Appendix E

NEPA Noise Assessment

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397 Blossom Hill Road Mixed-Use Project Environmental Assessment

City of San José

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397 BLOSSOM HILL ROAD
NEPA NOISE ASSESSMENT

San José, California

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INTRODUCTION

The project proposes to demolish an existing one-story commercial use building and construct a mixed-use affordable housing development on a 2.04-acre site located at 397 Blossom Hill Road in San José. The residential portion of the development would include up to 150 apartments and the commercial portion of the development would include approximately 26,000 square feet of commercial space.

The project's potential to result in adverse effects with respect to applicable National Environmental Policy Act (NEPA) guidelines is assessed in this report. The report is divided into two sections. The Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions. The NEPA Noise Assessment Section evaluates noise effects resulting from the project. Noise insulation is recommended to avoid the potential for adverse effects on the interiors of proposed residential units.

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.

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.

Regulatory Background

The U.S. Department of Housing and Urban Development (HUD) environmental noise regulations are set forth in 24CFR Part 51B (Code of Federal Regulations). The following exterior noise standards for new housing construction would be applicable to this project:

- 65 dBA DNL or less – acceptable.

- Exceeding 65 dBA DNL but not exceeding 75 dBA DNL – normally unacceptable (appropriate sound attenuation measures must provide an additional 5 decibels of attenuation over that typically provided by standard construction in the 65 dBA DNL to 70 dBA DNL zone; 10 decibels additional attenuation in the 70 dBA DNL to 75 dBA DNL zone).

- Exceeding 75 dBA DNL – unacceptable.

These noise standards also apply, "… at a location 2 meters from the building housing noise sensitive activities in the direction of the predominant noise source…" and "…at other locations where it is determined that quiet outdoor space is required in an area ancillary to the principal use on the site."

A goal of 45 dBA DNL is set forth for interior noise levels and attenuation requirements are geared toward achieving that goal. It is assumed that with standard construction any building will provide sufficient attenuation to achieve an interior level of 45 dBA DNL or less if the exterior level is 65 dBA DNL or less. Where exterior noise levels range from 65 dBA DNL to 70 dBA DNL, the project must provide a minimum of 25 decibels of attenuation, and a minimum of 30 decibels of attenuation is required in the 70 dBA DNL to 75 dBA DNL zone. Where exterior noise levels range from 75 dBA DNL to 80 dBA DNL, the project must provide a minimum of 35 decibels of attenuation to achieve an interior level of 45 dBA DNL or less.

Existing Noise Environment

The project site is located north of Blossom Hill Road, approximately 790 feet east of Snell Avenue in San José, California. The site is currently developed with a single-story furniture store and surrounded by a multi-family residential building to the north, a commercial building to the west, single family detached residential to the south and a commercial medical office building to the east. A noise monitoring survey was performed in the vicinity of the project site beginning Friday, October 5th, 2018 and concluding on Wednesday, October 10th, 2018. The monitoring survey included one long-term measurement and one short-term measurement, as shown in Figure 1.

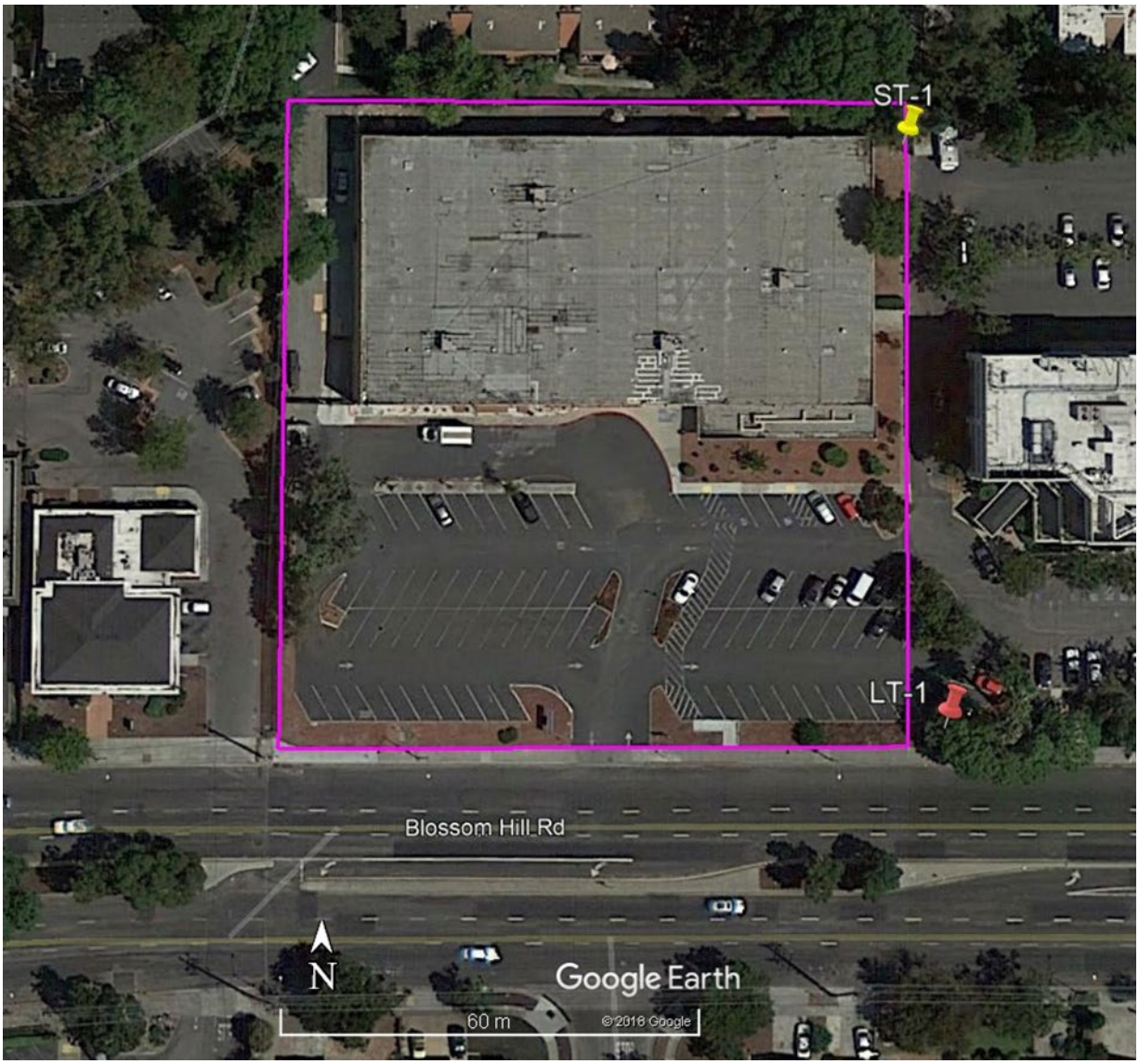
Long-term noise measurement LT-1 was made 65 feet north of the centerline of Blossom Hill Road. The primary noise source at this location was traffic along Blossom Hill Road. Hourly average noise levels ranged from 63 to 72 dBA L_{eq} during daytime hours, and from 58 to 70 dBA L_{eq} at night. The day-night average noise level at LT-1 ranged from 72 to 73 dBA DNL. The daily trends in measured noise levels are given in Figures 3 through 6.

Short-term noise measurement ST-1 was located in the northwest corner of the site, approximately 350 feet from the center of Blossom Hill Road. The primary noise source at this location was distant traffic along Blossom Hill Road. Occasional aircraft overflights also affected the noise environment at the site. The 10-minute average noise level, measured between 1:10 pm and 1:20 pm on Wednesday, October 10th, 2018, was 53 dBA L_{eq}. A summary of the short-term measurement results is shown in Table 3.

TABLE 3 Summary of Short-Term Noise Measurement Data, October 10th, 2018

ID	Location (Start Time)	Measured Noise Levels, dBA				Primary noise source
		L_{10}	L_{50}	L_{90}	L_{eq}	
ST-1	Northeast corner of project site (10/10/2018, 1:10 pm to 1:20 pm)	56	48	45	53	Traffic on Blossom Hill Road

FIGURE 1 Noise Measurement Locations



Source: Google Earth, 2018.

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Significance Criteria

An adverse effect would result if noise levels at the project site would exceed HUD Guidelines for acceptability. Exterior noise levels exceeding 65 dBA DNL or interior noise levels exceeding 45 dBA DNL would exceed HUD's noise compatibility criteria.

Future Exterior Noise Environment

The primary noise source for the project site is vehicular traffic along Blossom Hill Road. Pursuant to the HUD Guidelines, the noise exposure at least 10 years in the future must be considered in addition to the existing noise exposure. Based on the comparison between existing and future traffic volumes and trip generation data provided for the project [1], future traffic noise levels along Blossom Hill Road are anticipated to increase by 1 dB over existing levels.

Exterior use areas would include a courtyard and outdoor patio on Level 1 and a lookout terrace on Level 2. The Level 1 courtyard would include outdoor seating, a lawn, a veggie garden, and an outdoor multi-purpose room. The Level 1 courtyard area opens up to Blossom Hill Road and would be exposed to noise levels as high as 72 dBA DNL in areas closest to Blossom Hill Road. Interior portions of the courtyard would be exposed to 66 dBA DNL. The outdoor patio on the northwestern side of the building, located about 200 feet from the center of and partially shielded from Blossom Hill Road, would be exposed to up to 62 dBA DNL. The Level 2 lookout terrace would be exposed to up to 62 dBA DNL.

Exterior noise levels throughout the Level 1 courtyard would be considered "normally unacceptable" by HUD. Noise reduction strategies that would reduce day-night average noise levels to 65 dBA DNL or less include redesigning the layout of the proposed building in order to shield the outdoor areas from traffic noise generated by vehicular activity on Blossom Hill Road. This strategy allows the building itself to provide acoustical shielding from traffic noise to the outdoor areas. Another alternative would be to construct 6-foot sound walls to block the direct line of sight between central courtyard and Blossom Hill Road.

Noise levels in the Level 1 outdoor patio and the Level 2 lookout terrace would be considered "acceptable" by HUD and would be compatible with residential exterior use.

Future Interior Noise Environment

The project proposes to construct a four-level mixed use building with 150 residential units on Levels 2 through 4, commercial space on Level 1, and surface parking and enclosed parking at-grade.[2] South facing residential façades would be located 70 feet from the center of Blossom Hill Road. The calculated exterior noise level exposures of residential façades are summarized in Table 4.

[1] 397 Blossom Hill Road Affordable Housing Mixed-Use Project - Volumes and Trip Generation, *Hexagon Traffic Consultants*, data received on February 8, 2019.

[2] Blossom Hill Apartments, *Studio E Architects*, June 26, 2018.

TABLE 4 Predicted Exterior Noise Levels at Building Façades

Residential Building Façade (Levels 2-4)	Exterior Noise Level (dBA DNL)	Compatible with HUD Exterior Criteria?
Outer north facing façade	54	Acceptable
North façade facing courtyard	61	Acceptable
Outer east and west facades	67	Normally Unacceptable
Inner east and west façades facing courtyard	66	Normally Unacceptable
South façade facing Blossom Hill Road	74	Normally Unacceptable

The calculated exterior noise levels at north facing façades and the northern façade facing the courtyard would be less than 65 dBA DNL and would be considered "acceptable" by HUD. Under HUD guidelines, it is assumed that with standard construction any building will provide sufficient attenuation to achieve an interior level of 45 dBA DNL or less if the exterior level is 65 dBA DNL or less.

Exterior noise levels at the east, west and south residential façades would exceed 65 dBA DNL and would be considered "normally unacceptable" under HUD standards. Where exterior noise levels range from 65 dBA DNL to 70 dBA DNL, the project must provide a minimum of 25 decibels of attenuation (applicable to units with east and west facing façades), and a minimum of 30 decibels of attenuation is required in the 70 dBA DNL to 75 dBA DNL zone (applicable to units with south facing façades). Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA DNL with proper wall construction techniques, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

A review of the project plans indicates that the exterior walls will be finished with a combination of metal cladding, brick veneer, and sand finish stucco. The sound isolation provided by such an assembly, assuming internally insulated single stud walls with one layer of direct mount gypsum board at the room interior, would range from be STC[3] 39 to 46. Based on the floorplans and building elevations, units facing Blossom Hill Road would have typical window to wall ratios of 35% or less.

North facing units would achieve the 45 dBA DNL threshold with standard construction and windows open or closed. To maintain a habitable interior environment, east, west, south, and courtyard facing residential units should be mechanically ventilated so that windows and doors can be kept closed at the occupant's discretion to control noise intrusion indoors. Residential units with south facing façades adjacent to Blossom Hill Road would achieve the interior standard with the inclusion of forced-air mechanical ventilation and windows and exterior doors with STC ratings of 32 or higher. Figure 2 summarizes the above noise control recommendations. HUD

[3] **Sound Transmission Class (STC)** A single figure rating designed to give an estimate of the sound insulation properties of a partition. Numerically, STC represents the number of decibels of speech sound reduction from one side of the partition to the other. The STC is intended for use when speech and office noise constitute the principal noise problem.

Figure 19 (Figure 7 of this report) provides a summary example of the inputs used to complete the calculations of interior noise levels at residential units with the future worst-case noise exposure.

FIGURE 2 Recommended Sound Rated Construction for Residential Façades

Source: Site Plan

FIGURE 3 Daily Trend in Noise Levels at LT-1

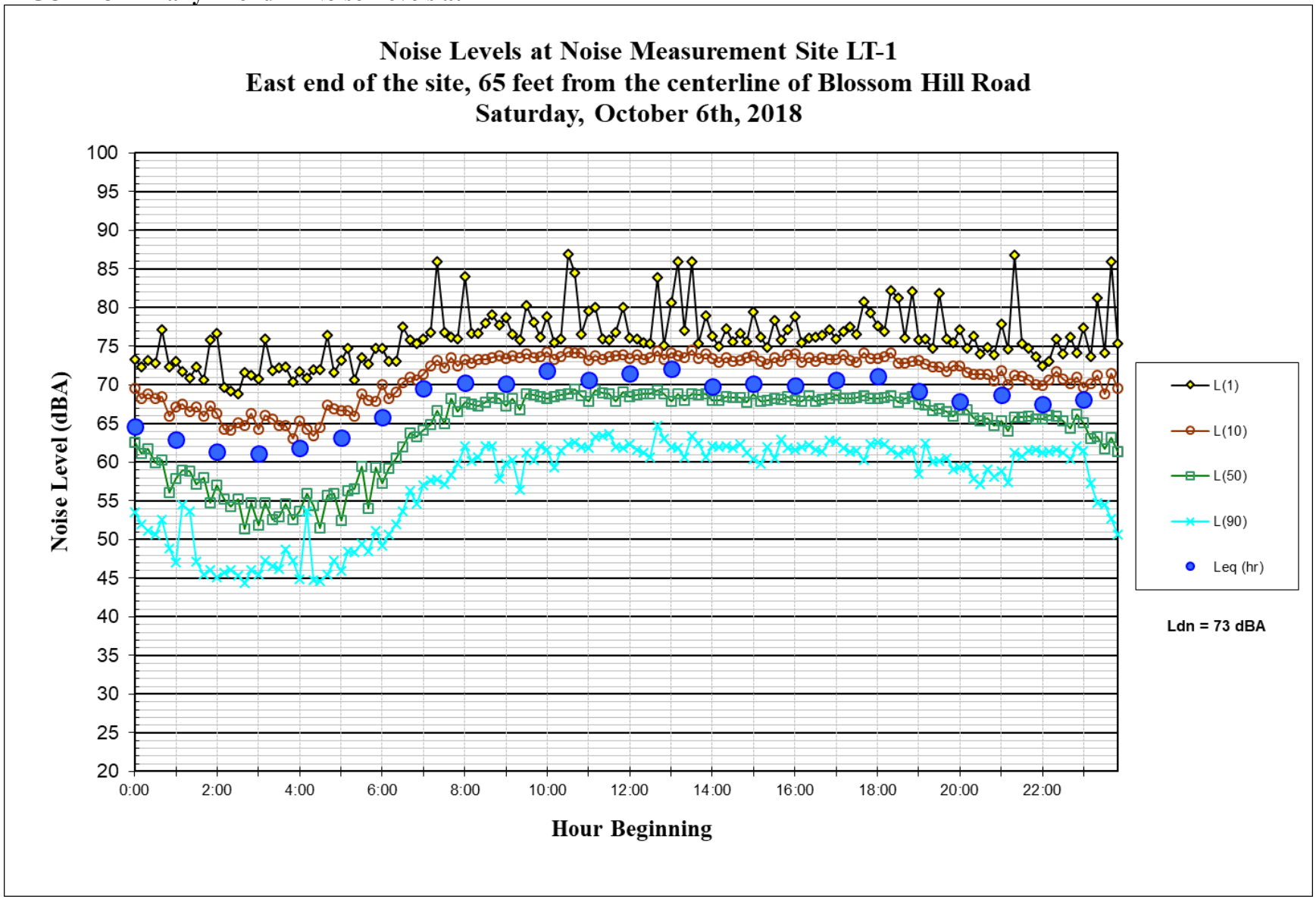

FIGURE 4 Daily Trend in Noise Levels at LT-1

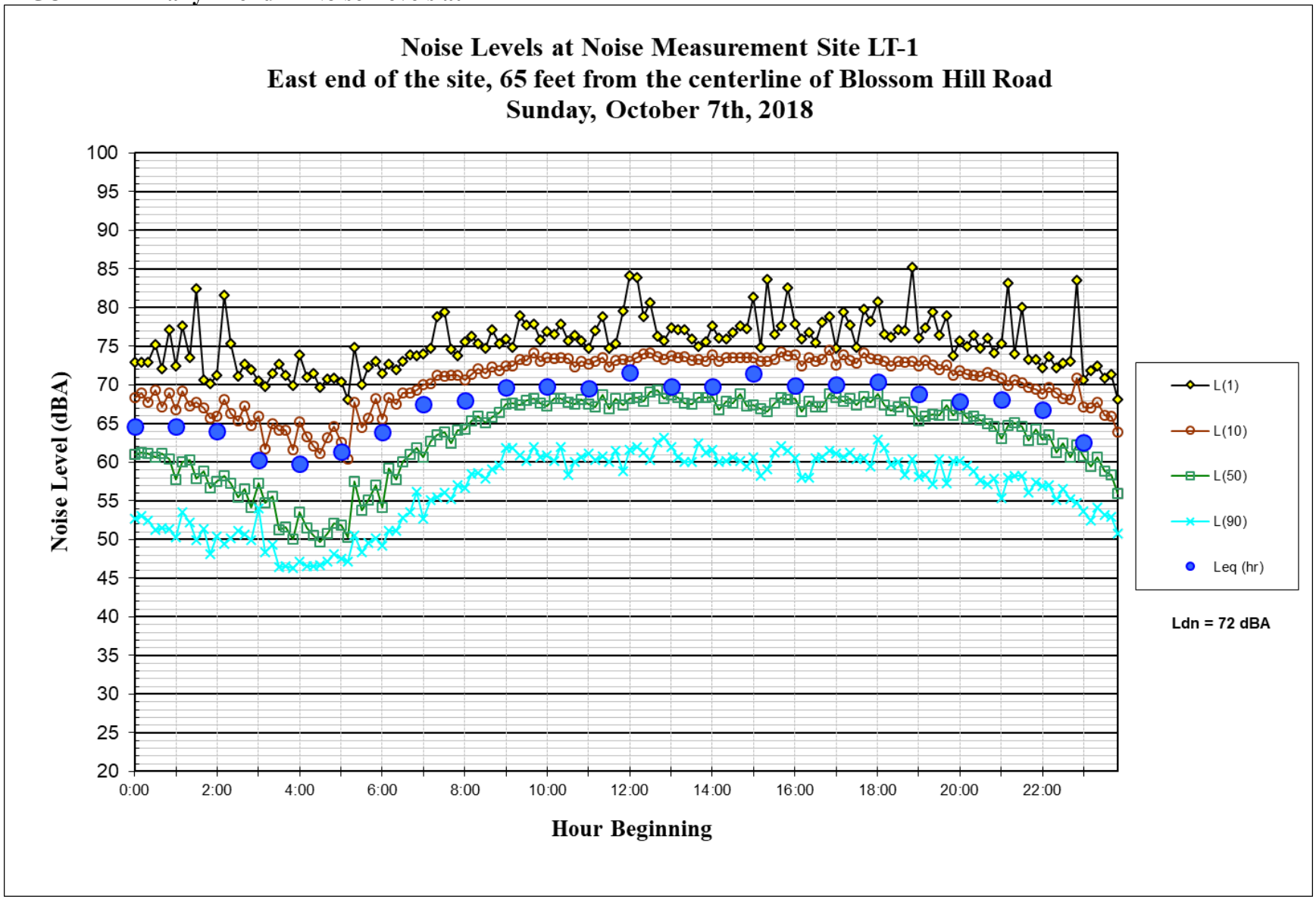

FIGURE 5 Daily Trend in Noise Levels at LT-1

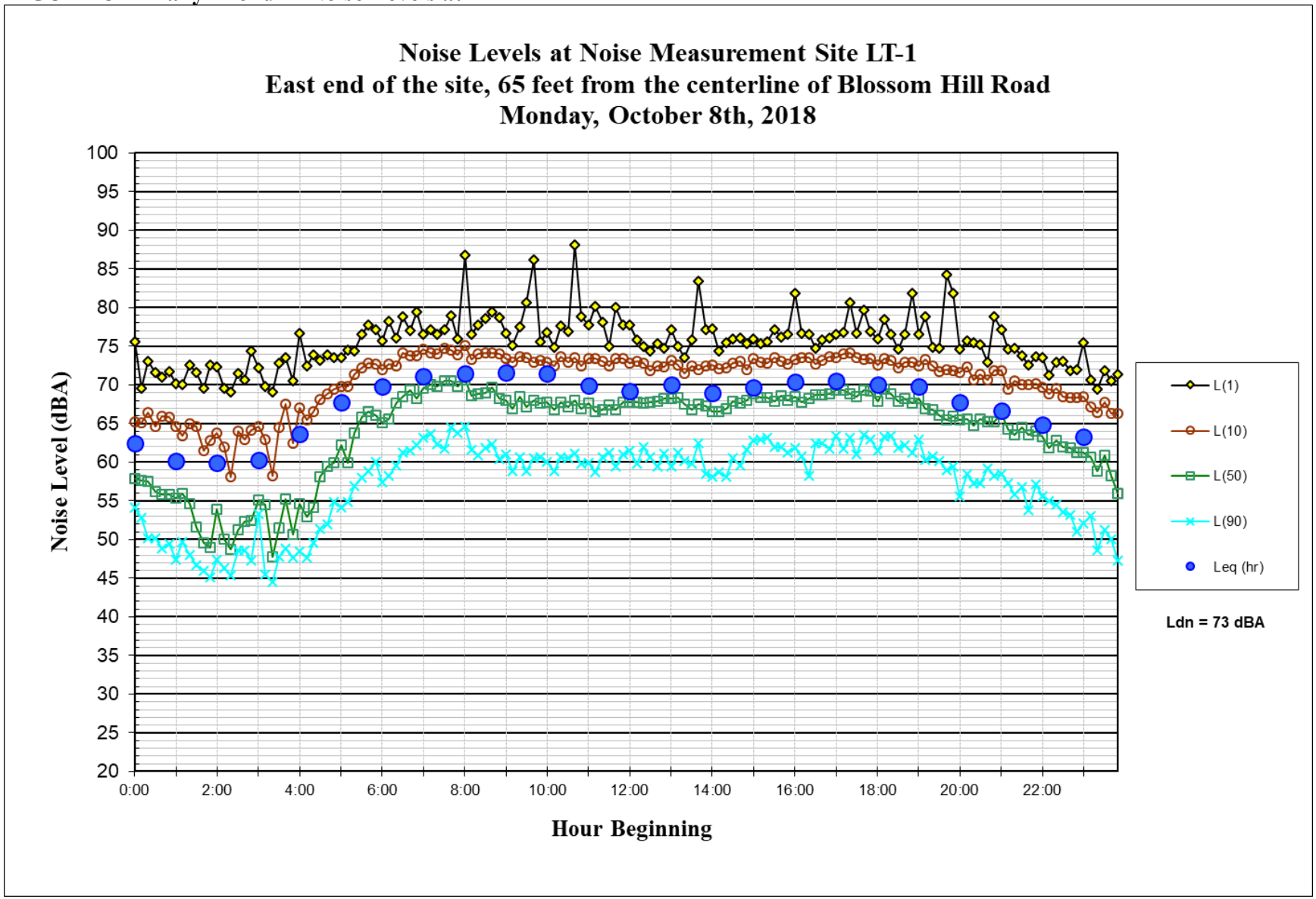

FIGURE 6 Daily Trend in Noise Levels at LT-1

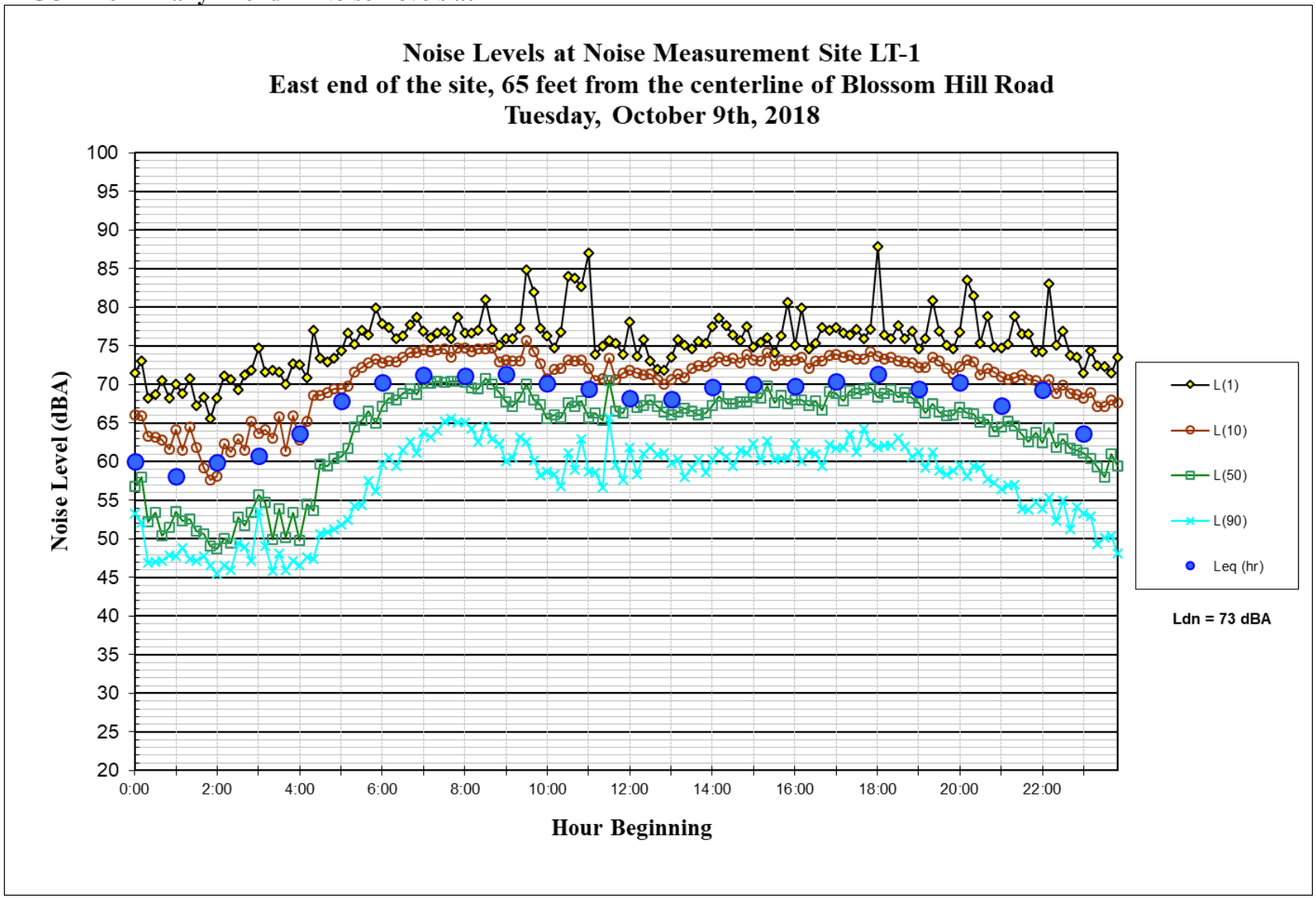

Figure 7 HUD Figure 19

Figure 19
Description of Noise Attenuation Measures
(Acoustical Construction)

Part I

Project Name: 397 Blossom Hill Road, Junior 1BR (Worst-Case Noise Exposure)

Location: San José, California

Sponsor/Developer: Studio E Architects

Noise Level (From NAG): 74 dBA DNL Attenuation Required: 30 dBA
Primary Noise Source(s): Blossom Hill Road

Part II

1. For wall(s) facing and parallel to the noise source(s) (or closest to parallel:
   a. Description of wall construction*: Metal Cladding
   b. STC rating for wall (rated for no windows or doors): STC 39
   c. Description of windows: Vinyl, dual-pane
   d. STC rating for window type: STC 32
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 35% and doors: 0%
   h. Combined STC rating for wall component: 33 dBA

2. For walls perpendicular to noise source(s):
   a. Description of wall construction*: Stucco
   b. STC rating for wall (rated for no windows or doors): STC 46
   c. Description of windows: Standard
   d. STC rating for window type: STC 26
   e. Description of doors: N/A
   f. STC rating for doors: N/A
   g. Percentage of wall (per wall, per dwelling unit) composed of windows: 35% and doors: 0%
   h. Combined STC rating for wall component: 32 dBA

3. Roofing component (if overhead attenuation is required to aircraft noise):
   a. Description of roof construction: N/A
   b. STC rating (rated as if no skylights or other openings): N/A
   c. Description of skylights or overhead windows: N/A
   d. STC rating for skylights or overhead windows: N/A
   e. Percentage of roof composed of skylights or windows (per dwelling unit): N/A
   f. Percentage of roof composed of large uncapped openings such as chimneys: N/A
   g. Combined STC rating for roof component: N/A

4. Description of type of mechanical ventilation provided: Rooftop HVAC equipment