilation so that windows can be kept closed at the occupant's discretion. Assuming the implementation of forced-air mechanical ventilation, the proposed project would be compatible with the City's interior noise standards for aircraft noise. This would be a less-than-significant impact.

Mitigation Measure 3: **None required.**

5 City of San José, "Norman Y. Mineta San José International Airport Master Plan Update Project: Twelfth Addendum to the Environmental Impact Report," City of San José Public Project File No. PP 18-059, May 25, 2018.

FIGURE 7 65 CNEL Noise Contour for SJIA (2027) Relative to Site



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.* Therefore, no further cumulative traffic noise increases would occur due to the proposed project.

Planned temporary construction projects in the vicinity of the project site include the following:

- **Almaden Corner Hotel** – this project is located at the corner of North Almaden Boulevard and West Santa Clara Street, which is one block and approximately 325 feet south of the Carlysle project site. This project plan has been approved but not yet built. This approved project would include the construction of a 19-story hotel with 272 guest rooms. Potentially, the Almaden Corner Hotel and the Carlysle could have an overlapping period of construction or could be constructed consecutively. The residential building located south of Carlysle would be exposed to direct construction activity from both of these sites. With the inclusion of Mitigation Measures 1a and 2 in this report and those provided in the Environmental Impact Report (EIR) for the Almaden Corner Hotel, noise and vibration impacts due to cumulative construction would be reduced, but considering the size of each project and the length of time each construction project would take, this would be a significant and unavoidable cumulative noise impact for the receptors in the immediate vicinity.

- **Silvery Towers** – this project is located southeast of the West St. James Street/Terraine Street intersection and is approximately 350 feet northeast of the project site. This project is currently under construction. This 22-story building would be completed by the time the proposed project would start. This is not expected to result in a significant cumulative noise impact.

- **Davidson Building** – this project is located northwest of the West St. James Street/Terraine Street intersection and is approximately 745 feet northeast of the project site. This project proposes the demolition of the existing office building and the construction of a 14-story office building. This project is in the planning review phase. This project also has the potential to occur simultaneously or consecutively with the proposed Carlysle project. However, the immediate receptors exposed to construction noise and vibration impacts for the Davidson Building project would not be the same direct receptors for the Carlysle. Respective mitigation measures for each project should reduce the construction noise and vibration impacts of each project to a less-than-significant level and should not result in a significant cumulative noise impact.

All other planned development projects in the downtown area would be located 900 feet or more from the project site and would not share impacted receptors with the proposed project. No further cumulative impacts would be expected.