WINCHESTER RANCH PROJECT NOISE AND VIBRATION ASSESSMENT

San José, California

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INTRODUCTION

The approximately 15.69-acre project site is comprised of a single parcel (APN 303-38-001) located at the northwest corner of the Winchester Boulevard and Interstate 280 (I-280) intersection in the City of San José. The project site is located within an urbanized area and is surrounded by single-family residences to the north and west, the former Century 23 Dome Theater and Winchester Mystery House to the northeast, offices to the east, and I-280 to the south. The project site is currently developed with 111 single-story mobile home units and associated club house facility and parking spaces. The site is currently accessed by one ingress/egress driveway on Olsen Drive and one ingress-only driveway on Winchester Boulevard.

As proposed, the project would demolish the existing structures and hardscape and remove landscaping on-site. Based on the site plan provided by the applicant, the project would construct up to 688 residential units (44 dwelling units per acre), park, walking paths, and a space for either a garden or a playground. Of the 688 residential units, 368 units would be located on the eastern portion of the project site in a five-story multi-family residential building above two levels of an above-ground parking garage. This building would be a total of seven stories (approximately 79.5 feet tall). The remaining 320 units would be located on the western portion of the site and would consist of 90 four-story row townhouses, 158 four-story condominiums, and 72 flats. The proposed residential units within the western portion of the property would have a maximum height of 50 feet.

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

SETTING

Fundamentals of Environmental Noise

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

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

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL and nighttime levels are 10 dBA lower. The standard is designed for

sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 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 or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest

construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

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

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

TABLE 1 Definition of Acoustical Terms Used in this Report

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

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

TABLE 2 Typical Noise Levels in the Environment

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

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

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

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

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

Regulatory Background - Noise

The State of California 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 guidelines are used in this analysis to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

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

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

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise sensitive land uses of 3 dBA or

greater would be considered a significant impact when projected noise levels would exceed those considered acceptable for the affected land use. An increase of 5 dBA DNL or greater would be considered a significant impact when projected noise levels would remain within those considered acceptable for the affected land use.

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

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-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction

noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

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

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

EC-1.11 Require safe and compatible land uses within the Mineta San José International Airport noise zone (defined by the 65 CNEL contour as set forth in State law) and encourage aircraft operating procedures that minimize noise.

City of San José Municipal Code. The City's Municipal Code contains a Zoning Ordinance that limits noise levels at adjacent properties. Chapter 20.30.700 states that sound pressure levels generated by any use or combination of uses on a property shall not exceed 55 dBA at any property line shared with land zoned for residential use, except upon issuance and in compliance with a Conditional Use Permit.

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

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

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan adopted by the Santa Clara County Airport Land Use Commission contains standards for projects within the vicinity of San José International Airport, which are relevant to this project:

4.3.2.1 Noise Compatibility Policies

Policy N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (2022 Aircraft Noise Contours).

Policy N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed use residential project or a multi-unit residential project. (Sound wall noise mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

Regulatory Background – Vibration

City of San José General Plan. The Environmental Leadership Chapter in the Envision San José 2040 General Plan sets forth policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations in the City of San José. The following policies are applicable to the proposed project:

EC-2.3 Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

Existing Noise Environment

The project site is located at the northwest corner of the Winchester Boulevard and I-280 intersection in the City of San José, and is surrounded by single-family residences to the north and west, the former Century 23 Dome Theater and Winchester Mystery House to the northeast, offices to the east, and I-280 to the south. The site is approximately 2.9 miles southwest of the Norman Y. Mineta San Jose International Airport.

A noise monitoring survey was performed at the site beginning on Wednesday, September 26, 2018 and concluding on Monday, October 1, 2018. The monitoring survey included two long-term (LT-1 and LT-2) noise measurements and two short-term (ST-1 and ST-2) noise measurements. All measurement locations are shown in Figure 1. Based on the results of the noise measurements, the noise environment at the site and in the surrounding area is dominated by traffic noise from I-280. Local traffic and aircraft also contribute to the ambient noise environment in the project vicinity.

Long-term noise measurement LT-1 was made in the southwestern corner of the project site, approximately 105 feet from the centerline of the nearest through lane of westbound I-280 and approximately 20 feet from the centerline of Water Witch Way. The microphone was positioned approximately 10 feet above the ground but was shielded from I-280 by the existing 16 to 18-foot noise barrier that exists along the right-of-way. Hourly average noise levels at LT-1 typically ranged from 60 to 70 dBA L_{eq} during daytime hours and from 55 to 66 dBA L_{eq} during nighttime hours. The day-night average noise level at LT-1 ranged from 67 to 69 dBA DNL, and the daily trends in noise levels at LT-1 are shown in Figures 2 through 7.

Noise measurement LT-2 was made near the northwestern corner of the site, at the east end of Olsen Drive. Hourly average noise levels at this location typically ranged from 47 to 61 dBA L_{eq} during the day and from 37 to 56 dBA L_{eq} at night. The day-night average noise level ranged from 54 to 59 dBA DNL at LT-2, and the daily trends in noise levels at LT-2 are shown in Figures 8 through 13. As shown in the figures, high noise levels were at times measured at LT-2, such as Monday morning during the 10:00 a.m. and 12:00 p.m. hours. However, since LT-2 was positioned near a residential cul-de-sac, these noise levels may have been due to vehicles or activities occurring very close to the sound level meter. These abnormal noise levels were removed from the day-night average calculations.

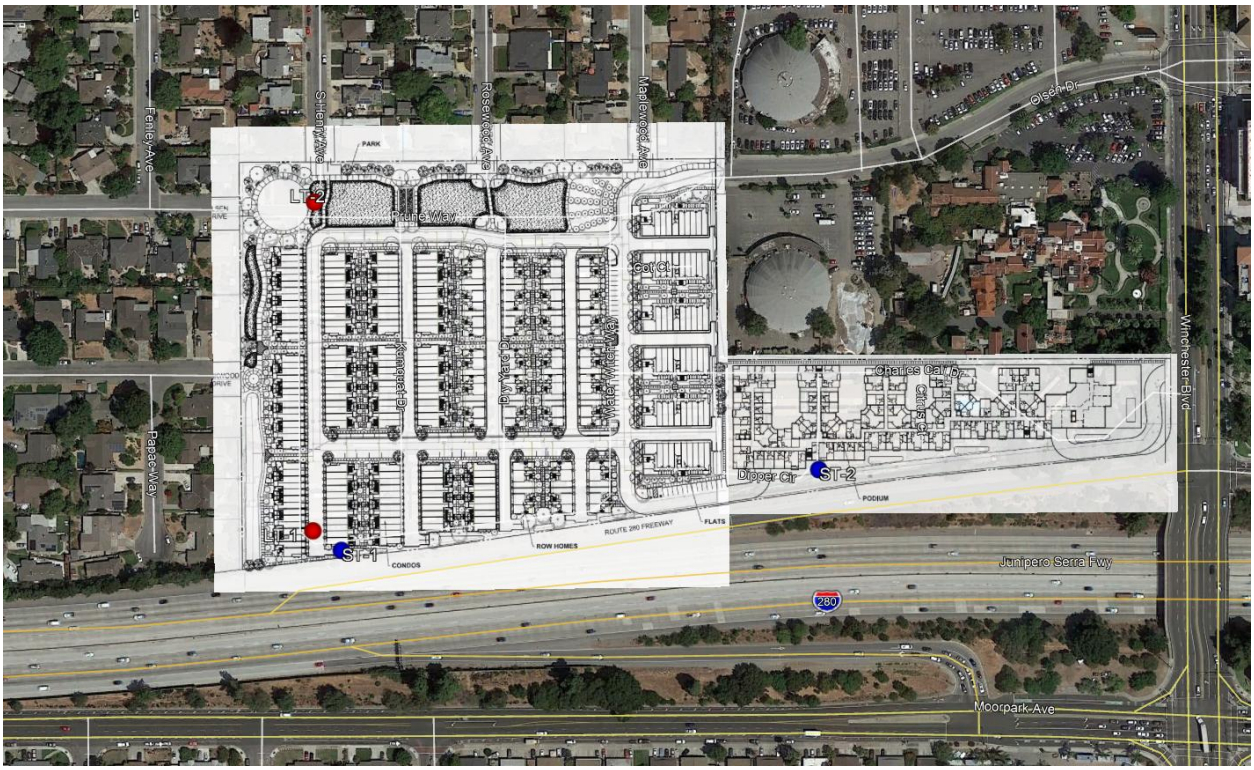
Two short-term noise measurements were made over 10-minute periods, concurrent with the long-term noise data, on Monday, October 1, 2018, between 12:30 p.m. and 1:10 p.m. These measurements were both made near the southern boundary of the project site. Currently, there is a sound wall along the southern boundary of the site, which is about 16 to 18 feet tall, and this sound wall provides shielding for the existing residences from traffic noise along I-280. To determine the effectiveness of this sound wall in reducing the traffic noise at the ground level, microphones were positioned at heights of 5 and 25 feet above the ground at each monitoring location. A summary of all short-term measurement results is provided in Table 4.

ST-1 was approximately 10 feet from the 18-foot sound wall and approximately 75 feet from the centerline of the nearest through lane along I-280. Ambient noise levels were dominated by I-280 at this location, with typical noise levels ranging from 63 to 64 dBA behind the wall at a height of 5 feet and from 79 to 81 dBA above the wall at 25 feet. The 10-minute average noise level measured at ST-1 was 63 dBA $L_{eq(10\text{-}min)}$ at the 5-foot high position and 80 dBA $L_{eq(10\text{-}min)}$ at the 25-foot high position.

Two consecutive 10-minute measurements were also made at ST-2 at heights of 5 and 25 feet above the ground. ST-2 was positioned near unit #510 along Dipper Circle, approximately 30 feet from the 16-foot sound wall. ST-2 was approximately 140 feet from the centerline of the nearest

through lane along I-280. Typical ambient noise levels at this location ranged from 62 to 63 dBA at a height of 5 feet above the ground and from 74 to 77 dBA at a height of 25 feet above the ground. The 10-minute average noise level measured at ST-2 was 62 dBA $L_{eq(10\text{-}min)}$ at the 5-foot high position and 76 dBA $L_{eq(10\text{-}min)}$ at the 25-foot high position.

FIGURE 1 Noise Measurement Locations



Source: Google Earth 2018.

FIGURE 2 Daily Trends in Noise Levels at LT-1, Wednesday, September 26, 2018

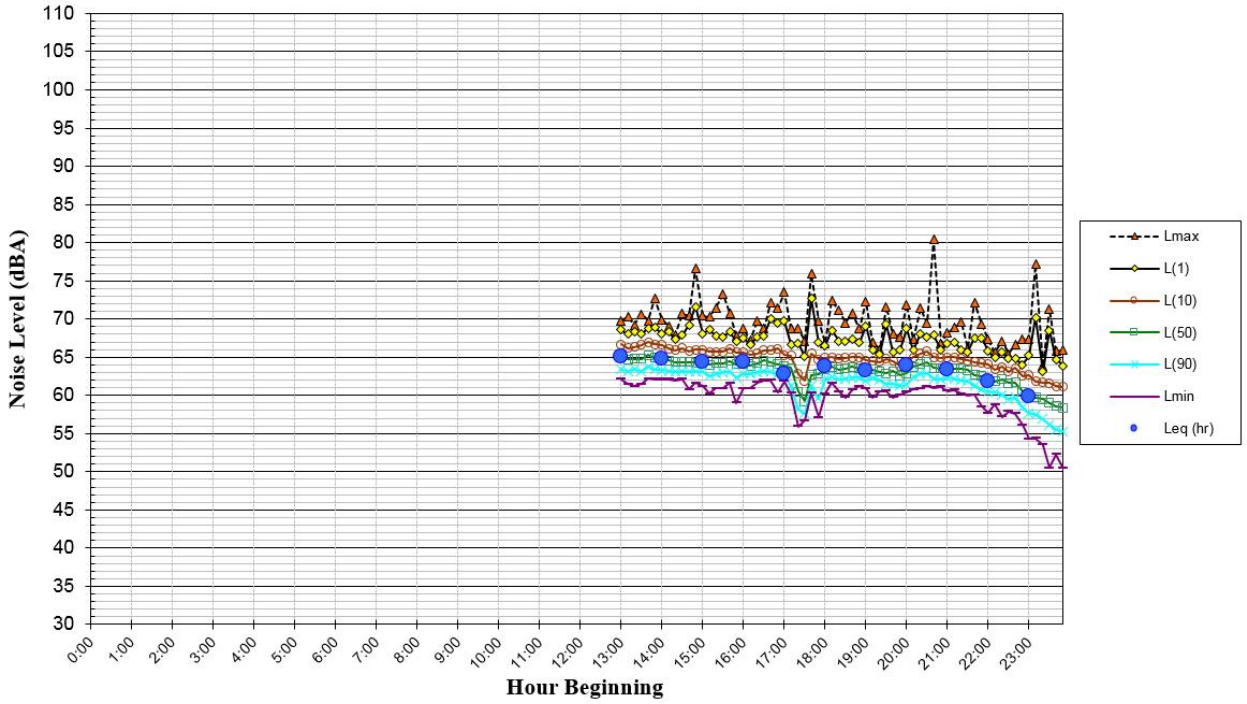


FIGURE 3 Daily Trends in Noise Levels at LT-1, Thursday, September 27, 2018

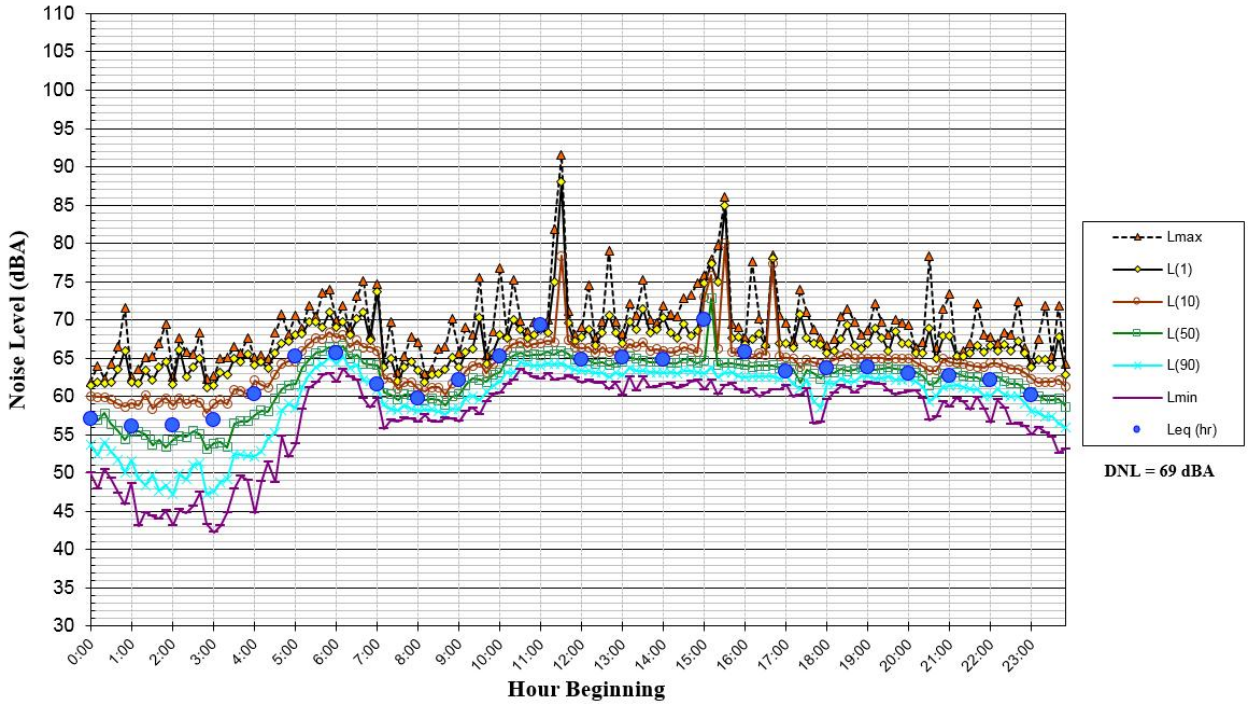


FIGURE 4 Daily Trends in Noise Levels at LT-1, Friday, September 28, 2018

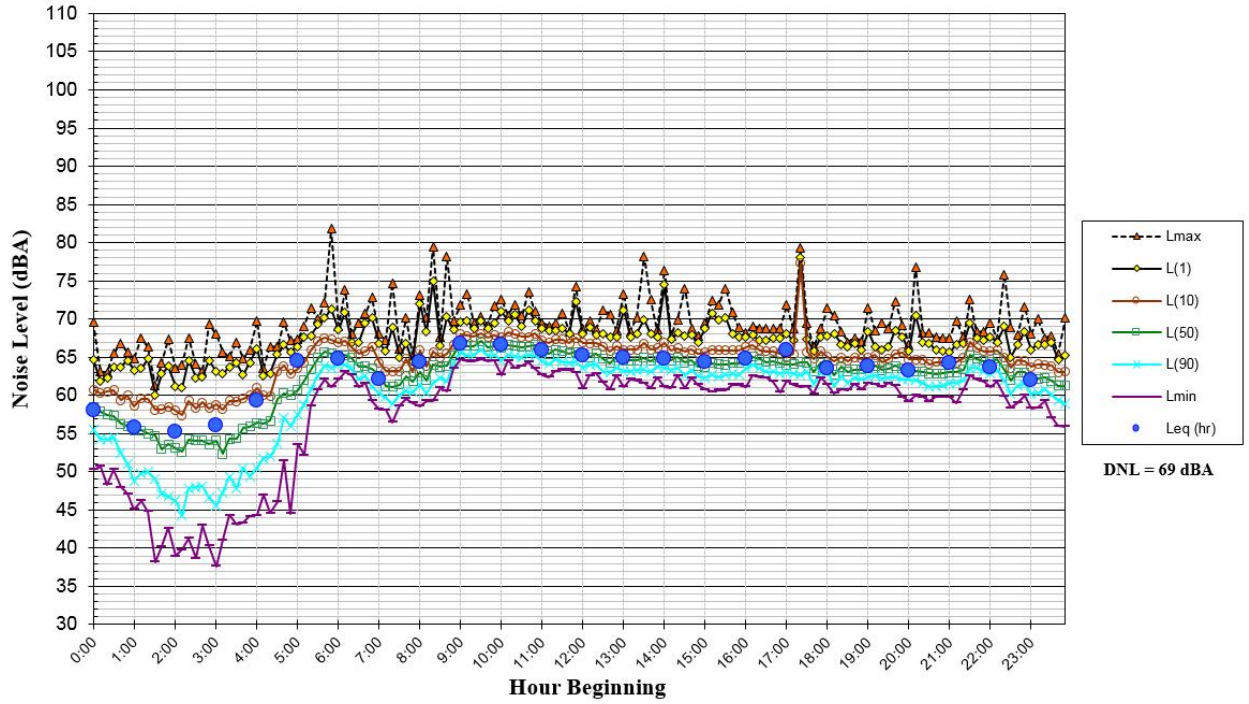


FIGURE 5 Daily Trends in Noise Levels at LT-1, Saturday, September 29, 2018

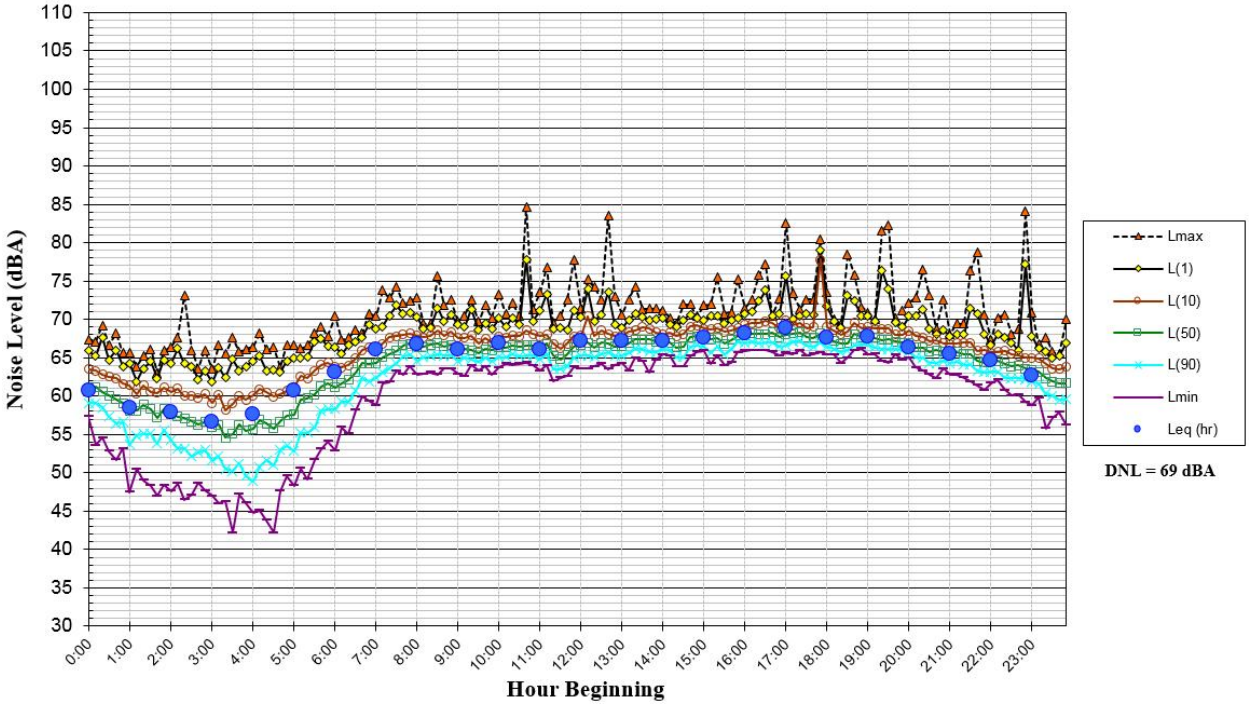


FIGURE 6 Daily Trends in Noise Levels at LT-1, Sunday, September 30, 2018

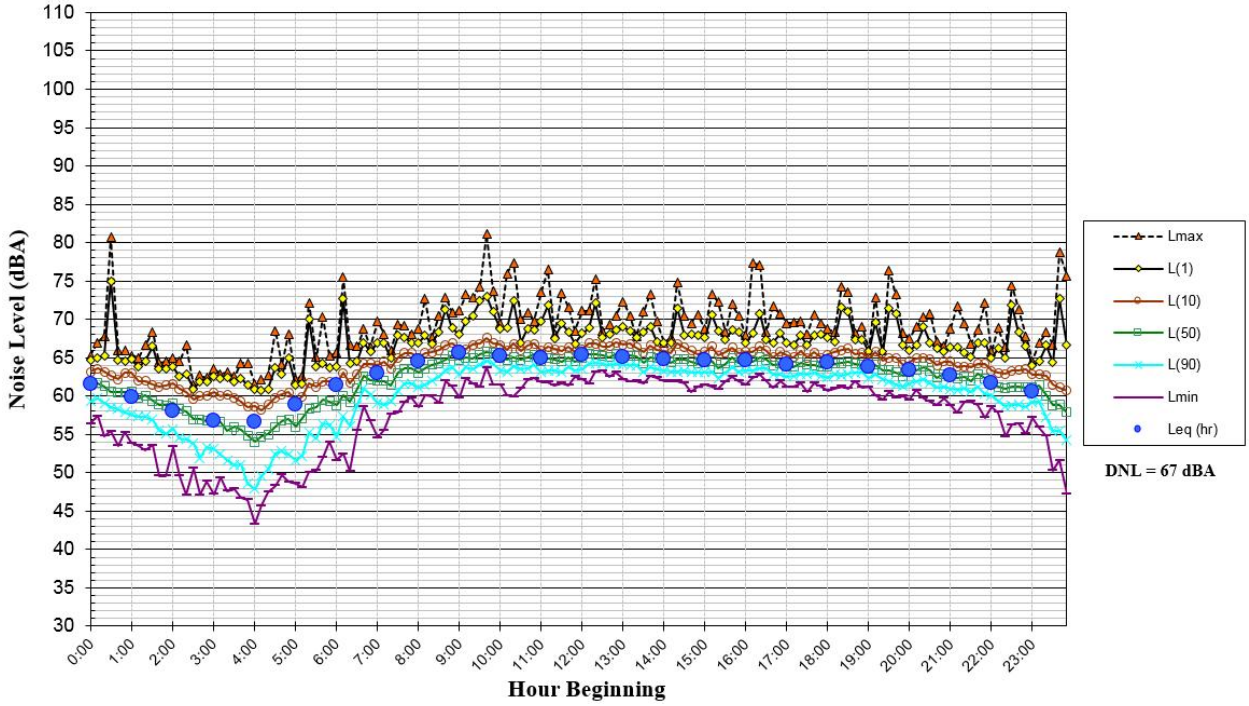


FIGURE 7 Daily Trends in Noise Levels at LT-1, Monday, October 1, 2018

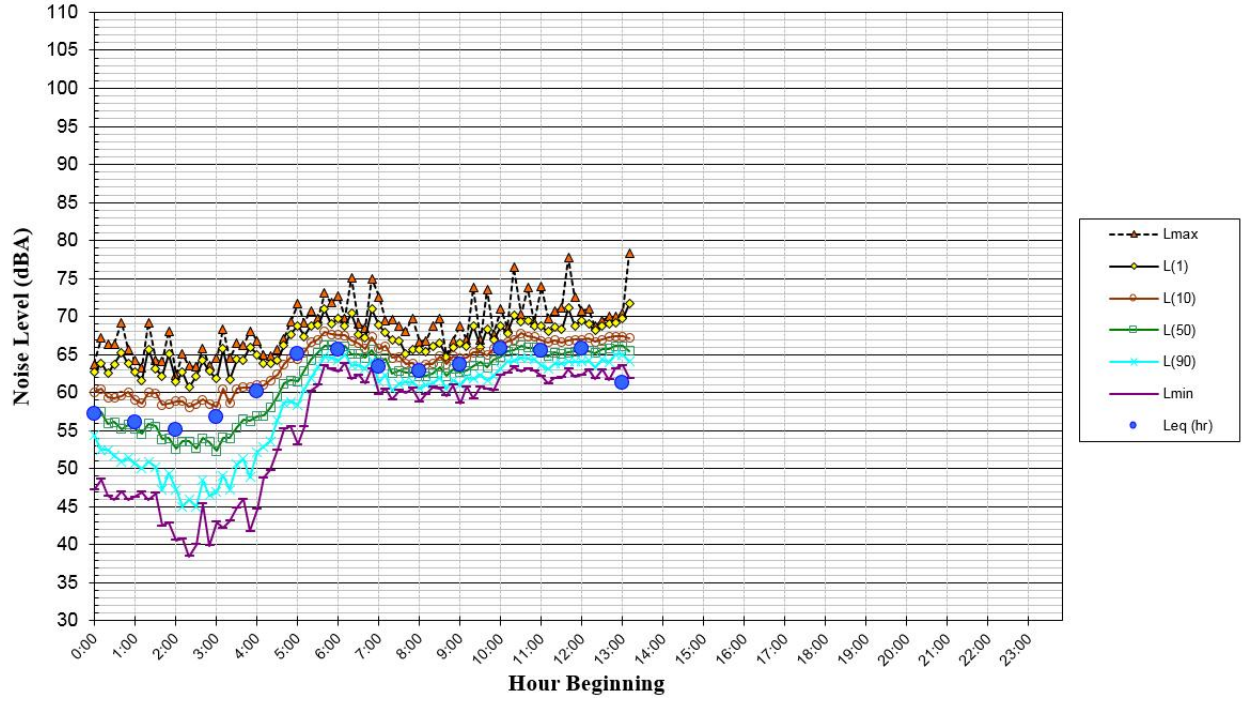


FIGURE 8 Daily Trends in Noise Levels at LT-2, Wednesday, September 26, 2018

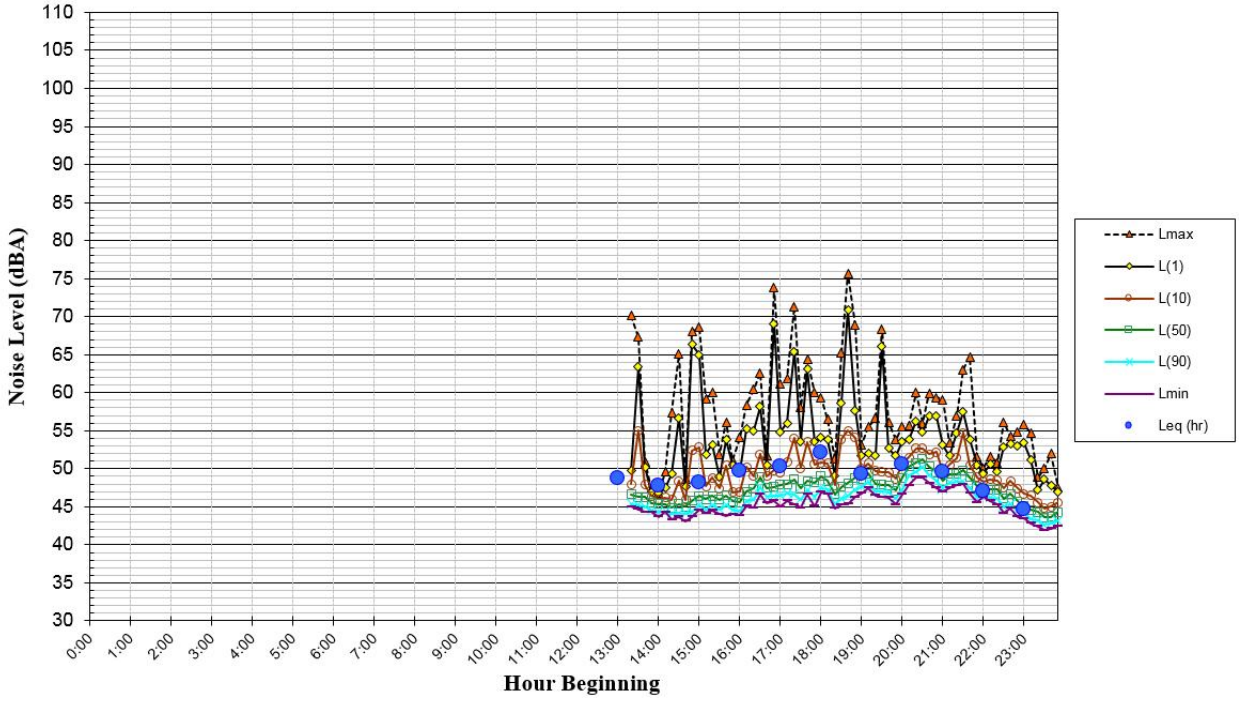


FIGURE 9 Daily Trends in Noise Levels at LT-2, Thursday, September 27, 2018

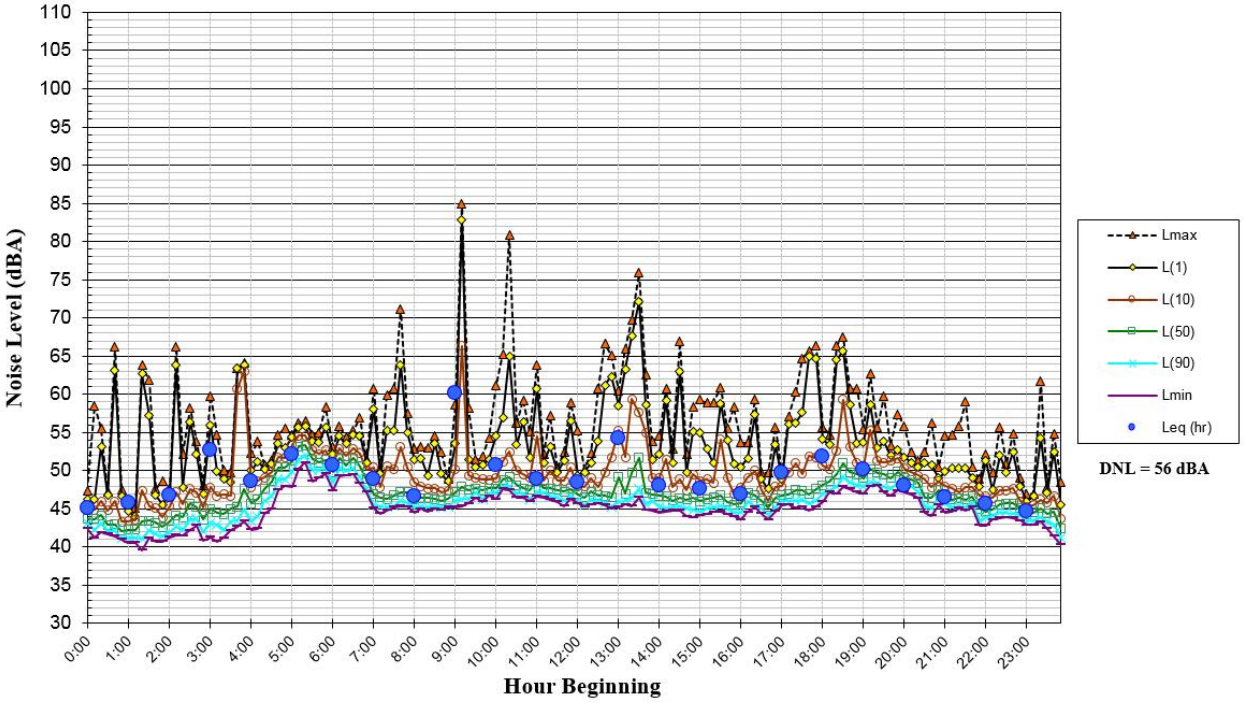


FIGURE 10 Daily Trends in Noise Levels at LT-2, Friday, September 28, 2018

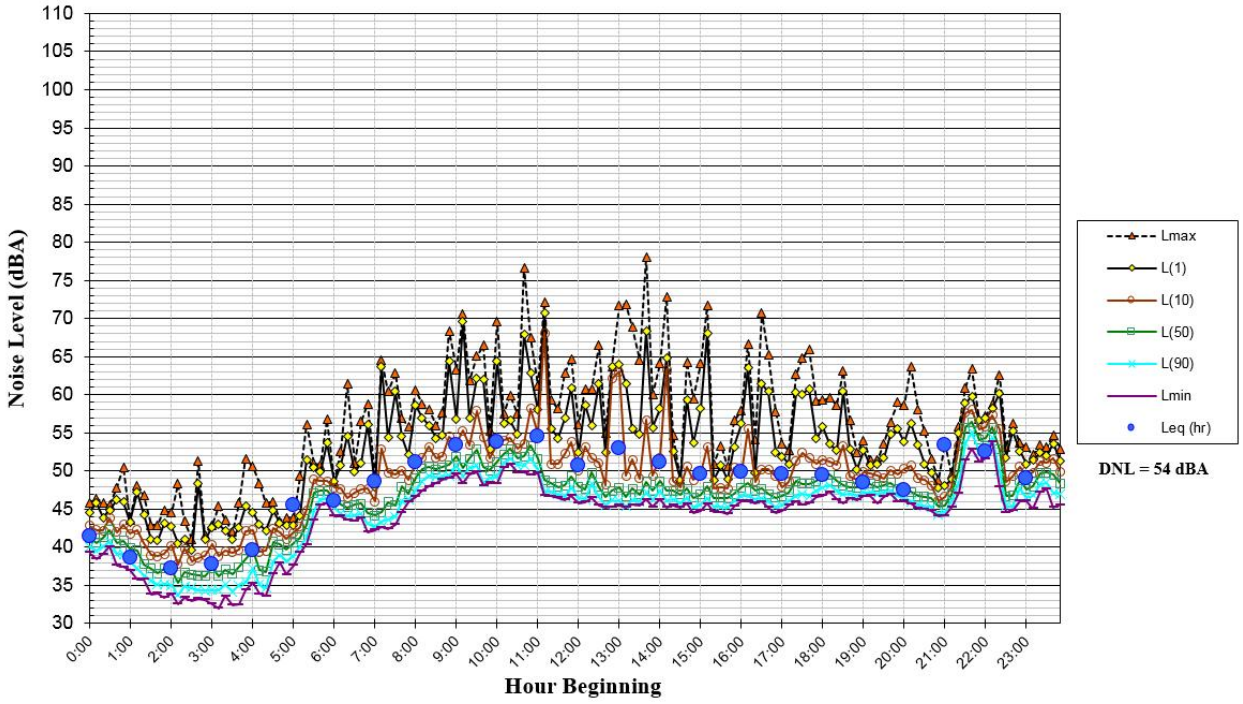


FIGURE 11 Daily Trends in Noise Levels at LT-2, Saturday, September 29, 2018

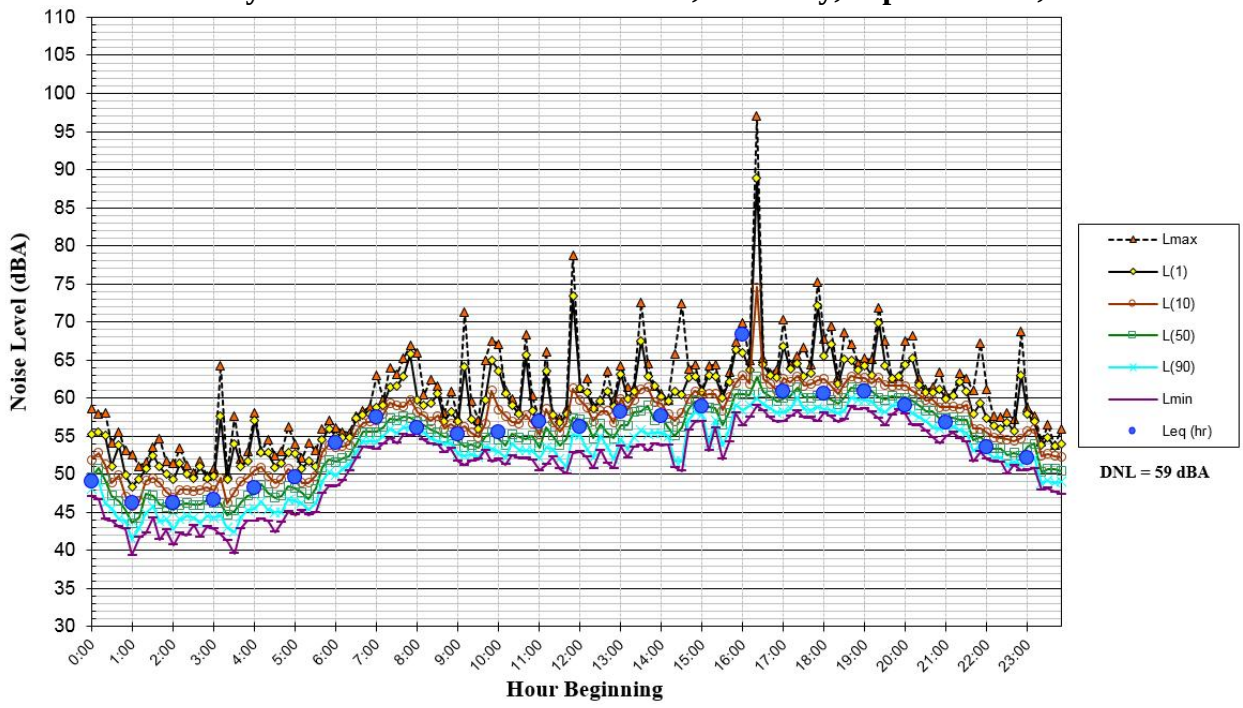


FIGURE 12 Daily Trends in Noise Levels at LT-2, Sunday, September 30, 2018

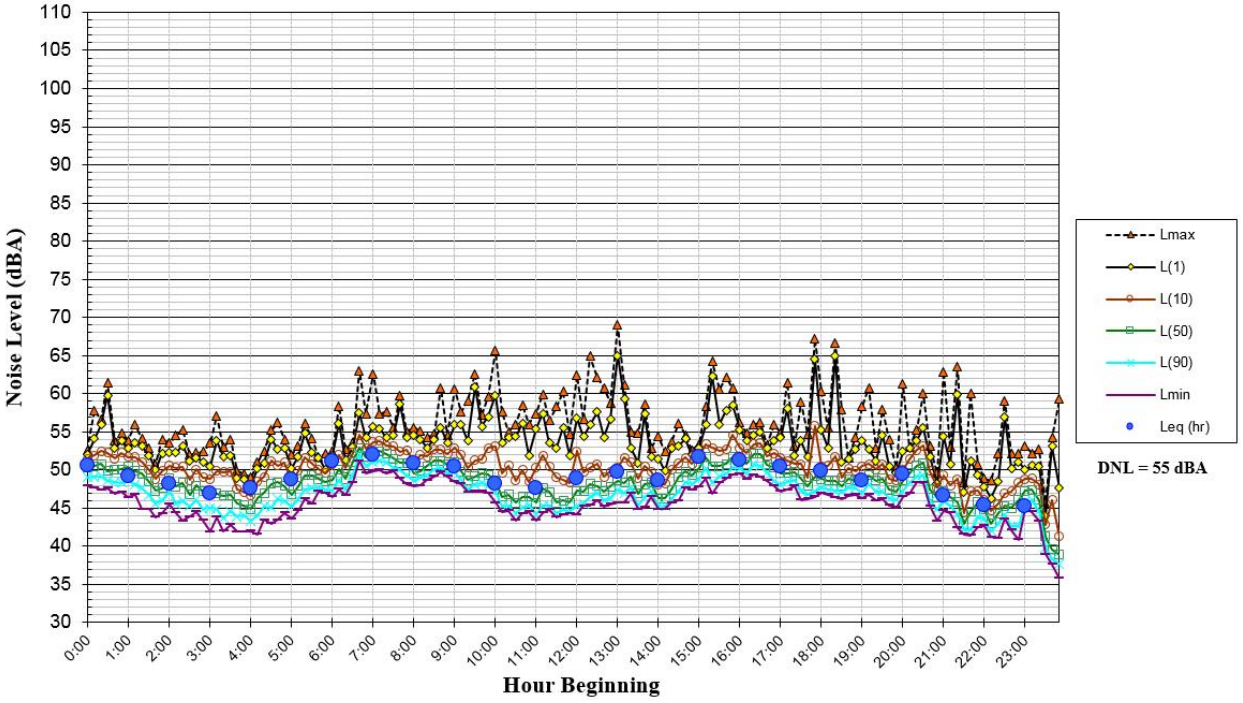


FIGURE 13 Daily Trends in Noise Levels at LT-2, Monday, October 1, 2018

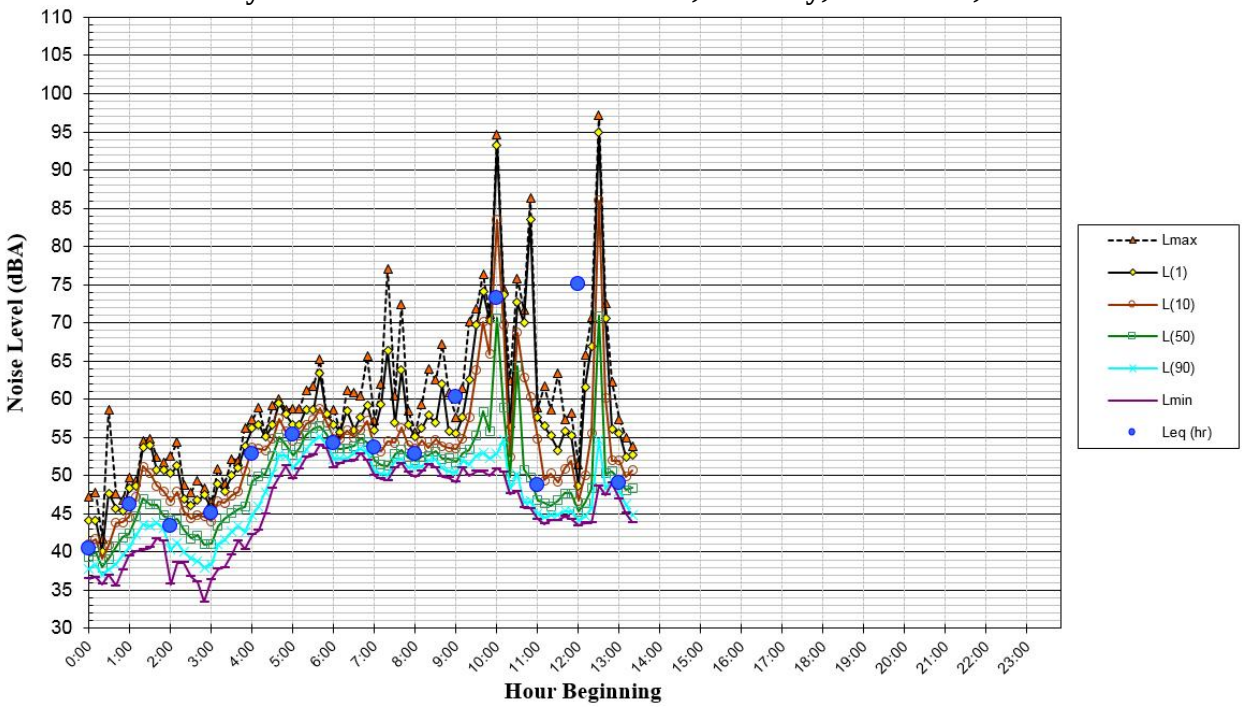


TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location	Date, Time	Height	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: Southwest corner of the project site, ~10 feet from the 18-foot sound wall	10/1/2018, 12:30-12:40	5 feet	66	66	64	63	61	63
		25 feet	85	83	81	80	78	80
ST-2: Southeast corner of the project site, ~30 feet from the 16-foot sound wall	10/1/2018, 12:52-13:00	5 feet	67	65	63	62	60	62
		25 feet	79	78	77	75	74	76
	10/1/2018, 13:00-13:10	5 feet	74	66	63	61	60	62
		25 feet	81	79	77	76	75	76

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The exterior noise threshold established in the City's General Plan for new residential projects is 60 dBA DNL at usable outdoor activity areas, excluding balconies and porches. Parks are required to have an exterior noise environment of 65 dBA DNL or less. The City requires that interior noise levels be maintained at 45 dBA DNL or less for residential uses.

The future noise environment at the project site would continue to result primarily from vehicular traffic along I-280. A traffic report was completed for the proposed project and included peak hour turning movements at intersections along local roadways in the project vicinity; however, traffic volumes along I-280 were not included in the traffic study. According to the Caltrans Traffic Census Program, which was last published in 2016, peak hour traffic volumes along I-280 in the vicinity of the project site was 17,000.[1] Traffic conditions along I-280 are near capacity. For the purposes of a credible worst-case assessment, however, it was assumed that an increase of 1 to 2% in traffic volumes could occur along I-280 per year over the next 15 to 20 years. These projections assume a standard rate of growth but are conservative for built-out areas where growth is not forecasted. As a result, future noise levels at the project site are conservatively estimated to increase by approximately 1 dBA over existing conditions. Therefore, the future noise levels at LT-1 would range from 68 to 70 dBA DNL under future project conditions.

Future Exterior Noise Environment

Five third-floor outdoor use courtyards and a third-floor outdoor pool area were identified as common use exterior areas at the podium building on the eastern portion of the project site. Additionally, a common use park would be located near the center of the rows, condos, and flats located on the western portion of the site. The five courtyards and the park would be shielded from

[1] Caltrans, http://www.dot.ca.gov/trafficops/census/docs/2016_aadt_volumes.pdf, 2016.

traffic noise along the surrounding roadways by project buildings. The project buildings would provide adequate noise level reduction such that the future noise environment at the centers of each of these outdoor use areas would be less than 60 dBA DNL.

While the outdoor pool area would be partially shielded by the podium building, the existing sound wall located along I-280 would not provide sufficient shielding for this outdoor use area. Comparing the ST-2 noise measurements at heights of 5 and 25 feet, the noise level reduction expected at the sound wall would be approximately 14 dBA. Applying this increase to the future exterior noise levels measured at LT-1, the future exterior noise levels at a distance of 105 feet from the centerline of the nearest through lane of I-280 would range from 82 to 84 dBA DNL. The center of the pool area located on the third floor of the proposed building would be 265 feet from the centerline of the nearest through lane of I-280. Due to the elevation of the pool deck and the façade of the podium building, partial shielding would occur at the pool area. Assuming partial shielding, the future exterior noise levels at the pool area would be 69 dBA DNL, with noise levels up to 76 dBA DNL at the nearest edge of the pool deck.

The center of the proposed park would be more than 600 feet from the centerline of the nearest through lane along I-280, and proposed condos and row homes would provide at least partial shielding for the park. At this distance and with the incorporation of the shielding, the future exterior noise levels at this outdoor use area would be below 65 dBA DNL.

Along the western boundary of the project site, there would be walking paths and possible open space; however, the site plan does not indicate this land would be used for extended outdoor use. Therefore, the City's exterior noise thresholds would not apply to this area.

While each of the courtyards and the park would have future exterior noise levels at or below the City's exterior noise thresholds for the respective land uses, the third-floor pool area would exceed the City's 60 dBA DNL threshold.

Recommended Measures to Reduce Exterior Noise Levels

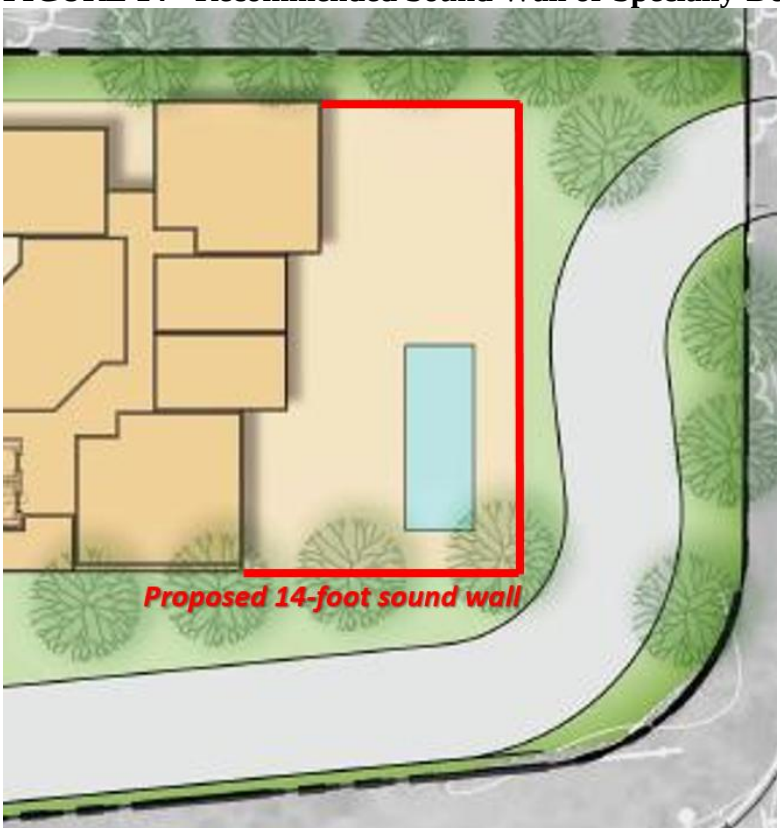
The future exterior noise levels at the center of the pool area would be within the range of allowable noise levels to be considered "conditionally acceptable." With the City's approval, this conditionally acceptable outdoor use area would not require measures to be implemented to further reduce noise levels. However, if measures would be required to reduce noise levels at the pool area, methods available would include site planning alternatives (e.g., increased setbacks and using the proposed buildings as noise barriers), the construction of noise barriers, or a combination of the above. For the proposed project, the pool area could be relocated to a more compatible location, such as one of the courtyards where the proposed podium building would surround the outdoor use area on three sides and provide adequate shielding.

Assuming this would not be a feasible option, the construction of a sound wall or a specially-designed barrier would be recommended around the perimeter of the pool deck. However, a barrier of 10 feet tall (with respect to the base elevation of the pool deck) would only reduce noise levels at the center of the pool area to 62 dBA DNL. This is due to the distance of the pool area to I-280. To achieve 60 dBA DNL, the perimeter barrier would need to be at least 14 feet tall. This barrier

height may not be ideal for this type of outdoor use area. Figure 14 shows the proposed location of the proposed 14-foot barrier. The proposed barrier should be continuous from grade to top, with no cracks or gaps, and have a minimum surface density of three lbs/ft^2.

The final recommendations shall be confirmed when detailed site plans and grading plans are available. With the implementation of this proposed barrier, the exterior noise environment would be at or below 60 dBA DNL.

FIGURE 14 Recommended Sound Wall or Specially-Designed Barrier



Future Interior Noise Environment

Standard residential construction, assuming windows to be partially open, provides exterior-to-interior noise reduction of approximately 15 dBA. With the windows maintained closed, standard residential construction typically provides 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA DNL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA DNL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Seven condo buildings are proposed along the southern boundary of the site, with the nearest façades planned approximately 70 to 90 feet from the centerline of the nearest through lane along I-280. While the first-floor rooms of the nearest units would be shielded from traffic noise by the existing 16- to 18-foot sound wall, the rooms located on the upper floors would have direct line-of sight to I-280. These southern condo units would be exposed to future exterior noise levels ranging from 85 to 86 dBA DNL.

The southernmost flats would be 120 to 130 feet from the centerline of the nearest through lane along I-280. At these distances, the upper story rooms would be exposed to future exterior noise levels of 83 dBA DNL.

The southern façade of the podium building would be 135 to 210 feet from the centerline of the nearest through lane along I-280, and at these distances, units along this façade would be exposed to future exterior noise levels ranging from 79 to 82 dBA DNL.

Assuming a 15 dBA exterior-to-interior reduction, the future interior noise levels at the units along the southern façades of the condo, flat, and podium buildings would be up to 64 to 71 dBA DNL. Measures would be required to reduce interior noise levels to meet the City's interior thresholds.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA DNL or less:

- Preliminary calculations indicate that the residential units along the southern building façades of the condos, flats, and podium building would require a wall assembly with an STC rating of at least 56 and windows and doors with a minimum rating of 43 STC to meet the interior noise threshold of 45 dBA DNL.

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the design phase pursuant to requirements set forth in the State Building Code. The study will also establish appropriate criteria for noise levels inside the commercial spaces affected by environmental 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. Treatments would include, but are not limited to, sound-rated windows and doors, sound-rated wall and window constructions, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control

treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

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

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

- A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan or Municipal Code at existing noise-sensitive receptors surrounding the project site.

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

    - A significant permanent noise level increase would occur if project-generated traffic would result in: a) a noise level increase of 5 dBA DNL or greater, with a future noise level of less than 60 dBA DNL, or b) a noise level increase of 3 dBA DNL or greater, with a future noise level of 60 dBA DNL or greater.

    - A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan.

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

- A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. Even with the incorporation of construction best management practices as project conditions of approval, the adjacent land uses would be exposed to

construction noise levels exceeding ambient noise levels for a period of about 3.5 years. **This would be a significant and unavoidable impact.**

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

Policy EC-1.7 of the City's General Plan requires that all construction operations within the City to use best available noise suppression devices and techniques and to limit construction hours near residential uses per the Municipal Code allowable hours, which are between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday when construction occurs within 500 feet of a residential land use. Further, the City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

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

For the residences to the west and to the south of the project site, opposite I-280, ambient daytime noise levels would be represented by LT-1 and would range from 60 to 70 dBA L_{eq}. For residences to the north of the project site, daytime ambient noise levels would be represented by LT-2 and would range from 47 to 61 dBA L_{eq}.

The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5). Table 6 shows the average noise level ranges, by construction phase. Hourly average noise levels generated by construction are about 72 to 88 dBA L_{eq} for residential buildings measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

Project construction would be broken down into two phases. Phase I involves the construction of the podium apartment building, the four-story flats, and four row homes, as shown in Figure 15.

Project construction would be broken down into two phases. Phase I involves the construction of the podium apartment building, the four-story flats, and four row homes, as shown in white in Figure 15. Phase II involves the mobile home removal and infrastructure work. The total project duration is just over 3.5 years (November 2020 to December 2024).

Using the equipment list provided at the time of this study, which included phasing information, type and quantity of equipment expected to be used in each phase, and the length of time for each phase, construction noise levels were estimated at the nearby existing off-site residential and commercial land uses. While construction activities are expected as close as 20 to 45 feet from the shared property lines of the adjacent land uses, a limited amount of equipment would be used at those distances. To estimate the worst-case scenario for each phase and stage of construction, each piece of equipment provided in the equipment list was assumed to run simultaneously. Since equipment would be spread throughout the construction site, this combined noise source for each construction stage was positioned at the geometrical center of active construction site for each phase and propagated to the property line of the nearest surrounding land use. Table 7 summarizes the estimated construction noise levels for each stage of construction for both Phases I and II, as well as the duration for each stage and the equipment assumed for each stage. For the purposes of estimating the worst-case scenario, no noise reduction due to shielding was assumed.

As shown in Table 7, construction noise levels would exceed 60 dBA L_{eq} at the existing residential land uses throughout the duration of construction and would exceed 70 dBA L_{eq} at the existing commercial uses. Further, ambient levels at the surrounding uses would potentially be exceeded by 5 dBA L_{eq} or more throughout construction. Since project construction would expose neighbors located within 500 feet of the project site to continuous construction for more than 12 months, this would be a significant impact.

Additionally, most of the mobile homes located on the western portion of the project site will remain occupied during Phase I construction, and during Phase II construction, occupants are expected in the newly constructed Phase I portion of the project. While these on-site receptors would be exposed to construction activities in close proximity to their residences, the proposed project site has been identified as replacement housing for the existing residents; therefore, the occupants may be inconvenienced for a time during construction of the proposed project, but once completed, they would benefit from the new development. During Phase I, the nearest existing mobile homes would be approximately 65 to 75 feet from the center of the nearest condo building being constructed. These residents would be exposed to Phase I construction noise levels ranging from 81 to 91 dBA L_{eq} during the loudest construction days. Likewise, the future residents that will move into the Phase I buildings once completed will be exposed to Phase II construction activities. Construction of the nearest building would be approximately 40 feet of future on-site residents, exposing these occupants to noise levels ranging from 83 to 92 dBA L_{eq} during the loudest construction days. Prior to construction, the on-site residents should be notified of the temporary construction activities and provided a timeframe for the disruption; however, since most of these on-site receptors would be relocated from an existing mobile home to the new residential development once completed, the annoyance would be minimal due to the temporary nature of the construction project and the long-term benefit the project would bring to those most affected by the noise. However, efforts should be made to reduce temporary construction noise levels at on-site residences.

TABLE 5 Construction Equipment 50-Foot Noise Emission Limits

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

Notes:

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

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

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

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

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

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

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

FIGURE 15 Phase I Construction

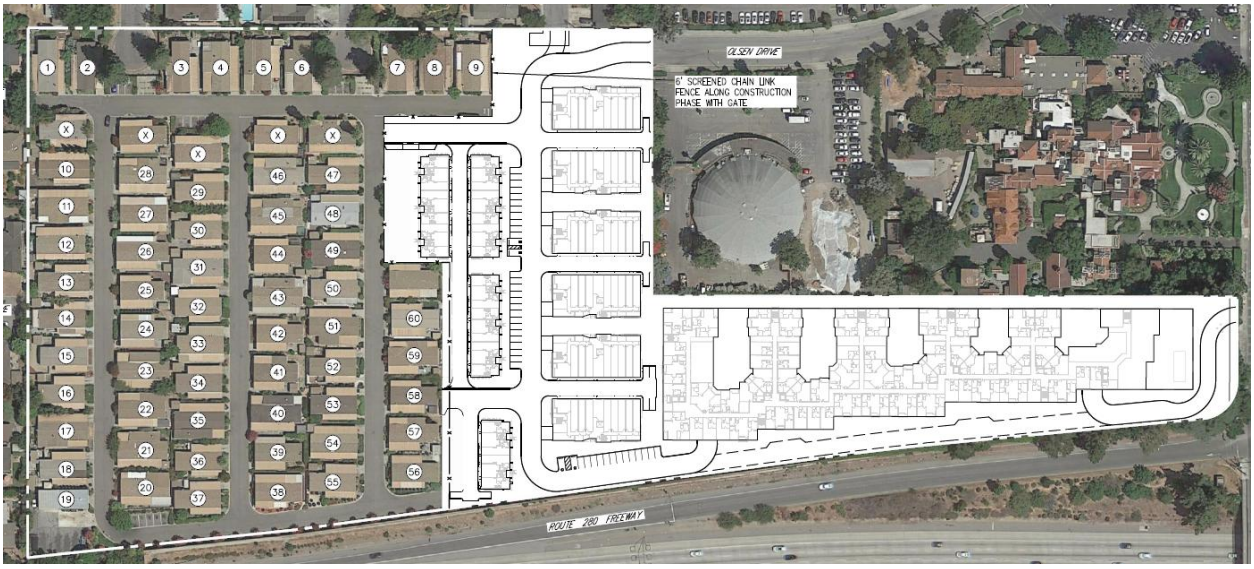


TABLE 7 Estimated Construction Noise Levels at the Noise-Sensitive Receptors

Stage of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			Residences to the North	Commercial Uses to the North	Commercial & Residential Uses to the East	Residences to the South	Residences to the West
			Ambient levels = 47-61 dBA	Ambient levels = 60-70 dBA			
Phase I – Eastern Portion of the Project Site							
Demolition	11/1/2020-12/1/2020	Concrete/Industrial Saw (2) Excavator (5) Rubber-Tired Dozer (5) Tractor/Loader/Backhoe (10)	72 dBA at 540 feet	89 dBA at 80 feet	72 dBA at 520 feet	72 dBA at 570 feet	65 dBA at 1,185 feet
Site Preparation	1/1/2021-2/21/2020	Grader (4) Rubber-Tired Dozer (5) Tractor/Loader/Backhoe (5)	70 dBA at 540 feet	87 dBA at 80 feet	71 dBA at 520 feet	70 dBA at 570 feet	64 dBA at 1,185 feet
Grading/ Excavation	2/19/2021-2/22/2021	Scraper (5) Excavator (5) Grader (5) Rubber-Tired Dozer (5) Tractor/Loader/Backhoe (5)	72 dBA at 540 feet	89 dBA at 80 feet	73 dBA at 520 feet	72 dBA at 570 feet	65 dBA at 1,185 feet
Trenching/ Foundation	2/22/2021-3/22/2021	Tractor/Loader/Backhoe (5) Excavator (5)	68 dBA at 540 feet	85 dBA at 80 feet	68 dBA at 520 feet	68 dBA at 570 feet	61 dBA at 1,185 feet
Building Exterior	4/5/2021-4/4/2022	Crane (2) Forklift (5) Generator Set (4) Tractor/Loader/Backhoe (4) Welder (5)	68 dBA at 540 feet	85 dBA at 80 feet	68 dBA at 520 feet	68 dBA at 570 feet	61 dBA at 1,185 feet
Building Interior/ Architectural Coating	10/1/2021-4/1/2023	Air Compressor (10)	63-69 dBA[a] at 540 feet	80-86 dBA[a] at 80 feet	63-70 dBA[a] at 520 feet	63-69 dBA[a] at 570 feet	56-62 dBA[a] at 1,185 feet
Paving	3/22/2021-4/19/2021	Cement and Mortar Mixer (4) Paver (2)	69-71 dBA[b] at 540 feet	86-88 dBA[b] at 80 feet	70-72 dBA[b] at 520 feet	69-71 dBA[b] at 570 feet	63-65 dBA[b] at 1,185 feet

Stage of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)				
			Residences to the North	**Commercial Uses to the North**	**Commercial & Residential Uses to the East**	**Residences to the South**	**Residences to the West**
			Ambient levels = 47-61 dBA	**Ambient levels = 60-70 dBA**			
		Paving Equipment (2) Roller (4) Tractor/Loader/Backhoe (4)					
Phase II – Western Portion of the Project Site							
Demolition	3/1/2022- 9/1/2022	Excavator (2) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)	69 dBA at 320 feet	67 dBA at 435 feet	57 dBA at 1,330 feet	63 dBA at 680 feet	68 dBA at 390 feet
Site Preparation	9/1/2022- 9/15/2022	Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)	68 dBA at 320 feet	65 dBA at 435 feet	56 dBA at 1,330 feet	61 dBA at 680 feet	66 dBA at 390 feet
Grading/ Excavation	9/12/2022- 9/30/2022	Scraper (3) Excavator (1) Grader (2) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	73-74 dBA[c] at 320 feet	70-71 dBA[c] at 435 feet	60-62 dBA[c] at 1,330 feet	66-67 dBA[c] at 680 feet	71-72 dBA[c] at 390 feet
Trenching/ Foundation	10/1/2022- 10/1/2024	Tractor/Loader/Backhoe (3) Excavator (2)	70 dBA at 320 feet	67 dBA at 435 feet	58 dBA at 1,330 feet	63 dBA at 680 feet	68 dBA at 390 feet
Building Exterior	11/1/2022- 10/1/2024	Forklift (3) Tractor/Loader/Backhoe (1)	65-71 dBA[d] at 320 feet	62-68 dBA[d] at 435 feet	52-59 dBA[d] at 1,330 feet	58-65 dBA[d] at 680 feet	63-69 dBA[d] at 390 feet
Building Interior/ Architectural Coating	2/1/2023- 12/31/2024	Air Compressor (5)	65-72 dBA[e] at 320 feet	62-69 dBA[e] at 435 feet	52-60 dBA[e] at 1,330 feet	58-65 dBA[e] at 680 feet	63-70 dBA[e] at 390 feet
Paving	11/1/2022- 11/30/2022	Cement and Mortar Mixer (1) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (1)	69-73 dBA[f] at 320 feet	67-71 dBA[f] at 435 feet	57-61 dBA[f] at 1,330 feet	63-67 dBA[f] at 680 feet	68-72 dBA[f] at 390 feet

[a] Range of noise levels reflects the building-interior/architectural coating phase only and when overlapped with the building-exterior phase during Phase I.
[b] Range of noise levels reflects the paving phase only and when overlapped with the building-exterior phase during Phase I.
[c] Range of noise levels reflects the grading/excavation phase only and when overlapped with the site preparation phase during Phase II.
[d] Range of noise levels reflects the building-exterior phase only and when overlapped with the trenching phase during Phase II.
[e] Range of noise levels reflects the building-interior phase only and when overlapped with the trenching and building-exterior phases during Phase II.
[f] Range of noise levels reflects the paving phase only and when overlapped with the trenching and building-exterior phases during Phase II .

Mitigation Measure 1a:

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Construction activities will be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work within 500 feet of residential land uses to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. Construction is prohibited on weekends at sites located within 500 feet of residential units. Further, the City shall require the construction crew to adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity.

Construction Best Management Practices

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

- 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 should be constructed around the perimeter of the site adjacent to residences, operational businesses, and other noise-sensitive land uses. The noise barrier would interrupt the line-of-sight between the noise source and receiver 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.

- 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. The on-site residences that would be exposed to Phase I construction should also receive notification in writing of the construction schedule of Phase I.

- Include a disclosure in the lease of the future tenants of the Phase I development that provides information regarding the on-going Phase II construction activities.

- A temporary noise control blanket barrier could be erected, if necessary, along building facades facing construction sites. This mitigation would only be necessary if conflicts occurred which were irresolvable by proper scheduling. Noise control blanket barriers can be rented and quickly erected.

- Designate a "disturbance coordinator" 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. Even with the implementation of these measures, the project would substantially increase noise levels intermittently at sensitive receptors over a period of about 3.5 years. The impact would be significant and unavoidable.

Impact 1b: **Permanent Noise Level Increase.** The proposed project is not expected to cause a substantial permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

A significant impact would result if traffic generated by the project would substantially increase noise levels at sensitive receptors 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. For reference, a 3 dBA DNL noise increase would be expected if the project would double existing traffic volumes along a roadway, and a 5 dBA DNL noise increase would be expected if the project would triple existing traffic volumes along a roadway.

The traffic study completed for the proposed project included peak hour AM and PM traffic turning movement volumes under existing, background, background plus project, cumulative, and cumulative plus project conditions. While existing plus project traffic conditions were not provided in the traffic report, existing traffic conditions and project trips were provided for all 11

intersections included in the traffic study. The project trips were added to the existing conditions to estimate the existing plus project traffic conditions. Upon comparison of existing plus project volumes to the existing traffic volumes, a traffic noise increase of less than 1 dBA was estimated for each roadway segment included in the traffic report except Olsen Drive, west of Winchester Boulevard. Over a 3 dBA DNL noise level increase was calculated along Olsen Drive, west of Winchester Boulevard. However, commercial land uses are located along this roadway segment prior to project site boundaries. Therefore, this increase of more than 3 dBA DNL would only affect commercial uses or future occupants on the project site. Since a permanent noise increase of 3 dBA DNL or more would not occur at existing residential land uses, this is a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 1c: Cumulative Noise Increase. The proposed project would not result in a "cumulatively considerable" permanent noise level increase at the existing residential land uses in the project vicinity. **This is a less-than-significant impact.**

A significant impact would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA DNL or greater for future levels exceeding 60 dBA DNL or was 5 dBA DNL or greater for future levels at or below 60 dBA DNL; and 2) if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA DNL or more attributable solely to the proposed project.

Cumulative traffic noise level increases were calculated by comparing the cumulative no project traffic volumes and the cumulative plus project volumes to existing traffic volumes. A traffic noise increase of 3 dBA DNL or more was calculated under both cumulative scenarios along Tisch Way, east of Winchester Boulevard, along Winchester Boulevard, north of Olin Avenue, along Olin Avenue, west of Winchester Boulevard, along Monroe Street, north and south of Stevens Creek Boulevard, along South Baywood Avenue, south of Stevens Creek Boulevard, and along Winchester Boulevard, south of Stevens Creek Boulevard. Since the same increase was calculated for the cumulative no project and the cumulative plus project scenarios, the project's contribution along these roadway segments would be less than 1 dBA DNL, which would not be considered a "cumulatively considerable" contribution.

Additionally, both cumulative scenarios would result in more than a 3 dBA DNL increase along Olsen Drive, west of Winchester Boulevard; however, the cumulative plus project scenario would result in an increase 1 dBA DNL greater than the cumulative no project scenario. Therefore, the project's contribution would be greater than 1 dBA DNL. However, the land uses along this roadway segment consist of commercial uses. With no residential land uses located along this roadway segment, the project would not cause a significant cumulative traffic noise impact at noise-sensitive uses in the project vicinity. This is a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 1d: **Noise Levels in Excess of Standards.** The proposed project would not generate noise in excess of standards established in the City's General Plan at the nearby sensitive receptors. While exceeding the City's Municipal Code threshold of 55 dBA DNL may occur, implementation of measures as a project condition of approval would reduce noise levels to below 55 dBA DNL. **This is a less-than-significant impact.**

Residential buildings typically require various mechanical equipment, such as air conditioners, exhaust fans, and air handling equipment for ventilation of the buildings. The site plan does not provide details pertaining to mechanical equipment expected at the proposed residential buildings. Typically, mechanical equipment, such as air conditioning units, are located on the rooftops of apartment buildings or on the ground level surrounding the structures of condo-type units. Without knowing specific information such as the number and types of units, size, enclosure specifications, source noise levels, and precise locations, the impact of mechanical equipment noise on nearby noise-sensitive uses cannot be assessed at this time.

Currently, residential land uses adjoin the site to the north and to the west. Design planning should take into account the noise criteria associated with mechanical equipment and utilize site planning to locate equipment in less noise-sensitive areas, such as the rooftop away from the edge of the building nearest to these residential land uses or on the ground level farthest from the shared property lines. Other controls, such as fan silencers, enclosures, and taller screen walls, etc., may be required.

The City's General Plan does not include policies specifically addressing mechanical noise generated by residential land uses; since no General Plan policies would be violated, this would be considered a less-than-significant impact. However, the residential mechanical noise should be addressed with respect to the City's Municipal Code threshold of 55 dBA DNL to minimize disturbance to the existing residences surrounding the project site. Conservatively, mechanical equipment noise for the proposed project has the potential to exceed 55 dBA DNL at the nearby sensitive uses. While exceeding this threshold would not result in a significant impact, measures shall be implemented as a project condition of approval to minimize noise disturbance at adjacent sensitive uses.

As a project condition of approval, mechanical equipment shall be selected and designed to reduce impacts on surrounding uses to meet the City's 55 dBA DNL noise level requirement at the nearby noise-sensitive land uses. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's Municipal Code noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels and installation of noise barriers, such as enclosures and parapet walls, to block the line-of-sight between the noise source and the nearest receptors. Other alternate measures may be optimal, such as locating equipment in less noise-sensitive areas, such as along the building façades farthest from adjacent neighbors, where feasible.

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

Impact 2: **Exposure to Excessive Groundborne Vibration due to Construction.** Construction-related vibration levels resulting from activities near the northern, wester, and southern boundaries of the project site would potentially exceed 0.2 in/sec PPV at the adjacent residential and commercial land uses. **This is a 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 preparation work, foundation work, and new building framing and finishing. According to the list of construction equipment provided at the time of this study, pile driving, which can cause excessive vibration, is not expected for the proposed project.

Policy EC-2.3 of the City of San José General Plan limits vibration levels during demolition and construction to 0.08 in/sec PPV for sensitive historic structures to minimize the potential for cosmetic damage to buildings on adjacent sites. 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. The Winchester Mystery House and the Century 21 theater north of Olsen Drive are designated historic structures and may qualify as a vibration sensitive historic structure, so the stringent 0.08 criterion is applied to this structure.[2] For all other buildings surrounding the project site, a significant impact would occur if nearby buildings were exposed to vibration levels in excess of 0.20 in/sec PPV.

Table 8 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

[2] "City of San José Historic Resources Inventory". City of San José. 2/8/2016. https://www.sanjoseca.gov/DocumentCenter/View/35475

TABLE 8 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 Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018.

The nearest structures on the Winchester Mystery House property are located approximately 10 to 25 feet north of the shared property line near the eastern portion of the site. Existing structures on the project site would be demolished in this portion of the site, and the podium building would be constructed. The use of a heavy vibratory roller or the dropping of a heavy loader bucket within about 60 feet of the structure could result in a vibration level equal to or above the 0.08 in/sec PPV threshold. Therefore, construction activities that utilize heavy equipment would potentially cause a significant impact at the Winchester Mystery House.

Additionally, the former Flames Restaurant, which is located approximately 800 feet northwest of the project site, is a Candidate City Landmark. At a distance of 800 feet, vibration levels would be at or below 0.005 in/sec PPV. Due to the Flames Restaurant being more than 200 feet from the project site, this potential historical site would not be considered a sensitive receptor and would not be subjected to construction vibration levels that would potentially be significant.

The Century 21 theater, which is considered a historic structure, is located north of Olsen Drive and would be approximately 110 feet from the project where heavy vibration-inducing equipment could be used. At this distance, vibration from heavy equipment would potentially reach levels up to 0.04 in/sec PPV, which would not exceed the conservative 0.08 in/sec PPV for this type of structure.

The residences to the north and to the west of the site would be approximately 15 to 20 feet from existing structures on the project, which would be demolished under the proposed project. Therefore, the residential structures to the north and to the west would be exposed to vibration levels up to 0.37 in/sec PPV, which would exceed the 0.2 in/sec PPV threshold. This would be considered a significant impact.

Additionally, existing commercial building are located to the north of the project site, at a distance of approximately 55 feet or more from any potential heavy equipment usage. Vibration levels would be up to 0.09 in/sec PPV, which may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the construction that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

Construction activity for the proposed project could potentially result in cosmetic damage to the Winchester Mystery House and to the residences adjacent to the site along the northern and western boundaries. This is a significant impact.

Mitigation Measure 2:

The following measures are recommended to reduce vibration impacts from construction activities to a less-than-significant impact:

- Comply with the City's Municipal Code, which limits construction hours at sites within 500 feet of residential land uses to between 7:00 a.m. and 7:00 p.m. Monday through Friday. Construction is prohibited on weekends at sites located within 500 feet of residential units.

- Use of heavy vibration-generating construction, such as impact compactors, large dozers, vibratory rollers, and packers, shall be prohibited within 60 feet of the nearest structures located on the Winchester Mystery House property.

- The project contractor shall be prohibited from using heavy vibration-generating construction equipment within 25 feet of nearby buildings along the northern and western property lines. Use smaller vibratory rollers, such as the Caterpillar model CP433E vibratory compactor, when compacting materials within 25 feet of these adjacent structures.

- Avoid dropping heavy equipment within 25 feet of adjacent buildings. Use alternative methods for breaking up existing pavement, such as a pavement grinder, instead of dropping heavy objects within 25 feet of buildings to the north and to the west.

- The contractor shall alert heavy equipment operators to sensitive adjacent structures (i.e., historical structures within 60 feet of the construction activities and all other structures within 20 feet of the construction activities) so they can exercise caution.

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

- The contractor shall retain a qualified firm to conduct a pre- and post-construction cosmetic crack survey of the buildings adjacent to the northern and western boundaries and shall repair any additional cosmetic cracking.

Critical factors pertaining to the impact of construction vibration on sensitive receptors include the proximity of the existing structures to the project site, the soundness of the structures, and the methods of construction used. The implementation of these mitigation measures would reduce a potential impact to a less-than-significant level.

Impact 3: **Excessive Aircraft Noise.** The project site is located more than two miles from a public airport or public use airport and would not expose people residing in the project area to excessive aircraft noise levels with the implementation of forced-air mechanical ventilation. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 2.9 miles northeast of the project site. A review of the 2027 noise contour map established by the Santa Clara County ALUC indicates that the project site is located outside of the future Mineta San José International Airport 60 CNEL noise contour. Residential land uses proposed in exterior noise environments of 65 CNEL or less are considered compatible with aircraft noise by the Santa Clara County ALUC. While occasional aircraft flyovers would be audible at the site, the proposed project would be compatible with the City's exterior noise standards for aircraft noise. This is a less-than-significant impact.

Mitigation Measure 3: **None required.**