Appendix E

Noise/Vibration Assessment

1495 WINCHESTER ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The site is located northwest of the intersection of Winchester Boulevard and Cadillac Drive, within the Winchester Urban Village Plan, in San José, California. The site is currently used by Pacific Interlock Pavingstone for retail sales of hardscape materials. The proposed project would demolish the existing site improvements and construct a 4-story mixed-use building consisting of 4,995 sf of retail land uses and 72 on-site parking stalls. Residential units will be located on levels 2-4.

This report evaluates the project's potential to result in significant environmental 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 land use compatibility utilizing noise policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

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

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

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

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

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

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

Effects of Noise

Sleep and Speech Interference

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

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to 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. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

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

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

Regulatory Background – Noise

The State of California 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) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels;

(c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project would expose people residing or working in the project area to excessive noise levels?

Checklist items (a) and (b) are applicable to the proposed project. The project is not located within two miles of a public airport or in the vicinity of a private airstrip and would not expose people

residing or working in the project area to excessive aircraft noise levels; therefore, item (c) is not carried further in this analysis.

The impacts of the project on the surrounding land uses are addressed in the Noise Impacts and Mitigation Measures Section of the report. The impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration are not considered under CEQA and are discussed in a separate section addressing Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan.

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

2016 California Green Building Standards Code (Cal Green Code). The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. The sections that pertain to this project are as follows:

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

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

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

EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider Federal, State, and City noise standards and guidelines as

a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

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

Exterior Noise Levels

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

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

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

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

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

Normally Acceptable:

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

Conditionally Acceptable:

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

Unacceptable:

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

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

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

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

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

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

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

- Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.
    - For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

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. This code is not explicit in terms of the acoustical descriptor associated with the noise level limit. Consistent with General Plan policy E.C.-1.3, a reasonable interpretation of this standard would identify the ambient base noise level criteria as the day/night 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

The City of San Jos**é** has established vibration guidelines applicable to this analysis.

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. 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 west of Winchester Boulevard and north of Cadillac Drive in a mixed-use area, with residential units to the west, a gas station to the north, and commercial uses to the south. A noise monitoring survey was performed at the project site and vicinity beginning Tuesday, February 27, 2018 and concluding on Wednesday, February 28, 2018. The monitoring survey included two long-term noise measurements and three short-term measurements, as shown in Figure 1. Table 4 summarizes the results of the short-term measurements. The results of the long-term noise measurements at LT-1 and LT-2 are shown in Figure 2 and Figure 3, respectively.

Long-term noise measurement LT-1 was positioned 25 feet from the centerline of Cadillac Drive and 120 feet west of Winchester Boulevard. The primary noise sources at this location were traffic along Cadillac Drive and Winchester Boulevard and local commercial activities. Hourly average noise levels ranged from 59 to 71 dBA L_{eq} at this location during daytime hours, and from 50 to 64 dBA L_{eq} at night. A food truck, parked about 35 feet from the measurement location, generated a steady noise level of 63 dBA between the hours of about 5:30 pm and 12:00 am on the evening of Tuesday, February 27th, 2018. To confirm the regular operation of the food truck in the vicinity of the site, additional data was acquired from Friday, June 8th to Wednesday, June 13th, 2018 (see Appendix A). Based on the additional data, the food truck was operational and generated a relatively steady noise level of about 60 dBA at the LT-1 location between the hours of approximately 5:00 pm and 1:00 am on the evening of Friday, June 8th, 7:00 pm and 1:00 am on the evening of Saturday, June 9th, 4:00 pm and 12:00 am on the evening of Sunday, June 10th, and 5:30 pm and 12:00 am on the evening of Tuesday, June 12th (see L_{90} noise levels in Appendix A that indicate continuous mechanical equipment noise during the evening time periods). Food truck operations are not apparent in the data for Monday, June 11th. The day-night average noise level from 1:00 p.m. on Tuesday February 27, 2018 to 1:00 p.m. on Wednesday, February 28, 2018 was 67 dBA DNL. The day-night average noise level on June 9th through June 12th, 2018 ranged from 67 to 68 dBA DNL on days with food truck operations and was 66 dBA DNL on Monday, June 11th, which did not include any apparent food truck related noise.

LT-2 was positioned on east edge of the site about 35 feet from the centerline of Winchester Boulevard. The primary noise source at this location was the traffic on Winchester Boulevard. Hourly average noise levels at this location ranged from 68 to 72 dBA L_{eq} during the day and from 59 to 69 dBA L_{eq} at night. The day-night average noise level from 1:00 p.m. on Tuesday February 27, 2018 to 1:00 p.m. on Wednesday, February 28, 2018 was 73 dBA DNL.

TABLE 4 Summary of Short-Term Noise Measurement Data, February 27, 2018

ID	Location (Start Time)	Measured Noise Levels, dBA				Calculated DNL, dBA	Primary noise source
		L_{10}	L_{50}	L_{90}	L_{eq}		
ST-1	Along the north boundary of the site, near the Mobil gas station and 60 feet west of Winchester Boulevard (1:00 p.m. to 1:10 p.m.)	63	55	51	60	63	Traffic on Winchester Boulevard
ST-2	Northwest corner of the site (1:20 p.m. to 1:30 p.m.)	54	50	46	51	54	Traffic Winchester Boulevard and Cadillac Drive
ST-3	In front of 3131 Cadillac Drive, 30 feet from centerline of Cadillac Drive (1:40 p.m. to 1:50 p.m.)	56	53	51	54	58	Traffic on Cadillac Drive

FIGURE 1 Noise Measurement Locations

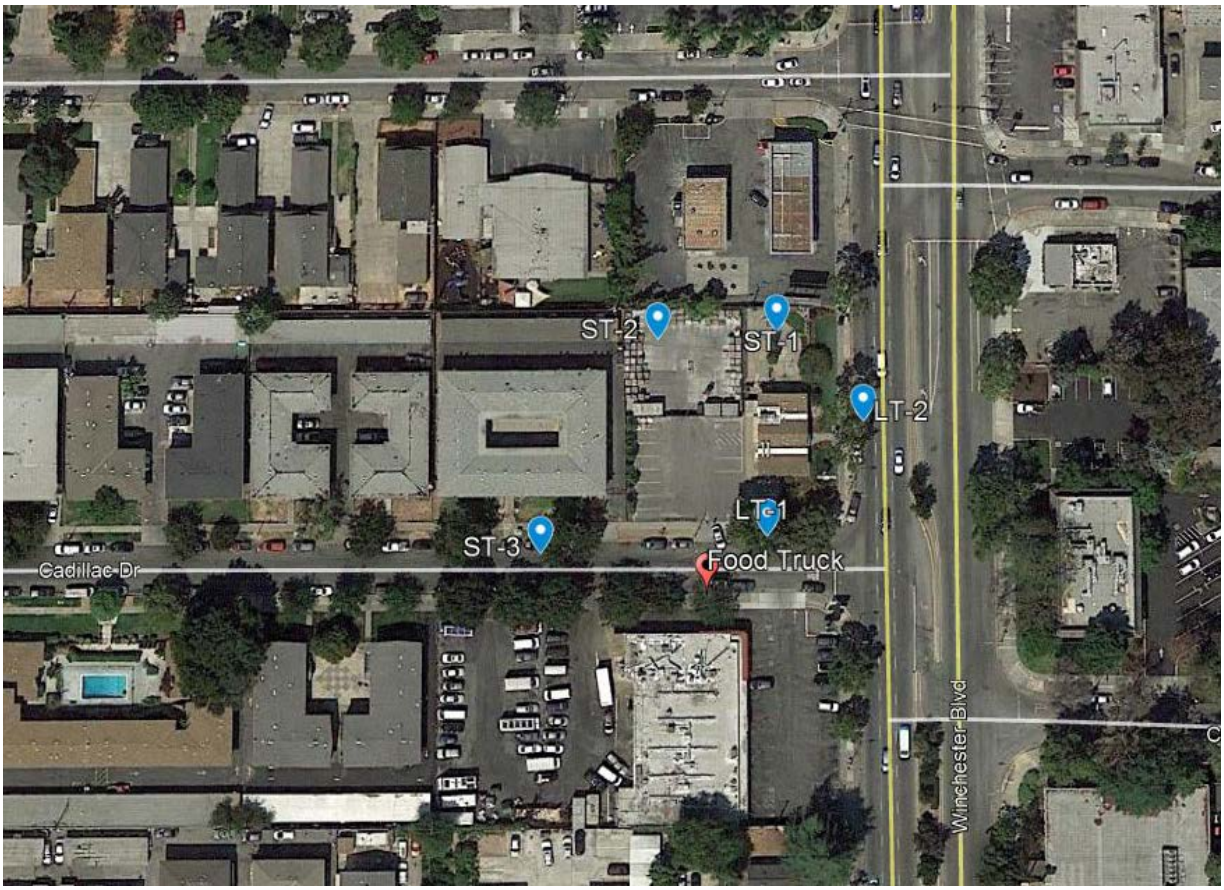


FIGURE 2 Daily Trend in Noise Levels at LT-1

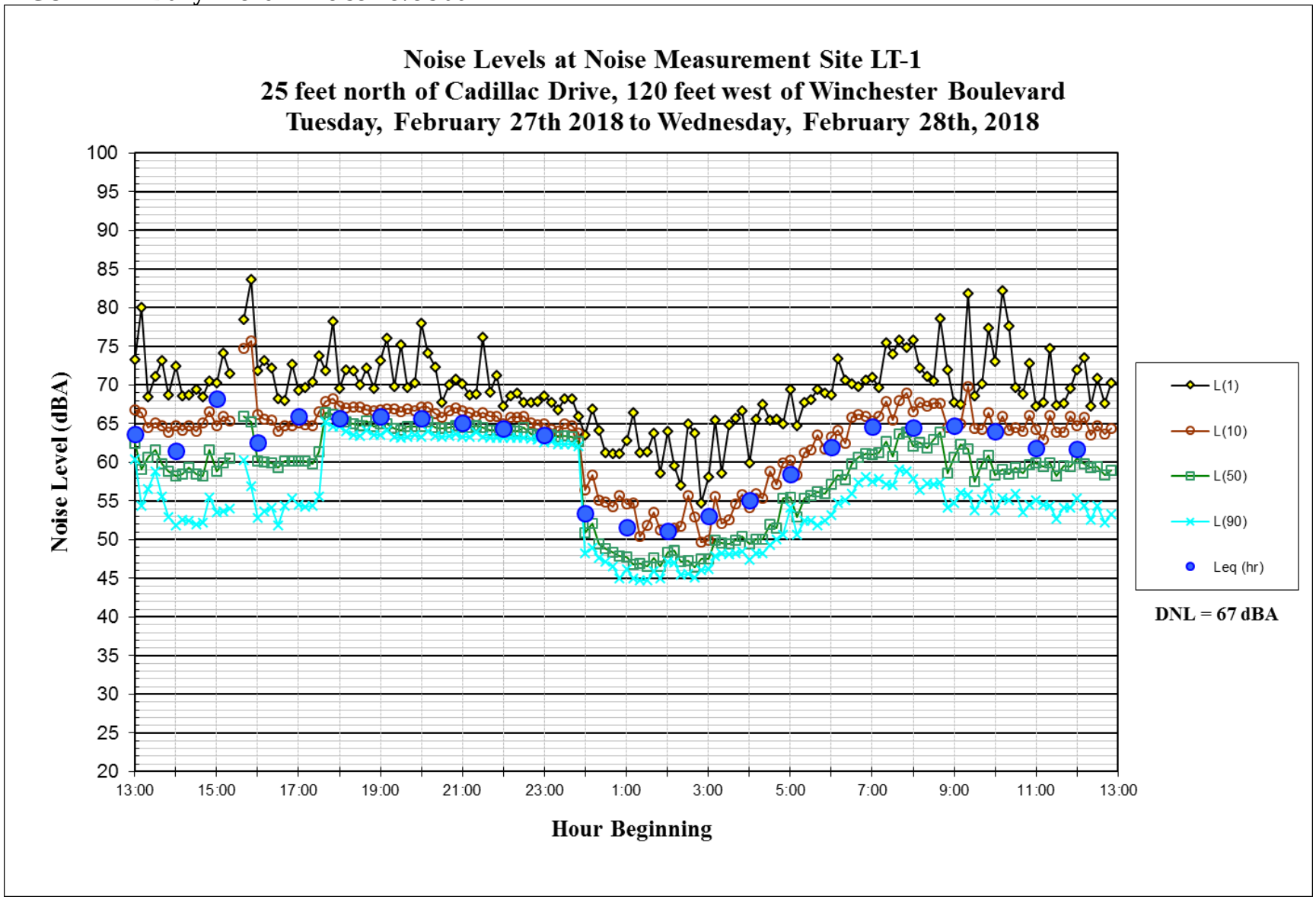
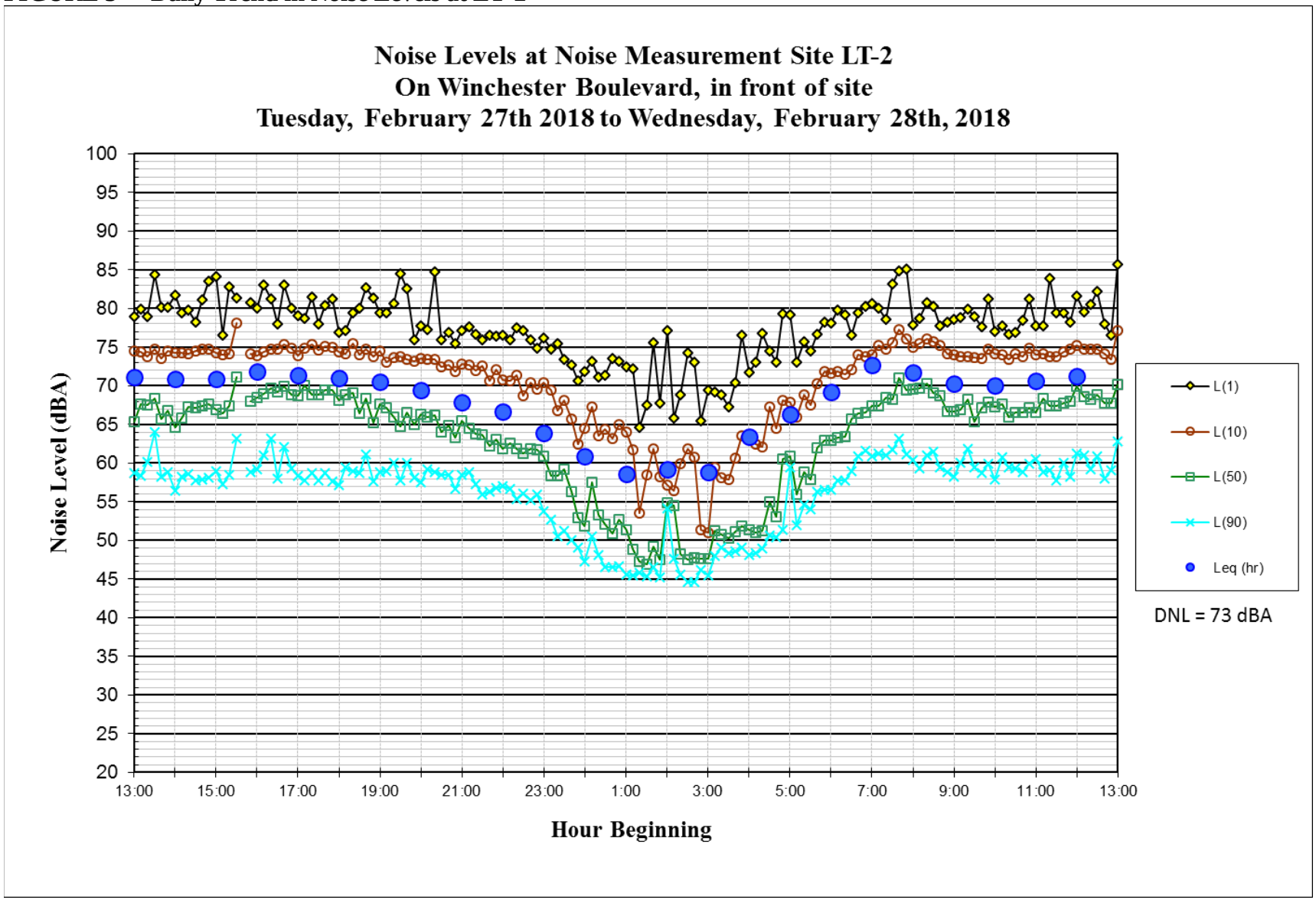


FIGURE 3 Daily Trend in Noise Levels at LT-2



GENERAL PLAN CONSISTENCY ANALYSIS

The impacts of site constraints such as exposure to excessive levels of noise and vibration are not considered under CEQA. This section addresses Noise and Land Use Compatibility for consistency with the policies set forth in the City of San José General Plan.

Noise and Land Use Compatibility

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

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for the proposed residential uses (Table EC-1).

- The City's acceptable exterior noise level objective is 70 dBA DNL for the proposed commercial uses (Table EC-1).

- The California Building Code and City's standard for interior noise levels in residences is 45 dBA DNL.

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

Future Noise Environment

The project proposes to construct a 4-story mixed-use building consisting of 4,995 sf of retail land uses and 72 on-site parking stalls. Residential units will be located on levels 2-4. The eastern façade of the building would face Winchester Boulevard and the south façade would face Cadillac Drive. A common outdoor use area (2nd Floor Podium) is proposed in the northwest corner of the 2nd floor of the building, well shielded from Winchester Boulevard and Cadillac Drive traffic by the building itself. Private residential decks are proposed on the 3rd and 4th floors overlooking the Podium and on the 4th floor overlooking Winchester Boulevard.

Future Exterior Noise Environment

A common outdoor use area is proposed in the northwest corner of the second floor of the building (2nd Floor Podium). The Podium location would be well shielded from adjoining noise sources, including traffic along Cadillac Drive (to the south) and Winchester Boulevard (to the east) and food truck operations on Cadillac Drive. Due to the substantial shielding provided by the project building, the noise level exposure in the Podium is calculated to be below 55 dBA DNL and would be considered acceptable with respect to both the City's residential exterior noise level objective of 60 dBA DNL or less and the City's office/commercial exterior noise level objective of 70 dBA

DNL or less. The City's exterior noise level objectives are not applicable to balconies and residential stoops and porches facing existing roadways.

Future Interior Noise Environment - Residential

The City of San José requires that interior noise levels be maintained at 45 dBA DNL or less for residences, consistent with the California Building Code. 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. Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation can reduce interior noise levels to acceptable levels by allowing occupants the option of closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Residential units are proposed on floors 2 through 4. The exterior noise exposure at residential façades facing north, east, south, and west would be 66, 72, 69, and 55 dBA DNL, respectfully, with the highest noise exposure occurring at the façade facing Winchester Boulevard. Based on preliminary calculations, only units with west facing façades would achieve the 45 dBA DNL interior standard with standard construction and windows in the open or closed position. North and south (Cadillac Drive) facing units would be anticipated to achieve the interior standard with the inclusion of forced-air mechanical ventilation and windows and doors with STC ratings of 28[1]. Unit façades facing Winchester Boulevard to the east would be anticipated to achieve the interior standard with the inclusion of forced-air mechanical ventilation and windows and doors with STC ratings of 28 to 30.

To avoid sleep disturbance (see Setting Section), additional interior to exterior noise reduction is recommended to reduce steady state noise levels generated by nighttime food truck operations inside south facing residential units. Based on preliminary calculations, closed windows with STC ratings of 30 would result in interior levels of 35 dBA or less in south facing units during food truck operations.

Future Interior Noise Environment – Non-Residential

Noise sensitive non-residential interior uses include retail and the building lobby on the first floor. Retail and lobby façades facing Winchester Boulevard would be exposed to an exterior noise level of about 72 dBA DNL with worst-hour noise levels as high as 72 dBA L_{eq}. North and south facing retail façades would be exposed to exterior noise levels of 66 and 69 dBA DNL/L_{eq}, respectfully.

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

Based on preliminary calculations, standard mixed use construction with windows in the closed positions would be sufficient to comply with the Cal Green Code standard of 50 dBA $L_{eq\ (1\text{-}hr)}$ in occupied areas during any hour of operation.

Summary of Recommendations

Noise levels in the 2nd Floor Podium would be considered acceptable with respect to the City's residential exterior noise level objectives with no additional noise reduction measures.

Once final building plans are available, a design level acoustical analyses should be conducted to ensure that interior noise levels will be reduced to 45 dBA DNL inside residential units. Based on preliminary calculations, interior noise levels in residential units would achieve the City and State interior thresholds, assuming windows with STC ratings of 28 to 30 and forced-air ventilation are provided for units with north, east, and/or south facing façades, to allow occupants the option of keeping windows closed to control noise. STC ratings of approximately 30 in south facing units would also be anticipated to reduce the occurrence of sleep disturbance due to food truck operations. Commercial uses are anticipated to comply with the Cal Green Code with standard construction and forced-air ventilation, to allow occupants the option of keeping windows closed to control noise.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, 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.

Significance Criteria

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

1. **Temporary or Permanent Noise Increases in Excess of Established Standards.** A significant impact would be identified if project construction or operations would result in a substantial temporary or permanent increase in ambient noise levels at sensitive receivers in excess of the local noise standards contained in the General Plan or Municipal Code, as follows:

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

    - Permanent Noise Increase. A significant impact would be identified if traffic noise 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.

    - Temporary Noise Increase. A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. The City of San José considers large or complex projects involving substantial noise-generating activities and lasting more than 12 months significant when within 500 feet of residential land uses or within 200 feet of commercial land uses or offices.

2. **Generation of Excessive Groundborne Vibration.** A significant impact would be identified if the construction of the project would generate excessive vibration levels. Groundborne vibration levels exceeding 0.2 in/sec PPV would be considered excessive as such levels would have the potential to result in cosmetic damage to buildings.

Impact 1: **Temporary or Permanent Noise Increases in Excess of Established Standards.** Project traffic would not result in a substantial permanent noise level increase at existing noise-sensitive land uses in the project vicinity. Project construction would not result in a significant temporary noise increase with the incorporation of construction best management practices as project conditions**.** However, existing noise-sensitive land uses could be exposed to operational noise levels in excess of the applicable noise thresholds. **This is a potentially significant impact.**

a) Permanent Noise Increases from On-Site Operational Noise

The analysis of mechanical equipment noise is based on the provided "planned development permit" plans. These plans do not include detailed information about the location or types of mechanical equipment. No specifications of the mechanical equipment were available for this analysis. Therefore, the following analysis is based on generic mechanical equipment information and locations for similar type projects that represent a worst-case scenario.

The proposed project would include mechanical equipment, such as heating, ventilation, and air conditioning systems. Information regarding the number, type, and size of the mechanical equipment units to be used in the proposed project was not available at the time of this study. Typically, mixed-use mechanical equipment would be anticipated to generate noise levels in the range of 50 to 60 dBA at a distance of 50 feet from the equipment, depending on the equipment selected. Equipment located inside or in a fully enclosed room with a roof would not be anticipated to be audible at off-site locations.

Under the City's Noise Element and Municipal Codes, noise levels produced by the operation of the mechanical equipment would be limited to 55 dBA DNL at receiving noise-sensitive land uses. The nearest noise-sensitive uses to the project site include residences located about 20 feet to the west. Given the proximity of noise-sensitive uses to the project site and lack of sufficient details about the mechanical equipment, mechanical enclosures, and rooftop locations, there is the potential for noise from mechanical equipment to exceed 55 dBA DNL at noise-sensitive land uses in the immediate project vicinity. Due to the number of variables inherent in the mechanical equipment needs of the project (number and types of units, size, housing, specs, location, 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. Other controls could include, but shall not be limited to, fan silencers, enclosures, and screen walls. This is a **potentially significant** impact.

Mitigation Measure 1a: Prior to the issuance of building permits, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's requirements. A qualified acoustical consultant shall be retained by the project applicant to review mechanical noise as the equipment systems are selected in order to determine specific noise reduction measures necessary to reduce noise to comply with the City's 55 dBA DNL noise limit at the shared property line. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and/installation of noise barriers such as enclosures and parapet walls to block the line of sight between the noise source and the nearest receptors. Other feasible controls could include, but shall not be limited to, fan silencers, enclosures, and mechanical equipment screen walls.

b) Permanent Noise Increases from Project Traffic

A significant permanent traffic noise increase would be identified if traffic noise 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.

Traffic volumes were provided in the January 21, 2019 traffic study conducted for the project by Hexagon Transportation Consultants, Inc.[2] A supplemental traffic memo was provided in June 2019[3] to address project design changes. The June 2019 memo indicated that the revised project would result in fewer project generated trips than the January 2019 analysis due to the elimination of the office component of the project.

To determine the effect of the project-generated traffic on the nearby residences, AM and PM peak hour traffic volumes for the Existing + Project condition were compared to Existing traffic volumes. Based on these calculations, project traffic would result in traffic noise increases of 0 to 1 dBA L_{eq} along the roadway network. Day-night average (DNL) noise level increases would be anticipated to be similar. This increase would not typically be noticeable and would be below the 3 dBA and 5 dBA DNL thresholds of significance. This is a **less-than-significant** impact.

Mitigation Measure 1b: None required.

c) Temporary Noise Increases from Project Construction

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

Construction activities 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

2 1495 S. Winchester Boulevard Mixed Use Development, Transportation Impact Analysis, Hexagon Transportation Consultants, Inc., January 21, 2019.

3 Traffic Study Consistency Review for the 1495 Winchester Mixed-Use Development Project Description Adjustments, Hexagon Transportation Consultants, Inc., June 24, 2019.

equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 5 and 6. Table 5 shows the average noise level ranges, by construction phase, and Table 6 shows the maximum noise level ranges for different construction equipment. Most demolition and construction noise is within the range of 80 to 90 dBA at a distance of 50 feet from the source.

TABLE 5 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

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

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

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

TABLE 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
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.

The construction of the proposed project would involve demolition of existing structures, earthwork, concrete paving, and framing/completion. Project construction is anticipated to occur over a period of 19 months, including earthwork, concrete and framing/completion. The noisiest phases of project construction (i.e., earthwork and concrete) would be limited to a period of less than 12 months. Pile driving is not anticipated as a method of construction.

Project specific construction equipment was not available at the time of this analysis. As shown in Tables 5 and 6, construction noise levels at a distance of 50 feet would be anticipated to range from 81 to 88 dBA L_{eq} with all equipment on-site and from 65 to 83 dBA L_{eq} with the minimum required equipment on-site. Construction noise levels would drop off at a rate of about 6 dBA per doubling of distance.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Construction activities will be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work within 500 feet of residential land uses to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday unless permission is granted with a development permit or other planning approval by the City. Construction is prohibited on weekends at sites located within 500 feet of residential units. Further, the City shall require the construction crew to adhere to the following construction best management practices as project conditions of approval 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

Develop and implement a construction noise control plan, including, but not limited to, the following available controls:

- Pile driving shall not be used as a method of construction for the project.

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

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receiver and if the barrier is constructed in a manner that eliminates any cracks or gaps.

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

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

- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.

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

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

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

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

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

- 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.

Mitigation Measure 1c: No additional measures are required.

Impact 2: Generation of Excessive Groundborne Vibration from Construction. Residential and commercial buildings in the vicinity of the project site would not be exposed to construction-related vibration levels exceeding 0.2 in/sec. PPVs. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site demolition work, preparation work, excavation for the below-grade level, foundation work, and new building framing and finishing. Construction is anticipated to occur over a period of 19

months. Table 7 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet.

TABLE 7 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)
Pile Driver (Impact)	upper range	1.158
	typical	0.644
Pile Driver (Sonic)	upper range	0.734
	typical	0.17
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2013.

Policy EC-2.3 of the City of San José's General Plan sets a construction vibration limit of 0.2 in/sec PPV to minimize damage at buildings of normal conventional construction. A significant impact would occur if buildings adjacent to the proposed construction site were exposed to vibration levels in excess of 0.2 in/sec PPV.

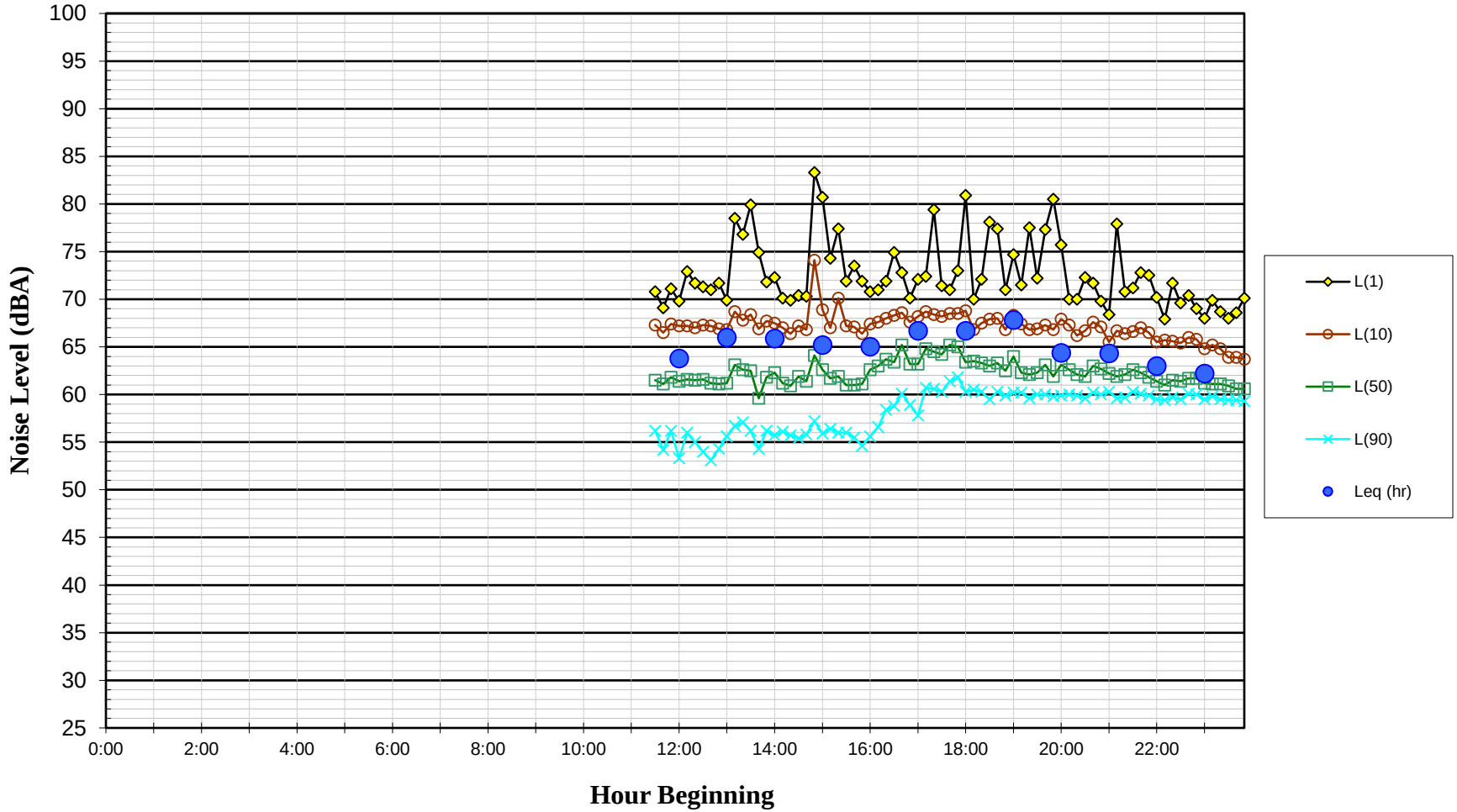
The nearest existing residential structure is located 25 feet west of proposed heavy construction. Impact pile driving is not anticipated for this project. Construction equipment is anticipated to include transfer trucks, excavators, concrete pumps, scissor lifts, and Gradalls. Vibration levels generated by the use of this equipment would not be anticipated to generate vibration levels over 0.2 in/sec PPV at a distance of 25 feet or greater. This is a **less-than-significant** impact.

Mitigation Measure 2: None required.

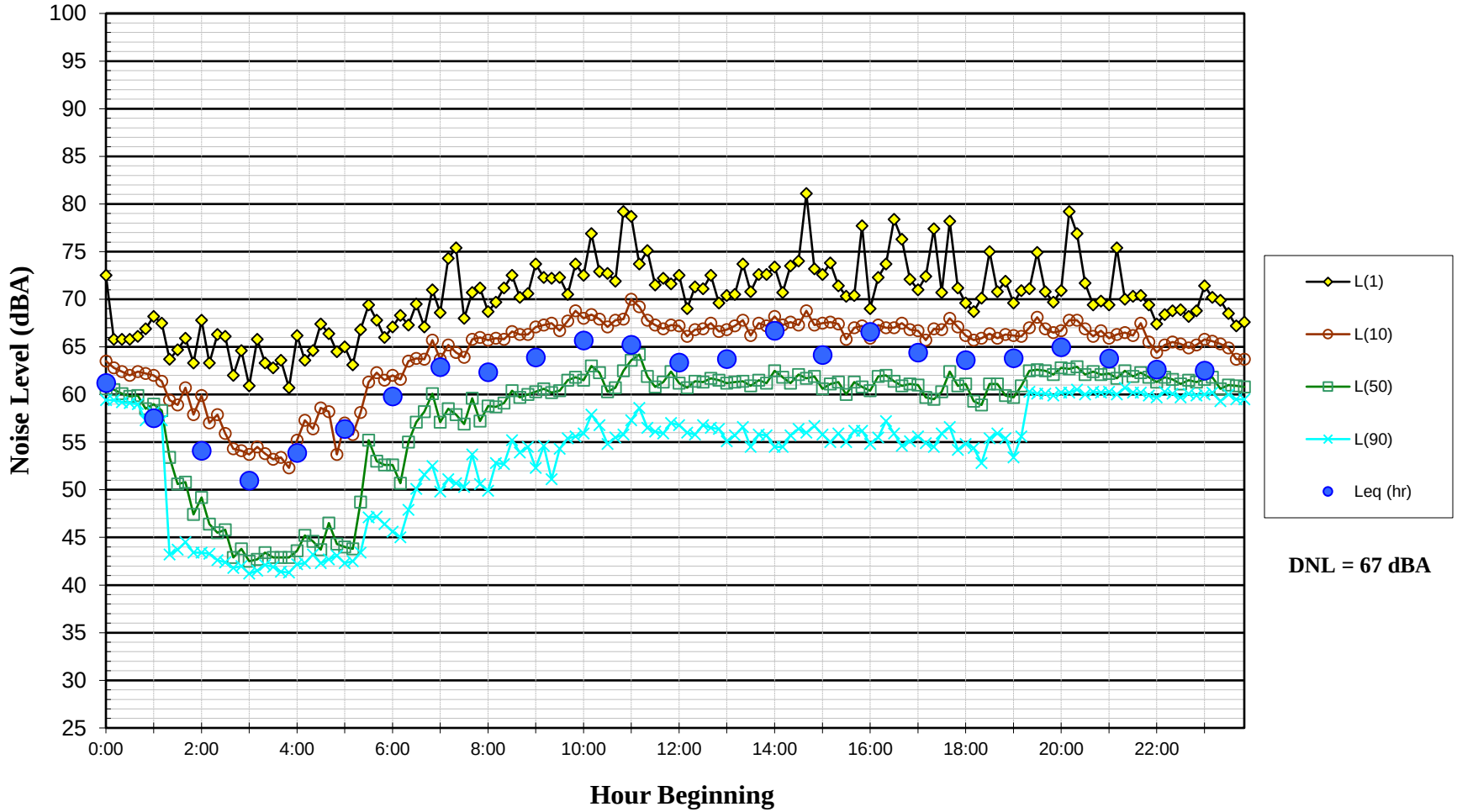
Appendix A

Long-Term Noise Monitoring Data at Site LT-1

Noise Levels at Noise Measurement Site LT-1
25 feet north of Cadillac Drive, 120 feet west of Winchester Boulevard
Friday, June 8th, 2018

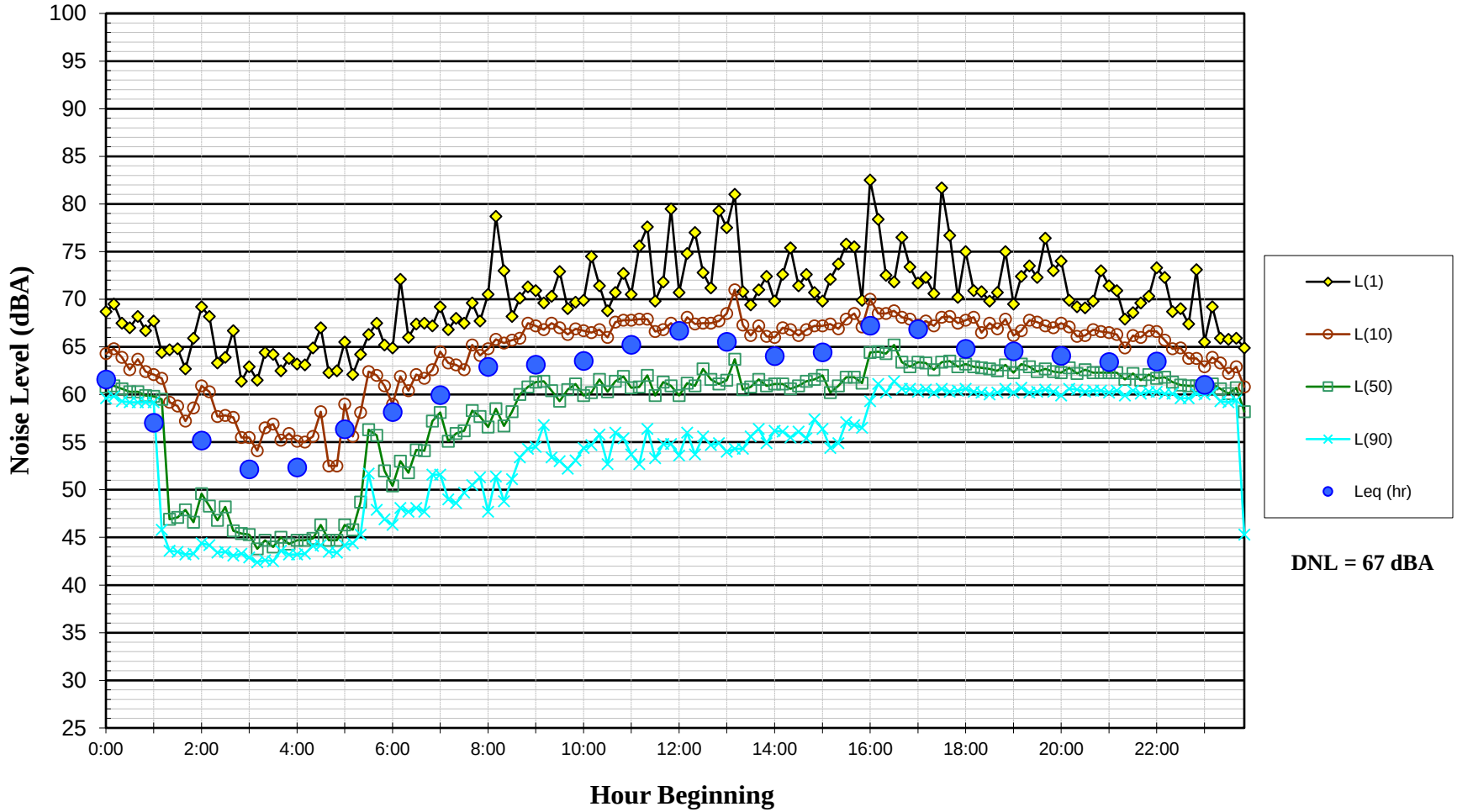


Noise Levels at Noise Measurement Site LT-1
25 feet north of Cadillac Drive, 120 feet west of Winchester Boulevard
Saturday, June 9th, 2018



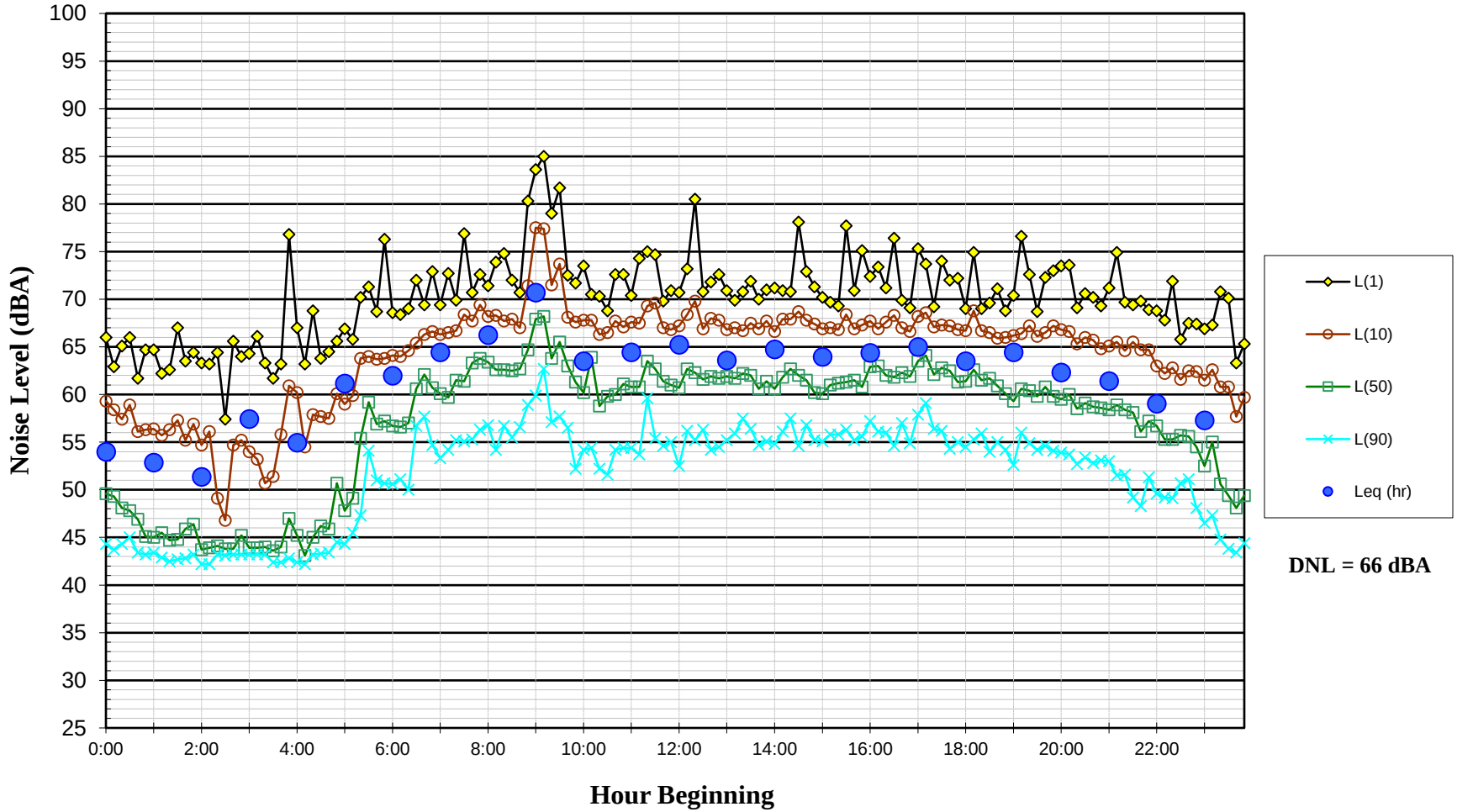
DNL = 67 dBA

Noise Levels at Noise Measurement Site LT-1
25 feet north of Cadillac Drive, 120 feet west of Winchester Boulevard
Sunday, June 10th, 2018



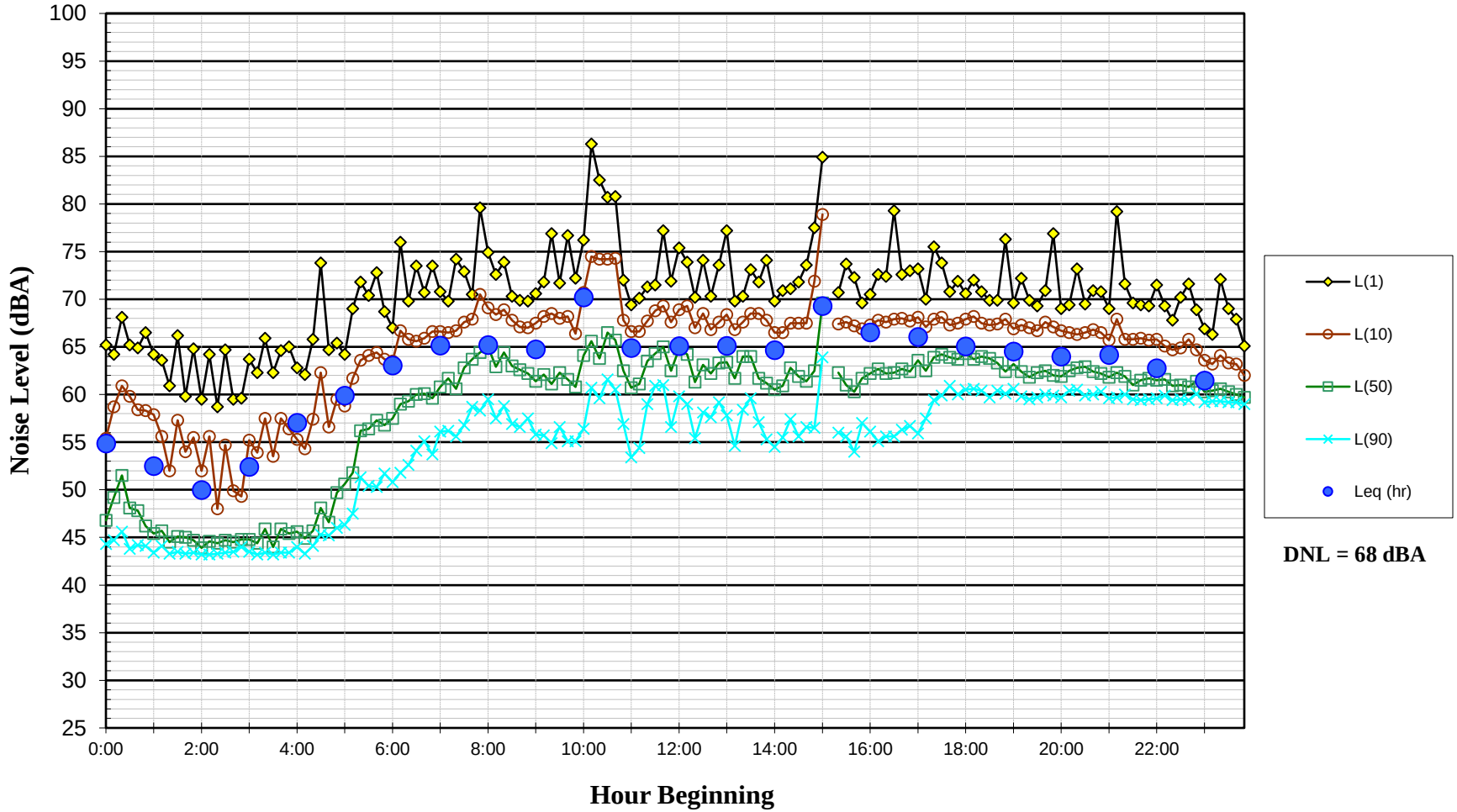
DNL = 67 dBA

Noise Levels at Noise Measurement Site LT-1
25 feet north of Cadillac Drive, 120 feet west of Winchester Boulevard
Monday, June 11th, 2018



DNL = 66 dBA

Noise Levels at Noise Measurement Site LT-1
25 feet north of Cadillac Drive, 120 feet west of Winchester Boulevard
Tuesday, June 12th, 2018



DNL = 68 dBA

Noise Levels at Noise Measurement Site LT-1
25 feet north of Cadillac Drive, 120 feet west of Winchester Boulevard
Wednesday, June 13th, 2018