

BLOCK 8 ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The Block 8 project proposes to demolish an existing surface parking lot and construct a mixed-use office building of up to 20 stories (up to 295 feet tall with mechanical parapet) at 282 S. Market Street in San José, California. The total floor area of the building would be up to 1,049,845 square feet. The building would include up to 16,375 square feet of commercial uses on the ground floor, 627,210 square feet of office uses on the first floor and floors 8 through 19, and parking on floors 2 through 7.¹ The project could include two levels of underground parking if the maximum amount of development identified is constructed. Sky gardens are proposed on floors 17 and 19.

The project is bound by the Casa del Pueblo Residential Tower and the Montgomery Hotel to the north, S. 1st Street to the east, W. San Carlos Street to the south, and Market Street to the west. Santa Clara Valley Transportation Authority (VTA) light rail trains run along W. San Carlos Street to the south and S. 1st Street to the east. Land uses in the project vicinity also include mixed-use commercial buildings to the south across W. San Carlos Street, the San José Civic and Plaza de César Chávez to the west across S. Market Street, and the Robert F. Peckham United States Courthouse and Federal Building to the east across S. 1st 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, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency – Noise and Land use Compatibility 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 the identified 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.

¹ The stated commercial and office square footages represent the leasable square footage and includes the area that can be occupied by tenants. The stated commercial and office square footages do not include elevator shafts or back of house/building equipment/maintenance space.

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	
	10 dBA	Broadcast/recording studio
	0 dBA	

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

Fundamentals of Groundborne Vibration

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

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

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

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

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

Railroad and light-rail operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of railroad track. People’s response to ground vibration has been correlated best with the velocity of the ground. The velocity of the

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

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

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

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	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.

TABLE 4 Typical Levels of Groundborne Vibration

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

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

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 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 ($L_{eq(1-hr)}$) 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. <u>Residential:</u> 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:

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:

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						

¹Noise 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.

City of San José Municipal Code. The City’s Municipal Code contains a Zoning Ordinance that limits noise levels at adjacent properties. Chapter 20.30.700 states that sound pressure levels generated by any use or combination of uses on a property shall not exceed 55 dBA at any property line shared with land zoned for residential use, except upon issuance and in compliance with a Conditional Use Permit. Chapter 20.100.450 of the Municipal Code establishes allowable hours

of construction within 500 feet of a residential unit between 7:00 am and 7:00 pm Monday through Friday unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

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-2.1** Near light and heavy rail lines or other sources of ground-borne vibration, minimize vibration impacts on people, residences, and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration. Require new development within 100 feet of rail lines to demonstrate prior to project approval that vibration experienced by residents and vibration sensitive uses would not exceed these guidelines.

- 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 W. San Carlos Street, between S. Market Street and S. 1st Street, in the downtown area of San José, California. The site is surrounded by residential and commercial mixed-use buildings, hotels, a U.S. District Courthouse, the San José Civic, and Plaza de César Chávez.

A noise monitoring survey was performed in the vicinity of the project site beginning on Wednesday, March 13, 2019 and concluding on Friday, March 15, 2019. The monitoring survey included one long-term noise measurement (LT-1) and one short-term noise measurement (ST-1), as shown in Figure 1. The noise environment at the site results primarily from vehicular traffic along S. 1st Street, W. San Carlos Street, and S. Market Street. VTA trains run frequently between the hours of 4:30 am and 12:30 am daily and sound warning bells near the site. Distant traffic along I-280 and SR 87 and occasional overhead aircraft associated with the Mineta San José International Airport also contribute to the noise environment in the area.

Long-term noise measurement LT-1 was made at a distance of approximately 40 feet from the center of S. 1st Street and approximately 15 feet from the center of the VTA light rail tracks. Hourly average noise levels typically ranged from 66 to 73 dBA L_{eq} during the day and from 59 to 71 dBA L_{eq} at night. The day-night average noise level on Thursday, March 14, 2019 was 75 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures 2 through 4.

Short-term noise measurement ST-1 was made to quantify noise levels at the center of the proposed project. The measurement was made approximately 170 feet north of the W. San Carlos Street centerline and 165 feet west of the S. 1st Street centerline. The primary noise source was local traffic, which generated noise levels typically between 60 and 65 dBA. Several overhead jets generated maximum instantaneous noise levels that ranged from 68 to 72 dBA. Table 5 summarizes the short-term noise measurement results.

FIGURE 1 Noise Measurement Locations

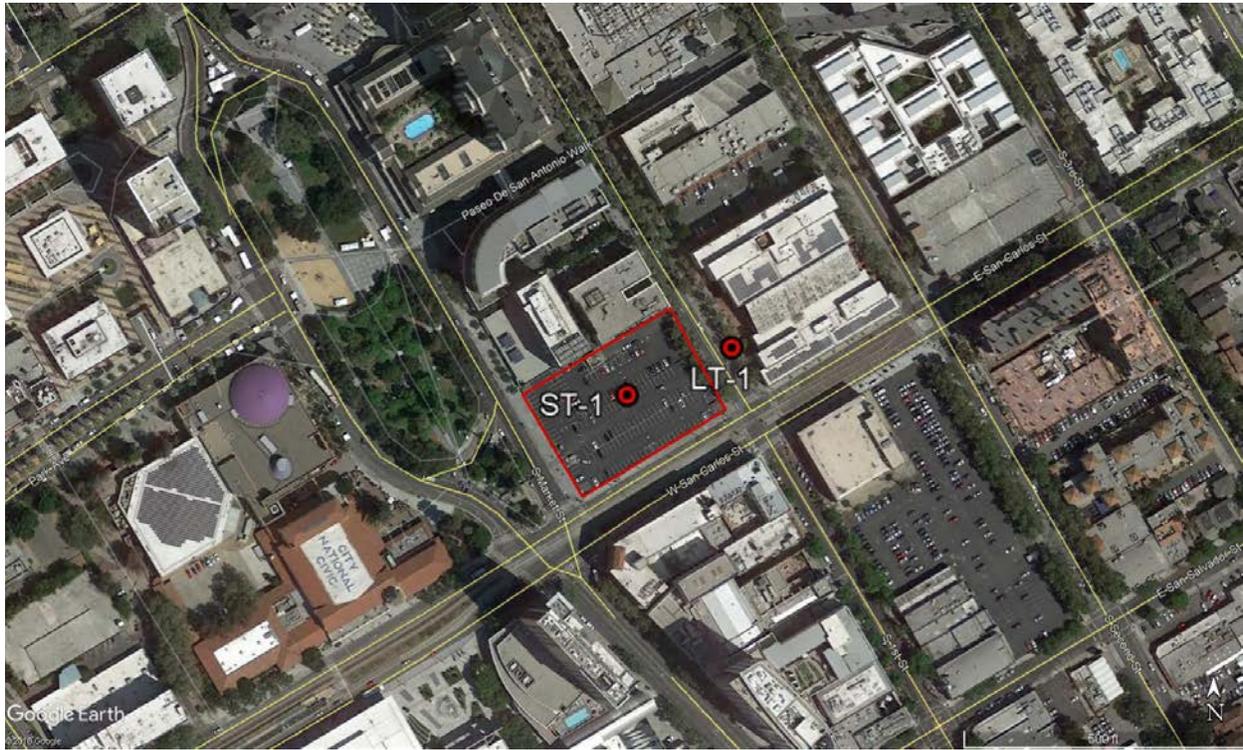


TABLE 5 Summary of Short-Term Noise Measurement Data

Noise Measurement Location (Date, Time)	L _{max}	L ₍₁₎	L ₍₁₀₎	L ₍₅₀₎	L ₍₉₀₎	L _{eq(10-min)}
ST-1: Center of Project Site (3/13/2019, 12:30 p.m. - 12:40 p.m.)	73	72	65	59	57	62

**Noise Levels at Noise Measurement Site LT-1
~ 40 feet east of S. 1st Street Centerline
Wednesday, March 13, 2019**

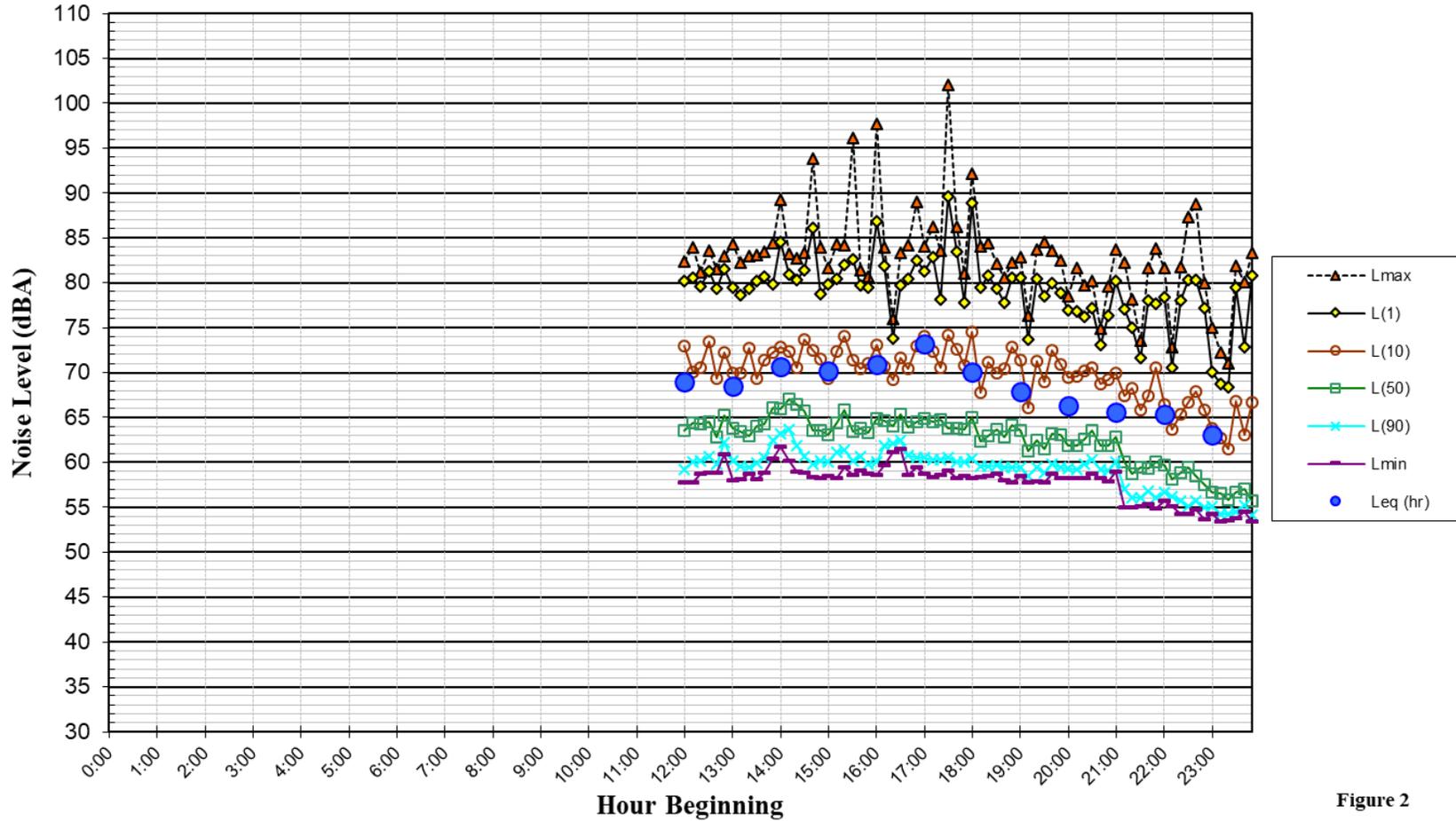


Figure 2

**Noise Levels at Noise Measurement Site LT-1
~ 40 feet east of S. 1st Street Centerline
Thursday, March 14, 2019**

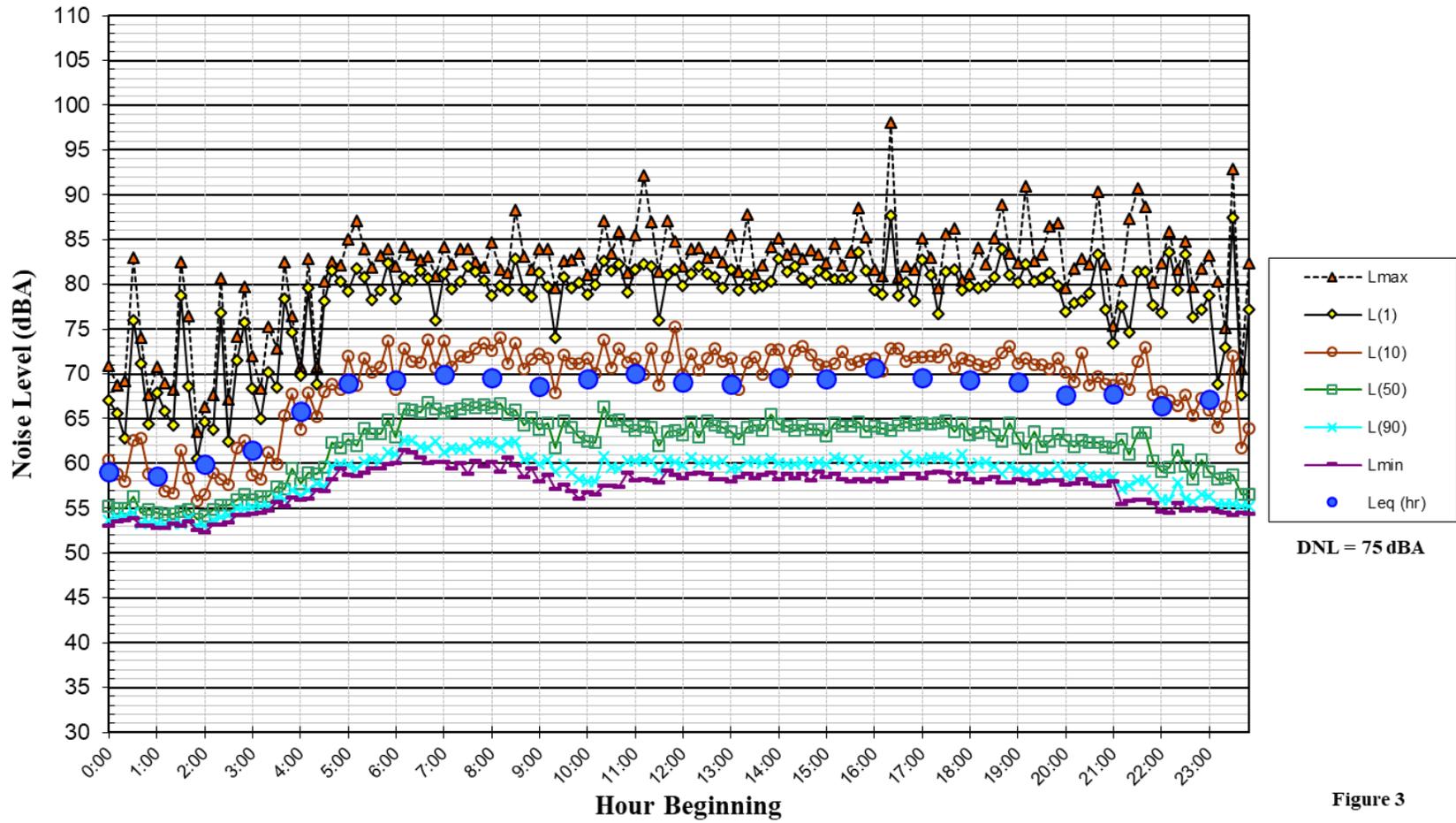


Figure 3

**Noise Levels at Noise Measurement Site LT-1
~ 40 feet east of S. 1st Street Centerline
Friday, March 15, 2019**

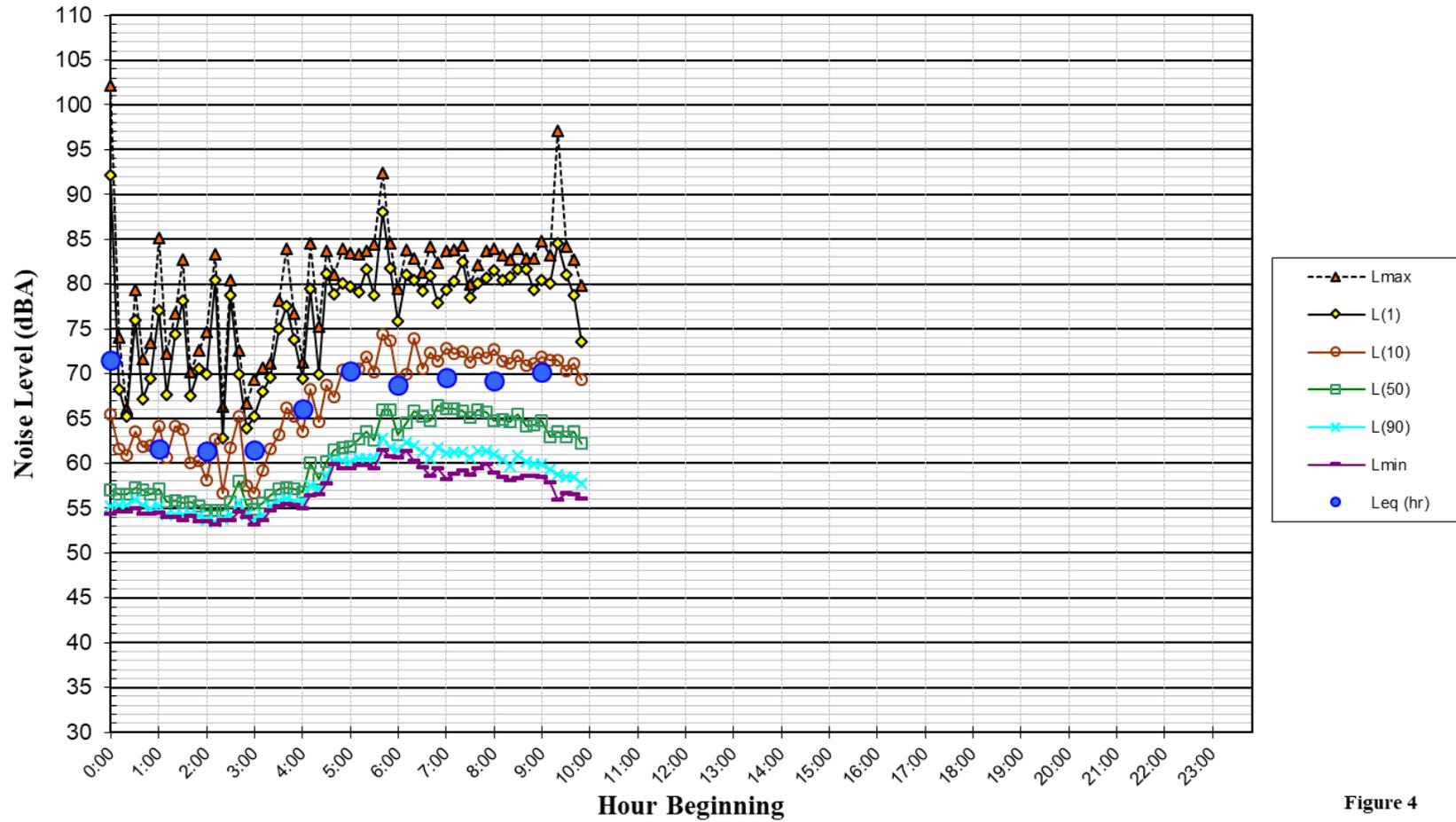


Figure 4

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 70 dBA DNL or less for the proposed office land use.
- The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq(1-hr)}$) of 50 dBA in occupied areas of non-residential uses during any hour of operation.

The future noise environment at the project site would continue to result primarily from local vehicular traffic and overhead aircraft. Based on a review of the traffic volumes contained in the *Downtown San José Strategy Plan 2040 EIR*², noise levels at the project site are anticipated to increase by 3 dBA DNL above existing conditions by 2040. Therefore, future noise are anticipated to be up to 78 dBA DNL at the exterior of the office building.

Future Exterior Noise Environment

The exterior noise threshold established in the City's General Plan for new office buildings is 70 dBA DNL at usable outdoor activity areas. According to the site plans dated July 19, 2019, outdoor sky gardens will be located on floors 17 and 19.

The ambient noise at the project site is best represented by long-term measurement LT-1, which recorded a day-night average noise level of 75 dBA DNL on Thursday, March 14, 2019. Since the outdoor sky gardens are elevated and thus setback at a greater distance from local traffic, and shielded from the direct view of the roadway by the building itself, noise levels would be below 70 dBA DNL. Overhead aircraft will periodically contribute to the noise environment but will not produce noise levels that exceed 65 dBA CNEL (see Noise Impact 3). The future noise environment at proposed outdoor spaces would be compatible with the City's General Plan threshold for exterior noise levels.

Future Interior Noise Environment

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

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

Day-night average noise levels at ground level of the building exterior are expected to be up to 78 dBA DNL. Since office spaces are located on floors 8 to 19, noise levels at office space exteriors will be up to approximately 73 dBA DNL.

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

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).

For consistency with the Cal Green Code, the following Conditions of Approval will be implemented by the project applicant:

- Provide forced-air mechanical ventilation to maintain interior noise levels at acceptable levels. A qualified acoustical specialist shall prepare a detailed analysis of interior noise levels resulting from all exterior sources during the final design phase of the project pursuant to requirements set forth in the General Plan and State Building Code. The study will review the final site plan, building elevations, and floor plans prior to construction and confirm building treatments necessary to reduce interior noise levels to 50 dBA $L_{eq(1-hr)}$ or lower, and address and adequately control noise from rooftop equipment on adjacent buildings, as necessary. Treatments would include, but are not limited to, sound-rated windows and doors as specified above, acoustical caulking, protected ventilation openings, etc. 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.

Vibration and Land Use Compatibility

The U.S. Department of Transportation, Federal Transit Administration's (FTA) vibration impact assessment criteria³ were used to evaluate vibration levels produced by light-rail trains at the project site. The FTA vibration impact criteria are based on maximum overall levels for a single event. Note that there are criteria for frequent events (more than 70 events of the same source per day), occasional events (30 to 70 vibration events of the same source per day), and infrequent events (less than 30 vibration events of the same source per day).

The frequency of the VTA light-rail trains would place the level of train activity in the "frequent events" category and the applicable threshold is 75 VdB for institutional land uses with primarily daytime use. Based on information presented in the FTA Generalized Ground Surface Vibration Curves⁴, vibration levels would be 65 VdB or less at a distance of 50 feet from the centerline of

³U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

the VTA light-rail train tracks assuming a travel speed of 20 mph or less. The nearest track switch (a movable section of special trackwork that enables a train to change direction depending on how the switch is set) is located approximately 50 feet from the project site, therefore, a +10 dB switch adjustment was included in the calculations resulting in vibration levels of up to 75 VdB outside the building. Vibration levels within the building would be about 10 dB less than vibration levels outside the building because of a coupling loss between the building and the ground (the heavier the building construction, the greater the coupling loss). Vibration levels due to light-rail trains are calculated to be 65 VdB or less, which is below the 75 VdB threshold level. Persons at rest may perceive the vibration; however, vibration controls are not required.

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. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise impact.

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

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project 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 receptors in the project vicinity would be represented by ST-1 and LT-1, which ranged from 62 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 highest maximum noise levels generated by project construction would typically range from about 80 to 90 dBA L_{max} at a distance of 50 feet from the noise source. A list of typical maximum instantaneous noise levels measured at 50 feet are provided in Table 6. Typical hourly average construction-generated noise levels for office buildings are about 78 to 89 dBA L_{eq} measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.), as shown in Table 7. 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 6 Construction Equipment 50-Foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)^{1,2}	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor ³	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes:

¹ Measured at 50 feet from the construction equipment, with a “slow” (1 sec.) time constant.² Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.³ Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

TABLE 7 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
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.

Construction of the project is estimated to take approximately 34 months starting as early as February 2021 and concluding as early as December 2023. Table 8 summarizes the equipment expected to be used during each phase of construction and the duration of each construction phase. For each phase, the equipment shown in Table 8 was input 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 8. These levels do not assume reductions due to intervening buildings or existing barriers.

The majority of construction would occur during daytime hours, however, concrete pouring is anticipated to occur throughout the night for approximately four days of construction and within the early morning and/or evening hours for approximately 40 days of construction. During concrete pouring, several concrete pumps would be operational while concrete trucks would be traveling to and from the project site.

As shown in Table 8, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more at various times throughout construction. Since project construction would last for a period of more than one year and considering that the project site is within 200 feet of existing residential uses, this temporary construction impact would be considered significant in accordance with Policy EC-1.7 of the City’s General Plan.

TABLE 8 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Total Work Days	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
		Residences and Hotel to the North (100 ft)	Residences and Hotel to the South (210 ft)	Courthouse to the East (225 ft)	Theater to the West (375 ft)
Demolition	4	79	72	72	67
Site Preparation	5	76	69	69	64
Shoring	15	75	69	68	64
Grading/Excavation	117	81	74	74	69
Trenching	15	72	66	65	61
Concrete Pouring	306	76	69	69	64
Building Exterior/Steel	540	76	70	69	65
Building Interior/Architectural Coating	300	74	67	67	62

In addition to the construction equipment listed per construction phase, a number of truck trips are anticipated to occur to and from the project site, particularly during the grading and excavation phase and concrete pouring phase. During the grading and excavation phase, it is estimated that approximately 80,000 cubic yards of soil and 725 tons of pavement will be removed from the project site. Based on the California Emissions Estimator Model (CalEEMod) output for the air quality and greenhouse gas assessment of the project⁴, approximately 10,000 truck hauling will be required. This is anticipated to occur over a span of 117 days, equating to approximately 85 truck trips per day, or 10 to 11 truck trips per hour. Noise levels from the hauling truck trips were modeled in the FHWA’s Traffic Noise Model (TNM) Model 2.5. Based on a rate of 11 truck trips per hour, noise levels at a distance of 40 feet were calculated to be up to 56 dBA L_{eq} . As discussed in the Setting Section, hourly average noise levels at a distance of 40 feet from S. 1st Street (LT-1) typically range from 66 to 73 dBA L_{eq} . By comparing the predicted noise levels of hauling trucks in the FHWA TNM model to existing ambient noise levels measured at LT-1, the hauling truck trips will not significantly increase traffic noise levels near the project site.

During the concrete pouring phase, it is anticipated that approximately 4,000 truck trips would be required over a span of approximately 306 days. This equates to approximately 13 truck trips per day, or less than two truck trips per hour. While the total number of truck trips are not anticipated to significantly increase the surrounding noise environment when compared to existing traffic conditions,⁵ truck trips should be controlled to limit noise exposure to receptors located near the project site as well as receptors located along surrounding roadways.

The potential short-term noise impacts associated with the project would be mitigated by General Plan Policy EC-1.7. This policy states:

⁴Illingworth & Rodkin, Inc., “Block 8 Air Quality and Greenhouse Gas Emission Assessment,” March 23, 2020.

⁵Hexagon Transportation Consultants, Inc., “Block 8 Mixed-Use Development Local Transportation Analysis,” November 5, 2019.

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.

A typical construction noise logistics plan would include, but not be limited to, the following measures to reduce construction noise levels as low as practical:

- Limit construction truck traffic to truck routes and avoid sensitive land uses where feasible. Configure a traffic pattern on the project site to minimize truck backing movements;
- 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;
- Prohibit impact, sonic, or vibratory pile driving methods. Drilled piles cause lower noise levels where geological conditions permit their use;
- Prepare a Relocation Plan that describes the process to temporarily relocate residents at the Casa del Pueblo Residential Tower and St. Claire Apartments that have direct line of sight to the construction site for the duration of the 24-hour concrete pouring construction phase. The Plan would describe the process to temporarily relocate residents, describe the alternative housing options, and describe the proposed timing of relocation. If said

residents request relocation, the applicant shall provide a copy of the Relocation Plan and implement the plan if requested;

- A temporary noise control blanket barrier could be erected, if necessary, along building facades facing construction sites. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling or temporary relocation. Noise control blanket barriers can be rented and quickly erected;
- 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.

The potential short-term noise impacts associated with construction would be mitigated by the implementation of the above policy that requires reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity to minimize the exposure of neighboring properties. Policy EC-1.7 in combination with the limitations on hours set forth in the Municipal Code, would reduce the impact 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 "conditionally 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 at four intersections in the vicinity of the project site. The traffic study also included peak hour project trips, which when added to the existing volumes provided existing plus project peak hour turning movements. 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 could generate noise in excess of standards established in the City's General Plan at the nearby sensitive receptors. This is a **potentially significant impact**.

Permanent Noise Increase due to Project Mechanical Equipment

High-rise structures typically include various mechanical equipment for heating, ventilation, and air-conditioning needs. Site plans indicate that the main electrical room and generator room will be enclosed on the north side of floor one. Both rooms will be encased with a concrete finish and will include metal panel doors. Additional mechanical equipment, including the boiler room, chiller room, and cooling tower will be located on level 20 and entirely surrounded by mechanical screens. At the time of this analysis, the specific mechanical equipment has not been selected, nor were specific details such as manufacturer's noise data for such equipment available. Under the City's Noise Element, noise levels produced by the operation of the mechanical equipment would be limited to 55 dBA DNL at receiving noise-sensitive land uses. Given that the mechanical equipment is entirely enclosed within the building, it is not anticipated that noise from mechanical equipment would exceed 55 dBA DNL at noise-sensitive land uses near the project site. However, due to the number of variables inherent in the mechanical equipment needs of the project, the impacts of mechanical equipment noise on nearby noise-sensitive uses should be assessed during the final project design stage. The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts.

Mitigation Measure 1c:

Prior to the issuance of building permits, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's 55 dBA DNL requirement. A qualified acoustical consultant shall be retained by the project applicant to review mechanical noise as the equipment systems are selected in order to determine specific noise reduction measures necessary to reduce noise to comply with the City's noise limit at the shared property lines. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and/or installation of noise barriers, such as mechanical equipment screens or enclosures.

Impact 2: Generation of Excessive Groundborne Vibration. Construction-related vibration levels are not expected to exceed applicable vibration thresholds at nearby sensitive land uses. **This is a less-than-significant impact.**

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

According to Policy EC-2.3 of the City of San José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. Table 9 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

Credible worst-case vibration levels were calculated at the nearest buildings surrounding the site, as measured from the project's boundaries. These vibration levels are shown in Table 9. The nearest existing buildings to the project site would be the Four Points by Sheraton Hotel (formerly the historic Montgomery Hotel) and the Casa del Pueblo Residential Tower that share the property line to the north. Based on previous assessments by Illingworth & Rodkin, Inc. and the inventory of historically documented buildings in the City of San José⁶, the Four Points by Sheraton is documented as a historic structure. Therefore, a significant impact would occur if this building is exposed to vibration levels exceeding 0.08 in/sec PPV. Additional structures of normal conventional construction within close proximity include the Casa del Pueblo Residential Tower, the Robert F. Peckham Federal Building and Courthouse to the east, and the Westin San José and multi-family residential buildings to the south. A significant impact would occur if these buildings are exposed to vibration levels exceeding 0.2 in/sec PPV.

Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity of existing properties adjoining the site. Some activities would occur at distances as close as 5 feet, and at this distance, vibration levels due to construction are conservatively calculated to reach up to 1.233 in/sec PPV, which would exceed the 0.2 in/sec PPV threshold for historical structures and buildings of normal conventional construction.

⁶ <http://www.sanjoseca.gov/DocumentCenter/View/35475>

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Buildings (in/sec PPV)				
		Residential Building (5 feet)	Historic Structure (5 feet)	Courthouse (90 feet)	Hotel and Residential Building (100 feet)	
Clam shovel drop	0.202	1.186	1.186	0.049	0.044	
Hydromill (slurry wall)	In soil	0.008	0.047	0.047	0.002	0.002
	In rock	0.017	0.100	0.100	0.004	0.004
Vibratory Roller	0.210	1.233	1.233	0.051	0.046	
Hoe Ram	0.089	0.523	0.523	0.022	0.019	
Large bulldozer	0.089	0.523	0.523	0.022	0.019	
Caisson drilling	0.089	0.523	0.523	0.022	0.019	
Loaded trucks	0.076	0.446	0.446	0.019	0.017	
Jackhammer	0.035	0.206	0.206	0.009	0.008	
Small bulldozer	0.003	0.018	0.018	0.001	0.001	

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., November 2019.

The Downtown Strategy 2040 Plan refined the categories and thresholds set forth in Policy EC-2.3, establishing seven separate categories to assess the potential for significant impacts from construction vibration. The first two categories in Table 10 (Categories 1 and 2) address human perceptibility of vibration only. The five remaining categories (Categories 3-7) address human perceptibility and potential for damage to buildings described as “Extremely fragile historic buildings, ruins, ancient monuments”, “Fragile buildings”, “Historic and some old buildings”, “Older residential structures”, “New residential structures”, and “Modern industrial/commercial buildings”. As shown in Table 9, the worst-case vibration levels produced by construction of the project would be up to 1.233 in/sec PPV, which would fall under Category 7. For projects that produce vibration levels falling under Category 7, there is a risk of damage to new residential and modern commercial/industrial structures. Since vibration levels may be above 0.08 in/sec PPV at the Four Points Sheraton historical structure in the vicinity and above 0.2 in/sec PPV at the Casa del Pueblo Residential Tower, this would be a potentially significant impact.

TABLE 10 Construction Vibration Annoyance and Damage Potential Threshold Criteria

Category	Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
1	0.01	Barely perceptible	No effect
2	0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
3	0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
4	0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
5	0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
6	0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
7	0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

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

Mitigation Measure 2:

The following measures are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- Prohibit impact, sonic, or vibratory pile driving methods. Drilled piles cause lower vibration levels where geological conditions permit their use.
- Limit other vibration-inducing equipment to the extent feasible.
- A list of all heavy construction equipment to be used for this project known to produce high vibration levels (tracked vehicles, vibratory compaction, jackhammers, hoe rams, etc.) shall be submitted to the City by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort for reducing vibration levels below the thresholds.
- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.
- Use smaller equipment to minimize vibration levels below the limits.
- Avoid using vibratory rollers and tampers near sensitive areas.

- Select demolition methods not involving impact tools.
- Modify/design or identify alternative construction methods to reduce vibration levels below the limits.
- Avoid dropping heavy objects or materials.
- Notify neighbors within 500 feet of the construction site of the construction schedule and that there could be noticeable vibration levels during project construction activities.
- A construction vibration monitoring plan shall be implemented to document conditions prior to, during, and after construction. All plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry-accepted standard methods. The construction vibration monitoring plan should be implemented to include the following tasks:
 - Identification of sensitivity to ground-borne vibration of the Montgomery Hotel and Casa Del Pueblo Residential Tower. A vibration survey (generally described below) would need to be performed by a qualified acoustical consultant, licensed historical architect, or licensed Professional Structural Engineer in the State of California.
 - Performance of a photo survey, elevation survey, and crack monitoring survey for each of these structures. Surveys shall be performed prior to any construction activity, in regular interval during construction, and after 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.
 - Development of 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. Alternative construction methods would be identified for when vibration levels approach the limits that are stated in the General Plan such as Policy EC-2.3.
 - If vibration levels approach limits, suspend construction and implement alternative construction methods to either lower vibration levels or secure the affected structures.
 - Conduct post-survey on structures where either monitoring has indicated high levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.
 - The results of all vibration monitoring shall be summarized and submitted in a report shortly after substantial completion of each phase identified in the project

schedule. The report will include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations. An explanation of all events that exceeded vibration limits will be included together with proper documentation supporting any such claims.

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

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

Impact 3 Exposure of Residents or Workers to Excessive Noise Levels in the Vicinity of a Private Airstrip or an Airport Land Use Plan. The project site is located 2 miles of the Norman Y. Mineta International Airport but is considered normally acceptable under the Santa Clara County ALUC noise compatibility policies for office land uses. This is a **less-than-significant** impact.

Norman Y. Mineta San José International Airport is a public-use airport located approximately 2 miles northwest of the project site. The project site lies within the 65 dBA CNEL 2027 noise contour for the airport, according to the Norman Y. Mineta San José International Airport Master Plan Update Project⁷ report published in May 2018 as an addendum to the Environmental Impact Report (see Figure 5). Future exterior noise levels due to aircraft from Norman Y. Mineta San José International Airport would be between 60 to 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. This would be a less-than-significant impact.

Mitigation Measure 3: None required.

⁷ 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 5 65 CNEL Noise Contour for SJIA (2027) Relative to Site

