GREYHOUND SITE MIXED-USE PROJECT NOISE AND VIBRATION ASSESSMENT SAN JOSÉ, CALIFORNIA

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INTRODUCTION

The Greyhound Site mixed-use project is proposing to construct two residential towers providing up to 785 residential units and up to 20,000 square feet (s.f.) of ground floor retail. The site is located along the south side of Post Street, between South Almaden Avenue and South San Pedro Street. The site is currently occupied by the Greyhound Bus Station.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency Section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

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 decibel increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Ground-borne 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 ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess ground-borne 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.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. 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 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 ground-borne vibration or ground-borne 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 and vibration, are not included in the Impacts and Mitigation Section of this report. Checklist items (a) and (b), regarding the compatibility of the project with noise and vibration levels at the site, are discussed in the General Plan Consistency section of the report. Checklist items (a) through (e) are applicable in the assessment of potential impacts resulting from the proposed project at off-site receptors. Checklist item (f) is not applicable to this project because the project 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.

2013 California Building Code, Title 24, Part 2. The current (2013) California Building Code (CBC) does not place limits on interior noise levels attributable to exterior environmental noise sources. The July 1, 2015 Supplement to the 2013 CBC corrects this omission, reinstating limits on interior noise levels attributable to exterior environmental noise sources which had been contained in all prior versions of the CBC dating back to 1974. In keeping with the provisions of the 2015 supplement, this report considers interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn} in any habitable room for new dwellings other than detached single-family dwellings.

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

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

<u>Interior Noise Levels</u>

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design,

building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected Envision General Plan traffic volumes to ensure land use compatibility and General Plan consistency over the life of this plan.

Exterior Noise Levels

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

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

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

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) 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.

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. The code is not explicit in terms of the acoustical descriptor associated with the noise level limit. However, a reasonable interpretation of this standard, which is 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.

***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.)

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 south of Post Street between South Almaden Avenue and South San Pedro Street in the centralized downtown area of San José, California. Existing commercial retail land uses are located adjacent to the project site to the south. To the north, opposite Post Street, is a parking lot, a three-story parking garage, and a commercial building. To the east, opposite South San Pedro Street, is a 16-story office building and parking garage. To the west of the project site, opposite South Almaden Avenue, is a parking lot and a nine-story residential building.

A noise monitoring survey was performed in the project vicinity beginning on Thursday, April 28, 2016 and concluding on Tuesday, May 3, 2016. The monitoring survey included three long-term (LT-1 through LT-3) noise measurements. All measurement locations are shown in Figure 1. The existing noise environment at the project site results primarily from vehicular traffic on the surrounding roadways and aircraft on approach to or departure from Mineta San José International Airport.

Long-term noise measurement LT-1 was made in front of 161 West San Fernando Street, approximately 30 feet from the West San Fernando Street centerline. Hourly average noise levels at this location typically ranged from 60 to 79 dBA L_{eq} during the day, and from 54 to 72 dBA L_{eq} at night. The day-night average noise level from Thursday, April 28, 2016 through Tuesday, May 3, 2016 ranged from 71 to 73 dBA DNL. The daily trends in noise levels at LT-1 are shown in Figures 2 through 7 at the end of this document.

LT-2 was measured along South Almaden Avenue, approximately 115 feet south of Post Street and approximately 30 feet east of the South Almaden Avenue centerline. Hourly average noise

levels at this location typically ranged from 60 to 71 dBA L_{eq} during the day, and from 55 to 68 dBA L_{eq} at night. The day-night average noise level from Thursday, April 28, 2016 through Tuesday, May 3, 2016 ranged from 68 to 70 dBA DNL. The daily trends in noise levels at LT-2 are shown in Figures 8 through 13 at the end of this document.

LT-3 was measured about halfway between Post Street and West San Fernando Street along South San Pedro Street. LT-3 was approximately 20 feet east of the centerline of South San Pedro Street. Hourly average noise levels at this location typically ranged from 61 to 81 dBA L_{eq} during the day, and from 56 to 75 dBA L_{eq} at night. The day-night average noise level from Thursday, April 28, 2016 through Tuesday, May 3, 2016 ranged from 72 to 77 dBA DNL. The daily trends in noise levels at LT-3 are shown in Figures 14 through 19 at the end of this document.

FIGURE 1 Noise Measurement Locations

Source: Google Earth 2016.

GENERAL PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The exterior noise threshold established in the City's General Plan for new multi-family residential projects and for the residential component of mixed-use development is 60 dBA DNL at usable outdoor activity areas, excluding balconies and residential stoops and porches facing existing roadways. For commercial uses, the City's "normally acceptable" threshold for outdoor activity areas is 70 dBA DNL. The City requires that interior noise levels be maintained at 45 dBA DNL or less for residential land uses.

The project proposes the construction of two towers providing up to 785 residential units with up to 20,000 square feet of ground floor retail. The first-floor retail uses would front Post Street and South Almaden Avenue. Residential units would be located on all upper floors. Parking would be located on the ground-level and below-grade.

The future noise environment at the project site would continue to result primarily from vehicular traffic along the surrounding roadways and from aircraft departures/arrivals. While a traffic report was not completed for the proposed project, the Envision San José 2040 General Plan EIR[1] provided future noise level increases in the project vicinity. From this data, traffic noise along roadways in the project vicinity would increase by up to 1 dBA DNL by the year 2035. Additionally, peak hour trips generated by the proposed project were provided by *Hexagon Transportation Consultants*.[2] During the peak AM hour, the project-generated trips would result in a net increase of 445 trips, and during the peak PM hour, the trips would result in a net increase of 479. Compared to the traffic volumes along the roadways in the project vicinity, the project trips could result in a 1 dBA DNL increase. Therefore, the total noise level increase under future plus project conditions would be 2 dBA DNL. At the measurement locations described above, the future exterior noise levels would range from 73 to 75 dBA DNL at a distance of 30 feet from the centerline of West San Fernando Street, from 70 to 72 dBA DNL at a distance of 30 feet from the centerline of South Almaden Avenue, and from 74 to 79 dBA DNL at a distance of 20 feet from the centerline of South San Pedro Street.

Based on the Norman Y. Mineta San José International Airport CLUP, the project site is located outside of the 65 CNEL noise contour. According to the City's current and projected noise contours for San José International Airport, the project site is exposed to aircraft noise levels of less than 65 dB CNEL, the minimum level at which aircraft noise would be considered a significant impact under State and federal guidelines. Aircraft noise levels are anticipated to be approximately 64 dBA CNEL at the site by 2027.

The noise environment at the project site exceeds the City's exterior noise goal of 60 dBA DNL for residential uses as a result of transportation noise sources in the project area (i.e., local traffic and aircraft) and downtown activities. Typical noise sources in the downtown area include music played at outdoor dining areas or within bars or nightclubs, mechanical equipment, outdoor

[1] Environmental Impact Report for the Envision San José 2040 General Plan, City of San José, June 2011.

[2] Hexagon Transportation Consultants, Inc., Greyhound Site Residential Development Traffic Operations Analysis, July 20, 2016.

maintenance activities, truck loading docks and deliveries, and/or parking lot activities. Due to the proximity of the proposed project to adjacent businesses, noise levels resulting from the operation of nearby businesses could at times exceed the Zoning Ordinance noise level limits of 55 dBA L_{eq} at residential property lines.

Future Exterior Noise Environment

Residential Land Uses

Outdoor use areas for the proposed project, which are all located on the third level, include common terrace space along South Almaden Avenue and along South San Pedro Street, a pool area, and a bocce ball court. Typically, the exterior noise standards established by the City are enforced at the center of each space. The center of both third-floor terraces are approximately 50 feet from the centerline of South Almaden Avenue and from South San Pedro Street. Due to these setbacks from the nearest roadways and the height of the outdoor use spaces relative to the adjacent roadways, the future exterior noise levels at the common terraces would range from 58 dBA DNL along South Almaden Avenue to 61 dBA DNL along South San Pedro Avenue.

The center of the pool area from the centerline of South Almaden Avenue would be approximately 130 feet. At this distance and the height above the roadway, the future exterior noise levels due to traffic at the pool area would be below 55 dBA DNL. The center of the bocce ball court and adjacent common area would be approximately 100 feet from the centerline of South San Pedro Street. At this distance and height above the roadway, the future exterior noise levels due to vehicular traffic at the bocce ball court would be below 55 dBA DNL. At both outdoor use areas, the future noise levels would be below the City's 60 dBA DNL threshold. However, the noise level at the common outdoor areas would exceed 60 dBA DNL due to aircraft operations alone.

While the future exterior noise levels at the outdoor use areas along South Almaden Avenue and the bocce ball court near South San Pedro Street were below 60 dBA DNL, the common terrace area nearest South San Pedro Street would exceed the City's 60 dBA DNL "normally acceptable" threshold for exterior noise by up to 1 dBA DNL. However, the future exterior noise levels would fall within the "conditionally acceptable" range for exterior noise. Since exterior noise levels at three of the outdoor use areas would be below the noise threshold established by the City of San José General Plan, noise levels of less than 65 dBA DNL at this lone outdoor use area would be sufficient for the proposed mixed-use project.

Commercial Land Uses

According to three-dimensional renderings provided for the proposed project, outdoor dining areas are expected at three ground-floor locations at the commercial retail stores: at the corner of South Almaden Avenue and Post Street, at the corner of South San Pedro Street and Post Street, and along Post Street. The setbacks from the centerlines of the adjacent roadways would be approximately 20 to 30 feet. At these distances, the future exterior noise levels would range from 72 to 74 dBA DNL at the corner of South Almaden Avenue and Post Street and from 72 to 77 dBA DNL at the corner of South San Pedro Street and Post Street. While these levels would exceed the "normally acceptable" threshold for commercial land uses established by the City, the levels fall within the "conditionally acceptable" range.

Measures to reduce exterior noise levels, such as barriers, could be implemented to meet the "normally acceptable" threshold of 70 dBA DNL; however, barriers would obstruct the view and access doorways to the commercial retail shops. Since the future exterior noise levels are expected to fall within the "conditionally acceptable" range at the proposed commercial uses, no further measures are recommended.

Future Interior Noise Environment

The California Building Code and the City of San José General Plan require that interior noise levels be maintained at or below 45 dBA DNL for residences. Residential units would be located at the third level through the 23th level. The exterior traffic noise exposure at these facades would be up to 72 dBA DNL for the western-facing façade nearest South Almaden Avenue, up to 79 dBA DNL at the eastern-facing façade nearest South San Pedro Street, and up to 75 dBA DNL at the northern-facing façade nearest Post Street. Mechanical equipment is located on the rooftop of the building adjoining the southern property line of the project. The residential units along this building façade located above the elevation of the roof of the adjoining building would be exposed to noise from this equipment that could elevate the overall noise level and be potentially disturbing to the residents due to its tonal characteristics.

Interior noise levels would vary depending upon the design of the buildings (relative window area-to-wall area) and the selected construction materials and methods. Preliminary building plans indicate that the exterior of the building would be mostly glass. 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 and doors 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 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 open would be up to 64 dBA DNL, and with windows and doors closed, interior noise levels would be up to 59 dBA DNL. This would exceed the City's threshold for interior noise.

For consistency with the General Plan the following Conditions of Approval are recommended for consideration by the City:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units, so that windows can be kept closed to control noise.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources (transportation and non-transportation) during the design phase pursuant to requirements set forth in the State Building Code. The study will also establish appropriate criteria for noise levels inside the commercial spaces

affected by traffic noise. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce residential interior noise levels to 45 dBA DNL or lower and reduce levels to the established criteria for the business and commercial uses; and, address and adequately control the noise from rooftop equipment on the adjacent building. Treatments would include, but are not limited to, sound-rated windows and doors, 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.

- Provide a disclosure to owners and/or tenants of the residential component of the project describing the potential for commercial-related noise sources in the site vicinity to generate noise levels in excess of the City of San Jose Zoning Ordinance limits. The implementation of this measure and the above measure would ensure that owners and/or tenants are fully aware of the noise environment in the Downtown area and that interior noise levels are maintained at acceptable levels.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from the currently applicable CEQA checklist questions in Appendix G of the CEQA Guidelines, a project would normally result in significant noise impact if it would cause traffic or other on-going sources of operational noise to result in a substantial permanent noise increase, if it would cause ambient noise levels at sensitive receivers to increase substantially during construction, or if it would generate excessive ground-borne vibration levels. 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 expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

- A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Ground-borne vibration levels exceeding 0.2 in/sec PPV for normal conventional construction buildings and 0.08 in/sec PPV for sensitive historic structures would have the potential to result in cosmetic damage to normal buildings.

- 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.

- 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 $L_{eq,}$ 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.

Impact 1: **Noise Levels in Excess of Standards.** The proposed project is expected to 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.**

Mechanical Equipment

High-rise multi-use structures typically include various mechanical equipment, such as air conditioners, exhaust fans, pool equipment, and air handling equipment for the underground parking levels. Due to the number of variables inherent in the mechanical equipment needs of the project (number and types of units, locations, size, housing, specs, etc.), the impacts of mechanical equipment noise on nearby noise-sensitive uses should be assessed during the final project design stage. 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. The most substantial noise-generating equipment would likely be large exhaust fans and building air conditioning units. Under the City's Noise Element, noise levels from building equipment would be limited to a noise level of 55 dBA DNL at receiving noise-sensitive land uses, such as residences. Given the close proximity of noise-sensitive uses to the project, there is a potential for noise from mechanical equipment to exceed 55 dBA DNL at noise-sensitive land uses.

Truck Deliveries

Truck deliveries for the ground-level commercial uses on the project site would also have the potential to generate noise. Typical noise levels generated by loading and unloading of truck deliveries would be similar to noise levels generated by truck movements on local roadways and by similar activities at surrounding uses. The nearest noise-sensitive receptors are located to the west of the project site, opposite South Almaden Avenue. Since the loading/unloading zones are located along South San Pedro Street, away from the noise-sensitive receptors, these deliveries are not expected to result in a significant impact.

Construction Noise

Construction activities would occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and would not occur on weekends or holidays, as outlined in the Municipal Code. All construction noise would be exempt from the City's limit of 55 dBA when conducted during allowable hours; therefore, the potential impact would be 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:

- Mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's noise level requirements. 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 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. Alternate measures may include locating equipment in less noise-sensitive areas, such as the rooftop of the high-rise building away from the western edge, where feasible.

- Ensure that noise-generating activities, such as maintenance activities and loading/unloading activities, are limited to the hours of 7:00 a.m. and 9:00 p.m.

Impact 2: **Exposure to Excessive Ground-borne Vibration due to Construction.** Construction-related vibration levels resulting from activities at the project site would exceed the City's 0.2 in/sec PPV at the nearest adjacent land use located south of the project site. Due to the close proximity of historical buildings, the project has the potential to exceed the 0.08 in/sec PPV threshold established by the City. **This is a significant impact.**

Construction activities, such as the removal of existing pavement, site preparation work, excavation of below grade levels, foundation work, and new building erection, could generate excessive vibration levels at nearby sensitive land uses or historic buildings. In particular, pile driving (if used) has the potential of generating the highest ground vibration levels and is of primary concern when it occurs within 100 to 200 feet of structures. The use of pile drivers (if required) and, to a lesser extent, other construction equipment would require some attention to ensure that structures in the vicinity of the project (including historic buildings within 200 feet from such activities) are sufficiently protected.

According to the City of San José General Plan, a vibration limit of 0.08 in/sec PPV should be used to assess construction and demolition vibration impacts at historic structures to minimize the potential for cosmetic damage to the building. For buildings of normal conventional construction, the City requires a vibration limit of 0.2 in/sec PPV to be used. The following historic and potentially historic properties are within the immediate project site vicinity:

- Sunol Building (1895) – located at 127-145 Post Street, approximately 60 feet from the project site;

- Market-Post Tower (1985) – located at 55 South Market Street, approximately 90 feet from the project site;
- Hatman & Normandin Block (1891) – located at 14-16 S. Almaden Avenue, approximately 100 feet from the project site; and

- Berger Building (1935) – located at 44. S. Almaden Avenue, immediately adjacent to the west of the site.

Table 4 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as pile driving (if required), 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. At a distance of 50 feet, construction activities other than pile driving would not likely generate vibration levels exceeding 0.08 in/sec PPV.

In areas where vibration would not be expected to cause structural damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and it would not be considered significant given the intermittent and short duration of the phases that would have the highest potential of producing vibration.

Due to the scope of construction, density of development in the immediate project area, and proximity of historic structures to the project site, the project would result in significant construction-related ground-borne vibration impacts.

TABLE 4 Vibration Source Levels for Construction Equipment

Equipment		**PPV at 25 ft. (in/sec)**	**Approximate L_v at 25 ft. (VdB)**
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

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

Mitigation Measure 2:

Consistent with the certified Envision San José 2040 General Plan Final EIR and General Plan policies (specifically Policy EC-2.3), the project proposes to implement the following mitigation measures to reduce construction-related ground-borne vibration impacts to a less than significant level:

- Avoid impact pile driving where possible. Drilled piers or rammed aggregate piers cause lower vibration levels and are preferred methods to pile driving where geological conditions permit.

- A list of all heavy construction equipment to be used for this project and the anticipated time duration of using equipment that has been known to produce high vibration levels (tracked vehicles, vibratory compaction, pile drivers, jackhammers, hoe rams, etc.) shall be submitted by the contractor to the structural engineer. This list shall be used to identify equipment and activities that would potentially generate substantial vibration and to define the level of effort required for continuous vibration monitoring.

- A Construction Vibration Monitoring Plan shall be implemented to document conditions prior to, during, and after vibration generating construction activities. All Plan tasks shall be undertaken under the direction of a licensed Professional Structural Engineer in the State of California and be in accordance with industry accepted standard methods. The Construction Vibration Monitoring Plan shall include the following tasks:

    - Identification of the sensitivity of nearby structures to ground-borne vibration. Vibration limits shall be applied to all vibration sensitive structures located within 200 feet of the project.

    - Performance of a photo survey, elevation survey, and crack monitoring survey for each structure within 200 feet of pile driving activities and for each structure within 50 feet of other construction activities identified as sources of high vibration levels. Surveys shall be performed prior to any construction activity, in regular interval during construction and after project completion and shall include internal and external crack monitoring in structures, settlement, and distress and shall document the condition of foundations, walls, and other structural elements in the interior and exterior of said structures.

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

    - At minimum, vibration monitoring shall be conducted during pavement demolition, excavation, and pile driving activities (if required). Monitoring results may indicate the need for more or less intensive measurements.

- If vibration levels approach limits, suspend construction and implement contingencies to either lower vibration levels or secure the affected structures.

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

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

- The results of all vibration monitoring shall be summarized and submitted in a report to the City shortly after substantial completion of each phase identified in the project schedule. The report shall include a description of measurement methods, equipment used, calibration certificates, and graphics as required to clearly identify vibration-monitoring locations. An explanation of all events that exceeded vibration limits shall be included together with proper documentation supporting any such claims.

Impact 3: **Permanent Noise Level Increase.** The proposed project would not result in a substantial permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

Typically, 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. According to the City's General Plan, the "normally acceptable" outdoor noise level standard for the multi-family residences in the project vicinity would be 60 dBA DNL, and existing ambient levels, based on the long-term measurement results, 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.

Compared to the existing traffic along the roadways in the project vicinity, the project-generated trips, which were 445 during the peak AM hour and 479 during the peak PM hour, would not be a significant traffic increase. The permanent noise level increases due to this project-generated traffic increase at the noise-sensitive receptors in project vicinity would be about 1 dBA DNL. Therefore, the proposed project would not cause a substantial permanent noise level increase at the nearby noise-sensitive receptors. This is a less-than-significant impact.

Mitigation Measure 3: **None required.**

Impact 4: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. This would be a **significant impact**.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance

between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time. Where noise from construction activities exceeds 60 dBA L_{eq} at residential land uses or exceeds 70 dBA L_{eq} at commercial land uses and exceeds the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive uses in the project vicinity for a period exceeding one year, the impact would be considered significant.

The adjacent commercial land use is located within 5 feet of the southern boundary of the project site. Existing daytime ambient noise levels would range from 60 to 79 dBA L_{eq}. The commercial land uses to the north and east, which are 45 to 60 feet from the project site, have existing daytime ambient noise levels ranging from 61 to 81 dBA L_{eq}. The noise-sensitive residential land uses to the west of the project, which are approximately 80 feet from the project site, have existing daytime ambient noise levels ranging from 60 to 71 dBA L_{eq}.

The typical range of maximum instantaneous noise levels for the proposed project, based on the equipment list provided, would be 80 to 90 dBA L_{max} at a distance of 50 feet (see Table 5). Hourly average noise levels generated by construction are about 65 to 88 dBA L_{eq} for a residential development measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

The proposed project is expected to take a total of 24 months to complete. Construction activities would include demolition, site preparation, excavation, grading, trenching, exterior building construction, interior building construction, and paving. 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. Table 6 shows the average noise level ranges, by construction phase. Once construction moves indoors, minimal noise would be generated at off-site locations.

TABLE 5 Construction Equipment 50-foot Noise Emission Limits

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

Notes:

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

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

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

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

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

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

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

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

The proposed project consists of the construction of two towers starting in the beginning of April 2017 and concluding at the beginning of April 2019. Table 7 summarizes the phases of construction, the time duration for each phase, the equipment expected to be used during each phase, and the estimated worst-case scenario construction noise levels for each phase at the nearest land uses. The estimated levels shown in the table represent unmitigated levels, which does not take into account possible shielding. The range of levels provided for various phases in Table 7 reflects periods of time when different phases overlap.

As shown in Table 7, noise levels would exceed 70 dBA L_{eq} at each of the nearby commercial land uses and would exceed 60 dBA L_{eq} at the nearby residential land use during each phase of project construction and would exceed ambient conditions at the surrounding land uses by 5 dBA L_{eq} at times throughout project construction. Since construction noise for the proposed project is expected to exceed 60 dBA L_{eq} at the residential land use to the west, exceed 70 dBA L_{eq} at the commercial land uses to the south, to the north, and to the east, and exceed ambient levels at the nearby the land uses by more than 5 dBA L_{eq} for a period of more than one year, this would be a significant impact.

TABLE 7 Estimated Construction Noise Levels at the Nearby Residences

Phase	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq}, dBA			
			Comm. South	Comm. North	Comm. East	Res. West
Demolition	4/1/2017-5/1/2017	Excavator (2) Dump Truck (2) Rubber-Tired Dozer (1) Backhoe (1)	103	84	82	79
Site Prep	5/1/2017-5/15/2017	Rubber-Tired Dozer (2) Backhoe (1) Water Truck (1)	102	83	80	78
Grading/Excavation	5/15/2017-12/1/2017	Excavator (3) Grader/Scraper (2) Dump Truck (6) Loader (2) Water Truck (1)	108	89	86	84
Trenching	12/1/2017-12/6/2017	Backhoe (1) Dump Truck (1)	96-107[a]	77-88[a]	74-85[a]	72-83[a]
Building-Exterior	12/1/2017-12/1/2018	Crane (2) Forklift (2) Gradall (1) Generators (4) Concrete Pumps (2)	106	87	85	82
Building-Interior/ Architectural Coating	6/1/2018-4/1/2019	Crane (1) Forklift (2) Gradall (1) Generators (2)	104-108[b]	85-89[b]	82-87[b]	80-84[b]
Paving	3/1/2019-4/1/2019	Cement/Mortar Mixer (1) Paver (1) Paving Equipment (1) Roller (1) Concrete Saw (1)	106-108[c]	87-89[c]	85-87[c]	82-84[c]

[a] The range of construction noise levels represents trenching only and the overlap of trenching and building exterior.
[b] The range of construction noise levels represents building interior only and the overlap of building interior and exterior.
[c] The range of construction noise levels represents paving only and the overlap of paving and building interior.

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.

Policy EC-1.7 of the City's General Plan states that for large or complex projects within 500 feet of residential land uses or within 200 feet of commercial land uses or offices involving substantial noise-generating activities lasting more than 12 months, 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.

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 between the hours of 7:00 a.m. and 7:00 p.m. 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. Modification, placement, and operation of construction equipment are possible means for minimizing the impact on the existing sensitive receptors. Construction equipment should be well-maintained and used judiciously to be as quiet as possible. 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.

Construction Best Management Practices

Consistent with the certified Downtown Strategy 2000 Final EIR, Envision San José 2040 General Plan Final EIR, General Plan policies (specifically policy EC-1.7), and Municipal Code, the project proposes to implement the following mitigation measure to reduce construction-related noise impacts to a less than significant level:

Develop and implement a construction noise logistics plan during all phases of construction on the project site. The construction noise logistics plan shall include, but not be limited to the following:

- Limit demolition and construction activities to non-holiday, daytime hours between 7:00 a.m. and 5:00 p.m.;

- Construct solid plywood fences around construction sites adjacent to operational businesses, residences, or noise-sensitive land uses;

- 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 businesses, residences, or noise-sensitive land uses;

- Prohibit all unnecessary idling of internal combustion engines;

- Notify all adjacent businesses, residences, and noise-sensitive land uses of the construction schedule in writing;

- A temporary noise control blanket barrier could be erected, if necessary, along building facades facing construction sites. This measure would only be

necessary if conflicts occurred which were irresolvable by proper scheduling. Noise control blanket barriers can be rented and quickly erected;

- Designate a disturbance coordinator, responsible for responding to complaints about construction noise. The name and telephone number of the disturbance coordinator shall be posted at the construction site and made available to businesses, residences, or noise-sensitive land uses adjacent to the construction site;

- Provide written schedule to adjacent land uses and nearby residences of "noisy" construction activities;

- If pile driving is necessary, pre-drill foundation pile holes to minimize the number of impacts required to seat the pile; and

- If pile driving is necessary, consider the use of "acoustical blankets" for receivers located within 100 feet of the site.

The implementation of the reasonable and feasible controls outlined above would reduce construction noise levels emanating from the site by 5 to 10 dBA in order to minimize disruption and annoyance. With the implementation of these controls, as well as the General Plan and Municipal Code limits on allowable construction hours, disruption and annoyance would be minimized.

APPENDIX A: Long Term Noise Level Daily Trends

FIGURE 2 Daily Trend in Noise Levels at LT-1, Thursday, April 28, 2016

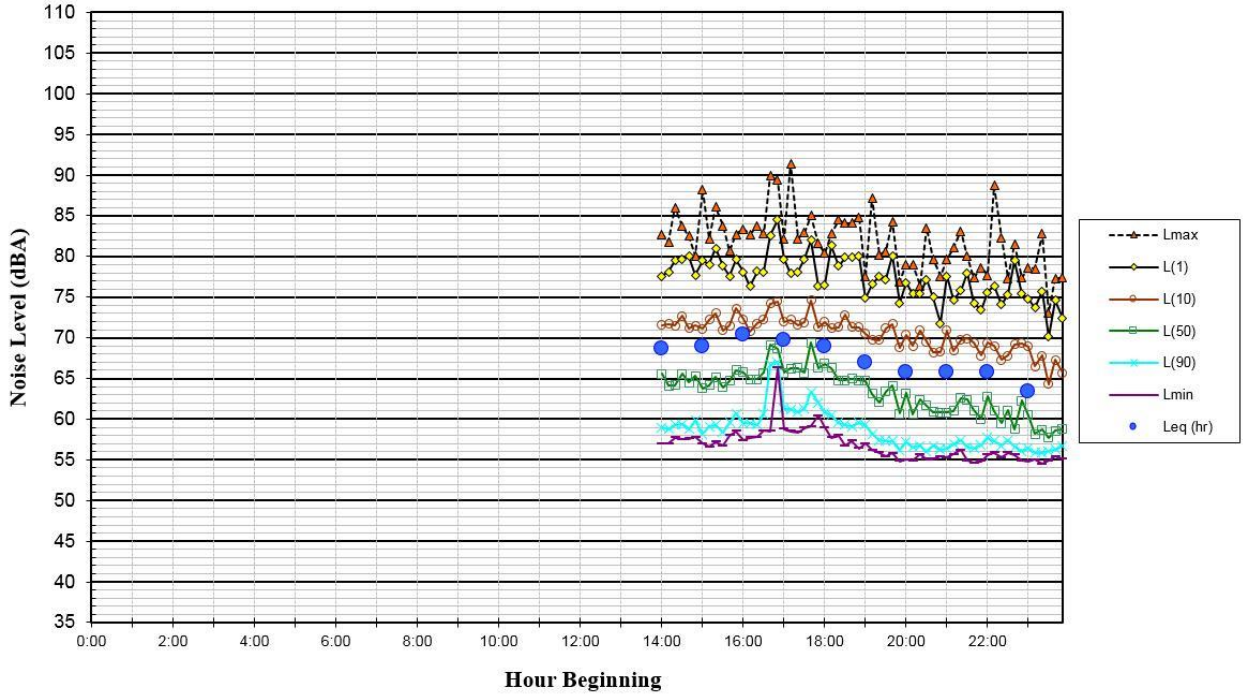

FIGURE 3 Daily Trend in Noise Levels at LT-1, Friday, April 29, 2016

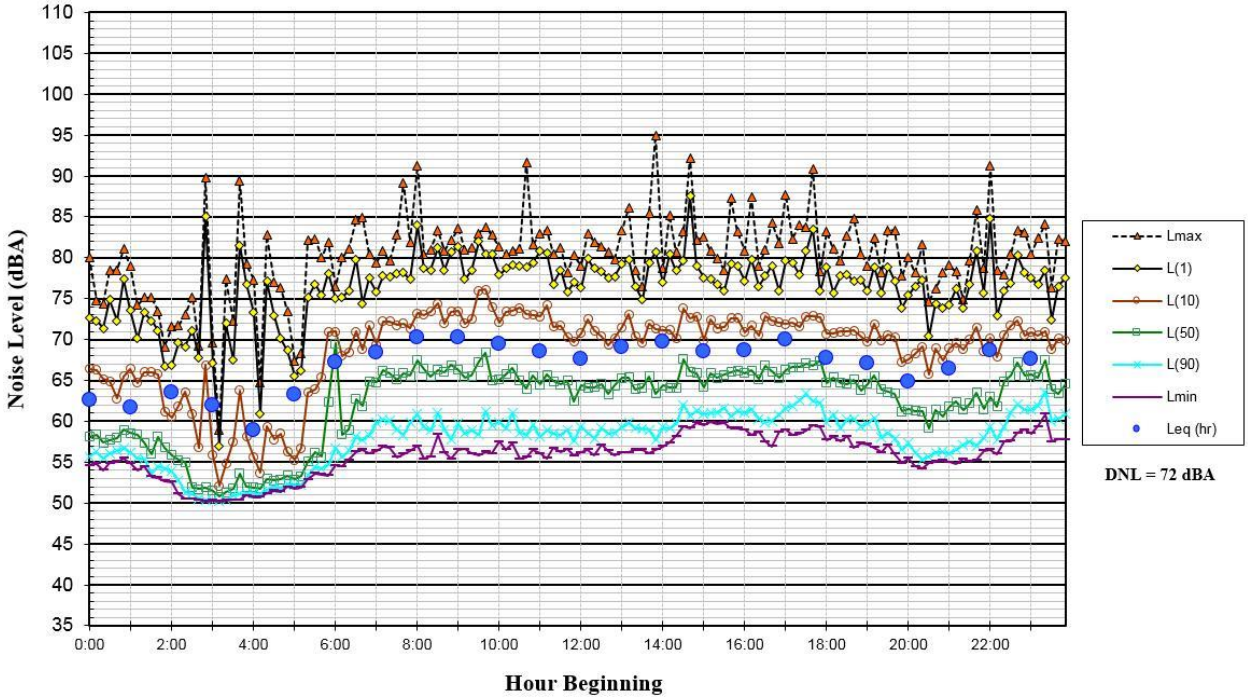

FIGURE 4 Daily Trend in Noise Levels at LT-1, Saturday, April 30, 2016

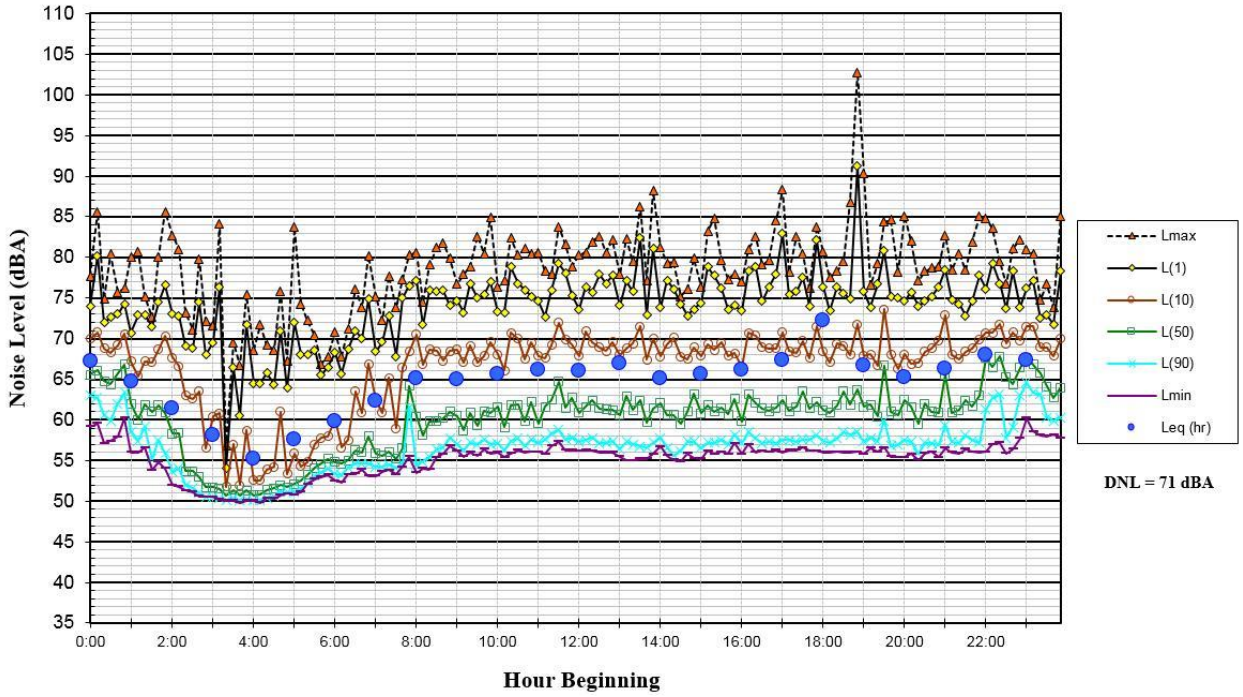

FIGURE 5 Daily Trend in Noise Levels at LT-1, Sunday, May 1, 2016

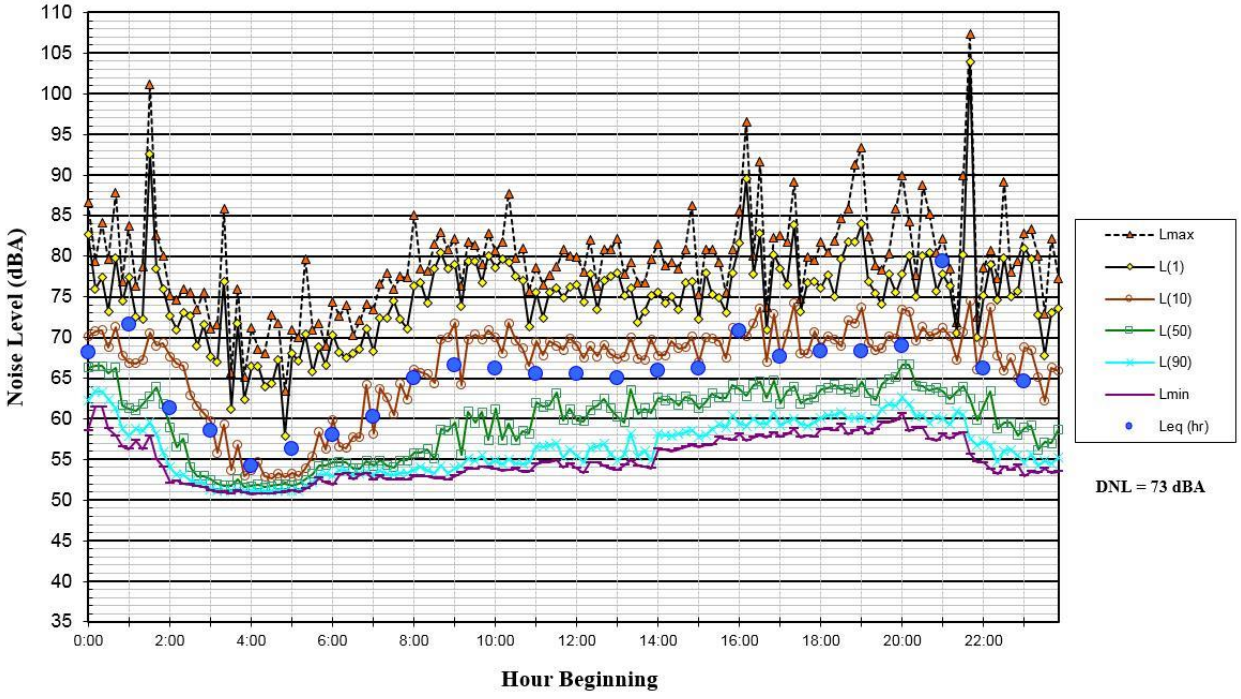

FIGURE 6 Daily Trend in Noise Levels at LT-1, Monday, May 2, 2016

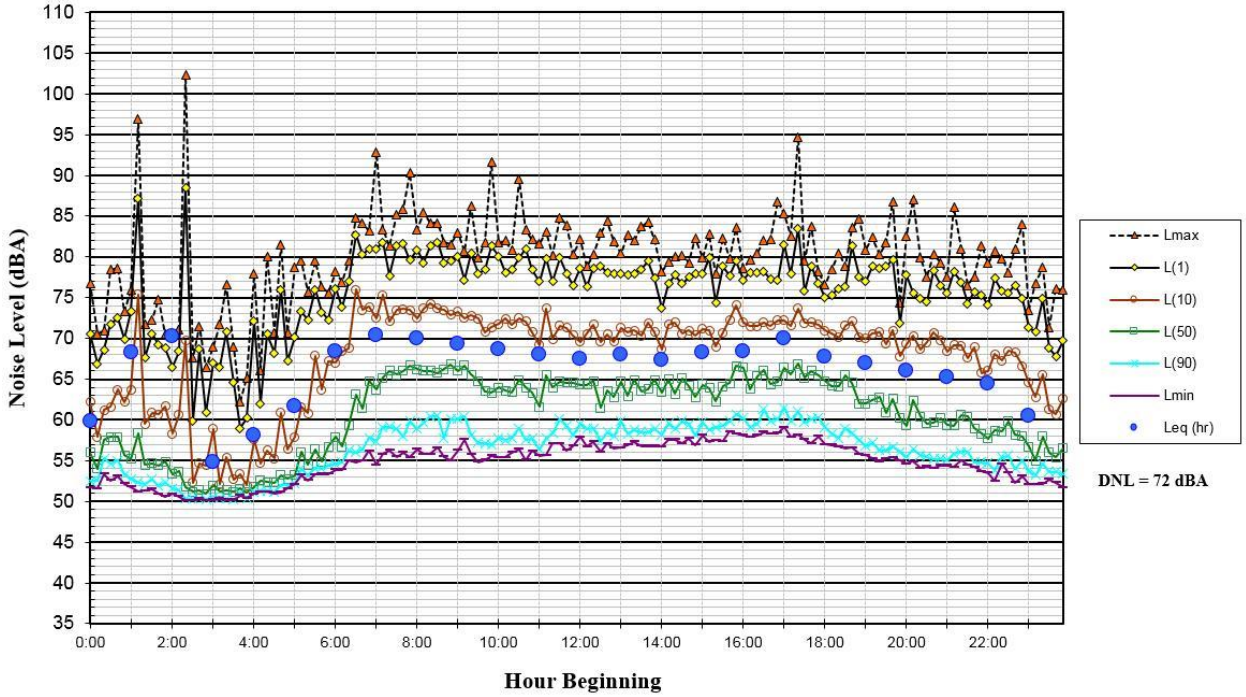

FIGURE 7 Daily Trend in Noise Levels at LT-1, Tuesday, May 3, 2016

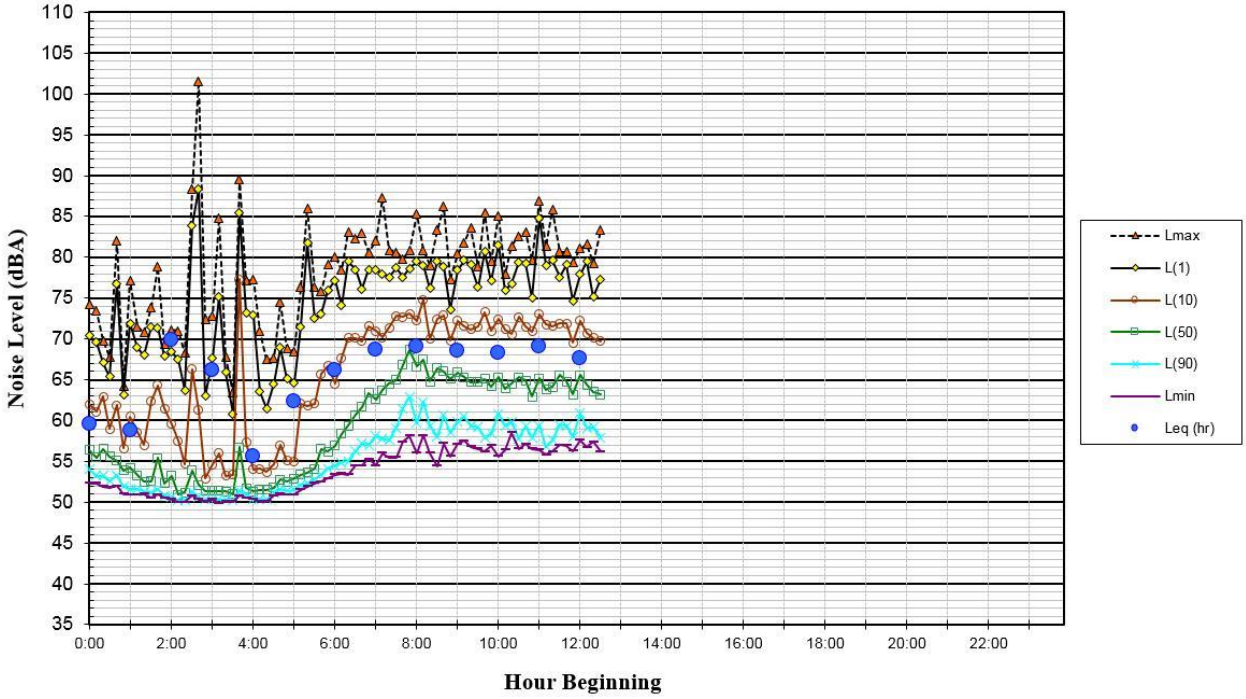

FIGURE 8 Daily Trend in Noise Levels at LT-2, Thursday, April 28, 2016

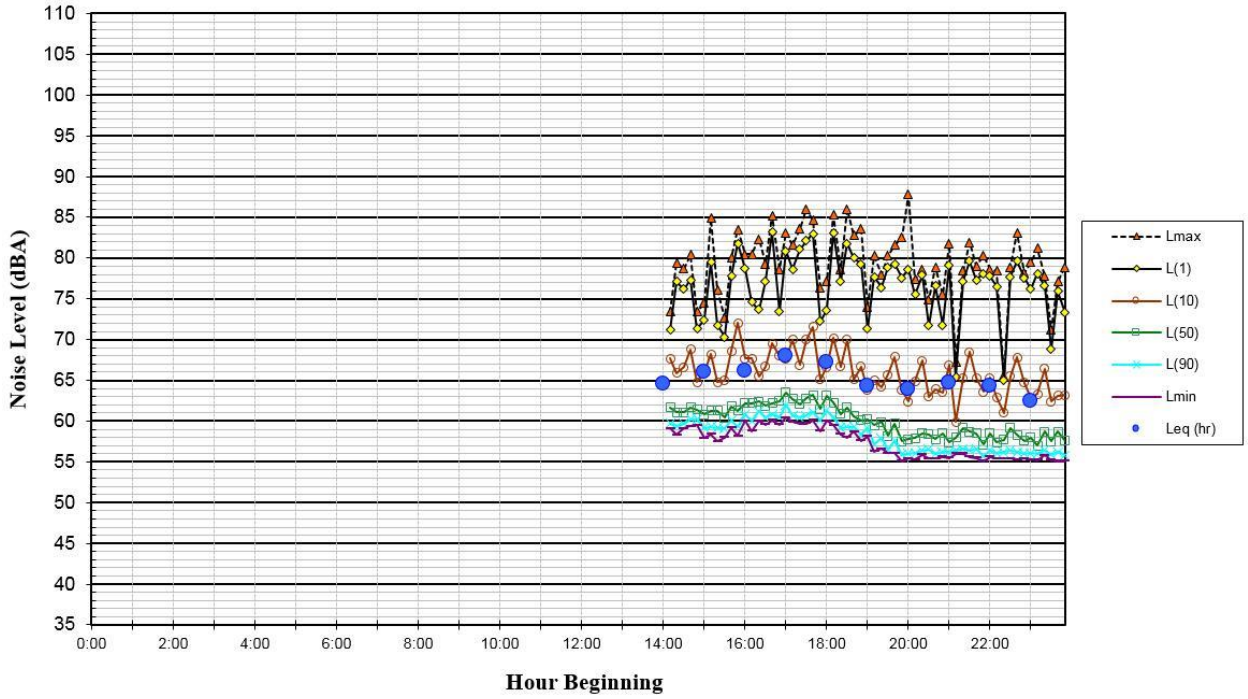

FIGURE 9 Daily Trend in Noise Levels at LT-2, Friday, April 29, 2016

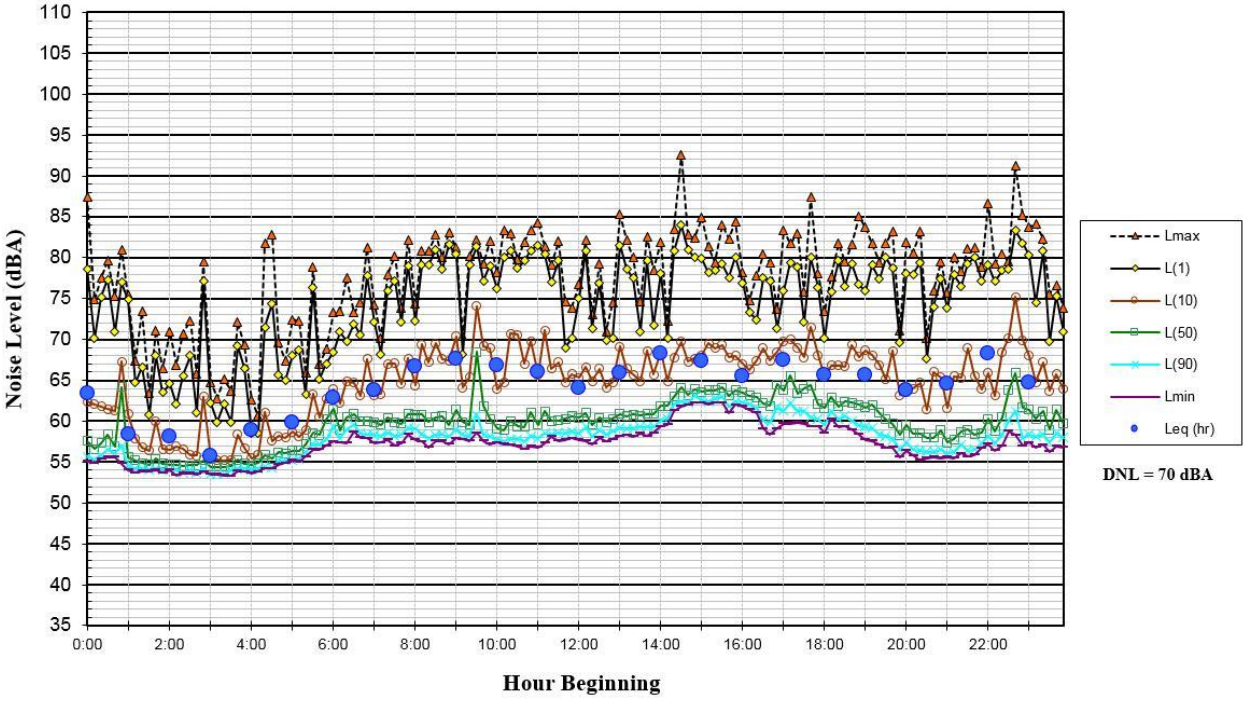

FIGURE 10 Daily Trend in Noise Levels at LT-2, Saturday, April 30, 2016

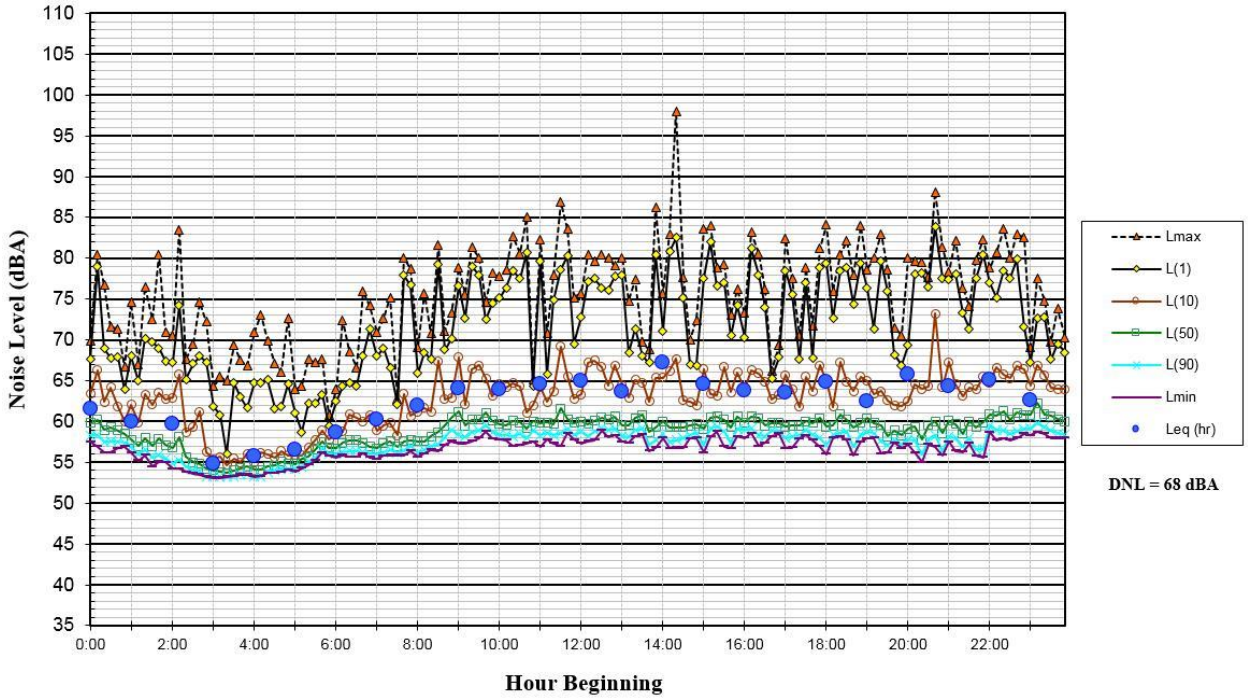

FIGURE 11 Daily Trend in Noise Levels at LT-2, Sunday, May 1, 2016

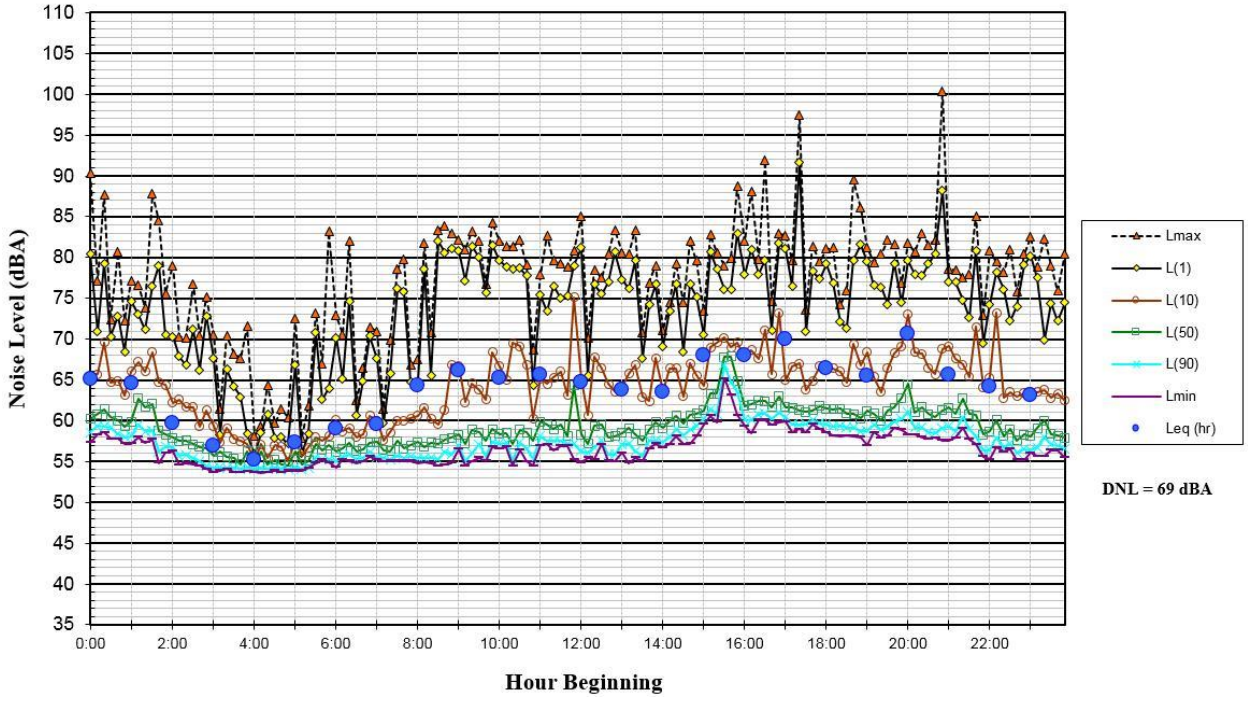

FIGURE 12 Daily Trend in Noise Levels at LT-2, Monday, May 2, 2016

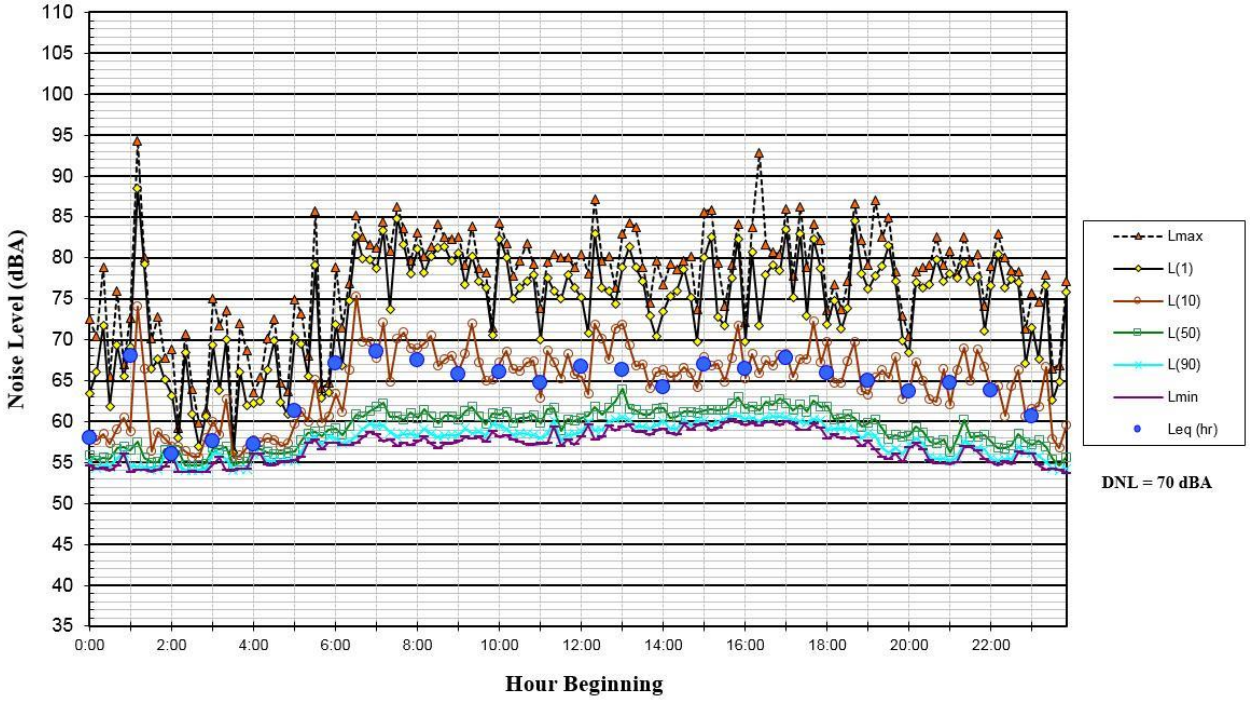

FIGURE 13 Daily Trend in Noise Levels at LT-2, Tuesday, May 3, 2016

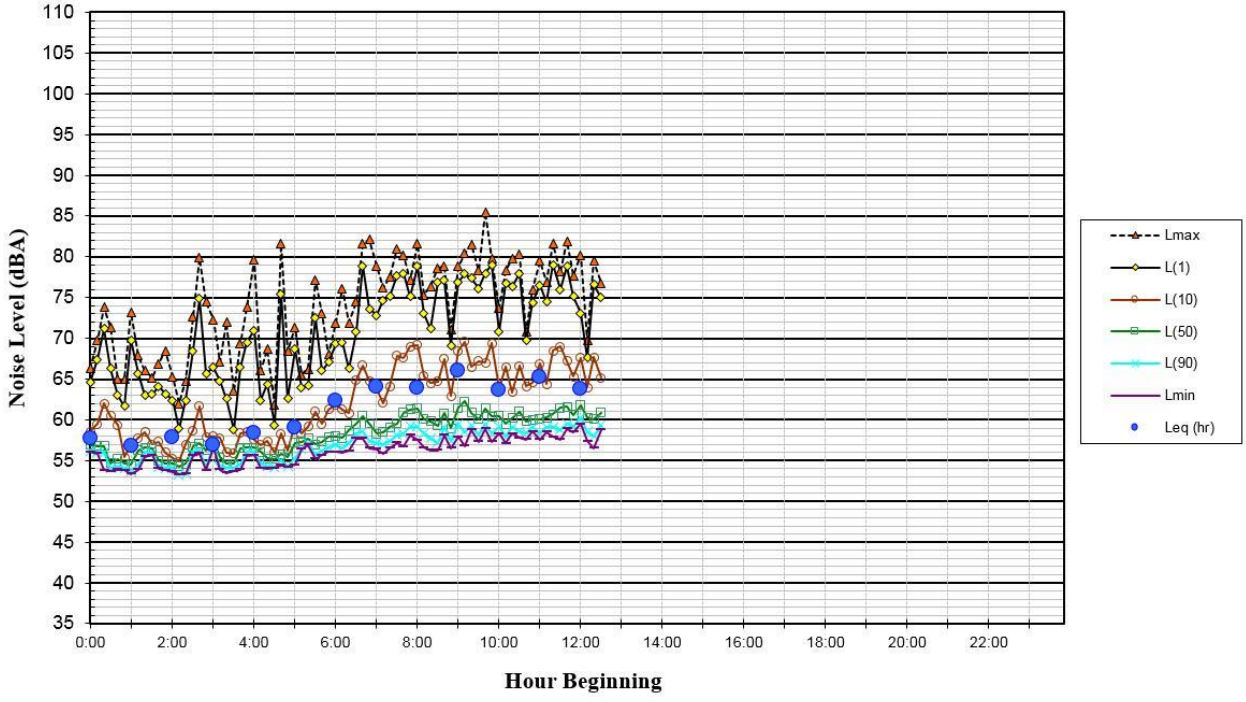

FIGURE 14 Daily Trend in Noise Levels at LT-3, Thursday, April 28, 2016

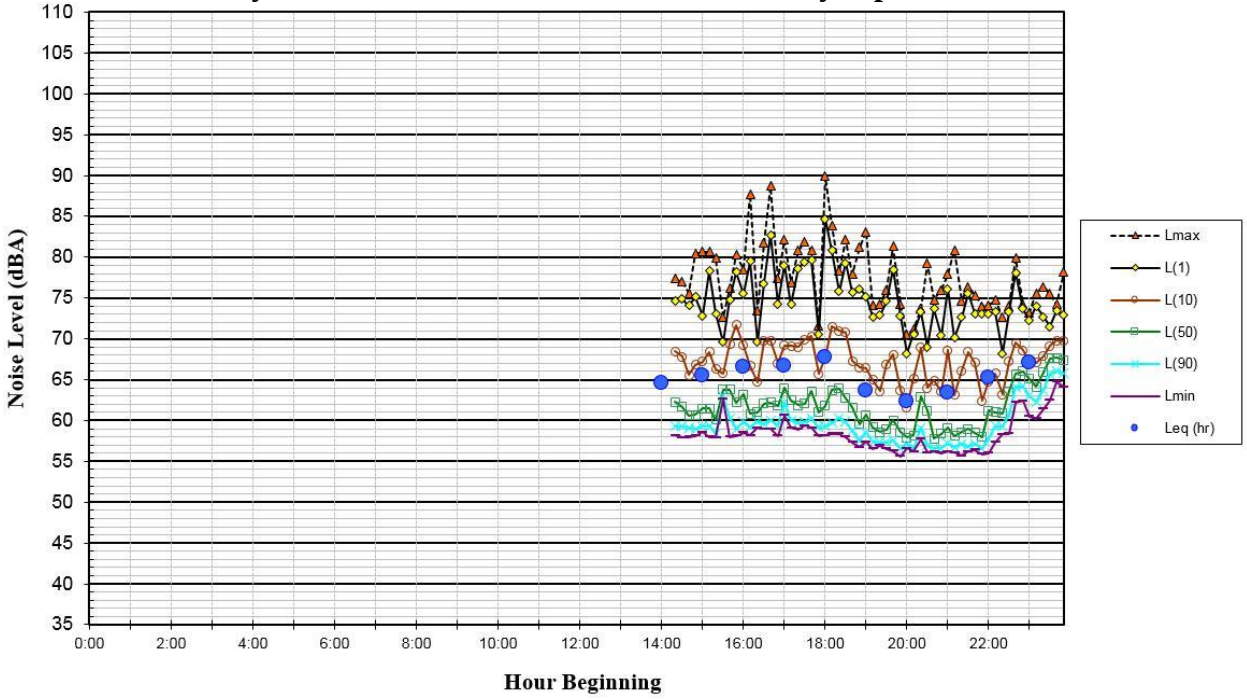

FIGURE 15 Daily Trend in Noise Levels at LT-3, Friday, April 29, 2016

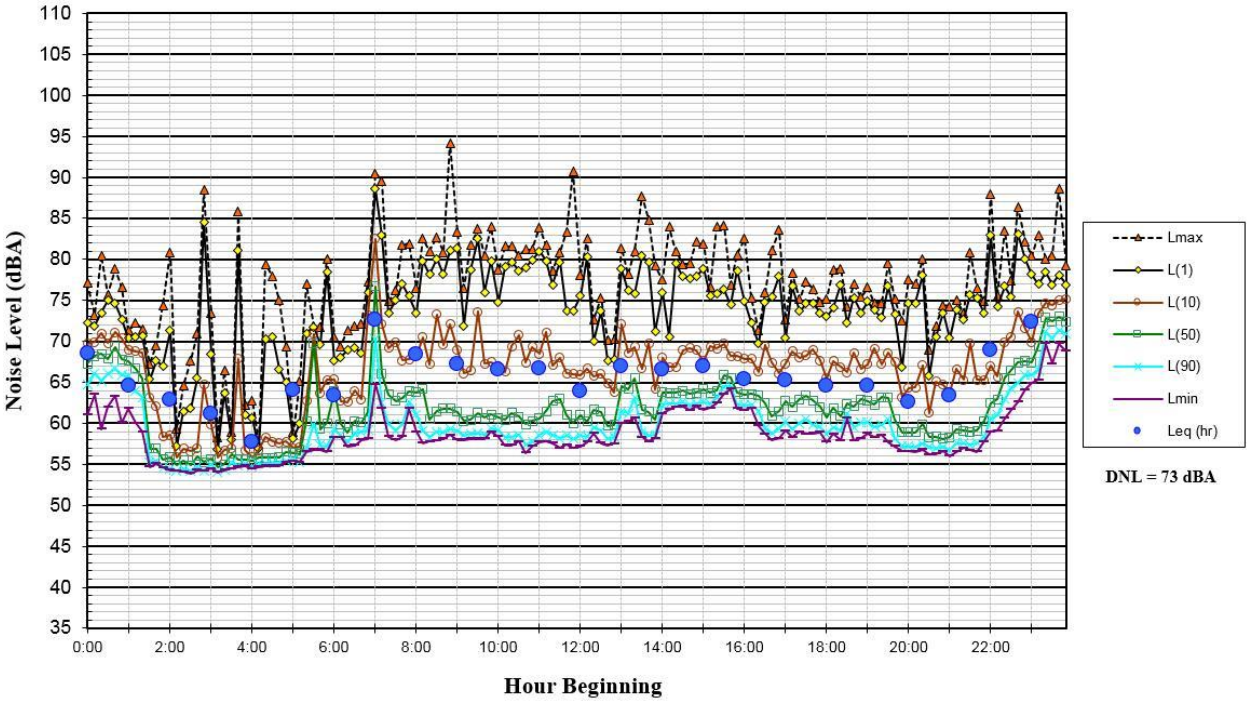

FIGURE 16 Daily Trend in Noise Levels at LT-3, Saturday, April 30, 2016

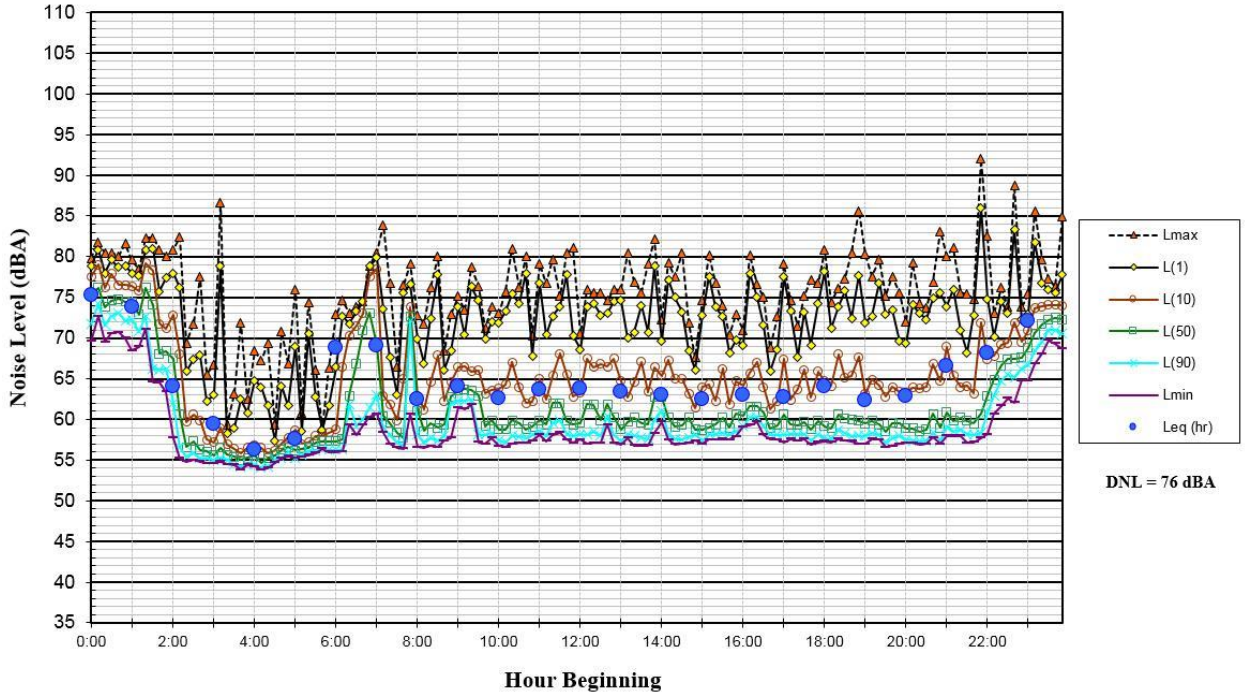

FIGURE 17 Daily Trend in Noise Levels at LT-3, Sunday, May 1, 2016

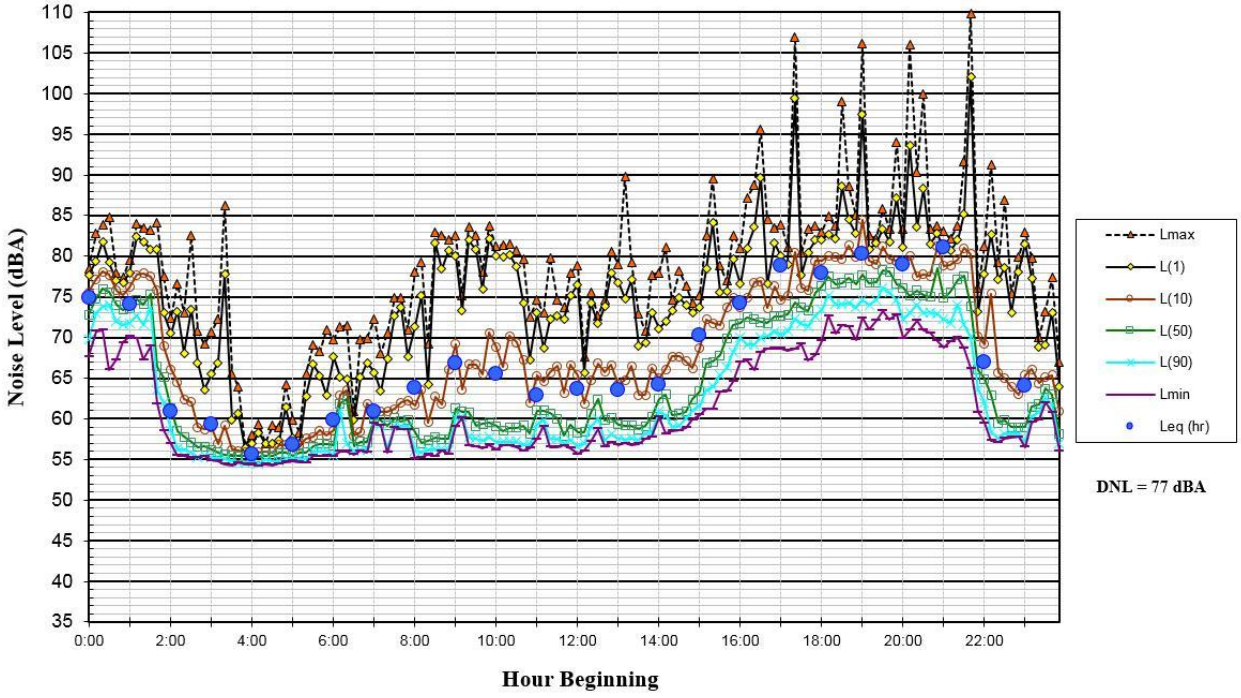

FIGURE 18 Daily Trend in Noise Levels at LT-3, Monday, May 2, 2016

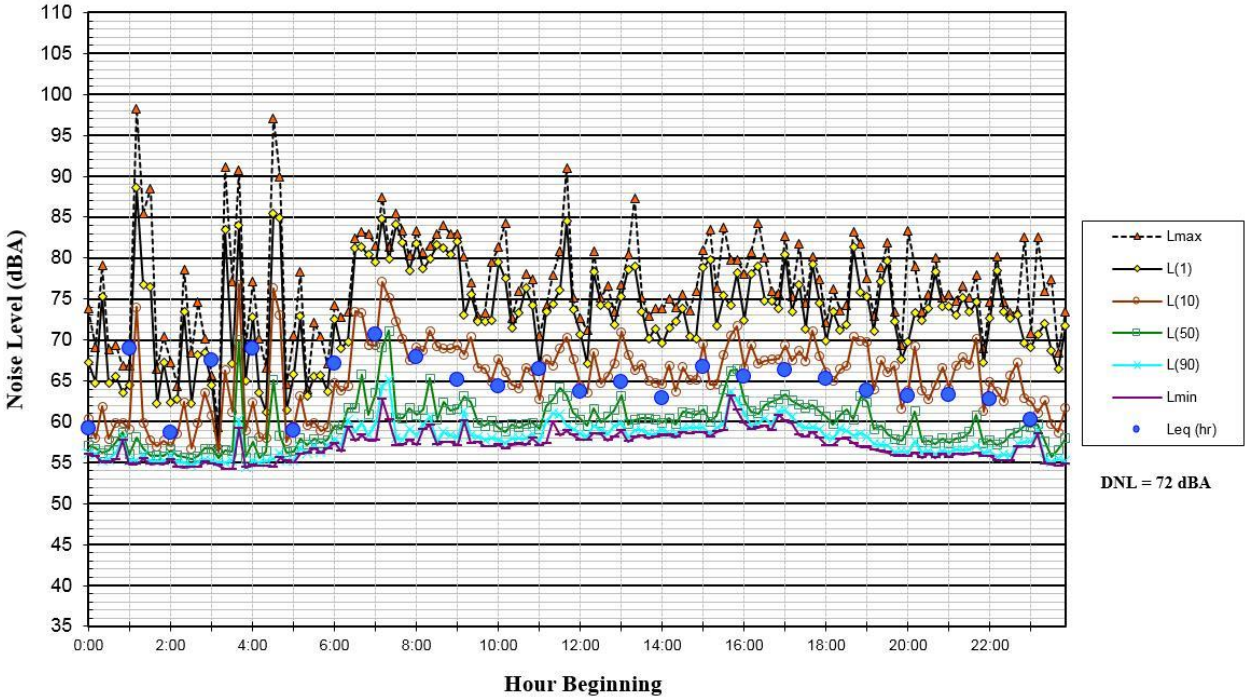

FIGURE 19 Daily Trend in Noise Levels at LT-3, Tuesday, May 3, 2016