2655 THE ALAMEDA
NOISE AND VIBRATION ASSESSMENT

Santa Clara, California

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INTRODUCTION

The proposed project would develop a vacant 0.4-acre (17,781 square foot) project site located at 2655 The Alameda in Santa Clara, California with a four-story mixed-use development featuring 39 residential units at a density of 98 units per acre and 1,540 square feet of retail space. The 33 parking spaces for the site would be provided in one, subgrade parking level (23 spaces) and surface parking (10 spaces) located within the development. The project includes large common open space activity areas on the second, third and fourth floors in the form of a central courtyard-outdoor deck space. The amenity areas of the proposed project include seating, planters, barbeque, and outdoor gathering spaces for use by future residents.

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 and groundborne vibration, summarizes applicable regulatory background, and describes the existing noise environment in the project vicinity; 2) the Plan Consistency Analysis Section discusses the noise and land use compatibility of the project; 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 site 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 L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} 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 L_{dn} with open windows and 65-70 dBA L_{dn} 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 L_{dn} 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 L_{dn}. At a L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} 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 L_{dn} of 60-70 dBA. Between a L_{dn} 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 L_{dn} 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 p.m. and 7:00 a.m.
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 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
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, April 2020.

Regulatory Background

The California Environmental Quality Act (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.

Federal

Federal Transit Administration's Transit Noise and Vibration Impact Assessment Manual. The Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual includes general assessment criteria for construction noise. During daytime hours, the hourly average noise level limit is 80 dBA L_{eq} at residential land uses and 90 dBA L_{eq} at commercial and industrial land uses.

State of California

State CEQA Guidelines. 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; 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.

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 L_{dn}/CNEL in any habitable room.

California Building Code, Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings, as set forth in the 2010 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). These standards were not altered in the 2019 revisions. 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. Both of 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 or additional envelope or altered 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 within the 65 dBA CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the Noise Element of the General Plan.

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 or addition envelope or altered 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.

California Department of Transportation. To avoid damage to buildings, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and conservative limits of 0.25 in/sec PPV for historic and some old buildings and 0.08 in/sec PPV for ancient ruins or monuments.

Local

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan (CLUP) 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

N-1 The Community Noise Equivalent Level (CNEL) method of representing noise levels shall be used to determine if a specific land use is consistent with the CLUP.

N-2 In addition to the other policies herein, the Noise Compatibility Policies presented in Table 4-1 shall be used to determine if a specific land use is consistent with this CLUP.

N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (not shown in this report).

N-6 Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. Table 4-1 presents acceptable noise levels for other land uses in the vicinity of the Airport.

Table 4 - 1

NOISE COMPATIBILITY POLICIES

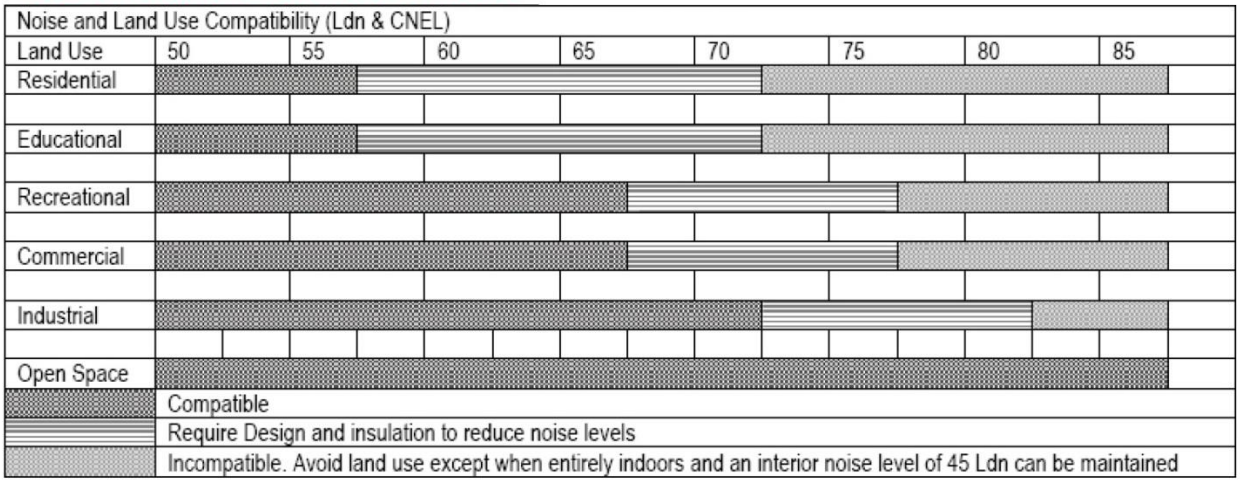
LAND USE CATEGORY	CNEL					
	55-60	60-65	65-70	70-75	75-80	80-85
Residential – low density Single-family, duplex, mobile homes	*	**	***	****	****	****
Residential – multi-family, condominiums, townhouses	*	**	***	****	****	****
Transient lodging - motels, hotels	*	*	**	****	****	****
Schools, libraries, indoor religious assemblies, hospitals, nursing homes	*	***	****	****	****	****
Auditoriums, concert halls, amphitheaters	*	***	***	****	****	****
Sports arena, outdoor spectator sports, parking	*	*	*	**	***	****
Playgrounds, neighborhood parks	*	*	***	****	****	****
Golf courses, riding stables, water recreation, cemeteries	*	*	*	**	***	****
Office buildings, business commercial and professional, retail	*	*	**	***	****	****
Industrial, manufacturing, utilities, agriculture	*	*	*	***	***	****
* Generally 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. Mobile homes may not be acceptable in these areas. Some outdoor activities might be adversely affected.					
** Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Outdoor activities may be adversely affected. Residential: Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.					
*** Generally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor activities are likely to be adversely affected.					
**** Unacceptable	New construction or development shall not be undertaken.					

Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

Source: Comprehensive Land Use Plan Santa Clara County, Norman Y Mineta San José International Airport, May 25, 2011, Amended May 23, 2019.

City of Santa Clara General Plan. The City of Santa Clara's General Plan identifies noise and land use compatibility standards for various land uses and establishes policies to control noise within the community. Table 5.10-2 from the General Plan shows acceptable noise levels for various land uses. Residential land uses are considered compatible in noise environments of 55 dBA L_{dn}/CNEL or less. The guidelines state that where the exterior noise levels are greater than 55 dBA L_{dn}/CNEL and less than 70 dBA L_{dn}/CNEL, the design of the project should include measures to reduce noise levels to acceptable levels. Noise levels exceeding 70 dBA L_{dn}/CNEL at residential land uses are considered incompatible.

TABLE 5.10-2: GENERAL PLAN NOISE STANDARDS



Applicable goals and policies presented in the General Plan are as follows:

5.10.6-G1 Noise sources restricted to minimize impacts in the community.

5.10.6-G2 Sensitive uses protected from noise intrusion.

5.10.6-G3 Land use, development and design approvals that take noise levels into consideration.

5.10.6-P1 Review all land use and development proposals for consistency with the General Plan compatibility standards and acceptable noise exposure levels defined on Table 5.10-1.

5.10.6-P2 Incorporate noise attenuation measures for all projects that have noise exposure levels greater than General Plan "normally acceptable" levels, as defined on Table 5.10-1.

5.10.6-P3 New development should include noise control techniques to reduce noise to acceptable levels, including site layout (setbacks, separation and shielding), building treatments (mechanical ventilation system, sound-rated windows, solid core doors and baffling) and structural measures (earthen berms and sound walls).

5.10.6-P4 Encourage the control of noise at the source through site design, building design, landscaping, hours of operation and other techniques.

5.10.6-P5 Require noise-generating uses near residential neighborhoods to include solid walls and heavy landscaping along common property lines, and to place compressors and mechanical equipment in sound-proof enclosures.

5.10.6-P6 Discourage noise sensitive uses, such as residences, hospitals, schools, libraries and rest homes, from areas with high noise levels, and discourage high noise generating uses from areas adjacent to sensitive uses.

5.10.6-P7 Implement measures to reduce interior noise levels and restrict outdoor activities in areas subject to aircraft noise in order to make Office/Research and Development uses compatible with the Norman Y. Mineta International Airport land use restrictions.

City of Santa Clara Municipal Code. The City's Municipal Code establishes noise level performance standards for fixed sources of noise. Section 9.10.40 of the Municipal Code limits noise levels at residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.). The noise limits are not applicable to emergency work, licensed outdoor events, City-owned electric, water, and sewer utility system facilities, construction activities occurring within allowable hours, permitted fireworks displays, or permitted heliports. Construction activities are not permitted within 300 feet of residentially zoned property except within the hours of 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

The City Code does not define the acoustical time descriptor such as L_{eq} (the average noise level) or L_{max} (the maximum instantaneous noise level) that is associated with the above limits. A reasonable interpretation of the City Code would identify the ambient base noise level criteria as an average or median noise level (L_{eq}/L_{50}).

Existing Noise Environment

The project site is a 0.4-acre vacant parcel (APN 230-12-012) located at the corner of Park Avenue and The Alameda (2655 The Alameda) in the City of Santa Clara. The site is bordered by a parking lot on the south side of the site which serves a grocery store beyond. Additionally, the site is adjacent to commercial and single family uses to the west, and housing for the Santa Clara University on the north and east.

A noise monitoring survey, which included two long-term (LT-1 and LT-2) and two short-term (ST-1 and ST-2) noise measurements, was made at the site between Monday, September 12, 2022 and Wednesday, September 14, 2022 to quantify existing noise levels and characterize noise sources. Figure 1 shows the project site and selected noise monitoring locations.

Long-term noise measurement LT-1 was made approximately 45 feet southwest of the centerline of The Alameda. Hourly average noise levels at LT-1 typically ranged from 61 to 66 dBA L_{eq}

during the day and from 50 to 62 dBA L_{eq} at night. The community noise equivalent level (CNEL) for Tuesday, September 13, 2022 was 66 dBA CNEL. Long-term noise measurement LT-2 was made approximately 25 feet southwest of the centerline of Park Avenue. Hourly average noise levels at LT-2 typically ranged from 57 to 66 dBA L_{eq} during the day and from 47 to 59 dBA L_{eq} at night. The CNEL on Tuesday, September 13, 2022 was 63 dBA. The daily trends in noise levels at LT-1 and LT-2 are shown in Appendix A of this report.

Short-term noise measurements ST-1 and ST-2 were made on Monday, September 12, 2022 between 11:50 a.m. and 12:20 p.m. Measured noise levels are summarized in Table 4. ST-1 was made at the south property line of the project site adjacent to the Safeway Center parking lot. The 10-minute average noise level at ST-1 was 54 dBA L_{eq} and was primarily the result of local traffic along the roadway network and within the parking lot, which produced noise levels generally ranging from 51 to 64 dBA. ST-2 was made at the apex of the site, near the intersection of Park Avenue and The Alameda. During this measurement, vehicles passing along The Alameda produced noise levels ranging from 55 to 74 dBA. Traffic noise from Park Avenue produced noise levels ranging from 57 to 82 dBA. The 10-minute average noise level at ST-2 was 63 dBA L_{eq}.

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

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: South Property Line (9/12/22, 11:50 a.m.-12:00 p.m.)	64	60	56	52	50	54
ST-2: North Property Line (9/12/22, 12:10 p.m.-12:20 p.m.)	82	74	66	59	53	63

FIGURE 1 Aerial Image Showing Site Plan and Noise Measurement Locations

Source: Google Earth, 2022.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

According to the City's General Plan, noise levels in outdoor use areas of residential land uses that are affected by transportation noise are required to be maintained at or below 55 dBA CNEL to be considered normally acceptable with the noise environment. Additionally, residential interior noise levels are required to meet the performance standard of 45 dBA CNEL, which is consistent with the requirements of the State Building Code.

Future Exterior Noise Environment

The future noise environment at the site would continue to result primarily from vehicular traffic along nearby roadways. Traffic noise levels are anticipated to increase by up to 1 dBA CNEL[1] along The Alameda and Park Avenue by 2035. This analysis conservatively assumes that the noise levels measured in 2022 would increase by 1 dBA CNEL, reaching 67 dBA CNEL at about 45 feet from the center of The Alameda and 64 dBA CNEL at about 25 feet from the center of Park Avenue.

The site plan shows a centrally located courtyard for residential use on the second floor that would be mostly shielded by the building, and partially shielded outdoor residential patios on the third and fourth floors. Future exterior noise levels at the centrally located courtyard on the second floor would be attenuated by the building itself and are calculated to be 58 to 60 dBA CNEL. The centrally located courtyard would serve as the primary use areas for quiet outdoor enjoyment. Unshielded outdoor patios overlooking The Alameda would be exposed to exterior noise levels reaching approximately 65 dBA CNEL, but it should be noted that residents would have the option of selecting well shielded courtyard locations for quiet outdoor enjoyment if they should choose to do so.

Exterior noise levels would exceed the City's 55 dBA CNEL "compatible" threshold without additional noise control. The project could consider revising the site plan to close the gap facing The Alameda and/or reorienting the gap toward Park Avenue, which is a less significant source of traffic noise.

Future Interior Noise Environment

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 CNEL, 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 CNEL, 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

[1] 2010-2035 General Plan ADEIR Noise Section, Illingworth & Rodkin, Inc., April 30, 2010.

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.

Exterior noise levels are calculated to reach 67 dBA CNEL at about 45 feet from the center of The Alameda and 64 dBA CNEL at about 25 feet from the center of Park Avenue. The worst-case exterior noise exposure would occur at the units nearest the intersection of The Alameda and Park Avenue where the traffic noise levels, combined, would reach 68 dBA CNEL. Assuming windows are partially open for ventilation, future interior noise levels in these units would reach 53 dBA CNEL.

Street level retail shops are proposed at the north end of the site where noise levels are calculated to reach 68 dBA CNEL and 68 dBA L_{eq} during the worst hour. Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so that windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 50 dBA $L_{eq(1\text{-}hr)}$.

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 CNEL or less at residential interiors:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards. Preliminary calculations indicate that worst-case units on the perimeter of the building would require windows and doors having a minimum rating of 26 to 30 STC in order to achieve the interior noise threshold of 45 dBA CNEL.

Conditions of Approval

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 Santa Clara General Plan and State Building Code. 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 CNEL 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.

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 substantial temporary noise increase would be identified if noise levels would exceed 80 dBA L_{eq} at residential land uses or 90 dBA L_{eq} at commercial land uses in the project vicinity.

    - A significant permanent noise level increase would occur if project-generated traffic generated by the project or project improvements/operations 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 CNEL or greater, with a future noise level of less than the "normally acceptable" standard, or b) the noise level increase is 3 dBA CNEL or greater, with a future noise level equal to or greater than the "normally acceptable" standard.

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

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.3 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. **This is a significant impact.**

Construction of the proposed project would take place over the course of approximately one and a half years with construction proposed from 6:00 am to 6:00 pm. The excavation on site would remove approximately 7,400 cubic yards of soil. Construction phases would include site preparation, grading/excavation, trenching/foundation/basement, building exterior, building

interiors/ architectural coating, and paving. The proposed project would not require demolition or foundation construction techniques involving pile driving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

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.

The City's Municipal Code limits construction activities (including the loading and unloading of materials and truck movements) within 300 feet of residentially zoned property to the hours of 7:00 a.m. to 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

However, the City of Santa Clara does not establish noise level thresholds for construction activities. As an alternative, this analysis uses the noise limits established by the Federal Transit Administration (FTA) to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*.[2] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses and 90 dBA L_{eq} shall be enforced at commercial and industrial land uses.

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) from the equipment. Table 6 shows the hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction are about 65 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.

Equipment expected to be used in each construction phase are summarized in Table 7, along with the quantity of each type of equipment, the reference noise level at 50 feet assuming the operation of the two loudest pieces of construction equipment, and the estimated noise levels at the nearest property lines projected from the center of the construction activity by phase. Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming the two loudest pieces of equipment would operate simultaneously, as recommend by the FTA for construction noise

[2] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

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.

TABLE 7 Construction Noise Levels

Phase (Work Days)	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} (dBA) From Operation of Two Loudest Pieces of Construction Equipment		
		50 feet	70 feet	100 feet
Site Preparation (1 day)	Tractor/Loader/Backhoe (1)*	80	77	74
Grading (44 days)	Excavator (1)* Tractor/Loader/Backhoe (1)*	82	79	76
Trenching (124 days)	Crane (1)* Forklift (2)*	74	71	68
Building – Exterior (163 days)	Crane (1)* Welder (1)* Forklift (1)	75	72	69
Building – Interior (138 days)	Air Compressor (4)*	77	74	71
Paving (28 days)	Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (2)* Concrete Saw (1)*	85	82	79

*Denotes two loudest pieces of construction equipment per phase except when only one Tractor/Loader/Backhoe is proposed.
Notes – The exterior building, interior building, and paving phases would overlap during the period of 8/1/24 to 12/3/24. The interior building and paving phases would also overlap for 12 days in December of 2024. The two loudest pieces of construction equipment were selected to conservatively represent the entire period.

evaluations. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power.

As shown in Table 7, construction noise levels would range from 74 to 85 dBA L_{eq} at a distance of 50 feet. The nearest receptors to the west are about 70 feet from the project boundary, while the nearest receptors to the northeast are approximately 100 feet from the site. Construction noise levels would exceed the exterior threshold of 80 dBA L_{eq} at residential land uses to the west during the paving phase when activities occur within a distance of 90 feet. Construction noise levels would not exceed 90 dBA L_{eq} at commercial land uses in the project vicinity. Since project construction would last approximately one and a half years and at times produce noise levels exceeding 80 dBA L_{eq} at nearby residences, this temporary construction impact would be considered significant.

Mitigation Measure 1a: Project construction operations shall use best available noise suppression devices and techniques including, but not limited to the following:

- Limit construction hours to between 7:00 a.m. and 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.
- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Prohibit unnecessary idling of internal combustion engines.
- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.
- Utilize “quiet” air compressors and other stationary noise sources where technology exists.
- Control noise from construction workers’ radios to a point where they are not audible at existing residences bordering the project site.
- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of “noisy” construction activities to adjacent land uses and nearby residences.
- 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 current the problem. Conspicuously post a telephone number for the

disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

With the implementation of the above measures, the temporary construction noise impact would be reduced to a less-than-significant level.

Impact 1b: **Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project is not expected to cause a substantial permanent noise level increase at the existing noise-sensitive land uses in the project vicinity or generate noise levels in excess of standards established in the City's General Plan of Municipal Code with the incorporation of standard conditions of project approval. **This is a less-than-significant impact.**

A significant impact would occur if the permanent noise level increase due to project-generated traffic was 3 dBA CNEL or greater for future ambient noise levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future ambient noise levels at or below 60 dBA CNEL. Existing ambient levels, based on the measurements made in the project vicinity, exceed 60 dBA CNEL. Therefore, a significant impact would occur if the proposed project would permanently increase ambient levels by 3 dBA CNEL.

The City's Municipal Code establishes noise level performance standards for fixed sources of noise. Section 9.10.40 of the Municipal Code limits noise levels at residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.).

Vehicle Traffic and Parking

The project's trip generation data was reviewed to determine the change in traffic noise levels along roadways serving the site due to the proposed project. The project would result in 214 new trips per day, with 15 new trips in the AM peak hour and 19 new trips in the PM peak hour. This small increase in daily/hourly trips would not measurably increase traffic noise levels along The Alameda or Park Avenue. Noise from vehicles utilizing the driveway would be similar to existing noise levels produced by surface parking at the Safeway Center, and noise occurring in the below grade parking garage would be less. The overall change in the noise environment due to vehicles associated with the project would be 0 dBA CNEL.

Mechanical Equipment

Mechanical equipment to be included as part of the project has not been specified, but such equipment would be located in two individual equipment rooms in the below-ground parking area (identified on Sheets A1 and A2 of the March 2022 Submittal Set as Elec., Mech. Room, and Equip. room). Air conditioning equipment, exhaust fans, and other necessary systems are also anticipated on the rooftop, but have not yet been specified. Noise levels received at nearby sensitive land uses would depend on system design level specifications, including the equipment location, type, size, capacity, and enclosure design. These details are typically not available until later phases of the project design and development review process.

Various mechanical equipment for heating, ventilation, and cooling purposes, exhaust fans, and other similar equipment would likely be located on the roof of the proposed building within mechanical equipment wells. The primary noise sources on the roof of the building would be the air conditioning condensing units, which cycle on and off based on the heating or cooling needs. To represent a credible worst-case scenario, up to eight clustered units were assumed to run continuously, producing hourly average noise levels of 75 dBA L_{eq} at a distance of 3 feet. The nearby receptors would not have direct line-of-sight to the rooftop equipment. Worst-case noise levels are calculated to be 33 dBA L_{eq} or less assuming the distance from the equipment to the receivers and the shielding provided by the rooftop edge of the building. The associated CNEL from the mechanical equipment would be 39 dBA or less at the nearest receptor to the west, which would not exceed the daytime or nighttime Municipal Code noise limits, nor measurably contribute to ambient CNEL noise levels in the project vicinity (0 dBA CNEL increase).

The project also proposes two mechanical equipment rooms within the underground parking garage (likely for a boiler, electrical equipment, etc.). The underground location of this equipment would provide adequate shielding for all surrounding noise-sensitive receptors (0 dBA CNEL increase).

Condition of Approval

As a project condition of approval, mechanical equipment shall be selected and designed to reduce noise levels to meet the Municipal Code requirements 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.

No equipment is anticipated for a project of this scale that would make meeting the applicable noise limits with standard noise control measures difficult. The operational noise levels produced by the project would be well below ambient noise levels produced by local vehicle traffic, and would not substantially increase the ambient noise environment at the nearest noise-sensitive receptors resulting in a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 2: **Exposure to Excessive Groundborne Vibration.** Construction-related vibration levels are not expected to exceed applicable vibration thresholds at nearby sensitive land uses. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools are used. Construction phases utilizing such equipment or tools would include demolition, site preparation, grading, trenching, building construction, and paving. Foundation construction techniques involving impact or vibratory pile driving equipment, which can cause excessive vibration, are not expected with the proposed project.

The California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and conservative limits of 0.25 in/sec PPV for historic and some old buildings and 0.08 in/sec PPV for ancient ruins or monuments (see Table 3). No known ancient ruins or monuments or buildings that are documented to be structurally weakened adjoin the project area. The nearest historic building is the John C. McPherson House located approximately 1,200 feet to the west at 561 Washington Street.[3] Therefore, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact at normal buildings in the site vicinity.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. 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, if uncontrolled, generate substantial vibration in the immediate vicinity. Vibratory rollers typically generate vibration levels of 0.202 in/sec PPV at 25 feet while drilling and the use of jackhammers typically generates vibration levels ranging from 0.035 to 0.089 in/sec PPV at a distance of 25 feet.

Vibration levels are highest close to the source, and then attenuate with increasing distance at the rate $(D_{ref}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet. Table 9 summarizes the vibration levels expected at nearby buildings and shows that vibration levels would not exceed the 0.3 in/sec PPV threshold at the nearest buildings 80 to 240 feet from the project site. This is a less-than-significant impact.

At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic damage, vibration levels 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 phases 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.

[3] https://missioncity.maps.arcgis.com/apps/MapTour/index.html?appid=c3261a39356546e38ec3445f953fbe1b

TABLE 8 Vibration Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Estimated Vibration Levels at Structures Surrounding the Project Site, in/sec PPV		
			West Residential (80 feet)	Northeast Educational (120 feet)	South Commercial (240 feet)
Clam shovel drop		0.202	0.056	0.036	0.017
Hydromill (slurry wall)	in soil	0.008	0.002	0.001	0.001
	in rock	0.017	0.005	0.003	0.001
Vibratory Roller		0.210	0.058	0.037	0.017
Hoe Ram		0.089	0.025	0.016	0.007
Large bulldozer		0.089	0.025	0.016	0.007
Caisson drilling		0.089	0.025	0.016	0.007
Loaded trucks		0.076	0.021	0.014	0.006
Jackhammer		0.035	0.010	0.006	0.003
Small bulldozer		0.003	0.001	0.001	0.000

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., September 2022.

Mitigation Measure 2: None required.

Impact 3: Excessive Aircraft Noise. The proposed project would not expose people residing or working in the area to excessive aircraft noise levels. **This is a less-than-significant impact.**

Norman Y. Mineta San José International Airport is a public-use airport located approximately 0.75 miles northeast of the project site. According to the City's new Airport Master Plan Environmental Impact Report,[4] the project site lies outside the 60 dBA CNEL contour line (see Figure 4). Aircraft noise levels less than 65 dBA CNEL would be considered compatible at exterior use areas and within the building, and this is a less-than-significant impact.

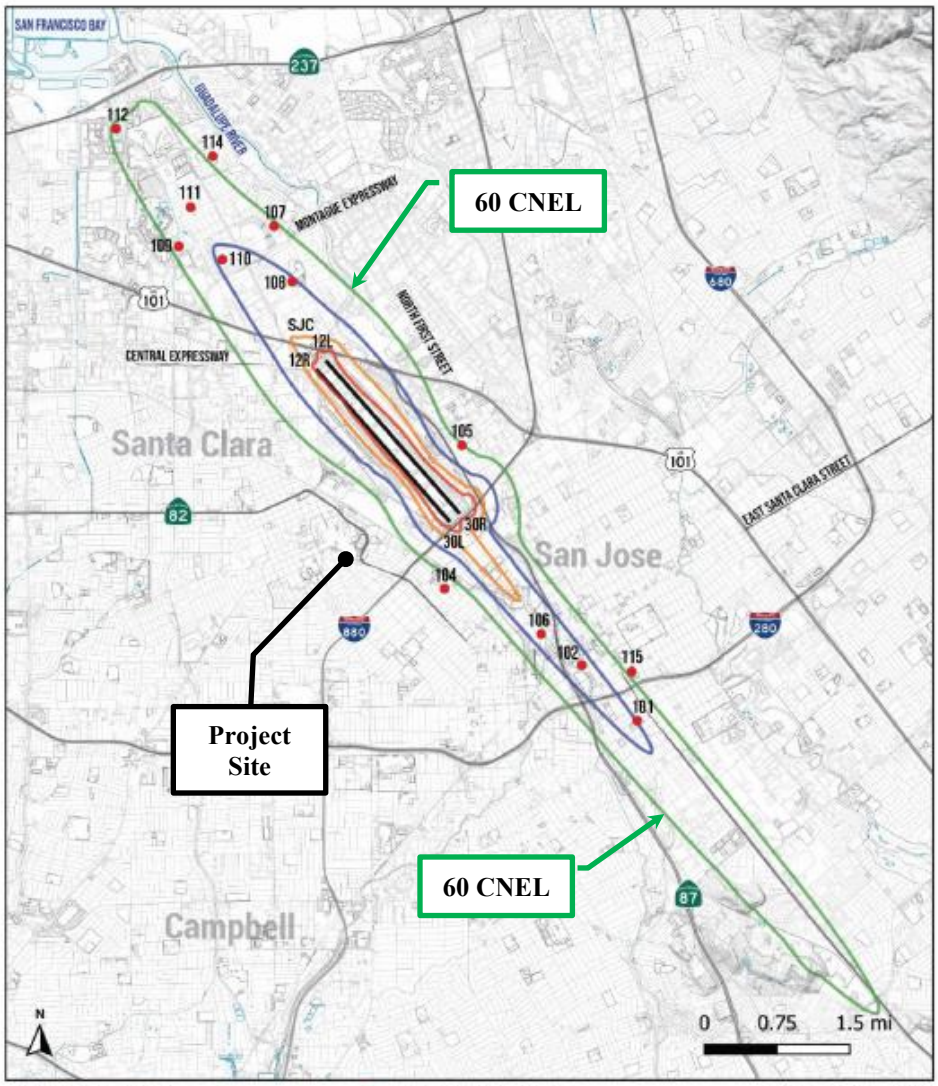
Mitigation Measure 3: None required.

[4] David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.

FIGURE 4 2037 CNEL Noise Contours for SJIA Relative to Project Site

Figure 5
Scenario 2: With Project 2037 Noise Contour Map

SAN JOSE INTERNATIONAL AIRPORT | Environmental Impact Report FINAL | October 2019



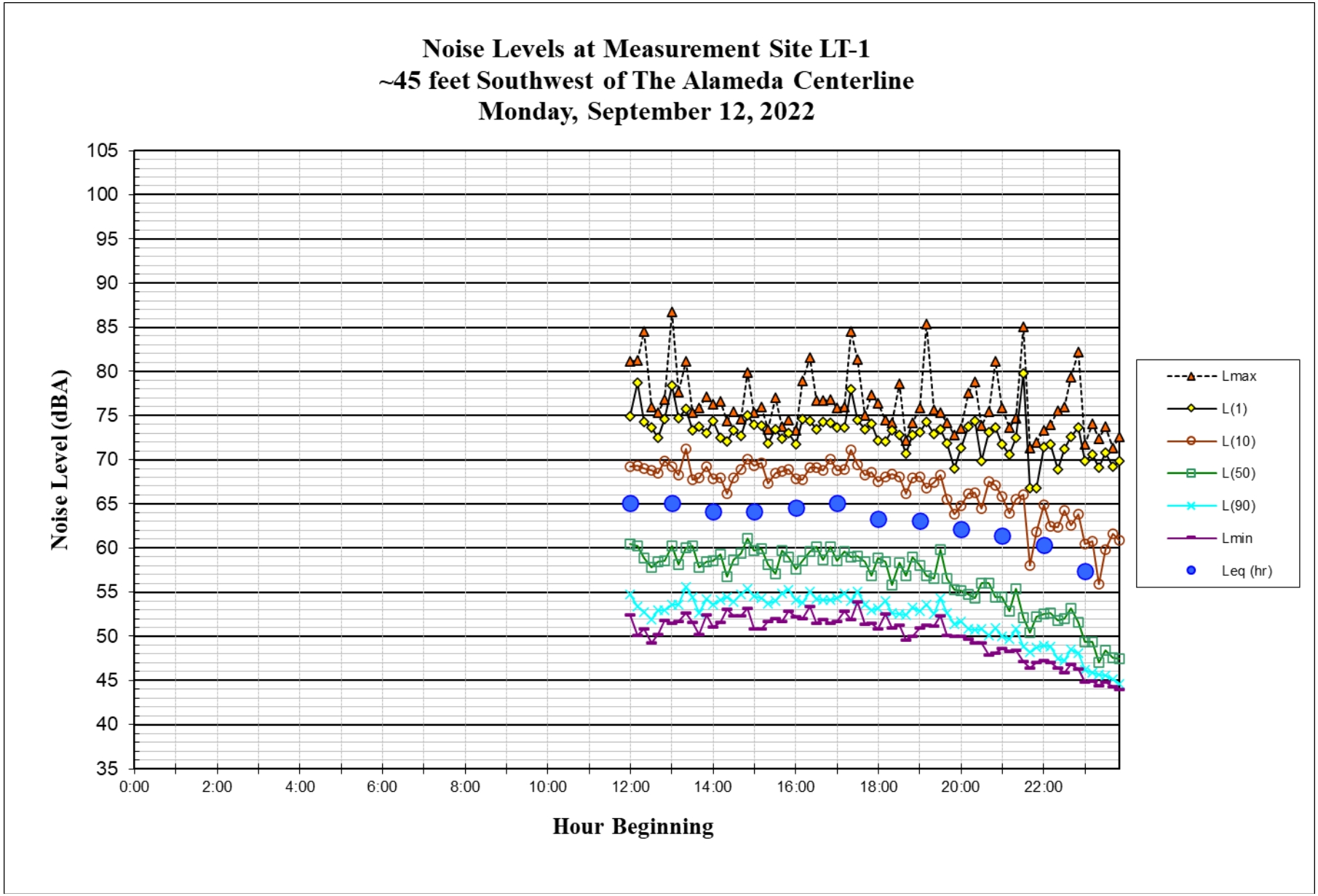
NORMAN Y. MINETA SAN JOSE INTERNATIONAL AIRPORT

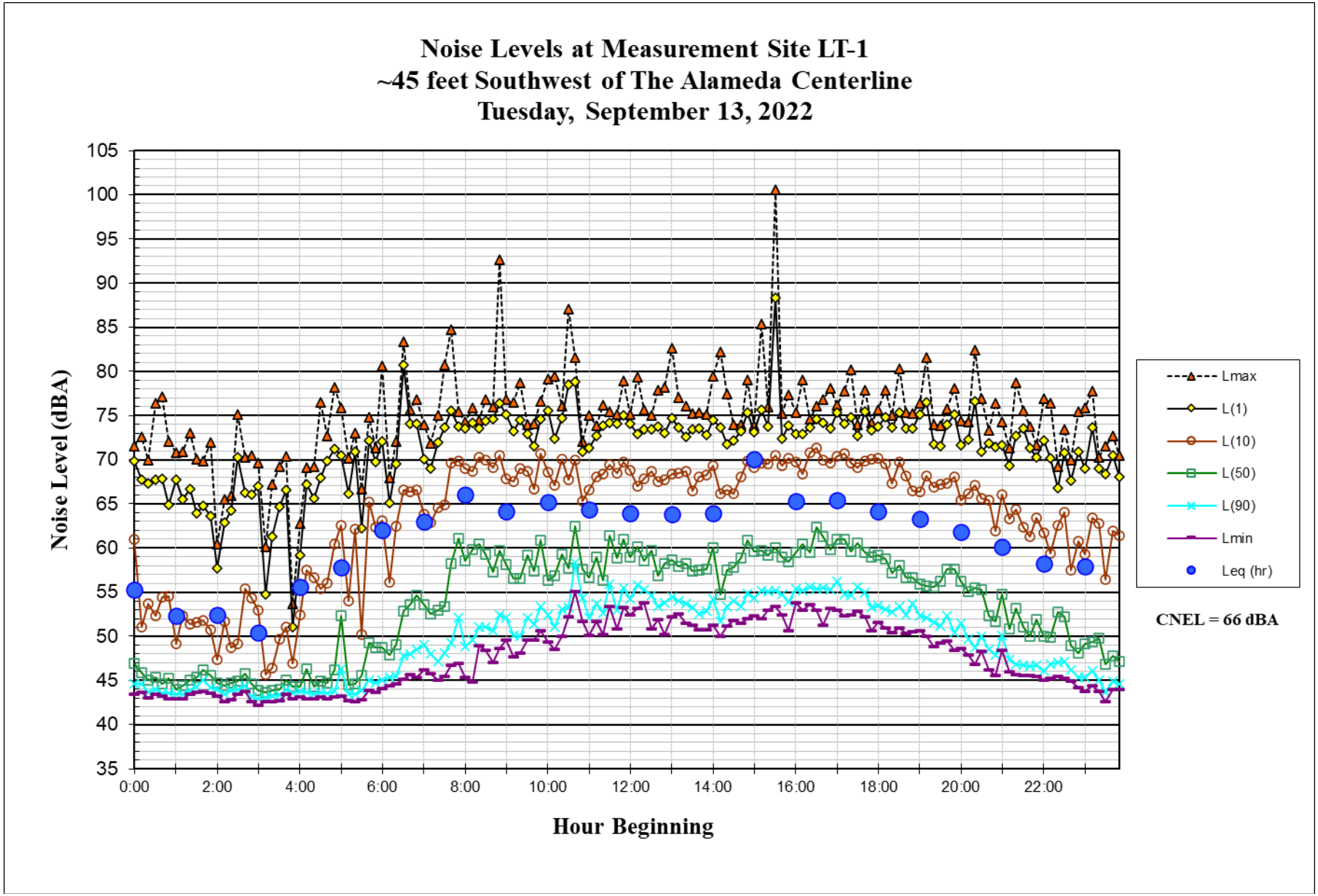
- Noise Monitoring Station
- 101 Site ID
- Runway
- 75 dBA and Greater CNEL Contour
- 70 dBA and Greater CNEL Contour
- 65 dBA and Greater CNEL Contour
- 60 dBA and Greater CNEL Contour

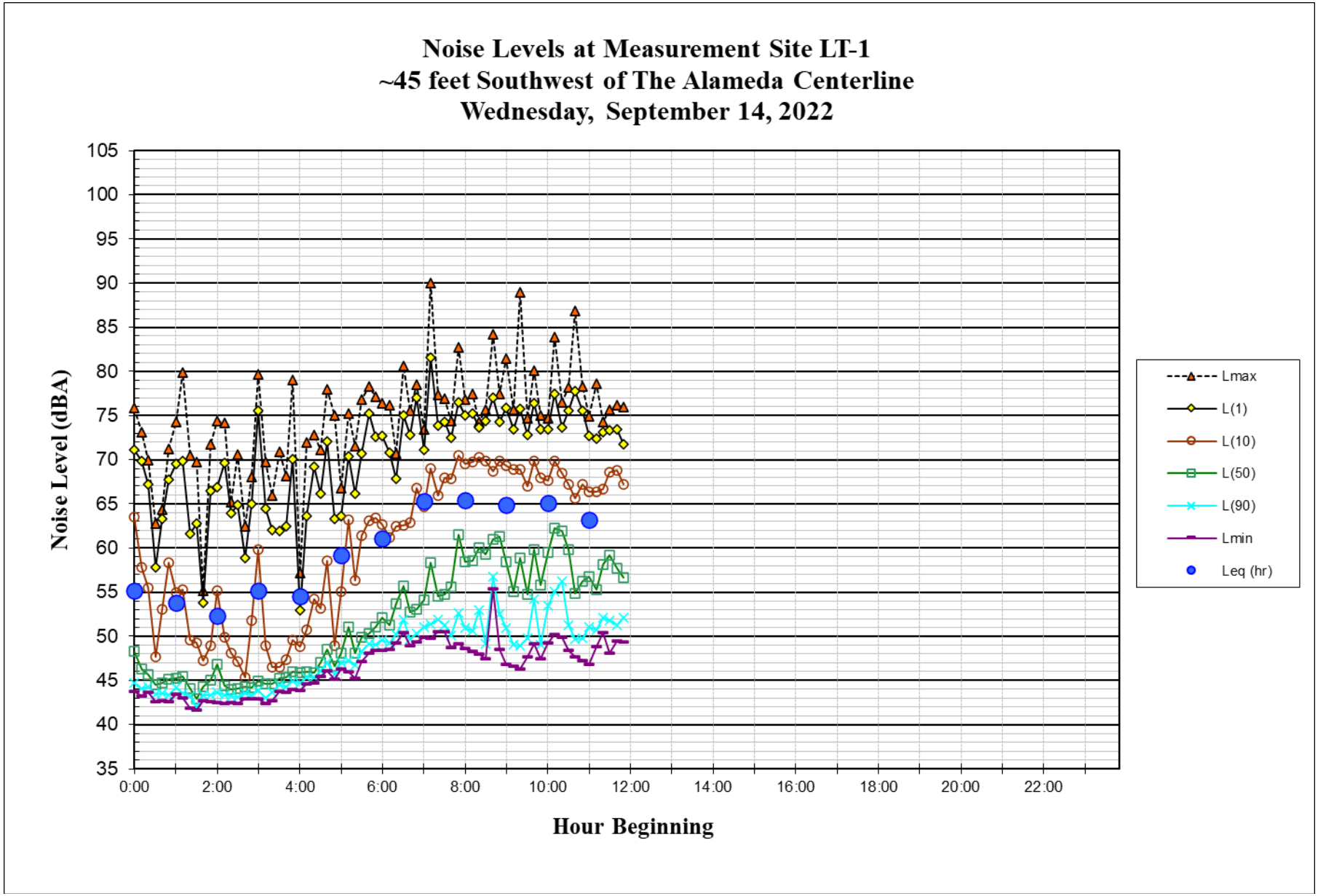
Figure 5 Scenario 2: With Project 2037 Noise Contour Map

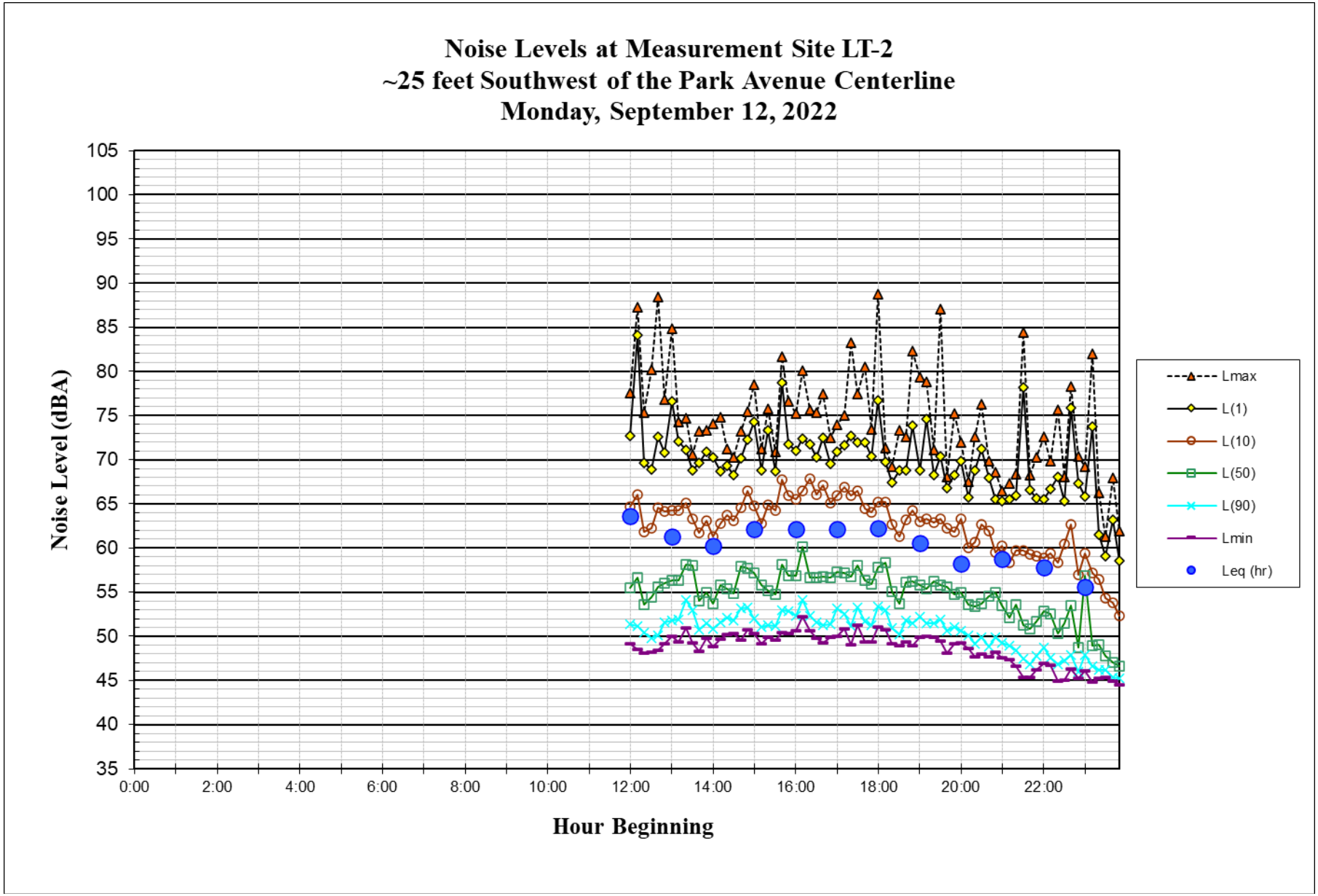
Source: BridgeNet International 2019

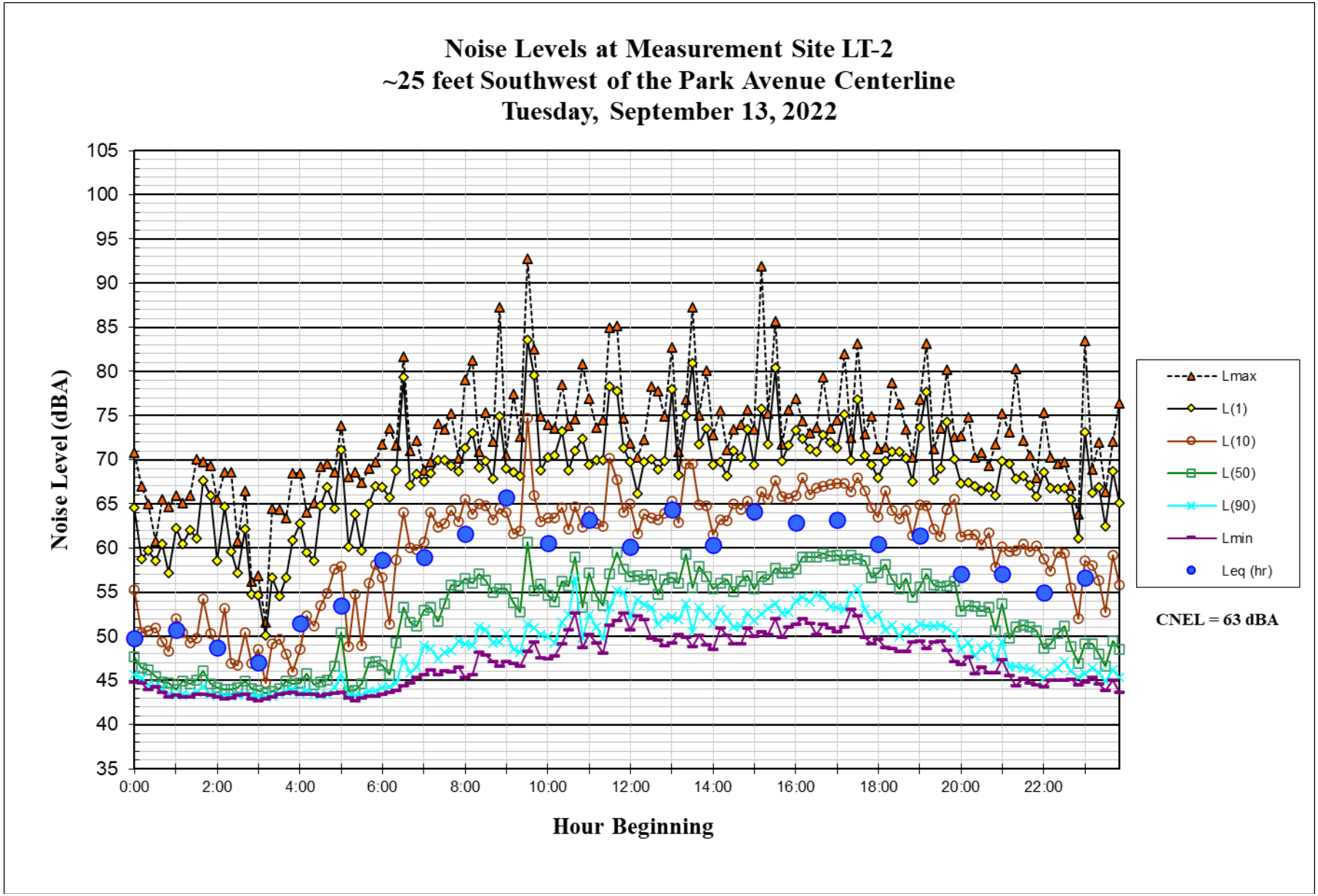
APPENDIX A – LONG-TERM NOISE DATA


Noise Levels at Measurement Site LT-1
~45 feet Southwest of The Alameda Centerline
Monday, September 12, 2022
Noise Level (dBA)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)


Noise Levels at Measurement Site LT-1
~45 feet Southwest of The Alameda Centerline
Tuesday, September 13, 2022
Noise Level (dBA)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
CNEL = 66 dBA


Noise Levels at Measurement Site LT-1
~45 feet Southwest of The Alameda Centerline
Wednesday, September 14, 2022
Noise Level (dBA)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)


Noise Levels at Measurement Site LT-2
~25 feet Southwest of the Park Avenue Centerline
Monday, September 12, 2022
Noise Level (dBA)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)


Noise Levels at Measurement Site LT-2
~25 feet Southwest of the Park Avenue Centerline
Tuesday, September 13, 2022
Noise Level (dBA)
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
CNEL = 63 dBA

Noise Levels at Measurement Site LT-2
~25 feet Southwest of the Park Avenue Centerline
Wednesday, September 14, 2022