Appendix F – Environmental Noise and Vibration Assessment

WESTLAKE SOUTH MIXED USE PROJECT ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

Daly City, California

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Project: 21-092

INTRODUCTION

The proposed Westlake South project is a mixed-use redevelopment project that will demolish and replace the vacant Burlington retail store located at 99 Southgate Avenue within the Westlake shopping center (1.93-acre site) in Daly City, California. The new development will be a seven-story, 214-unit mixed-use project. The development would include a five-story residential structure atop a two-story enclosed parking structure with 321 interior parking spaces and pedestrian oriented retail fronting Southgate Avenue.

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

SETTING

Fundamentals of Environmental Noise

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

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

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

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

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

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

Effects of Noise

Sleep and Speech Interference

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

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn}/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 L_{dn}/CNEL. At a L_{dn}/CNEL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn}/CNEL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a L_{dn}/CNEL of 60-70 dBA. Between a L_{dn}/CNEL of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn}/CNEL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

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

The State of California and the City of Daly City have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

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

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

(b) Generation of excessive ground-borne vibration or ground-borne 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.

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

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 2010 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). These standards were not altered in the 2019 revisions. Section 5.507 states that either the prescriptive (Section 5.507.4.1) or the performance method (Section 5.507.4.2) shall be used to determine environmental control at indoor areas. The prescriptive method is very conservative and not practical in most cases; however, the performance method can be quantitatively verified using exterior-to-interior calculations. For the purposes of this report, the performance method is utilized to determine consistency with the Cal Green Code. Both of the sections that pertain to this project are as follows:

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

Daly City 2030 General Plan. The Noise Element in the Daly City 2030 General Plan states that construction noise is regulated in Daly City through the environmental review process by the Engineering and Planning Divisions. Typically, construction activities are limited to the daytime hours between 8:00 a.m. and 5:00 p.m. and are prohibited on weekends and holidays. Additionally, the Noise Element sets forth a noise goal and policies related to noise control in the City. The City's noise goal is:

> *Promote a noise environment that reflects a balance of the various City objectives while providing an environment that maintains a healthy living environment; fosters relaxation and recreation; is conducive to the work environment; and provides pleasant living conditions.*

The following policies are applicable to the proposed project:

Policy NE-1: Use the future noise contour map to identify existing and potential noise impact areas.

> **Task NE-1.1:** Use the existing and projected noise contours in conjunction with the State Office of Noise Control Guidelines (Guidelines) to identify areas where land use incompatibilities exist and to guide future noise sensitive development to appropriate and compatible locations.
>
> **Task NE-1.2:** Use the existing and projected noise contours to identify existing noise impact areas that could benefit from noise insulation programs.

Policy NE-2: Use the State Office of Noise Control Guidelines as a guide to assess development that will need additional noise study and mitigations.

> **Task NE-2.1:** Use the Noise Control Guidelines to assess the suitability of a site for new development in combination with the noise contours to accurately identify areas that may need additional noise study and mitigation. Noise mitigations include additional insulation, double glazing of windows and increasing building setbacks from the noise source. Mitigations should also be creative and attractive whenever possible and appropriate. Creative noise mitigation measures can include incorporation of fountains using water to mask freeway noise and noise walls of an appropriate scale painted with decorative murals.

Policy NE-3: Maintain a CNEL level of not more than 70 dBA L_{eq}[1] in residential areas.

> **Task NE-3.1:** Continue to enforce the environmental noise requirements of the State Building Code (Title 24).
>
> **Task NE-3.2:** Encourage noise insulation programs in areas that do not meet the current noise standard and ensure that future development is mitigated appropriately or avoided in areas where the noise levels exceed or is projected to exceed 70 dBA L_{eq}.[2]

Policy NE-4: Maintain a noise level not in excess of 75 dBA CNEL in open space, parks, and tot lots, including outdoor activity areas such as outdoor entertainment or green space of multi-family projects.

> **Task NE-4.1:** When feasible, situate new parks and tot-lots away from busy streets or other known noise sources.

Policy NE-5: Maintain the City's current standard of 75 dBA CNEL for office, commercial, and professional areas.

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1 The statistical descriptor L_{eq} is referenced in error in the City of Daly City General Plan. This analysis assumes that the noise limit is 70 dBA CNEL.

2 The statistical descriptor L_{eq} is referenced in error in the City of Daly City General Plan. This analysis assumes that the noise limit is 70 dBA CNEL.

Task NE-5.1: Additional noise studies should be conducted in "Conditionally Acceptable" noise environments to ensure adequate mitigation features are employed. Usually conventional construction with closed windows and fresh air supply systems will maintain a healthy noise environment.

Policy NE-6: Require new development to perform additional acoustical studies in noise environments that are identified as 'Conditionally Acceptable' or 'Normally Unacceptable' to the Guidelines.

Task NE-6.1: Require acoustical studies for new development through the discretionary review and California Environmental Quality Act processes, while paying particular attention to borderline noise environments. Conditions and mitigations, as appropriate, should be attached to projects.

Task NE-6.2: As part of the development of the new Commercial Mixed-Use zone, identify and codify, where possible, noise attenuation measures to assure that noise impacts by more intensive development to adjacent residential uses are reduced.

Policy NE-7: Require proposed intensification of development and proposed new development in noise environments identified as "Clearly Unacceptable" in the Guidelines to reduce ambient interior noise levels to 45 dBA CNEL.

Task NE-7.1: Either discourage new development or mitigate the noise impacts to it in areas identified as "Clearly Unacceptable" in the Noise Compatibility Guidelines.

Policy NE-8: Discourage noise sensitive land uses from locating in areas of inappropriate or high noise levels.

Task NE-8.1: Work to ensure that the outdoor ambient noise levels for uses such as day care centers, extended care facilities, and group care homes in residential neighborhoods not exceed 70 dBA CNEL. For such uses allowed by right, the City should encourage a potential care provider to maintain an appropriate noise environment.

Task NE-8.2: Continue to attach conditions of project approval to residential day care centers in excess of eight children through the administrative use permit process to maintain an appropriate noise environment.

Policy NE-9: Work to ensure that the expansion of or changes to existing land uses do not create additional noise impacts for sensitive receptors in the vicinity of the project from intensification or alteration of existing land uses by requiring applicants.

Task NE-9.1: Depending upon the hours of operation, intensity of use, and the location of sensitive receptors in the area, the expansion or change of use could cause noise impacts. Acoustical studies should be performed, at the applicant's expense, during the discretionary and environmental review processes and conditions should be placed on the project accordingly.

Policy NE-11: Require that all future land use actions and/or associated development conforms to the relevant height, aircraft noise, and safety policies and compatibility criteria contained in the most recently adopted version of the Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport.

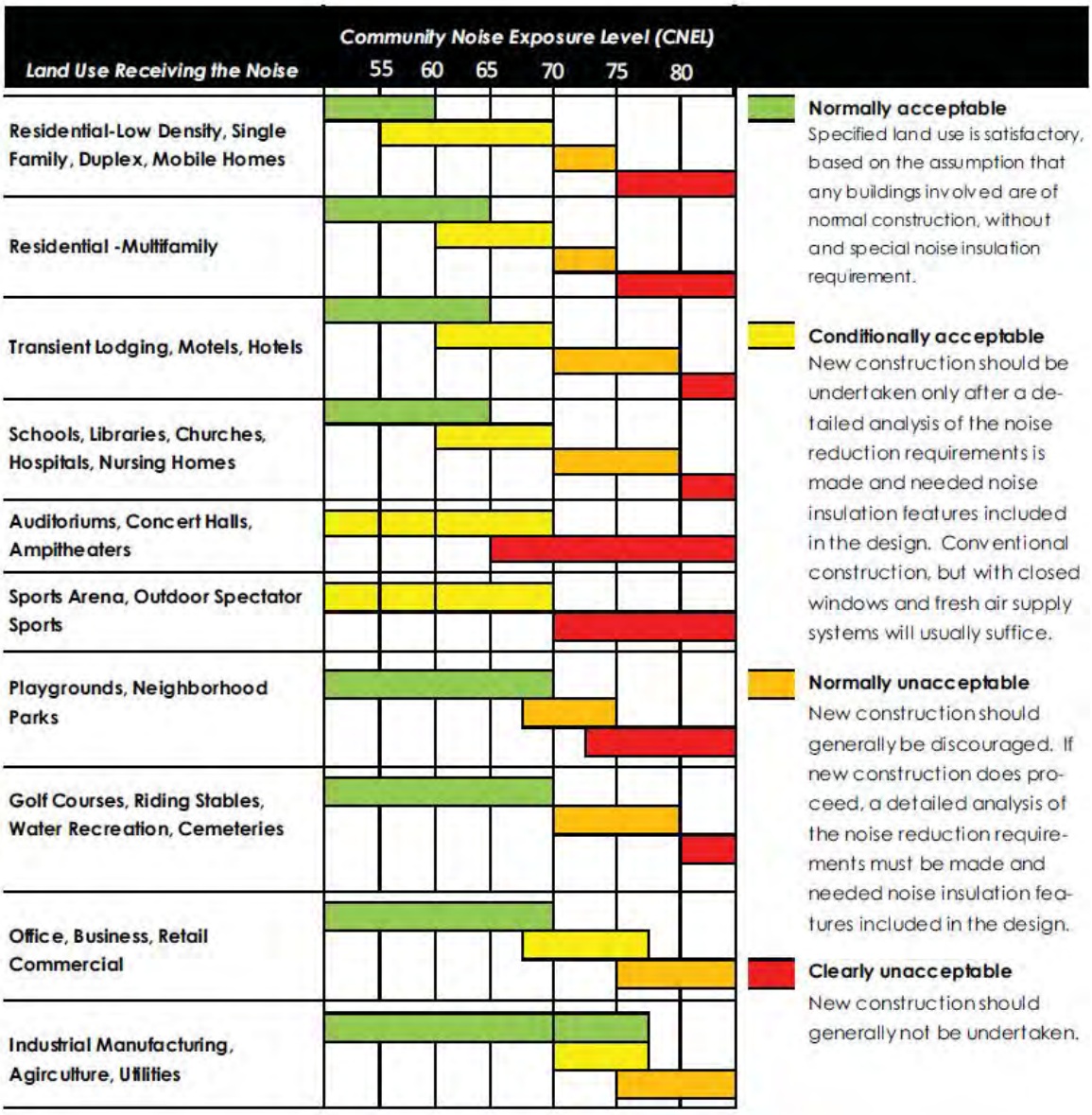
Task NE-11.1: Route any proposed land use policy actions, including new specific plans, zoning ordinances, general plan amendments, and rezoning involving land development to the Airport Land Use Commission in compliance with the Airport Land Use Plan.

Task NE-11.2: Require that development involving the construction of one or more dwelling units within the 65 dBA CNEL SFO noise contour to submit an avigation easement to the airport, when required by the Airport Land Use Commission. Specific avigation easement requirements shall be consistent with the Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport. This requirement shall be implemented prior to final project approval or, if the project requires construction, prior to building permit issuance.

Task NE-11.3: Require all future development within the Airport Influence Area B boundary for San Francisco International Airport to conform to the relevant height/airspace protection, aircraft noise, and safety policies and land use compatibility criteria contained within the most recent adopted version of the comprehensive airport/land use compatibility plan (ALUCP) for the environs of San Francisco International Airport.

Task NE-11.4: Ensure that all future development in Daly City complies with all relevant FAA standards and criteria for safety, regarding flashing lights, reflective building material, land uses that may attract large concentrations of birds, HVAC exhaust vents, thermal plumes, and uses that may generate electrical/electronic interference with aircraft communications and/or instrumentation.

Figure NE-2: Noise Compatibility Guidelines



Source: State of California Office of Noise Control

Source: Daly City 2030 General Plan, Noise Element, March 2013.

Daly City Municipal Code. Chapter 9.22 of the City's Municipal Code discusses disturbing the peace. While noise level restrictions are not provided in the Municipal Code, the following sections establish qualitative noise disturbances and hours of sensitivity applicable to proposed project:

> **9.22.010 – Disturbing the peace prohibited.** No person shall make in any place, nor allow to be made upon his premises, or premises within his control, any noise, disorder or tumult to the disturbance of the public peace.

9.22.030 – Noise. Between the hours of ten p.m. (10:00 p.m.) and six a.m. (6:00 a.m.) of the following day, no person shall cause, create or permit any noise, music, sound or other disturbance upon his property which may be heard by, or which noise disturbs or harasses, any other person beyond the confines of the property, quarters or apartment from which the noise, music, sound or disturbance emanates.

Existing Noise Environment

The project site is located southeast of the intersection of Southgate Avenue and Lake Merced Boulevard in Daly City, California. Southgate Avenue and Palmcrest Drive bound the site to the north and east respectively. Currently, the project site is occupied by the vacant Burlington retail store. To the north, east and west of the site are commercial land uses owned by KIMCO. Residential land uses are located northwest and south of the project site.

The noise environment at the site and in the surrounding area primarily results from vehicular traffic along Southgate Avenue, Lake Merced Boulevard and Palmcrest Drive. A noise monitoring survey was conducted at the site beginning on Wednesday, October 27, 2021, and concluding on Friday, October 29, 2021. The monitoring survey included three long-term (LT-1 through LT-3) noise measurements and three short-term (ST-1 through ST-3) measurements, as shown in Figure 1.

Long-term noise measurement LT-1 was made near the southwest corner of the project site, about 20 feet east of the Lake Merced Boulevard centerline. This measurement location represented the existing ambient noise environment of the adjacent residential land uses. Hourly average noise levels typically ranged from 54 to 65 dBA L_{eq} during daytime hours between 7:00 a.m. and 10:00 p.m and from 46 to 59 dBA L_{eq} at night between 10:00 p.m. and 7:00 a.m. The daily trend in noise levels at LT-1 is shown on Figures 2 through 4.

Measurement LT-2 was conducted near the southeast corner of the project site, about 25 feet west of the Palmcrest Drive centerline. This measurement location also represented the existing ambient noise environment of the adjacent residential land uses located towards the southeast of the project site. Hourly average noise levels at this location typically ranged from 52 to 68 dBA L_{eq} during the day and from 46 to 56 dBA L_{eq} at night. The daily trend in noise levels at LT-2 is shown on Figures 5 through 7.

Long term noise measurement LT-3 was conducted southwest of the intersection of Southgate Avenue and Palmcrest Drive, about 30 feet south of the Southgate Avenue centerline. Vehicular traffic along Southgate Avenue was the primary source of noise at this measurement location. Hourly average noise levels at this location typically ranged from 60 to 70 dBA L_{eq} during the day and from 55 to 62 dBA L_{eq} at night. The daily trend in noise levels at LT-3 is shown on Figures 8 through 10.

Three short term noise measurements were also conducted to complete the noise survey at the project site. Table 4 summarizes the results of the short-term noise measurements.

TABLE 4 Summary of Short-Term Noise Measurement Data, October 29, 2021

ID	Location (Date, Time)	Measured Noise Levels, dBA					Primary Noise Source
		L_1	L_{10}	L_{50}	L_{90}	L_{eq}	
ST-1	Northwest of site at 16 Southgate Ave, ~35 feet north of Southgate Ave centerline (10/29/21, 9:30 a.m. to 9:40 a.m.)	75	66	59	52	63	Traffic on Southgate Ave
ST-2	West of site at 150 Coronado Ave, ~40 feet from Lake Merced Blvd centerline (10/29/21, 9:50 a.m. to 10:00 a.m.)	60	54	51	50	52	Traffic on Lake Merced Blvd/Ambient noise environment
ST-3	East of site at 101 Palmcrest Dr, ~45 feet from Palmcrest Dr (10/29/21, 10:10 a.m. to 10:20 a.m.)	69	58	53	50	57	Traffic on Palmcrest Dr/Ambient noise environment

FIGURE 1 Noise Measurement Locations

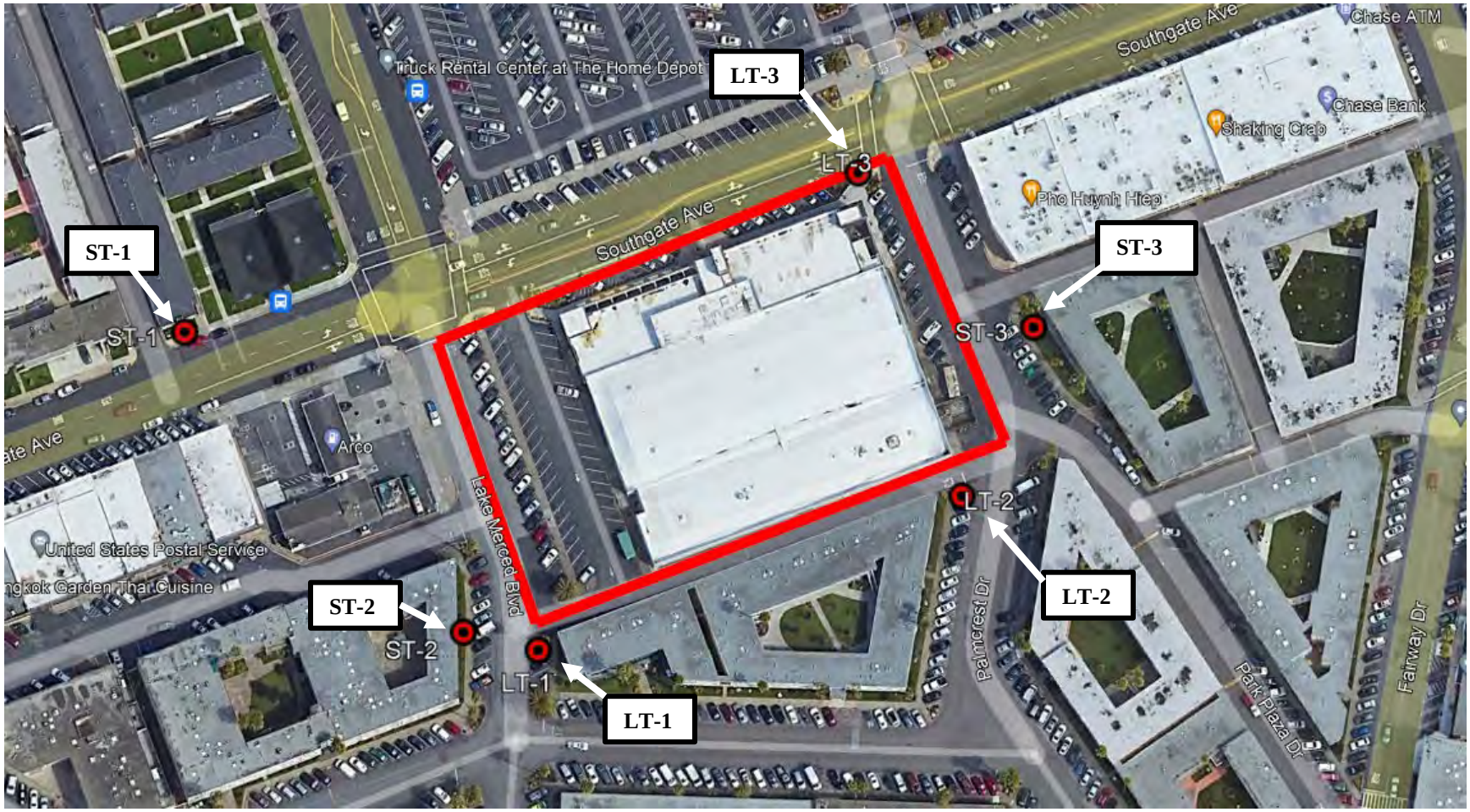


FIGURE 2 Daily Trend in Noise Levels at LT-1, Wednesday, October 27, 2021

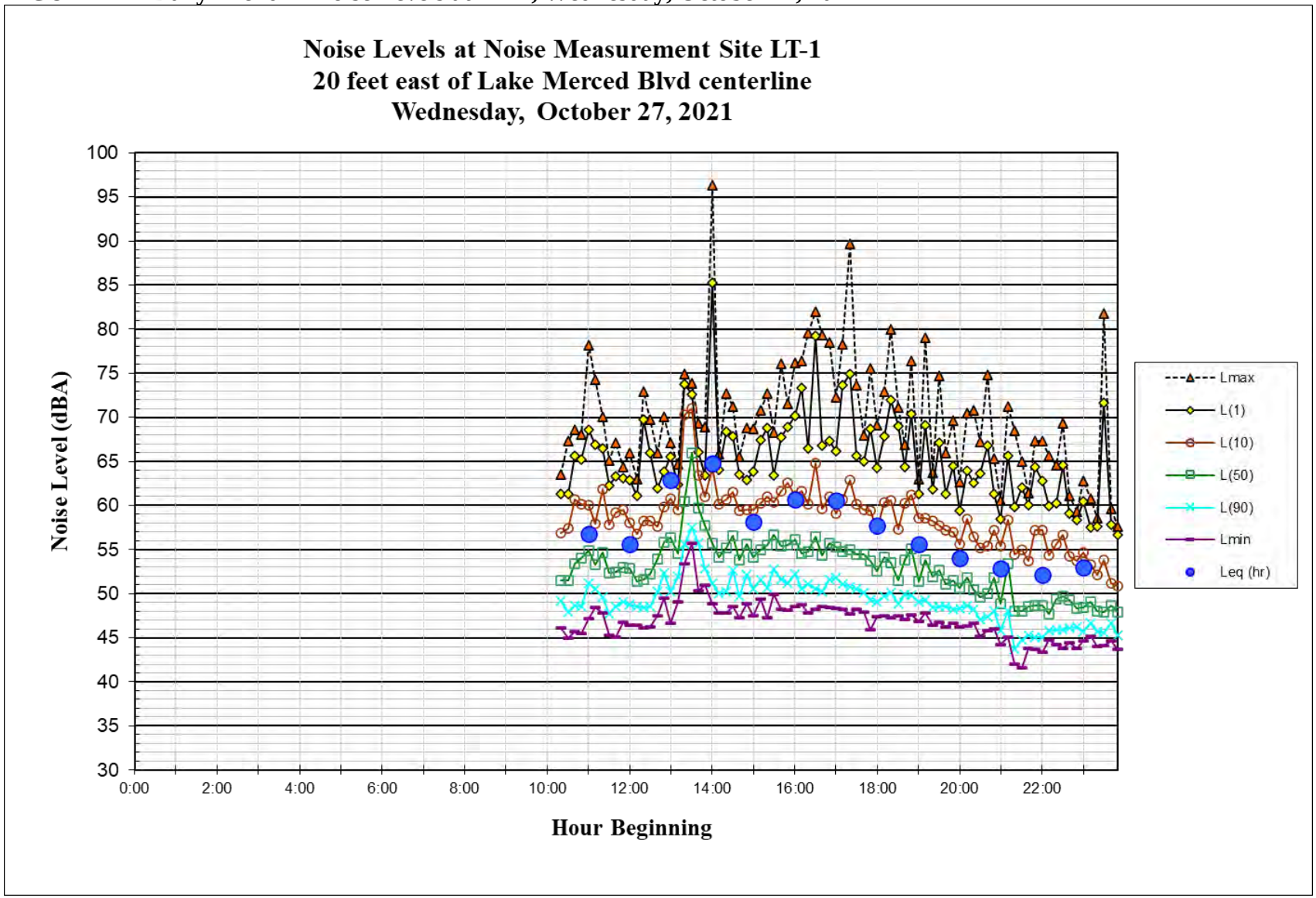


FIGURE 3 Daily Trend in Noise Levels at LT-1, Thursday, October 28, 2021

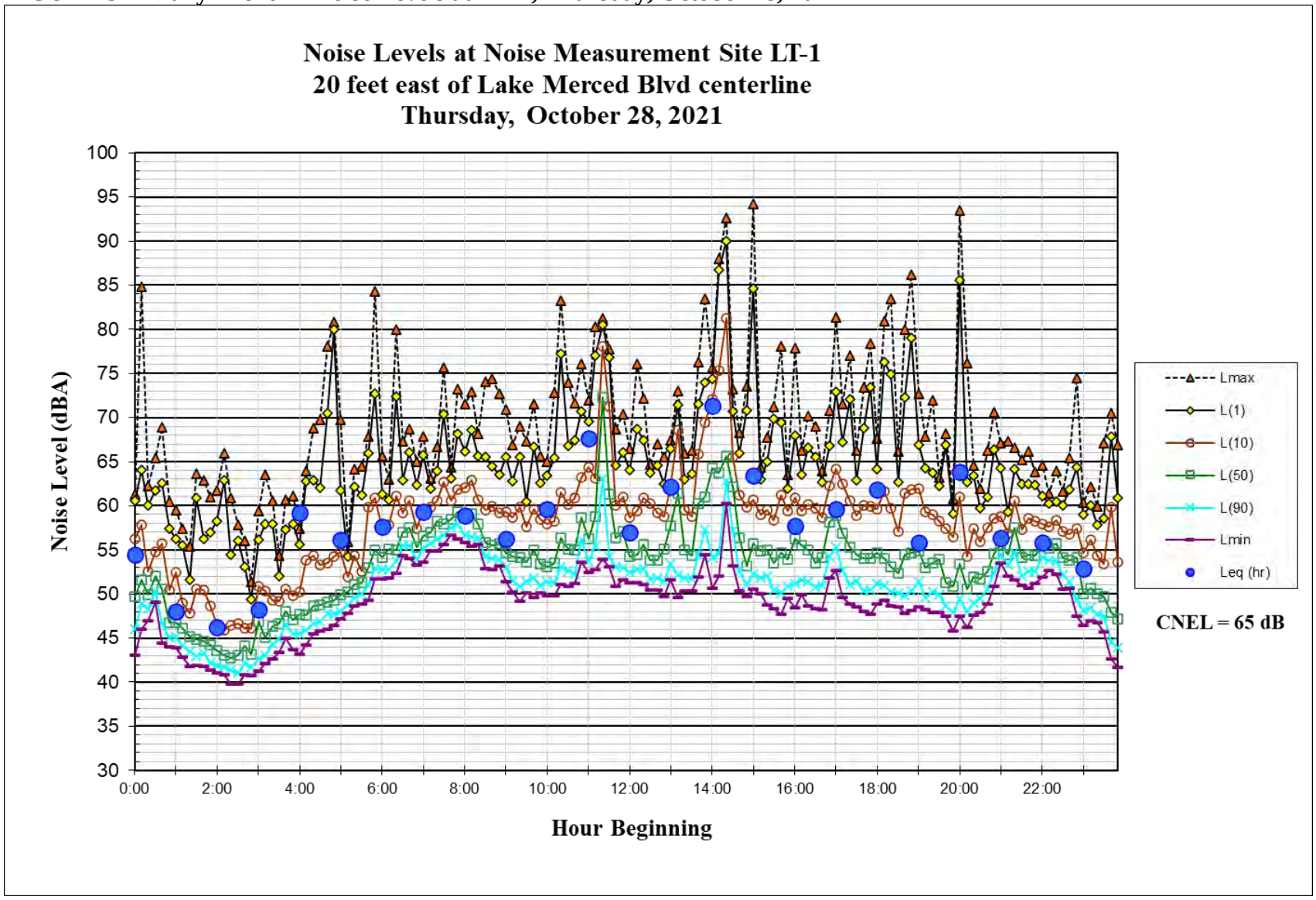


FIGURE 4 Daily Trend in Noise Levels at LT-1, Friday, October 29, 2021

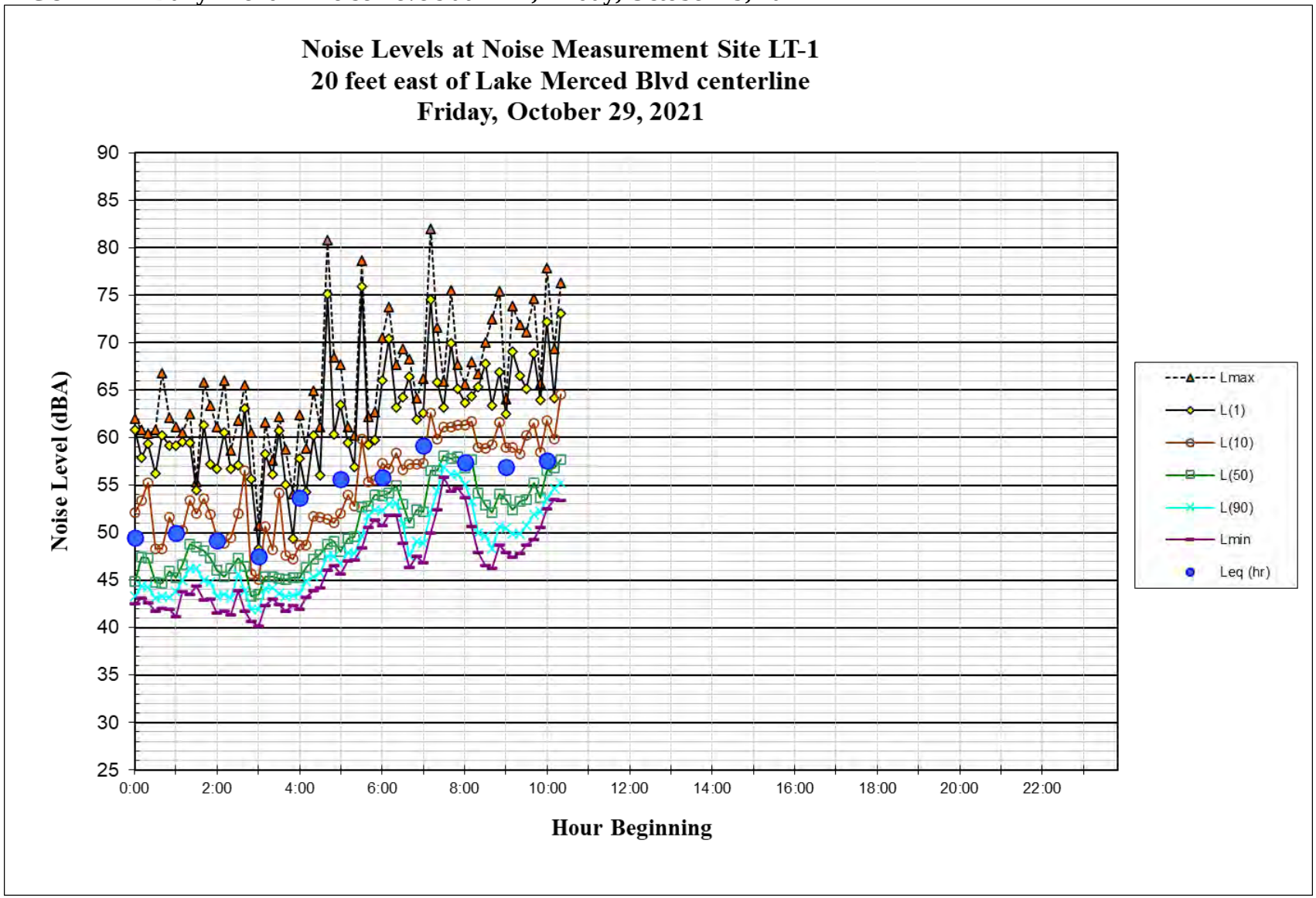


FIGURE 5 Daily Trend in Noise Levels at LT-2, Wednesday, October 27, 2021

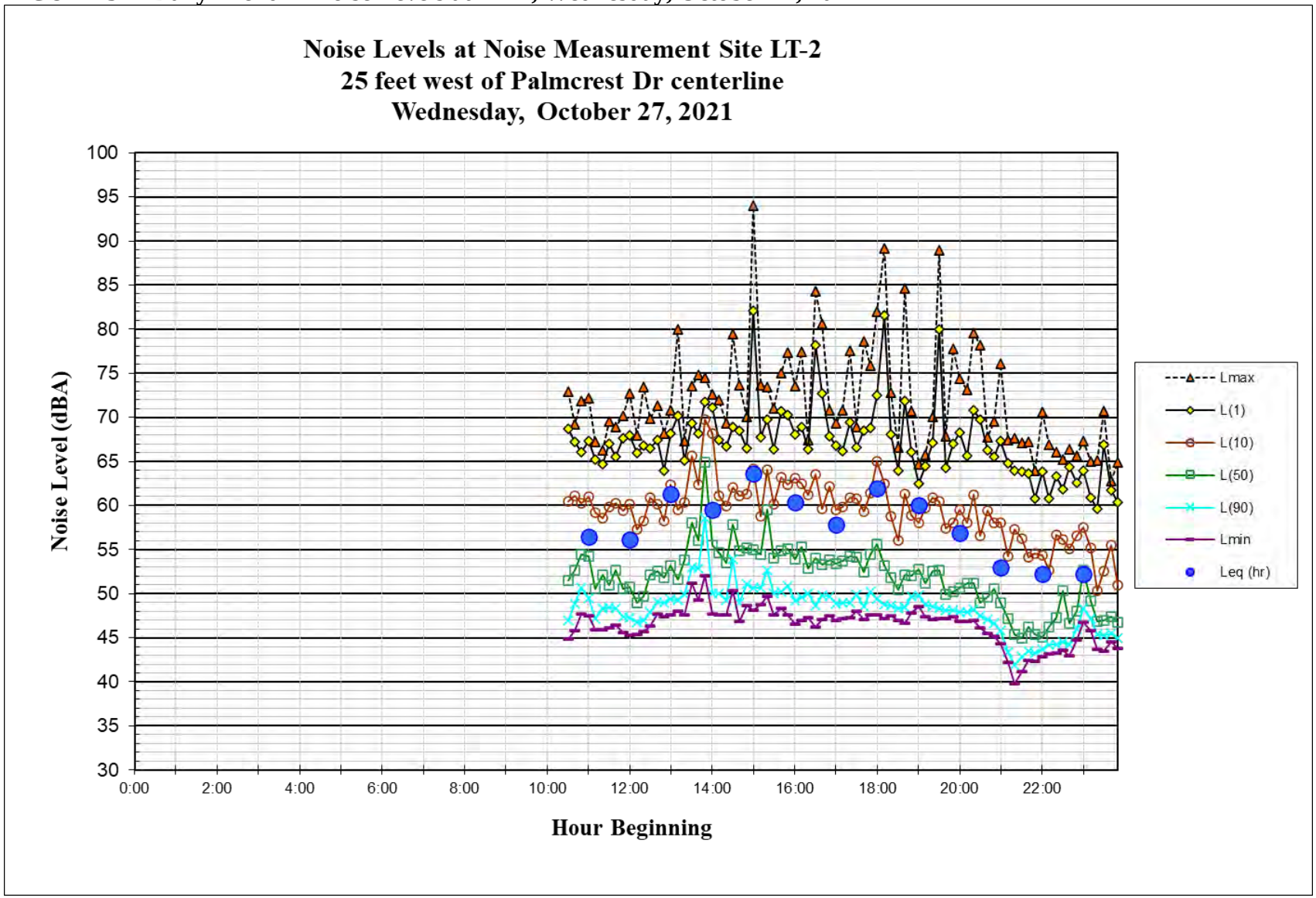


FIGURE 6 Daily Trend in Noise Levels at LT-2, Thursday, October 28, 2021

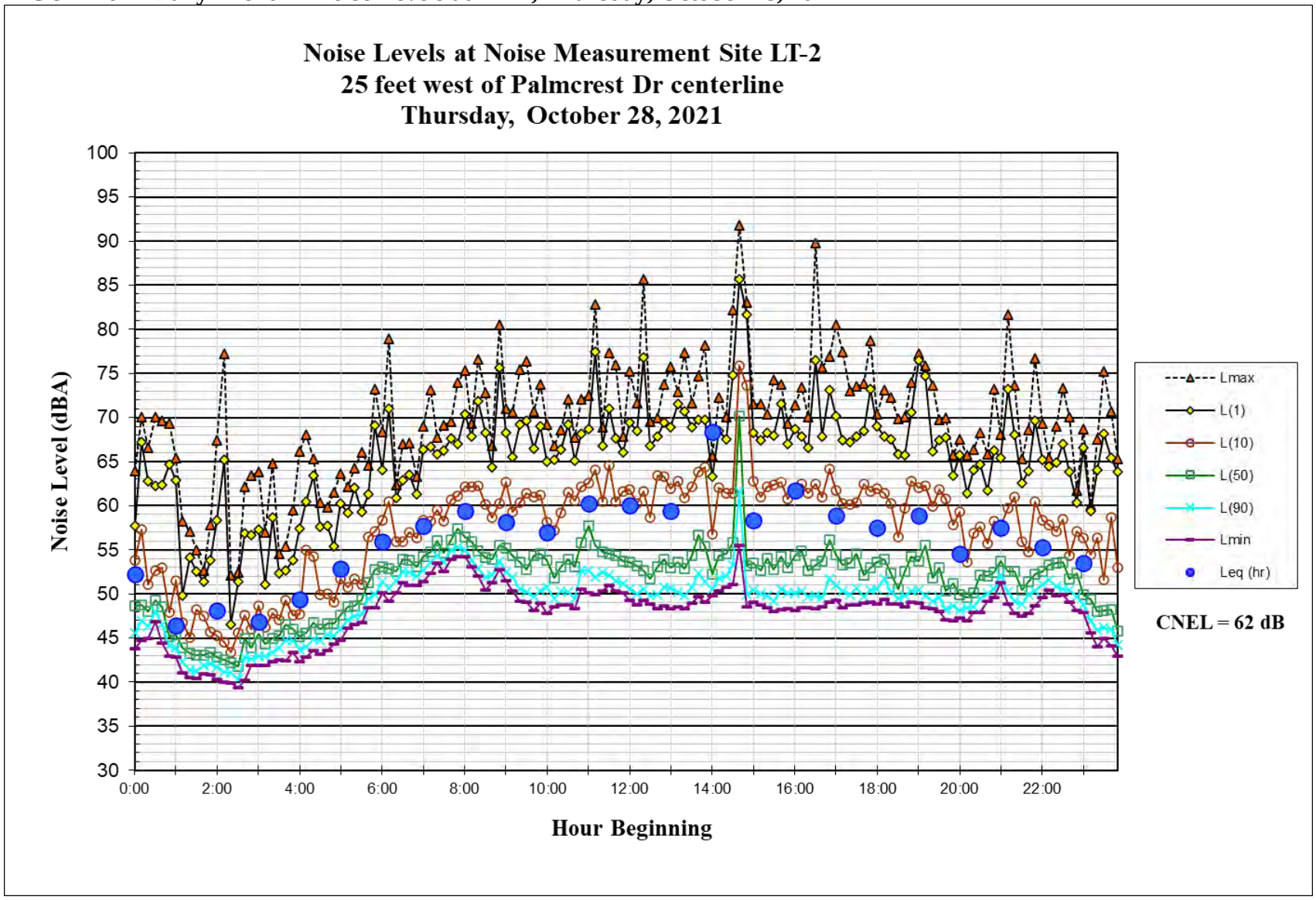


FIGURE 7 Daily Trend in Noise Levels at LT-2, Friday, October 29, 2021

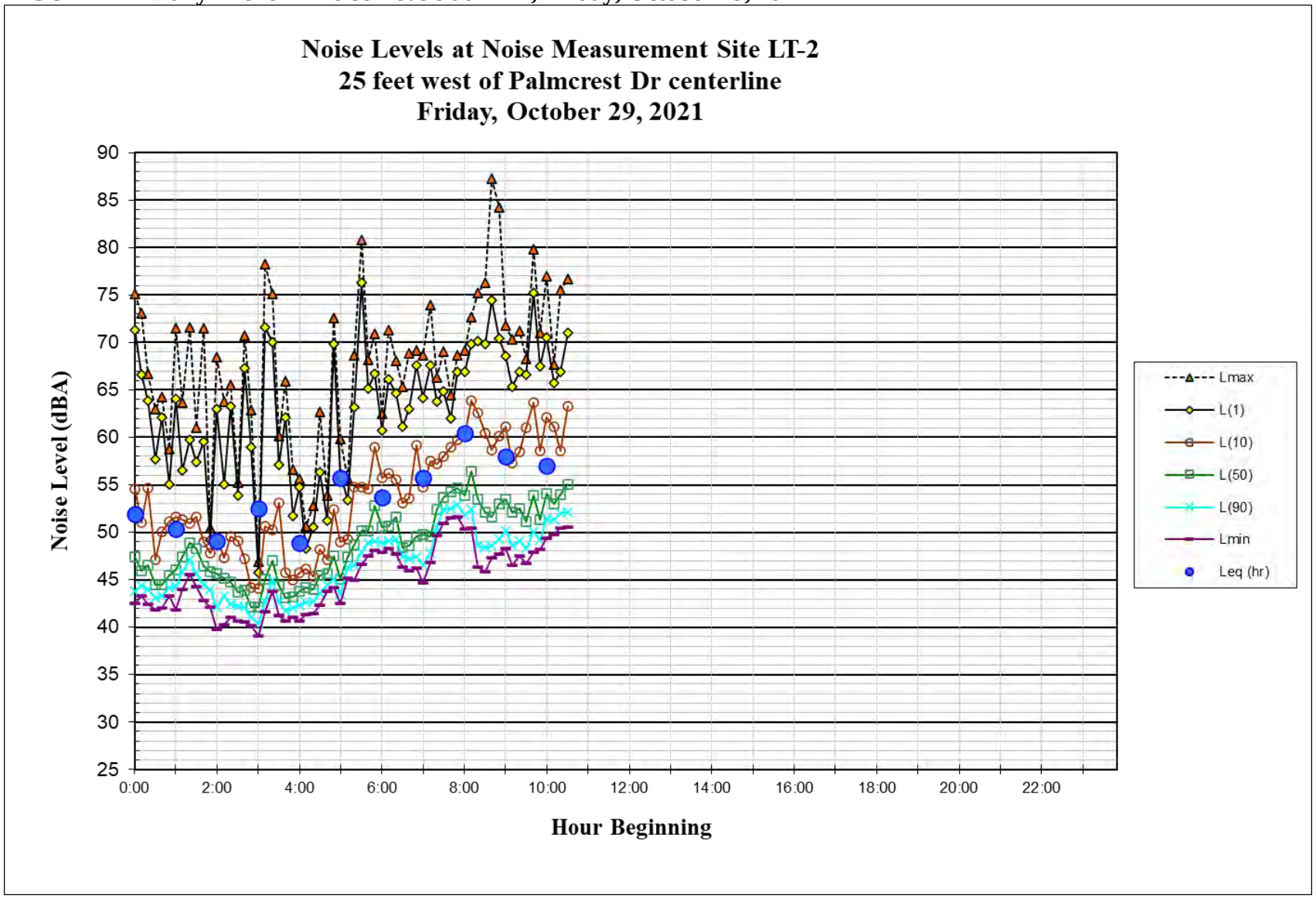


FIGURE 8 Daily Trend in Noise Levels at LT-3, Wednesday, October 27, 2021

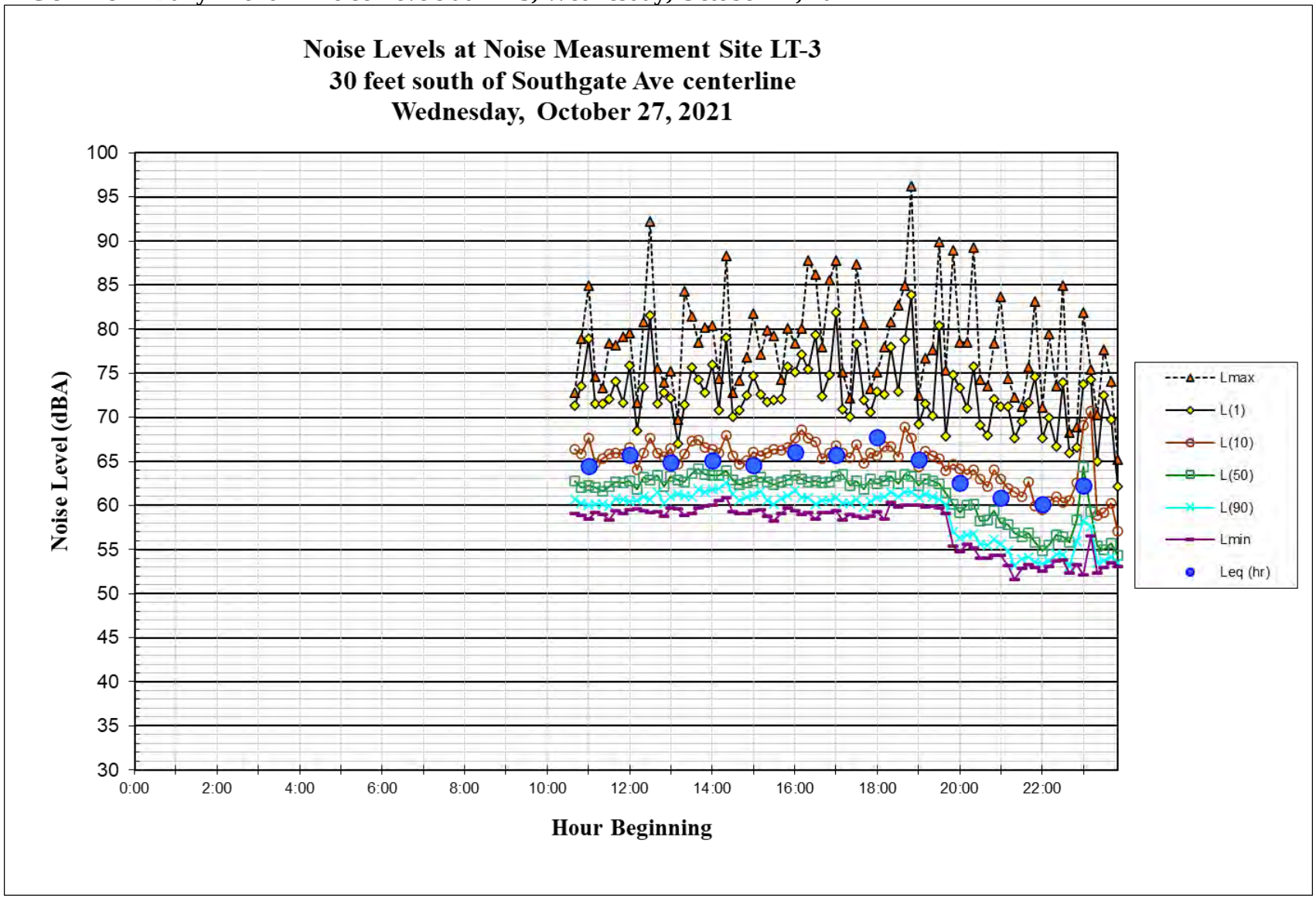


FIGURE 9 Daily Trend in Noise Levels at LT-3, Thursday, October 28, 2021

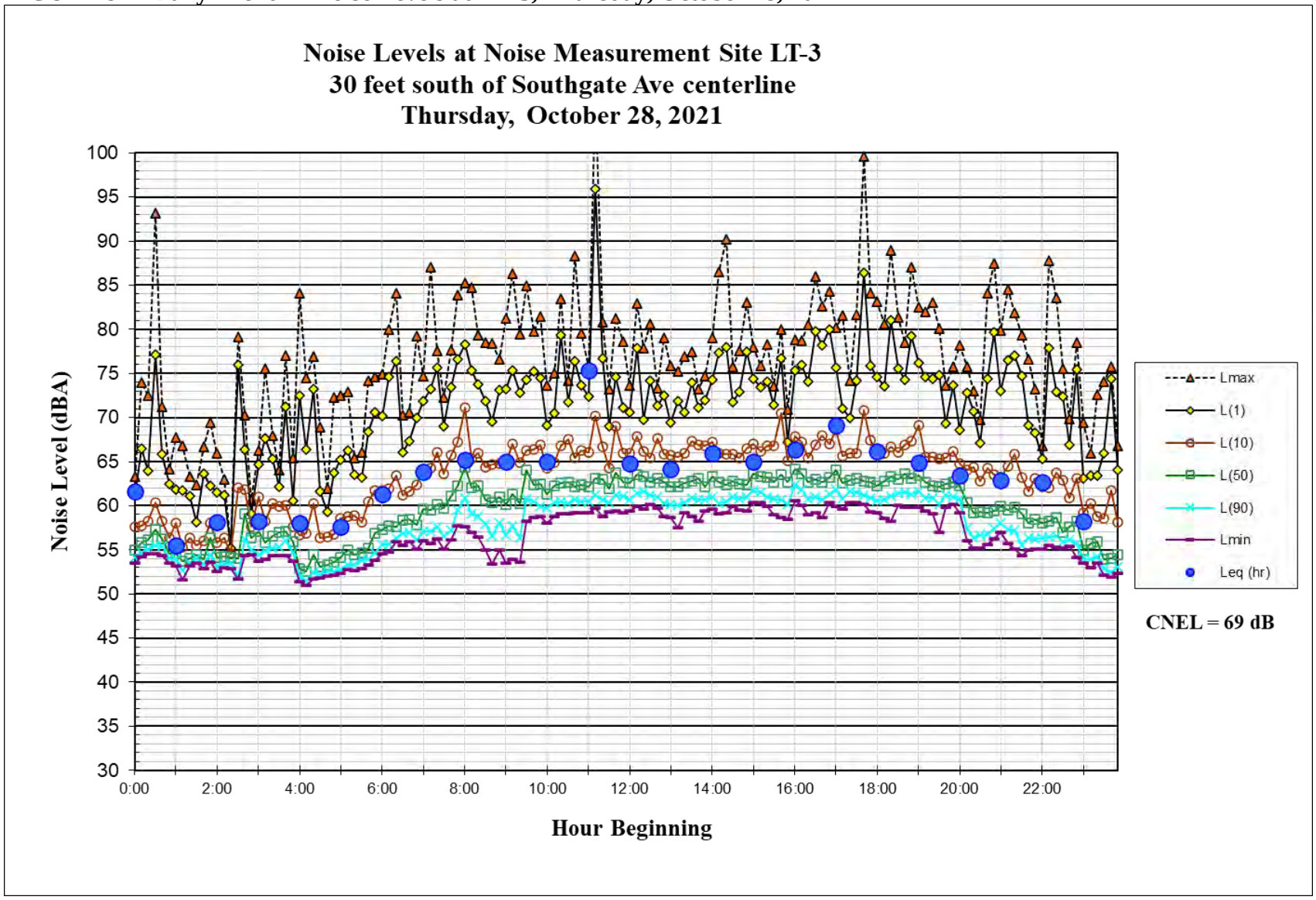
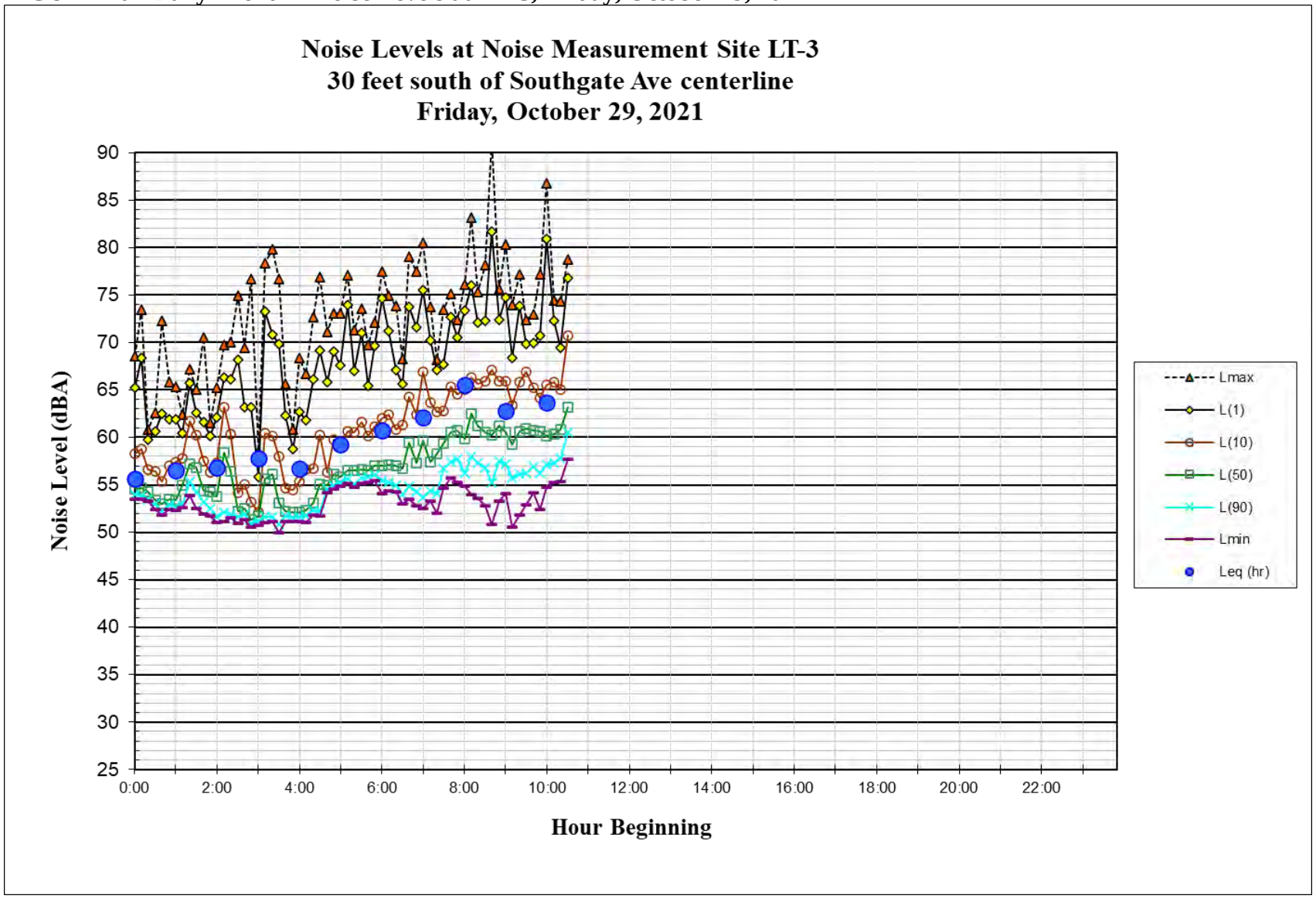


FIGURE 10 Daily Trend in Noise Levels at LT-3, Friday, October 29, 2021



GENERAL PLAN CONSISTENCY ANALYSIS

The impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration are not considered under CEQA. This section addresses the compatibility of the project with respect to the applicable policies and standards set forth in the City's General Plan.

Consistency Analysis Thresholds

The Noise Element of the Daly City 2030 General Plan sets forth policies with the goal of minimizing the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies in the City of Daly City. The applicable General Plan policies were presented in detail in the Regulatory Background section of this report and are summarized below for the proposed project Figure 11 shows an aerial view of the project site along with an overlay of the proposed project plans.

- Policies NE-3 and NE-5 states that a CNEL of not more than 70 dBA shall be maintained in residential areas and a CNEL of 75 dBA shall be maintained in commercial areas.

Additionally, the State of California establishes interior noise limits for residential and commercial land uses as follows:

- The California Building Code establishes an interior noise threshold of 45 dBA CNEL for multi-family residential units.

- The Cal Green Code standards specify an interior noise environment attributable to exterior sources that shall not 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.

FIGURE 11 Aerial Image Showing Proposed Site Plan

Noise and Land Use Compatibility

Future Exterior Noise Environment

The primary source of noise affecting the project site under future conditions will continue to be vehicular traffic on Southgate Avenue. A traffic study was prepared for the proposed project by *Kimley-Horn and Associates, Inc.* in August 2021[3], which included peak hour turning movements (AM, PM and weekend) for 11 intersections in the project vicinity. Existing, existing plus project, cumulative, and cumulative plus project scenarios were reported. Along the roadway segments adjacent to the project site, the worst-case weekday and weekend traffic noise increase is expected to be approximately 1-2 dBA CNEL above existing conditions. Therefore, future noise levels at the project site would be at or below the 70 dBA CNEL threshold for residential areas and below the 75 dBA CNEL threshold for commercial areas.

An outdoor courtyard area appears to be a part of the proposed building plans on level 3 along with common open spaces on level 4. These areas open towards the center of the proposed building and are bound by the inner facades of the building. This would ensure that the noise levels at these outdoor spaces is well below 70 dBA CNEL since the facades of the building would provide adequate shielding of about 10 to 15 dB.

Future Interior Noise Environment

Interior noise levels would vary depending upon the design of the buildings (relative window area to wall area) and the selected construction materials and methods. Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 65 to 70 dBA CNEL, the inclusion of adequate forced-air mechanical ventilation can reduce interior noise levels to acceptable levels by allowing occupants the option of closing the windows to control noise. In noise environments exceeding 70 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.

<u>Proposed Residential Use</u>
For the proposed residential use portion of the project, the northern façade of the proposed building would have direct line-of-sight to Southgate Avenue, with a setback of approximately 60 feet from the centerline of the roadway. At this distance, the units along this façade would be exposed to future exterior noise levels of 70 dBA CNEL. Assuming standard construction with windows open as mentioned above, the future interior level for the rooms facing the roadways is expected to be 56 dBA CNEL. With windows closed, the future interior level would range from 46 to 51 dBA CNEL. The proposed residential units would thus require noise insulation features and forced-air mechanical ventilation systems to meet the City's interior noise thresholds.

[3] Kimley-Horn and Associates, Inc., "Westlake South Development", August 9, 2021

The western and eastern facades of the proposed project would have a direct line-of-sight to Lake Merced Boulevard and Palmcrest Drive, respectively. The setback from both the roadways is approximately 30 feet. At this distance, the units along these facades would be exposed to future exterior noise levels of 67 and 64 dBA CNEL, respectively. Assuming standard construction with windows open as mentioned above, the future interior levels for the rooms facing the roadways is expected to be 52 and 49 dBA CNEL, for the western and eastern facades, respectively. With windows closed, the future interior level would be 47 and 44 dBA CNEL, respectively.

Proposed Commercial Use

The ground floor of the mixed-use development would be utilized for commercial uses. Standard construction materials for commercial uses would provide about 25 to 30 dBA of noise reduction in interior spaces assuming the inclusion of adequate forced-air mechanical ventilation systems. With a setback of about 60 feet from Southgate Avenue and 30 feet from Lake Merced Boulevard, the future exterior noise along the commercial use façade is expected to range from 60 to 65 dBA $L_{eq(1\text{-}hr)}$, respectively. Using standard construction materials with the inclusion of forced-air mechanical ventilation, interior noise levels at the commercial use portion would range from 35 to 40 dBA $L_{eq(1\text{-}hr)}$ during the peak daytime hour. This would satisfy the Cal Green code interior noise threshold for the State of California of 50 dBA $L_{eq(1\text{-}hr)}$, for areas of nonresidential uses.

Noise Insulation Features Recommended to Reduce Future Residential Interior Noise Levels

For consistency with the Building Code and Cal Green Code for the State of California, the following Conditions of Approval will be implemented by the project applicant:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential buildings, so that windows can be kept closed to control noise.

- Provide sound-rated windows and doors for the northern façade of the proposed building to maintain interior noise levels or below the City's 45 dBA CNEL interior noise threshold. Preliminary calculations show that sound-rated windows and doors with minimum STC ratings of 30 would be satisfactory for units facing Southgate Avenue to meet the interior noise threshold. Standard residential grade windows and doors (minimum STC 26) would be required for all remaining units.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the final design phase of the project pursuant to requirements set forth in the General Plan and State Building Code. The study will review the final site plan, building elevations, and floor plans prior to construction and confirm building treatments necessary to reduce interior noise levels to 45 dBA CNEL or less. Treatments would include, but are not limited to, sound-rated windows and doors as specified above, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to provide a compatible project in relation to adjacent noise sources and land uses.

Significance Criteria

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

1. 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) A potentially significant impact would occur if the project generated noise levels would result in a substantial temporary or periodic increase in ambient noise levels above current levels.

    b) A significant permanent noise level increase would occur if project-generated traffic generated by the project or project improvements/operations would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA CNEL or greater, with a future noise level of less than the "normally acceptable" standard, or b) the noise level increase is 3 dBA CNEL or greater, with a future noise level equal to or greater than the "normally acceptable" standard.

    c) 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.

2. A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Ground-borne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

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 noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise 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.

The City's General Plan suggests construction activities be limited to the hours of 8:00 a.m. to 5:00 p.m. on weekdays and prohibits construction on weekends and holidays. Additionally, the City's Municipal Code prohibits noise disturbances between 10:00 p.m. and 6:00 a.m. Daly City does not establish noise level thresholds for construction activities.

Ambient noise levels at noise-sensitive receptors in the vicinity of the project site range from 50 to 60 dBA L_{eq} during daytime hours, based on noise data collected at LT-1, LT-2, LT-3, ST-1, ST-2, and ST-3.

Construction noise levels vary on a day-to-day basis, depending on the type and amount of equipment operating on-site and the specific task that is being completed on a given day. Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. Table 5 summarizes the maximum instantaneous noise levels generated by typical construction equipment that generate either non-impact or impact sounds at a distance of 50 feet from the noise source. The highest maximum noise levels generated by project construction would typically range from about 80 to 90 dBA L_{max} at a distance of 50 feet from the noise source. Typical hourly average construction-generated noise levels for various types of projects are summarized in Table 6 at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc. 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 can provide an additional 5 to 10 dBA noise reduction at distant receptors.

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.

Source: Mitigation of Nighttime Construction Noise, Vibrations and Other Nuisances, National Cooperative Highway Research Program, 1999.

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.

Project construction is expected to start in January 2023 and would be built out over a period of approximately 27 months (to be completed by March 2025).

The Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels anticipated for the worst-case scenario for each construction phase, based on the equipment list provided by the applicant at the time of this study. RCNM 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 estimate the worst-case scenario for each phase of the proposed project, it was assumed that all equipment provided for each phase would operate simultaneously. Additionally, all mobile equipment will be fitted with backup alarms per OSHA requirements. 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 L_{max} at a distance of 50 feet.

Table 7 summarizes all equipment and quantities expected to be used for each construction phase, the duration of each phase, and the estimated worst-case scenario noise levels expected at the property lines of the nearest surrounding noise-sensitive land use. During construction at both areas, construction equipment would likely be spread throughout the sites, but for purposes of modeling the worst-case scenario, all equipment was assumed to be operating in relatively the same area, with the geometrical center of construction equipment being the center of the construction sites. Therefore, the propagation distances were estimated from the center of the active construction site to the property lines of the surrounding receptors. No shielding effects were assumed for the estimated noise levels shown in Table 7.

TABLE 7 Estimated Construction Noise Levels at the Nearby Land Uses

Phase	Time Duration	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} at Residence, dBA			
			South Res (*120 ft*)	West/ Southwest Res & Commercial (*250 ft*)	East Res & Commercial (*250 ft*)	Northwest Res (320ft)
Demolition	1/2/2023-2/17/2023	Concrete/Industrial Saw (2) Excavator (2) Rubber-Tired Dozer (2) Tractor/Loader/Backhoe (2)	81	75	75	73
Site Preparation	2/18/2023-3/9/2023	Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (1)	77	71	71	68
Grading/ Excavation	3/10/2023-4/7/2023	Excavator (1) Grader (2) Rubber Tired Dozer (1) Tractor/Loader/Backhoe (1)	79	73	73	71
Trenching/ Foundation	4/8/2023-5/19/2023	Tractor/Loader/Backhoe (1) Excavator (1)	74	68	68	66
Building - Exterior	5/20/2023-10/11/2024	Crane (2) Forklift (2) Generator set (2) Tractor/Loader/Backhoe (1) Welder (2)	77	70	70	68
Building-Interior/ Architectural coating	2/14/2024-1/14/2025	Air Compressor (3) Aerial Lift (3)	72 to 78 [a]	66 to 72 [a]	66 to 72 [a]	63 to 70 [a]
Paving	1/15/2025-3/18/2025	Cement and Mortar Mixers (1) Paver (1) Paving Equipment (1) Roller (1) Tractor/Loader/Backhoe (1)	76 to 77 [b]	69 to 71 [b]	69 to 71 [b]	67 to 69 [b]

[a] The range of construction noise levels represents the levels during the Building-Interior/Architectural Coating phase only and combined with the Building-Exterior phase.

[b] The range of construction noise levels represents the levels during the Paving phase only and combined with the Building-Interior/Architectural Coating and Building-Exterior phases.

The predicted construction noise levels in Table 7 indicates that project construction could potentially generate noise levels exceeding ambient noise levels by 5 dBA L_{eq} or more throughout construction.

Construction Best Management Practices

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. It is assumed that construction of the proposed project would be conducted in accordance with the provisions of the City's General Plan, which limits temporary construction work to daytime hours between 8:00 a.m. and 5:00 p.m., Monday through Friday. Construction is prohibited on weekends and all holidays. Additionally, 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.

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

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

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

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

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

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

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

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

- Route construction-related traffic along major roadways and as far as feasible from sensitive receptors.

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

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

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

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

Implementation of the above measures as project conditions of approval would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. With the implementation of these measures and recognizing that noise generated by construction activities would occur over a temporary period, the temporary increase in ambient noise levels would be less-than-significant.

Mitigation Measure 1a: None required.

Impact 1b: Permanent Noise Level Increase. The proposed project would not result in a substantial permanent noise level increase due to project-generated traffic at the existing noise-sensitive land uses in the project vicinity. **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. The existing ambient noise environment measured at LT-1 and LT-2 near residential areas resulted in noise levels ranging from 62 to 65 dBA CNEL. The ambient noise environment near the commercial areas as measured by LT-3 resulted in a noise level of 69 dBA CNEL. A significant impact would occur if project-generated traffic increased levels by 3 dBA CNEL or more. For reference, a 3 dBA CNEL noise increase would be expected if the project would double existing traffic volumes along a roadway.

To determine the effect of the project-generated traffic on the nearby existing residences and commercial properties, the existing plus project traffic volumes for the peak AM, peak PM, and peak weekend hours included in the traffic study by *Kimley-Horn & Associates, Inc.* was compared to the existing traffic volumes. The proposed project generates a net decrease of 891 daily trips, an increase of 33 trips in the AM peak hour, a decrease of 129 trips in the PM peak hour, and a decrease of 105 trips in the weekend peak hour. This indicates a less than 1 dBA CNEL traffic

noise increase at all roadway segments included in the study area. Therefore, the project-generated traffic would not cause a substantial permanent noise increase at the surrounding noise-sensitive receptors. This impact is a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 1c: Cumulative Noise Increase. The proposed project would not make a cumulatively considerable contribution to future noise levels at residential land uses in the vicinity. **This is a less-than-significant impact.**

A significant impact would occur 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 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.

Cumulative traffic noise level increases were calculated by comparing the peak hour volumes for the cumulative and cumulative plus project conditions to volumes in the existing scenario. Along each roadway segment included in the traffic study, the future noise level increase was calculated to be 1 dBA CNEL or less under both cumulative scenarios (with and without project). Therefore, a less than 1 dBA CNEL contribution would be attributable to the proposed project. The proposed project would not make a cumulatively considerable contribution to increased noise levels. This is a less-than-significant impact.

Mitigation Measure 1c: None required.

Impact 1d: Noise Levels in Excess of Standards. The proposed project would not generate noise levels exceeding the existing ambient environment at the surrounding sensitive land uses. Therefore, the project is not expected to violate the City's noise disturbance prohibition. **This is a less-than-significant impact.**

Daly City does not specify noise limits for mechanical equipment or deliveries. However, the City's Municipal Code prohibits noise disturbances between 10:00 p.m. and 6:00 a.m. Therefore, an increase in ambient noise levels outside the City's allowable hours would constitute a significant impact.

Mechanical Equipment

The proposed mixed use development building would include mechanical equipment, such as heating, ventilation, and air conditioning (HVAC) systems. As per the client provided building plans, there appear to be five roof-top units (RTUs) along with several heat pump systems in the roof plan.

Typically, multiple HVAC units would cycle on and off throughout a given day, and for projects similar to the proposed project, there are primarily two types of mechanical equipment used on the

roof: heat pump systems and heat recovery systems. Heat pumps produce noise levels of 55 dBA at 5 feet while heat recovery systems produce a noise level of 68 dBA at 5 feet. Assuming 3 RTUs operating simultaneously along with about 40 heat pumps (representing a conservative estimate), the total noise level generated would be about 75 dBA at 5 feet. The nearest building façade is about 60 feet away from the HVAC units on the rooftop. At this distance, the HVAC units would generate an unshielded noise level of 53 dBA. The community noise equivalent level, assuming daytime and nighttime operating hours for about 50% of the HVAC units would be 60 dBA CNEL. With existing ambient noise levels at nearby residences exceeding 60 dBA CNEL as seen from the measurements conducted, noise levels generated at the project site by HVAC units are expected to be below ambient conditions. An additional 5-10 dB noise reduction is expected due to shielding effects of parapets, enclosures and the edges of the proposed building. This would be a less-than-significant impact.

Mitigation Measure 1d: None required.

Impact 2: Generation of Excessive Groundborne Vibration due to Construction. Construction-related vibration levels would not exceed the 0.3 in/sec PPV at existing off-site residences or commercial buildings. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include site demolition, preparation work, grading/excavation, trenching/foundation work, building exterior and interior work and paving. The proposed project would not require pile driving, which can cause excessive vibration.

Daly City does not define any vibration thresholds. For structural damage, 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. A conservative vibration limit 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 conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection. No historical buildings or buildings that are documented to be structurally weakened adjoin the project site. The 0.3 in/sec PPV vibration limit would be applicable to properties in the immediate vicinity of the project site since there are no known historic buildings in the vicinity.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. 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 are highest close to the source, and then attenuate with increasing distance at the rate (Dref/D)1.1, where D is the distance from the source in feet, and Dref is the reference distance of 25 feet. Table 8 presents typical vibration levels that could be expected from construction equipment at 25 feet and summarizes the expected vibration levels at residences bordering the site, the closest being 25 feet away from the project site, to the south. Vibration levels at distances greater than 25 feet from the

project site would not exceed the 0.3 in/sec PPV threshold for buildings of normal conventional construction, especially since there is no pile driving activity involved in any phase of the construction.

The US Bureau of Mines has analyzed the effects of blast-induced vibration on buildings in USBM RI 8507,2 and these findings have been applied to vibrations emanating from construction equipment on buildings.3 Figure 12 presents the damage probability, as reported in USBM RI 8507 and reproduced by Dowding, assuming a maximum vibration level of 0.3 in/sec PPV. Based on the data summarized in Figure 12, there would be no observations of "threshold damage," "minor damage," or "major damage" at buildings of normal conventional construction when vibration levels were 0.3 in/sec PPV or less.

Project-generated vibration levels would fall below the 0.3 in/sec PPV structural damage threshold at all surrounding residential and commercial buildings. Neither cosmetic, minor, or major damage would occur beyond 25 feet. At these locations and in other surrounding areas where vibration would not be expected to cause structural 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. 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 residences, perceptible vibration can be kept to a minimum.

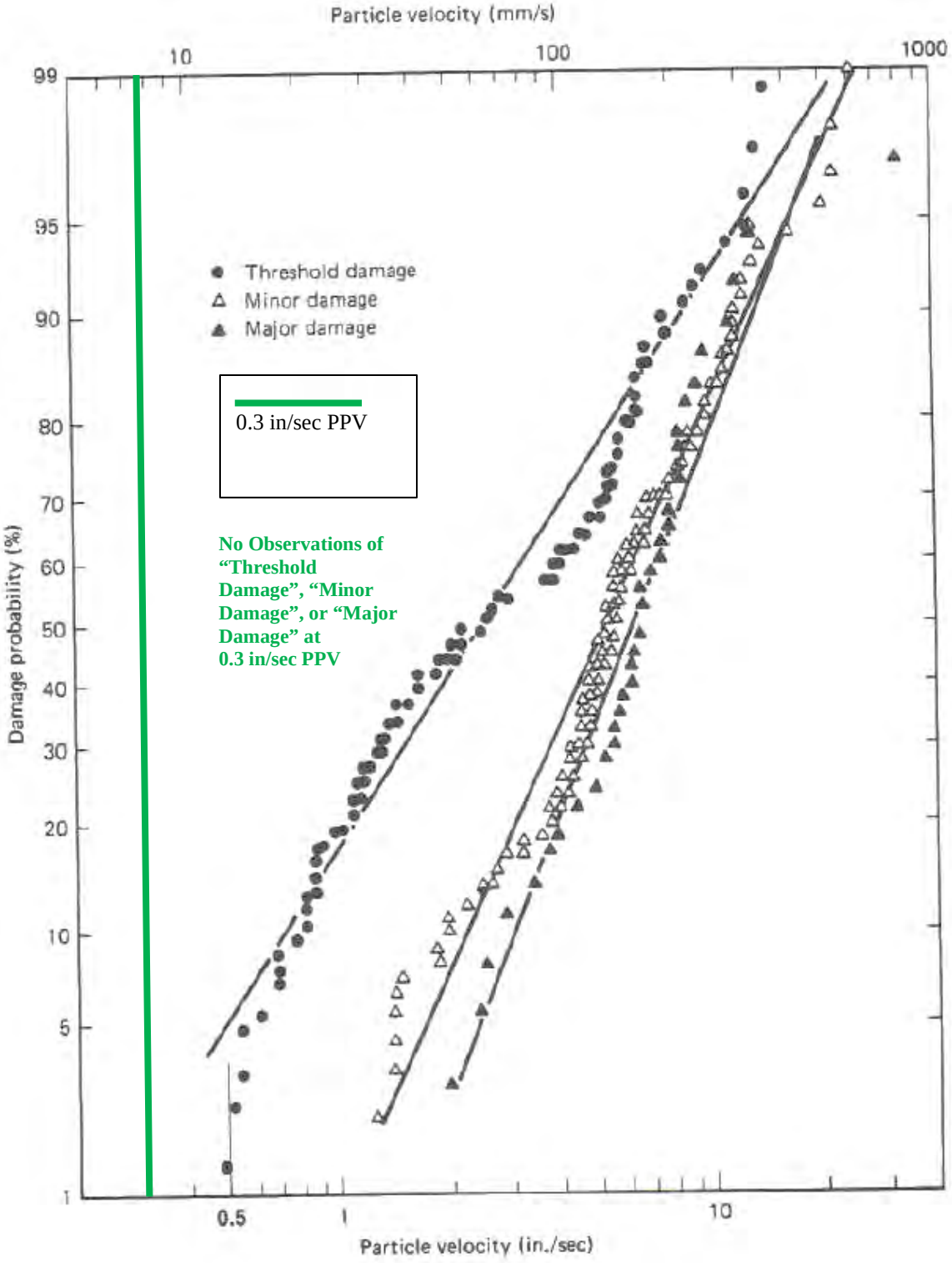
While construction activity may be perceptible, the proposed project is not expected to result in "architectural" damage to any surrounding structure. This is a less-than-significant impact.

TABLE 8 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Surrounding Building Façades (in/sec PPV)			
			South Residential (20 ft)	East Commercial (60 ft)	Southeast Residential (75 ft)	West Residential (85 ft)
Clam shovel drop		0.202	0.258	0.077	0.060	0.053
Hydromill (slurry wall)	In soil	0.008	0.010	0.003	0.002	0.002
	In rock	0.017	0.022	0.006	0.005	0.004
Vibratory Roller		0.21	0.268	0.080	0.063	0.055
Hoe Ram		0.089	0.114	0.034	0.027	0.023
Large bulldozer		0.089	0.114	0.034	0.027	0.023
Caisson drilling		0.089	0.114	0.034	0.027	0.023
Loaded trucks		0.076	0.097	0.029	0.023	0.020
Jackhammer		0.035	0.045	0.013	0.010	0.009
Small bulldozer		0.003	0.004	0.001	0.001	0.001

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, May 2006 and modified by Illingworth & Rodkin, Inc., November 2021.

FIGURE 12 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996 as modified by Illingworth & Rodkin, Inc., November 2021.

Mitigation Measure 2: None Required.

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

San Francisco International Airport is a public-use airport located approximately 6.5 miles southeast of the project site. According to the Noise Element of the Daly City 2030 General Plan, the project site lies outside the 60 dBA CNEL 2030 noise contour of the airport (Figure 13 below). This means that future exterior noise levels due to aircraft from San Francisco International Airport would be compatible with the City's exterior noise standards for aircraft noise.

Mitigation Measure 3: **None required.**

FIGURE 13 Future Noise Contour Map Showing Project Site