BLOCK 21 - EAST 3RD AVENUE / SOUTH DELAWARE STREET NOISE AND VIBRATION ASSESSMENT

San Mateo, California

February 18, 2022

Prepared for:

Matthew Moore
Associate Project Manager
David J. Powers & Associates, Inc.
1736 Franklin Street, Suite 300
Oakland, CA 94612

Prepared by:

Carrie J. Janello
Michael S. Thill

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

I&R Job No.: 21-183

INTRODUCTION

A six-story mixed-use project is proposed at 500 East 3rd Avenue in San Mateo, California. The proposed project would include 111 residential units, 180,950 square feet of office space, and two levels of below-grade parking. Construction of the project would include demolition of the existing on-site buildings associated surface parking lots.

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 mitigate 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.

This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA 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 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. Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} 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.

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 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a L_{dn} of 60 to 70 dBA. Between a L_{dn} 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 L_{dn} 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.

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.

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 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 – Noise

This section describes the relevant guidelines, policies, and standards established by State Agencies and the City of San Mateo. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State of California

State CEQA Guidelines. The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

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

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

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

2019 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

2019 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 2019 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 exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\,(1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

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

City of San Mateo

City of San Mateo General Plan: The Noise Element of the City of San Mateo General Plan sets forth goals and policies to control environmental noise and protect citizens from excessive noise exposure. The goals and policies relevant to this project are summarized below:

GOAL 1: Protect "noise sensitive" land uses from excessive noise levels.

POLICIES:

N 1.1: Interior Noise Level Standard. Require submittal of an acoustical analysis and interior noise insulation for all "noise sensitive" land uses listed in Table N-1 that have an exterior noise level of 60 dB (L_{dn}) or above, as shown on Figure N-1. The maximum interior noise level shall not exceed 45 dB (L_{dn}) in any habitable rooms.

N 1.2: Exterior Noise Level Standard. Require an acoustical analysis for new parks, play areas, and multi-family common open space (intended for the use and the enjoyment of residents) that have an exterior noise level of 60 dB (L_{dn}) or above, as shown on Figure N-1. Require an acoustical analysis that uses peak hour L_{eq} for new parks and play areas. Require a feasibility analysis of noise reduction measures for public parks and play areas. Incorporate necessary mitigation measures into residential project design to minimize common open

space noise levels. Maximum exterior noise should not exceed 67 dB (L_{dn}) for residential uses and should not exceed 65 dB (L_{eq}) during the noisiest hour for public park uses.

GOAL 2: Minimize unnecessary, annoying and unhealthful noise.

POLICIES:

N 2.1: Noise Ordinance. Continue implementation and enforcement of City's existing noise control ordinance: (a) which prohibits noise that is annoying or injurious to neighbors of normal sensitivity, making such activity a public nuisance, and (b) restricts the hours of construction to minimize noise impact.

N 2.2: Minimize Noise Impact. Protect all "noise-sensitive" land uses listed in Tables N-1 and N-2 from adverse impacts caused by noise generated on-site by new developments. Incorporate necessary mitigation measures into development design to minimize noise impacts. Prohibit long-term exposure increases of 3 dB (L_{dn}) or greater at the common property line, excluding existing ambient noise levels.

N 2.3: Minimize Commercial Noise. Protect land uses other than those listed as "noise sensitive" in Table N-1 from adverse impacts caused by the on-site noise generated by new developments. Incorporate necessary mitigation measures into development design to minimize noise impacts. Prohibit new uses that generate noise levels of 65 dB (L_{dn}) or above at the property line, excluding existing ambient noise levels.

N 2.4: Traffic Noise. Recognize projected increases in ambient noise levels resulting from traffic increases. Promote the installation of noise barriers along highways where "noise-sensitive" land uses listed in Table N-1 are adversely impacted by unacceptable noise levels [60 dB (L_{dn}) or above]. Require adequate noise mitigation to be incorporated into the widening of SR 92 and US 101. Accept noise increases on El Camino Real at existing development and require new multi-family development to provide common open space having a maximum exterior noise level of 67 dB (L_{dn}).

TABLE N-1
NOISE SENSITIVE LAND-USE COMPATIBILITY GUIDELINES FOR COMMUNITY NOISE ENVIRONMENTS[1]
Day-Night Average Sound Level (L_{dn}), Decibels

Land-Use Category	Normally Acceptable[2]	Conditionally Acceptable[3]	Normally Unacceptable[4]
Single-Family Residential	50 to 59	60 to 70	Greater than 70
Multi-Family Residential	50 to 59	60 to 70	Greater than 70
Hotels, Motels, and Other Lodging Houses	50 to 59	60 to 70	Greater than 70
Long-Term Care Facilities	50 to 59	60 to 70	Greater than 70
Hospitals	50 to 59	60 to 70	Greater than 70
Schools	50 to 59	60 to 70	Greater than 70
Multi-Family Common Open Space Intended for the Use and Enjoyment of Residents	50 to 67	--	Greater than 67

TABLE N-2
NOISE GUIDELINES FOR OUTDOOR ACTIVITIES
Average Sound Level (L_{eq}), Decibels

Land Use Category	Normally Acceptable[2]	Conditionally Acceptable[3]	Normally Unacceptable[4]
Parks, Playgrounds	50 to 65*	--	Greater than 65*

[1] These guidelines are derived from the California Department of Health Services, Guidelines for the Preparation and Content of the Noise Element of the General Plan, 2003. The State Guidelines have been modified to reflect San Mateo's preference for distinct noise compatibility categories and to better reflect local land-use and noise conditions. It is intended that these guidelines be utilized to evaluate the suitability of land-use changes only and not to determine cumulative noise impacts. Land uses other than those classified as being "noise sensitive" are exempt from these compatibility guidelines.

[2] Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

[3] Conditionally Acceptable – New construction should be undertaken only after a detailed analysis of the noise reduction requirement is conducted and needed noise insulation features included in the design.

[4] Normally Unacceptable – New construction 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.

* Average Sound Level (L_{eq}) for peak hour.

City of San Mateo Municipal Code: The Noise Regulations of the San Mateo Municipal Code, Chapter 7.30 are set forth to protect the inhabitants of the City against all forms of nuisances.

Section 7.30.040 Maximum Permissible Sound Levels. It is unlawful for any person to operate or cause to be operated any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other property to exceed:

(1) The noise level standard for that property as specified in Table 7.30.040 for a cumulative period of more than thirty minutes in any hour;

(2) The noise level standard plus five dB for a cumulative period of more than fifteen minutes in any hour;

(3) The noise level standard plus ten dB for a cumulative period of more than five minutes in any hour;

(4) The noise level standard plus fifteen dB for a cumulative period of more than one minute in any hour; or

(5) The noise level standard or the maximum measured ambient level, plus twenty dB for any period of time.

If the measured ambient level for any area is higher than the standard set in Table 7.30.040, then the ambient shall be the base noise level standard for purposes of this section. In such cases, the noise levels for purposes of subsections (2) through (5) of this section shall be increased in five dB increments above the ambient.

Table 7.30.040: Noise Level Standards

Noise Zone	Time Period	Noise Level, dBA
Noise Zone 1	10 p.m.--7 a.m.	50
	7 a.m.--10 p.m.	60
Noise Zone 2	10 p.m.--7 a.m.	55
	7 a.m.--10 p.m.	60
Noise Zone 3	10 p.m.--7 a.m.	60
	7 a.m.--10 p.m.	65
Noise Zone 4	Anytime	70

Section 7.30.060 Special Provisions. Construction, alteration, repair, or land development activities authorized by a valid city permit shall be allowed at the following times:

- Weekdays: between 7:00 a.m. and 7:00 p.m.
- Saturdays: between 9:00 a.m. and 5:00 p.m.
- Sundays and Holidays: between 12:00 p.m. and 4:00 p.m.
- Or at other such hours as authorized or restricted by the permit, so long as they meet the following conditions:

1. No individual piece of equipment shall produce a noise level exceeding 90 dBA at a distance of 25 feet. If the device is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close to 25 feet as possible.
2. The noise level outside of any point outside the property plane of the project shall not exceed 90 dBA.

Existing Noise Environment

The project site occupies the block between East 3rd Avenue and East 4th Avenue and between South Claremont Street and South Delaware Street in San Mateo, California. West of the project site, opposite South Claremont Street, is an existing office/residential building and a future office/residential building currently under construction. Commercial uses are located north of the site, opposite East 3rd Avenue; east of the site, opposite South Delaware Street; and south of the site, opposite East 4th Avenue.

The existing noise environment at the site results primarily from local vehicular traffic along East 3rd Avenue, East 4th Avenue, and South Delaware Street. Distant U.S. Highway 101 (Highway 101) traffic noise, train noise from the nearby tracks one block to the west, and aircraft associated with the San Francisco International Airport also contribute to the noise environment.

A noise monitoring survey, which included two long-term and four short-term noise measurements, was performed at the site between Wednesday January 5, 2022 and Friday January 7, 2022. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 25 feet from the centerline of East 3rd Avenue, along the northern boundary of the project site. Hourly average noise levels at LT-1 typically ranged from 64 to 75 dBA L_{eq} during the day and from 54 to 68 dBA L_{eq} at night. The day-night average noise level (L_{dn}) for the 24-hour period occurring on Thursday January 6, 2022 was 71 dBA L_{dn}. The daily trends in noise levels at LT-1 are shown in Figures A1 through A3 in the Appendix of this report.

Noise measurement LT-2 was made approximately 30 feet from the centerline of East 4th Avenue, along the southern boundary of the project site. Hourly average noise levels at LT-2 typically ranged from 65 to 70 dBA L_{eq} during the day and from 48 to 66 dBA L_{eq} at night. The day-night average noise level (L_{dn}) for the 24-hour period occurring on Thursday January 6, 2022 was 69 dBA L_{dn}. The daily trends in noise levels at LT-2 are shown in Appendix Figures A4 through A6.

Four short-term noise measurements were made on Wednesday January 5, 2025 in 10-minute intervals between 12:10 p.m. and 1:50 p.m. ST-1 was made midway between East 3rd Avenue and East 4th Avenue along South Delaware Street, approximately 35 feet from the centerline. During this measurement, traffic noise along South Delaware Street included passenger cars typically ranging from 62 to 64 dBA and heavy trucks typically ranging from 68 to 74 dBA. Loud vehicle pass-bys resulted in noise levels up to 78 dBA, while a distant train horn generated noise levels of 69 dBA. The 10-minute average noise level at ST-1 was 65 dBA $L_{eq(10\text{-}min)}$.

ST-2 was made near the front yard of 217 South Claremont Street, approximately 25 feet east of the centerline of the roadway. Passenger vehicles along South Claremont Street generated noise levels of 62 to 64 dBA during this 10-minute period, while heavy trucks generated noise levels ranging from 68 to 70 and a bus pass-by resulted in noise levels of 72 dBA. Distant train horns generated noise levels at ST-2 ranging from 72 to 74 dBA. The 10-minute average noise level at ST-2 was 61 dBA $L_{eq(10\text{-}min)}$.

ST-3 was made at the east end of the Taco Bell parking lot, on the block south of the project site. ST-3 was approximately 100 feet south of the centerline of East 4th Avenue and approximately 115 feet east of the centerline of South Claremont Street. Typical vehicular traffic noise ranged from 56 to 58 dBA. Noise levels from cars starting their engines in the parking lot ranged from 62 to 64 dBA, and train horns ranged from 68 to 70 dBA. The 10-minute average noise level at ST-3 was 59 dBA $L_{eq(10\text{-}min)}$.

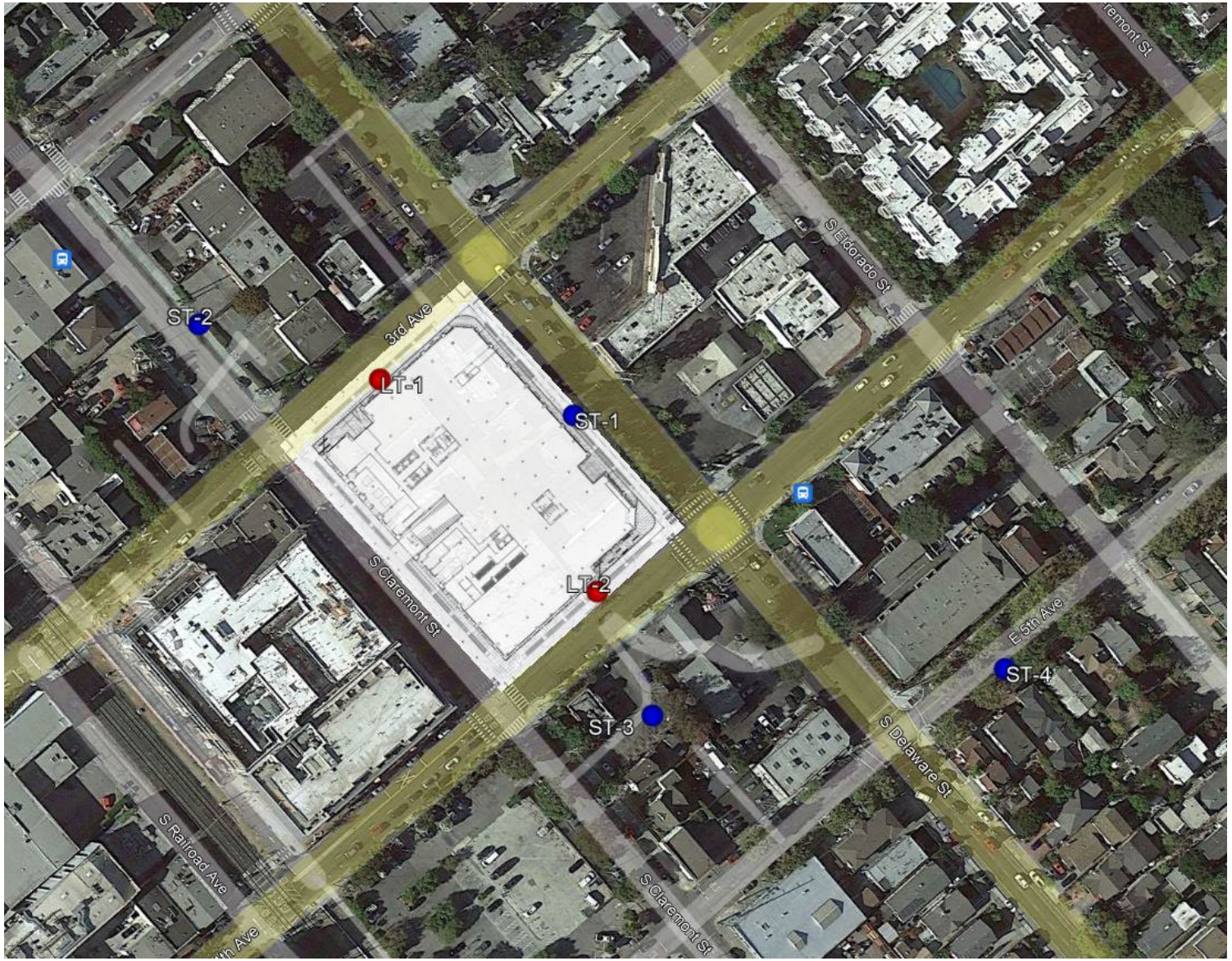
ST-4 was made near the front yard of 610 East 5th Avenue, approximately 15 feet south of the centerline of the roadway. Ambient traffic noise from surrounding roadways typically ranged from 48 to 52 dBA. Passenger cars along East 5th Avenue generated noise levels ranging from 64 to 66 dBA, and heavy trucks along East 5th Avenue generated noise levels ranging from 68 to 70 dBA. Train horns generated noise levels up to 77 dBA. The 10-minute average noise level at ST-4 was 62 dBA $L_{eq(10\text{-}min)}$.

Table 4 summarizes the results of the 10-minute noise measurements made at ST-1 through ST-4.

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

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10)}$
ST-1: ~35 feet west of the centerline of South Delaware Street (1/5/2022, 12:10-12:20 p.m.)	78	73	69	62	56	65
ST-2: Front of 217 South Claremont Street (1/5/2022, 12:50-1:00 p.m.)	74	71	64	58	53	61
ST-3: East end of Taco Bell parking lot (1/5/2022, 1:20-1:30 p.m.)	70	67	61	57	54	59
ST-4: Front of 610 East 5th Avenue (1/5/2022, 1:40-1:50 p.m.)	77	72	66	57	51	62

FIGURE 1 Noise Measurement Locations



Source: Google Earth, 2022.

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The City of San Mateo General Plan, which is presented in detail in the Regulatory Background section of this report, includes exterior and interior noise thresholds for residential uses. Note, the City's exterior noise thresholds apply only to common use areas and not private balconies, porches, or patios. Additionally, the State of California establishes acceptable interior noise limits within residential and non-residential land uses. The thresholds that apply to the proposed project are summarized below:

- Policy N 1.2 and Table N-1 of the City's General Plan identifies exterior noise thresholds of 59 dBA L_{dn} or below as "normally acceptable" for multi-family residential uses; however, the policy further states that common open spaces at multi-family residential buildings intended for the use and enjoyment of residents would be limited to a maximum allowable noise level of 67 dBA L_{dn}.

- The City and State's acceptable interior noise level standard is 45 dBA L_{dn} or less for the proposed residential land uses.

- The Cal Green Code standards specify an interior noise environment attributable to exterior sources not to exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas of nonresidential uses during any hour of operation.

The future noise environment at the site would continue to result primarily from vehicular traffic along nearby roadways. The traffic study completed for the proposed project included average daily traffic (ADT) volumes along the roadways surrounding the project site. Comparing the ADT volumes for the cumulative plus project scenario to the existing ADT volumes, the traffic noise level increase experienced at the project site would be up to 2 dBA L_{dn} above existing conditions with the inclusion of the proposed project.

Future Exterior Noise Environment

The proposed project includes office uses on levels one through three, with office amenity rooms on levels four and five. Residential units are located on floors four through six. A second level atrium associated with the proposed offices is shown in the site plans, as well as four office balconies located on the third level, one on each side of the building, and two office balconies located on the fourth level. Common open space areas associated with the residential component of the proposed project are located on the fourth level. Additionally, a public seating area is located on the ground level. While the City does not define exterior noise thresholds for office uses or public seating areas, other cities in the Bay Area typically limit exterior noise levels at these types of uses to 70 dBA L_{dn}.

<u>Residential Land Uses</u>
The site plan shows three common open space areas associated with the residential component of the proposed project. Each of these are located on the fourth level: one located along South

Claremont Street; one located along South Delaware Street; and one located on the interior of building.

The common open space along South Delaware Street is located in the easternmost corner of the site, with the center of the open space approximately 60 feet west of the centerline of South Delaware Street and approximately 90 feet north of the centerline of East 4th Avenue. The elevation of this outdoor use area, which would be over 40 feet above the ground, would result in noise attenuation at the center of the outdoor use are where most of the extended use would occur. The future exterior noise thresholds at the center of the common open space along South Delaware Street would be up to 63 dBA L_{dn}, which would exceed 59 dBA L_{dn} but would be less than the maximum common open space threshold of 67 dBA L_{dn}.

The common open space along South Claremont Street runs along the majority of the western façade. The center of the open space would be approximately 45 feet east of the centerline of South Claremont Street and approximately 155 feet north of the centerline of East 4th Avenue. This outdoor space would not be exposed to direct traffic noise from East 3rd Avenue. With noise attenuation from the elevation of the outdoor space, the future exterior noise thresholds at the center of the common open space along South Claremont Street would be 59 dBA L_{dn}, which would meet the noise level threshold in Policy N 1.2 and Table N-1 of the City's General Plan.

The common open space located on the interior of the building would be completely surrounded by the proposed building, with no direct exposure to the surrounding traffic noise. Therefore, the future exterior noise thresholds at the center of this common open space would be below 59 dBA L_{dn}.

While future noise levels at the centers of the residential common open space areas located along South Claremont Street and on the interior of the building would meet the City's normally acceptable threshold, the fourth level outdoor use area facing South Delaware Street would have future exterior noise levels up to 63 dBA L_{dn}. According to the City's General Plan, common open space uses for multi-family residential buildings would be allowed to have noise levels up to 67 dBA L_{dn}. Therefore, no additional measures would be required for the outdoor use area facing South Delaware Street. The proposed project would be compatible with the City's allowable exterior noise limits.

Office Land Uses

The atrium located on the second level is shown on the interior of the building, completely surrounded by the building. Future exterior noise levels at the center of the atrium would below 70 dBA L_{dn}.

Four office balconies are located on each side of the building on the third level. These balconies would have partial shielding from surrounding traffic noise by the proposed building and the elevation above the ground. Each of the third level office balconies would have future exterior noise levels below 70 dBA L_{dn}.

The two office balconies on the fourth level would be setback approximately 45 feet from the centerline of South Claremont Street and approximately 55 feet from the centerline of East 3rd

Avenue. Additionally, these balconies would have more attenuation from the additional elevation. Therefore, both fourth level office balconies would have future exterior noise levels below 70 dBA L_{dn}.

The public seating area located on the ground level would face South Delaware Street, with the center of the outdoor use area setback approximately 60 feet from the centerline of the roadway. At this distance and with partial shielding from the building on either side, future exterior noise levels at the public seating area would be 70 dBA L_{dn}.

All outdoor use areas associated with the office use and public seating would be at or below 70 dBA L_{dn}. These common use areas would be considered compatible with the future noise environment.

Future Interior Noise Environment

Residential Land Uses

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 L_{dn}, 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 L_{dn}, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Residential units are located on levels four through six of the proposed building. Units located along the eastern façade nearest South Delaware Street would be set back from the centerline of the roadway by approximately 70 feet. At this distance, the units facing South Delaware Street would be exposed to future exterior noise levels up to 71 dBA L_{dn}. Assuming windows to be partially open, future interior noise levels in these units would be up to 56 dBA L_{dn}.

Units along the western façade would be set back approximately 60 feet from the centerline of South Claremont Street. At this distance, the units facing South Claremont Street would be exposed to future exterior noise levels would up to 65 dBA L_{dn}. Assuming windows to be partially open, future interior noise levels in these units would be up to 50 dBA L_{dn}.

Residential units located along the northern façade nearest East 3rd Avenue would be set back from the centerline of the roadway by approximately 75 feet. At this distance, the units facing East 3rd Avenue would be exposed to future exterior noise levels up to 68 dBA L_{dn}. Assuming windows to be partially open, future interior noise levels in these units would be up to 53 dBA L_{dn}.

Units along the southern façade would be set back approximately 65 feet from the centerline of East 4th Avenue. At this distance, the units facing East 4th Avenue would be exposed to future

exterior noise levels would up to 68 dBA L_{dn}. Assuming windows to be partially open, future interior noise levels in these units would be up to 53 dBA L_{dn}.

To meet the City and State's interior noise requirement of 45 dBA L_{dn}, implementation of noise insulation features would be required.

Office Land Uses

Commercial offices on levels one through three would have setbacks from the centerlines of the surrounding roadways of approximately 55 feet from South Delaware Street, approximately 45 feet from South Claremont Street, approximately 35 feet from East 3rd Avenue, and approximately 40 feet from East 4th Avenue. At these distances, daytime hourly average noise levels would range from 60 to 76 dBA L_{eq}, with day-night average noise levels of 66 to 72 dBA L_{dn}.

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 $L_{eq(1\text{-}hr)}$

Spaces where lower noise levels would be desired, such as private offices and conference rooms, may benefit from additional noise control in order to meet a lower, more desirable interior noise level. Additional noise control could be accomplished by selecting higher sound-rated windows (STC 34 or greater along exterior façades).

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 L_{dn} 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 facing South Delaware Street would require windows and doors with a minimum rating of 33 to 35 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA L_{dn}.

- Units facing East 3rd Avenue and East 4th Avenue would require windows and doors with a minimum rating of 30 to 31 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA L_{dn}.

- Units facing South Claremont Street and located along the interior of the building would achieve interior noise levels of 45 dBA L_{dn} with standard construction materials and the incorporation of forced-air mechanical ventilation.

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

Conditions of Approval

Interior Noise Standard for Residential Development. The project applicant shall prepare final design plans that incorporate building design and acoustical treatments to ensure compliance with State Building Codes 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 L_{dn} or lower within the residential unit and to 50 dBA $L_{eq(1\text{-}hr)}$ or lower within nonresidential interiors. The project 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

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

Significance Criteria

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

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

    - A significant noise impact would be identified if construction-related noise would exceed the applicable noise standards presented in the San Mateo Municipal Code.

    - A significant permanent noise level increase would occur if the project would result in a 3 dBA L_{dn} or greater.

    - A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan 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 (see Table 3).

- 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 and future noise-sensitive land uses would potentially be exposed to a temporary increase in noise levels excess of the City's construction noise limits. **This is a potentially significant impact.**

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

Section 7.30.060 of the City of San Mateo's Municipal Code limits construction to weekdays between 7:00 a.m. and 7:00 p.m., Saturdays between 9:00 a.m. and 5:00 p.m., and Sundays and holidays between 12:00 p.m. and 4:00 p.m. Additionally, the City specifies that no individual piece of equipment shall produce a noise level exceeding 90 dBA at a distance of 25 feet and that the noise level outside any point outside the property plane of the project shall not exceed 90 dBA.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The construction of the proposed project would involve demolition of the existing structures located at the site, excavation to create the basement level and foundations, utilities, and building construction. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. For the proposed project, pile driving, which generates excessive noise levels, is not expected. The City has designated 402 South Delaware Street as the staging area during construction of the proposed project. This staging area is shown in Figure 2.

FIGURE 2 Construction Staging Area

Construction activities for individual projects are typically carried out in phases. 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. 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 75 to 89 dBA L_{eq} for mixed-use 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.

Construction for the proposed project would occur between the hours of 8:00 a.m. and 5:00 p.m. A detailed list of equipment expected to be used during each phase of project construction was provided by the applicant for this analysis and is summarized in Table 7. 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 every piece of equipment would operate simultaneously, which would represent the worst-case scenario. 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.

For each phase, the worst-case hourly average noise level was estimated at the property line of each surrounding land use. For overall construction noise levels, multiple pieces of equipment used simultaneously would add together creating a collective noise source. While every piece of equipment per phase would likely be scattered throughout the site, the noise-sensitive receptors surrounding the site would be subject to the collective noise source generated by all equipment operating at once. Therefore, to assess construction noise impacts at the receiving property lines of noise-sensitive receptors, the collective worst-case hourly average noise level for each phase was positioned at the geometrical center of the site and propagated to the nearest property line of the surrounding land uses. These noise level estimates are also shown in Table 7. Noise levels in Table 7 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

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/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 at Receiving Property Lines

Phase of Construction	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
			Res/Off Building - West (175ft)	Comm - North (200ft)	Comm - East (180ft)	Comm - South (225ft)
			Level, L_{eq} dBA	Level, L_{eq} dBA	Level, L_{eq} dBA	Level, L_{eq} dBA
Demolition	1/3/2022-6/15/2022	Concrete/Industrial Saw (1) Excavator (2) Tractor/Loader/Backhoe (1)	75	74	75	73
Site Preparation	6/16/2022-7/1/2022	Grader (2)	73	72	73	71
Grading/ Excavation	7/1/2022-9/1/2022	Excavator (2) Grader (1) Tractor/Loader/Backhoe (2)	75	74	75	73
Building – Exterior	9/1/2022-9/1/2023	Crane (1) Forklift (2) Welder (1)	65	64	65	63
Building – Interior/ Architectural Coating	10/1/2023-11/1/2023	Air Compressor (1) Aerial Lift (5)	66	65	66	64
Paving	10/1/2023-11/1/2023	Cement & Mortar Mixer (1) Paver (1) Paving Equipment (2) Roller (2) Tractor/Loader/Backhoe (1)	77 dBA[a]	75 to 76 dBA[a]	76 to 77 dBA[a]	74 to 75 dBA[a]

[a] Range in construction noise levels represents equipment from the paving phase only and during the overlapping period with the building – interior/architectural coating phase.

As shown in the above tables, ambient levels at the surrounding uses would potentially be exceeded at various times throughout construction. Additionally, individual pieces of equipment could potentially exceed the City's 90 dBA noise limit at a distance of 25 feet. Further, when equipment is used within 25 feet of the project's boundaries, 90 dBA could be exceeded outside the property plane. This is a potentially significant impact.

Mitigation Measure 1a:

Modification, placement, and operation of construction equipment are possible means for minimizing the impact of construction noise on existing sensitive receptors. Construction equipment should be well-maintained and used judiciously to be as quiet as possible. Additionally, construction activities for the proposed project should include the following best management practices to reduce noise from construction activities near sensitive land uses:

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

- Use of exceptionally loud equipment such as jackhammers and concrete saws within 35 feet of shared property lines shall be limited, as feasible.

- 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 and property lines. If they must be located within 35 feet of receptors and property lines, adequate muffling (with barriers or enclosures where feasible and appropriate) shall be used to reduce noise levels at the adjacent sensitive receptors.

- 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.

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

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the

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

Implementation of the above best management practices would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. With the implementation of these measures and recognizing that noise generated by construction activities would occur over a temporary period, the impact would be reduced to less-than-significant.

Impact 1b: **Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would not result in a substantial permanent noise level increase or exceed applicable standards at the noise-sensitive receptors in the project vicinity. **This is a less-than-significant impact.**

According to Policy N2.2 of the City's General Plan, a significant permanent noise increase would occur at existing noise-sensitive receptors if a new development results in a permanent noise increase of 3 dBA L_{dn} or greater.

Policy N2.3 limits new commercial developments from generating noise levels of 65 dBA L_{dn} or greater at the property line, excluding existing ambient noise levels. Additionally, operational noise is limited to the levels specified in Table 7.30.040, adjusted for ambient conditions. Noise-sensitive uses in the site vicinity include existing and future residential/office buildings west of the project site, opposite South Claremont Street, and commercial uses north of the site, opposite East 3rd Avenue; east of the site, opposite South Delaware Street; and south of the site, opposite East 4th Avenue. Maximum permissible noise levels for noise sources operating more than 30 minutes in a given hour for residences would be that of Zone 1: 50 dBA during nighttime hours (between 10:00 p.m. and 7:00 a.m.) and 60 dBA during daytime hours (between 7:00 a.m. and 10:00 p.m.). Maximum permissible noise levels for noise sources operating more than 30 minutes in a given hour for offices and commercial uses would be that of Zone 2: 55 dBA during nighttime hours and 60 dBA during daytime hours. For noise sources operating more than 15 minutes in a given hour, 5 dBA would be added to these thresholds. Noise sources operating more than five minutes in a given hour would have thresholds 10 dBA above these levels, and noise sources operating more than one minute in a given hour would have thresholds 15 dBA above these levels.

The Municipal Code also states that ambient noise levels would be used if existing ambient noise levels exceed the Municipal Code limits. The measured hourly average noise levels during daytime hours ranged from 64 to 76 dBA L_{eq} (average of 66 dBA L_{eq}) and from 48 to 68 dBA L_{eq} during nighttime hours (average of 62 dBA L_{eq}) in the project vicinity. Since the average hourly average noise levels measured in the project vicinity during daytime and nighttime hours exceed the Municipal Code thresholds, these average levels will be used as the baseline threshold for activities occurring more than 30 minutes in a given hour to conservatively assess the significance of the project's operational noise. Where appropriate, the proper increase will be applied.

Project Traffic Increase

The traffic study included net peak hour trips of 134 during the peak AM hour and 37 during the peak PM hour. Compared to the existing traffic volumes along the surrounding roadways, these

peak hour traffic volumes would result in a permanent noise level increase of 1 dBA L_{dn} or less. Therefore, the project would not result in a permanent noise increase of 3 dBA L_{dn} or more at noise-sensitive receptors in the project vicinity.

Mechanical Equipment

A Generac SD300 300 kW diesel generator would be located on the below-ground P1 level of the proposed building. Due to the location of the generator, the proposed building would provide adequate shielding from all surrounding land uses. The generator would not result in noise levels in excess of the City's standards or in a measurable or detectable increase (0 dBA L_{dn} increase) at the receiving land uses in the project vicinity.

The site plan shows a transformer room along South Claremont Street on the ground level; a mechanical yard with office HVAC systems, including exhaust fans for the garage, fan coils, and air handlers, on the sixth level; and residential mechanical equipment and solar panels on the roof. Mechanical screens surround the mechanical yard, which is about 10.2 feet tall and solid from floor to top. A parapet wall also surrounds the rooftop; however, the height is unknown at this time.

The ground-level transformer room would be located along the western building façade, facing South Claremont Street. Assuming no windows in this room, at least 20 dBA reduction would be expected due to the room enclosure. Typically, transformers up to 1,000 kVA generate noise levels up to 64 dB, as measured at 1 meter (3.28 feet). Assuming the transformer runs continuously during daytime and nighttime hours, the day-night average noise level would be 50 dBA L_{dn} at a distance of 1 meter (3.28 feet), which includes the 20 dBA reduction due to the wall assembly. This would be below the City's 65 dBA L_{dn} threshold at the property line. The nearest receiving land uses with line-of-sight to the transformer room would be the residential/office building to the west of the project site, opposite South Claremont Street. The nearest receiving property line would be 70 feet from the transformer room. Hourly average noise levels due to transformers would be below 20 dBA L_{eq} during daytime and nighttime hours, and day-night average noise levels would be below 25 dBA L_{dn}. All other electrical and pump rooms on the first level and basement levels would generate noise levels lower than transformers. For all existing receptors, the noise level increase due to transformer noise would not be measurable or detectable (0 dBA L_{dn} increase).

Equipment located in the mechanical yard would include office HVAC systems, including exhaust fans for the garage, fan coils, and air handlers. Typical heating pumps for office buildings of this size would generate noise ranging from 56 to 66 dBA at a distance of 3 feet. Air handling units typically generate noise levels up to 62 dBA at 20 feet. When operating at full speed, noise levels for exhaust fans could be up to 76 dBA at a distance of 5 feet and up to 65 dBA at 5 feet when operating at 35% speed. Assuming up to eight heating pumps and eight air handling units operating simultaneously at any given time with exhaust fans, hourly average noise levels would be up to 89 dBA L_{eq} at a distance of 3 feet during daytime and nighttime hours. The nearest property line would be 100 to 130 feet from the center of the mechanical yard. Assuming a minimum attenuation of 10 dBA from the building façade and roof screen, the day-night average noise level at the property lines would range from 52 to 54 dBA L_{dn}, which would be below the City's 65 dBA L_{dn} threshold. Table 8 summarizes the hourly average and day-night average noise levels propagated from the sixth level mechanical yard to the property lines of the nearest surrounding receptors.

TABLE 8 Estimated Operational Noise Levels for Equipment Located in the Sixth Floor Mechanical Yard

Receptor	Distance from Center of Mech. Yard	Combined L_{eq} from Mech. Yard, dBA	Combined L_{dn}, dBA	Noise Level Increase, dBA L_{dn}
West Residential/ Office Building	200 feet	42[a]	48[a]	0
North Commercial	165 feet	44[a]	50[a]	0
East Commercial	160 feet	44[a]	50[a]	0
South Commercial	265 feet	40[a]	46[a]	0

[a] Conservative 10 dBA noise level reduction from the building façades and roof screen surrounding the mechanical yard is assumed.

Assuming a minimum attenuation of 10 dBA from the building façades and roof screen, the equipment from the mechanical yard would not exceed the City's hourly average noise levels during daytime or nighttime hours at the nearest surrounding receptors or the day-night average noise level at the property line. For all existing receptors, the noise level increase due to equipment in the mechanical yard would not be measurable or detectable (0 dBA L_{dn} increase).

The rooftop equipment includes heating, ventilation, and air conditioning (HVAC) units and solar panels. Solar panels do not generate noise levels that would be audible at off-site receptors and would not contribute to the mechanical equipment noise generated at the project site. Typical residential HVAC systems generate noise levels up to 58 dBA at 5 feet. The HVAC systems located on the rooftop would be clustered together, with several units operating simultaneously at any given time. Assuming up to 10 units would be operating continuously for a 24-hour period, the combined noise level of all 10 units would be 68 dBA at 5 feet. The nearest property line would be 60 to 80 feet from the center of the rooftop equipment. At this distance and assuming a conservative 10 dBA attenuation from the parapet surrounding the edge of the roof, the day-night average noise level at the property line would range from 40 to 43 dBA L_{dn}, which would meet the City's General Plan noise limit. Table 9 summarizes the hourly average and day-night average noise levels propagated from the rooftop equipment to the property lines of the nearest surrounding receptors.

TABLE 9 Estimated Operational Noise Levels for the Rooftop Equipment

Receptor	Distance from Center of Roof Equipment	Combined L_{eq} from Rooftop Equipment, dBA	Combined L_{dn}, dBA	Noise Level Increase, dBA L_{dn}
West Residential/ Office Building	130 feet	30[a]	36[a]	0
North Commercial	140 feet	29[a]	36[a]	0
East Commercial	130 feet	30[a]	36[a]	0
South Commercial	125 feet	30[a]	37[a]	0

[a] Conservative 10 dBA noise level reduction from the parapet wall surrounding the rooftop is assumed.

Assuming the parapet wall surrounding the rooftop would provide a minimum reduction of 10 dBA, the rooftop equipment would not exceed the City's hourly average noise levels during daytime or nighttime hours at the nearest surrounding receptors or the day-night average noise level at the property line. For all existing receptors, the noise level increase due to rooftop equipment noise would not be measurable or detectable (0 dBA L_{dn} increase).

Truck Loading and Unloading

The site plan shows a receiving/trash room for both residential and office use along the western building façade. While most loading and unloading activities would occur within these rooms, some truck maneuvering activities would occur on South Claremont Street for the trucks to access the loading zones. For all loading and unloading activities, including trash pickup, truck maneuvering would take up to five minutes. Since the measured hourly average noise levels in the project vicinity exceeded the City's thresholds in Table 7.30.040, the noise limit for all loading/unloading activities occurring for up to five minutes in any hour would be 76 dBA.

Truck maneuvering noise would include a combination of engine, exhaust, and tire noise, as well as the intermittent sounds of back-up alarms and releases of compressed air associated with truck/trailer air brakes. Heavy trucks typically generate maximum instantaneous noise levels of 70 to 75 dBA at a distance of 50 feet. The noise level of backup alarms can vary depending on the type and directivity of the sound, but maximum noise levels are typically in the range of 65 to 75 dBA at a distance of 50 feet.

The existing and future residential/office buildings to the west would be the receptors with direct exposure to the receiving rooms, at a distance of approximately 70 feet from nearest receiving property line. At this distance, the truck maneuvering noise levels would range from 67 to 72 dBA, with backup alarms up to 72 dBA. This would be lower than the 76 dBA. The distance to all other receptors would be greater, and the noise levels would be lower. Assuming up to two deliveries in the same 24-hour period, which would represent the worst-case scenario, the day-night average

noise level would be 52 dBA L_{dn} at the nearest property line, which meets the City's 65 dBA L_{dn} limit. For all existing receptors, the noise level increase due to truck delivery noise would not be measurable or detectable (0 dBA L_{dn} increase).

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment, and truck loading/unloading activities) would result in an increase of 1 dBA L_{dn} or less at all existing noise-sensitive receptors surrounding the project site. Therefore, the proposed project would not result in a substantial increase over ambient noise levels in the project vicinity. Further, operational noise levels would not exceed 65 dBA L_{dn} at the property lines or exceed ambient levels at the surrounding land uses. This is a less-than-significant impact.

Mitigation Measure 1b: No further mitigation required.

Impact 2: Exposure to Excessive Groundborne Vibration. Construction-related vibration levels would not 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 (e.g., jackhammers, hoe rams) are used. Construction activities would include demolition, 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 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 has been 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 buildings that are documented to be structurally weakened, a cautious limit of 0.08 in/sec PPV is often used to provide the highest level of protection.

Two historical buildings were identified in the project vicinity: at 273 South Railroad Avenue and at 415 South Claremont Street. The nearest historical building façade located at 273 South Railroad Avenue would be approximately 190 feet from the northwestern corner of the project site, and the nearest building façade at 415 South Claremont Street would be approximately 165 feet from the project site boundary. These structures would be subject to the conservative 0.08 in/sec PPV threshold. All other buildings surrounding the project site would be subject to the 0.3 in/sec PPV threshold.

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. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration

levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

Table 10 summarizes the vibration levels at each of the surrounding buildings in the project vicinity. 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. Therefore, the distances used to propagate construction vibration levels (as shown in Table 10), which are different than the distances used to propagate construction noise levels (as shown in Table 7), were estimated under the assumption that each piece of equipment was operating along the nearest boundary of the project site, which would represent the worst-case scenario.

As shown in Table 10, vibration levels are not expected to exceed the conservative 0.3 in/sec PPV at the nearest buildings in the project vicinity. Further, vibration levels are not expected to exceed 0.08 in/sec PPV at the nearest historical buildings in the project vicinity.

Neither cosmetic, minor, or major damage would occur at historical or conventional buildings located in the project vicinity. 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 not generate vibration levels exceeding the 0.08 in/sec PPV at historic properties in the project site vicinity or the 0.3 in/sec PPV threshold at the nonhistorical buildings in the project site vicinity. This would be a less-than-significant impact.

Mitigation Measure 2: **None required.**

TABLE 10 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 feet (in/sec)	PPV (in/sec) Estimated at Nearest Building Façades Surrounding the Project Site					
			West Existing & Future Res./Off. Buildings (75ft)	North Comm. Buildings (70ft)	East Comm. Buildings (70ft)	South Buildings (80ft)	273 S. Railroad Ave. Historical Building (190ft)	415 S. Claremont St. Historical Building (165ft)
Clam shovel drop		0.202	0.060	0.065	0.065	0.056	0.022	0.025
Hydromill (slurry wall)	in soil	0.008	0.002	0.003	0.003	0.002	0.001	0.001
	in rock	0.017	0.005	0.005	0.005	0.005	0.002	0.002
Vibratory Roller		0.210	0.063	0.068	0.068	0.058	0.023	0.026
Hoe Ram		0.089	0.027	0.029	0.029	0.025	0.010	0.011
Large bulldozer		0.089	0.027	0.029	0.029	0.025	0.010	0.011
Caisson drilling		0.089	0.027	0.029	0.029	0.025	0.010	0.011
Loaded trucks		0.076	0.023	0.024	0.024	0.021	0.008	0.010
Jackhammer		0.035	0.010	0.011	0.011	0.010	0.004	0.004
Small bulldozer		0.003	0.001	0.001	0.001	0.001	0.0003	0.0004

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 2022.

Impact 3: **Excessive Aircraft Noise.** The project site is located about 3.7 miles from the San Francisco International Airport. The noise environment attributable to aircraft is considered normally acceptable. This is a **less-than-significant** impact.

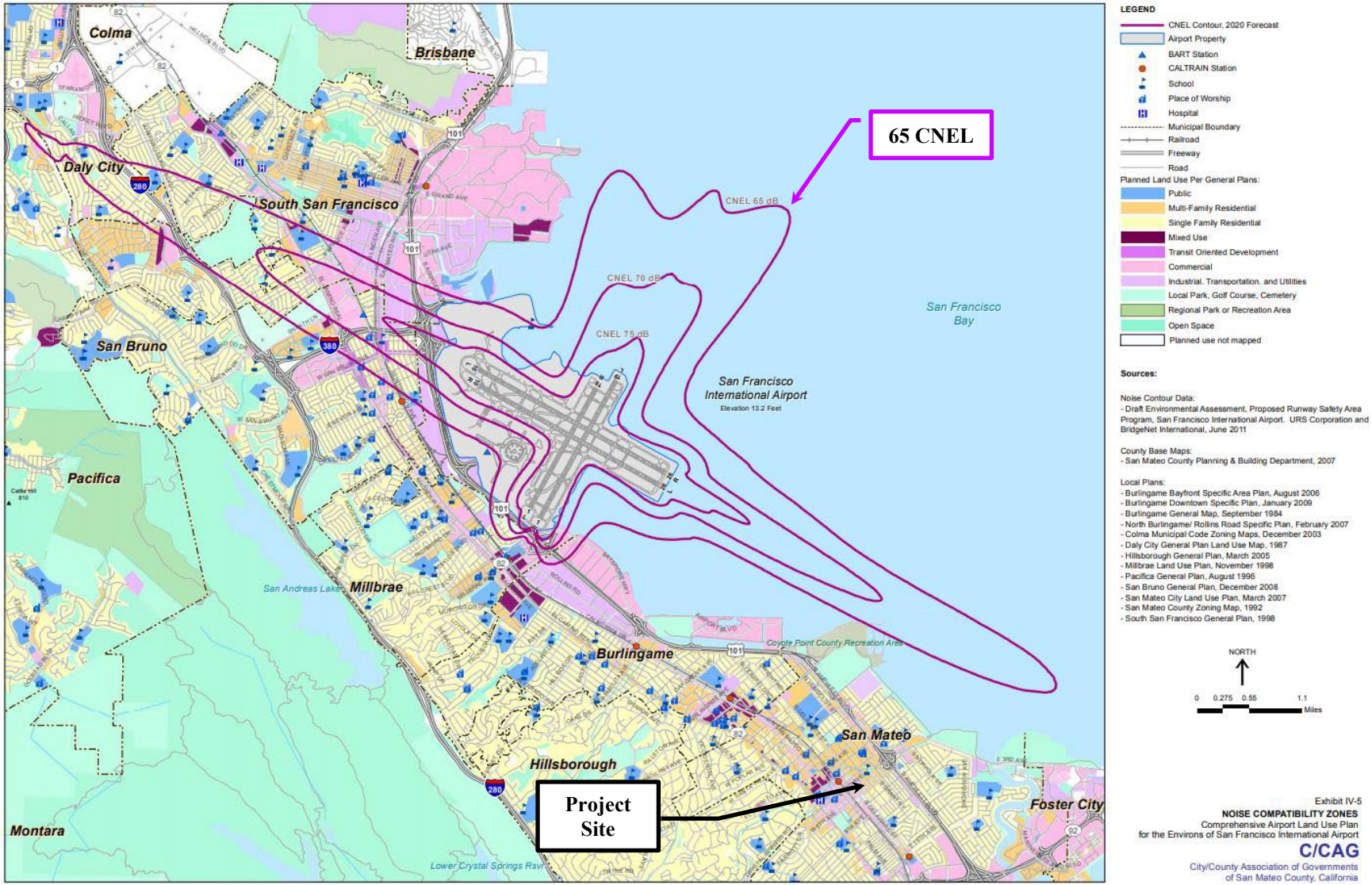
The San Francisco International Airport is a public-use airport located approximately 3.7 miles northwest of the project site. According to the *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*,[2] the project site lies well outside the 65 dBA CNEL/L_{dn} noise contour (see Figure 3), and the required safe and compatible threshold for exterior noise levels would be at or below 65 dBA CNEL/L_{dn} for aircrafts. Therefore, the proposed project would be compatible with the 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 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.**

[2] Ricondo & Associates, Inc. with Jacobs Consultancy and Clarion Associates, *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport*, November 2012.

FIGURE 3 2020 CNEL Noise Contours for San Francisco International Airport Relative to Project Site



Cumulative Impacts

Cumulative noise impacts would include temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise impact would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA L_{dn} or greater for future levels exceeding the normally acceptable threshold; 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 L_{dn} or more attributable solely to the proposed project.

Cumulative and cumulative plus project ADT traffic volumes were included in the traffic study. When these volumes were compared to the existing ADT volumes, an increase of 2 dBA L_{dn} or less was calculated with and without the project, which would not be considered a "cumulatively considerable" contribution. Therefore, the project would not cause a significant cumulative noise increase at noise-sensitive uses in the project vicinity.

The City of San Mateo has provided the following list of project sites located within 500 feet of the proposed Block 21 project site:

- **435 East 3rd Avenue** – this project is located in the northwestern corner of the East 3rd Avenue/South Claremont Street intersection and would be less than 100 feet from the Block 21 project site. This project is currently in the planning review phase and would consist of demolishing the existing auto-repair shop and constructing a five-story mixed-use building. Construction dates for this project have not been confirmed but due to the close proximity of the project site and the noise-sensitive receptors shared by both project sites (i.e., the future residential/office building in the southwestern corner of the intersection and the commercial buildings in the northeastern corner of the intersection), a significant cumulative construction impact would potentially occur, exposing the nearby sensitive receptors to construction activities at both sites simultaneously or consecutively.

- **480 East 4th Avenue** – this project is located in the southwestern corner of the East 4th Avenue/South Claremont Street intersection and would be less than 100 feet from the Block 21 project site. This project would consist of construction of a seven-story affordable housing building with a five-story parking structure located at 400 East 5th Avenue. While this project has been approved, construction has not started. Since this project has been approved, it is likely that it will be completed before Block 21 construction begins. This would not result in a cumulative construction impact.

- **406 East 3rd Avenue** – this project is located west of the project site, opposite South Claremont Street and consists of a mixed-use building. This project is currently under construction and will be completed before Block 21 starts. This would not result in a cumulative construction impact.

The future residential/office building in the southwestern corner of the East 3rd Avenue/South Claremont Street intersection and the commercial buildings in the northeastern corner of the

intersection would be considered sensitive receptors during construction activities at both Block 21 and 435 East 3rd Avenue project sites. However, due to the size of 435 East 3rd Avenue construction project, the time duration and equipment used at that site would be expected to be less than Block 21. With the implementation of construction noise and vibration mitigation measures included in the individual projects, construction noise and vibration levels would be reduced as much as possible at all surrounding sensitive receptors during construction of each individual project. Therefore, the potential cumulative construction impact would be less-than-significant.

APPENDIX

FIGURE A1 Daily Trend in Noise Levels at LT-1, Wednesday, January 5, 2022

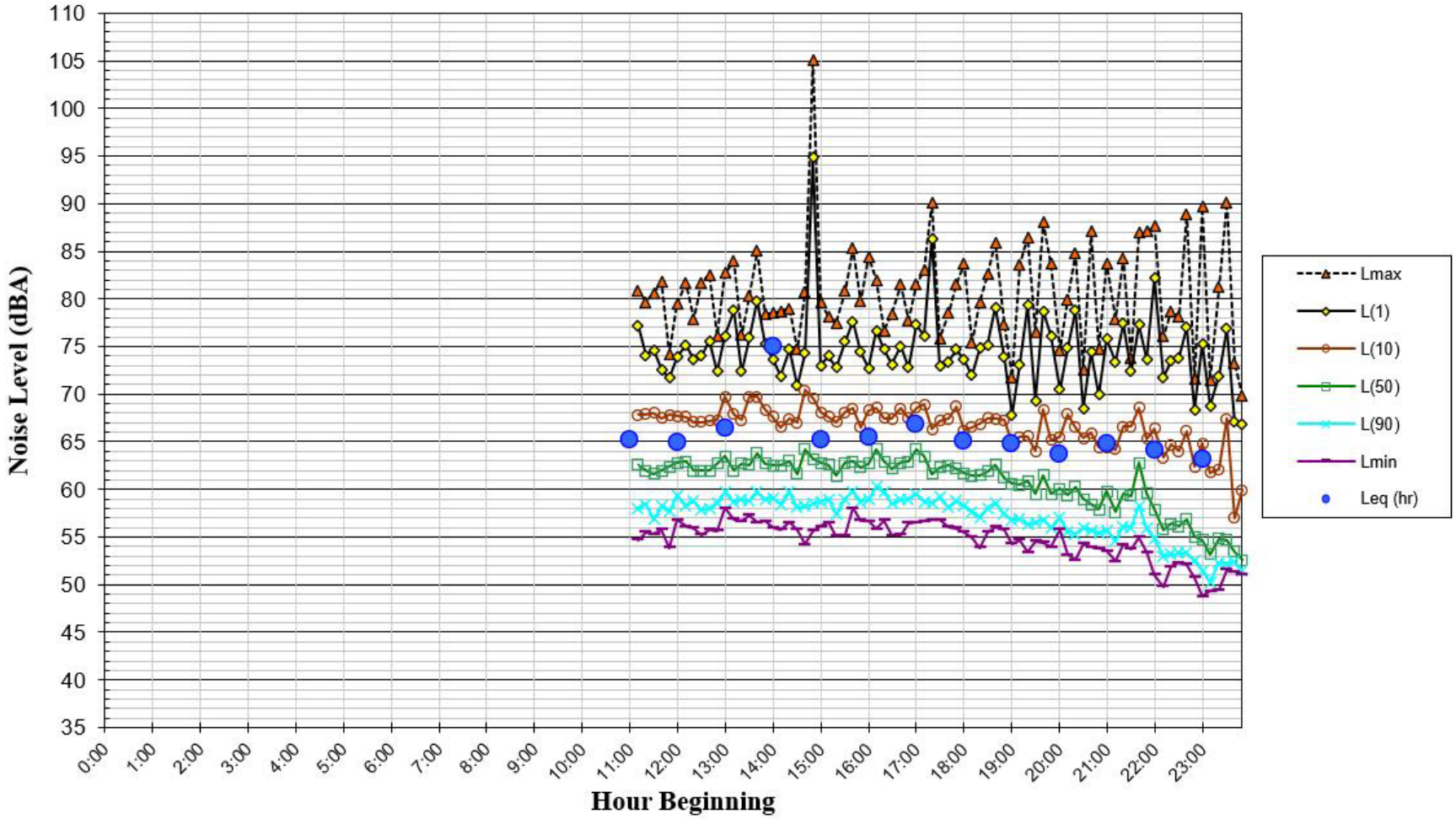


FIGURE A2 Daily Trend in Noise Levels at LT-1, Thursday, January 6, 2022

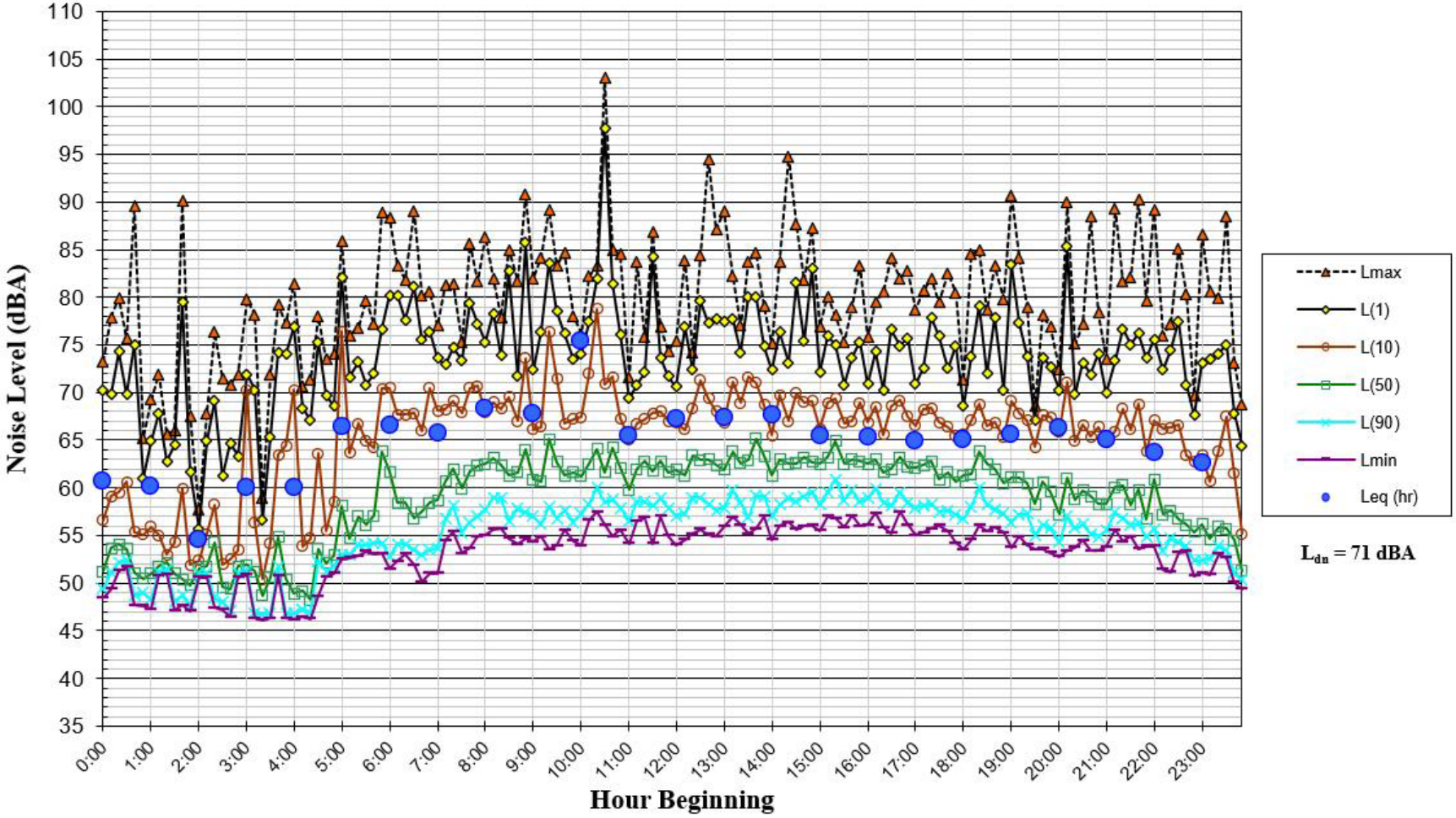


FIGURE A3 Daily Trend in Noise Levels at LT-1, Friday, January 7, 2022

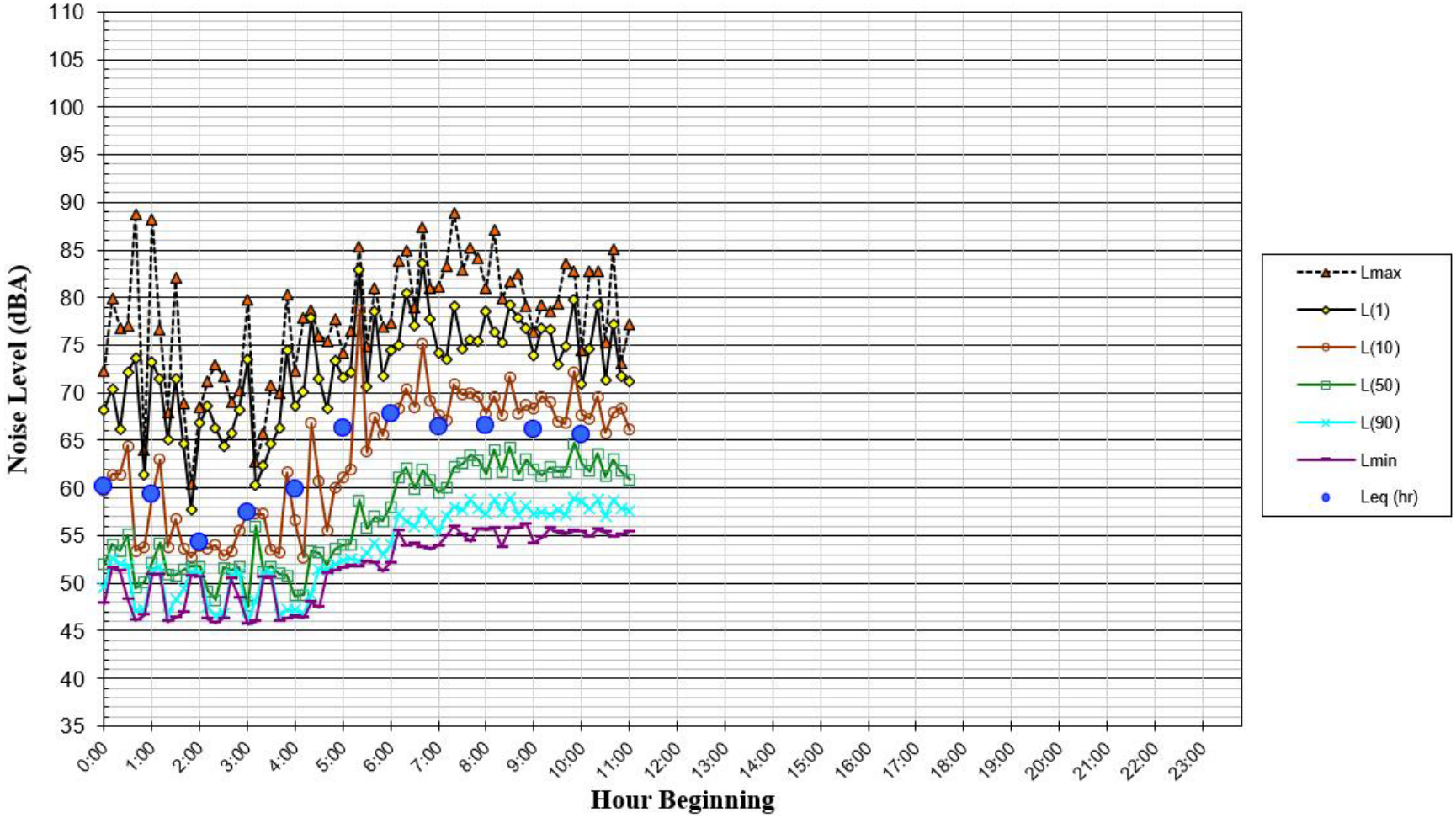


FIGURE A4 Daily Trend in Noise Levels at LT-2, Wednesday, January 5, 2022

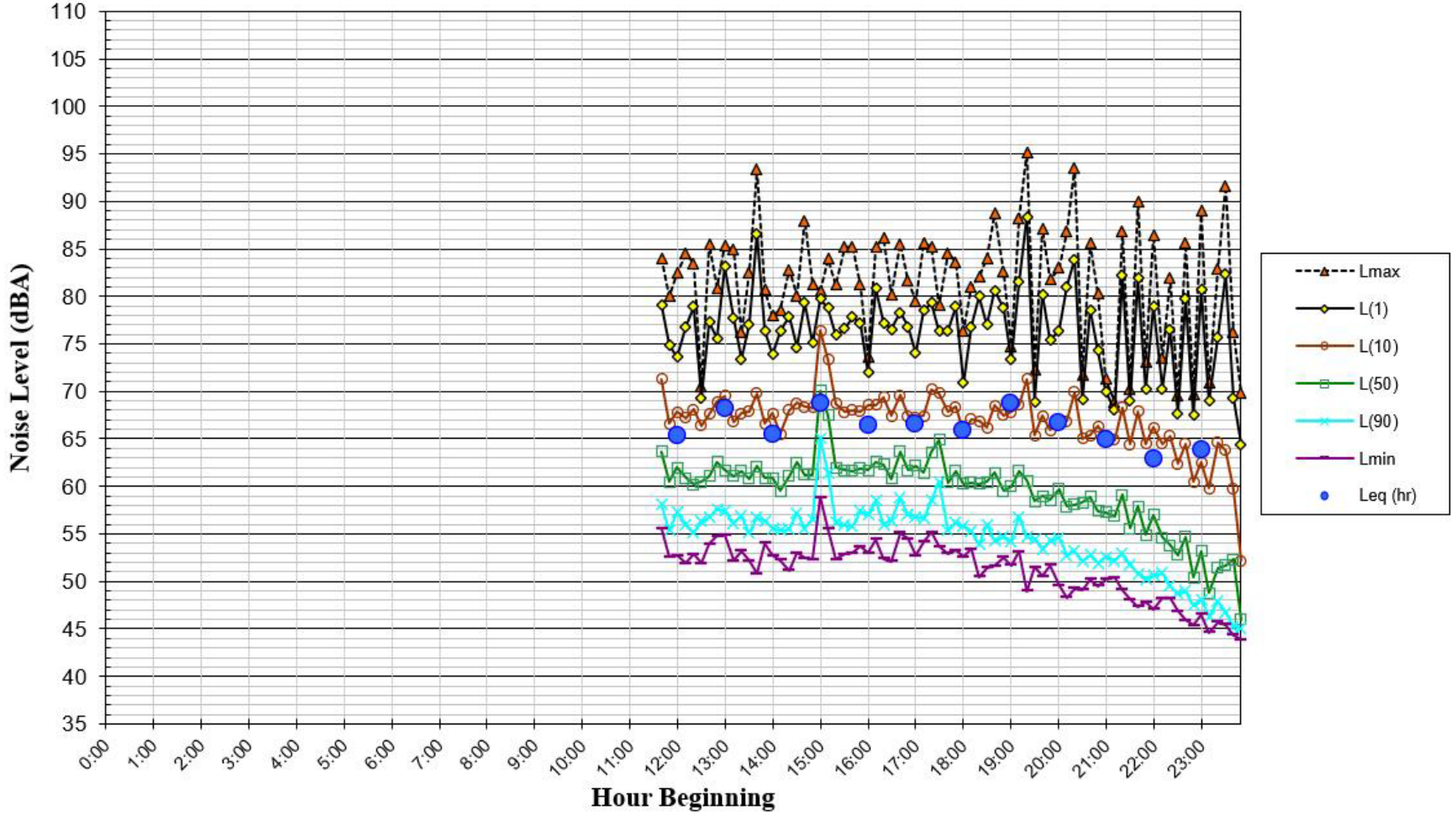


FIGURE A5 Daily Trend in Noise Levels at LT-2, Thursday, January 6, 2022

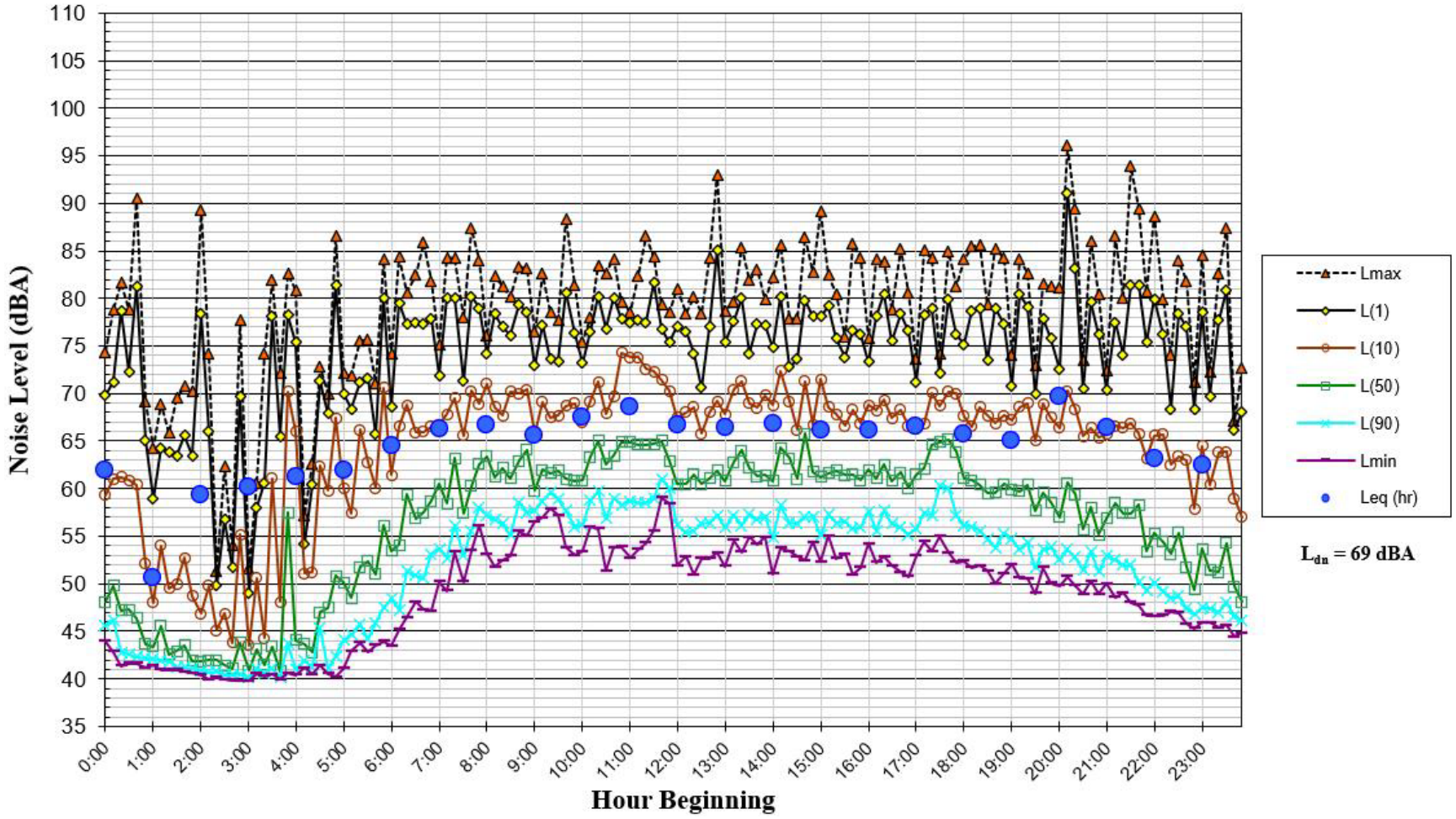


FIGURE A6 Daily Trend in Noise Levels at LT-2, Friday, January 7, 2022