ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, California 94931
Tel: 707-794-0400 Fax: 707-794-0405
www.illingworthrodkin.com illro@illingworthrodkin.com

Memo

Date: October 9, 2025

To: Patrick Kallas
Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

From: Adwait Ambaskar
Illingworth & Rodkin, Inc.

Subject: **Homestead Townhomes Update, Santa Clara, CA**
Noise Update (I&R Job # 25-009)

In March and May of 2025, *Illingworth & Rodkin, Inc. (I&R)* prepared a noise and vibration assessment for the mixed-use project located at 3521-3591 Homestead Road in Santa Clara, California. Modifications to the Project are now proposed. The purpose of this memo is to provide an update to the revised noise and vibration analysis of this Project which accounts for the proposed Project modifications.

Original Project – March 2025

The original Project in March 2025 included the construction of 153 townhomes across 14 buildings on the 5.55-acre site. Each unit would have a garage and there would be 56 guest parking spaces throughout the project site. There would also be an approximately 7,700 square feet (sf) open space area for the residents. The original Project was anticipated to be constructed from April 2026 to December 2028.

I&R analyzed the noise and land use compatibility in addition to CEQA significance criteria for noise and vibration for the original Project. No significant impacts were expected from temporary or permanent increase in noise levels in the vicinity of the project in excess of standards established in the City's general plan or noise ordinance, or applicable standards of other agencies. For construction vibration expected from the Project, mitigation measures were specified to reduce a potential impact to a less-than-significant level. For the noise and land use compatibility section of the assessment, preliminary recommendations and conditions of approval were identified to

control future exterior and interior noise levels at the project site to meet the City's General Plan limits.

Revised Project – May 2025

The Project design was then revised in May 2025, which reduced the Project size to 150 townhomes, 54 guest parking spaces, and 6,000-sf of open space area. It also included the addition of 2,500-sf of retail space. The construction and operation in terms of noise and vibration for the revised Project was anticipated to remain the same as compared to the original Project, with minor modifications accounting for the new retail space. I&R updated the noise and vibration assessment where the conclusions for the revised Project (temporary and permanent noise increases, construction vibration and land use compatibility) remained similar to the original Project.

Modified Project – October 2025

The Project applicant now proposes additional modifications. The modified Project plans to further reduce the townhomes to 147 units so that the retail space can be increased to 5,000-sf. The construction for the modified Project is anticipated to be the same as the original and revised Projects' construction activities. Since the modified Project would have construction activities similar to those analyzed in the May 2025 revised analysis and the original analysis, the small reduction in units and small increase in retail space would not substantially change the impact findings in the noise and vibration analysis. Additionally, no major permanent noise increases are anticipated compared to what was already evaluated for the Revised Project. Therefore, the temporary and operational noise impacts, as well as General Plan Policy/Mitigation Measure implementations, associated with the modified Project would be the same as those identified for the original and revised Project. Impacts due to construction vibration are expected to remain the same. Noise and land use compatibility recommendations and conditions of approval would also remain the same for the modified Project. No further analysis is required for the modified Project.

HOMESTEAD TOWNHOMES
NOISE AND VIBRATION ASSESSMENT

Santa Clara, California

March 17, 2025
Revised May 14, 2025

Prepared for:

Patrick Kallas
Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Adwait Ambaskar and
Michael S. Thill

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400

Project: 25-009

INTRODUCTION

The proposed project would demolish the existing uses at 3521-3591 Homestead Road in Santa Clara, California, and construct up to 60 three-story townhomes and 90 four-story townhomes across 14 buildings totaling approximately 348,778 square feet (sf). There would also be approximately 2,500-sf of retail space and an approximately 6,000-sf open space area for the residents. This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses ambient noise conditions in the project vicinity; 2) the Plan Consistency Analysis section discusses noise and land use compatibility utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

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

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

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

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.

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 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 CNEL. Typically, the highest steady traffic noise level during the daytime is about equal to the CNEL 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 to 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.[1] Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA CNEL with open windows and 65 to 70 dBA CNEL if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 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.

[1] Based on the U.S. Department of Transportation Federal Highway Administration document "Highway Traffic Noise: Analysis and Abatement Guidance" (2010) and data from Illingworth & Rodkin, Inc. noise monitoring projects.

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 CNEL 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 CNEL. At a CNEL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the CNEL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a CNEL of 60 to 70 dBA. Between a CNEL of 70 to 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 CNEL is 60 dBA, approximately 30 to 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.[2]

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.

[2] Kryter, Karl D. The Effects of Noise on Man. Menlo Park, Academic Press, Inc., 1985.

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.

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.

Regulatory Background - Noise

The State of 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. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[3] which limits daytime construction noise to 80 dBA L_{eq} at residential land uses, to 85 dBA L_{eq} at commercial land uses, and to 90 dBA L_{eq} at 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.

2022 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.

2022 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2022 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with

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

exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.

5.507.4.2 Performance method. For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

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

Santa Clara County

***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-4 No residential 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 project. All property owners within the 65 dB CNEL contour boundary who rent or lease their property for residential use shall include in their rental/lease agreement with the tenant, a statement advising that they (the tenants) are living within a high noise area and the exterior noise level is predicted to be greater than 65 dB CNEL.

N-5 Residential construction will not be permitted in the area between the 60 dB CNEL contour boundary and the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound level will be no greater than 45 dB CNEL.

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.					

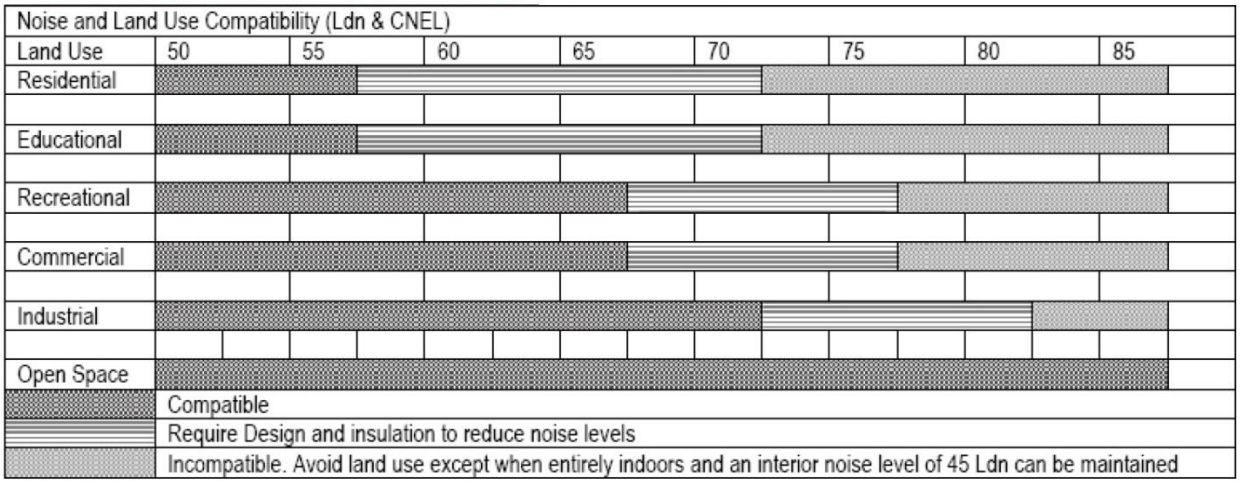
Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

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

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 receiving single- and multi-family 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.); at receiving commercial and office buildings to 65 dBA during daytime hours and 60 dBA at night; and at receiving light industrial uses to 70 dBA anytime. 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}).

Regulatory Background – Vibration

California Department of Transportation. 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, which typically consist of buildings constructed since the 1990s. Conservative vibration limits of 0.3 in/sec PPV is used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3 above for further explanation). For historical buildings or some older buildings, a vibration limit of 0.25 in/sec PPV would apply.

Existing Noise Environment

The project site is located at 3521-3591 Homestead Road in Santa Clara, California. The project site is bound by residences across Lochinvar Avenue to the north; a pre-school (Santa Clara KinderCare), residences and a commercial use (McDonald's) to the east; commercial uses to the south across Homestead Road and residences to the west across Lawrence Expressway.

The noise environment at the site and in the surrounding area results primarily from vehicular traffic along Lawrence Expressway along with local traffic along Homestead Road.

A noise monitoring survey consisting of three long-term (LT-1 to LT-3) and three short-term (ST-1 to ST-3) noise measurements was conducted between Tuesday, February 18, 2025, and Thursday, February 20, 2025.

Long-term noise measurement LT-1 was made near the southeast corner of the project site, approximately 70 feet from the Homestead Road centerline. Hourly average noise levels at LT-1 typically ranged from 64 to 77 dBA L_{eq} during the day (between 7:00 a.m. and 7:00 p.m.), from 64 to 66 dBA L_{eq} during the evening (between 7:00 p.m. and 10:00 p.m.) and from 53 to 66 dBA L_{eq} at night (between 10:00 p.m. and 7:00 a.m.). The community noise equivalent level Wednesday, February 19, 2025, was 70 dBA CNEL. The daily trend in noise levels at LT-1 is shown in Figure A1 through A3 of Appendix A.

Long-term noise measurement LT-2 was made along the western boundary of the project site, approximately 80 feet from the Lawrence Expressway centerline. Hourly average noise levels at LT-2 typically ranged from 70 to 76 dBA L_{eq} during the day (between 7:00 a.m. and 7:00 p.m.), from 70 to 73 dBA L_{eq} during the evening (between 7:00 p.m. and 10:00 p.m.) and from 62 to 73 dBA L_{eq} at night (between 10:00 p.m. and 7:00 a.m.). The community noise equivalent level Wednesday, February 19, 2025, was 76 dBA CNEL. The daily trend in noise levels at LT-2 is shown in Figure A4 through A6 of Appendix A.

Long-term noise measurement LT-3 was made along the northern boundary of the project site, approximately 30 feet from the Lochinvar Avenue centerline. Hourly average noise levels at LT-3 typically ranged from 58 to 67 dBA L_{eq} during the day (between 7:00 a.m. and 7:00 p.m.), from 58 to 62 dBA L_{eq} during the evening (between 7:00 p.m. and 10:00 p.m.) and from 50 to 60 dBA L_{eq} at night (between 10:00 p.m. and 7:00 a.m.). The community noise equivalent level Wednesday, February 19, 2025, was 64 dBA CNEL. The daily trend in noise levels at LT-3 is shown in Figure A7 through A9 of Appendix A.

Short-term noise measurements were made over 10-minute measurement periods, concurrent with the long-term noise data, on Tuesday, February 18, 2025 between 11:10 a.m. and noon. All short-term measurements are summarized in Table 4. All measurement locations are shown in Figure 1.

TABLE 4 Summary of Short-Term Noise Measurements

Noise Measurement Location	Date, Time	Measured Noise Level, dBA					
		L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	L_{eq}
ST-1: made near the northwestern corner of site	2/18/2025, 11:10-11:20	79	77	74	67	55	70
ST-2: made near the southwestern corner of site	2/18/2025, 11:30-11:40	75	73	71	66	59	67
ST-3: made along the eastern boundary of site	2/18/2025, 11:50-12:00	62	59	56	53	50	54

FIGURE 1 Aerial Image of the Project Site and Surrounding Area with the Noise Measurement Locations Identified

Source: Google Earth 2025.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

Noise levels at outdoor use areas that are affected by transportation noise are required to be maintained at or below 55 dBA CNEL to be considered normally acceptable for residential land uses, according to the City's General Plan. Additionally, residential interior noise levels are required to meet the performance standard of 45 dBA CNEL.

Noise levels are required to be maintained at or below 65 dBA CNEL to be considered normally acceptable for commercial land uses, as per the City's General Plan. Additionally, commercial interior noise levels are not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The existing noise environment measured during the noise survey showed noise levels of 64 dBA CNEL along the north boundary of the site (along Lochinvar Avenue). The western boundary of the project site measured noise levels of about 76 dBA CNEL. Noise levels along the south boundary of the project site were about 70 dBA CNEL.

The future noise environment at the project site would continue to result primarily from vehicular traffic along Lawrence Expressway and Homestead Road. Additionally, local traffic along Lochinvar Avenue could also contribute to the ambient noise environment towards the north boundary of the site.

Potential noise level increases due to traffic noise along Lawrence Expressway are considered in this analysis to assume worst-case conditions. While a full traffic study was not required for the proposed project, 58 to 67 peak hour trips would be expected during the AM and PM peak hours as a result of the project. However, compared to the existing peak hour traffic volumes along Lawrence Expressway, these peak hour trips would not result in a measurable noise level increase (i.e., 0 dBA CNEL increase).

To estimate the future permanent noise level increase, a 2% traffic increase per year through 2045 was estimated. This increase is typical for a built-out area. The noise level increase by the year 2045 was calculated to be 2 dBA CNEL. This increase was applied throughout the project site to represent worst-case conditions. Therefore, the north, west and south boundaries of the site would be exposed to noise levels of about 66 dBA CNEL, 78 dBA CNEL and 72 dBA CNEL, respectively.

Future Exterior Noise Environment

The site plan shows an outdoor park located towards the southeastern portion of the site about 215 feet away from the Lawrence Expressway centerline. Based on the noise measurements at the project site, future noise exposures at this distance are expected to be about 65 dBA CNEL. Additional shielding from the project buildings would reduce the future noise exposure at the park to about 55 dBA CNEL which would be considered acceptable per the City's exterior noise standards for residential land uses.

Based on project plans, private outdoor decks are mainly located along the building facades facing Lochinvar Avenue and along Homestead Road (Buildings 7, 8 and 14). Some private decks also directly face Lawrence Expressway (Buildings 1, and 3 to 7). Typically, the City's acceptable exterior noise standard only applies to common outdoor use areas. Exterior noise thresholds are not enforced at private balconies, porches, or front yard areas. To reduce exterior noise exposure to a conditionally acceptable level (maximum of 70 dBA CNEL) in ground-level porches and paseos between buildings, a continuous 6- to 8-foot sound wall could be installed along the Lawrence Expressway frontage. Alternatively, if the City and the applicant prefer, individual sound walls of the same height could be placed directly in front of ground-level patios, porches, and paseos adjacent to Lawrence Expressway to achieve similar noise reduction.

The commercial use building is located at the southeast corner of the project site which would be exposed to a future noise level of 74 dBA CNEL. Any outdoor uses at this commercial building would exceed the City's acceptable noise exposure of 65 dBA CNEL.

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 percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Residential units located along the western façades of the proposed project buildings facing Lawrence Expressway would be exposed to future exterior noise levels of 78 to 80 dBA CNEL. Assuming windows to be partially open, future interior noise levels in the residential units would be up to 65 dBA CNEL.

Residential units located along the northern façades of the proposed project buildings facing Lochinvar Avenue would be exposed to future exterior noise levels of 66 to 68 dBA CNEL. Assuming windows to be partially open, future interior noise levels in the residential units would be up to 53 dBA CNEL.

Residential units located along the southern façades of the proposed project buildings facing Homestead Road would be exposed to future exterior noise levels of 72 to 74 dBA CNEL. Assuming windows to be partially open, future interior noise levels in the residential units would be up to 59 dBA CNEL.

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 commercial building would be exposed to a future exterior noise exposure of 74 dBA CNEL. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 50 dBA $L_{eq(1\text{-}hr)}$.

To meet the interior noise requirements for residences set forth by the City of Santa Clara of 45 dBA CNEL, implementation of noise insulation features would be required.

Recommended 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, 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.

- Preliminary calculations indicate that residential units located along the western façades of project buildings directly adjacent to Lawrence Expressway would require windows and doors with a minimum rating of STC 42 with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA CNEL.

- Preliminary calculations indicate that residential units located along the southern boundary of the project directly facing Homestead Road would require windows and doors with a minimum rating of STC 36 with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA CNEL.

- Units along the northern façades of project buildings facing Lochinvar Avenue located would require windows and doors with a minimum rating of STC 30 with adequate forced-air mechanical ventilation.

- All remaining units would benefit from shielding provided by project buildings and other units. This implies that these units require windows and doors with standard construction materials and adequate forced-air mechanical ventilation to meet the 45 dBA CNEL interior threshold.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA CNEL or less at residential uses.

Conditions of Approval

The project applicant shall prepare final design plans that incorporate building design and acoustical treatments to ensure compliance with the State Building Code and City noise standards. A project-specific acoustical analysis shall be prepared to ensure that the design incorporates controls to reduce interior noise levels to 45 dBA CNEL or lower within the residential units. The applicant shall conform with any special building construction techniques requested by the City's

Building Department, which may include sound-rated windows and doors, sound-rated wall constructions, and acoustical caulking.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

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

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

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

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

Impact 1a: **Temporary Construction Noise.** Temporary noise increase due to construction at the nearest noise-sensitive receptors would be lower than the FTA thresholds. With the implementation of standard controls, this is a **less-than-significant** impact.

The project is expected to be constructed over a period of approximately 33 months. Construction phases would include demolition, site preparation, excavation/grading, trenching/foundation, building exterior, architectural coating, and paving. 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.

While noise thresholds for temporary construction are not provided in the City's General Plan or Municipal Code, 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*.[1] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be applied at residential land uses, and 85 dBA L_{eq} shall be applied at commercial land uses.
Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. For the proposed project, pile driving is not proposed. 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 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 results in lower construction noise levels at distant receptors.

Equipment expected to be used in each construction stage are summarized in Table 7, along with the quantity of each type of equipment and the reference noise level at 50 feet, assuming the operation of the two loudest pieces of construction equipment for each construction 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 recommended by the FTA for construction noise 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.

To assess construction noise impacts at the receiving property lines of existing noise-sensitive receptors, the worst-case hourly average noise level, which is calculated by combining all pieces of equipment per phase, was propagated from the geometrical center of the project buildings to the nearest property lines of the surrounding land uses. These noise level estimates are shown in Table 8. Noise levels in Table 8 do not assume reductions due to intervening buildings or existing barriers.

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 Estimated Construction Noise Levels for Two Loudest Pieces Of Construction Equipment per Phase At A Distance Of 50 Feet

Phase of Construction	Total Number of Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet, dBA L_{eq}
Demolition	20	Concrete/Industrial Saw (1)[a] Excavator (2) Tractor/Loader/Backhoe (2)[a]	85
Site Preparation	20	Graders (1) [a] Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2) [a]	84
Grading/Excavation	40	Excavator (2) Grader (2)[a] Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (3) [a]	84
Trenching/Foundation	260	Tractor/Loader/Backhoe (1)[a] Concrete Trucks & Pumper (1)[a]	82
Building – Exterior	480	Crane (2) [a] Forklift (3) Welder (1) [a]	75
Building – Interior	360	Air Compressor (4)[a] Aerial Lift (4)[a]	75
Paving	15	Paver (1) Paving Equipment (1)[a] Roller (1) Tractor/Loader/Backhoe (2) [a]	85

[a] Denotes two loudest pieces of construction equipment per phase.

TABLE 8 Estimated Construction Noise Levels for the Proposed Project at the Property Lines of Receptors Surrounding the Project Site

Phase	Calculated Hourly Average L_{eq}, dBA				
	North Lochinvar Ave Residences (375 ft)	East Preschool (245 ft)	East Bing Drive Residences (200 ft)	East Commercial (230 ft)	West Residences (370 ft)
Demolition	69	73	75	74	69
Site Preparation	68	72	74	73	69
Grading/Excavation	71	75	77	76	72
Trenching	65	68	70	69	65
Building-Exterior	61	64	66	65	61
Building-Interior/ Architectural Coating	63	67	69	67	63
Paving	69	73	74	73	69

As shown in Tables 7 and 8, construction noise levels would intermittently range from 75 to 85 dBA L_{eq} when activities occur 50 feet from nearby receptors. When focused near the center of the project buildings, construction noise levels would typically range from 61 to 77 dBA L_{eq} at the surrounding residential buildings, from 64 to 75 dBA L_{eq} at the preschool and from 65 to 76 dBA L_{eq} at the nearest commercial building.

Construction noise levels would not exceed the FTA's 85 dBA L_{eq} threshold at adjacent commercial buildings and would not exceed the FTA's 80 dBA L_{eq} threshold at the nearest residences.

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. The construction crew shall 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. The incorporation of construction best management practices would reduce temporary construction noise levels as much as possible.

Construction Best Management Practices

- Ensure that excavating, grading and filling activities, and other construction activities (including the loading and unloading of materials and truck movements) within 300 feet of residentially zoned property, are limited 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.

- 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 to reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.

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

- 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.

Mitigation Measure 1a: No further mitigation measures required.

Impact 1b: **Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would not result in a substantial permanent noise increase at receptors in the project vicinity. Operational noise levels generated by the proposed project would not exceed the City's Municipal Code thresholds. 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 measurements made in the project site vicinity indicate that existing and future ambient noise levels at the noise-sensitive receptors in the project site vicinity would result in noise levels over 60 dBA CNEL. Therefore, a significant impact would occur if project-generated permanent noise sources increased levels by 3 dBA CNEL or more.

Under the City of Santa Clara Municipal Code, noise generated by fixed sources of noise would be restricted to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and to 50 dBA during

nighttime hours (10:00 p.m. to 7:00 a.m.) at residentially-zoned land uses. At receiving commercial and office buildings, noise would be restricted to 65 dBA during daytime hours and 60 dBA at night. At existing industrial land uses, noise would be restricted to 70 dBA anytime.

Project Traffic Increase

The transportation analysis report prepared for this project indicates that less vehicle trips would be expected with the proposed project as compared to existing conditions. Compared to the existing traffic volumes in the area along Lawrence Expressway and Homestead Road, these peak hour trips would not result in a measurable or detectable noise level increase or decrease. This impact is a less-than-significant impact.

Mechanical Equipment

The proposed project would not include any rooftop heating, ventilation, and air conditioning equipment (HVAC) for the residences. Condensers for cooling would be located on the ground level of the buildings in walled areas outside each structure. The proposed project would not include backup generators to support the project buildings.

Typical noise levels produced by residential HVAC units would range from 53 to 63 dBA at 3 feet during operation. These types of units typically cycle on and off continuously during daytime and nighttime hours. Assuming that the operation of up to 10 units simultaneously at any given time would be audible for the nearest sensitive receptors, the estimated hourly average noise level at 3 feet would be 73 dBA L_{eq}, and the community noise equivalent level would be 80 dBA CNEL (at 3 feet), assuming this worst hour level operates over a 24-hour period.

Table 9 shows the estimated HVAC equipment noise propagated to the surrounding land uses.

TABLE 9 Operational Noise Levels for HVAC equipment

Receptor	Distance from HVAC Equipment, feet	Hourly L_{eq}, dBA	CNEL, dBA	Noise Level Increase, dBA CNEL
North residences (Lochinvar Ave)	110	42	49	0
East Preschool	50	49	56	0
East Bing Drive Residences	50	49	56	0
West Residences	165	38	45	0

Based on the estimated noise levels in Table 9, HVAC equipment noise levels would not exceed the City's daytime or nighttime thresholds at the neighboring preschool or residential land uses.

For the nearby noise-sensitive receptors, the noise level increase due to HVAC equipment noise would not be measurable or detectable (0 dBA CNEL increase). This would not exceed the 3 dBA CNEL threshold.

For the commercial building located at the southeast corner of the site, typical air handling units produce noise levels of about 62 dBA at 20 feet. The nearest commercial receptor to the east would be exposed to an hourly average noise level of 55 dBA L_{eq} at 55 feet. This would be less than the City's Municipal Code limit of 65 dBA during daytime hours. The resulting noise level increase would not be measurable or detectable (0 dBA CNEL increase). The nearest residential receptor would be located more than 500 feet away from the proposed commercial building where noise level increases from mechanical equipment would not be measurable or detectable considering the distance and the existing noise environment.

Truck Loading and Unloading

According to project plans, trash pickup trucks would enter the site from the north (Lochinvar Avenue) and south (Homestead Road). Trash pickup trucks would generate a combination of engine, exhaust, and tire noise, as well as releases of compressed air associated with truck/trailer air brakes and dumpster unloading. Maximum instantaneous noise levels typically range from 70 to 75 dBA L_{max} at a distance of 50 feet. One trash pickup in a 24-hour period would result in an hourly average noise level of 64 dBA L_{eq} at 50 feet, assuming about five minutes per pickup. Noise from trash pickups would be noticeable only for the north and east sensitive receptors. These would be located about 60 feet and 85 feet respectively from the proposed trash pickup truck paths.

The community noise equivalent level corresponding to trash pickup trucks at the north residences would be about 49 dBA CNEL. For the sensitive receptors to the east (preschool and Bing Drive residences), this community noise equivalent level would be about 46 dBA CNEL. Therefore, the noise level increase due to trash pickups would not be measurable or detectable (0 dBA CNEL increase). This would not exceed the 3 dBA CNEL threshold.

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment, truck loading and unloading) would not result in a measurable noise level increase (i.e., 0 dBA CNEL) at all existing noise-sensitive receptors in the project vicinity. Therefore, the proposed project would not result in a substantial increase over ambient noise levels in the project vicinity.

Operational noise levels due to mechanical equipment and truck loading and unloading at the surrounding land uses would not exceed the City's thresholds. This is a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 2: **Exposure to Excessive Groundborne Vibration.** Construction-related vibration levels would potentially exceed applicable vibration thresholds at nearby sensitive land uses. **This is a potentially significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

The California Department of Transportation (Caltrans) recommends a vibration limit of 0.5 in/sec PPV for new residential and modern commercial/industrial structures, which typically consist of buildings constructed since the 1990s. A vibration limit of 0.3 in/sec PPV is used for older residential structures, which would apply to most structures built since the 1940s. For historical buildings or some older buildings, a vibration limit of 0.25 in/sec PPV would apply. These vibration limits are conservative and designed to provide protection for existing buildings in California. Vibration levels exceeding these thresholds would be capable of cosmetically damaging adjacent buildings. Cosmetic damage (also known as threshold damage) is defined as hairline cracking in plaster, the opening of old cracks, the loosening of paint, or the dislodging of loose objects. Minor damage is defined as hairline cracking in masonry or the loosening of plaster. Major structural damage is defined as wide cracking or the shifting of foundation or bearing walls.

Each of the residential buildings and the preschool surrounding the site are considered structures built to modern construction standards, and the 0.5 in/sec PPV threshold would apply to vibration generated by project construction. Conservatively, the 0.3 in/sec PPV threshold would be applied to the residences and preschool surrounding the site since construction dates for these buildings is not known. According to the City's website,[4] there are no historical buildings located within 200 feet of the project site.

Table 10 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. 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. Table 10 also summarizes the distances to the 0.3 in/sec PPV threshold for older conventional buildings and to the 0.5 in/sec PPV threshold for newer buildings constructed to modern standards.

[4] https://www.santaclaraca.gov/our-city/departments-a-f/community-development/planning-division/historic-preservation

TABLE 10 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Minimum Distance to Meet 0.3 in/sec PPV (feet)	Minimum Distance to Meet 0.5 in/sec PPV (feet)
Clam shovel drop		0.202	18	11
Hydromill (slurry wall)	in soil	0.008	1	<1
	in rock	0.017	2	2
Vibratory Roller		0.210	19	12
Hoe Ram		0.089	9	6
Large bulldozer		0.089	9	6
Caisson drilling		0.089	9	6
Loaded trucks		0.076	8	5
Jackhammer		0.035	4	4
Small bulldozer		0.003	<1	<1

Source: Transit Noise and Vibration Impact Assessment Manual, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2018, as modified by Illingworth & Rodkin, Inc., February 2025.

Vibration levels are highest close to the source and then attenuate with increasing distance at the rate $\left({}^{D_{ref}}/_{D}\right)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line. Further, construction vibration impacts are assessed based on the potential for damage to buildings on receiving land uses, not at receptors at the nearest property lines. Table 11 summarizes the vibration levels at the surrounding buildings in the project vicinity.

TABLE 11 Vibration Levels for Construction Equipment at Nearest Buildings Adjoining the Project Site

Equipment		PPV (in/sec) Estimated at Nearest Buildings Adjoining the Project Site				
		North Residences (70 ft)	East Preschool (55 ft)	East Residences (15 ft)	East Commercial (25 ft)	West Residences (180 ft)
Clam shovel drop		0.065	0.085	**0.354**	0.202	0.023
Hydromill (slurry wall)	in soil	0.003	0.003	0.014	0.008	0.001
	in rock	0.005	0.007	0.030	0.017	0.002
Vibratory Roller		0.068	0.088	**0.368**	0.210	0.024
Hoe Ram		0.029	0.037	0.156	0.089	0.010
Large bulldozer		0.029	0.037	0.156	0.089	0.010
Caisson drilling		0.029	0.037	0.156	0.089	0.010
Loaded trucks		0.024	0.032	0.133	0.076	0.009
Jackhammer		0.011	0.015	0.061	0.035	0.004
Small bulldozer		0.001	0.001	0.005	0.003	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., February 2025.

Project construction activities would potentially generate vibration levels up to 0.368 in/sec PPV at the nearest residences adjoining the site to the east. This would exceed the Caltrans limit of 0.3 in/sec PPV. A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[5] The findings of this study have been applied to buildings affected by construction-generated vibrations.[6] As reported in USBM RI 8507[6] and reproduced by Dowding,[7] Figure 2 presents the damage probability, in terms of "threshold damage" (described above as cosmetic damage), "minor damage," and "major damage," at varying vibration levels.

As shown in Figure 2, maximum vibration levels of 0.368 in/sec PPV or lower would result in no cosmetic damage. No minor or major damage would be expected at the buildings immediately adjoining the project site.

Neither cosmetic, minor, or major damage would occur at buildings located 20 feet or more from the project site. 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.

In summary, the construction of the project would potentially generate vibration levels exceeding the Caltrans threshold of 0.3 in/sec PPV at the closest residences to the east of the project site. This would be a potentially significant impact.

Mitigation Measure 2:

The following measures would be implemented by the project applicant:

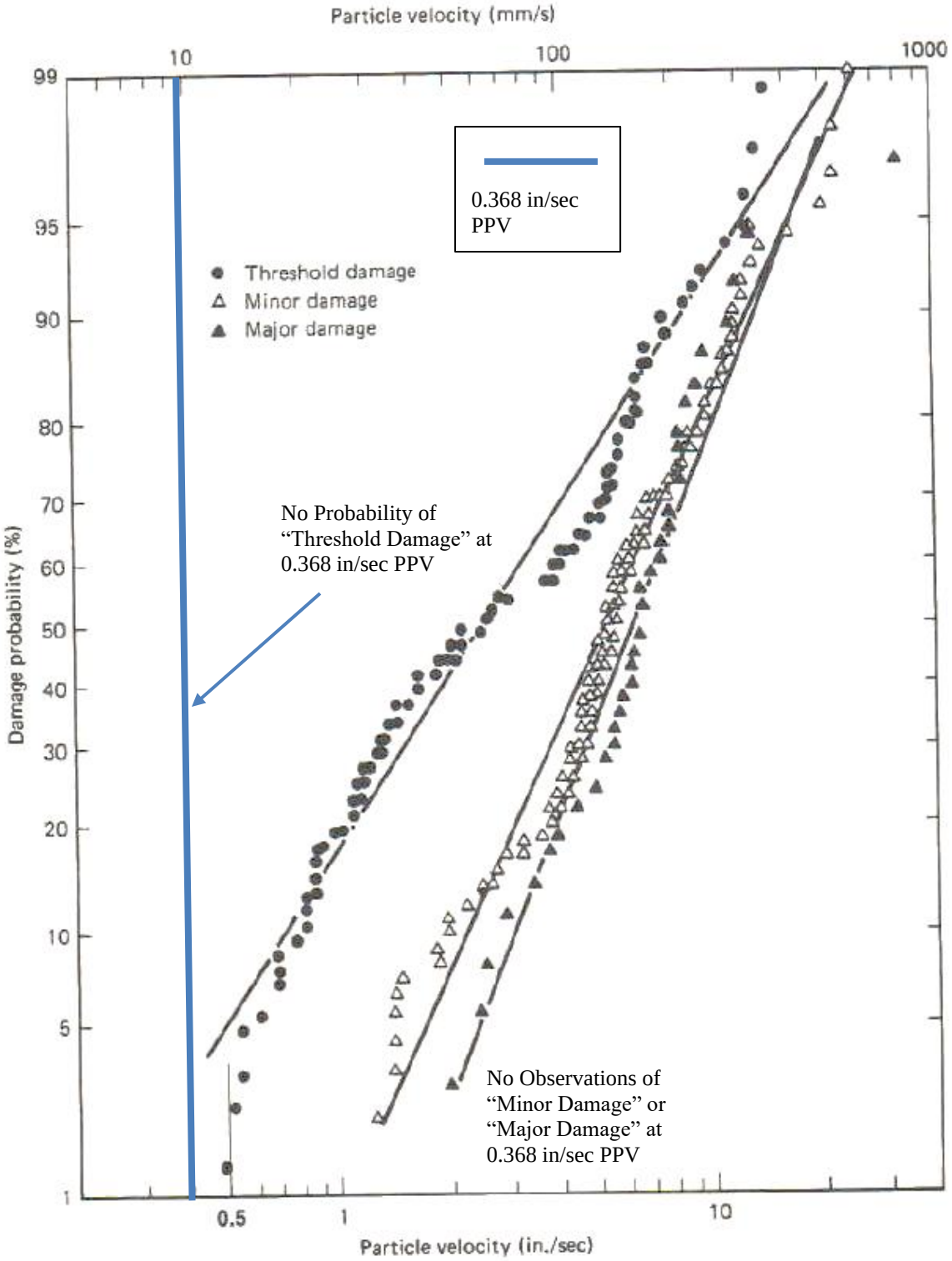
- Avoid dropping heavy equipment and using vibratory rollers within 30 feet of sensitive structures adjoining the project site to the east.

- Use a smaller vibratory roller, such as the Caterpillar model CP433E vibratory compactor, when compacting materials within 30 feet of adjacent buildings. Only use static compaction mode when compacting materials within 15 feet of buildings.

The implementation of these mitigation measures would reduce a potential impact to a less-than-significant level.

[5] Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration form Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.
[6] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

FIGURE 2 Probability of Cracking and Fatigue from Repetitive Loading



Mitigation Measure 2: None required.

Impact 3: **Excessive Aircraft Noise.** The project site is located more than 4 miles from San José Mineta International Airport, and the noise environment attributable to aircraft is considered compatible under the Santa Clara County ALUC noise compatibility policies. This is a **less-than-significant** impact

San José Mineta International Airport is a public-use airport located more than 4 miles east of the project site. According to the San Jose's Airport Master Plan Environmental Impact Report,[7] the project site lies outside the 60 dBA CNEL/L_{dn} contour line. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

Assuming standard construction materials for aircraft noise below 60 dBA L_{dn}, the future interior noise levels resulting from aircraft would be below 45 dBA L_{dn}. Therefore, future interior noise at the proposed building would be compatible with aircraft noise. This would be a less-than-significant impact.

Mitigation Measure 3: **None required.**

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

Cumulative Impacts

Cumulative noise impacts would include either cumulative traffic noise increases under future conditions or temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA CNEL or greater for future levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future levels at or below 60 dBA CNEL; 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 CNEL or more attributable solely to the proposed project.

The transportation analysis for the project did not include peak hour turning movements for the cumulative (no project) and cumulative plus project scenarios. Considering that the project would not generate any net new trips, the project trips would also be insignificant under future cumulative conditions. Therefore, the project is not expected to result in a significant cumulative traffic noise increase. This is a less-than-significant impact.

From the City's website,[8] no planned or approved project would be located within 1,000 feet of the project site. Therefore, no cumulative construction impact is expected from this project.

[8] https://missioncity.maps.arcgis.com/apps/MapTour/index.html?appid=5afdbed13fad458cb6288c46a0bad060

APPENDIX A

FIGURE A1 Daily Trend in Noise Levels for LT-1, Tuesday, February 18, 2025

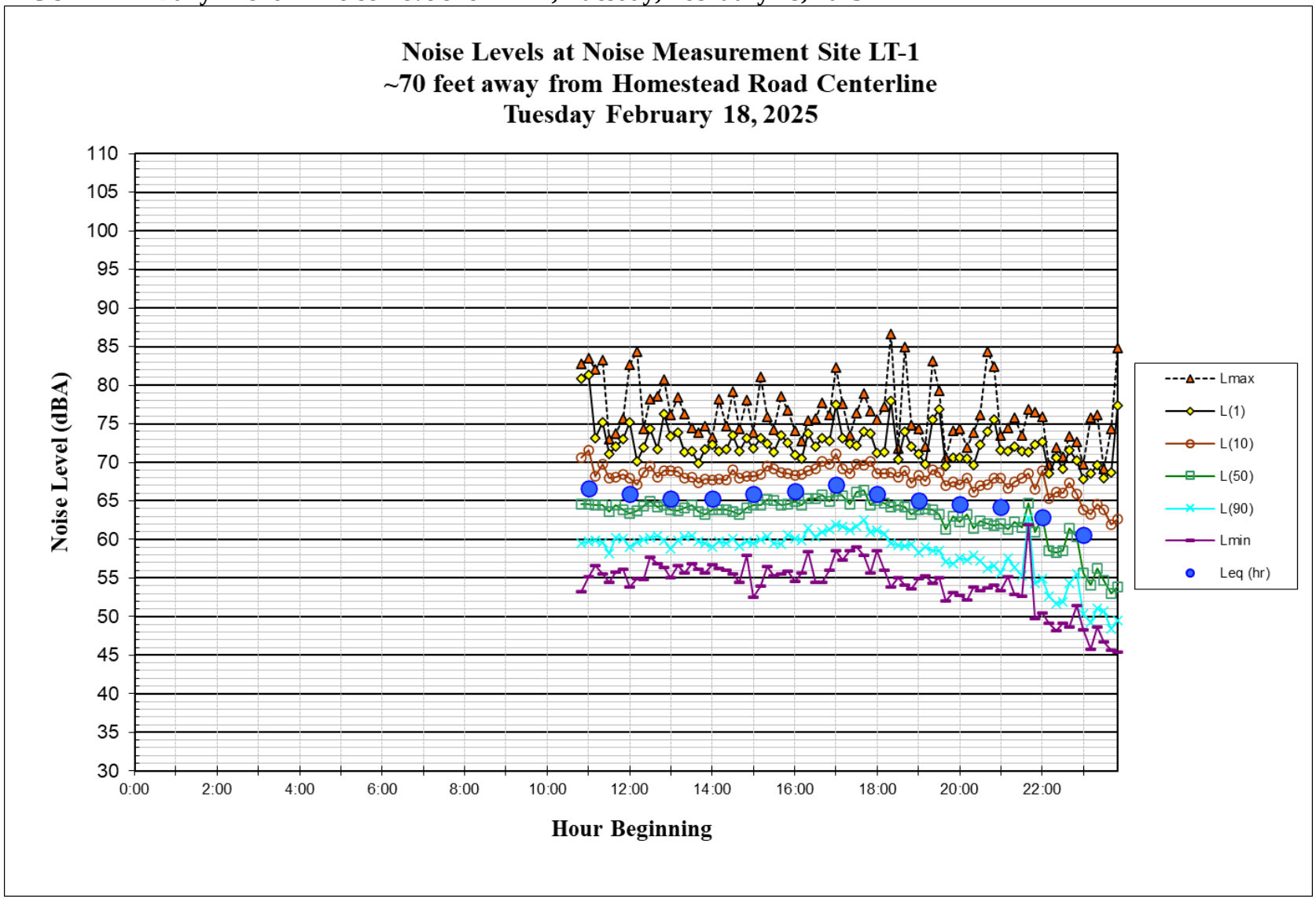


FIGURE A2 Daily Trend in Noise Levels for LT-1, Wednesday, February 19, 2025

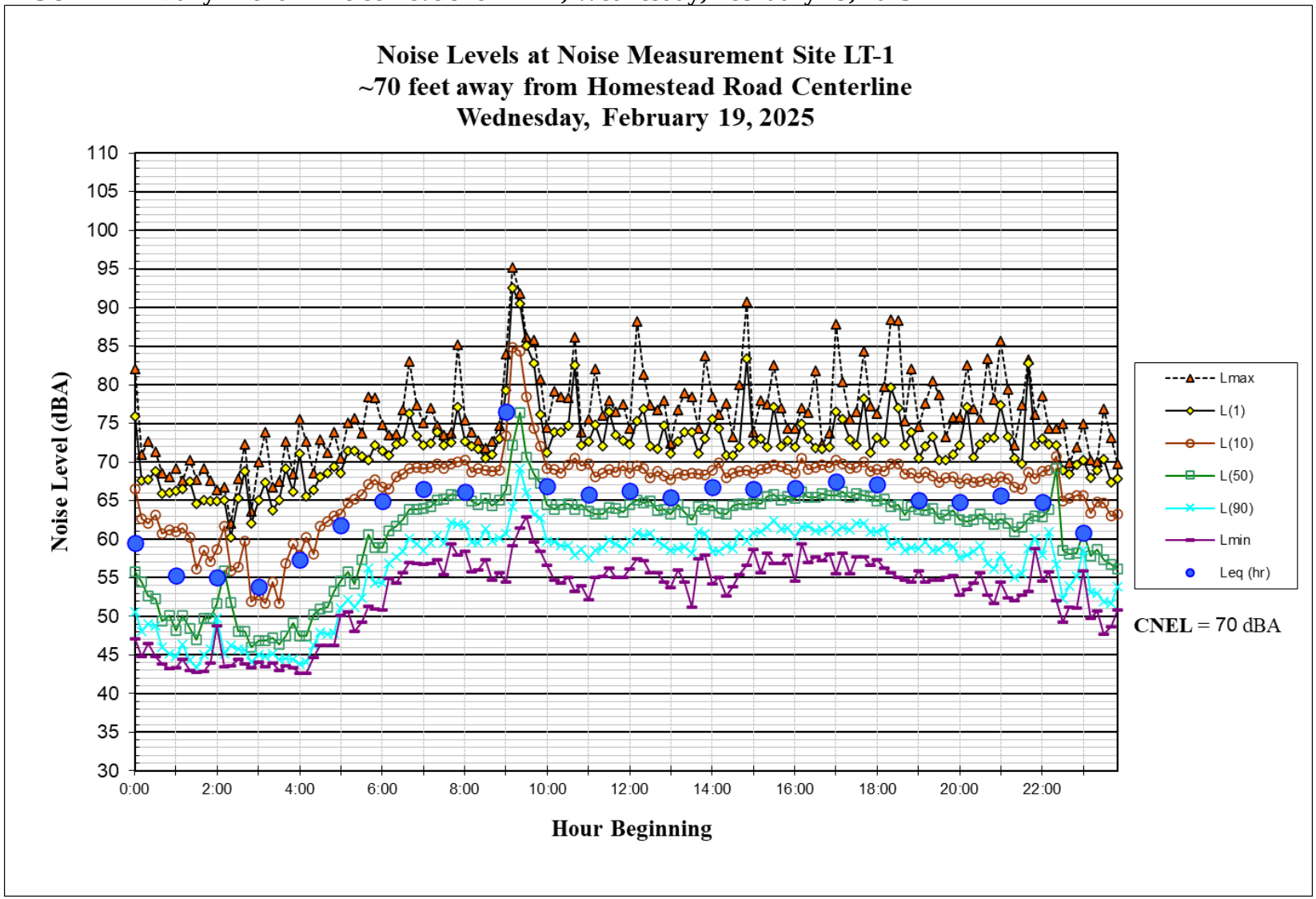


FIGURE A3 Daily Trend in Noise Levels for LT-1, Thursday, February 20, 2025

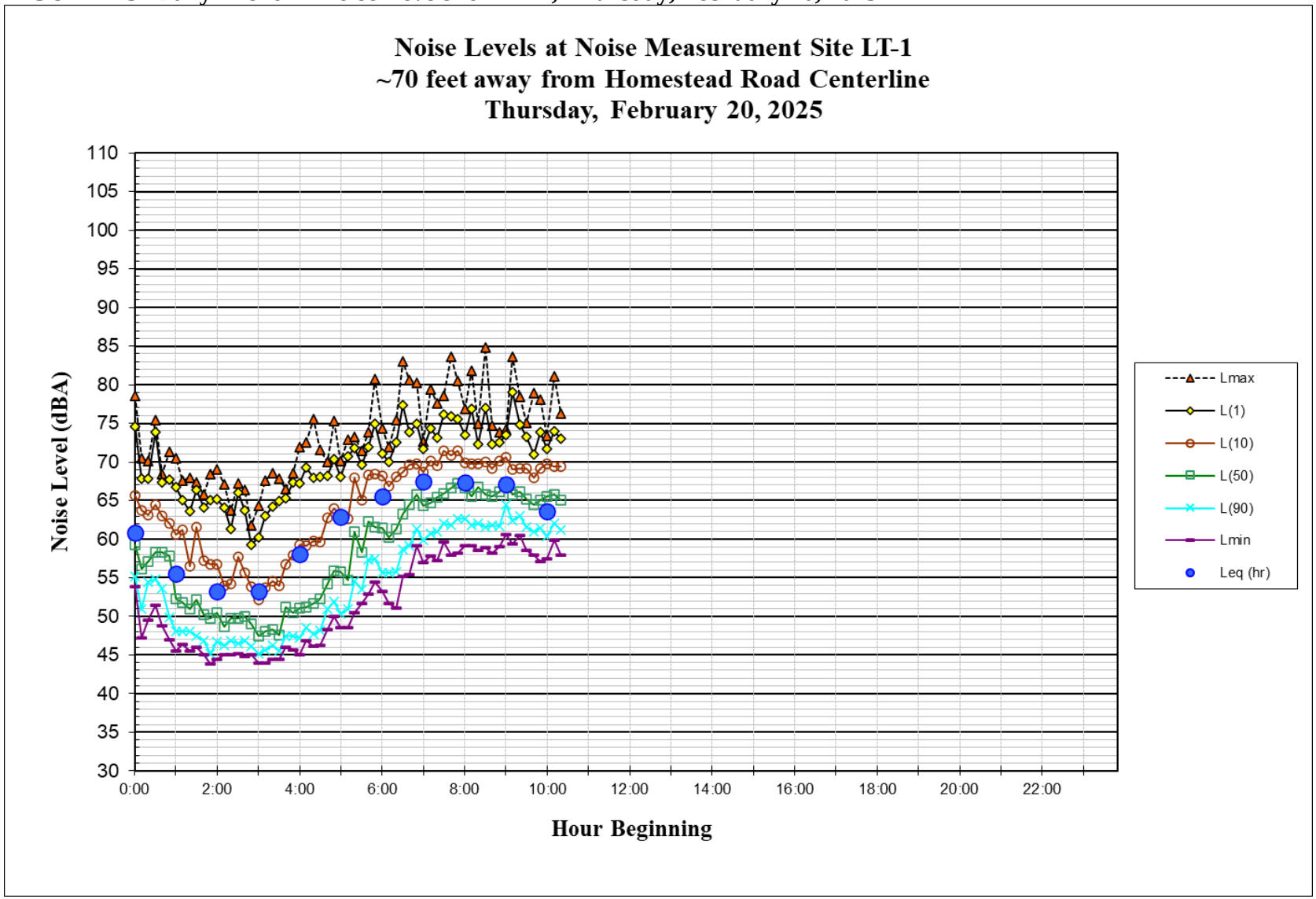


FIGURE A4 Daily Trend in Noise Levels for LT-2, Tuesday, February 18, 2025

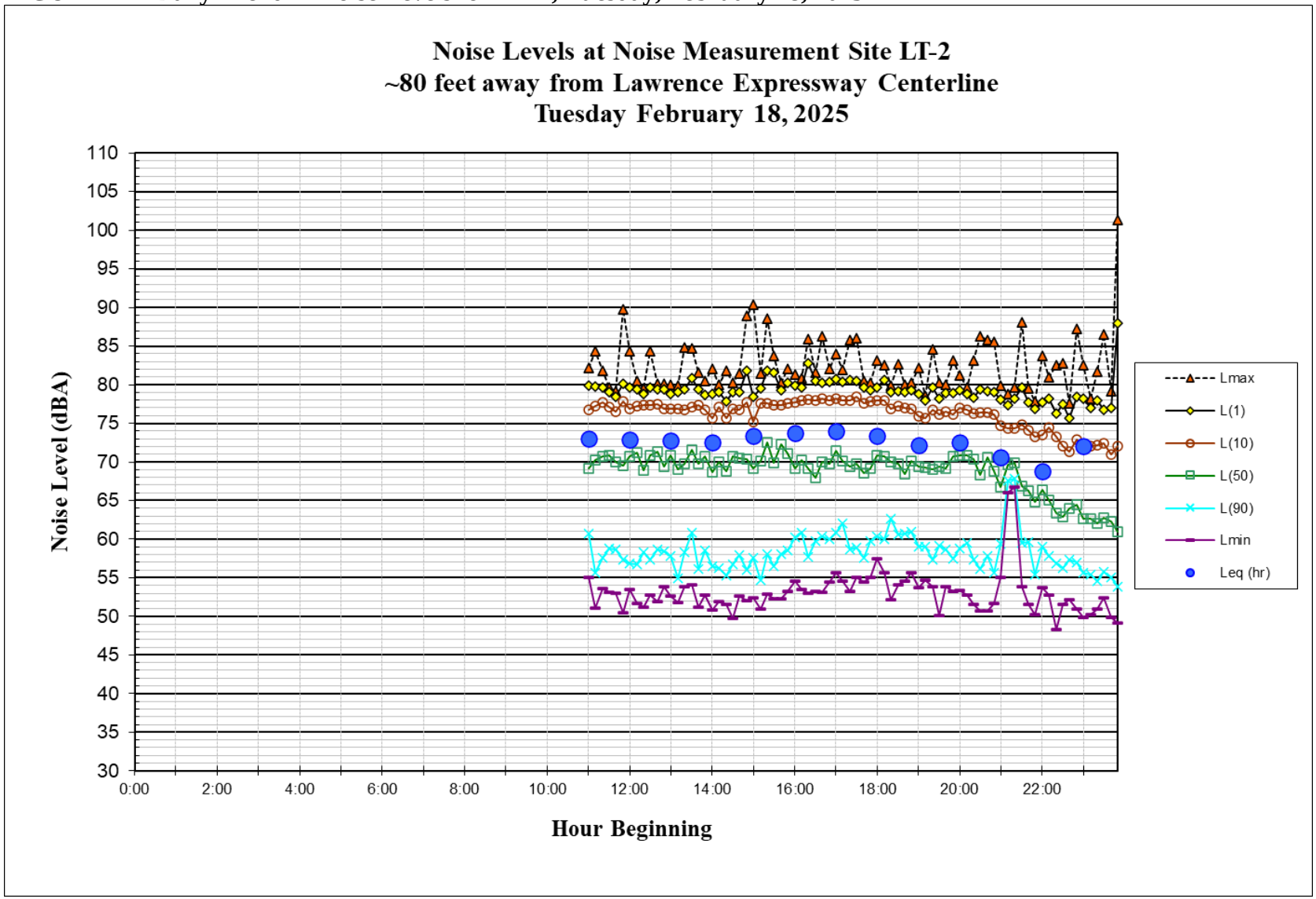


FIGURE A5 Daily Trend in Noise Levels for LT-2, Wednesday, February 19, 2025

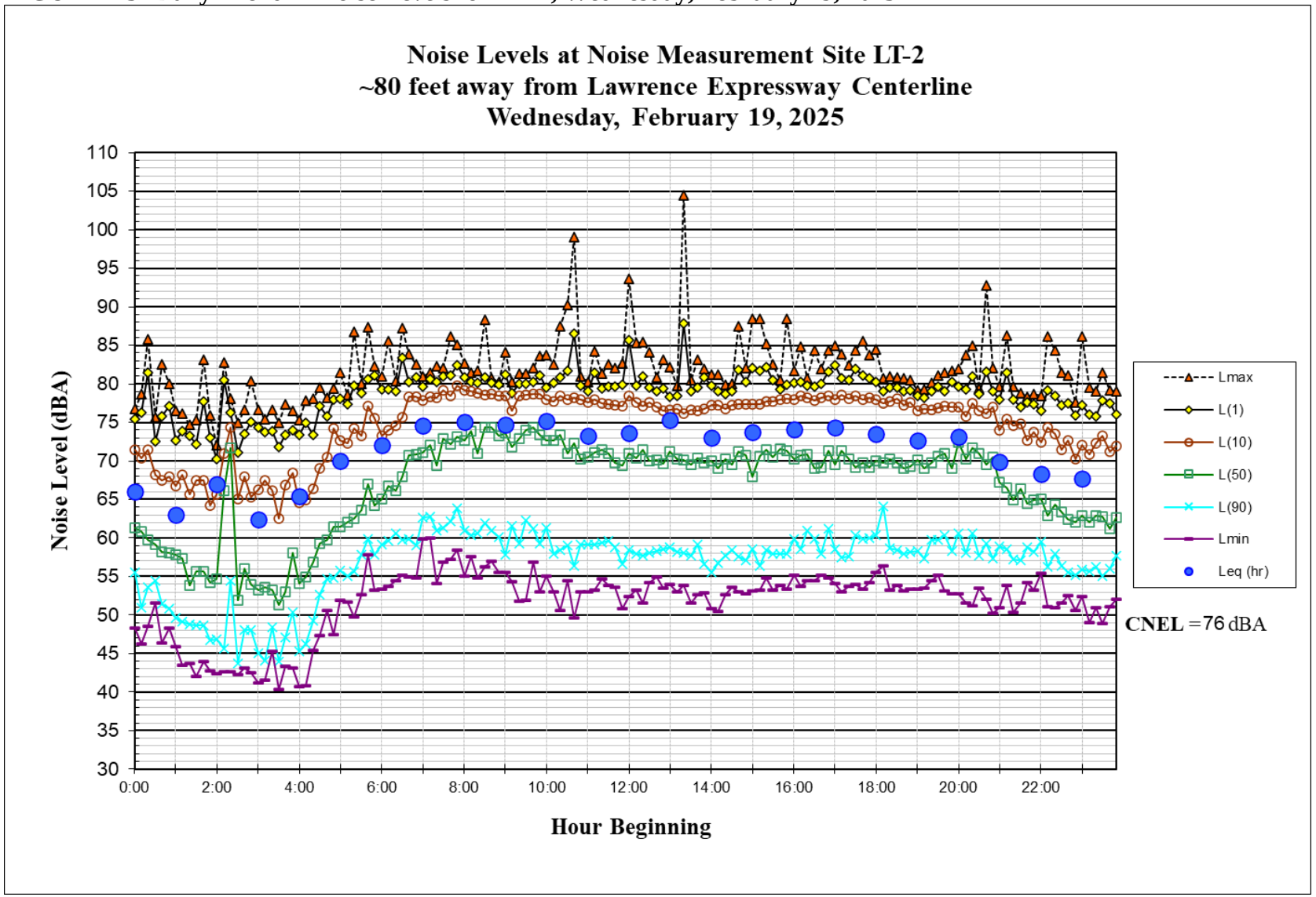


FIGURE A6 Daily Trend in Noise Levels for LT-2, Thursday, February 20, 2025

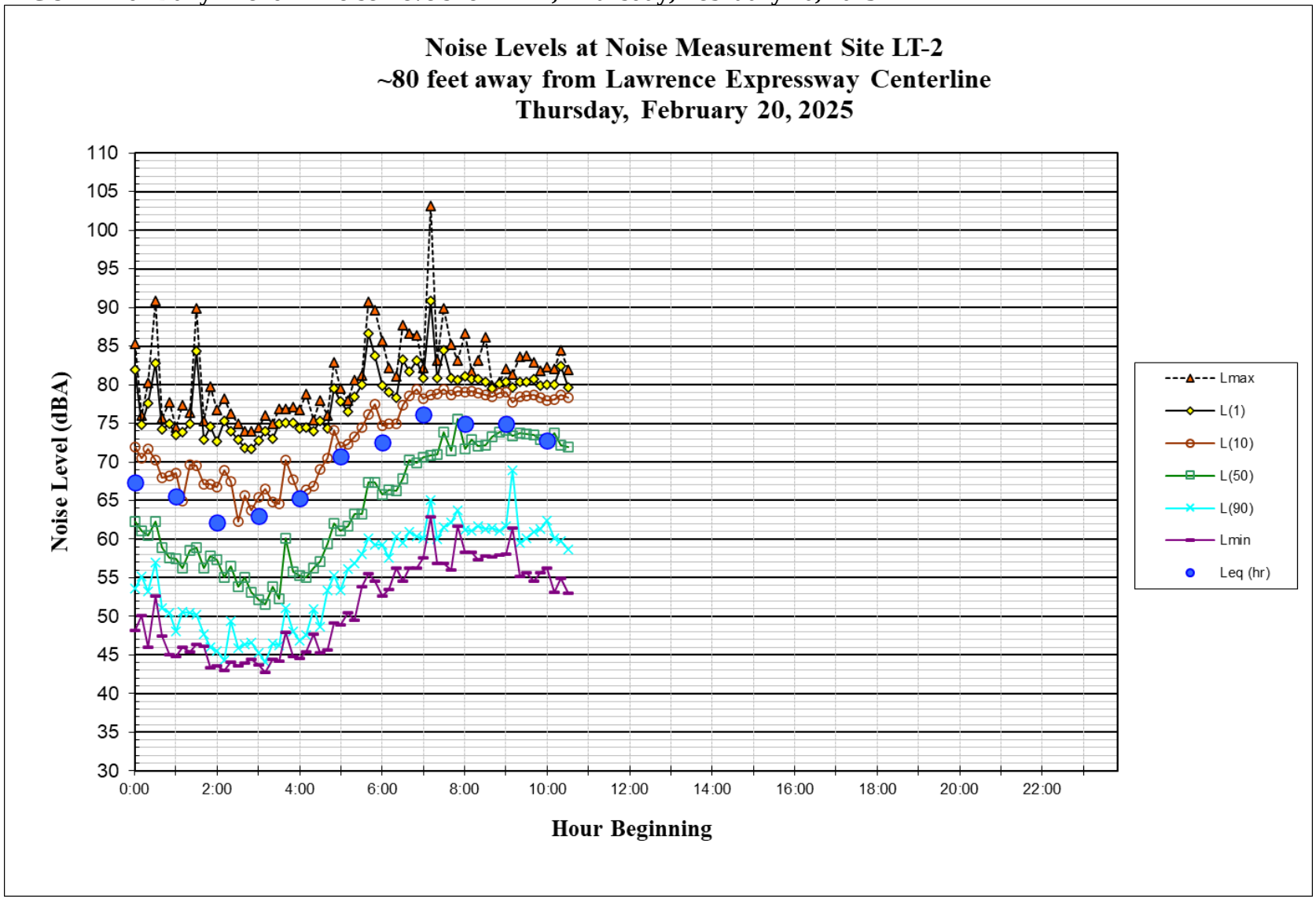


FIGURE A7 Daily Trend in Noise Levels for LT-3, Tuesday, February 18, 2025

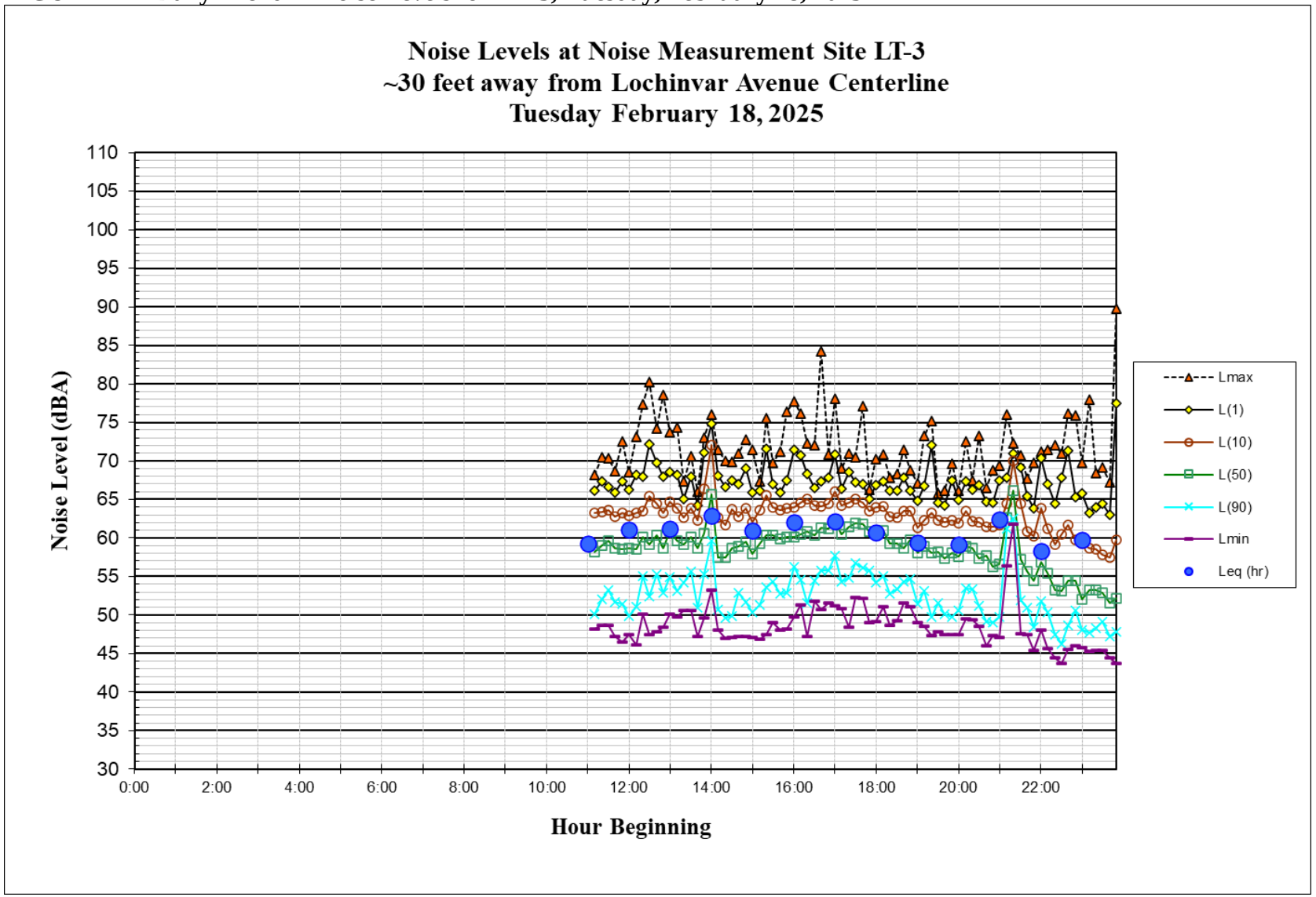


FIGURE A8 Daily Trend in Noise Levels for LT-3, Wednesday, February 19, 2025

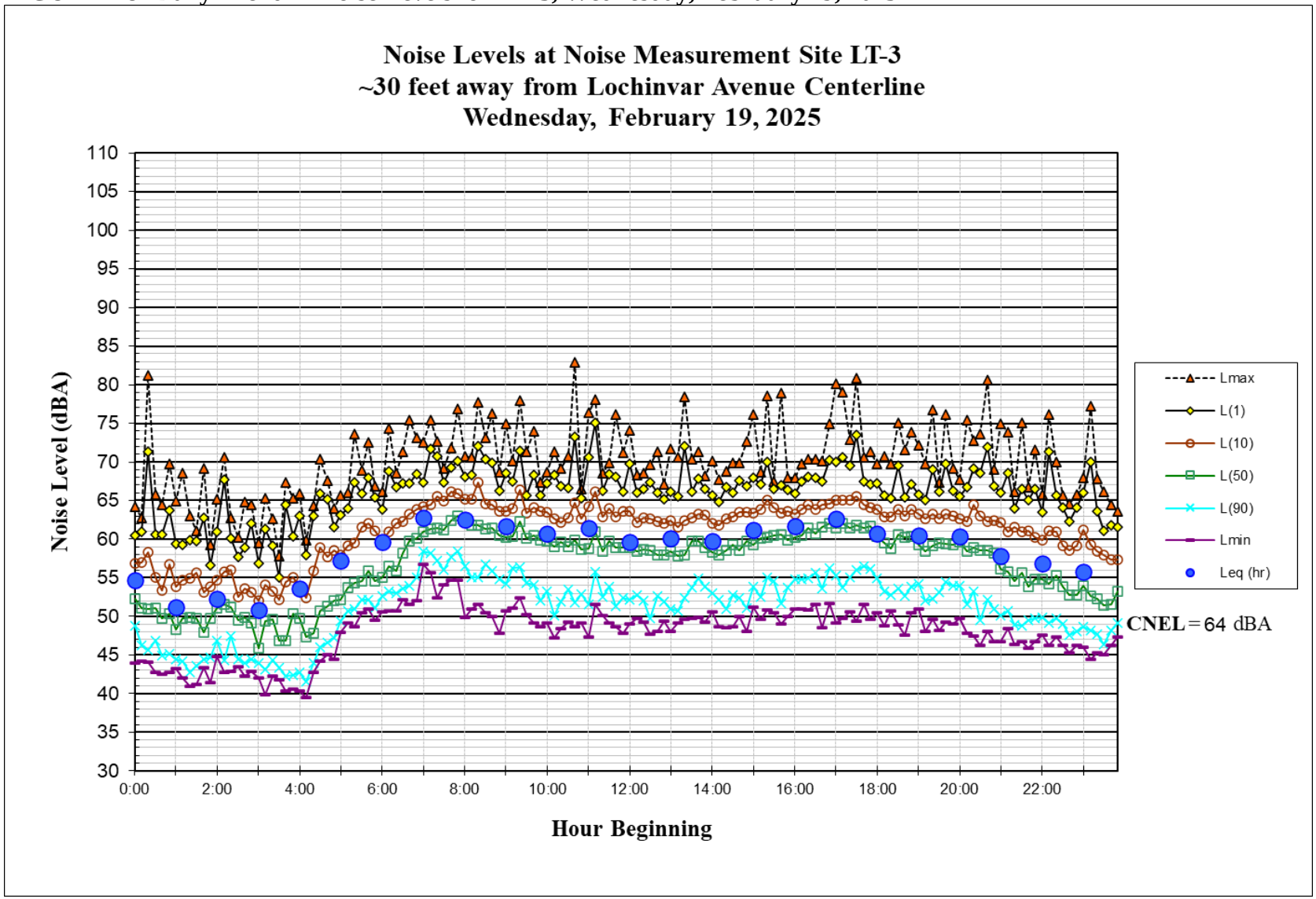


FIGURE A9 Daily Trend in Noise Levels for LT-3, Thursday, February 20, 2025