# *DELMAS ASSISTED LIVING PROJECT NOISE AND VIBRATION ASSESSMENT*

## *San José, California*

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### Prepared for:

**Fiona Phung**
**Project Manager**
**David J. Powers & Associates, Inc.**
**1871 The Alameda, Suite 200**
**San José, CA 95126**

### Prepared by:

**Carrie J. Janello and**
**Michael S. Thill**

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

Project: 19-193

## INTRODUCTION

The Delmas Assisted Living project proposes the demolition of the existing single-family residences and commercial structures on parcels 82 through 88 and the construction of an assisted living facility with 116 assisted living units and 49 memory care units in a building with a gross floor area of 185,054 square feet. Additionally, four affordable housing units are proposed as on-site staff housing. The project site is located in the southwestern corner of the West San Carlos Street/Gifford Avenue intersection in San José, California. This project would require a General Plan Amendment to accommodate the new development of an assisted living facility. The proposed building would be six stories and would be a full-service care facility for seniors, with meals and a variety of other services.

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 Plan Consistency Analysis Section discusses noise and land use compatibility, utilizing policies in the City's General Plan; and 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents 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:

4.3.2.1 Noise Compatibility Policies

**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 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.

**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 project site consists of eight parcels in the southwestern corner of the West San Carlos Street/Gifford Avenue intersection in the City of San José, California. Existing commercial uses adjoin the site to the west and are located opposite West San Carlos Street to the north. Existing automotive repair shops are located adjacent to the project site to the south and opposite Gifford Avenue to the east. Single-family residences are also located opposite Gifford Avenue to the east and south of the adjacent automotive repair shop .

The existing noise environment at the project site and in the surrounding area results primarily from vehicular traffic along State Route 87 (SR 87) and West San Carlos Street. Local traffic along Gifford Avenue and Auzerais Avenue, and aircraft associated with Mineta San José International Airport, also contribute to the noise environment in the project vicinity.

A noise monitoring survey was performed in the project vicinity beginning on Monday, October 14, 2019 and concluding on Wednesday, October 16, 2019. The monitoring survey included two long-term (LT-1 and LT-2) noise measurements and one short-term (ST-1) noise measurement. All measurement locations are shown in Figure 1.

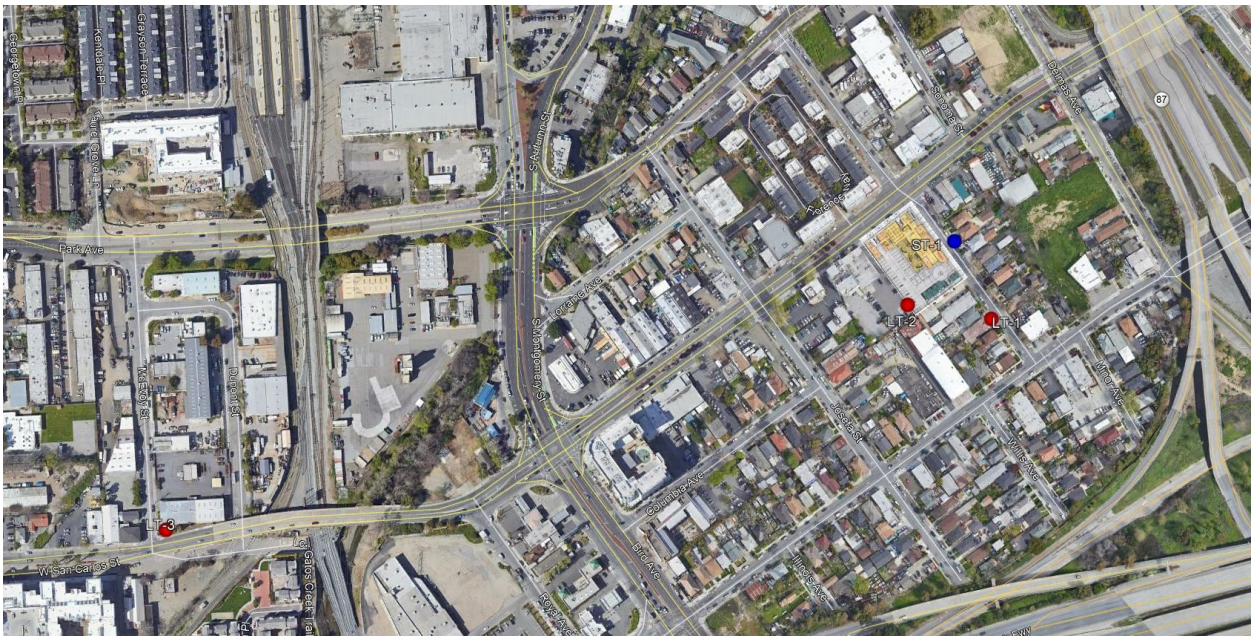
Long-term noise measurement LT-1 was made in front of the residence at 385 Gifford Avenue approximately 20 feet west of the centerline. The primary noise source at this receptor was traffic along Auzerais Avenue. Operations at the automotive repair shop opposite Gifford Avenue were also audible. Hourly average noise levels at this location typically ranged from 59 to 64 dBA $L_{eq}$ during the day and from 49 to 60 dBA $L_{eq}$ at night. The day-night average noise level was 64 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 250 feet south of the centerline of West San Carlos Street. The predominant noise source at LT-2 was distant traffic along SR 87 and West San Carlos Street. Hourly average noise levels at this location typically ranged from 57 to 71 dBA $L_{eq}$ during the day and from 47 to 59 dBA $L_{eq}$ at night. The day-night average noise level was 62 dBA DNL. The daily trend in noise levels at LT-2 is shown in Figures 5 through 7.

The short-term noise measurement (ST-1) was made over a 10-minute period, concurrent with the long-term noise data, on Monday, October 14, 2019, between 12:40 p.m. and 12:50 p.m. ST-1 was made in front of 324 Gifford Avenue, approximately 15 feet east of the centerline of the roadway. The primary noise source at ST-1 was West San Carlos Street traffic, which generated noise levels ranging from 54 to 56 dBA. A heavy truck pass-by along West San Carlos Street generated noise levels of 63 dBA, and buses along West San Carlos Street produced noise levels ranging from 59 to 61 dBA. Typical car pass-bys along Gifford Avenue generated noise levels ranging from 62 to 72 dBA. Additionally, three jet flyovers generated noise levels of 69 to 70 dBA. The 10-minute average noise level measured at ST-1 was 59 dBA $L_{eq(10\text{-}min)}$. The short-term measurement results for ST-1 are summarized in Table 4.

In addition to the site-specific measurements, the 2040 San José Downtown Strategy Environmental Impact Report (EIR), within which the proposed project falls, provides measurement data for a long-term receptor positioned 45 feet from the centerline of West San Carlos Street. This receptor is shown in Figure 1 as LT-3, and data from this receptor 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. The daily trend in noise levels at LT-3 is shown in Figures 8 through 10.

**FIGURE 1 Noise Measurement Locations**




Source: Google Earth 2020.

**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: Front yard equivalent of 324 Gifford Avenue (10/14/2019, 12:40-12:50 p.m.) | 72 | 69 | 63 | 53 | 49 | 59 |

**FIGURE 2 Daily Trend in Noise Levels at LT-1, Monday, October 14, 2019**

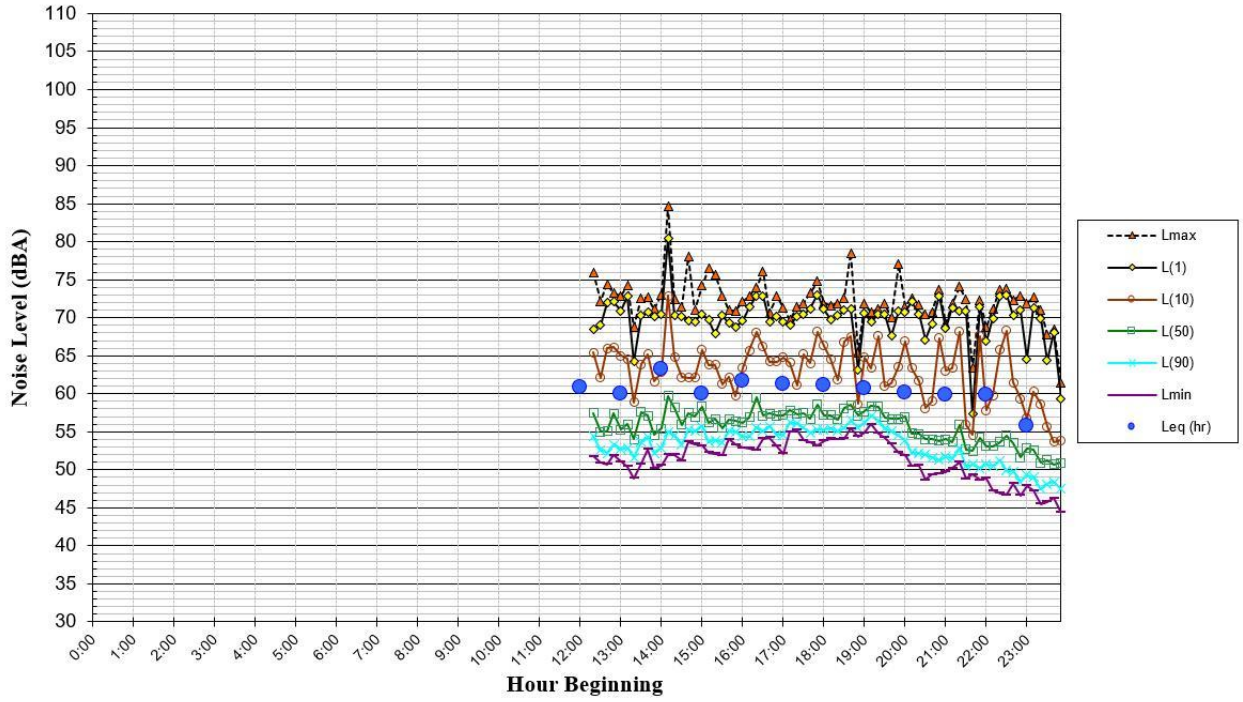



**FIGURE 3 Daily Trend in Noise Levels at LT-1, Tuesday, October 15, 2019**

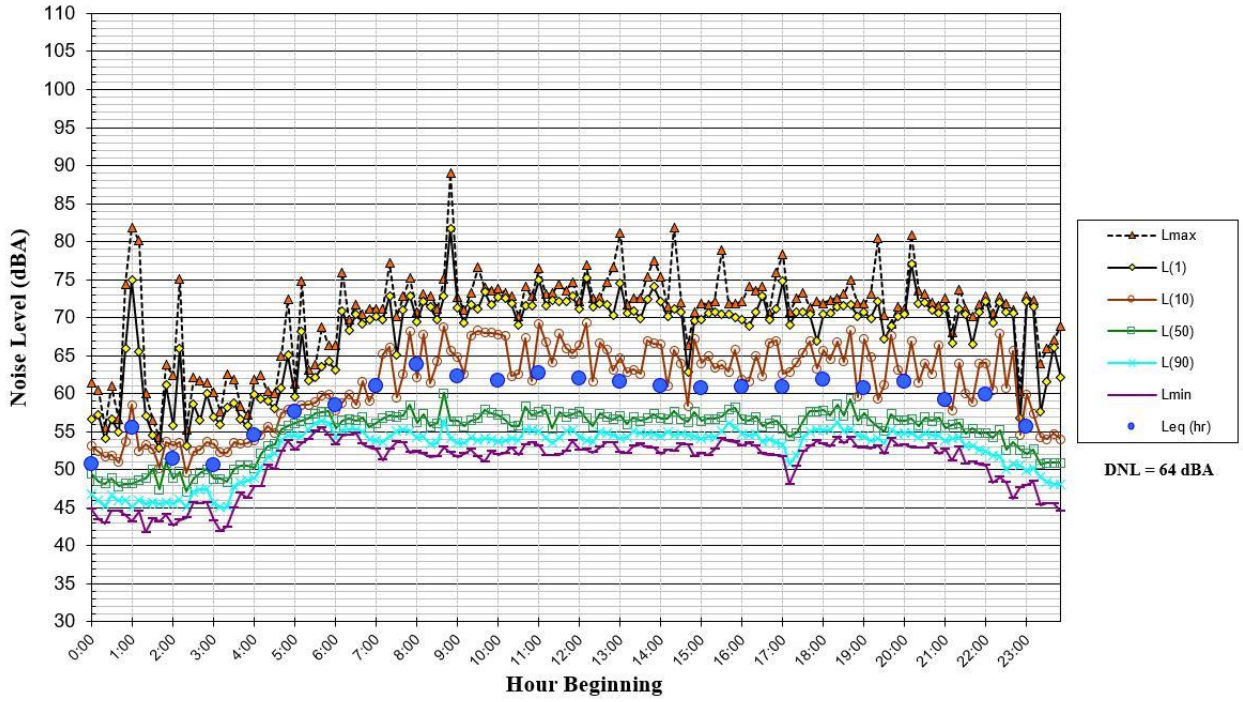


**FIGURE 4 Daily Trend in Noise Levels at LT-1, Wednesday, October 16, 2019**

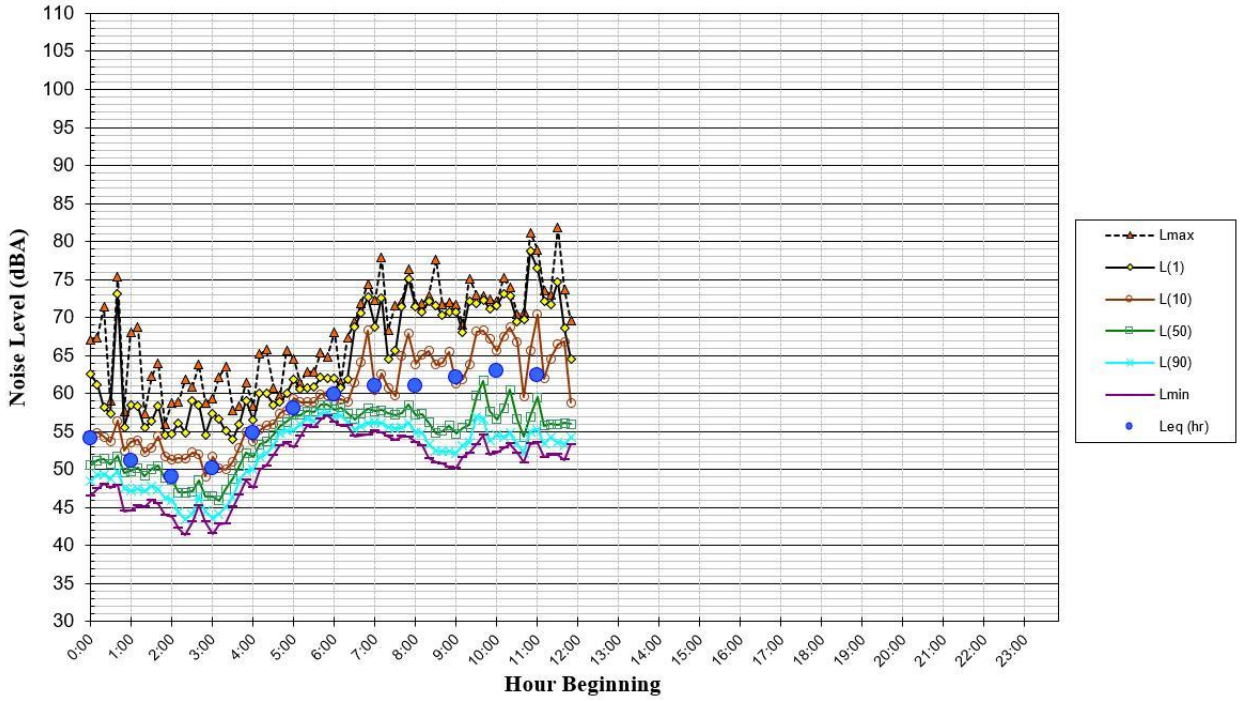



**FIGURE 5 Daily Trend in Noise Levels at LT-2, Monday, October 14, 2019**

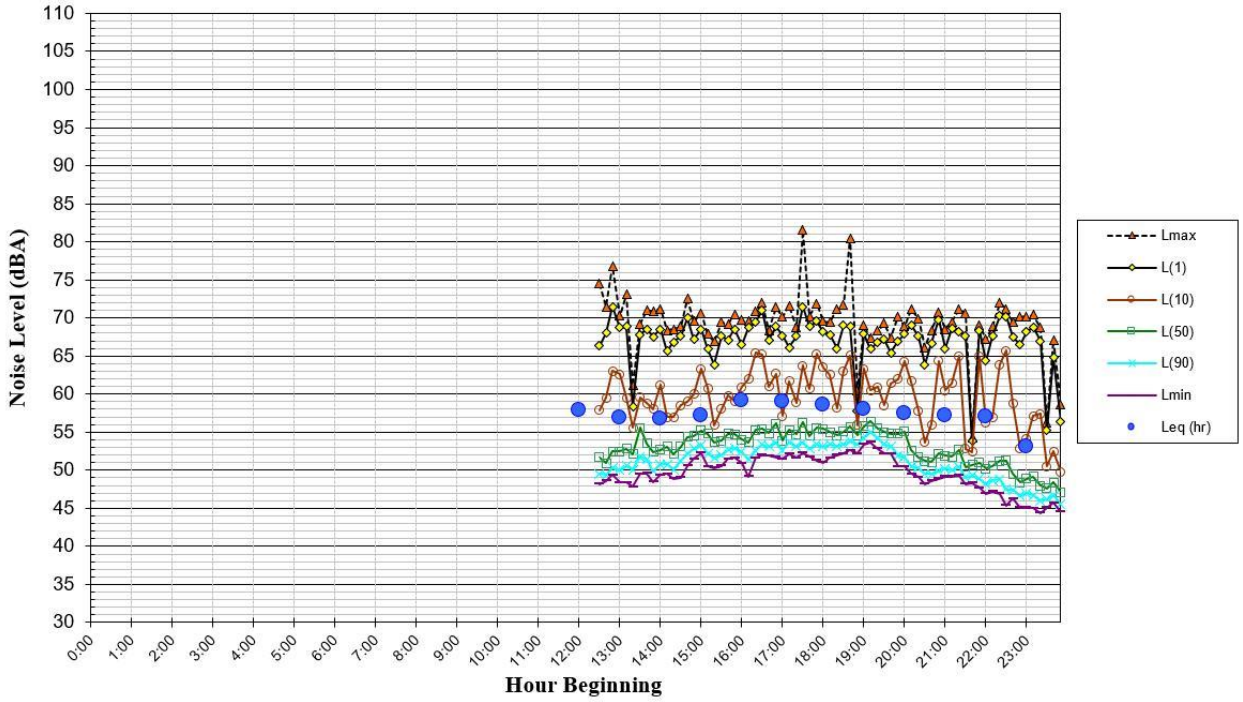


**FIGURE 6 Daily Trend in Noise Levels at LT-2, Tuesday, October 15, 2019**

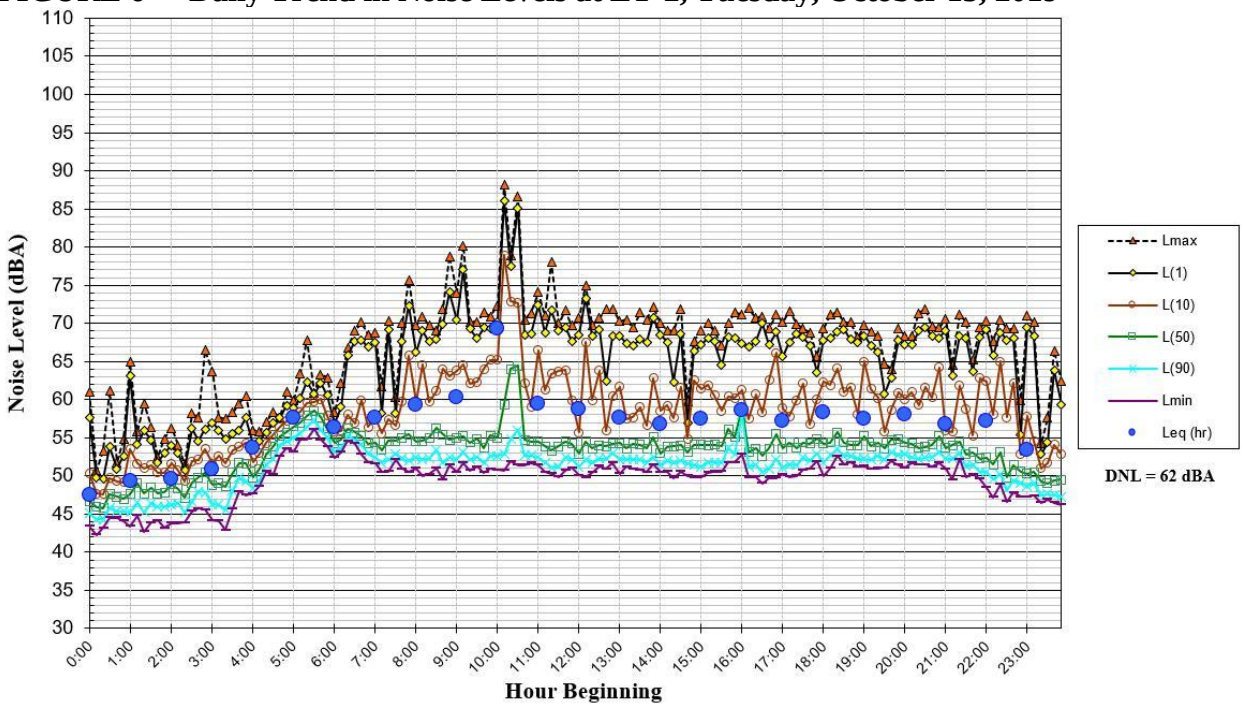



**FIGURE 7 Daily Trend in Noise Levels at LT-2, Wednesday, October 16, 2019**

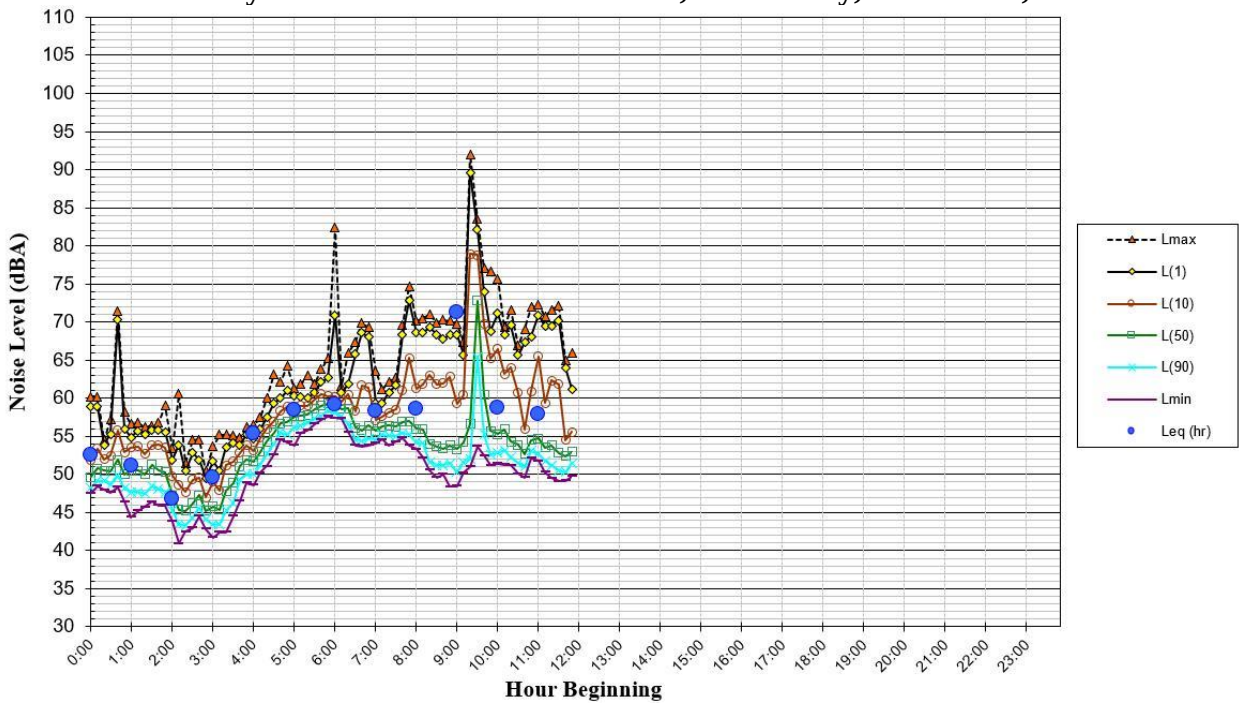


**FIGURE 8 Daily Trend in Noise Levels at LT-3, Wednesday, February 21, 2018**

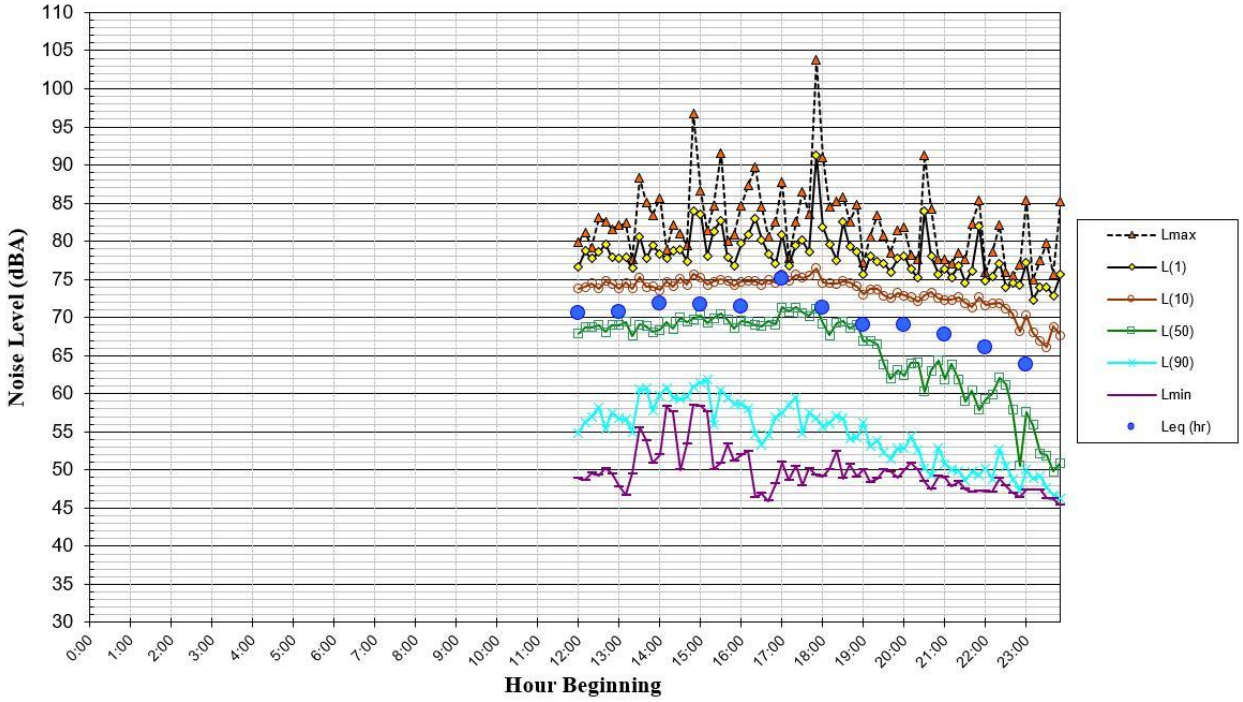



**FIGURE 9 Daily Trend in Noise Levels at LT-3, Thursday, February 22, 2018**

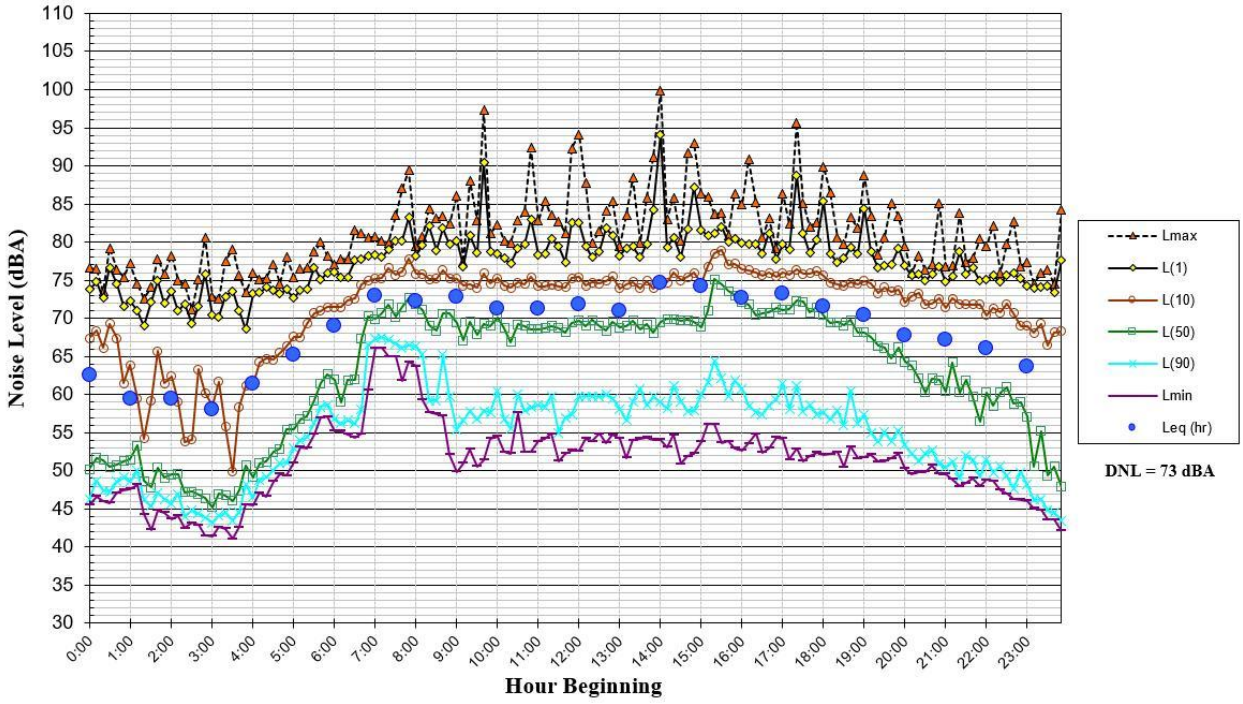
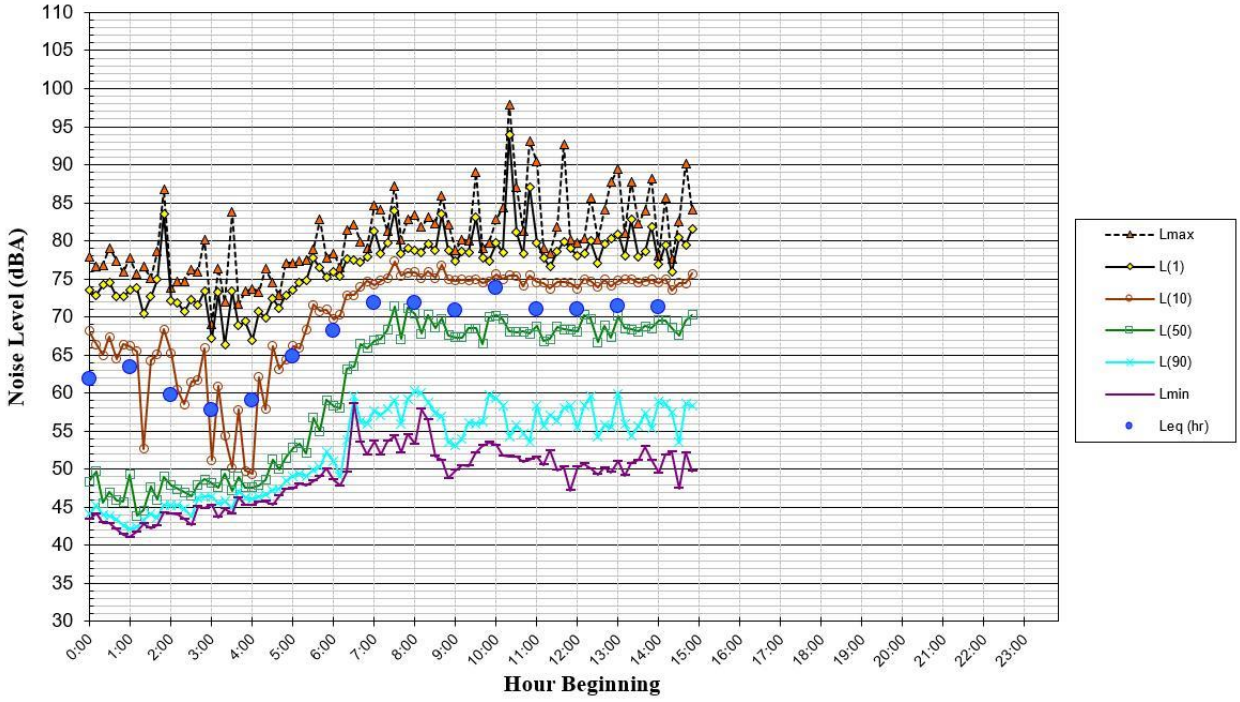


**FIGURE 10 Daily Trend in Noise Levels at LT-3, Friday, February 23, 2018**




## PLAN CONSISTENCY ANALYSIS

### Noise and Land Use Compatibility

The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques and through appropriate land use policies in the City of San José. The applicable General Plan policies were presented in detail in the Regulatory Background section and are summarized below for the proposed project:

- The City's acceptable exterior noise level standard is 60 dBA DNL or less for the proposed residential land uses.

- The City's acceptable interior noise level standard is 45 dBA DNL or less for the proposed residential land uses.

The future noise environment at the project site would continue to result primarily from vehicular traffic along SR 87 and West San Carlos Street. A traffic report was completed for the proposed project in July 2020 by *Hexagon Transportation Consultants, Inc*.[1] However, the traffic study did not include cumulative plus project traffic volumes. The proposed project falls within the plan area boundaries of the *Downtown San José Strategy Plan 2040 EIR*.[2] For each 2040 buildout scenario included in the Downtown Strategy Plan, the traffic noise increase along West San Carlos Street

[1] Hexagon Transportation Consultants, Inc., "Gifford Assisted Living Development Local Transportation Analysis," July 13, 2020.
[2] City of San José, "Downtown San José Strategy Plan 2040 Environmental Impact Report," December 2018.

would be 4 dBA above existing conditions. This increase was added to the ambient noise levels measured at LT-2, which was dominated by West San Carlos Street. Additionally, cumulative 2040 peak hour traffic volumes for SR 87 were also provided in the Downtown Strategy Plan. Under each of the cumulative buildout alternatives, a traffic noise increase of 1 dBA DNL was estimated along SR 87. This noise level increase was added to the ambient noise measurements made at LT-1, which is dominated by SR 87. Therefore, future noise levels are anticipated to be 65 dBA DNL at a distance of 20 feet from the centerline of Gifford Avenue (LT-1) and 66 dBA DNL at a distance of 250 feet from the centerline of West San Carlos Street (LT-2).

*Future Exterior Noise Environment*

The proposed project includes an outdoor common space on the ground level, which is completely surrounded by the building. Two second-floor outdoor decks, a third-floor deck, and a fourth-floor deck are also located on the interior of the building, overlooking the ground-level common space. A six-floor viewing deck is located along the eastern portion of the building.

Interior Outdoor Use Areas

The ground-level common space and decks located on floors two, three, and four would be shielded from all surrounding traffic noise sources by the proposed building. For each of these outdoor use areas, at least 30 dBA noise attenuation would be provided by the building. Therefore, the future exterior noise levels at the ground-level common space and the second-, third-, and fourth-floor decks would be below 60 dBA DNL.

Sixth-Floor Viewing Deck

The sixth-floor viewing deck would be located along the eastern portion of the building. The center of the deck would be set back approximately 35 feet from the centerline of Gifford Avenue. Due to the orientation of the building, the western half of this deck would be shielded from West San Carlos Street, while the eastern half would have some direct exposure to the traffic noise. Further, the elevation of the deck would provide direct line-of-sight to SR 87 from the outdoor use area. The future exterior noise levels at the center of the sixth-floor viewing deck would be 69 dBA DNL, with future noise levels up to 70 dBA DNL at the edge of the deck.

The future exterior noise levels at the outdoor use areas on floors one through four would meet the City's 60 dBA DNL exterior noise threshold; however, the sixth-floor viewing deck would exceed the threshold by up to 9 dBA DNL. Since these noise levels fall within the City's conditionally acceptable range, the City could allow this outdoor use space without noise-reducing measures. If the City would not allow conditionally acceptable noise levels at the sixth-floor viewing deck, additional measures would be required to reduce exterior noise levels to at or below 60 dBA DNL.

*Recommended Measures to Reduce Exterior Noise Levels*

Methods available to reduce exterior noise levels at the residential viewing deck along the eastern building façade include site planning alternatives (e.g., increased setbacks and using the proposed buildings as noise barriers), the construction of traditional noise barriers, or a combination of the above. For the proposed project, the viewing deck is mostly likely positioned along this façade for the purpose of viewing the City of San José, and relocating the deck to another building façade

would reduce the aesthetic appeal. Therefore, the optimal measure for noise reduction would be to construct a sound wall or a specially-designed barrier.

The height of the proposed sound wall or specially-designed fence would need to break the line-of-sight from the deck to the traffic noise sources along SR 87. A feasible height for the barrier would be 5 feet, which would reduce noise levels to 63 dBA DNL at the center of the deck. While this still exceeds the 60 dBA DNL threshold, constructing a barrier capable of reducing noise levels by 9 dBA DNL would not be realistic. To achieve 60 dBA DNL, the sixth-floor viewing deck would need to be completed enclosed, or an indoor space. Therefore, the optimal barrier height of 5 feet would reduce noise levels to the conditionally-acceptable level of 63 dBA DNL.

The 5-foot barrier would be located along the perimeter of the deck, as measured from the base elevations, and attach to the building on either end. One solid barrier, continuous from grade to top, with no cracks or gaps, would be recommended and shall consist of a minimum surface density of three lbs/ft$^2$. A clear barrier would be optimal in order to maintain aesthetic appeal (i.e., ½-inch laminated glass).

*Conditions of Approval*

Prior to the issuance of any building permit, the project applicant shall ensure all outdoor use areas achieve future exterior noise levels at or below the City's "normally acceptable" threshold of 60 dBA DNL at the center of the spaces where reasonably achievable. For common outdoor use areas where 60 dBA DNL is not reasonably achievable, such as the sixth-floor deck along the eastern façade, measures should be incorporated to achieve reasonable "conditionally acceptable" noise levels at the centers of the outdoor use spaces.

The project applicant shall retain a qualified acoustical consultant to review the final site plan in order to determine specific noise reduction measures to meet the City's requirements. Noise reduction measures could include increased setbacks, using the proposed building façades as noise barriers, the construction of traditional noise barriers, or a combination of these methods. The applicant's retained qualified acoustical consultant shall prepare a detailed acoustical study during final building design to evaluate the land use compatibility of the proposed common use outdoor spaces with the future noise environment at the site and to identify the necessary noise controls that are included in the design to meet the City's requirements. The study shall be submitted to the Director of Planning, Building and Code Enforcement or the Director's designee prior to issuance of any building permit.

*Future Interior Noise Environment*

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required.

Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Residential Units Along the North Façade

Residential units facing West San Carlos Street are located on floors 2 through 6 of the proposed building. The northern façade of the building would be set back from the centerline of West San Carlos Street by 40 to 45 feet. At these distances, the units located along the northern façade would be exposed to future exterior noise levels ranging from 70 to 72 dBA DNL. Assuming windows to be partially open for ventilation, future interior noise levels would range from 55 to 57 dBA DNL.

Residential Units Along the South Façade

Units along the southern façade are located on floors 1 through 6. While the ground-level units would be mostly shielded from traffic noise along SR 87 by the surrounding buildings, units located on the upper floors would have direct line-of-sight to SR 87. The ground-level units would be exposed to future exterior noise levels ranging from 61 to 64 dBA DNL. Assuming windows to be partially open for ventilation, future interior noise levels would range from 46 to 49 dBA DNL. Units on the upper floors would be exposed to future exterior noise levels ranging from 66 to 70 dBA DNL. Assuming windows to be partially open, future interior noise levels would range from 51 to 55 dBA DNL.

Residential Units Along the East Façade

Units along the eastern façade are located on floors 2 through 6 and would have direct line-of-sight to SR 87. These units would be exposed to future exterior noise levels ranging from 69 to 70 dBA DNL. Assuming windows to be partially open, future interior noise levels would range from 54 to 55 dBA DNL.

Residential Units Along the West Façade

Units along the western façade would be shielded from SR 87 and partially shielded from West San Carlos Street. These units would be exposed to future exterior noise levels ranging from 62 dBA DNL at the southwestern corner to 70 dBA DNL at the northwestern corner. Assuming windows to be partially open, future interior noise levels would range from 47 to 55 dBA DNL.

Residential Units Located on the Building Interior

Units surrounding the common outdoor space on the interior of the building would be well-shielded by the building façade. These units would be exposed to future exterior noise levels at or below 60 dBA DNL. Assuming windows to be partially open for ventilation, future interior noise levels would be at or below 45 dBA DNL.

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

*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:

- 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 West San Carlos Street along the northern façade and nearest to SR 87 along the eastern façade would require windows and doors with a minimum rating of 31 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL. See Figure 11.

- Residential units along the southern façade, as well as the two northernmost and the southernmost units along the western façade, would require windows and doors with a minimum rating of 28 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA DNL. See Figure 11.

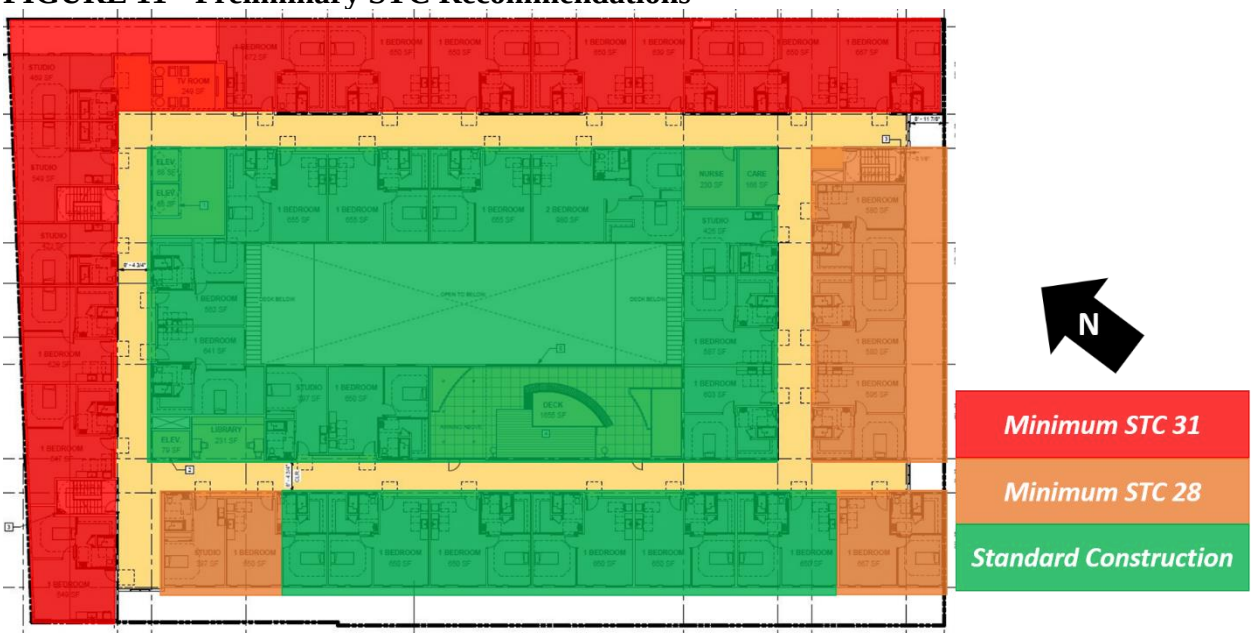
- The remaining units along the western façade and the units along the interior of the building would meet the City's interior threshold of 45 dBA DNL with standard construction materials and adequate forced-air mechanical ventilation. See Figure 11.

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

*Conditions of Approval*

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 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.

**FIGURE 11 Preliminary STC Recommendations**




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

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

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project 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 east of the project site would have daytime ambient noise levels represented by LT-1 and ST-1, which ranged from 59 to 64 dBA $L_{eq}$. Existing commercial properties surrounding the project site, which are located along West San Carlos Street, would be represented by LT-3. Daytime noise levels at receptors located near West San Carlos Street range from 67 to 75 dBA $L_{eq}$.

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 average noise level ranges, by construction phase. Hourly average noise levels generated by construction are about 65 to 88 dBA $L_{eq}$ for an assisted living facility 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, assuming all equipment per phase operated

simultaneously. This would represent the worst-case scenario for each phase of construction. For construction noise, the use of multiple pieces of equipment simultaneously would add together as a collective noise source. Using the modeled worst-case noise levels for each phase, the construction noise levels were calculated from the geometrical center of the project site to the 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 16 months. 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 impact to be significant.

**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 |

| Equipment Category | $L_{max}$ Level (dBA)[1,2] | Impact/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) | | | |
|---|---|---|---|---|---|---|
| | | | South Comm. (115ft) | East Res. & Comm. (125ft) | North Comm. (200ft) | West Comm. (80ft) |
| Demolition | 9/20/2021-10/8/2021 | Concrete/Industrial Saw (1)<br>Excavator (1)<br>Rubber-Tired Dozer (2)<br>Tractor/Loader/Backhoe (2) | 80 dBA | 79 dBA | 75 dBA | 83 dBA |
| Site Preparation | 10/11/2021-10/22/2021 | Grader (1)<br>Rubber-Tired Dozer (3)<br>Tractor/Loader/Backhoe (3) | 81 dBA | 80 dBA | 76 dBA | 84 dBA |
| Grading/Excavation | 10/25/2021-11/19/2021 | Excavator (1)<br>Grader (1)<br>Rubber-Tired Dozer (1)<br>Tractor/Loader/Backhoe (3) | 80 dBA | 79 dBA | 75 dBA | 83 dBA |
| Trenching/Foundation | 11/22/2021-2/11/2022 | Tractor/Loader/Backhoe (1)<br>Cement Mixer (10) | 79 dBA | 78 dBA | 74 dBA | 82 dBA |
| Building Exterior | 2/14/2022-11/18/2022 | Crane (1)<br>Forklift (3)<br>Generator Set (1)<br>Tractor/Loader/Backhoe (3)<br>Welder (1) | 79 dBA | 78 dBA | 74 dBA | 82 dBA |
| Building Interior/Architectural Coating | 8/1/2022-11/18/2022 | Air Compressor (1)<br>Aerial Lift (1) | 67-79 dBA[a] | 67-78 dBA[a] | 63-74 dBA[a] | 71-82 dBA[a] |
| Paving | 11/21/2022-12/16/2022 | Cement and Mortar Mixer (1)<br>Paver (1)<br>Paving Equipment (2)<br>Roller (1)<br>Tractor/Loader/Backhoe (1) | 80 dBA | 79 dBA | 75 dBA | 83 dBA |

[a] Range of hourly average noise levels reflects the Building Interior/Architectural Coating phase only and in combination with the Building Exterior phase.

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,[3] which parcels 82 through 85 fall within, and the Diridon Station Area Plan (DSAP) Integrated Final Program EIR,[4] which parcels 86 through 88 fall within, provided 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 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

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

additional measures for typical construction noise logistics plans, which would include, but not be limited to, the following measures to reduce construction noise levels as low as practical:

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

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

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

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

- Prohibit all unnecessary idling of internal combustion engines;

- If impact pile driving is proposed, multiple-pile drivers shall be considered to expedite construction. Although noise levels generated by multiple pile drivers would be higher than the noise generated by a single pile driver, the total duration of pile driving activities would be reduced; *(not applicable to the proposed project)*

- If impact pile driving is proposed, temporary noise control blanket barriers shall shroud pile drivers or be erected in a manner to shield the adjacent land uses. Such noise control blanket barriers can be rented and quickly erected; *(not applicable to the proposed project)*

- If impact pile driving is proposed, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile. Notify all adjacent land uses of the construction schedule in writing; *(not applicable to the proposed project)*

- 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 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 included peak hour turning movements for four intersections in the project vicinity. When the peak hour project trips were added to the existing traffic volumes, the existing plus project traffic scenario was calculated. By comparing the existing plus project traffic volumes to the existing traffic volumes, 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. Therefore, the proposed project would not result in a permanent noise increase of 3 dBA DNL or more. 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. However, the project could potentially exceed the City's Municipal Code threshold of 55 dBA DNL. Implementation of measures as a project condition of approval would ensure noise levels to be below 55 dBA DNL. **This is a less-than-significant impact.**

Assisted living facilities would be treated as a residential land use since occupants would sleep on the premises. The City's General Plan does not include policies specifically addressing mechanical noise generated by residential land uses. However, the residential mechanical noise should be addressed with respect to the City's Municipal Code threshold of 55 dBA DNL to minimize disturbance to the existing residences surrounding the project site.

*Mechanical Equipment*

The roof plan shows 1,673 square feet of green roof space and 7,542 square feet of solar panels. Solar panels are not typically considered an excessive noise-generating source. These panels would not be audible on adjacent properties.

The proposed project is expected to include mechanical equipment, such as heating, ventilation, and air conditioning systems (HVAC), as well as emergency generators, pumps, condensers, etc.

Six potential locations for such equipment are shown on the roof plan, along the edge of the roof surrounding the interior outdoor use area. Mechanical equipment would be at least 45 feet from the northern and eastern property lines, at least 35 feet from the western boundary, and at least 50 feet from the southern boundary. Details pertaining to the number, type, and size were not available at the time of this study. Nor was noise level information, provided by the manufacturers, available at the time of this study.

Noise levels produced by a typical heat pump for a building this size are approximately 56 dBA at 3 feet during operation. Assuming up to six heat pumps would operate simultaneously at any given time, the hourly average noise level would be 64 dBA $L_{eq}$ at 3 feet, and the estimated day-night average noise level at 3 feet would be 70 dBA DNL. At each of the surrounding boundaries, the hourly average noise level would be at or below 40 dBA $L_{eq}$, and the day-night average noise level would be at or below 49 dBA DNL. With the nearest residential property lines set back an additional 35 feet or more from the project site, noise levels due to heat pumps would be below the City's 55 dBA DNL threshold at the nearest residential property lines.

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 worst-case hourly average noise level would be 74 dBA $L_{eq}$ at 3 feet, and the total day-night average noise level due to air conditioning condensers at a distance of 3 feet would be 80 dBA DNL. Assuming these units to be located on the rooftop near the heat pumps, the combined noise levels from six heat pumps and six air conditioners would be about 74 dBA $L_{eq}$ and 81 dBA DNL at 3 feet. The nearest residential property line would be approximately 85 feet from the nearest rooftop equipment. At this distance, the hourly average noise level would be 45 dBA $L_{eq}$, and the day-night average noise level would be 52 dBA DNL, which would satisfy the City's 55 dBA DNL threshold. All other residential property lines would be farther from the mechanical equipment noise sources and therefore would be exposed to noise levels below 52 dBA DNL.

An emergency generator is expected as part of the project in case of power outages. The emergency generator would have a capacity up to 300 kW. Generators of this size typically generate noise levels up to 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 running of generators would be exempt from City noise restrictions; however, generators are typically tested for a period of about one hour 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 the one-hour period, the day-night average noise level at 23 feet would be 75 dBA DNL, assuming a weather enclosure, or would range from 61 to 67 dBA DNL with a Level 1 or Level 2 sound enclosure. The most recent site plan shows the generator on the ground level in the northwest corner of the building, which would be within the parking structure. A conservative 20 dBA of shielding is assumed based on standard residential construction materials with no windows. The nearest residential property line would be north of West San Carlos Street, approximately 100 feet or more from the proposed generator room. At this distance and assuming a conservative 20 dBA attenuation, testing the emergency generator, assuming a capacity up to 300 kW, would result in

hourly average noise levels up to 54 dBA $L_{eq}$ and day-night average noise levels up to 41 dBA DNL, depending on the type of enclosure. This would not exceed the City's 55 dBA DNL threshold at the nearest residential property line.

Since the City's General Plan does not include policies specifically addressing mechanical noise generated by residential land uses, no General Plan policies would be violated, and this would be considered a less-than-significant impact. However, depending on the specific location of the mechanical equipment and generator room, as well as the size and capacity of the proposed units, mechanical equipment noise could potentially generate noise levels exceeding the City's Municipal Code thresholds. 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.

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.

*Truck Deliveries and Parking Lot Noise*

The only on-site parking would be within a ground-level parking structure. Additionally, truck delivery and passenger loading zones are also shown within the parking structure. All surrounding noise-sensitive receptors would be well shielded from noise generated by on-site parking and truck deliveries. This would be a less-than-significant impact.

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

**Impact 2: Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels resulting from activities could potentially exceed 0.2 in/sec PPV at the surrounding sensitive land uses. The incorporation of construction best management practices from Impact 1a and additional vibration-specific measures as project conditions of approval would result in a **less-than-significant** construction vibration 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 José General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction.

Table 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,[5] there are no historic buildings within 500 feet of the project boundary. Therefore, for the purposes of this study, all structures in the vicinity of the project site would be exposed to significant construction vibration if vibration levels are in excess of the City's 0.2 in/sec PPV threshold.

Table 9 summarizes the vibration levels estimated at the nearest buildings immediately surrounding the site. Each of these vibration levels were estimated under the assumption that each piece of equipment was operating along the nearest boundary of the project site, which would represent the worst-case scenario. The commercial buildings adjoining the site to the south and to the west would be 5 to 20 feet from the shared property lines. As shown in Table 9, vibration levels at 5 feet would exceed 0.2 in/sec PPV if the following equipment were used along the northern, southern, and western property lines of the site: clam shovel drop, vibratory roller, hoe ram, large bulldozer, caisson drilling, loaded trucks, and jackhammer. At 20 feet, only the clam shovel drop

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

and vibratory roller would exceed 0.2 in/sec PPV. For the nearest residences to the east, which are located 65 feet or more from the project site, vibration levels would be below 0.2 in/sec PPV. The City's threshold of 0.2 in/sec PPV for non-historical buildings would potentially be exceeded at the nearest structures adjoining the project site when construction activities occur along the shared boundary.

**TABLE 9 Vibration Source Levels for Construction Equipment**

| Equipment | | PPV (in/sec) | | | |
|---|---|---|---|---|---|
| | | South Comm. (5ft) | West Comm. (20ft) | North Comm. (90ft) | East Res. (65ft) |
| Clam shovel drop | | **1.186** | **0.258** | 0.049 | 0.071 |
| Hydromill (slurry wall) | in soil | 0.047 | 0.010 | 0.002 | 0.003 |
| | in rock | 0.100 | 0.022 | 0.004 | 0.006 |
| Vibratory Roller | | **1.233** | **0.268** | 0.051 | 0.073 |
| Hoe Ram | | **0.523** | 0.114 | 0.022 | 0.031 |
| Large bulldozer | | **0.523** | 0.114 | 0.022 | 0.031 |
| Caisson drilling | | **0.523** | 0.114 | 0.022 | 0.031 |
| Loaded trucks | | **0.446** | 0.097 | 0.019 | 0.027 |
| Jackhammer | | **0.206** | 0.045 | 0.009 | 0.012 |
| Small bulldozer | | 0.018 | 0.004 | 0.001 | 0.001 |

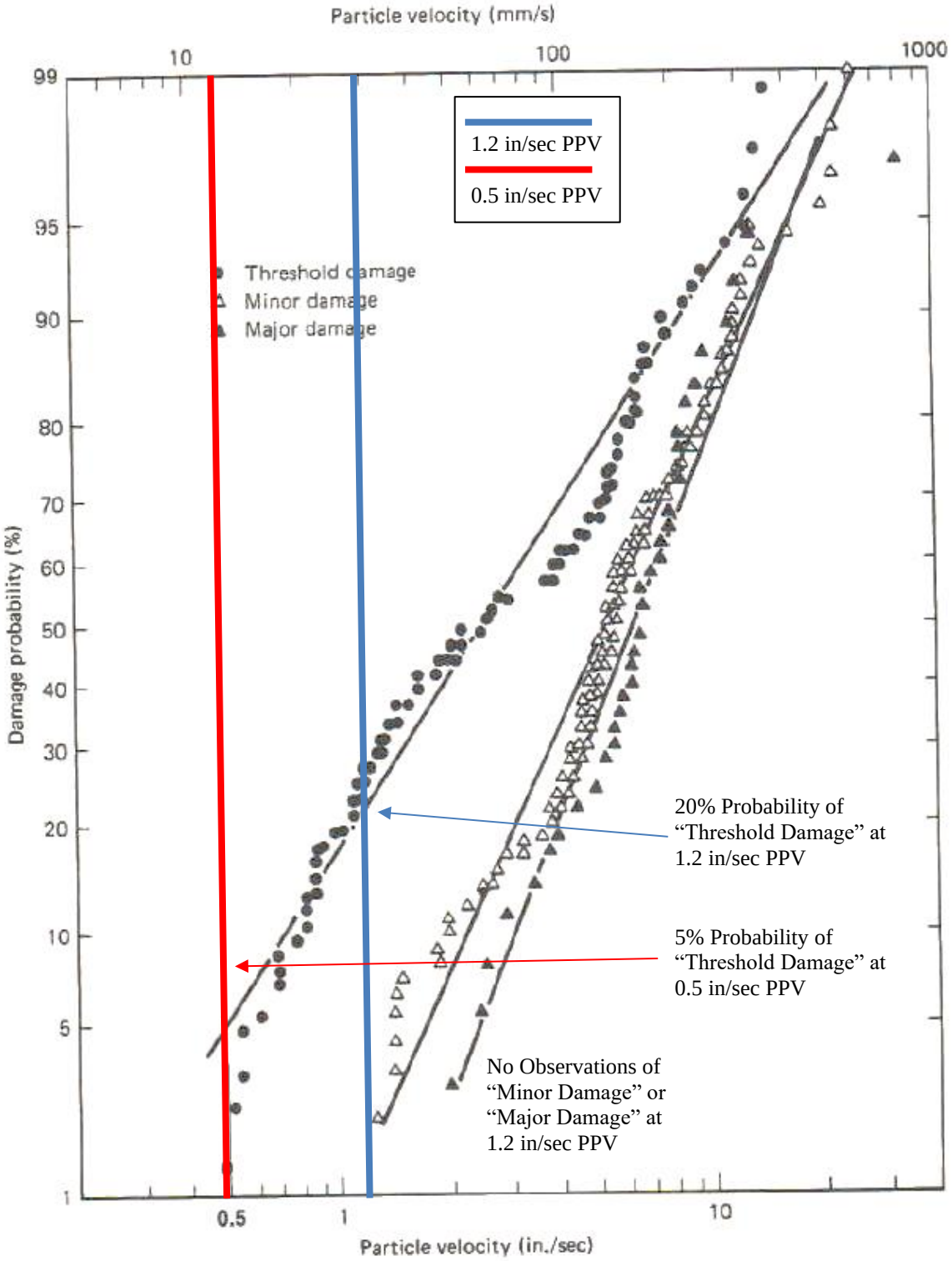
Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006, as modified by Illingworth & Rodkin, Inc., November 2019.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[6] The findings of this study have been applied to buildings affected by construction-generated vibrations.[7] As reported in USBM RI 8507[4] and reproduced by Dowding,[5] Figure 12 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 12, 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. Vibration levels of 0.5 in/sec PPV would result in no minor or major damage, and there would be about 5% chance of threshold damage or cosmetic damage.

[6] 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.

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

**FIGURE 12 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., November 2019.

Typical construction equipment, as shown in Table 9, would have the potential to produce vibration levels up to 1.2 in/sec PPV at the non-historical structures surrounding the site. While no minor or major damage would occur at these conventional buildings, there is a 20% chance of generating 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. The following best available controls, in addition to the best practices specified in Impact 1a of this report, were provided in the Downtown Strategy 2040 EIR for all projects not involving impact or vibratory pile driving. These controls shall be implemented into the proposed project as a project condition of approval:

- A list of all heavy construction equipment to be used for this project known to produce high vibration levels (e.g. tracked vehicles, vibratory compaction, jackhammers, hoe rams, clam shovel drop, and vibratory roller, etc.) shall be submitted to the City by the contractor. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort for reducing vibration levels below the thresholds.

- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.

- Use smaller equipment to minimize vibration levels below the limits.

- Avoid using vibratory rollers and clam shovel drops near sensitive areas.

- Select demolition methods not involving impact tools.

- Modify/design or identify alternative construction methods to reduce vibration levels below the limits.

- Avoid dropping heavy objects or materials.

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

**Mitigation Measure 2:** **No further mitigation required.**

**Impact 3:** **Excessive Aircraft Noise.** The project site is located 1.9 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 with the implementation of forced-air mechanical ventilation. **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. According to the City's new Airport Master Plan Environmental

Impact Report,[8] the project site lies near the 60 dBA CNEL/DNL contour line (see Figure 13). This means that future exterior noise levels due to aircraft from Norman Y. Mineta San José International Airport would be equal to but 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 aircrafts. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

Assuming standard construction materials for aircraft noise of about 60 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.**

[8] David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.

**FIGURE 13 2037 CNEL Noise Contour Map for SJIA Relative to Project Site**

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

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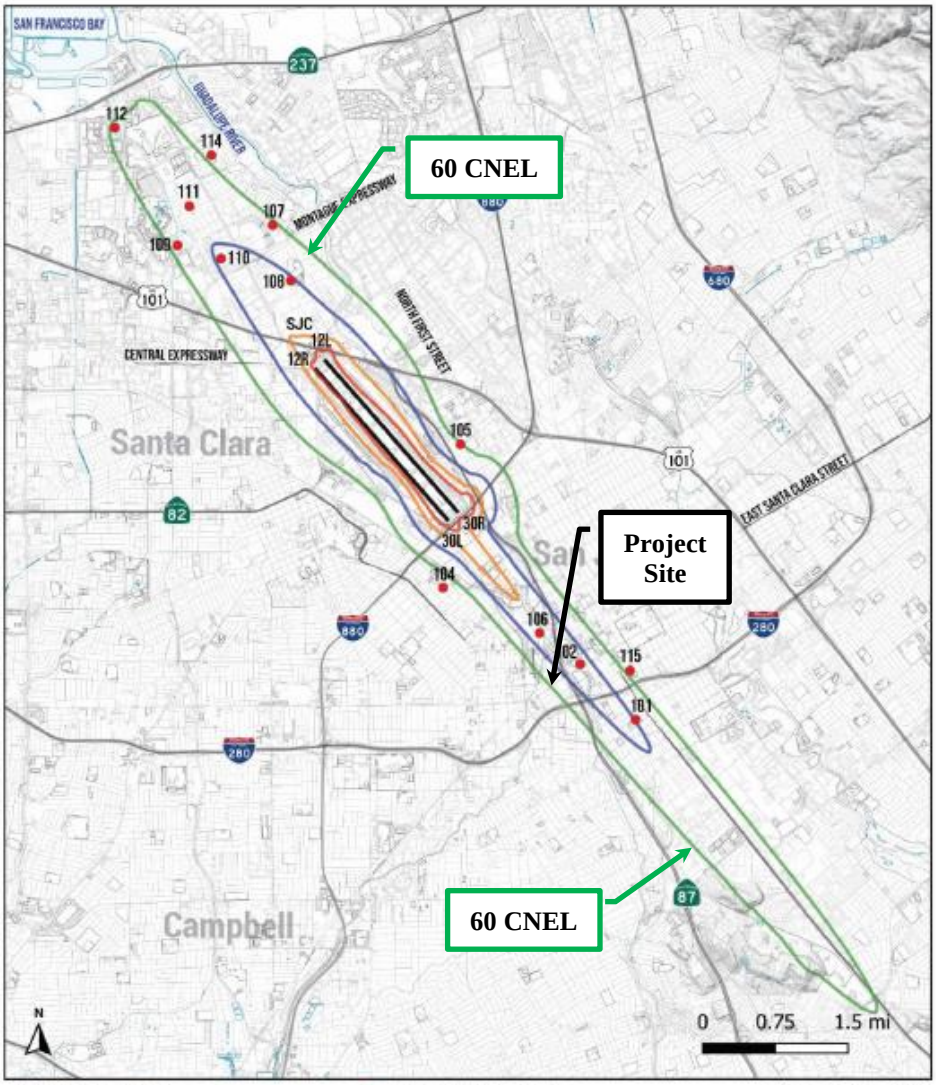


NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

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

Figure 5 Scenario 2: With Project 2037 Noise Contour Map

Source: BridgeNet International 2019