ATTACHMENT B - Updated Noise Report for CP19-021

2375 & 2395 SOUTH BASCOM AVENUE ASSISTED LIVING AND MEMORY CARE PROJECT NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

A three-story assisted living and memory care center is proposed at 2375 and 2395 South Bascom Avenue in San José, California. The proposed facility would include the provision of medicine management/administration, daily health monitoring, visits from third party medical providers, supervision by an on-site nurse, as well as access to entertainment, beauty salon, fitness activities and dining facilities, including prepared meals, to on-site residents. A total of 79 assisted living units are proposed. The total number of staff employed in the community is expected to be 75 to 80, with the maximum number of on-site staff during a typical day shift of about 35 people. The building would include a subterranean parking garage, with access via South Bascom Avenue.

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 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 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 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

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

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

Regulatory Background - Noise

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.

Pursuant to recent court decisions, the impacts of site constraints, such as exposure of the proposed project to excessive levels of noise and vibration, are not included in the Impacts and Mitigation Section of this report. These items are discussed in a separate section addressing the project's consistency with the policies set forth in the City's General Plan.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise sensitive land uses of 3 dBA or greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA DNL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use.

2019 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

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:

<u>Interior Noise Levels</u>

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1). The acceptable exterior noise level objective is established for the City, except in the environs of the San José International Airport and the Downtown, as described below:

  - For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding by buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation techniques to achieve the 60 dBA DNL standard for noise from sources other than aircraft and elevated roadway segments.

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

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

[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-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable;" or
- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

EC-1.11 Require safe and compatible land uses within the 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 project site is located at 2375-2395 South Bascom Avenue in San José, California. Adjoining the site to the north is a dealership for new and used motorboats and to the south are restaurants. Other commercial land uses are located to the east, opposite South Bascom Avenue. Adjoining the site to the west and to the southwest are residential land uses.

The existing noise environment at the project site and in the surrounding area results primarily from vehicular traffic along nearby Highway 17 and South Bascom Avenue. Aircraft flyovers associated with Mineta San José International Airport operations also affect the noise environment at the site.

A noise monitoring survey was performed in the project vicinity beginning on Tuesday, October 8, 2019 and concluding on Thursday, October 10, 2019. The monitoring survey included two long-term (LT-1 and LT-2) noise measurements and two short-term (ST-1 and ST-2) noise measurements. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 50 feet west of the centerline of South Bascom Avenue. The predominant noise source at LT-1 was South Bascom Avenue traffic. Hourly average noise levels at this location typically ranged from 67 to 75 dBA L_{eq} during the day and from 56 to 67 dBA L_{eq} at night. The day-night average noise level was 72 dBA DNL. The daily trend in noise levels at LT-1 is shown in Figures 2 through 4.

LT-2 was made at the rear of the project site, approximately 360 feet west of the centerline of South Bascom Avenue. The main noise source at this location was Highway 17. Hourly average noise levels at LT-2 typically ranged from 48 to 61 dBA L_{eq} during the day and from 44 to 52 dBA L_{eq} at night. The day-night average noise level was 57 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figures 5 through 7.

The short-term noise measurements (ST-1 and ST-2) were made over 10-minute periods, concurrent with the long-term measurements, on Tuesday, October 8, 2019, between 7:40 a.m. and 8:10 a.m. The short-term measurement results for ST-1 and ST-2 are summarized in Table 4.
ST-1 was made along the northwestern boundary of the site, approximately 320 feet west of the centerline of South Bascom Avenue. The primary noise source at ST-1 was Highway 17. Typical traffic noise from Highway 17 ranged from 52 to 54 dBA, and a distant noisy motorcycle generated noise levels of 60 dBA at ST-1. A chirping bird was also observed to generate noise levels of 61 dBA. The 10-minute average noise level measured at ST-1 was 54 dBA $L_{eq(10\text{-}min)}$.

ST-2 was made along the southern boundary of the site, approximately 260 feet west of the centerline of South Bascom Avenue. The primary noise source at ST-2 was traffic along South Bascom Avenue. Typical traffic noise from Highway 17 ranged from 49 to 51 dBA, and typical traffic noise along South Bascom Avenue ranged from 54 to 55 dBA. A heavy truck braking along South Bascom Avenue generated noise levels of 68 dBA at ST-2, while a motorcycle produced a noise level of about 65 dBA. Additionally, a nearby car door slam generated noise levels of 66 dBA. The 10-minute average noise level measured at ST-2 was 53 dBA $L_{eq(10\text{-}min)}$.

FIGURE 1 Aerial Image Showing Site Plan and Noise Measurement Locations

Source: Google Earth 2019.

TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10\text{-}min)}$
ST-1: along the northwestern boundary of the project site (10/8/2019, 7:40-7:50 a.m.)	62	57	55	54	53	54
ST-2: along the southern boundary of the project site (10/8/2019, 8:00-8:10 a.m.)	66	59	54	52	50	53

FIGURE 2 Daily Trend in Noise Levels at LT-1, Tuesday, October 8, 2019

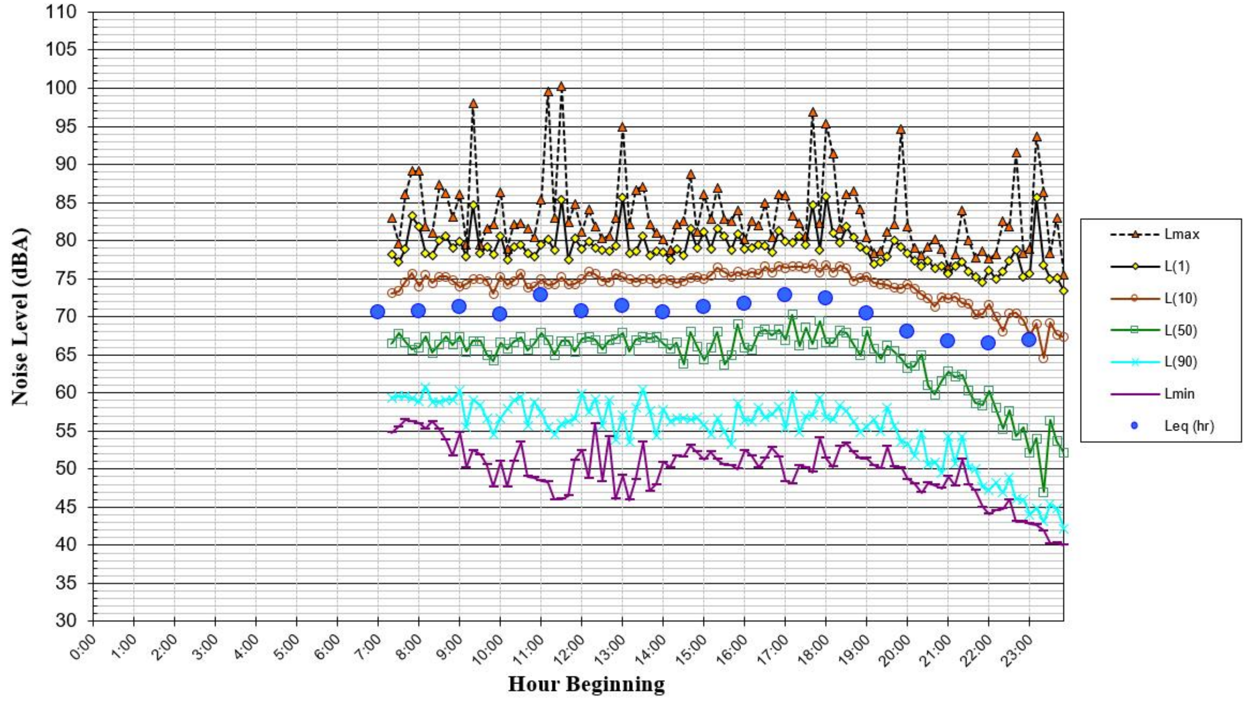


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday, October 9, 2019

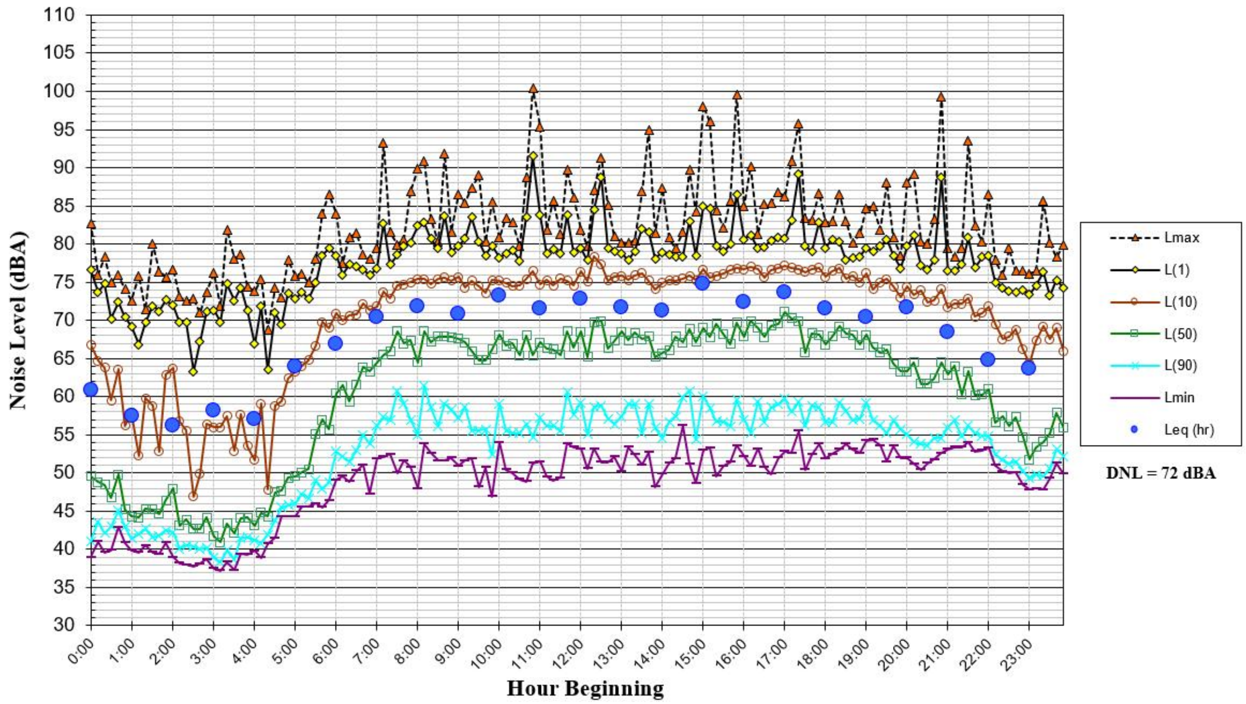


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday, October 10, 2019

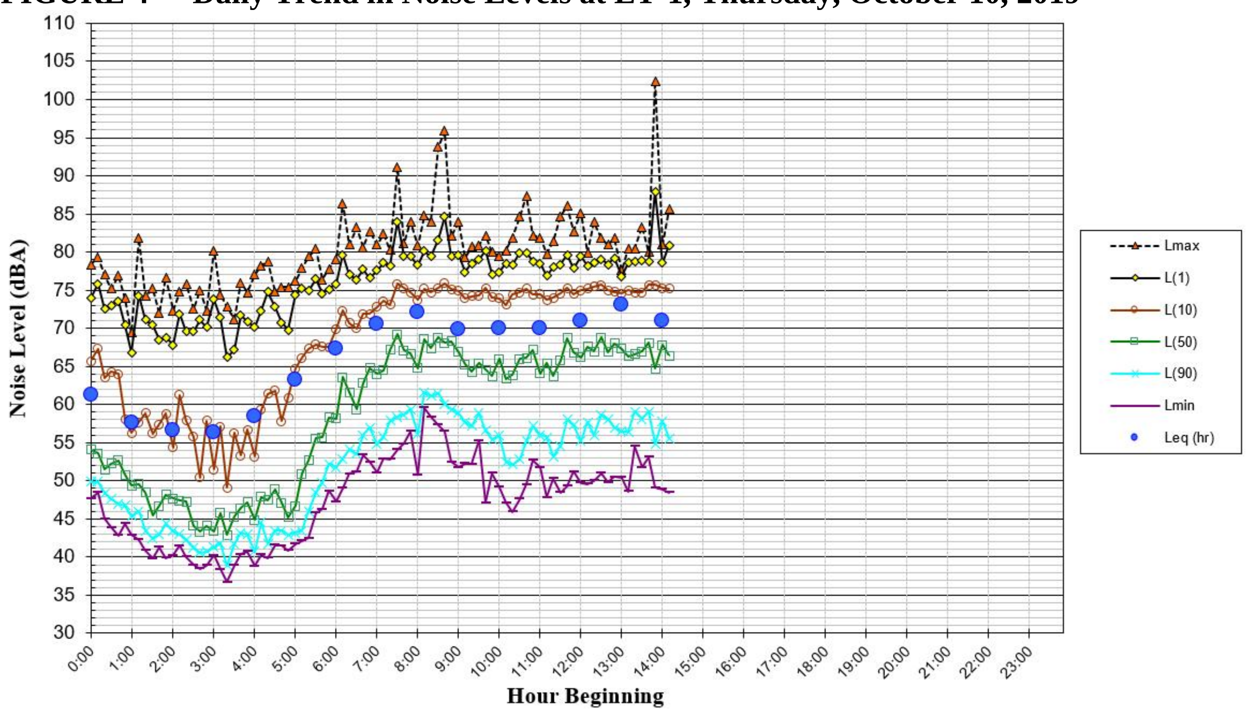


FIGURE 5 Daily Trend in Noise Levels at LT-2, Tuesday, October 8, 2019

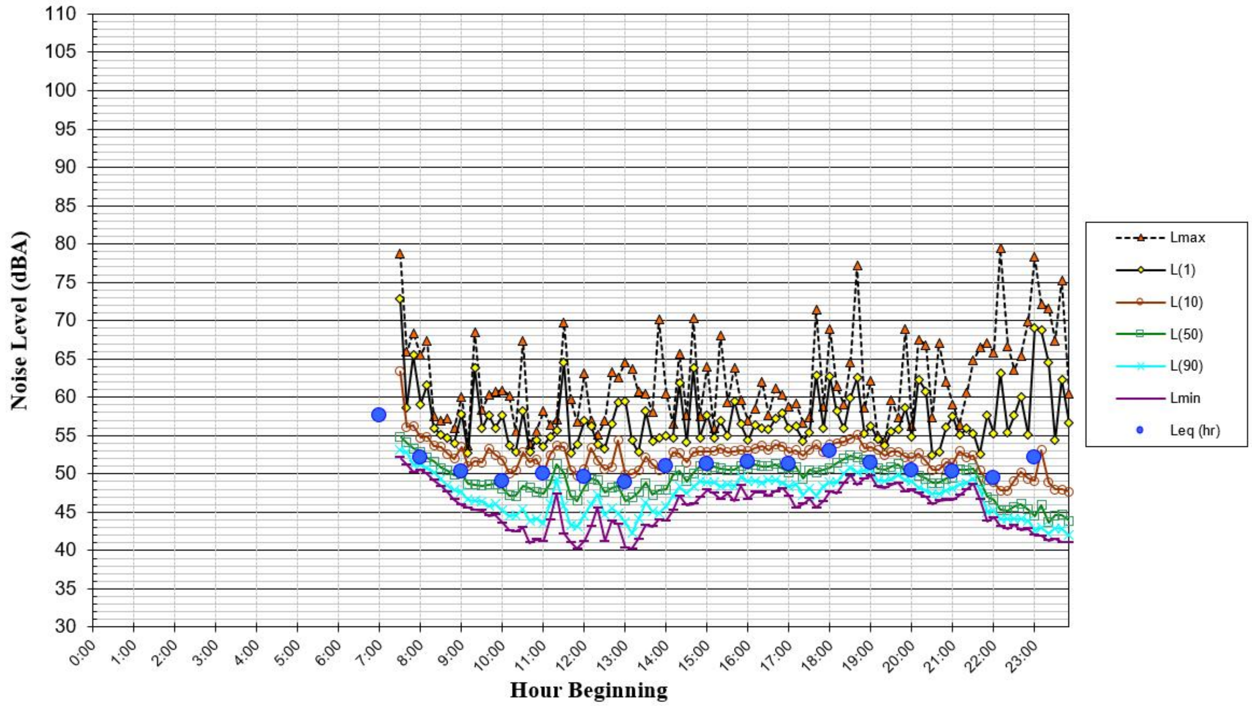


FIGURE 6 Daily Trend in Noise Levels at LT-2, Wednesday, October 9, 2019

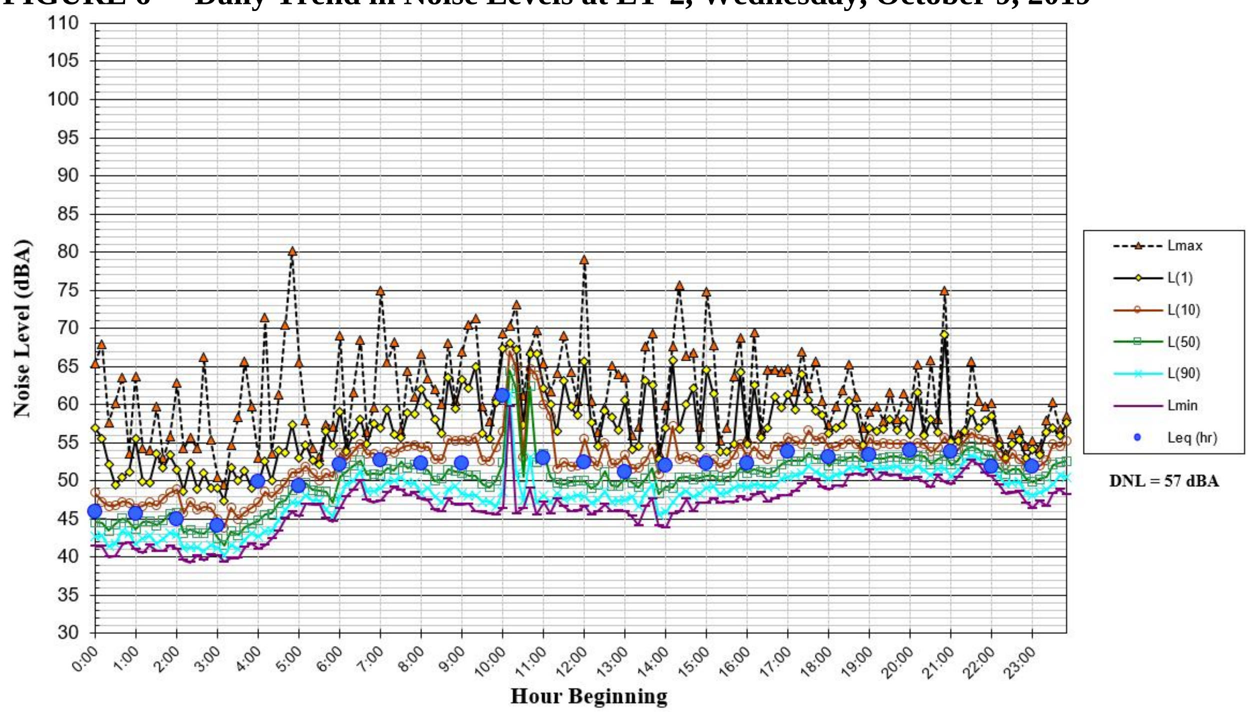
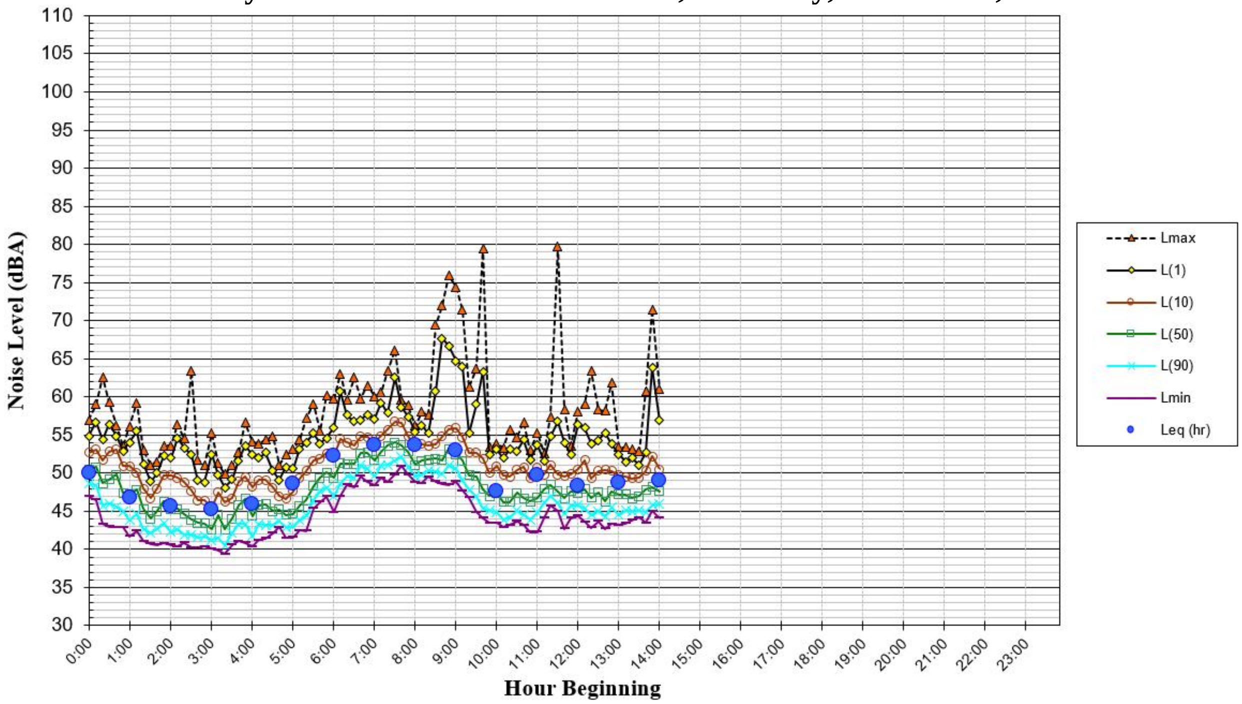


FIGURE 7 Daily Trend in Noise Levels at LT-2, Thursday, October 10, 2019



PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The future noise environment at the project site would continue to result primarily from vehicular traffic along South Bascom Avenue and Highway 17. A traffic report was completed for the proposed project on November 8, 2019 by *Hexagon Transportation Consultants, Inc*.[1] While the traffic study indicated that the proposed project would not produce a measurable noise level increase compared to the existing traffic volumes, the traffic study did not provide information related to future traffic volumes. Therefore, to estimate future traffic noise levels, a review of the traffic volumes contained in the *Draft Program EIR for the Envision San José 2040 General Plan*,[2] was made. Traffic noise levels along South Bascom Avenue are expected to increase by 2 dBA by the year 2035. Therefore, future noise levels would be 74 dBA DNL at a distance of 50 feet from the centerline of South Bascom Avenue (LT-1).

Future Exterior Noise Environment

The exterior noise threshold established in the City's General Plan for new multi-family residential projects, which would include assisted living facilities, is 60 dBA DNL at usable outdoor activity areas, excluding private balconies and porches.

[1] Hexagon Transportation Consultants, Inc., "2375 & 2395 S. Bascom Avenue Senior Assisted Living Development," November 8, 2019.
[2] City of San José, *Draft Program Environmental Impact Report for the Envision San José 2040 General Plan*, State Clearinghouse Number 2009072096, File Number: PP09-011, June 2011.

An assisted living courtyard and memory care garden are shown in the site plan on the ground-level. Both of these outdoor use areas would be located along the western building façade, which would be shielded from South Bascom Avenue. Existing structures west of the site would similarly shield traffic noise emanating from Highway 17. Considering the shielding provided by existing residential structures and the proposed project building, common outdoor use areas would be exposed to future exterior noise levels below 60 dBA DNL.

The second floor of the proposed building would include three green roof areas and two patios. Based on the angle of the building relative to traffic noise sources and the existing buildings surrounding the site, each of these outdoor use areas would be adequately shielded and would be exposed to future exterior noise levels below 60 dBA DNL.

The third floor of the proposed building would also have a green roof area. This area would be located along the western building façade and would be adequately shielded from South Bascom Avenue. Even at the third-floor elevation of this outdoor space, Highway 17 would be more than 2,500 feet west of the site. Therefore, the noise levels from Highway 17 would audible but would not significantly increase the noise environment as calculated at the lower floors. The future exterior noise levels at the third-floor green roof area would be below 60 dBA DNL.

The outdoor use areas associated with the proposed assisted living and memory care facility have been properly located on the site in shielded areas resulting in a compatible future noise environment. No additional noise control measures are required.

Future Interior Noise Environment

The City requires that noise levels within residential units be maintained at 45 dBA DNL or less.

The residential units located along the eastern building façade nearest South Bascom Avenue would be set back from the centerline of the roadway by approximately 65 feet. At this distance, the units facing South Bascom Avenue would be exposed to future exterior noise levels up to 73 dBA DNL.

Units along the northern façade would be set back from the centerline of South Bascom Avenue by 65 to 210 feet, and at these distances, these units would be exposed to future exterior noise levels ranging from 66 to 73 dBA DNL. The angle of the southern building façade allows for partial shielding for the ground-floor units located 200 to 310 feet from the project site, due to intervening buildings on the adjacent commercial site. However, the units located on the upper floors would have direct line-of-sight to South Bascom Avenue. With setbacks ranging from 65 to 310 feet, these would be exposed to future exterior noise levels ranging from 63 to 73 dBA DNL.

Units along the western façade would be shielded from traffic noise along South Bascom Avenue. These units would be exposed to future exterior noise levels at or below 60 dBA DNL.

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Assuming windows to be partially open for ventilation, the interior noise levels for the proposed project would be up to 58 dBA DNL at the units along the eastern façade of proposed building. This would exceed the 45 dBA DNL threshold for interior noise and require noise insulation features.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA DNL or less:

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

- Preliminary calculations indicate that residential units nearest to South Bascom Avenue along the eastern façade would require windows and doors with a minimum rating of 30 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

- Residential units located along the northern and southern façades within approximately 155 feet of the centerline of South Bascom Avenue would require windows and doors with minimum STC ratings of 28 with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL.

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

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

NOISE IMPACTS AND MITIGATION MEASURES

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 project-generated traffic would result in: a) a noise level increase of 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) a noise level increase of 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

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

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

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

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

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

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

Existing residences to the west and to the southwest of the project site would be represented by measurements made at LT-2, ST-1, and ST-2. Daytime noise levels typically ranged from 48 to 61 dBA L_{eq} at these locations. The existing commercial uses to the north, south, and east are exposed to daytime ambient noise levels ranging from 67 to 75 dBA L_{eq}, as measured at LT-1.

The typical range of maximum instantaneous noise levels for the proposed project, based on the equipment list provided, would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5). Table 6 shows the hourly average noise level ranges, by construction phase for various types of construction projects. Hourly average noise levels generated by construction are about 65 to 88 dBA L_{eq} for an assisted living development measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

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

As shown in Table 7, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more at various times throughout construction. Project construction is expected to last for a period of approximately 18 months. Since project construction is expected to exceed one year in duration, the project would be considered a significant impact and would require the inclusion of construction best management practices as project conditions of approval.

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.

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

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

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

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

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses

Phase of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			West Res. (80ft)	Southwest Res. (145ft)	North Comm. (130t)	South Comm. (70t)	East Comm. (250ft)
Demolition	20 days	Concrete/Industrial Saw (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (3)	83 dBA	78 dBA	79 dBA	84 dBA	73 dBA
Site Preparation	2 days	Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	81 dBA	75 dBA	76 dBA	82 dBA	71 dBA
Grading/Excavation	4 days	Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	81 dBA	75 dBA	76 dBA	82 dBA	71 dBA
Trenching	4 days	Tractor/Loader/Backhoe (1) Excavator (1)	78-82 dBA[a]	72-77 dBA[a]	73-78 dBA[a]	79-83 dBA[a]	68-72 dBA[a]
Building Exterior	200 days	Crane (1) Forklift (1) Generator Set (1) Tractor/Loader/Backhoe (1) Welder (3)	79 dBA	74 dBA	75 dBA	80 dBA	69 dBA
Building Interior/Architectural Coating	10 days	Air Compressor (1)	70 dBA	65 dBA	65 dBA	71 dBA	60 dBA
Paving	10 days	Cement and Mortar Mixer (1) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (1)	81 dBA	76 dBA	77 dBA	83 dBA	72 dBA

[a] Range of hourly average noise levels reflects the Trenching phase only and in combination with the Grading/Excavation phase.

Mitigation Measure 1a:

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 Municipal Code requires that reasonable noise reduction measures be incorporated into the construction plan and implemented during all phases of construction activity. In accordance with Policy EC-1.7, a construction noise logistics plan should be developed for the proposed project.

Construction Noise Logistics Plan: Prior to the issuance of any grading or demolition permits, the project proponent shall submit and implement a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting and notification of construction schedules, equipment to be used, and designation of a noise disturbance coordinator. The noise disturbance coordinator shall respond to neighborhood complaints and shall be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses. The noise logistic plan shall be submitted to the Director of Planning or Director's designee of the Department of Planning, Building, and Code Enforcement prior to the issuance of any grading or demolition permits.

As a part of the noise logistic plan and project, construction activities for the proposed project shall include, but is not limited to, the following best management practices:

- In accordance with Policy EC-1.7 of the City's General Plan, utilize the best available noise suppression devices and techniques during construction activities.

- Construction activities shall be limited to the hours 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 (San José Municipal Code Section 20.100.450).

- Construct temporary noise barriers, where feasible, to screen mobile and stationary construction equipment. The temporary noise barrier fences provide noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receiver and if the barrier is constructed in a manner that eliminates any cracks or gaps.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Unnecessary idling of internal combustion engines shall be strictly prohibited.

- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Construction staging areas shall be established at locations that would create the greatest distance between the construction-related noise source and noise-sensitive receptors nearest the project site during all project construction.

- A temporary noise control blanket barrier shall 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.

- If impact pile driving is proposed, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile. Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile.

- Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- The project applicant shall prepare a detailed construction schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.

- Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

With the implementation of GP Policy EC-1.7, Municipal Code requirements, and the above measures, the temporary construction noise impact would be reduced to a less-than-significant level.

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

According to Policy EC-1.2 of the City's General Plan, a significant permanent noise increase would occur if the project would increase noise levels at noise-sensitive receptors by 3 dBA DNL or more where ambient noise levels exceed the "normally acceptable" noise level standard. Where ambient noise levels are at or below the "normally acceptable" noise level standard, noise level increases of 5 dBA DNL or more would be considered significant. The City's General Plan defines the "normally acceptable" outdoor noise level standard for the residential land uses to be 60 dBA DNL. Existing ambient levels along South Bascom Avenue, based on the measurements made at LT-1, exceed 60 dBA DNL. Therefore, a significant impact for noise-sensitive receptors along South Bascom Avenue would occur if traffic due to the proposed project would permanently increase ambient levels by 3 dBA DNL. For noise-sensitive receptors set back more than 200 feet from South Bascom Avenue, existing ambient noise levels would be below 60 dBA DNL, as measured at LT-2. A significant impact at these receptors would occur if traffic noise levels increased by 5 dBA DNL or more. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway, and a 5 dBA DNL noise increase would occur if traffic volumes tripled.

The traffic study prepared for the proposed project included peak hour turning movements for the South Bascom Avenue/Dry Creek Road intersection and the South Bascom Avenue/Surrey Place intersection. By comparing the existing plus project peak hour traffic volumes along each segment of these intersections, the noise level increase along each segment was calculated to be less than 1 dBA. The project would not result in doubling or tripling of the traffic, and therefore, the proposed project would not result in a significant permanent noise increase. This is a less-than-significant impact.

Mitigation Measure 1b: **None required.**

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

The proposed project would include mechanical equipment, such as heating, ventilation, and air conditioning systems (HVAC), as well as an emergency generator, pumps, exhaust fans, etc. A schematic roof plan was available at the time of this study that indicated that HVAC systems would be located within a mechanical equipment well and would be well shielded from nearby residences. However, specifications related to the number, type, size, and locations of HVAC equipment were not available. In addition, the site plan shows rooms within the below-grade parking garage, such as the utility closet, electrical room, water heater and pump room, a theater, and a generator room. Noise produced by equipment indoors would not be expected to contribute to ambient noise levels outdoors.

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. Assuming up to 6 units would operate simultaneously, the total day-night average noise level due to air conditioning condensers at a distance of 3 feet would be 80 dBA DNL. At the nearest residence approximately 75 feet to the west, the calculated noise level produced by the air conditioning condensers would be 47 dBA DNL and 41 dBA L_{eq}. The calculated noise level produced by the air conditioning condensers would be 41 dBA DNL and 35 dBA L_{eq} at the nearest residences to the southwest, which would be approximately 150 feet from the mechanical equipment well. Noise levels due to these equipment would be below the City's 55 dBA DNL threshold and 55 dB Municipal Code noise limit.

Buildings of this size would typically require emergency generators with a capacity of about 250 kW. Generators of this size typically produce noise levels of 89 dBA at 23 feet if a weather enclosure is included or ranging from 75 to 81 dBA at 23 feet if a Level 1 or Level 2 sound enclosure is included. During emergency situations, the noise produced by the operation of generators would be exempt from City noise restrictions; however, generators are typically tested for a period of two hours every month. During these testing periods, ambient noise levels would temporarily increase and would be required to meet the 55 dBA DNL threshold at nearby residential land uses. Assuming the emergency generator would run continuously during a two-hour period, the day-night average noise level at 23 feet would be 78 dBA DNL, assuming a weather enclosure, or would range from 64 to 70 dBA DNL with a Level 1 or Level 2 sound enclosure. With the location of the generator room being in the northwestern corner of the underground parking structure of the building, the proposed building would provide at least 25 dBA of shielding. Therefore, testing the emergency generator, assuming a capacity of 250 kW or less, would not be expected to exceed the City's 55 dBA DNL threshold at the nearest residential property line.

Mitigation Measure 1c: None required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities are not expected to exceed 0.2 in/sec PPV at the surrounding sensitive land uses. **This is a significant impact.**

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

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

Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 8 also summarizes the distances to the 0.08 in/sec PPV threshold for historical buildings and to the 0.2 in/sec PPV threshold for all other buildings.

TABLE 8 Vibration Source Levels for Construction Equipment

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

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006, as modified by Illingworth & Rodkin, Inc., October 2019.

Based on the Historical Resources Inventory for the City of San José,[3] only one building is located in the project vicinity: 2295 South Bascom Road, which is approximately 540 feet north of the project site. At this distance, the nearest building façade would be exposed to vibration levels ranging from 0.0001 to 0.007 in/sec PPV. Construction equipment would not generate vibration levels in excess of the City's 0.08 in/sec PPV vibration threshold.

Table 9 summarizes the vibration levels at the nearest adjacent buildings surrounding the site. While construction noise sources increase based on all equipment in use simultaneously, construction vibration would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration source level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line. Further, construction vibration impacts are assessed based on damage to buildings on receiving land uses, not receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels (as shown in Table 9), which are different than the distances used to propagate construction noise levels (as shown in Table 7), were estimated under the assumption that each piece of equipment from Table 8 was operating along the nearest boundary of the project site, which would represent the worst-case scenario.

There are two residences to the west that would be located about 10 feet from the shared property line. When the following equipment is used along this shared property line, vibration levels would potentially exceed 0.2 in/sec PPV: clam shovel drop, vibratory roller, hoe ram, large bulldozer, caisson drilling, and loaded trucks. Additionally, the nearest commercial building to the north would be approximately 25 feet from the shared property line. Therefore, when clam shovel drops or vibratory rollers are used along the northern property line of the project site, vibration levels would potentially exceed 0.2 in/sec PPV at this structure. All other structures surrounding the site would be 35 feet or more from the site, where vibration levels would be below 0.2 in/sec PPV.

[3] https://www.sanjoseca.gov/index.aspx?NID=2172

The City's threshold of 0.2 in/sec PPV for non-historical buildings would potentially be exceeded at the two nearest residences to the west of the project site and the nearest commercial building to the north of the project site when construction activities occur along the shared boundaries.

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment		PPV (in/sec)				
		West Res. (10ft)	Southwest Res. (35ft)	North Comm. (25ft)	South Comm. (50ft)	East Comm. (130ft)
Clam shovel drop		**0.553**	0.140	**0.202**	0.094	0.033
Hydromill (slurry wall)	in soil	0.022	0.006	0.008	0.004	0.001
	in rock	0.047	0.012	0.017	0.008	0.003
Vibratory Roller		**0.575**	0.145	**0.210**	0.098	0.034
Hoe Ram		**0.244**	0.061	0.089	0.042	0.015
Large bulldozer		**0.244**	0.061	0.089	0.042	0.015
Caisson drilling		**0.244**	0.061	0.089	0.042	0.015
Loaded trucks		**0.208**	0.052	0.076	0.035	0.012
Jackhammer		0.096	0.024	0.035	0.016	0.006
Small bulldozer		0.008	0.002	0.003	0.001	0.0005

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., October 2019.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[4] The findings of this study have been applied to buildings affected by construction-generated vibrations.[5] As reported in USBM RI 8507[4] and reproduced by Dowding,[5] Figure 8 presents the damage probability, in terms of "threshold damage," "minor damage," and "major damage," at varying vibration levels. Threshold damage, which is described as cosmetic damage in this report, would entail hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage would include hairline cracking in masonry or the loosening of plaster, and major structural damage would include wide cracking or shifting of foundation or bearing walls. As shown in Figure 8, maximum vibration levels of 1.2 in/sec PPV would result in approximately 20% of threshold damage or cosmetic damage, while no minor or major damage was observed with maximum vibration levels of 1.2 in/sec PPV. At 0.6 in/sec PPV, no minor or major damage would be expected, and there would be a about 8% chance of threshold damage or cosmetic damage.

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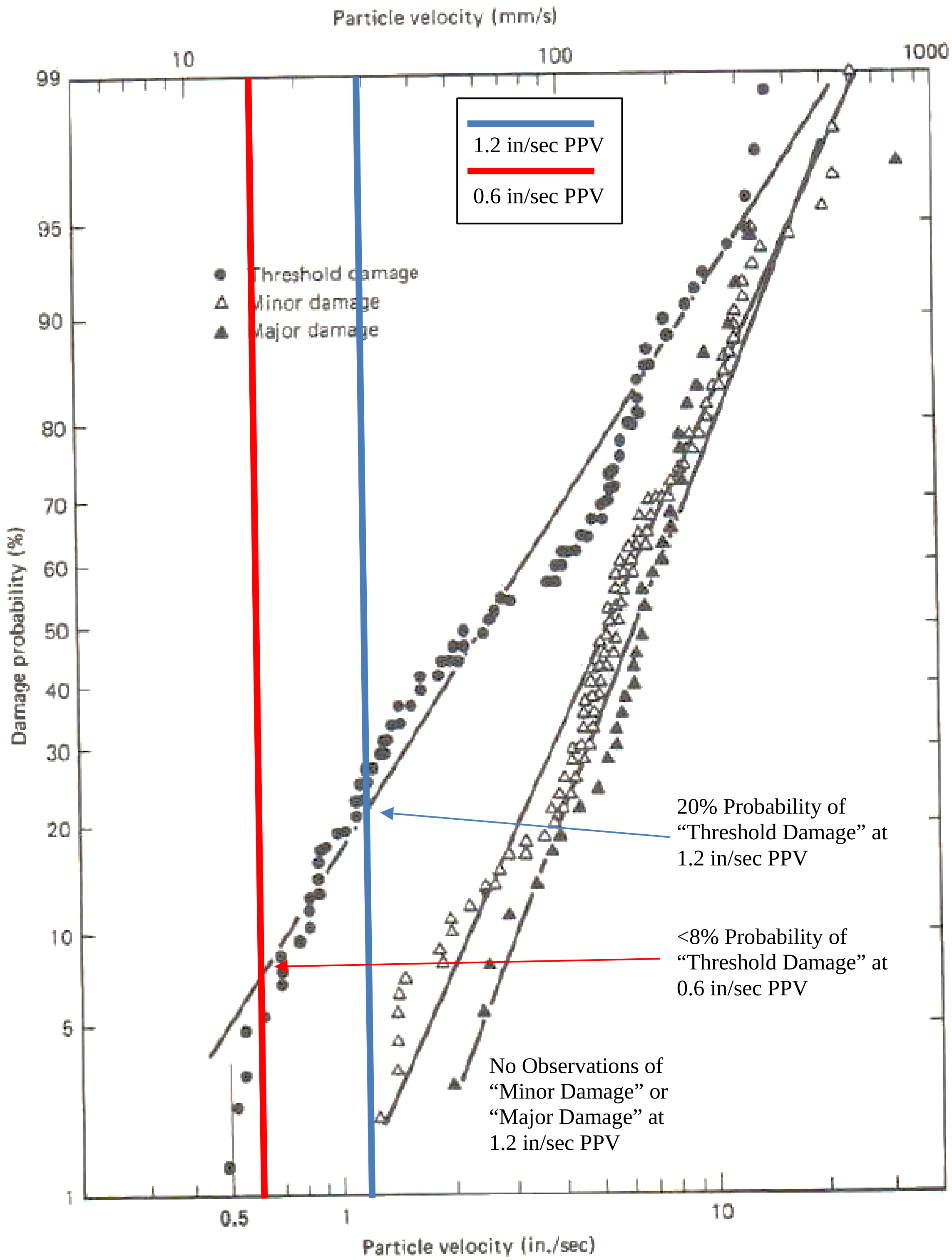
[4] Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration form Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.

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

FIGURE 8 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., October 2019.

Typical construction equipment, as shown in Table 9, would have the potential to produce vibration levels of 0.2 in/sec PPV or more at the non-historical buildings surrounding the site. While no minor or major damage would occur at these conventional buildings, there is the potential to generate threshold or cosmetic damage at the surrounding buildings. This is a significant impact.

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

Mitigation Measure 2:

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

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

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

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

- Where possible, use of the heavy vibration-generating construction equipment shall be prohibited within 20 feet of any adjacent building.

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

    - Vibration limits shall be applied to vibration-sensitive structures located within 30 feet of all construction activities identified as sources of high vibration levels.

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

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

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

- If vibration levels approach limits, suspend construction and implement contingency measures to either lower vibration levels or secure the affected structures. *(not applicable)*

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

- Conduct a post-construction survey on structures where either monitoring has indicated high vibration levels or complaints of damage has been made. Make appropriate repairs or compensation where damage has occurred as a result of construction activities.

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

Impact 3: **Excessive Aircraft Noise.** The project site is located approximately 5 miles from Norman Y. Mineta San José International. The proposed project would not expose people residing or working at the site to excessive aircraft noise. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 5 miles north of the project site. The project site lies well outside the 60 dBA CNEL 2027 noise contour of the airport, according to the Norman Y. Mineta San José International Airport Master Plan Update Project[6] report published in February 2010 as an addendum to the Environmental Impact Report (see Figure 9). This means that future exterior noise levels due to aircraft 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. This is a less-than-significant impact.

Mitigation Measure 3: **None required.**

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[6] City of San José, "Norman Y. Mineta San José International Airport Master Plan Update Project: Eighth Addendum to the Environmental Impact Report," City of San José Public Project File No. PP 10-024, February 10, 2010.

FIGURE 9 2027 CNEL Noise Contours for SJIA Relative to Project Site