MARRIOTT TOWNEPLACE SUITES NOISE AND VIBRATION ASSESSMENT

San José, California

June 16, 2020
Updated November 2, 2020

Prepared for:

Pooja Nagrath
Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Steve J. Deines
Dana M. Lodico, PE, INCE Bd. Cert.

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400

Project: 19-224

INTRODUCTION

The project proposes the demolition of six existing buildings and two sheds and the construction of a 177,084 square foot, eight-story Marriott hotel building at 495 West San Carlos Street in the Delmas neighborhood of downtown San José, California. The hotel building would feature 175 rooms, three floors of above-ground parking making up 119 spaces, a fourth-floor open air courtyard, and a rooftop terrace. The maximum height of the building would reach 84.5 feet with parapets up to 95 feet.

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

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* (L_{dn} or *DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA DNL with open windows and 65 to 70 dBA DNL if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and

interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a DNL of 60 to 70 dBA. Between a DNL of 70 to 80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

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 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.

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

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.

Regulatory Background - Noise

The State of California, Santa Clara County, and the City of San José have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, California Building Code, Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan, and the City of San Jose General Plan are used to assess the potential significance of impacts. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. 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; or

(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 attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

2019 California Green Building Standards Code (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). Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. 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 Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan 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:

<u>4.3.2.1 Noise Compatibility Policies</u>

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (2022 Aircraft Noise Contours).

Policy N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed use

residential project or a multi-unit residential project. (Sound wall noise mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

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 hotel 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 hotel projects, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies, stoops, and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all guests. 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.

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.

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.

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

Regulatory Background – Vibration

City of San José 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 0.6-acre project site is located is located at 495 West San Carlos Street in the Delmas neighborhood of downtown San José, California. Existing multifamily residences adjoin the site to the northwest and northeast. Existing commercial uses adjoin the site to the east and are located across West San Carlos Street to the southeast and Josefa Street to the southwest.

Due to the COVID-19 pandemic, a current noise monitoring survey which would characterize the noise environment of the site was unable to be conducted for this study. Based on review of Google Earth and the 2040 San José Downtown Strategy Environmental Impact Report (EIR), the existing noise environment at the project site and in the surrounding area results primarily from local vehicular traffic along West San Carlos Street. At upper stories with reduced shielding from surrounding structures, vehicular traffic along State Route 87 (SR 87) and Interstate 280 (I-280) also act as primary noise sources. Secondary noise sources include vehicular traffic along Josefa Street and aircraft associated with the Norman Y. Mineta San José International Airport. The San José Diridon Station rail depot and railroad tracks used by Caltrain, the Valley Transportation Authority, Amtrak, Union Pacific, and the Altamont Corridor Express are located approximately 1,100 feet west of the project site. At this distance, train noise is not anticipated to significantly contribute to the noise environment at the site. The Federal Transportation Authority's Transit Noise and Vibration Impact Assessment Manual estimates noise exposure from railroad lines at a distance of 800 feet and up to be 45 dBA DNL.

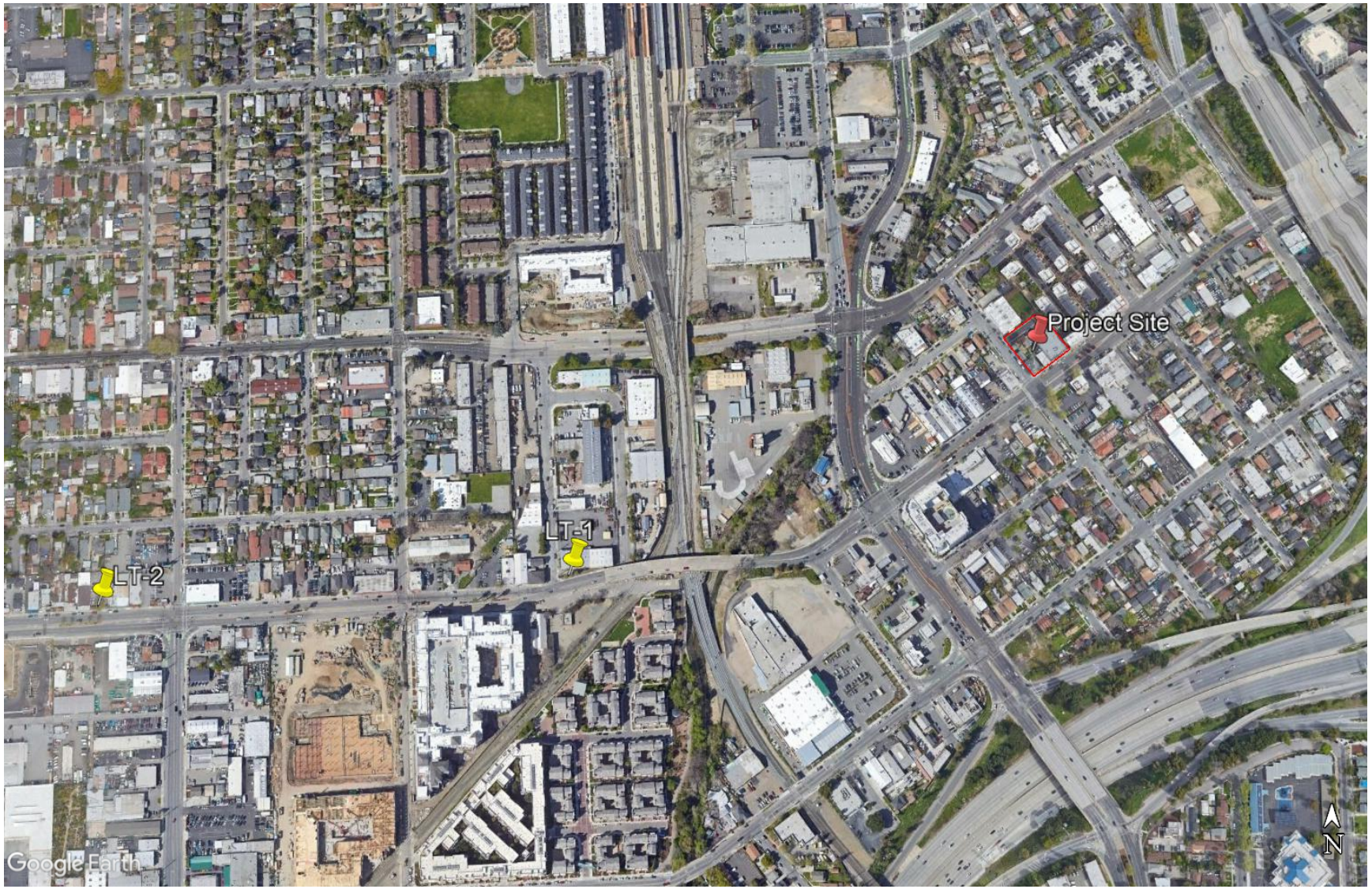
The 2040 San José Downtown Strategy EIR provides measurement data for a long-term receptor positioned on a light pole and 45 feet from the centerline of West San Carlos Street, 190 feet from the nearest railroad track, and approximately 1,750 feet southwest of the project site. Data at this location was collected from Wednesday, February 21, 2018 through Friday, February 23, 2018. Hourly average noise levels at this location typically ranged from 67 to 75 dBA L_{eq} during the day and from 58 to 69 dBA L_{eq} at night. The day-night average noise level was 73 dBA DNL originating from both traffic on San Carlos Street and nearby rail operations. The location of this measurement relative to the project site is shown as LT-1 in Figure 1.

Illingworth & Rodkin, Inc. conducted an additional long-term noise measurement approximately 55 feet from the centerline of West San Carlos Street and approximately 3,300 feet west of the project site. Data at this location was collected from Tuesday, March 1, 2016 through Thursday, March 3, 2016. Hourly average noise levels ranged from 63 to 69 dBA L_{eq} during the day and from 53 to 66 dBA L_{eq} at night. The day-night average noise level was 69 dBA DNL. The location of this measurement relative to the project site is shown as LT-2 in Figure 1. Noise levels at locations LT-1 and LT-2 are anticipated to be higher than those at the project site due to decreased traffic volumes as West San Carlos Street continues east, towards the site, and past Lincoln Avenue and Bird Avenue (as indicated in traffic data provided for the 2040 San José Downtown Strategy EIR), due to LT-1 having greater exposure to train noise, and due to the project site having a greater setback from West San Carlos Street.

Noise modeling of the site was conducted using SoundPLAN, a three-dimensional noise modeling software that considers site geometry and the characteristics of noise sources. The model utilized traffic (2018) and geometric inputs from the 2040 San José Downtown Strategy EIR. Based on

modeling results, the existing noise level at the site is 66 dBA DNL at the setback of the proposed building to San Carlos Street. The site is located just outside of the 60 dBA CNEL aircraft noise contour of the Norman Y. Mineta San José International Airport. With the contribution from aircraft noise, noise levels at the setback of the hotel to San Carlos Street are anticipated to be 67 dBA DNL. This noise level is consistent with measurements made in the area, as described above.

FIGURE 1 LT-1 Measurement Location Relative to Project Site



Source: Google Earth, 2020

GENERAL PLAN CONSISTENCY ANALYSIS

The impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration are not considered under CEQA. This section addresses Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan.

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:

- For the proposed hotel land use, the City's "normally acceptable" exterior noise level standard is 60 dBA DNL or less and the "conditionally acceptable" exterior noise level standard is 75 dBA DNL or less.

- The California Building Code requires interior noise levels in hotel rooms attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

- 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 non-residential uses during any hour of operation.

The future noise environment at the project site would continue to result primarily from vehicular traffic along West San Carlos Street. At upper stories, which would have reduced shielding from surrounding structures, traffic noise from SR 78 and I-280 also act as primary noise sources. Aircraft noise and local traffic along Josefa Street will also contribute to the future noise environment.

Future Exterior Noise Environment

The exterior noise threshold established in the City's General Plan for new hotel uses is 60 dBA DNL at usable outdoor activity areas. According to site plans dated April 24, 2020 and the provided project description, there will be two outdoor spaces provided for the site, including a fourth-floor courtyard and an eighth-floor rooftop terrace. Noise levels at the project site increase as the elevation reaches a point where there is a greater amount of direct exposure to the elevated SR 87 and I-280 highways.

The fourth-floor courtyard would be located in the center of the hotel and surrounded on all sides by the hotel structure, and is therefore not directly exposed to substantial sources of exterior noise. Noise levels at the courtyard would be approximately 59 dBA DNL due to aircraft activity and would meet the City's "normally acceptable" limit of 60 dBA DNL for exterior noise at hotel outdoor use areas.

The eighth-floor terrace would be located at the building's southern corner and exposed to traffic noise. Based on the results of the model under future (2040) traffic conditions, noise levels at the terrace would reach 66 dBA DNL, including the contribution from aircraft. The "normally acceptable" limit for exterior noise at outdoor use spaces would be exceeded at the rooftop terrace with no mitigation in place. Project plans indicate a wall surrounding the terrace reaching approximately three feet in height. If the terrace wall is to be constructed without any gaps or cracks and have a minimum surface weight of three pounds per square foot (such as 1-inch-thick wood, ½-inch laminated glass, masonry block, concrete, or metal one-inch) then it would be expected to provide additional noise reduction. Based on sound modeling, a three-foot wall around the terrace and constructed as previously described would reduce overall noise levels at the terrace by 2 dBA DNL, bringing the calculated noise level to 64 dBA DNL from a combination of aircraft and traffic noise. Increasing the wall height to 6 feet would reduce the noise level by an additional 1 dBA DNL, bringing the combined calculated noise level to 63 dBA DNL, with approximately 62 dBA DNL of the noise level attributable to traffic noise. As the site is exposed to an aircraft generated noise level of about 59 dBA DNL, the traffic generated noise level would need to be below 55 dBA DNL for the combined exterior noise level to be 60 dBA DNL. This makes reducing noise levels at the rooftop terrace below the "normally acceptable" limit infeasible without construction of significant walls around the perimeter of the space. The noise level at the terrace would be below the City's "conditionally acceptable" limit of 65 dBA DNL for exterior noise in outdoor use spaces at hotels and hotel occupants would have access to the fourth-floor terrace, which would meet the City's "normally acceptable" noise limit.

Future Interior Noise Environment

The California Building Code requires that interior noise levels attributable to exterior environmental noise sources not exceed 45 dBA DNL in any habitable room. The Cal Green Code requires that interior noise levels attributable to exterior sources not exceed 50 dBA $L_{eq\ (1\text{-}hr)}$ in occupied areas of non-residential uses during any hour of occupation.

Future 2040 building façade noise exposures were calculated using the SoundPLAN model. Table 4 below lists noise levels at building façades at different elevations. As seen in Table 4, noise exposures above the second-floor increase by two to four dBA DNL due to increased exposure to elevated highways such as SR 87 and I-280.

TABLE 4 Future Noise Exposure at Building Façades

Floor	Future Noise Exposure at Façades (dBA DNL)			
	Northeast	Northwest	Southeast	Southwest
First	61	61	70	63
Second	61	61	70	65
Third	61	61	70	65
Fourth	61	61	70	65
Fifth	62	61	69	65
Sixth	63	61	69	65
Seventh	64	61	69	65
Eighth	65	61	70	65

Interior noise levels would vary depending upon the design of the buildings (relative window area to wall area) and the selected construction materials and methods. 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 70 dBA DNL, the inclusion of adequate forced-air mechanical ventilation can reduce interior noise levels to acceptable levels by allowing occupants the option of closing the windows to control noise.

The first three floors of the proposed building would consist primarily of the on-site parking garage. The southeast portion of the first and second floors of the building facing San Carlos Street would include the main entrance, lobby, a community dining area, and employee office space. At the third floor along this same portion of the building would be a fitness center, and staff break room. In these spaces, the Cal Green Code limit of 50 dBA $L_{eq\ (1\text{-}hr)}$ would apply during any hours of occupation. Calculated peak-hour noise levels at building façades were 1 dBA less than DNL values shown in Table 4. Project elevations, dated April 24, 2020, show a variety of materials would make up exterior walls at these levels of the southeast façade including brick, metal or wood panels, stucco, and in the case of the fitness center, glass windows. Preliminary calculations indicate that for the third-floor fitness center and staff break room, standard construction with windows closed is anticipated to provide the necessary noise reduction to keep interior noise levels below 50 dBA $L_{eq\ (1\text{-}hr)}$ during hours of occupation. The inclusion of force-air ventilation would be needed to allow occupants the option of keeping windows closed.

For consistency with the San Jose General Plan and California Building Code the following Conditions of Approval are recommended:

- To reduce noise to below 65 dBA DNL, the wall along the perimeter of the eighth-floor terrace shall be constructed to provide adequate noise reduction. The wall shall reach a

minimum height of three feet and be constructed without any gaps or cracks along the face or at the base and have a minimum surface weight of three pounds per square foot (such as 1-inch-thick wood, ½-inch laminated glass, masonry block, concrete, or metal one-inch).

- Building sound insulation requirements would need to include the provision of forced-air mechanical ventilation for all noise sensitive interior spaces so that windows could be kept closed at the occupant's discretion to control noise.

- A qualified acoustical specialist shall prepare a detailed analysis of interior noise levels resulting from all exterior sources during the design phase of the project. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce interior noise levels in guest rooms to 45 dBA DNL or lower, and in other occupied rooms such as the fitness center to below 50 dBA $L_{eq\ (1\text{-}hr)}$. 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.

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 and vibration resulting from the project:

- **Temporary or Permanent Noise Increases in Excess of Established Standards.** A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase in ambient noise levels at existing noise-sensitive receptors in excess of the applicable noise standards presented in the General Plan or Municipal Code, as follows:

    - Temporary Noise Increase. 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.

    - Permanent Noise Increase. 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.

- Operational Noise in Excess of Standards. 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.

- **Generation of Excessive Groundborne Vibration.** 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.

- **Excessive Aircraft Noise Levels.** 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.

Chapter 20.100.450 of the City of San José's 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. Policy EC-1.7 of the City of San José's General Plan requires that all construction operations within the City use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours. Further, the City of San José 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.

Temporary noise increases resulting from construction vary depending upon the noise levels generated by various pieces of construction equipment, the timing and duration of noise-generating activities, the distance between construction noise sources and noise-sensitive areas, and the presence of intervening shielding features such as buildings or terrain. 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.

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 average noise level ranges, by construction phase, and Table 6 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise falls with the range of 80 to 90 dBA at a distance of 50 feet from the source.

TABLE 5 Construction Equipment 50-Foot Noise Emission Limits

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

Notes:

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

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

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

Source: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, National Cooperative Highway Research Program, 1999.

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.

Construction of the project is planned to occur between the hours of 7:00 a.m. and 5:00 p.m., 7 days a week, beginning in January of 2021 for a period of approximately 19 months. It is assumed that a development permit or planning approval would be given to allow for weekend construction, and therefore construction would only occur during hours allowed by the San José Municipal Code. A detailed list of equipment expected to be used during each phase of construction was provided and assessed for each phase of construction. The Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming every piece of equipment would operate simultaneously, which would represent the worst-case scenario. Pile driving is not anticipated as a method of construction.

Noise-sensitive uses surrounding the site include adjacent multi-family residences approximately 90 feet from the center of construction to the northeast, residences approximately 100 feet to the northwest, commercial uses approximately 100 feet to the east, commercial uses approximately 140 feet to the southwest across Josefa Street, residences approximately 180 feet to the northwest across Josefa Street, and commercial uses approximately 180 feet to the southeast across West San Carlos Street. These surrounding uses fall within the City's significant noise impact ranges of 200 feet for commercial or office uses and 500 feet for residences.

Hourly average and maximum construction noise levels for each construction phase, assuming all equipment operating simultaneously, are shown in Table 7 for each of the nearby noise sensitive land uses relative to the center of the active construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Noise levels in shielded areas would be anticipated to be 5 to 20 dB lower.

TABLE 7 Calculated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Total Work Days	Calculated Noise Levels (dBA)							
		Residences to Northeast (90 ft)		Residences to Northwest, Commercial to East (100 ft)		Commercial to Southwest (140 ft)		Residential to Northwest, Commercial to Southeast (180 feet)	
		L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Demolition	39	83	84	82	84	79	81	77	78
Site Preparation	18	80	80	79	79	76	76	74	74
Grading/Excavation	25	81	80	80	79	77	76	75	74
Trenching/Foundation	102	76	79	75	78	72	75	70	73
Building Exterior	132	79	79	78	78	75	75	73	73
Building Interior	94	70	73	69	72	67	69	64	67
Paving	63	83	84	82	83	79	81	77	78

Note: RCNM-calculated L_{max} noise levels represent the maximum noise level of the loudest individual piece of equipment per phase and therefore may occasionally be below the calculated hourly average noise level.

Ambient noise levels at sensitive receptors near the site are expected to be similar to that of the site itself, 68 to 69 dBA DNL. Peak-hour noise levels would be about one dBA less at 67 to 68 dBA $L_{eq\ (1\text{-}hr)}$. As seen in Table 7, Project construction would result in noise levels exceeding the ambient by 5 dBA L_{eq} or more throughout most phases of construction at most nearby receptors. Since project construction would last for a period longer than one year and considering that the project site is within 500 feet of existing residences and within 200 feet of existing commercial uses, Policy EC-1.7 of the City's General Plan would consider this temporary construction noise impact to be significant.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. The Integrated Downtown Strategy 2040 EIR[1] and the Diridon Station Area Plan (DSAP) Integrated Final Program EIR,[2] which the project site and nearby receptors are within, provide standard noise control measures to be implemented in future projects included in the area plan to reduce and avoid construction-related noise impacts. As stated in the Downtown Strategy and DSAP EIRs, the Municipal Code requires that reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity. The following standard noise control measures shall be implemented:

- 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

[1] The City of San Jose, *Downtown Strategy 2040 Integrated Final Environmental Impact Report*, SCH# 2003042127, December 2018.
[2] The City of San Jose, *Diridon Station Area Plan Integrated Final Program Environmental Impact Report*, SCH# 2011092022, August 2014.

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).

- The surrounding neighborhood 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.

The Downtown Strategy and DSAP EIRs also stated that for large projects, such as the proposed project, construction is anticipated to generate noise levels exceeding the City's acceptable noise standard beyond one construction season. Therefore, a "construction noise logistics plan," in accordance with Policy EC-1.7, would be required. The Downtown Strategy EIR included additional measures for typical construction noise logistics plans, which would include, but not be limited to, the following applicable 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;

- 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, 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 noise level increase at the existing residential or commercial 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 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 prepared for the proposed project by Hexagon Transportation Consultants, Inc.[3] included peak hour turning movements for four affected intersections in the project vicinity. By comparing cumulative future traffic levels with and without the project, the project's contribution to the noise level increase was determined to be 2 dBA DNL or less along every segment included in the traffic study with the exception of a.m. peak hour noise levels along the segment of Josefa Street between Park Avenue and West San Carlos Street. However, as the traffic study found that total traffic volume during this period would amount to fewer than 90 cars, the overall noise environment along this segment is and is anticipated to continue to be primarily characterized by other noise sources such as traffic along SR 87, I-280, and West San Carlos Street. Therefore, the proposed project would not result in a permanent noise increase of 3 dBA DNL or more to the noise environment in the site 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

[3] Hexagon Transportation Consultants, Inc., *491 W. San Carlos Street Marriott Towneplace Hotel Development Local Transportation Analysis*, April 24, 2020

nearby sensitive receptors. However, due to a lack of detail in the specification of mechanical equipment and the proximity of noise sensitive land uses, implementation of measures as a project condition of approval are included to ensure noise levels to be below 55 dBA DNL. **This is a potentially significant impact.**

The City's Municipal Code limits the noise generation of new nonresidential land uses to 55 dBA DNL when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses.

The proposed project would include mechanical equipment, such as heating, ventilation, and air conditioning systems (HVAC), as well as emergency generators, pumps, condensers, etc. Details pertaining to the number, type, size, noise specifications, and specific locations of equipment were not available at the time of this study. However, the site plan does show ground-level rooms, such as a mechanical and electrical room.

Noise levels produced by a typical heat pump for a building this size are approximately 56 dBA at 3 feet during operation. Without knowing specific locations for such units, it is assumed that all pumps for the proposed buildings would be located on the rooftop. The building elevations indicate that rooftop equipment would be 84 feet above the ground. Noise levels produced by a typical air conditioning condenser are approximately 66 dBA at 3 feet during operation. These types of units typically cycle on and off continuously during daytime and nighttime hours. Therefore, multiple units clustered in the same general vicinity are usually operating simultaneously at any given time. HVAC noise sources were added to the SoundPLAN model assuming six heat pump and six air conditioner units would operate simultaneously. With a minimum setback of 10 feet from the edge of the roof, rooftop equipment was calculated to result in a noise level of 37 dBA DNL at the nearest residences.

A 60 kW emergency generator is planned to be included with the project in case of power outages. While a specific model and noise level of the generator was not available as of this writing, unenclosed generators of this size typically generate noise levels of 86 dBA at 23 feet, 77 dBA at 23 feet if the generator is equipped with a weatherproof enclosure, or 73 to 74 dBA at 23 feet if the generator is equipped with a sound-attenuating enclosure. During emergency situations, the running of generators would be exempt from City noise restrictions; however, generators are typically tested during the daytime for a period of up to two hours every month. A worst-case placement of a rooftop generator with a weather enclosure set 10 feet back from the edge of the roof was added to the SoundPLAN model and run concurrently with HVAC equipment. With HVAC operations and a two-hour test of the generator, rooftop equipment was calculated to result in a noise level of 49 dBA DNL at the nearest residences. Under these assumptions, it is not expected that typical mechanical equipment would result in the City's threshold of 55 dBA DNL being exceeded at residences in the site vicinity.

As exact mechanical equipment plans are not currently known, the calculated mechanical equipment noise scenario may be exceeded depending on selection, number, and placement of equipment. As such, during final design of the mechanical systems, the noise levels from the

various pieces of equipment should be examined to ensure noise levels would be below 55 dBA DNL to avoid disturbance at the adjacent residences. This is a **potentially significant** impact.

Mitigation Measure 1c: As a project condition of approval, mechanical equipment shall be selected and designed to reduce excessive noise levels at the surrounding uses to meet the City's 55 dBA DNL noise level requirement at the nearby noise-sensitive land uses. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's Municipal Code noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors. Other alternate measures may be optimal, such as locating equipment in less noise-sensitive areas, such as along the building façades farthest from the nearest neighbors, where feasible. Implementation of this measure would reduce the impact to a **less-than-significant** level.

Impact 2: **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels are expected to potentially exceed applicable vibration thresholds at a nearby sensitive land use. **This is a potentially significant impact.**

Demolition and construction activities required for construction often generate perceptible vibration levels and levels that could affect nearby structures when heavy equipment or impact tools (e.g. jackhammers, pile drivers, hoe rams) are used in the vicinity of nearby sensitive land uses. Building damage generally falls into three categories. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls.

Policy EC-2.3 of the City of San José General Plan establishes a vibration limit of 0.08 in/sec PPV to minimize the potential for cosmetic damage to sensitive historic structures, and a vibration limit of 0.2 in/sec PPV to minimize damage at buildings of normal conventional construction. The vibration limits contained in this policy are conservative and designed to provide the ultimate level of protection for existing buildings in San José.

The California Department of Transportation published a Transportation and Construction Guidance Manual in 2013. The Manual developed a synthesis of various vibration criteria to assess the damage potential for representative categories of structures and effects upon people. The guideline criteria, summarized in Table 3 of the Setting section, refine the categories and thresholds set forth in Policy EC-2.3, establishing seven separate categories. The first two categories (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". Most, if not all buildings in the downtown area

would fall into Categories 5-7. The goal in establishing vibration limits is to mitigate potential vibration impacts associated with demolition and construction activities to a less-than-significant level by establishing safe limits to protect structures from potential damage and to minimize vibration impacts on people and businesses. The vibration limits contained in Policy EC-2.3 utilized criteria from literature available to the City in 2008 that are conservative, and given the broad categories, are now believed to be too general for buildings in the Downtown Strategy 2040 Plan area. Given that the new guideline criteria best accomplish the goal to identify and mitigate construction vibration impacts, the Downtown Strategy 2040 Integrated Final EIR recommends that these criteria be utilized to implement General Plan Policy EC-2.3 for projects facilitated by the Downtown Strategy 2040 Plan.

According to the City of San José Historic Resources Inventory,[4] historic buildings within 500 feet of the site include 530 West San Carlos Street, located approximately 230 feet from the site, and 575 West San Carlos Street, located approximately 300 feet from the site. These historic buildings would be classified as Category 5 structures and the 0.25 in/sec PPV Caltrans threshold criteria would apply. The remaining buildings surrounding the site would fall under Category 7 for modern residential and commercial structures and the 0.5 in/sec PPV threshold criteria would apply.

Construction activities associated with the project would include demolition of existing site improvements, site preparation, foundation work, new building framing and finishing, and paving. According to construction information provided by the project design team, pile driving is not a method of construction.

Table 8 presents typical vibration levels from construction equipment at 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 8 also presents construction vibration levels at representative distances from the construction equipment located at the closest property line to the nearest structures. Calculations were made to estimate vibration levels at distances of 10 feet from the site to represent the distance between the residential buildings to the northeast and northwest and the commercial building to the east and the nearest site property line, as well as distances of 70 and 100 feet from the site to represent other nearby buildings. Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet.

[4] "City of San José Historic Resources Inventory." City of San José, Accessed June 4, 2020, https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/historic-preservation/historic-resources-inventory .

TABLE 8 Vibration Levels for Construction Equipment at Various Distances

Equipment		PPV at 10 ft. (in/sec)	PPV at 25 ft. (in/sec)	PPV at 70 ft. (in/sec)	PPV at 100 ft. (in/sec)
Clam shovel drop		**0.553**	0.202	0.065	0.044
Hydromill (slurry wall)	in soil	0.022	0.008	0.003	0.002
	in rock	0.047	0.017	0.005	0.004
Vibratory Roller		**0.575**	0.210	0.068	0.046
Hoe Ram		0.244	0.089	0.029	0.019
Large bulldozer		0.244	0.089	0.029	0.019
Caisson drilling		0.244	0.089	0.029	0.019
Loaded trucks		0.208	0.076	0.024	0.017
Jackhammer		0.096	0.035	0.011	0.008
Small bulldozer		0.008	0.003	0.001	0.001

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006 as modified by Illingworth & Rodkin, Inc., June 2020.

As indicated in Table 8, heavy vibration generating construction equipment, such as vibratory rollers and clam shovel drops, would have the potential to produce vibration levels greater than the 'modern' structure threshold of 0.5 in/sec PPV within about 12 feet of construction. Residences to the northeast and northwest, and commercial uses to the east are located within 12 feet of construction. Vibration levels could exceed the historic building threshold of 0.25 in/sec PPV at distances within about 25 feet of construction. There are no historic buildings located within 25 feet.

The US Bureau of Mines has analyzed the effects of blast-induced vibration on buildings in USBM RI 8507[5], and these findings have been applied to vibrations emanating from construction equipment on buildings[6]. Figure 2 presents the damage probability as reported in USBM RI 8507 and reproduced by Dowding assuming a maximum vibration level of 0.6 in/sec PPV. As shown on Figure 5, these studies indicate an approximate 7% probability of "threshold damage" (referred to as cosmetic damage elsewhere in this report) at vibration levels of 0.6 in/sec PPV or less and no observations of "minor damage" or "major damage" at vibration levels of 0.6 in/sec PPV or less. Based on these data, cosmetic or threshold damage would be manifested in the form of hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. However, minor damage (e.g., hairline cracking in masonry or the loosening of plaster) or major structural damage (e.g., wide cracking or shifting of foundation or bearing walls) to the residential and commercial structures adjacent to the site would not be anticipated to occur assuming a maximum vibration level of 0.6 in/sec PPV.

Groundborne vibration levels from project construction would be anticipated to exceed 0.5 in/sec PPV when construction is located within 12 feet of the structures adjacent to the project site to the

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

northwest, northeast, and east. Vibration levels may still be perceptible in areas further from the site during periods of heavy construction but would not be expected to cause structural damage. This is a **potentially significant impact**.

Mitigation Measure 2: The following measures are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- Limit the use of vibratory rollers and avoid clam shovel drops within 15 feet of the property lines shared with residences and commercial structures adjacent to the site.

- 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.

- Select demolition methods not involving impact tools.

- Avoid dropping heavy objects or materials near vibration sensitive locations.

- 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 required for continuous vibration monitoring.

- A construction vibration-monitoring plan shall be implemented to document conditions at the residences and commercial structures adjacent to the site 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 should be implemented to include the following tasks:

    - Identification of sensitivity to ground-borne vibration of the residences and commercial structures adjacent to the site. A vibration survey (generally described below) would need to be performed.

    - Performance of a photo survey, elevation survey, and crack monitoring survey for the residences and commercial structures adjacent to the site. Surveys shall be performed prior to and after completion of vibration generating construction activities located within 25 feet of the structure. The surveys shall include internal and external crack monitoring in the structure, settlement, and distress, and shall document the condition of the foundation, walls and other structural elements in the interior and exterior of the structure.

    - Conduct a post-survey on the structure where either monitoring has indicated high levels or complaints of damage. Make appropriate repairs in accordance with the

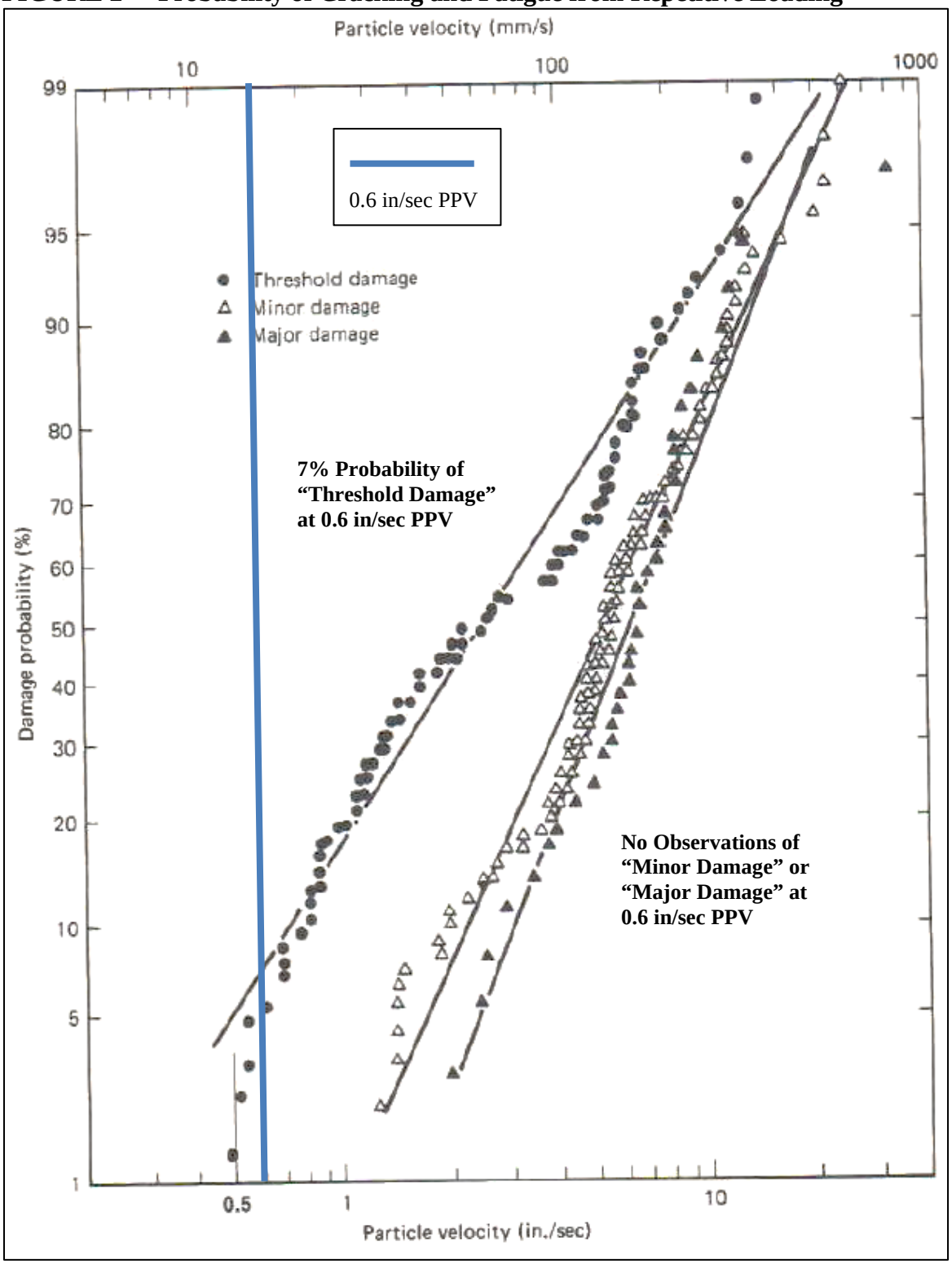
Secretary of the Interior's Standards where damage has occurred as a result of construction activities.

- The results of any 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.

Implementation of these measures would reduce the impact to a **less-than-significant** level.

FIGURE 2 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996 as modified by Illingworth & Rodkin, Inc., June 2020.

Impact 3: **Excessive Aircraft Noise.** The project site is located approximately 2 miles from a public airport or public use airport and would not expose people residing or working in the project area to excessive aircraft noise levels. **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 just outside of the 60 dBA CNEL 2027 noise contour of the airport, according to the Norman Y. Mineta San José International Airport Master Plan Update Project[7] report published in February 2010 as an addendum to the Environmental Impact Report (see Figure 3). Future exterior noise levels due to aircraft from Norman Y. Mineta San José International Airport would not exceed 60 dBA CNEL/DNL. 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 aircraft. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

Assuming standard construction materials for aircraft noise of about 59 dBA DNL, the future interior noise levels resulting from aircraft would be at or below 45 dBA DNL. Therefore, future interior noise at the proposed building would be compatible with aircraft noise. This would be a **less-than-significant** impact.

Mitigation Measure 3: **None required.**

[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 3 2027 CNEL Noise Contours for SJIA Relative to Project Site