EMPIRE LUMBER MIXED-USE PROJECT
1260 EAST SANTA CLARA STREET
NOISE AND VIBRATION ASSESSMENT
SAN JOSÉ, CALIFORNIA

July 13, 2016

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INTRODUCTION

The Empire Lumber Mixed-Use project is located at 1260 East Santa Clara Street in San José, California. The project proposes to demolish the existing land uses and develop a new seven-story mixed-use development with 405 residential units and about 60,000 square feet of retail. There would be one level of below grade parking and two levels of above grade parking. The third floor podium level would have a central outdoor courtyard surrounded by residential units, with the remaining residences on the floors above.

This report evaluates the project's potential to result in significant 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 – Noise and Land use Compatibility 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 increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the DNL is 60 dBA, approximately 30-35 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.

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 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 and vibration identified in Checklist Questions (a) and (b), or the exposure to excessive aircraft noise identified in Checklist Questions (e), and (f) are not included in the Impacts and Mitigation Section of this report. These items are discussed in a separate section addressing the consistency of the project with regard to the policies set forth in the City's General Plan. 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.

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.

Regulatory Background – Vibration

Federal Transit Administration – Train Vibration. The City of San José has not identified quantifiable vibration limits that can be used to evaluate the compatibility of land uses with train vibration levels. Although there are no local standards that control the allowable vibration in a new residential development, the U.S. Department of Transportation (DOT) has developed vibration impact assessment criteria for evaluating vibration impacts associated with transit projects.[1] The Federal Transit Administration (FTA) has proposed vibration impact criteria, based on maximum overall levels for a single event. The impact criteria for groundborne vibration are shown in Table 4. Note that there are criteria for frequent events (more than 70 events of the same source per day), occasional events (30 to 70 vibration events of the same source per day), and infrequent events (less than 30 vibration events of the same source per day).

[1] U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

TABLE 4 Railroad Train Groundborne Vibration Thresholds

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 µinch/sec, RMS)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1 Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2 Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3 Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research should always require detailed evaluation to define the acceptable vibration levels. Ensuring low vibration levels in a building requires special design of HVAC systems and stiffened floors.

Source: U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

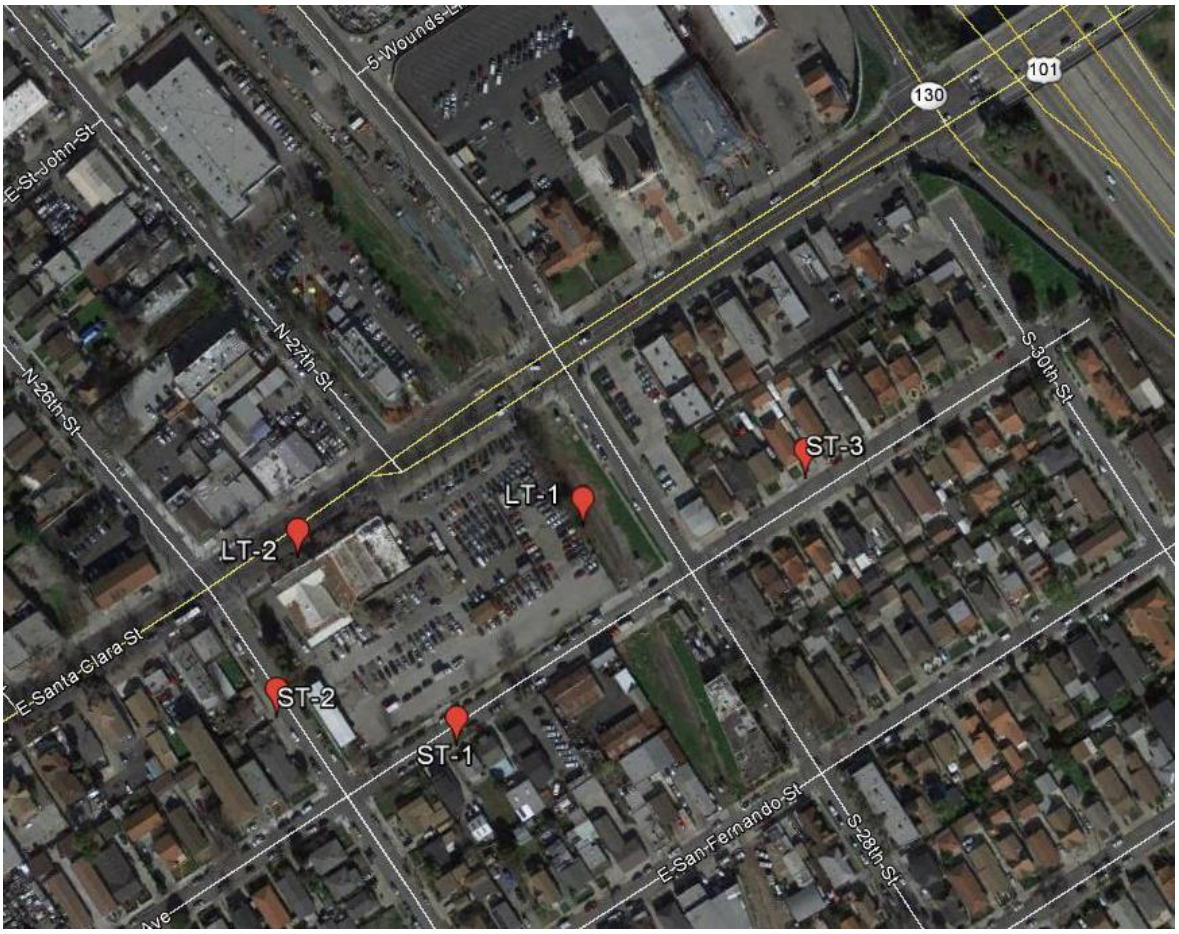
City of San José General Plan – Construction Vibration. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations in the City of San José. The following policies 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 Empire Lumber Mixed-Use project site is located at 1260 East Santa Clara Street in San José, California. The project site is surrounded by residential and commercial land uses, and a railroad train line bounds the site to the east. A noise monitoring survey was performed in the vicinity of the project site beginning on Tuesday, June 7th, 2016 and concluding on Thursday, June 9th, 2016. The monitoring survey included two long-term (LT-1 and LT-2) noise measurements and three short-term (ST-1, ST-2, and ST-3) noise measurements. Measurement locations are shown in Figure 1, and the daily trends in noise levels for the long-term measurements are shown in Appendix A. The noise environment at the site and at the nearby land uses results primarily from vehicular traffic along East Santa Clara Street. Table 5 summarizes the results of the short-term measurements.

FIGURE 1 Noise Measurement Locations



Source: Google Earth

Long-term noise measurement LT-1 was located about 100 feet west of the center of South 28th Street and about 25 feet west of the center of the adjacent railroad tracks. Hourly average noise levels at this location typically ranged from 59 to 61 dBA L_{eq} during the day, and from 50 to 59 dBA L_{eq} at night. The day-night average noise level on Wednesday, June 8th, 2016 was 63 dBA

DNL. During the measurement period, there were no train pass by events that were discernable in the noise data.

Measurement LT-2 was located across from 1269 East Santa Clara Street, about 40 feet south of the roadway centerline. Hourly average noise levels at this location typically ranged from 70 to 76 dBA L_{eq} during the day, and from 59 to 73 dBA L_{eq} at night. Noise levels during some hours were raised considerably due to short-term high noise level events, presumably generated by loud vehicles on East Santa Clara Street. The day-night average noise level on Wednesday, June 8th, 2016 was 75 dBA DNL.

TABLE 5 350 Winchester Blvd Summary of Short-Term Noise Measurement Data

Noise Measurement Location	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}	Calc. L_{dn}	Primary Noise Source
ST-1: In Front of 1260 Shortridge Avenue, ~30 feet from centerline of roadway (6/7/2016, 1:50 – 2:00 pm)	62	58	55	53	51	53	57	Distant Traffic
ST-2: In Front of 9 & 33 N. 26th Street, ~30 feet from centerline of roadway (6/7/2016, 2:10 – 2:20 pm)	70	67	60	54	51	57	61	Traffic on Santa Clara Street
ST-3: In Front of 1385 Shortridge Avenue, ~30 feet from centerline of roadway (6/9/2016, 12:40 – 12:50 pm)	68*	65	55	53	51	55	58	Distant Traffic

*Includes aircraft event, which generated a maximum noise level of 68 dBA L_{max}.

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

Noise and Land Use Compatibility

The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of San José. The project site is more than two miles from an airport so policies related to these issues do not require evaluation. The applicable General Plan policies were presented in detail in the Regulatory Background section and are summarized below for 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.

    - 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). 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.

- The City's standard for interior noise levels in residences is 45 dBA DNL.
- FTA Criteria for residences exposed to frequent events (defined as more than 70 events per day) is 72 VdB.

The project proposes to develop a seven story mixed use building with 405 residential units and about 60,000 square feet of retail. There will be one level of below grade parking and two levels of above grade parking.

The future noise environment at the project site would continue to result primarily from traffic along the surrounding roadways, including East Santa Clara Street and US 101. Existing noise sources generate noise levels of 57 to 75 dBA DNL at the ground level façades of the proposed building. The future noise level along East Santa Clara Street was calculated to increase by about 3 dBA DNL under Cumulative Plus Project traffic conditions, resulting in a level of 78 dBA DNL. Noise level increases of 0 to 1 dBA over existing conditions are calculated to occur along Shortridge Avenue, North 26th Street, and North 28th Street under Cumulative Plus Project conditions. Noise levels are anticipated to be 1 to 2 dBA higher at east facing 3rd and 4th floor residences, which would have increased exposure to US 101 traffic noise due to the reduction in shielding from the intervening structures.

An out-of-service rail line currently adjoins the site to the east. This rail line is intended to be converted into a trail, which would not be a high noise generating use. However, the BART Silicon Valley Phase 2 Extension is planned to run past the site along East Santa Clara Street through an underground tunnel under the Railroad to 28th Street Option. Since the future BART trains will run underground through the segment adjacent to the project, airborne train noise is not anticipated to be audible at the site above ambient traffic noise. However, groundborne noise and vibration could impact adjacent uses.

Future Exterior Noise Environment

Residential amenities would include an outdoor pool, an outdoor patio and grilling area, and an indoor club/fitness room, all located in a courtyard area on the third floor and well shielded from the surrounding roadway traffic by the proposed building. In addition, all residences would have outdoor patio/deck areas.

The City's noise level goal for residential common open space is 60 dBA DNL. The common outdoor use areas are located in a courtyard area and well shielded from the surrounding roadway traffic by the proposed building. Noise levels in these areas are calculated to be 55 to 60 dBA DNL, and would conform to the City's guidelines regarding compatibility with the future noise environment. Noise levels in patios/decks facing East Santa Clara Street, South 26th Street, and South 28th Street would exceed 60 dBA DNL and the City's guidelines. However, all residences would have access to common areas where exterior noise levels meet the City's criteria.

Future Interior Noise Environment

The California Building Code and the City of San José General Plan require that interior noise levels be maintained at 45 dBA DNL or less for residences. Residential units would be located on all above ground building levels. The exterior traffic noise exposure at these facades would be up to 78 dBA DNL for the northern facing façade, 58 to 75 dBA DNL at the eastern and western facing facades, and 58 dBA DNL at the southern facing facade.

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 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 63 dBA DNL in northern facing units, and with windows and doors closed, interior noise levels would be up to 58 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 units facing East Santa Clara Street, South 26th Street, or South 28th Street, 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 and office 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.

Future Vibration Environment

Based on the Silicon Valley Rapid Transit Corridor Final EIR[2] (SVRTC EIR), trains along the extension would have an operating speed of 67 mph and would operate from 4:00 a.m. to 1:30 a.m. with 6-minute headways during peak service (6:00 a.m. to 7:30 p.m.), and 20-minute headways during off-peak service (4:00 a.m. to 6:00 a.m. and 7:30 p.m. to 1:30 a.m.). Based on the SVRTC EIR, groundborne vibration levels of about 73 VdB are anticipated to occur at distance of 55 to 60 feet from the track along the Santa Clara Street alignment between 26th Street and 28th Street. At these same locations, groundborne noise levels of 36 to 38 dBA are anticipated.

Based on Appendix A of the SVRTC EIR, which shows the BART Alternative Plan and Profile, the rail line would run from the proposed Alum Rock Station (to be located southeast of the Julian Street interchange with US 101), meeting up with Santa Clara Street at South 26th Street. The SVRTC EIR proposes a number of mitigation options to reduce impacts to less-than-significant levels. For the underground tunnel portion of the train line, the use of resilient fasteners, resiliently supported ties, and/or floating slabs are recommended. With the use of resilient fasteners along the segment of track adjacent to the site, impacts are not anticipated at distances of 55 feet or further from the tracks (groundborne vibration levels would be below 72 VdB).

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

- Ensure that groundborne vibration levels due to future rail activity along the proposed SVRTC line will not exceed 72 VdB at the setback of the proposed buildings. With the mitigation proposed in the SVRTC EIR, groundborne vibration levels are not anticipated to exceed 72 VdB at distances greater than 55 feet from the center of the near track.

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 groundborne vibration levels. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- **Project Generated Traffic Noise:** A significant impact would be identified if project generated traffic or operational noise sources 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 and future noise levels would remain "Normally

2 Silicon Valley Rapid Transit Corridor Final EIR, Environmental Analysis, Noise and Vibration, 2004.

Acceptable" for the land use, or b) the noise level increase is 3 dBA DNL or greater where future noise levels would equal or exceed the "Normally Acceptable" level.

- **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.

- **Construction Vibration:** 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.

Impact 1: **Project-Generated Traffic Noise.** The proposed project would not result in a permanent noise level increase at existing noise sensitive land uses due to project-generated traffic. **This is a less-than-significant impact.**

A significant impact would result if traffic generated by the project would substantially increase noise levels at sensitive receptors in the vicinity. For residential land uses, 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. For commercial land uses, 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 70 dBA DNL, or b) the noise level increase is 3 dBA DNL or greater, with a future noise level of 70 dBA DNL or greater.

The project's traffic study provided AM and PM project trip assignments for intersections surrounding the project site. 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 is estimated be the same as the change in the peak hour L_{eq}.

Traffic noise levels along South 26th Street are calculated to increase by about 4 dB between East Santa Clara Street and the proposed project entrance off of South 26th Street. The portion of South 26th Street north of the project driveway is bordered by commercial uses to the west and the project site to the east. The noise environment in this area is dominated by traffic noise from vehicles on East Santa Clara Street. Based on the noise monitoring survey, vehicles on East Santa Clara Street currently generate a noise level of about 75 dBA DNL at a distance of 40 feet from the center of the roadway. Traffic noise modeling using the Federal Highway Administration's Traffic Noise Model calculated the existing traffic noise level along South 26th Street to be 53 dBA DNL at a distance of 40 feet from the centerline. An existing noise level of about 65 dBA DNL is calculated at a distance of 40 feet from the center of the South 26th Street and 200 feet from the center of East Santa Clara Street, resulting primarily from traffic along East Santa Clara Street. Taking into account project generated noise increases along both roadways (traffic noise along East Santa

Clara Street is calculated to increase by less than 1 dB as a result of the project), noise levels at commercial uses fronting South 26th Avenue and adjacent to East Santa Clara Avenue would continue to be exposed to an Existing Plus Project traffic noise level of 75 dBA DNL; an increase of less than 1 dB. At a distance of 200 feet from the center of East Santa Clara Street, commercial uses are calculated to be exposed to an Existing Plus Project traffic noise level of 66 dBA DNL; an increase of 1 dB above existing levels in this area.

South of the project entrance off of South 26th Street, a noise increase of about 1 dB is anticipated. A traffic noise increase of about 2 dB is anticipated along Shortridge Avenue between South 24th Street and South 26th Street. Traffic noise increases of less than 1 dBA DNL are calculated to occur all other the roadway segments in the network.

These increases would not be considered to be substantial and would result in a **less-than-significant** impact.

Mitigation Measure 1: None required.

Impact 2: **Operational Noise.** Mechanical equipment associated with the project and on site vehicle deliveries could generate noise in excess of the City's noise policy goal of 55 dBA DNL. **This is a potentially significant impact.**

Mechanical Equipment

Multi-use structures typically include various mechanical equipment, such as air conditioners, exhaust fans, and air handling equipment for the buildings and 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. The most substantial noise-generating equipment would likely be large exhaust fans and building cooling and air conditioning units. 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.

The nearest noise sensitive uses include residences located about 65 to 75 feet to the south and west of the site, and residences located about 180 feet east of the site. 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 use. Given the distance between rooftop equipment located on top of an 85 foot high structure and nearby noise-sensitive uses and the shielding provided by the roof structure, mechanical equipment noise is not anticipated to exceed 55 dBA DNL at these nearby residences or other sensitive uses. However, the final site plan should be reviewed by a qualified acoustical consultant to address any potential conflicts.

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. These are not anticipated to impact the nearby noise-sensitive land uses.

Mitigation Measure 2:

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

- A detailed acoustical study shall be prepared during building design to evaluate the potential noise generated by building mechanical equipment and to identify the necessary noise controls that are included in the design to meet the City's 55 dBA DNL noise limit at the shared property line. The study shall evaluate the noise from the equipment and predict noise levels at noise-sensitive locations. Noise control features, such as sound attenuators, baffles, and barriers, shall be identified and evaluated to demonstrate that mechanical equipment noise would not exceed 55 dBA DNL at noise-sensitive locations, such as residences. The study shall be submitted to the City of San José for review and approval prior to issuance of any building permits.

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

Impact 3: **Construction Noise.** 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.

Where noise from construction activities exceeds 60 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive residential in the project vicinity for a period exceeding one year, the impact would be considered significant. For commercial uses, a significant impact would be identified if construction noise were to exceed 70 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} for a period exceeding one year. Additionally, the City considers significant construction noise impacts to have occurred 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, according to Policy EC-1.7 of the General Plan.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. Construction activities for the project would be carried

out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Table 6. Table 7 shows the calculated construction noise levels for each phase of construction, based on the equipment specified for the project, at a distance of 100 feet from the center of the construction activity.

TABLE 6 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
	85	Continuous

Equipment Category	L_{max} Level (dBA)1,2	Impact/Continuous
All other equipment with engines larger than 5 HP		

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 7 Calculated Construction Noise Levels for Each Phase of Construction

Construction Phase	At Distance of 100 ft.	
	L_{eq}, dBA	L_{max}, dBA
Demolition (April 15-May 15, 2017)	79	84
Site Preparation (May 15-June 15, 2017)	70	72
Grading/Excavation, 63 days (June 15-Sept. 1, 2017)	80	80
Trenching (August 1-October 1, 2017)	72	75
Building-Exterior (October 1, 2017 – May 15, 2019)	73	75
Building-Interior (March 15, 2018 – May 15, 2019)	Minimal Off-Site	Minimal Off-Site
Paving (March 1-May 15, 2019)	73	73

[1] Calculated using a standard drop off rate for point sources of 6 dB per doubling of distance.

Pile driving is not anticipated to be necessary for this project as a method of foundation construction for this project. The highest noise levels would be generated during demolition and grading/excavation. As indicated in Table 7, demolition and construction activities are calculated to generate noise levels in the range of 70 to 80 dBA at a distance of 100 feet from the source, with maximum noise levels of 72 to 84 dBA L_{max}.

The nearest noise sensitive uses include residences located about 65 to 75 feet to the south and west of the site, and residences located about 180 feet east of the site, which are shielded by a 5 to 6 foot high solid wall. Commercial uses are located as close as 65 to 75 feet to the south and west of the site, 130 feet to the east, and 100 feet to the north of the site. Daytime ambient noise levels at these land uses range from 53 to 55 dBA L_{eq} at land uses along Shortridge Avenue to 70 to 76 dBA L_{eq} at land uses along East Santa Clara Street. The range of noise levels at surrounding land uses resulting from construction are summarized in Table 8.

TABLE 8 Range of Construction Noise Levels at Adjacent Land Uses

Receiver	Closest Distance, ft	Construction Noise Level Range, dBA L_{eq}

Residences and Commercial Uses to West and South	65 ft	73-83
Residences to East	180 ft	60-70*
Commercial to East	130 ft	68-78
Commercial to North	100 ft	70-80

*Includes 5 dBA of noise reduction from existing 5 to 6 foot high sound wall.

As indicated in Table 8, construction noise levels would exceed 60 dBA L_{eq} at the nearest land uses intermittently during all phases of exterior constriction, which would occur over a period of about 2 years. Constriction noise would also exceed ambient noise levels at residences to the east, west, and south by at least 5 dBA L_{eq} for the majority of construction. Constriction noise would exceed ambient noise levels at commercial uses to the south, southeast, and southwest by at least 10 dBA L_{eq}. Constriction noise levels generated at commercial uses to the north would be within 10 dBA L_{eq} of ambient noise levels. Construction noise levels would be lower as construction moves away from the site boundaries or into shielded areas. 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 barriers or structures can provide an additional 5 to 10 dBA noise reduction from ground level construction activities at distant receptors. This is a potentially significant impact.

Mitigation Measure 3:

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.

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. Additionally, construction activities for the proposed project should include the following best management practices to reduce noise from construction activities near sensitive land uses:

- 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.

- 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 should be strictly prohibited.

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

- 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. To be most effective, the barriers should be placed as close as possible to the noise source or the sensitive receptor and be a minimum height of 8 feet.

- 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.

- Construct temporary barriers around the eastern, wester, and southern boundaries of the construction site adjacent to operational businesses, residences, or other noise-sensitive land uses. Temporary noise barriers could reduce construction noise levels by 5 dBA.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will 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 in it the notice sent to neighbors regarding the construction schedule.

Implementation of the above measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. With the implementation of these measures, and recognizing that noise generated by construction activities would occur over a temporary period, the temporary increase in ambient noise levels would be **less-than-significant**.

Impact 4: **Groundborne Vibration during Construction.** Residences and local businesses in the vicinity of the project site would be exposed to construction-related vibration, particularly during impact pile driving events. **This is a potentially significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Table 9 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet.

TABLE 9 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.

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

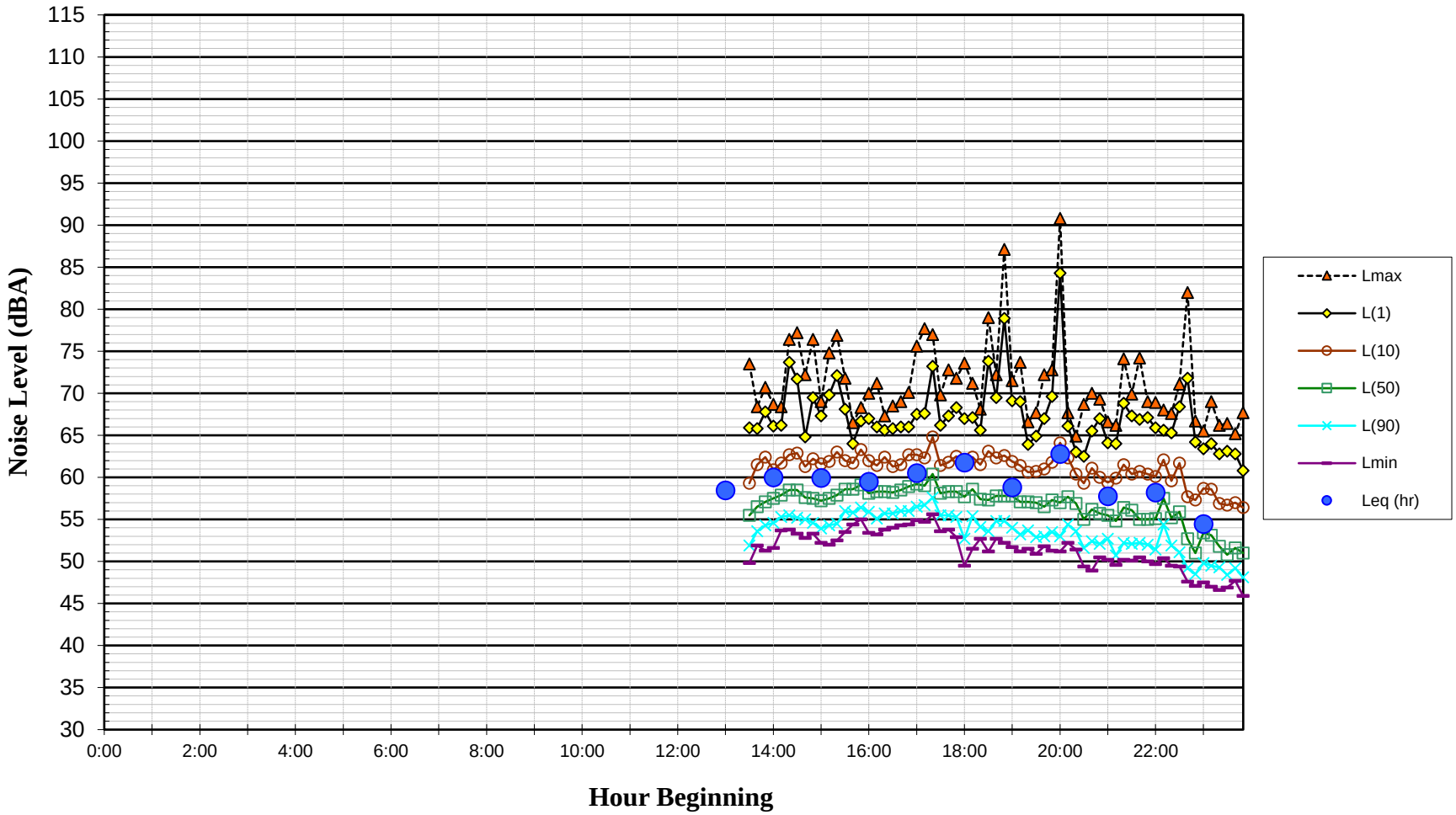
Again, pile driving would not be needed for project construction. Project construction activities such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate 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.

The nearest structures are located about 65 feet from the project site to the south and west. Structures to the north are as close as about 100 feet from the project site and structures to the east re as close as 130 feet from the site. Based on the levels shown in Table 8, vibration levels produced by heavy

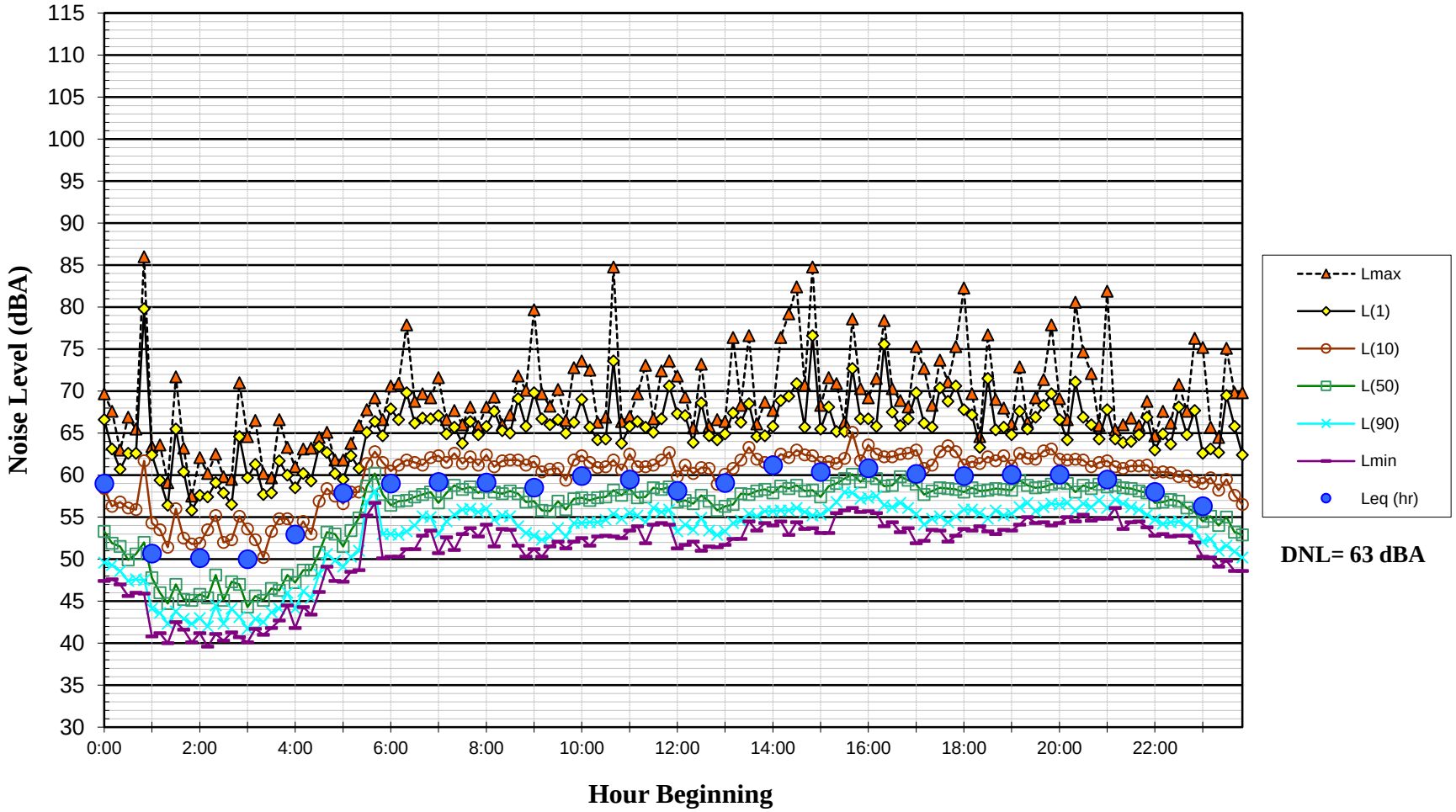
equipment (vibratory rollers, clam shovel drops) during construction are calculated to be 0.07 in/sec PPV or less at a distance of 65 feet and less than 0.05 in/sec PPV at a distance of 100 feet. These vibration levels are not anticipated to be perceptible at adjacent land uses and would not approach the 0.2 in/sec PPV threshold for architectural damage. This is a less-than-significant impact.

Mitigation Measure 4: None Needed.

Noise Levels at Noise Measurement Site LT-1
Mid-Point on Northeast Fence Line, 90 Feet from S. 28th Street Centerline
Tuesday, June 7, 2016

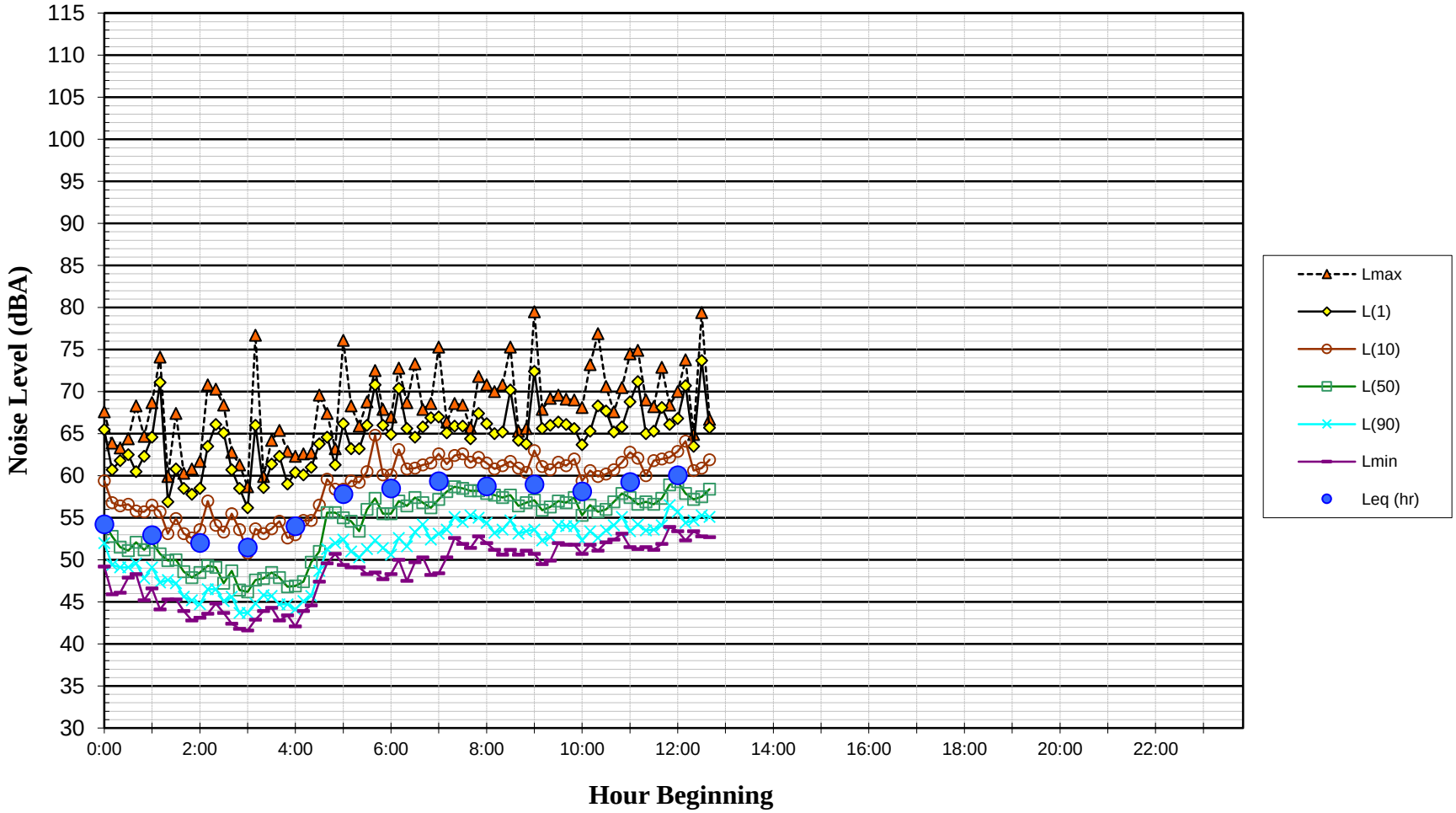


Noise Levels at Noise Measurement Site LT-1
Mid-Point on Northeast Fence Line, 90 Feet from S. 28th Street Centerline
Wednesday, June 8, 2016

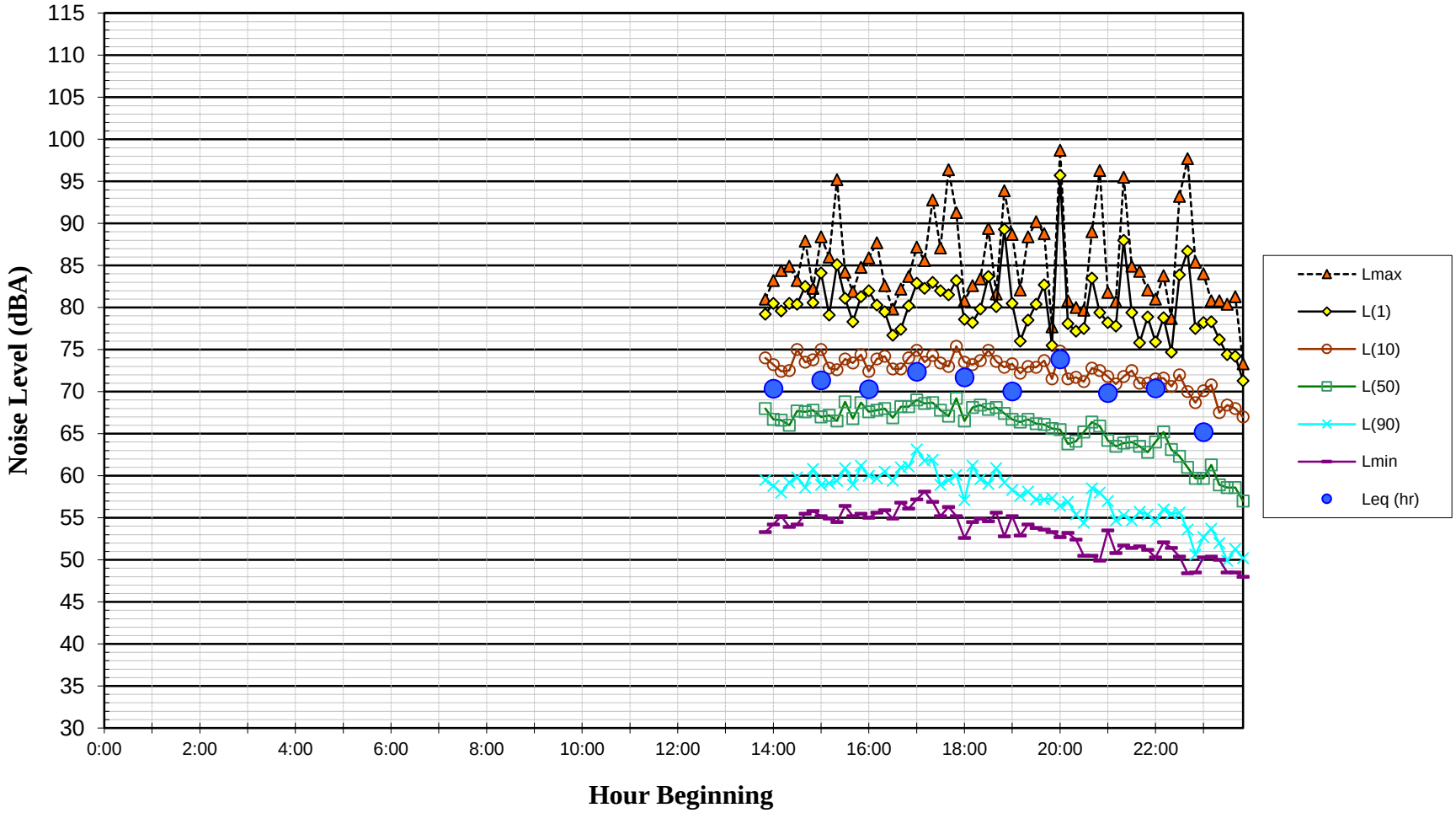


DNL= 63 dBA

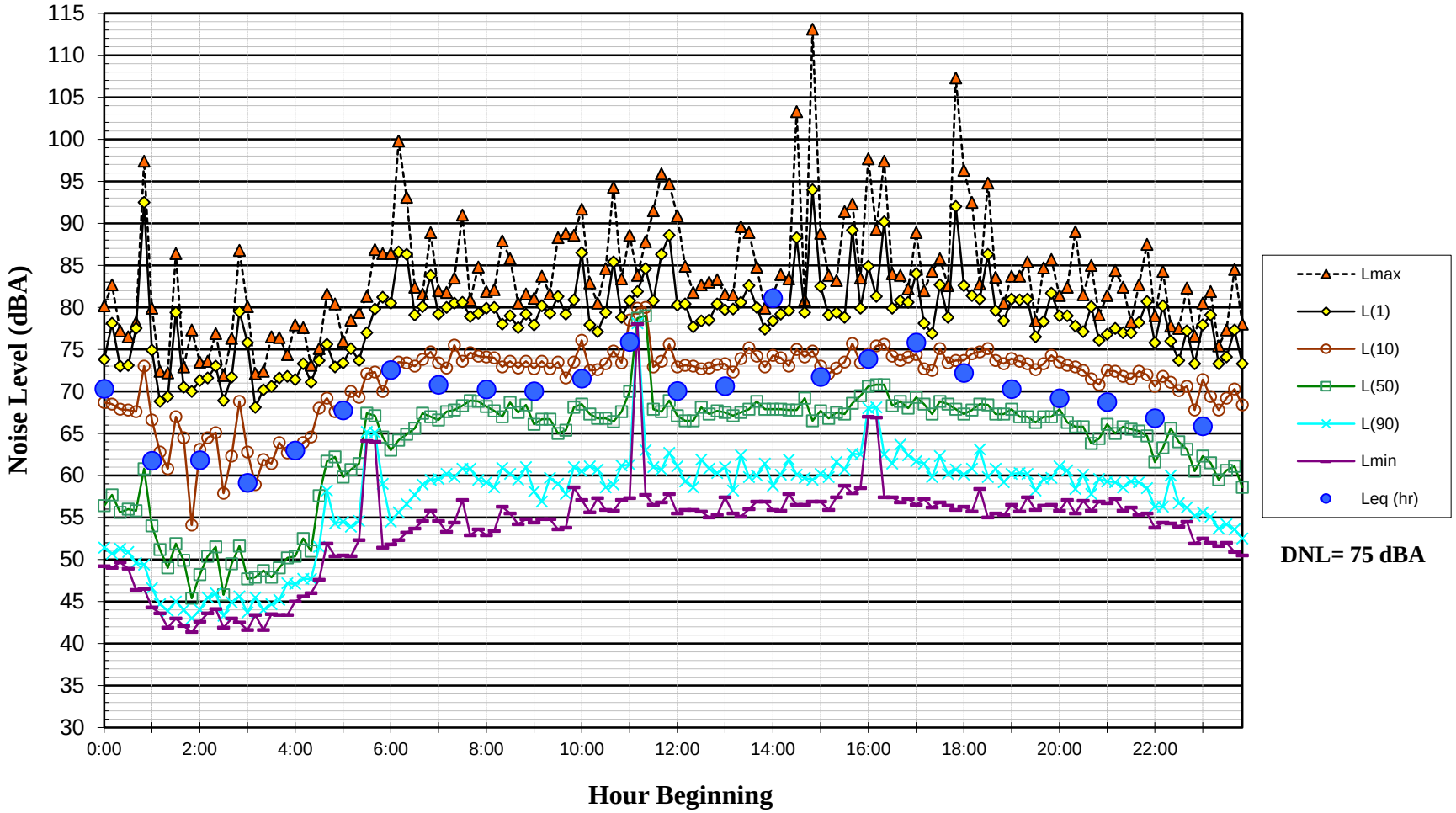
Noise Levels at Noise Measurement Site LT-1
Mid-Point on Northeast Fence Line, 90 Feet from S. 28th Street Centerline
Thursday, June 9, 2016



Noise Levels at Noise Measurement Site LT-2
Across from 1269 East Santa Clara Street, 40 Feet Northwest of Centerline
Tuesday, June 7, 2016



Noise Levels at Noise Measurement Site LT-2
Across from 1269 East Santa Clara Street, 40 Feet Northwest of Centerline
Wednesday, June 8, 2016



DNL= 75 dBA

Noise Levels at Noise Measurement Site LT-2
Across from 1269 East Santa Clara Street, 40 Feet Northwest of Centerline
Thursday, June 9, 2016