# Appendix D

# Noise/Vibration Assessment

# *1015 S. BASCOM AVENUE ASSISTED LIVING PROJECT NOISE AND VIBRATION ASSESSMENT*

## *San José, California*

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## INTRODUCTION

The proposed 1015 S. Bascom Avenue Assisted Living project in San José, California would consist of 165 units in a six story Type I structure over a below grade podium parking deck, which would include a total of 102 parking spaces. Unit mix would include studios, one, and two bedroom residences. Building amenities would include community activities rooms, fitness and therapy rooms, a salon, a theater, lounges, dining rooms, and a secured courtyard. There would also be commercial spaces on the eastern façade of the ground floor along S. Bascom Avenue.

This report evaluates the project's potential to result in significant environmental noise or 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 land use compatibility utilizing noise and vibration-related 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 to a less than significant level.

## SETTING

### Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a

method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called $L_{eq}$. The most common averaging period is hourly, but $L_{eq}$ can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (*DNL* or $L_{dn}$) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

**Effects of Noise**

*Sleep and Speech Interference*

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

*Annoyance*

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

**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 vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much 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.

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 induce structural 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. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. 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.

Damage caused by vibration can be classified as cosmetic or structural. Cosmetic damage includes minor cracking of building elements (exterior pavement, room surfaces, etc.). Structural damage includes threatening the integrity of the building. Damage resulting from construction related vibration is typically classified as cosmetic damage. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. 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.

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

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

**Regulatory Background – Noise**

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, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

***State CEQA Guidelines.*** The 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) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

(c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) For a project located within 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;

(f) For a project within the vicinity of a private airstrip, 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 identified in Checklist Question (a) is not included in the Impacts and Mitigation Section of this report. This item is discussed in a separate section addressing Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan. Checklist items (a) through (d) are applicable in the assessment of potential impacts resulting from the proposed project at off-site receptors. Checklist items (e) and (f) are not applicable to this project because the project is not located within an airport land use plan, is not within two miles of an airport, and is not in the vicinity of a private air strip.

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.

***2016 California Building Code, Title 24, Part 2.*** The current version of the California Building Code (CBC) requires interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

***2016 California Building Cal Green Code.*** The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA $L_{dn}$ noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

***City of San José General Plan.*** The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of San José. The following policies are applicable to the proposed project:

**EC-1.1** Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, state, and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

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

Exterior Noise Levels

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

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

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

| LAND USE CATEGORY | EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 55 60 65 70 75 80 |
|---|---|
| 1. Residential, Hotels and Motels, Hospitals and Residential Care[1] | |
| 2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds | |
| 3. Schools, Libraries, Museums, Meeting Halls, Churches | |
| 4. Office Buildings, Business Commercial, and Professional Offices | |
| 5. Sports Arena, Outdoor Spectator Sports | |
| 6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters | |

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

**Normally Acceptable:**

- Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

**Conditionally Acceptable:**

- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

**Unacceptable:**

- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

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

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

**EC-1.3** Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses.

**EC-1.6** Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

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

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

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

**EC-1.11** Require safe and compatible land uses within the Mineta 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.

***City of San José Municipal Code.*** The City's Municipal Code contains a Zoning Ordinance that limits noise levels at adjacent properties. Chapter 20.30.700 states that sound pressure levels generated by any use or combination of uses on a property shall not exceed 55 dBA at any property line shared with land zoned for residential use, except upon issuance and in compliance with a Conditional Use Permit. Chapter 20.40.600 states the sound pressure level generated by any use or combination of uses shall not exceed 60 dBA at any property line shared with land zoned for commercial/industrial uses, except upon issuance and in compliance with a Conditional Use Permit. These codes are not explicit in terms of the acoustical descriptor associated with the noise level limit. However, a reasonable interpretation of these standards, which are based on policy EC-1.3 of the City's General Plan, would identify the ambient base noise level criteria as a day-night average noise level (DNL).

Chapter 20.100.450 of the Municipal Code establishes allowable hours of construction within 500 feet of a residential unit between 7:00 am and 7:00 pm Monday through Friday unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

Chapter 20.40.500 of the Municipal Code prohibits outdoor activity, including loading, sweeping, landscaping or maintenance, which occurs within 150 feet of any residentially zoned property, between the hours of 12:00 a.m. midnight and 6:00 a.m.

**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 vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a 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 vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction.

**Existing Noise Environment**

The project site is located at 1015 S. Bascom Avenue in San José. Figure 1 show the project site plan overlaid on an aerial image of the site vicinity. As shown on Figure 1, the project site is surrounded by residential and commercial land uses. Single- and multi-family residential buildings are located adjacent to the project site to the north and west. Commercial buildings are located adjacent to the project site to the north and south, as well as opposite S. Bascom Avenue to the east. The City of San José Bascom Branch Library is also located to the east opposite S. Bascom Avenue.

A noise monitoring survey was performed to quantify and characterize ambient noise levels at the site and in the project vicinity between Thursday, September 21, 2017 and Tuesday, September 26, 2017. The monitoring survey included two long-term noise measurements (LT-1 and LT-2) and two short-term measurements (ST-1 and ST-2), as shown in Figure 1. The noise environment at the site and at the nearby land uses in the project vicinity results primarily from vehicular traffic along S. Bascom Avenue.

Long-term noise measurement LT-1 was made along the eastern border of the project site, approximately 70 feet west of the S. Bascom Avenue centerline. Hourly average noise levels at this location ranged from 66 to 76 dBA $L_{eq}$ during the day and from 57 to 69 dBA $L_{eq}$ at night. The day-night average noise level from Thursday, September 21, 2017 through Tuesday, September 26, 2017 ranged from 70 to 73 dBA DNL. The daily trend in noise levels at LT-1 is shown in Appendix A.

Long-term noise measurement LT-2 was made along the western border of the project site, approximately 30 feet east of the Delna Manor Lane centerline and approximately 275 feet west of the S. Bascom Avenue centerline. Due to a battery failure, noise levels at this position were not recorded after 3:00 a.m. on Sunday, September 24, 2017. Hourly average noise levels at this location ranged from 55 to 62 dBA $L_{eq}$ during the day and from 49 to 60 dBA $L_{eq}$ at night. The day-night average noise level from Thursday, September 21, 2017 through Saturday, September 23, 2017 was 62 dBA DNL. The daily trend in noise levels at LT-2 is shown in Appendix A.

Short-term noise measurement ST-1 was made at the center of the project site, approximately 170 feet west of the S. Bascom Avenue centerline. The 10-minute average noise level measured at this location between 1:00 p.m. and 1:10 p.m. on Tuesday, September 26, 2017 was 55 dBA $L_{eq}$. Short-term noise measurement ST-2 was made along the eastern border of the project site, approximately 70 feet west of the S. Bascom Avenue centerline. The 10-minute average noise level measured at this location between 1:10 p.m. and 1:20 p.m. on Tuesday, September 26, 2017 was 65 dBA $L_{eq}$.

**FIGURE 1 Noise Measurement Locations**


Source: Google Earth

**TABLE 4 Summary of Short-Term Noise Measurement Data (dBA)**

| Noise Measurement Location | $L_{max}$ | $L_{(1)}$ | $L_{(10)}$ | $L_{(50)}$ | $L_{(90)}$ | $L_{eq}$ |
|---|---|---|---|---|---|---|
| ST-1: Center of project site. (9/26/2017, 1:00 p.m. - 1:10 p.m.) | 63 | 60 | 58 | 55 | 50 | 55 |
| ST-2: Eastern border of project site. (9/26/2017, 1:10 p.m. - 1:20 p.m.) | 74 | 71 | 69 | 64 | 54 | 65 |

**GENERAL PLAN CONSISTENCY ANALYSIS –**
**COMPATIBILITY OF PROJECT WITH NOISE ENVIRONMENT AFFECTING THE SITE**

In December 2015, the California Supreme Court issued an opinion in the California Building Industry Association vs. Bay Area Air Quality Management District (CBIA vs. BAAQMD) case that CEQA is primarily concerned with the impacts of a project on the environment, not the effects of the existing environment on a project. In light of this ruling, the effect of existing ambient noise on future users or residents of the project would not be considered an impact under CEQA. However, General Plan Policy EC-1.1 requires that existing ambient noise levels be analyzed for new residences, hotels, motels, residential care facilities, hospitals, and other institutional facilities, and that noise attenuation be incorporated into the project in order to reduce interior and exterior noise levels to acceptable limits.

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 objective is 60 dBA DNL or less for the proposed residential uses and 70 dBA DNL for the proposed commercial uses (Table EC-1).

- The City's acceptable interior noise level objective is 45 dBA DNL.

- The California Green Building Code limits interior noise levels within new non-residential land uses to an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The existing ambient noise environment at the project site ranges from 62 to 73 dBA DNL. The future noise environment at the project site would continue to result primarily from vehicular traffic along S. Bascom Avenue. Traffic data was gathered for the proposed project by *Hexagon Transportation Consultants, Inc*. According to this traffic data, the future background plus project conditions are expected to increase traffic noise levels along S. Bascom Avenue by less than 1 dBA DNL. To estimate the future noise environment at the project site, this increase in noise levels due to increased traffic volumes is applied to the results of the existing measurements described above. Therefore, at 70 feet from the centerline of S. Bascom Avenue, the future unmitigated noise level would be up to 74 dBA DNL (LT-1) and at 275 feet from the centerline of S. Bascom Avenue, the future unmitigated noise level would be up to 63 dBA DNL (LT-2).

*Future Exterior Noise Environment*

Residential Land Uses

Common residential outdoor use areas for the proposed project would include a ground floor courtyard on the west side of the building, a 5$^{th}$ floor outdoor balcony outside the Sky Lounge on the west side of the building, and two 6$^{th}$ floor outdoor balconies; one outside the dining room on the west side of the building and one outside the activity and living rooms on the east side of the

building facing S. Bascom Avenue. Typically, the exterior noise standards established by the City are evaluated at the center of each space.

*Ground Floor Courtyard.* The center of the ground floor courtyard on the west side of the proposed building would be approximately 200 feet from the centerline of S. Bascom Avenue. The future exterior noise level at this courtyard would be up to 69 dBA DNL assuming no intervening shielding. However, the ground floor courtyard would be mostly shielded from transportation related noise sources from S. Bascom Avenue by the proposed building itself. The proposed building would provide approximately 25 dBA of acoustical shielding at receptors within the courtyard from S. Bascom Avenue traffic noise. Therefore, future exterior noise levels at the ground floor courtyard of the proposed project would be well below the 60 dBA DNL threshold for residential land uses.

*Outdoor Balconies of the 5th and 6th Floor – West Facing.* The centers of the 5th floor and 6th floor outdoor balconies on the west side of the proposed building would be approximately 150 feet from the centerline of S. Bascom Avenue. The future exterior noise levels at these outdoor balconies on the west side of the building would be up to 71 dBA DNL assuming no intervening shielding. The outdoor balconies on the west side of the proposed building would be also be shielded from transportation related noise sources from S. Bascom Avenue by the proposed building itself, when considering the height of the balconies relative to the adjacent roadways, and the solid parapet barriers along the edge of the balconies. These factors would provide approximately 25 dBA of acoustical shielding at receptors on the 5th floor and 6th floor outdoor balconies on the west side of the proposed building from S. Bascom Avenue traffic noise. Therefore, future exterior noise levels at the 5th floor and 6th floor outdoor balconies on the west side of the proposed building would be well below the 60 dBA DNL threshold for residential land uses.

*Outdoor Balconies of the 6th Floor – East Facing.* The center of the 6th floor outdoor balcony on the east side of the proposed building facing S. Bascom Avenue would be approximately 75 feet from the centerline of S. Bascom Avenue. The future exterior noise level at this outdoor balcony would be up to 74 dBA DNL assuming no intervening shielding. However, the outdoor balcony on the east side of the proposed building would be shielded from transportation related noise sources from S. Bascom Avenue when considering the height of the balcony relative (51 to 61 feet above ground) to the adjacent roadways and the solid parapet barrier along the edge of the balcony. These factors would provide approximately 17 dBA of acoustical shielding at receptors on the 6th floor outdoor balcony on the east side of the proposed building from S. Bascom Avenue traffic noise. Therefore, future exterior noise levels at the 6th floor outdoor balcony on the east side of the proposed building would be less than the 60 dBA DNL threshold for residential land uses.

Exterior noise levels at the acoustically shielded residential outdoor use areas would not exceed the City's 60 dBA DNL exterior noise standard for residential land uses and would be considered compatible with the proposed land use.

Commercial Land Uses

Common commercial outdoor use areas for the proposed project would include ground floor seating areas on the east side of the proposed building adjacent to S. Bascom Avenue. The commercial seating areas would be approximately 65 feet west of the S. Bascom Avenue centerline

and would have a future exterior noise level of up to 74 dBA DNL. This future exterior noise level would be above the 70 dBA DNL normally acceptable threshold for commercial land uses. However, noise levels would fall within the conditionally acceptable range. Noise mitigation measures, such as barriers, would be unreasonable because they would block access from S. Bascom Avenue to the outdoor sitting areas and the proposed building's entrance. The conditionally acceptable noise level would be adequate at the commercial sitting areas.

Although the commercial outdoor sitting areas would be above the City's normally acceptable exterior noise threshold, it would fall within the conditionally acceptable range and would be considered compatible with the proposed land use.

*Future Interior Noise Environment*

Residential Land Uses

The City of San José requires that interior noise levels be maintained at 45 dBA DNL or less for residences. Residential units would be located on the 1st through 6th floors. At a distance of 70 feet from the S. Bascom Avenue centerline, residences along the eastern façade of the proposed building facing S. Bascom Avenue would be exposed to exterior traffic noise levels of up to 74 dBA DNL.

Interior noise levels would vary depending upon the design of the building (relative window area to wall area) and the selected construction materials and methods. Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 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, at the discretion of the residents, 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. For the proposed project, the interior noise levels with standard construction and windows and doors partially open for ventilation would be up to 59 dBA DNL, which exceeds the City's threshold for interior noise. Therefore, the project shall incorporate the standard permit conditions to provide consistency with the General Plan policies to meet residential interior noise thresholds.

Commercial Land Uses

The State of California requires interior noise levels to be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation at the proposed commercial retail on the ground floor. The proposed commercial uses would be located on the ground floor of the proposed building. At a distance of 70 feet from the S. Bascom Avenue centerline, commercial uses along the eastern façade of the proposed building would be exposed to future exterior noise levels ranging from 66 to 76 dBA $L_{eq(1\text{-}hr)}$ during daytime hours. Standard commercial construction provides at least 30 dBA of outdoor to indoor noise reduction assuming that the building includes adequate forced-air mechanical ventilation systems so that the windows and doors may remain closed to control noise.

Assuming standard commercial construction methods with the windows and doors closed, interior noise levels are calculated to range from 36 to 46 dBA $L_{eq(1\text{-}hr)}$ during daytime hours, which would be below the Cal Green Code standard of 50 dBA $L_{eq(1\text{-}hr)}$.

*Measures to Consider to Ensure General Plan Consistency*

For consistency with the General Plan, the following standard permit conditions will be implemented by the project applicant:

- Final project design shall provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, so that windows can be kept closed to control noise.

- Final project design shall provide sound rated windows to maintain interior noise levels at acceptable levels. Preliminary calculations show that sound-rated windows with minimum STC[1] Ratings of 36 and sound-rated doors with minimum STC Ratings of 32 would be satisfactory to achieve acceptable interior noise levels for the corner units facing S. Bascom Avenue. French doors facing S. Bascom Avenue should be rated at STC 34 or greater in order to achieve the interior noise level threshold of 45 dBA DNL. The remaining units would require sound-rated windows with minimum STC Ratings of 31 to achieve acceptable interior noise levels.

- The project applicant shall retain a qualified acoustical specialist to prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the final design phase of the project 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 confirm building treatments necessary to reduce residential interior noise levels to 45 dBA DNL or lower, and address and adequately control the noise from adjacent rooftop equipment. Treatments would include, but are not limited to, sound-rated windows and doors as specified above, 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.

## NOISE IMPACTS AND MITIGATION MEASURES

### Significance Criteria

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted

[1] **Sound Transmission Class (STC)** A single figure rating designed to give an estimate of the sound insulation properties of a partition. Numerically, STC represents the number of decibels of speech sound reduction from one side of the partition to the other. The STC is intended for use when speech and office noise constitute the principal noise problem.

environmental standards or plans, if the project would generate excessive groundborne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- **Noise Levels in Excess of Standards:** A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

- **Groundborne Vibration from Construction:** A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings. Groundborne vibration levels exceeding 0.08 in/sec PPV would have the potential to result in cosmetic damage to sensitive historic structures.

- **Project-Generated Traffic Noise Increases:** A significant impact would be identified if traffic generated by the project would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

- **Construction Noise:** A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA $L_{eq}$ at the property lines shared with residential land uses, and the ambient by at least 5 dBA $L_{eq}$, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses. Hourly average noise levels exceeding 70 dBA $L_{eq}$ at the property lines shared with commercial land uses, and the ambient by at least 5 dBA $L_{eq}$, for a period of more than one year would also constitute a significant temporary noise.

**Impact 1:** **Noise Levels in Excess of Standards.** The proposed project could generate noise levels in excess of standards established in the City's General Plan and Municipal Code at the nearby sensitive receptors. **This is a potentially significant impact.**

*Construction Noise*

Chapter 20.100.450 of the City's Municipal Code establishes allowable hours of construction within 500 feet of a residential unit between 7:00 am and 7:00 pm Monday through Friday unless permission is granted with a development permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence. This analysis assumes that construction activities will occur only during the allowable hours. Project construction will be consistent with the code limits and the impact is less-than-significant.

*Mechanical Equipment Noise*

Mixed-use residential buildings typically require various mechanical equipment, such as air conditioners, exhaust fans, and air handling equipment for ventilation of the buildings. The site plan indicates maintenance and electrical rooms located on the interior of the below-grade parking level, mechanical and electric rooms on the interior of the ground through 6$^{th}$ floors, a generator room and outdoor transformer on the ground floor at the southwest corner of the building, and rooftop mechanical equipment with mechanical screening. The nearest noise-sensitive uses to the project site include the adjacent single-family and multi-family residences to the west and north. Under the City's Noise Element and Municipal Codes, noise levels produced by the operation of the project would be limited to 55 dBA DNL at receiving noise-sensitive land uses.

Typical air conditioning units and heat pumps for multi-story residential projects produce noise levels of up to 70 dBA at a distance of 3 feet. The rooftop mechanical equipment would be at least 75 feet from the shared residential property lines. The distance from the rooftop mechanical equipment to the closest shared property line, the building itself, and the rooftop mechanical screening would provide at least 20 dBA of acoustic shielding. The noise levels from the rooftop mechanical equipment at the shared residential property lines would be below the City's threshold. Typical transformers for multi-story residential projects produce noise levels of up to 50 dBA at a distance of 3 feet. The ground floor transformer on the southwest corner of the building would be approximately 15 feet from the shared residential property line to the west. At this distance, typical transformer equipment noise levels would be sufficiently below the City's threshold.

The is a generator room on the ground floor at the southwest corner of the building. Given the close proximity of noise-sensitive uses to the generator room and lack of sufficient details about the equipment types and enclosures, there is the potential for noise from generator equipment to exceed 55 dBA DNL at noise-sensitive land uses in the immediate project vicinity, especially at receptors closest to the ground floor generator room. The final design plans should be reviewed by a qualified acoustical consultant to address any potential conflicts. Design planning should take into account the noise criteria associated with such equipment and utilize site planning to locate equipment in less noise-sensitive areas. Other controls could include, but shall not be limited to, fan silencers, enclosures, and screen walls. This is a potentially significant impact.

*Truck Loading and Unloading*

Truck deliveries and trash pickups for the ground floor commercial uses and residences on the project site would have the potential to generate noise. The site plan indicates a delivery area and trash enclosure would be located along the north side of the proposed building. While delivery and trash pickup times and frequency of these events were not provided at the time of this study, it is assumed that these activities would occur during daytime hours, at most 2 to 3 times a week. Typical noise levels generated by loading and unloading of truck deliveries would be similar to noise levels generated by truck movements on S. Bascom Avenue and by similar activities at surrounding commercial uses. Peak noise levels from truck activities would therefore not increase the day-night average noise level. These infrequent deliveries are not anticipated to substantially increase ambient noise levels at the nearby noise-sensitive land uses.

Truck deliveries occurring at the proposed project site would not generate levels exceeding 55 dBA DNL or existing ambient conditions at the nearby residences. This would be a less-than-significant impact.

*Parking and Circulation Noise*

Intermittent noise from vehicles accessing the parking garage must meet the project generated noise threshold established in the City's Municipal Code. According to the project plans, the parking garage would be located on the basement level. The below-grade parking garage would be completely enclosed and shielded from nearby noise-sensitive receptors, and would not result in audible noise levels at off-site sensitive receptor locations. However, sensitive receptors would potentially be exposed to the noise of vehicles accessing the garage. Vehicles will be circulating around the perimeter of the site to access the parking garage. Assuming ten vehicle trips per unit per day and shielding provided by the existing solid wooden fence along the northern and eastern property lines, the calculated DNL at the adjacent residential property line from project generated vehicles would be 42 dBA DNL. This noise level would be below the City's threshold for exterior noise and would result in a less-than-significant impact.

**Mitigation Measure 1:**

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- Prior to the issuance of building permits, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's requirements. A qualified acoustical consultant shall be retained by the project applicant to review mechanical noise as the equipment systems are selected in order to determine specific noise reduction measures necessary to reduce noise to comply with the City's 55 dBA DNL noise limit at the shared property line. 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.

**Impact 2:** **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels would exceed the 0.2 in/sec PPV threshold at nearby commercial buildings. **This is a potentially significant impact.**

The proposed project operation would consist of an assisted living facility with approximately 5,000 square feet of retail/commercial space on the ground floor. Most of the operations from the proposed project would not generate substantial vibration impacts to the surrounding areas. 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, grading and excavation, trenching, paving, and new building framing and finishing. Based on a review of the construction equipment list provided at the time of this study, the proposed project is not expected to require pile driving, which can cause excessive vibration.

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 0.2 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction. With no known historical buildings in the vicinity of the project site, a significant impact would occur if nearby buildings were exposed to vibration levels in excess of 0.2 in/sec PPV.

Table 5 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 5 Vibration Source Levels for Construction Equipment**

| **Equipment** | | **PPV at 25 ft. (in/sec)** |
|---|---|---|
| Pile Driver (Impact) | upper range | 1.158 |
| | typical | 0.644 |
| Pile Driver (Sonic) | upper range | 0.734 |
| | typical | 0.170 |
| Clam shovel drop | | 0.202 |
| Hydromill (slurry wall) | in soil | 0.008 |
| | in rock | 0.017 |
| Vibratory Roller | | 0.210 |
| Hoe Ram | | 0.089 |
| Large bulldozer | | 0.089 |
| Caisson drilling | | 0.089 |
| Loaded trucks | | 0.076 |
| Jackhammer | | 0.035 |
| Small bulldozer | | 0.003 |

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006.

The nearest sensitive receptors would be the adjacent residences located approximately 30 feet to the west of the project site. At this distance, vibration levels due to construction activities would be up to 0.17 in/sec PPV, which would be below the 0.2 in/sec PPV threshold. Other sensitive receptors near the project site include the residences located approximately 60 feet north. At this distance, vibration levels due to construction activities would be up to 0.08 in/sec PPV, which would be below the 0.2 in/sec PPV threshold. The nearest commercial land uses would be the adjacent commercial building located approximately 20 feet to the north of the project site. At this distance, vibration levels due to construction activities would be up to 0.27 in/sec PPV, which would slightly exceed the 0.2 in/sec PPV threshold. Other commercial land uses near the project site include the commercial building located approximately 40 feet south and the commercial building and commercial buildings located approximately 150 feet east opposite S. Bascom Avenue. At these distances, vibration levels due to construction activities would be up to 0.13

in/sec PPV, which would be below the 0.2 in/sec PPV threshold. Construction vibration levels would be below the threshold at nearby sensitive receptors, but would be above the threshold at the nearest commercial land uses. This is a potentially significant impact.

**Mitigation Measure 2:**

The following measures are recommended to reduce vibration impacts from construction activities:

- Prohibit the use of heavy vibration-generating construction equipment, such as vibratory rollers or excavation using clam shell or chisel drops, within 30 feet of any adjacent building. Prohibit pile driving, but if pile driving is necessary, prohibit within 70 feet of any adjacent building,

- 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.

- A vibration plan shall be submitted to the Supervising Planner at PBCE prior to issuance of any grading permit. The vibration plan shall include, but is not limited to:

    - Proposed list of construction equipment and their specification in regards to vibration generation. This should be based on distance if possible.

    - Person responsible for noise and vibration complaints.

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

**Impact 3:** **Substantial Permanent Noise Increase due to Project-Generated Traffic.** Project-generated traffic would not cause a permanent noise level increase at existing noise-sensitive land uses in the project vicinity. **This is a less-than-significant impact.**

A significant noise impact would occur if traffic generated by the project would substantially increase noise levels at sensitive receptors in the project vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater. Noise-sensitive land uses along S. Bascom Avenue are exposed to noise levels greater than 60 dBA DNL; therefore, a significant impact would occur if project-generated traffic would permanently increase noise levels by 3 dBA DNL. For reference, traffic volumes would have to double for noise levels to increase by 3 dBA DNL.

The traffic data provided peak hour volumes for the project-generated traffic at local and major roadways in the immediate project vicinity. Traffic volume information was reviewed to calculate the permanent noise increase attributable to project-generated traffic. Traffic volumes under the Existing Plus Project scenario were compared to the Existing scenario to calculate the relative

increase in the hourly average traffic noise level ($L_{eq}$) attributable to the proposed project. The change in the DNL would be the same as the change in the peak hour $L_{eq}$ given that the hourly distribution of traffic and mix of vehicles is expected to be similar to the existing traffic. The permanent noise level increase due to this project-generated traffic would be less than 1 dBA DNL at noise-sensitive receptors in project vicinity. Therefore, the proposed project would not cause a substantial permanent noise level increase at the nearby noise-sensitive receptors.

**Mitigation Measure 3: None required.**

**Impact 4: Substantial Temporary Noise Increase due to Construction.** Existing noise-sensitive land uses would be exposed to construction noise levels in excess of the significance thresholds for a period of more than one year. **This is a potentially 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. Project construction is anticipated to occur over an approximate period of 24 months, beginning in 2019.

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and none on weekends 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.

While noise thresholds for temporary construction are not provided in the City's General Plan or Municipal Code, the Fundamentals section of this report provides a threshold of 45 dBA for speech interference indoors. Assuming a 15 dBA exterior-to-interior reduction for standard residential construction and a 25 dBA exterior-to-interior reduction for standard commercial construction, this would correlate to an exterior threshold of 60 dBA $L_{eq}$ at residential land uses and 70 dBA $L_{eq}$ at commercial land uses. Additionally, temporary construction would be annoying to surrounding land uses if the ambient noise environment increased by at least 5 dBA $L_{eq}$ for an extended period of time. Therefore, the temporary construction noise impact would be considered significant if project construction activities exceeded 60 dBA $L_{eq}$ at nearby residences or exceeded 70 dBA $L_{eq}$ at nearby commercial land uses and exceeded the ambient noise environment by 5 dBA $L_{eq}$ or more for a period longer than one year.

The noise-sensitive receptors (residences) to the west and north of the project site would have existing daytime ambient noise levels similar to the noise levels recorded at LT-2. Based on these data, the average hourly noise level during construction hours would range from 55 to 62 dBA $L_{eq}$. The commercial receptors to the north, east, and south of the project site would have existing daytime ambient noise levels similar to the data collected at LT-1. Average hourly noise levels during construction hours range from 66 to 76 dBA $L_{eq}$ at commercial receptors in the project vicinity.

Construction activities generate considerable amounts of noise, especially during earth-moving activities and during the construction of the building's foundation when heavy equipment is used. Typical hourly average construction-generated noise levels for residential mixed-use buildings are about 81 to 88 dBA $L_{eq}$ measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.), as shown in Table 6. The typical range of maximum instantaneous noise levels would be 78 to 90 dBA $L_{max}$ at a distance of 50 feet, as shown in Table 7.

**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 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 |

| Equipment Category | $L_{max}$ Level (dBA)[1,2] | Impact/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.

The proposed project is expected to take approximately two years to complete. Construction activities would include demolition, site preparation, excavation, grading, trenching, building construction, paving, and architectural coating. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. The hauling of excavated materials and construction materials would generate truck trips on local roadways as well.

A detailed list of equipment expected to be used for the proposed project construction period and phasing information for the project was available at the time of this study. The calculated construction equipment noise data were used to estimate the range of construction noise levels

expected at the nearby existing land uses. The estimates were calculated by measuring from the nearby receptors to the center of the proposed building.

Hourly average noise levels due to construction activities during busy construction periods outdoors would range from about 81 to 87 dBA $L_{eq}$ at a distance of 50 feet. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. The nearest noise-sensitive land uses are approximately 130 feet and 170 feet from the center of the project site. At these distances, hourly average noise levels during busy construction periods would range from 73 to 79 dBA $L_{eq}$ at the adjacent residences to the west and from 70 to 76 dBA $L_{eq}$ at the residences to the north. Construction noise levels at these noise-sensitive receptors would be expected to exceed 60 dBA $L_{eq}$ and exceed the ambient noise environment by at least 5 dBA $L_{eq}$ at noise-sensitive residential uses in the project vicinity for a period exceeding one year. Nearby commercial land uses would be exposed to construction noise levels ranging from 72 to 78 dBA $L_{eq}$ at the adjacent commercial building 140 feet to the north of the center of the project site, from 71 to 77 dBA $L_{eq}$ at the adjacent commercial building 160 feet to the south, and from 67 to 73 dBA $L_{eq}$ at the commercial buildings 250 feet to the east opposite S. Bascom Avenue. Construction noise levels at commercial land uses would exceed 70 dBA $L_{eq}$ but would not exceed the ambient noise environment by at least 5 dBA $L_{eq}$ for a period exceeding one year.

Construction noise levels from the project site would be expected to exceed thresholds at nearby noise-sensitive residential receptors but not at nearby commercial receptors. In addition, since the project construction would last for a period of more than 12 month and considering that the project location 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 potentially significant.

**Mitigation Measure 4:**

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. Construction activities will be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work within 500 feet of residential land uses to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. Construction is prohibited on weekends at sites located within 500 feet of residential units. Further, the City shall require the construction crew to adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity.

The project applicant shall prepare 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 shall respond to neighborhood complaints. Measures from this plan shall be included on all approved grading and building permit plans. The construction noise logistics plan shall be reviewed and approved by the Supervising Environmental Planner of the City of San José Department of Planning, Building, and Code Enforcement prior to issuance of any grading permit and/or building permits. Measures to be included in the plan shall include, but not be limited to:

- Notifying the neighborhood of the construction activities and construction schedule (including estimated dates of various construction phases) at least one week and no more than three weeks prior to the start of construction.

- Prohibit unnecessary idling of internal combustion engines. Equipment shall be shut off when not in use and the maximum idling time shall be limited to five minutes.

- In order to minimize construction noise impacts, best available noise control practices and equipment (including mufflers, intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds) shall be used for all heavy earthmoving equipment, impact tools, compressors, engine generators, and diesel-fueled trucks. A letter from a qualified acoustic specialist shall be attached to the plan along with a list of proposed construction equipment, certifying that the proposed construction equipment includes the best available noise attenuating technologies.

- If impact equipment (e.g., jack hammers, pavement breakers, or rock drills) is needed during construction, hydraulically or electric-powered equipment shall be used wherever feasible to avoid the noise associated with compressed-air exhaust from pneumatically powered tools. However, where use of pneumatically powered tools is unavoidable, an exhaust muffler on the compressed-air exhaust shall be used. External jackets on the tools themselves shall also be used if available and feasible.

- Locate equipment at the work area as far away from the nearby residential areas as possible to maximize the distance to noise-sensitive receptors and to take advantage of any shielding that may be provided by other on-site equipment.

- Designate a "noise disturbance coordinator" who shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall 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 shall be conspicuously posted at the construction site.

In addition to the mitigation measures, the project shall incorporate the following standard permit conditions to further reduce the noise impacts to nearby sensitive receptors to a less-than-significant level.

*Standard Permit Conditions*

- 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.

- Construct solid plywood fences around ground level construction sites adjacent to operational businesses, residences, or other noise-sensitive land uses.

- 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.

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

- 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.

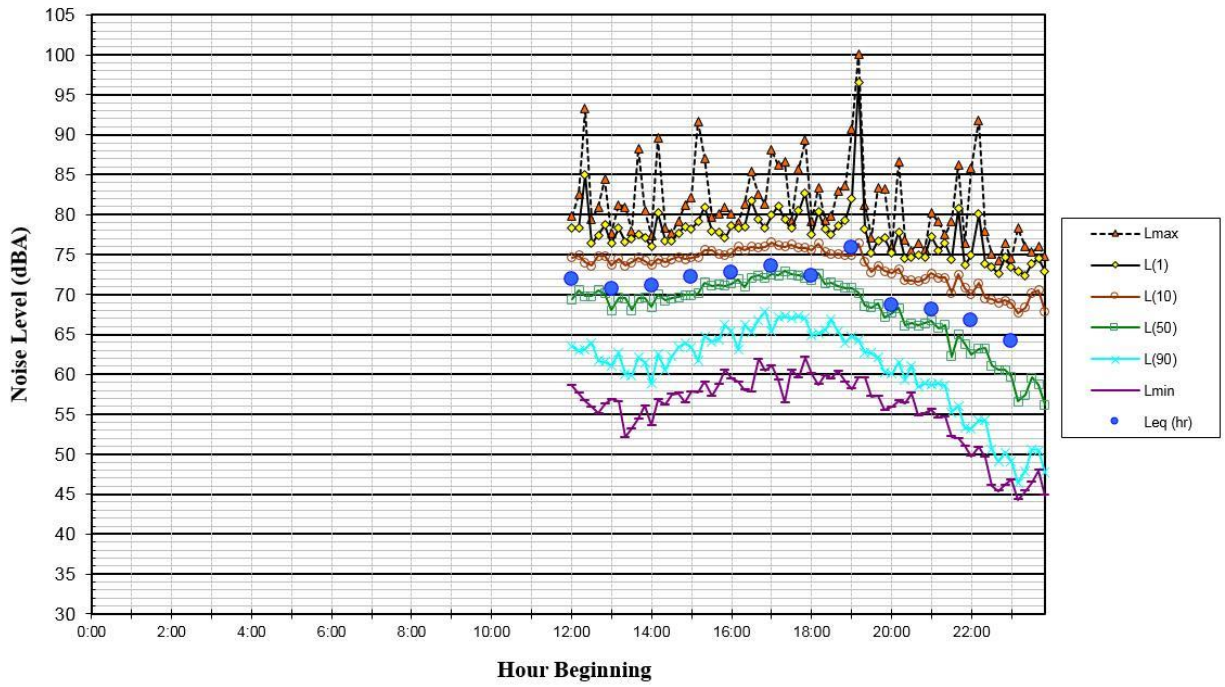
- If complaints are received or excessive noise levels cannot be reduced using the measures above, a temporary noise control blanket barrier shall be erected along surrounding building facades that face the construction sites.

- 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 shall 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.

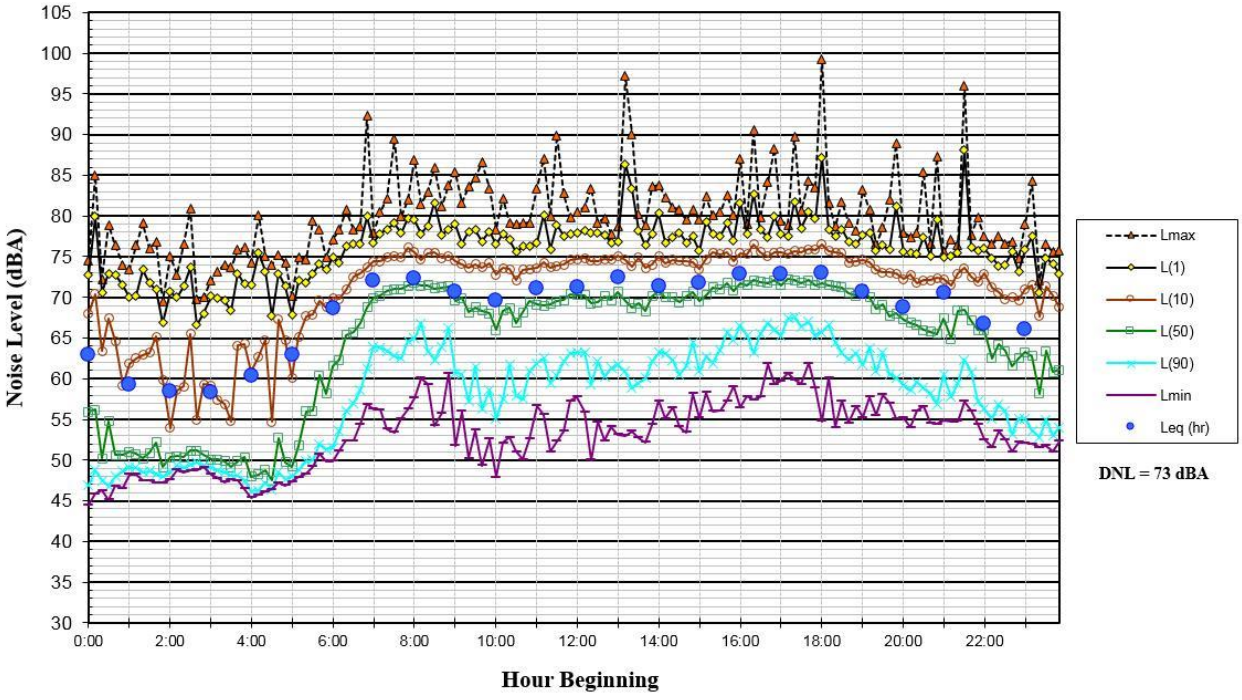
With the incorporate of the mitigation measures and permit conditions mentioned above, temporary construction impact would be reduced to less-than-significant level.

## APPENDIX A: Daily Trend in Long Term Noise Levels

**Noise Levels at Noise Measurement Site LT-1**
**Eastern Border of Site, ~70 Feet West of S. Bascom Ave Centerline**
**Thursday, September 21, 2017**

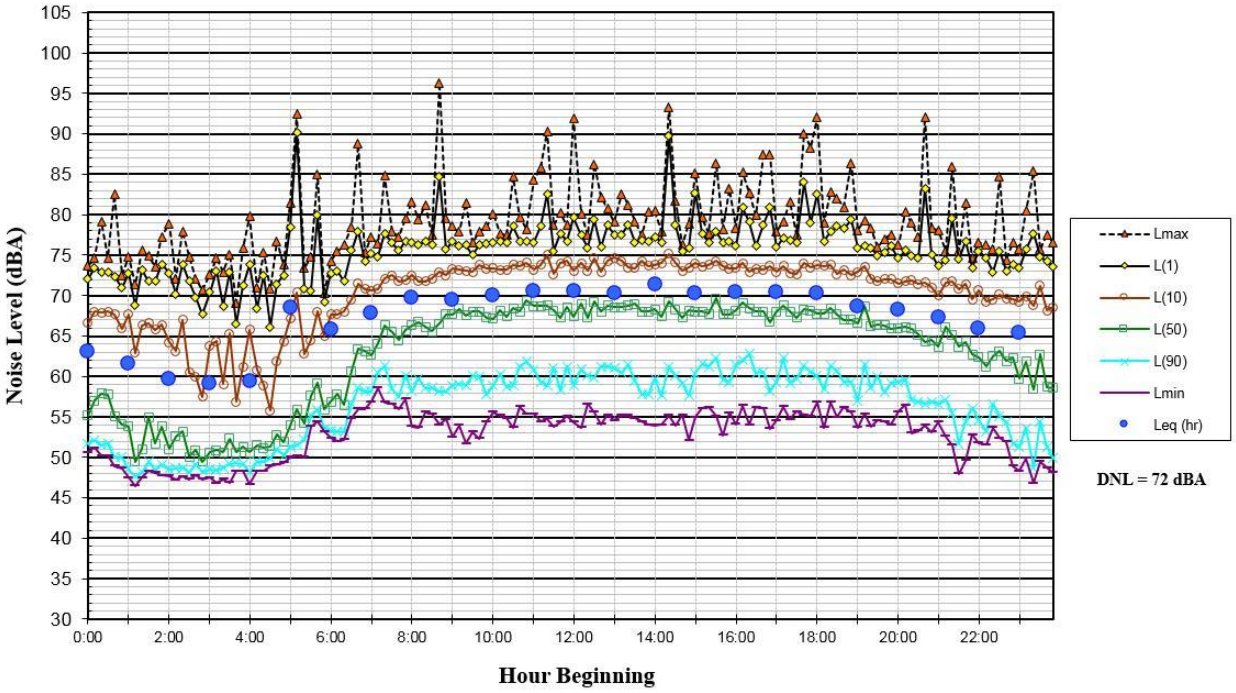



**Noise Levels at Noise Measurement Site LT-1**
**Eastern Border of Site, ~70 Feet West of S. Bascom Ave Centerline**
**Friday, September 22, 2017**



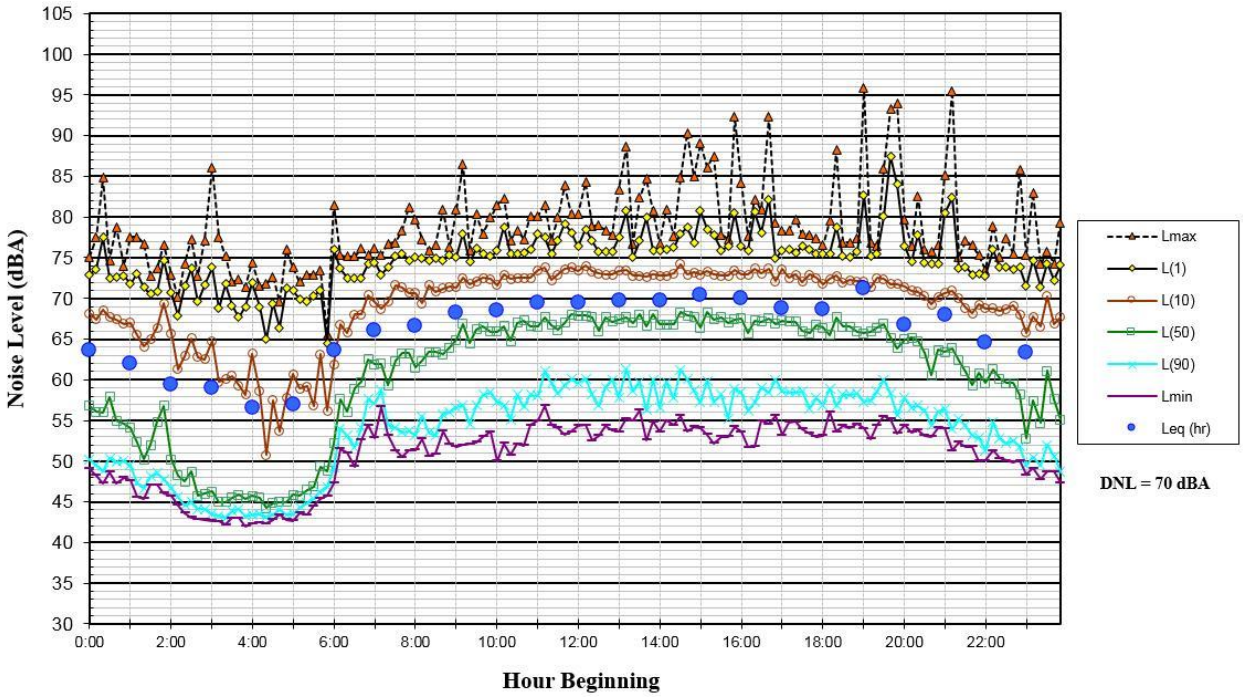

**DNL = 73 dBA**

**Noise Levels at Noise Measurement Site LT-1**
**Eastern Border of Site, ~70 Feet West of S. Bascom Ave Centerline**
**Saturday, September 23, 2017**



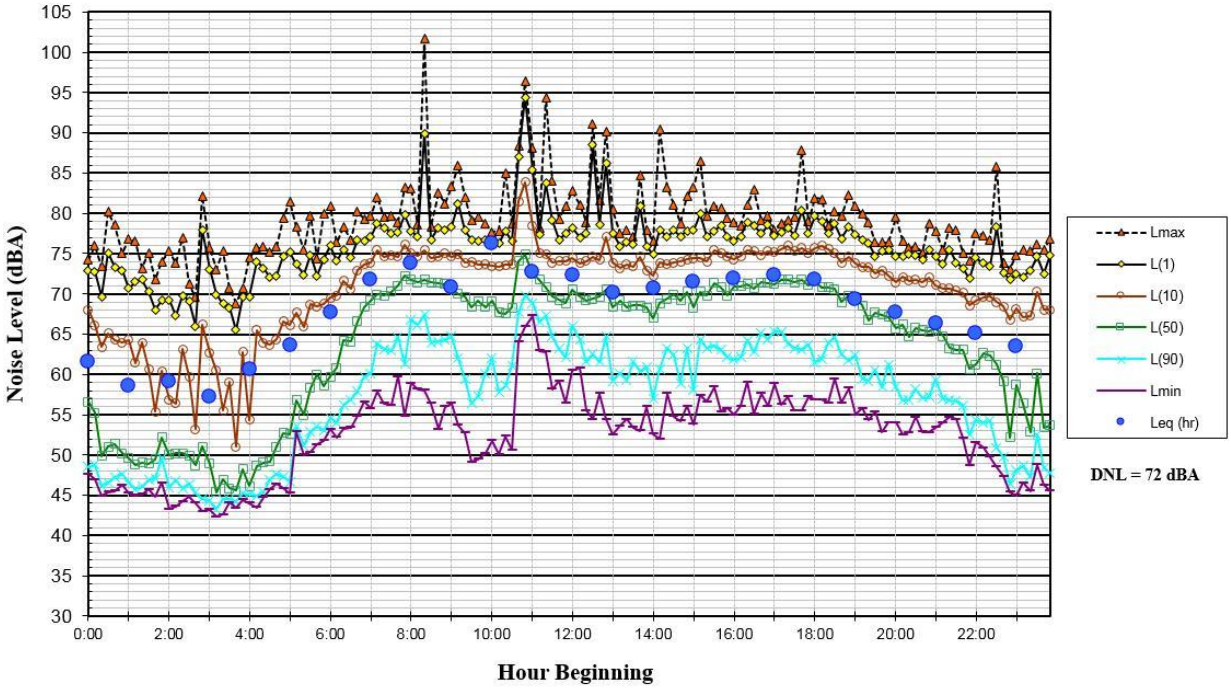

**DNL = 72 dBA**

**Noise Levels at Noise Measurement Site LT-1**
**Eastern Border of Site, ~70 Feet West of S. Bascom Ave Centerline**
**Sunday, September 24, 2017**



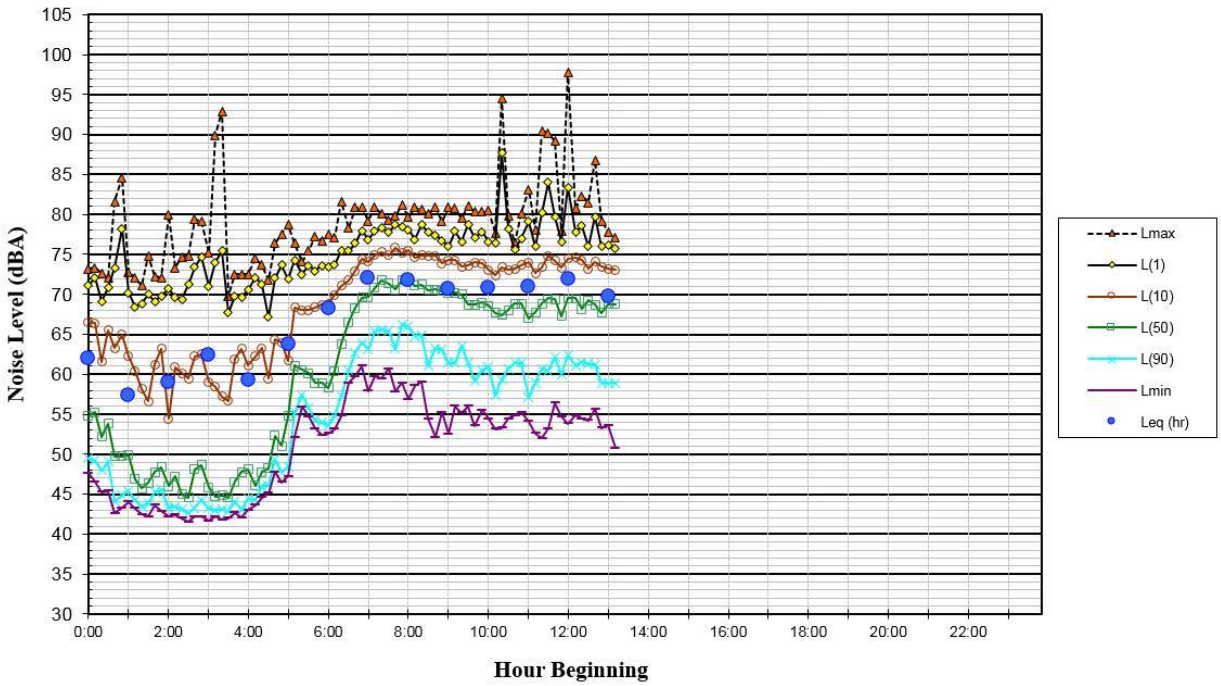

**DNL = 70 dBA**

**Noise Levels at Noise Measurement Site LT-1**
**Eastern Border of Site, ~70 Feet West of S. Bascom Ave Centerline**
**Monday, September 25, 2017**

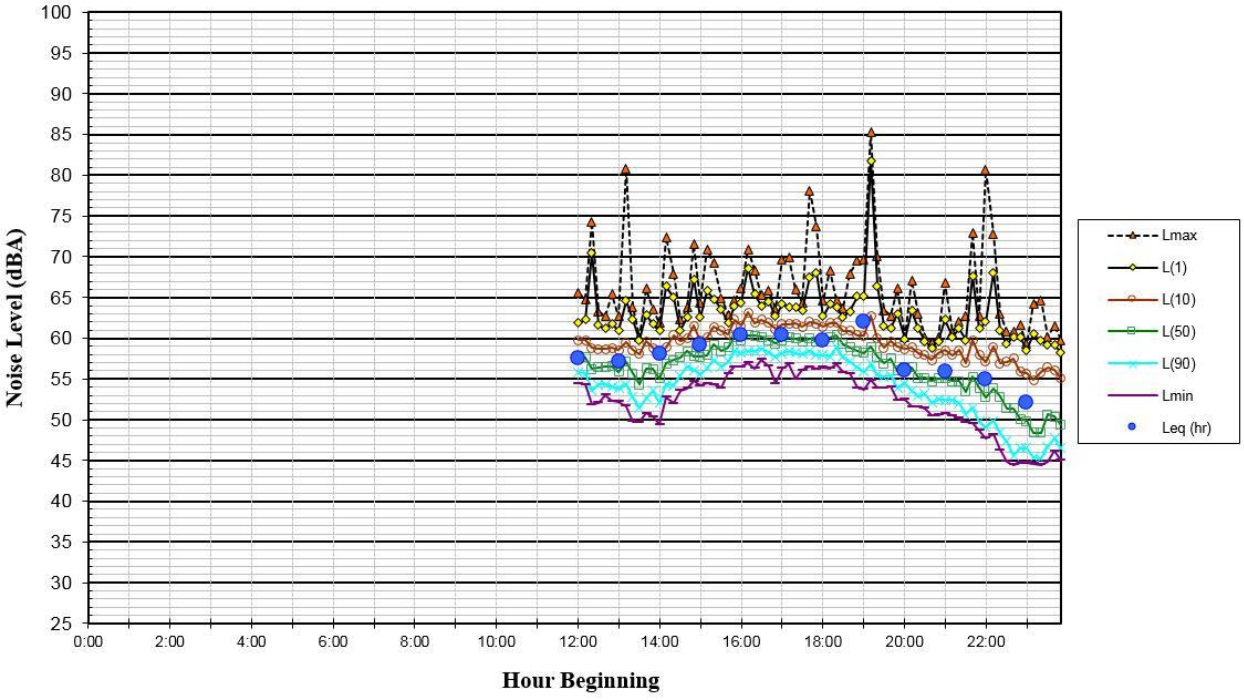



**DNL = 72 dBA**

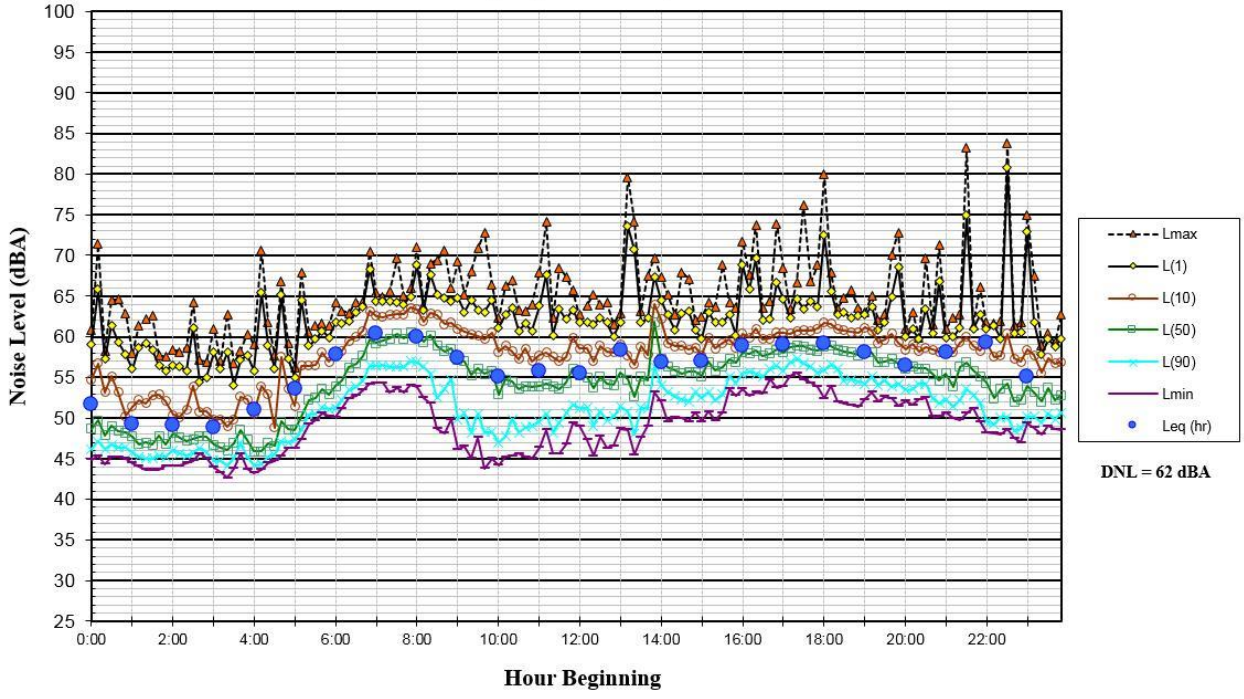
**Noise Levels at Noise Measurement Site LT-1**
**Eastern Border of Site, ~70 Feet West of S. Bascom Ave Centerline**
**Tuesday, September 26, 2017**



**Noise Levels at Noise Measurement Site LT-2**
**Western Border of Site, ~30 Feet East of Delna Manor Lane Centerline**
**Thursday, September 21, 2017**

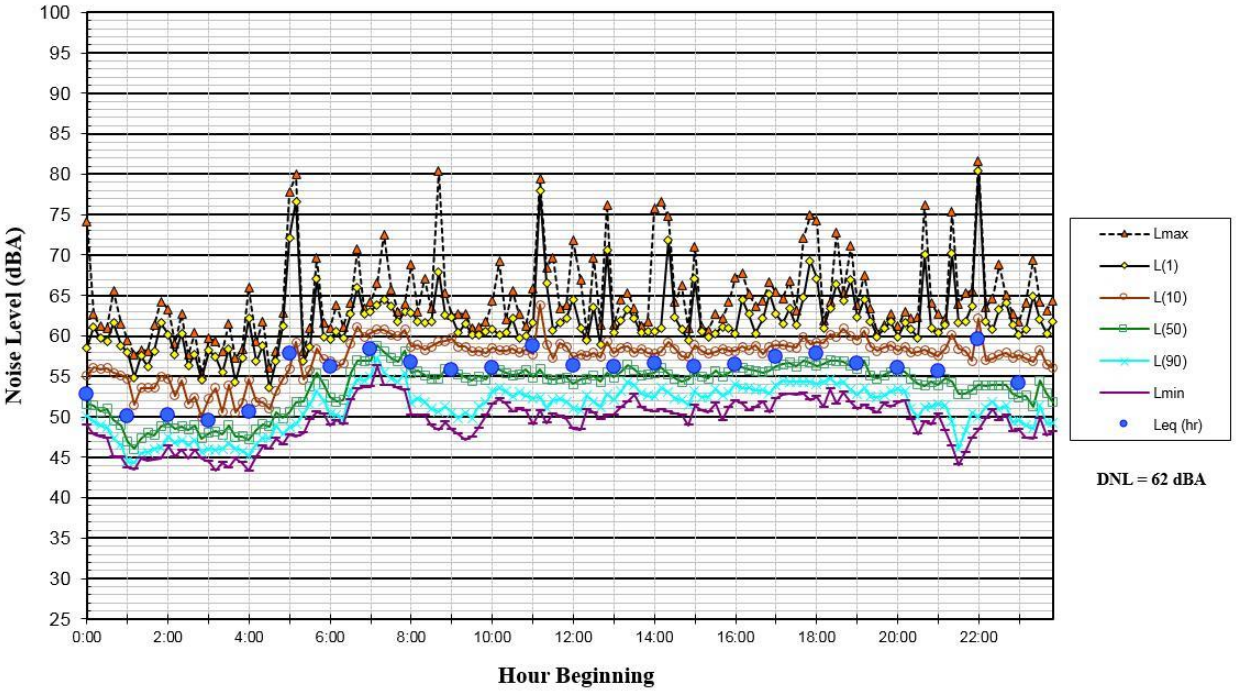



**Noise Levels at Noise Measurement Site LT-2**
**Western Border of Site, ~30 Feet East of Delna Manor Lane Centerline**
**Friday, September 22, 2017**




**DNL = 62 dBA**

**Noise Levels at Noise Measurement Site LT-2**
**Western Border of Site, ~30 Feet East of Delna Manor Lane Centerline**
**Saturday, September 23, 2017**




**DNL = 62 dBA**

**Noise Levels at Noise Measurement Site LT-2**
**Western Border of Site, ~30 Feet East of Delna Manor Lane Centerline**
**Sunday, September 24, 2017**