MONTEREY AVENUE SKATEPARK PROJECT NOISE AND VIBRATION ASSESSMENT CAPITOLA, CALIFORNIA

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INTRODUCTION

This report presents the results of the noise and vibration assessment completed for the Monterey Avenue Skatepark Project proposed at Monterey Avenue Park in Capitola, California. The project would construct an approximate 6,000 sf skatepark designed to serve beginner to intermediate riders generally in the 5-14 year-old age range, although the facility would be available for use by anyone over the age of five years. It is anticipated that use of the facility would occur between the hours of 8:00 a.m. - dusk. Use would vary throughout the day and times of the year, but given the size of the facility, it is estimated that approximately 1-25 skateboarders would potentially be using the facility at the same time depending on the participantôs experience.

This report first presents the fundamentals of noise and vibration for those who are not familiar with acoustical terminology and concepts, summarizes the regulatory criteria applicable in the assessment of project impacts, and presents the results of the ambient noise monitoring survey made to establish existing conditions. The report then provides an evaluation of the significance of noise and vibration related impacts that would result from the project. Mitigation is then presented to reduce significant noise impacts to less-than-significant levels.

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 p.m. - 10:00 p.m.) and a 10 dB addition to nocturnal (10:00 p.m. - 7:00 a.m.) noise levels. The *Day/Night Average Sound Level* (L_{dn}) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise, but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard which is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

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 noise of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when

exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows with Sound Transmission Class ratings greater than 30 STC.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed[1]. 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 55 dBA L_{dn}. At an L_{dn} of about 60 dBA, approximately 2 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 12 percent of the population. Therefore, there is an increase in annoyance due to ground vehicle noise of about 1 percent per dBA between a L_{dn} of 60-70 dBA. Between a L_{dn} of 70-80 dBA, each decibel increase increases the percentage of the population highly annoyed by about 2 percent. People appear to respond more adversely to aircraft noise. When the L_{dn} due to aircraft noise is 60 dBA, approximately 10 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 2 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase in aircraft noise results in about a 3 percent increase in the percentage of the population highly annoyed.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous vibration levels produce.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much 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

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

give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

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 induce structural 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. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. 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 minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. 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.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 Reactions 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	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background

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

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

a) Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

e) For a project located within 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; or

f) For a project within the vicinity of a private airstrip, if the project would expose people residing or working in the project area to excessive noise levels.

CEQA checklist questions a) and d) evaluate the potential for noise impacts attributable to project construction activities and operations. Item a) evaluates construction and operational noise with regard to applicable local limits contained in the Capitola Municipal Code. Item d) evaluates the temporary noise resulting from project construction activities with respect to activity interference thresholds. Construction activities would also have the potential to result in excessive groundborne vibration levels. This issue is addressed under Item b). Item c) evaluates the potential for substantial permanent increases in ambient noise levels as a result of project operations. Items e) and f) evaluate the potential exposure of persons or workers to excessive aircraft noise, but are not applicable to the proposed project and are not discussed further.

CEQA does not define what noise level increase would be considered substantial. Typically, project-generated noise level increases of 3 dBA L_{dn}/CNEL or greater would be considered significant where exterior noise levels would exceed the normally acceptable noise level standard (60 dBA L_{dn}/CNEL for residential land uses). Where noise levels would remain at or below the normally acceptable noise level standard with the project, noise level increases of 5 dBA L_{dn}/CNEL or greater would be considered significant.

City of Capitola Municipal Code. Chapter 9.12 of the City of Capitola Municipal Code presents the noise-related regulations of the City. Section 9.12.010 states that, ñIt is unlawful for any person, firm or corporation to make, or permit to be made, any loud, boisterous, irritating, penetrating or unusual noise, or to keep, harbor or maintain, or to permit the keeping, harboring or maintaining of any barking or howling dogs, or to engage in, hold, conduct, operate, or permit the engaging in, holding, conduct or operation of, any business, public meeting or gathering, game, dance, amusement, appliance, contrivance, device, structure, construction, ride, machine, implement, or instrument, the use, engaging in, conduct or operation of which makes a loud, penetrating, irritating, boisterous or unusual noise, within two hundred feet of any residence, hotel, apartment house, cabin, cottage, cottage court, lodging facility or any building or place regularly used for sleeping purposes in the city between the hours of ten p.m. and eight a.m. of any day or days.ò Section 9.12.010 also prohibits construction activities between the hours of 9:00 p.m. and 7:30 a.m. on weekdays and on weekends with the exception of Saturday work between 9:00 a.m. and 4:00 p.m. or emergency work approved by the building official. (Ord. 883 § 1, 2005; Ord. 27 § 1, 1949).

Section 9.12.040 addresses amplified sound. ñIt is unlawful for any person without a city permit to operate a loudspeaker, public address system or sound amplification system, or to play any musical instrument anywhere in the city except as follows:

A. Sound reproduction within automobiles for the pleasure and entertainment of the occupants of such automobiles; provided, however, that the sound reproduction shall not be amplified beyond the reasonable necessity of the occupants of such automobiles, nor to a level which a nonoccupant of ordinary sensibilities would find bothersome;

B. The operation of sound reproduction or broadcasting equipment within the dwelling for the pleasure and entertainment of the occupants of such dwelling; provided, however, that the reception shall not be amplified to a level which persons of ordinary sensibility located on another property or in another dwelling would find bothersome;

C. The use of such equipment or musical instruments outside of automobiles or dwelling houses between the hours of nine a.m. and nine p.m. on private property for the private entertainment of people, provided it cannot be heard on any other property; or

D. The use of such equipment or musical instruments by duly authorized agents of the city or other governmental bodies or their agents in connection with activities related to health, safety and welfare.ò (Ord. 745 § l (part), 1992; Ord. 370 § 1, 1973).

City of Capitola General Plan. The Safety and Noise Element addresses noise problems, quantifies current and projected noise levels, establishes noise compatibility guidelines for different land uses, and defines strategies for reducing the negative impact of noise to the community.

The goal of the Safety and Noise Element is to minimize the communityôs exposure to excessive noise. Policies in support of this goal, and applicable to the proposed project include the following:

Policy SN-7.1 Noise Sensitive Land Uses. Minimize the exposure of noise sensitive land uses to unacceptable noise levels as identified in Table SN-1. Noise sensitive land uses shall be as determined by the Community Development Director, including land uses such as residential areas, lodging facilities, libraries, schools, parks, and medical care facilities.

Policy SN-7.2 Noise Level Standards. Ensure that noise generated from all land uses and activities in Capitola complies with the noise level standards identified in Table SN-1. The City Council may allow exceptions to these noise level standards when mitigation of noise impacts is not technically or economically feasible or inconsistent with other City goals, policies, and regulations.

Policy SN-7.4 Acoustical Analyses. Require an acoustical analysis for all proposed projects that would locate noise sensitive land uses where the projected ambient noise level is greater than the respective ònormally acceptableò noise level, as shown in Table SN-1, and require mitigation of noise impacts that exceed the land use compatibility standards. An acoustical analysis required by the Noise Element shall:

DžBe performed according to a scope of work that has been approved by the Community Development Director.

DžBe the financial responsibility of the applicant for new construction and allow assistance for needed improvements for existing development.

DžBe prepared by a qualified person experienced in the fields of noise assessment and architectural acoustics.

- Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions, predominant noise sources, and peak noise sources.
- Estimate existing and projected cumulative (2035) noise levels in terms of CNEL, and compare those levels to the adopted policies of the Noise Element.
- Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element, giving preference to proper site planning and design over the construction of noise barriers or structural modifications to buildings. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance.
- Estimate noise exposure after the prescribed mitigation measures have been implemented.
- Describe a post-project monitoring program that could be used to evaluate the effectiveness of the proposed mitigation measures.

Existing Noise Environment

Ambient Noise Measurements near the Project Site

The proposed skatepark site is located within Monterey Avenue Park adjacent to New Brighton Middle School and the Soquel Elementary School District Offices. Single-family residential land uses bound Monterey Avenue Park to the north, east, and south. An ambient noise monitoring survey was conducted at representative locations of the nearest receptors located in the proposed skatepark vicinity while school was still in session. Noise levels were monitored using Larson-Davis Laboratories Model 820 integrating sound level meters fitted with precision microphones and windscreens. The noise monitoring survey consisted of two five-day noise measurements (LT-1 and LT-2) at residential land uses to the south and east and one ten-minute noise measurement at residential land uses near Monterey Avenue (ST-1) to document existing noise conditions during the anticipated hours of operation. Noise monitoring locations are depicted in Figure 1.

The first long-term noise measurement was conducted from Friday, June 5, 2015 through Tuesday, June 9, 2015 at the east boundary of Monterey Avenue Park near Junipero Court residences. Noise levels were measured in consecutive hourly intervals over a period of three weekdays and the weekend. During each interval, the maximum sound level, the minimum sound level, and the sound levels exceeded 1, 10, 50, and 90 percent of the time were measured. Additionally, the hourly equivalent level (L_{eq}) for each hour was measured. These data are shown in Figures 2 through 6. A review of the data indicates that hourly average daytime noise levels ranged from 43 to 63 dBA L_{eq} and maximum hourly noise levels ranged from 55 to 87 dBA L_{max}. The day-night average noise levels on weekdays were 51 to 55 dBA L_{dn} and 50 to 52 dBA L_{dn} on the weekend.

The second long-term noise measurement was made at the south boundary of Monterey Avenue Park near Orchid Avenue residences. These data are shown in Figures 7 through 11. A review of the data collected at Site LT-2 indicates that hourly average daytime noise levels ranged from 42

to 65 dBA L_{eq} and maximum hourly noise levels ranged from 52 to 87 dBA L_{max}. The day-night average noise levels on weekdays were 54 to 56 dBA L_{dn} and 48 to 52 dBA L_{dn} on the weekend. A review of the noise data collected at Sites LT-1 and LT-2 showed a strong correlation in noise levels measured at the two sites.

A single ten-minute noise measurement was made to supplement the long-term noise data and provide a data point representative of residential receptors located adjacent to Monterey Avenue. The short-term noise measurement was made 45 feet from the centerline of Monterey Avenue at the northeast corner of Monterey Avenue Park. The average noise level measured between 10:50 a.m. and 11:00 a.m. was 59 dBA L_{eq}, and the estimated day-night average noise level at this location is approximately 60 dBA L_{dn}.

FIGURE 1 Noise Measurement Locations

Skatepark Noise Measurements

Illingworth & Rodkin, Inc. (I&R) has monitored noise from skateparks on several different occasions. A review of the previously collected noise data was made to identify the most appropriate noise data to be used in the assessment for future noise level projections. From this review, noise data collected at a large skatepark in Sunnyvale, California and noise data collected

at a similar sized skatepark in Santa Cruz, California were selected to best represent the proposed skatepark.

Sunnyvale Skatepark, Sunnyvale, California. Noise measurements were conducted by I&R at the Sunnyvale Skatepark on Saturday, February 12, 2011 from 12:45 p.m. to 2:30 p.m. The surface area of the Sunnyvale skatepark is approximately 18,000 square feet (approximately three times the size of the proposed Monterey Avenue skatepark) and includes some similar features such as ramps, bowls, banks, quarter pipes, and grind rails. Based on observations, about 25 to 30 skateboarders were in the skatepark at any given time, of which, about 5 to 12 were actively skating at any given moment. According to a frequent visitor of the park, this level of use was about the busiest the skatepark gets.

Noise measurement locations were chosen at locations north of the skatepark to limit exposure from noise sources other than skatepark activities. The center of the nearest lane of North Wolf Road is 70 feet south of the Sunnyvale skatepark. To the east of the park is a commercial/industrial land use that was a constant source of equipment noise during the measurements. Some nearby soccer players made a minor contribution to noise levels during measurements. Four measurements (M1-M4) were made from beyond the north and northwest edge of the skatepark. M1 was made 75 feet north of the nearest edge of the skatepark and resulted in noise levels of 57 dBA L_{eq} and 72 dBA L_{max}. M2 was 60 feet northwest of the nearest edge of the skatepark and resulted in noise levels of 56 dBA L_{eq} and 68 dBA L_{max}. M3 was 75 feet northwest of the nearest edge of the skatepark and resulted in noise levels of 55 dBA L_{eq} and 68 dBA L_{max}. M4 was 13 feet north of the nearest edge of the skatepark and resulted in noise levels of 64 dBA L_{eq} and 77 dBA L_{max}. The L_{max} noise levels at locations directly north of locations M1 and M4 were due to use of a grind rail, the northernmost feature of the skatepark.

Jose Avenue Skatepark, Santa Cruz, California. Noise measurements of a similar sized skatepark were conducted by I&R during the afternoon of September 17, 2002 at Jose Avenue Park in Santa Cruz, California. Noise levels were monitored during a typical weekday afternoon when the park was most active (4:40 p.m. and 5:40 p.m.). The skatepark was actively used during the measurement.

Noise levels at the Jose Avenue skatepark were measured approximately 30 feet from the edge of the ñskatepark bowlò. Measurements were made at several locations around the park at the same distance from the bowl. The data indicated that there was no directionality to the facility. Variations in noise levels were due to variations in noise generated within the facility during any 5-minute period. There were 3 spectators and 4 to 5 skaters typically using the facility during the measurements. In addition, there were parents and children circulating in the area. Measurements were made at a height approximately 5 feet above the ground. There was a direct line-of-sight between the sound level meter microphone and the skating area. Sound levels were measured in 5-minute intervals for approximately one-hour. Five-minute average sound levels ranged from 52 dBA to 60 dBA L_{eq}. Sources of noise identified during the survey included the sound of the skateboards rolling on the surface, wipeouts, grinding, yelling, talking, and biking. The sounds of the skateboards rolling on the surface were typically in the range of 55 to 60 dBA. Tricks generated maximum noise levels of about 59 to 62 dBA, and falls occasionally generated maximum instantaneous noise levels of up to 65 to 67 dBA. Shouts reached 75 dBA. The one-hour average was 56 dBA L_{eq}.

An additional series of noise measurements were made at this skatepark on the afternoon of June 4, 2015. There were 3 skaters using the facility during the noise measurements, and five-minute average sound levels ranged from 54 dBA to 55 dBA $L_{eq.}$ Maximum noise levels from voices ranged from 45 to 51 dBA, ñgrindsò generated maximum instantaneous noise levels of approximately 58 to 64 dBA, and the sounds of tricks (e.g., the skateboard slapping the concrete surface) ranged from 57 to 67 dBA. The 2015 noise data showed that the noise levels measured in 2002 continue to be valid.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Paraphrasing from Appendix G of the CEQA Guidelines, a project would normally result in significant noise impacts if noise levels generated by the project conflict with adopted environmental standards or plans, if the project would generate excessive groundborne vibration levels, or if ambient noise levels at sensitive receivers would be substantially increased over a permanent, temporary, or periodic basis. The following criteria were used to evaluate the significance of environmental noise resulting from the project:

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

- A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal buildings. For adverse human reaction, this analysis uses an annoyance threshold of 0.1 in/sec PPV, which corresponds with vibration levels that are ñstrongly perceptibleò.

- A significant impact would be identified if the project would substantially increase noise levels at sensitive receivers in the vicinity. Skatepark-generated noise would be considered significant if levels would exceed 60 dBA L_{dn}/CNEL (the normally acceptable noise and land use compatibility standard for residential land uses) or substantially exceed existing ambient noise levels (in terms of hourly average noise level or maximum instantaneous noise level, L_{eq} or $L_{max,}$ respectively). A substantial exceedance of existing ambient noise levels is defined as 5 dBA or more because such an increase in noise level is clearly perceptible by most persons. A substantial permanent noise increase would also occur if: a) the noise level increase is 5 dBA L_{dn}/CNEL or greater, with a future noise level of less than 60 dBA L_{dn}/CNEL, or b) the noise level increase is 3 dBA CNEL or greater, with a future noise level of 60 dBA L_{dn}/CNEL or greater.

- A significant noise impact would be identified if construction-related noise would substantially increase ambient noise levels at sensitive receptors over an extended period of time.

Impact 1: **Generation of Noise Levels In Excess of Standards.** Project construction activities would be conducted in accordance with the allowable hours as established in the Municipal Code. Project operational hours would not conform to the allowable hours as established in the Municipal Code, resulting in a **significant impact**.

The City of Capitola Municipal Code (Chapter 9.12.010) prohibits construction activities between the hours of 9:00 p.m. and 7:30 a.m. on weekdays. Construction noise is also prohibited on weekends with the exception of Saturday work between 9:00 a.m. and 4:00 p.m. or emergency work approved by the building official. Pursuant to the Municipal Code, project construction activities would be restricted to Monday through Friday from 7:30 a.m. to 9:00 p.m. and Saturday between 9:00 a.m. and 4:00 p.m. Project construction hours would conform to the allowable hours as established in the Municipal Code, resulting in a less-than-significant impact.

Section 9.12.010 of the Municipal Code also limits any loud, boisterous, irritating, penetrating, or unusual noise resulting from the operation of projects to between the hours of 10:00 p.m. and 8:00 a.m. Operations occurring outside allowable hours would result in exposure of persons to and generation of noise levels in excess of the City of Capitola Municipal Code noise standards, which would result in a significant noise impact. It is anticipated that the facility would be available between the hours of 8:00 a.m. and dusk. Based on this assumption, project operational hours would conform to the allowable hours as established in the Municipal Code, resulting in a less-than-significant impact.

Section 9.12.040 of the Municipal Code addresses amplified sound. Amplified sound sources such as boom-boxes would be prohibited at the skatepark, representing a less-than-significant impact.

The Safety and Noise Element of the Capitola General Plan establishes noise and land use compatibility guidelines to provide the community with a means of judging the noise environment that it deems to be generally acceptable and to minimize noise-related complaints from residents. Playgrounds, neighborhood parks, and schools are considered to be ñnormally acceptableò in noise environments of 70 dBA L_{dn}/CNEL or less. The noise environment at the project site is less than 55 dBA L_{dn} and clearly compatible with the proposed skatepark use. This is a less-than-significant impact.

Impact 3 evaluates day-night average noise levels resulting from project operations with respect to Capitola General Plan Policy SN-7.2. Single-family residential land uses are considered to be ñnormally acceptableò in noise environments of 60 dBA L_{dn}/CNEL or less.

Mitigation Measure 1: **None required.**

Impact 2: **Exposure to Excessive Groundborne Vibration.** Construction-related vibration would not be excessive at nearby land uses. **This is a less-than-significant impact.**

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, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. No ancient buildings or buildings that are documented to be structurally weakened surround the project site. Therefore, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact. For adverse human reaction, this analysis uses an annoyance threshold of 0.1 in/sec PPV, which corresponds with vibration levels that are ñstrongly perceptibleò.

Construction activities would primarily include limited grading and then concrete work, which do not normally cause excessive vibration levels. However, the construction of the project may generate perceptible vibration levels at the nearest sensitive receptors when heavy equipment or impact tools (e.g. jackhammers) are used. Table 4 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. For the proposed project, the use of a vibratory roller would likely be required for soil compaction purposes, and this activity would be expected to generate the highest vibration levels at off-site receptors. A vibratory roller can produce vibration levels of 0.21 in/sec PPV at a distance of 25 feet. The nearest sensitive buildings include the Soquel Union Elementary School District Offices, located approximately 80 feet to the north, and single-family residences along Orchid Avenue, approximately 100 feet to the south. Vibration levels produced by a vibratory roller would be expected to be 0.06 in/sec PPV or less at the nearest receptors, well below the 0.3 in/sec PPV significance threshold, and below the 0.1 in/sec PPV threshold used to assess human annoyance to construction vibration levels. Vibration generated by construction activities would be perceptible at times, however, would not be expected to result in ñstructuralò damage to these buildings or be considered excessive.

TABLE 4 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)
Pile Driver (Impact)	upper range	1.158
	typical	0.644
Pile Driver (Sonic)	upper range	0.734
	typical	0.170
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Federal Transit Agency, Office of Planning and Environment, May 2006.

Mitigation Measure 2: None required.

Impact 3: Project-Generated Noise. The operation of the proposed project would substantially increase ambient noise levels at noise-sensitive land uses in the project vicinity. **This is a significant impact.**

Skatepark-generated noise would be considered significant if levels would exceed 60 dBA L_{dn}/CNEL (the normally acceptable noise and land use compatibility standard for residential land uses) or substantially exceed existing ambient noise levels (in terms of hourly average noise level or maximum instantaneous noise level, L_{eq} or L_{max}). A substantial exceedance of existing ambient noise levels is defined as 5 dBA or more because such an increase in noise level is clearly perceptible by most persons.

A substantial permanent noise increase would occur if: a) the noise level increase is 5 dBA L_{dn}/CNEL or greater, with a future noise level of less than 60 dBA L_{dn}/CNEL, or b) the noise level increase is 3 dBA CNEL or greater, with a future noise level of 60 dBA L_{dn}/CNEL or greater.

Skatepark Noise

Noise impacts resulting from the proposed skatepark are evaluated in this analysis using four separate acoustical descriptors including L_{max}, L_{eq}, L_{dn} and CNEL. The L_{max} is the maximum instantaneous noise level resulting from activities, and would likely be the result of shouting, the slapping of the skateboard, or ñgrindsò. The L_{eq} is the average noise level resulting from skateboarding activities. The L_{eq} is the logarithmic average of all sounds measured during the period and is highly influenced by maximum instantaneous noise events. The L_{dn} is the day-night

average noise levels resulting from the use of the skatepark on a daily basis. The CNEL is similar to the L_{dn}, but applies an additional 5 dBA penalty to noises occurring during the evening.

Based on our experience with skateparks, it has been observed that skatepark use varies depending on the day (weekday versus weekend or school-year versus summer), the time of day, and the popularity of the park. Similar to other existing park activities (including the use of the park by New Brighton Middle School), use of the skatepark would vary on a daily basis. Typically, there are 5 to 12 skaters using the skatepark during busy periods. There are also periods where the skatepark is not used by more than 1 to 2 skaters at a time. Additionally, there are periods of time where no activity occurs at the skatepark.

The proposed skatepark would replace an existing grass-covered area in Monterey Avenue Park. Other noise generating sources at the park (e.g., baseball/softball fields, track) would remain unchanged. The nearest sensitive receptors include the Soquel Union Elementary School District Offices and single-family residences along Orchid Avenue, located approximately 80 feet to the north and south, respectively. New Brighton Middle School classrooms are located approximately 140 feet to the west and Junipero Court residences are located approximately 300 feet to the east.

This analysis assumes that the use of the skatepark will be limited to between the hours of 8:00 a.m. and dusk per the allowable hours of operation as specified in the Municipal Code. The results of the noise measurements made at the Sunnyvale skatepark were utilized in modeling noise from the proposed skatepark to represent a credible worst-case scenario. Figure 12 shows the results of the maximum instantaneous noise level calculations made using the SoundPLAN noise model. Point-sources and line-sources modeled at locations throughout the skatepark were reflective of areas where shouting, the slapping of the skateboard, or ñgrindsò would be concentrated. Based on a review of Figure 12, maximum instantaneous noise levels would be approximately 65 to 70 dBA L_{max} at the Soquel Union Elementary School District Offices and single-family residences located at the west end of Orchid Avenue. Maximum instantaneous noise levels are calculated to range from 60 to 65 dBA L_{max} at the nearest New Brighton Middle School classrooms, located approximately 140 feet to the west, and reach 60 dBA L_{max} at Junipero Court residences approximately 300 feet to the east. Noise levels attributable to exterior noise sources are approximately 15 dBA lower inside a building of standard construction assuming that the buildingôs windows are partially open for ventilation. With the windows closed, interior noise levels are approximately 20 to 25 dBA less than the noise levels received at the buildingôs façade. Maximum instantaneous noise levels indoors are calculated to range from 50 to 55 dBA L_{max} at the Soquel Union Elementary School District Offices and 45 to 50 dBA L_{max} at the nearest New Brighton Middle School classrooms assuming the windows of the buildings are open for ventilation. Interior noise levels at Junipero Court residences are calculated to reach 45 dBA L_{max} assuming the windows are open for ventilation.

A review of the ambient noise data collected at measurements sites LT-1 and LT-2 shows that maximum instantaneous noise levels at the quietest locations surrounding the proposed skatepark ranged from 53 to 87 dBA L_{max} between the hours of 8:00 a.m. and dusk, and the arithmetic average L_{max} was 65 dBA. In the rear yards of residences bordering the site, the arithmetic average L_{max} was assumed to be 5 dBA less because of the acoustical shielding provided by the existing 6-foot wood fences (60 dBA L_{max}). Predicted L_{max} noise levels resulting from the use of

the skatepark would fall within the existing range of L_{max} noise levels generated by Monterey Avenue Park activities, but would exceed the arithmetic average L_{max} by up to 5 dBA L_{max} at the nearest Soquel Union Elementary School District Office and Orchid Avenue residences. This is a significant impact. Predicted L_{max} noise levels attributable to the skatepark would fall within the existing range of L_{max} noise levels and the arithmetic average L_{max} generated by Monterey Avenue Park activities at New Brighton Middle School classrooms and Junipero Court residences. This is a less-than-significant impact.

Figure 13 shows the results of the calculations made to quantify hourly average noise levels due to active skatepark use assuming 25 to 30 skateboarders were present and about 5 to 12 skateboarders were actively skating at a given moment. A review of Figure 13 shows that hourly average noise levels would be approximately 50 to 55 dBA L_{eq} at the Soquel Union Elementary School District Offices and 50 dBA L_{eq} or less at nearby single-family residences and New Brighton Middle School classrooms.

Existing hourly average noise levels ranged from 43 to 65 dBA L_{eq} between the hours of 8:00 a.m. and dusk at Sites LT-1 and LT-2, and the arithmetic average L_{eq} was 48 dBA. In the rear yards of residences bordering the site, noise levels are assumed to be 5 dBA less because of the acoustical shielding provided by the existing 6-foot wood fences (arithmetic average L_{eq} of 43 dBA) that block the line-of-sight from the rear yards to the park.

Predicted L_{eq} noise levels resulting from the use of the skatepark would fall within the existing range of L_{eq} noise levels generated by Monterey Avenue Park activities, but would exceed the arithmetic average L_{eq} by up to 7 dBA L_{eq} at the nearest Soquel Union Elementary School District Office and Orchid Avenue residences. At New Brighton Middle School classrooms, the operation of the skatepark would generate noise levels that exceed the arithmetic average L_{eq} by up to 2 dBA L_{eq}. This is significant impact.

The final issue is whether or not the 24-hour average noise level (in terms of L_{dn} or CNEL) level of noise generated by the skatepark would comply with policies outlined in the General Plan. By applying the formula for L_{dn} or CNEL and assuming the number of hours and time of day the skatepark would operate (8:00 a.m. to dusk), one can calculate the L_{dn} or CNEL from the hourly L_{eq} data. Assuming that the skatepark operated at full occupancy for the entire operational period, the L_{dn} caused by the skatepark would be 3 dBA lower than the hourly L_{eq} values stated above. The CNEL would be 2 dBA lower than the hourly L_{eq} values. L_{dn} noise levels attributable to skatepark operations would be approximately 47 to 52 dBA L_{dn} at the Soquel Union Elementary School District Offices and 47 dBA L_{dn} or less at nearby single-family residences and New Brighton Middle School classrooms, below the most-restrictive threshold used to evaluate noise impacts at land uses (60 dBA L_{dn}). CNEL noise levels attributable to skatepark operations would be approximately 48 to 53 dBA CNEL at the Soquel Union Elementary School District Offices and 48 dBA CNEL or less at nearby single-family residences and New Brighton Middle School classrooms. Further, the operation of the project would not result in a substantial permanent noise increase as the existing L_{dn} or CNEL noise levels would not be increased by 5 dBA L_{dn}/CNEL or greater with the project. This is a less-than-significant impact as operational noise levels, as measured on a daily basis, would not exceed 60 dBA L_{dn}/CNEL or be substantially increased with the project.

Transportation-Related Noise

The traffic report developed by *Kimley Horn* was reviewed as part of this analysis to calculate noise level increases attributable to project generated traffic. The traffic analysis included peak hour traffic counts at two intersections in the immediate vicinity of the project site. The project is expected to generate 8 trips during the weekday p.m. peak hour and 11 trips over the Saturday peak hour. The low amount of vehicle trips resulting from the project would not measurably increase ambient traffic noise levels along roadways serving the site (the noise increase would be less than 1 dBA L_{eq} during the peak traffic hour and less than 1 dBA L_{dn}/CNEL on a daily average basis). Ancillary noise could result from automobiles coming and going from the skatepark and circulating in the parking lot. Given the existing volume of traffic and associated noise levels along Monterey Avenue, and recognizing that the parking lot is located on the other side of the roadway from the nearest residences, the incremental increase in noise resulting from the noise of projectôs vehicular traffic would be insignificant. Similarly, the noise generated skatepark users riding skateboards to the skatepark is much less than the noise produced by vehicle traffic along roadways. It follows that skateboard noise produced as skaters ride to the skatepark along sidewalks would also not measurably increase ambient traffic noise levels along roadways serving the site. This is a less-than-significant impact.

Mitigation Measure 3:

- Six-foot noise barriers shall be constructed at the north and south boundaries of the skatepark, along the proposed fence line, to reduce maximum instantaneous and hourly average noise levels by a minimum of 5 dBA at the Soquel Union Elementary School District Offices and single-family residences at the west end of Orchid Avenue. Noise barriers shall be constructed from materials having a minimum surface weight of 3 lbs/sf, such as one-inch thick wood fence boards, masonry block, or concrete, and be constructed in a manner free of any cracks or gaps between barrier materials and between the barrier and the ground. Alternately, suitable barrier materials such as Acoustifence by Acoustiblok or ¼-in. plexiglass could be attached to the proposed metal fence surrounding the skatepark to provide an equivalent noise level reduction.

Figures 14 and 15 show the approximate locations of the proposed noise barriers and the resultant noise levels assuming mitigation. With the additional acoustical shielding provided by the six-foot noise barriers, predicted L_{max} noise levels resulting from the use of the skatepark would not exceed 70 dBA L_{max} or the arithmetic average L_{max} plus 5 dBA at the nearest Soquel Union Elementary School District Office. Predicted L_{max} noise levels within the rear yards of residences located at the west end of Orchid Avenue would not exceed the existing arithmetic average L_{max} noise level of 60 dBA by more than 5 dBA. Similarly, the six-foot noise barriers would reduce hourly average noise to less than 50 dBA L_{eq}. The implementation of Mitigation Measure 3 would ensure that the proposed project does not result in a substantial noise increase in terms of L_{max} and L_{eq}, reducing the noise impact to a less-than-significant level.

Impact 4: **Temporary Increases in Noise due to Construction.** Existing noise-sensitive land uses would be exposed to construction noise levels that would temporarily increase the ambient noise environment; however, the limited scope and duration of the project is such that the impact would be **less-than-significant**.

Impact 1 evaluated construction noise with regard to the applicable local limits contained in the City of Capitola Municipal Code. The discussion below evaluates the noise impacts resulting from project construction activities when compared to activity interference thresholds and ambient noise conditions.

Noise levels at sensitive receptors in the project vicinity would increase during the construction period. Pursuant to the Municipal Code, construction activities would be restricted to Monday through Friday from 7:30 a.m. to 9:00 p.m. and Saturday between 9:00 a.m. and 4:00 p.m. The project is expected to be completed within eight to ten weeks. The grading component of construction is anticipated to be completed within ten days.

Noise impacts from project construction activities are a function of the level of noise generated by individual pieces of construction equipment, the amount of equipment operating at any given time, the distance and sensitivities of nearby land uses, the presence of noise barriers or other structures that provide acoustical shielding, and the timing and duration of the noise-generating activities.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The highest construction noise levels would be generated during grading and excavation, with lower noise levels occurring during the skatepark construction. Large pieces of earth-moving equipment, such as graders, scrapers, and bulldozers, generate maximum instantaneous noise levels of 85 to 90 dBA L_{max} at a distance of 50 feet during their individual operation. Table 5 presents the typical range of hourly average noise levels generated by different phases of construction measured at a distance of 50 feet. Typical hourly average construction-generated noise levels for the proposed project would be about 77 to 89 dBA L_{eq} measured 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.

The nearest sensitive receptors include the Soquel Union Elementary School District Offices and single-family residences along Orchid Avenue, located approximately 80 feet to the north and south, respectively. New Brighton Middle School classrooms are located approximately 140 feet to the west and Junipero Court residences are located approximately 300 feet to the east. Construction noise levels are calculated to range from 73 to 85 dBA L_{eq} at a distance of 80 feet, from 68 to 80 dBA L_{eq} at a distance of 140 feet, and from 61 to 73 dBA L_{eq} at a distance of 300 feet. Noise generated by project construction would be expected to at times substantially exceed existing ambient noise levels. Although construction-generated noise levels would exceed the noise level threshold and ambient noise levels at receptors surrounding the project site, construction activities would occur over a relatively short duration (eight to ten weeks and during daytime hours only). Given the limited construction activities, short duration, and intermittent

sounds associated with construction throughout a given day, the impact would be a less-than-significant impact.

TABLE 5 Hourly Average Noise Levels for Construction Equipment at 50 feet

	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 ï All pertinent equipment present at site.
II ï Minimum required equipment present at site.
Source: United States Environmental Protection Agency, 1973, Legal Compilation on Noise, Vol. 1, p. 2-104.

Mitigation Measure 4: None required.

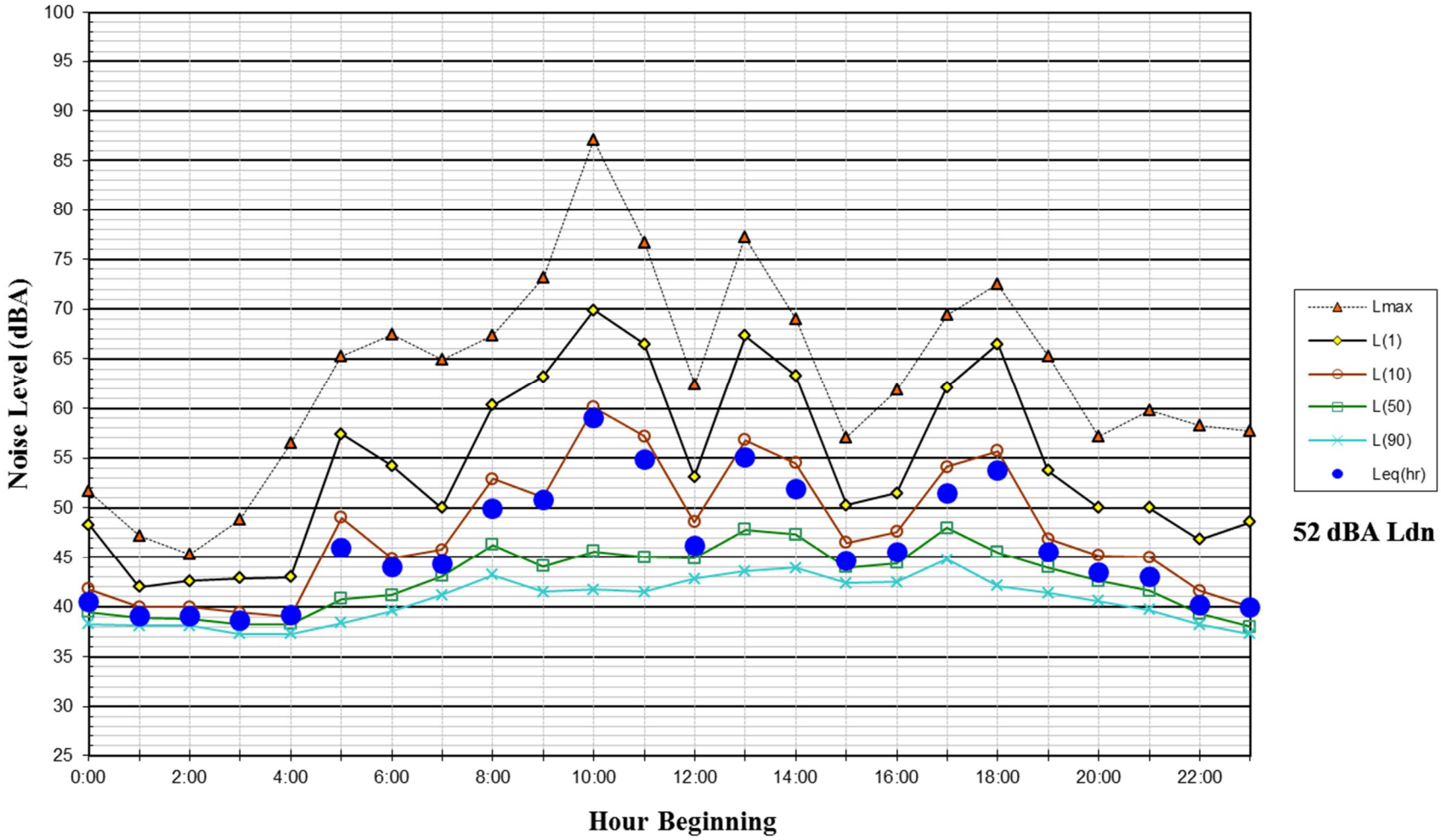

Noise Levels at LT-1
Monterey Avenue Park near Junipero Court Residences
June 5, 2015 (Friday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
52 dBA Ldn

Figure 2

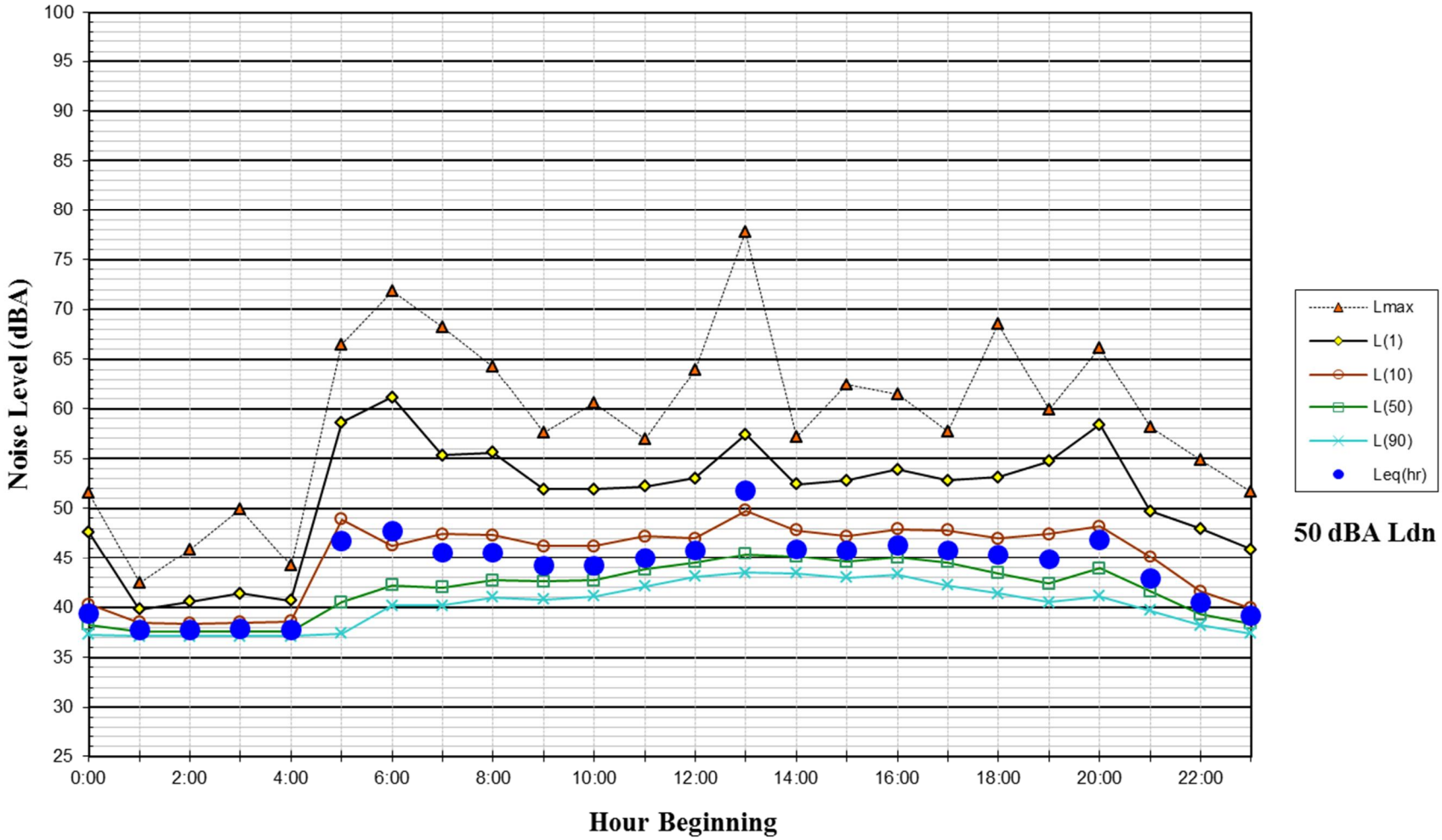

Noise Levels at LT-1
Monterey Avenue Park near Junipero Court Residences
June 6, 2015 (Saturday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
50 dBA Ldn

Figure 3

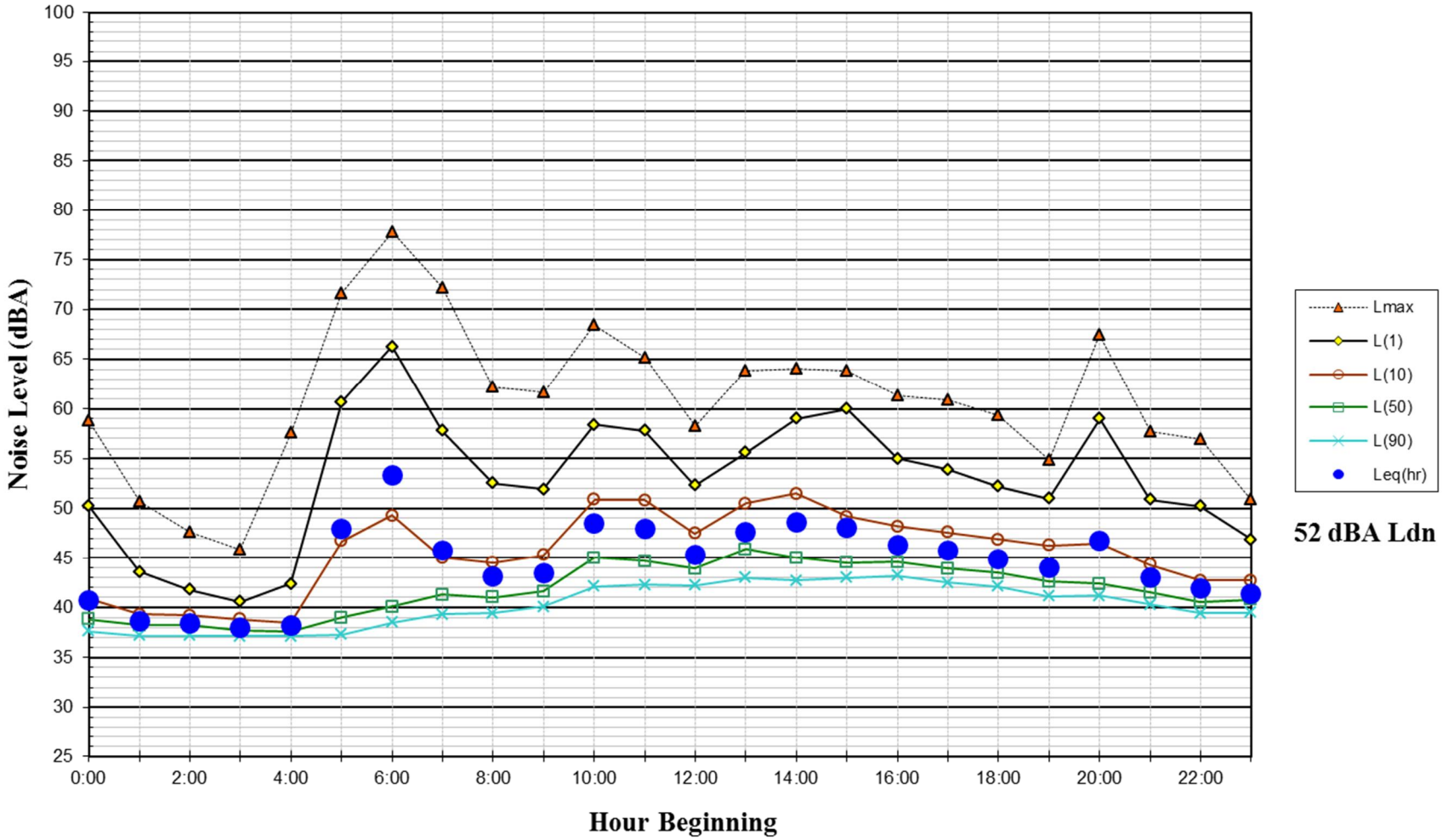

Noise Levels at LT-1
Monterey Avenue Park near Junipero Court Residences
June 7, 2015 (Sunday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
52 dBA Ldn

Figure 4

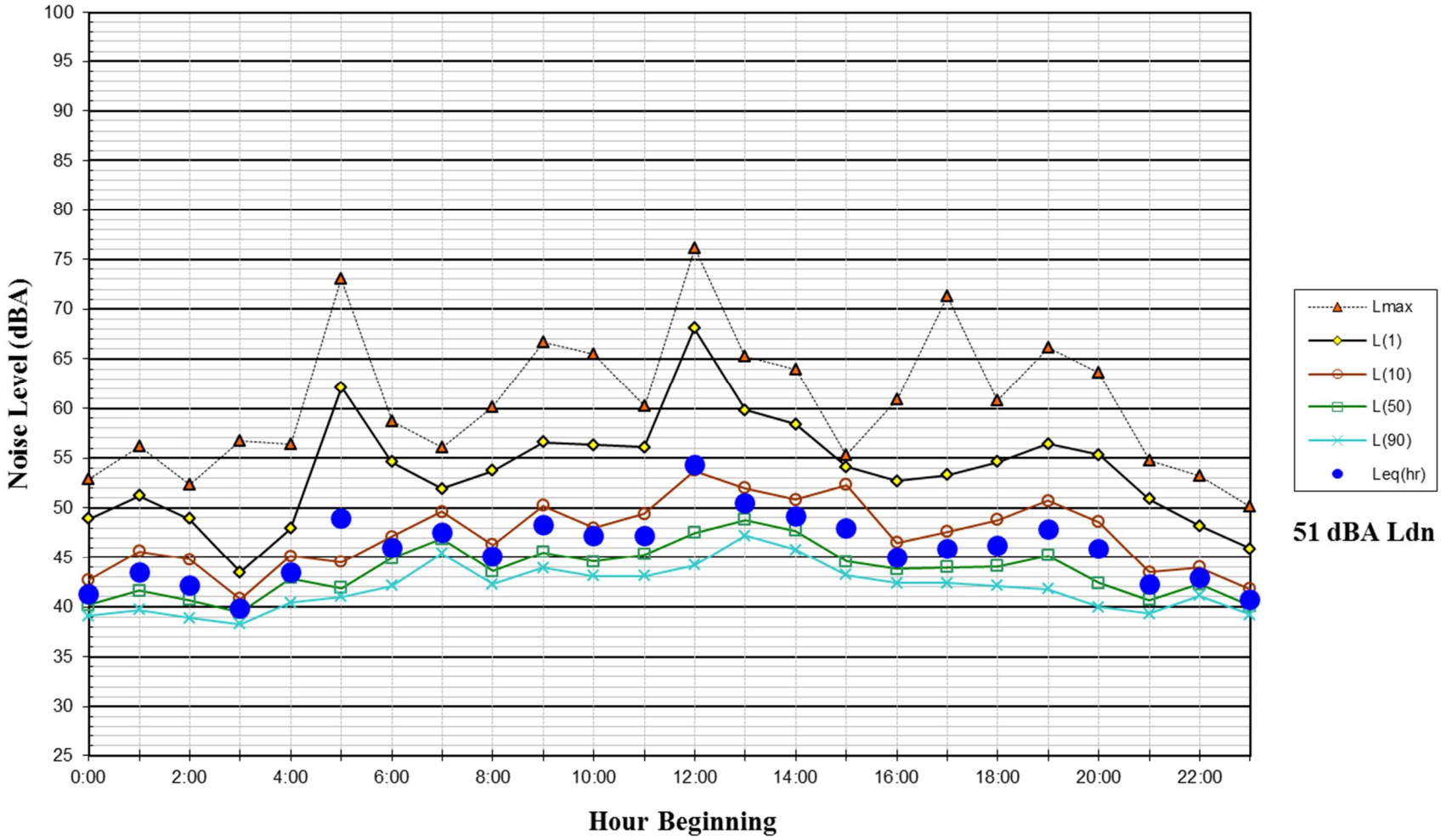

Noise Levels at LT-1
Monterey Avenue Park near Junipero Court Residences
June 8, 2015 (Monday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
51 dBA Ldn

Figure 5

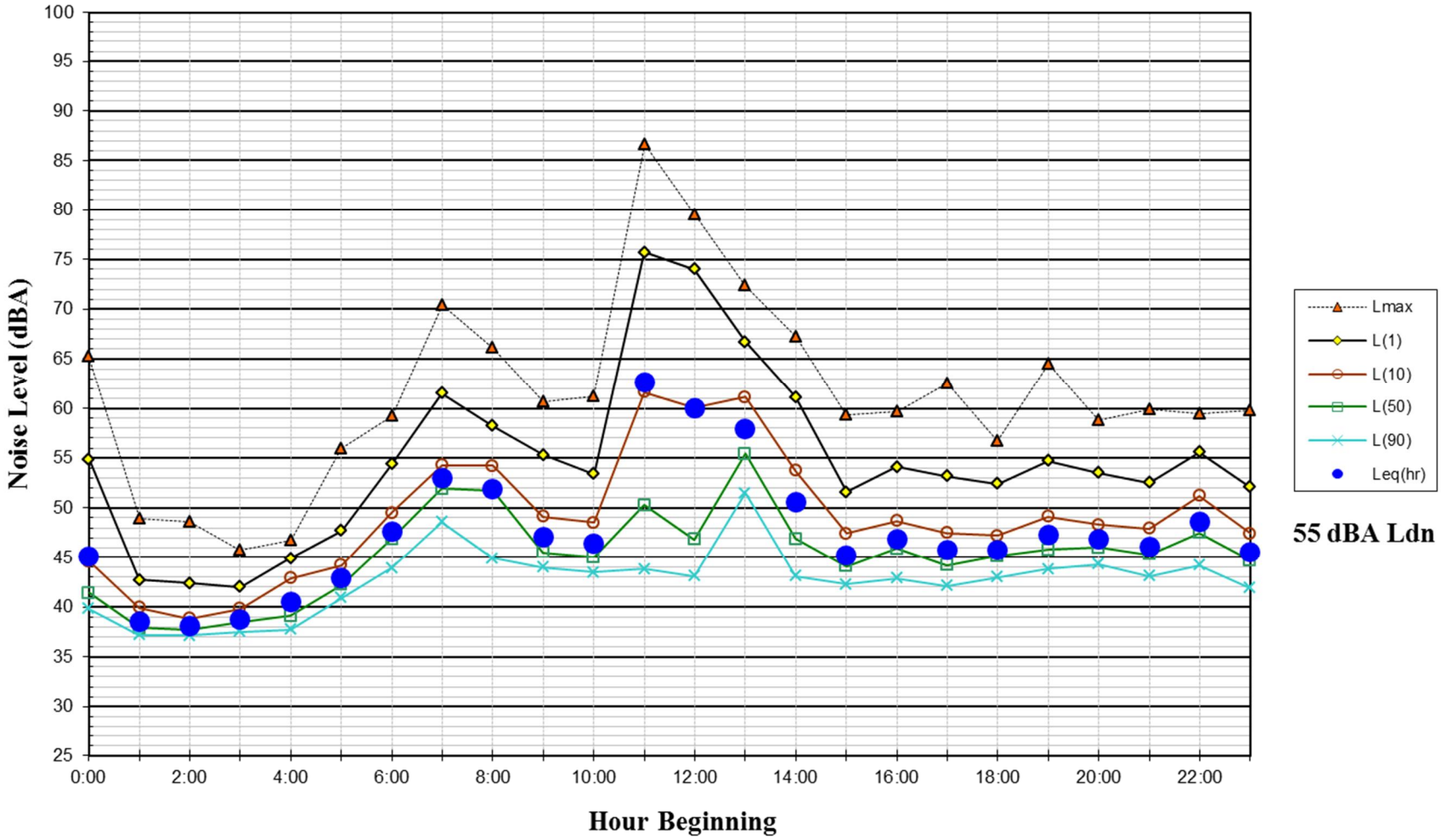

Noise Levels at LT-1
Monterey Avenue Park near Junipero Court Residences
June 9, 2015 (Tuesday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
55 dBA Ldn

Figure 6

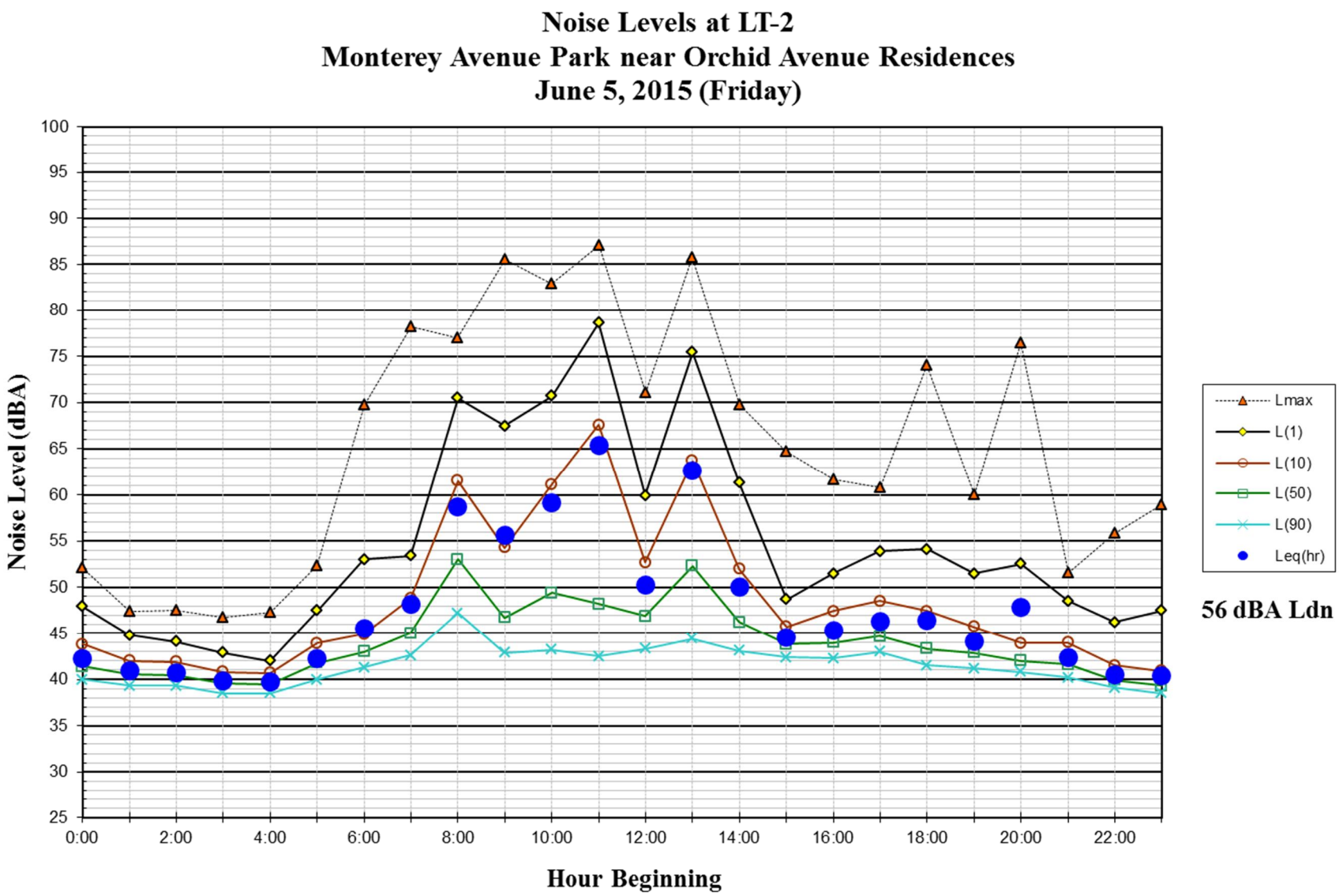

Noise Levels at LT-2
Monterey Avenue Park near Orchid Avenue Residences
June 5, 2015 (Friday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
56 dBA Ldn

Figure 7

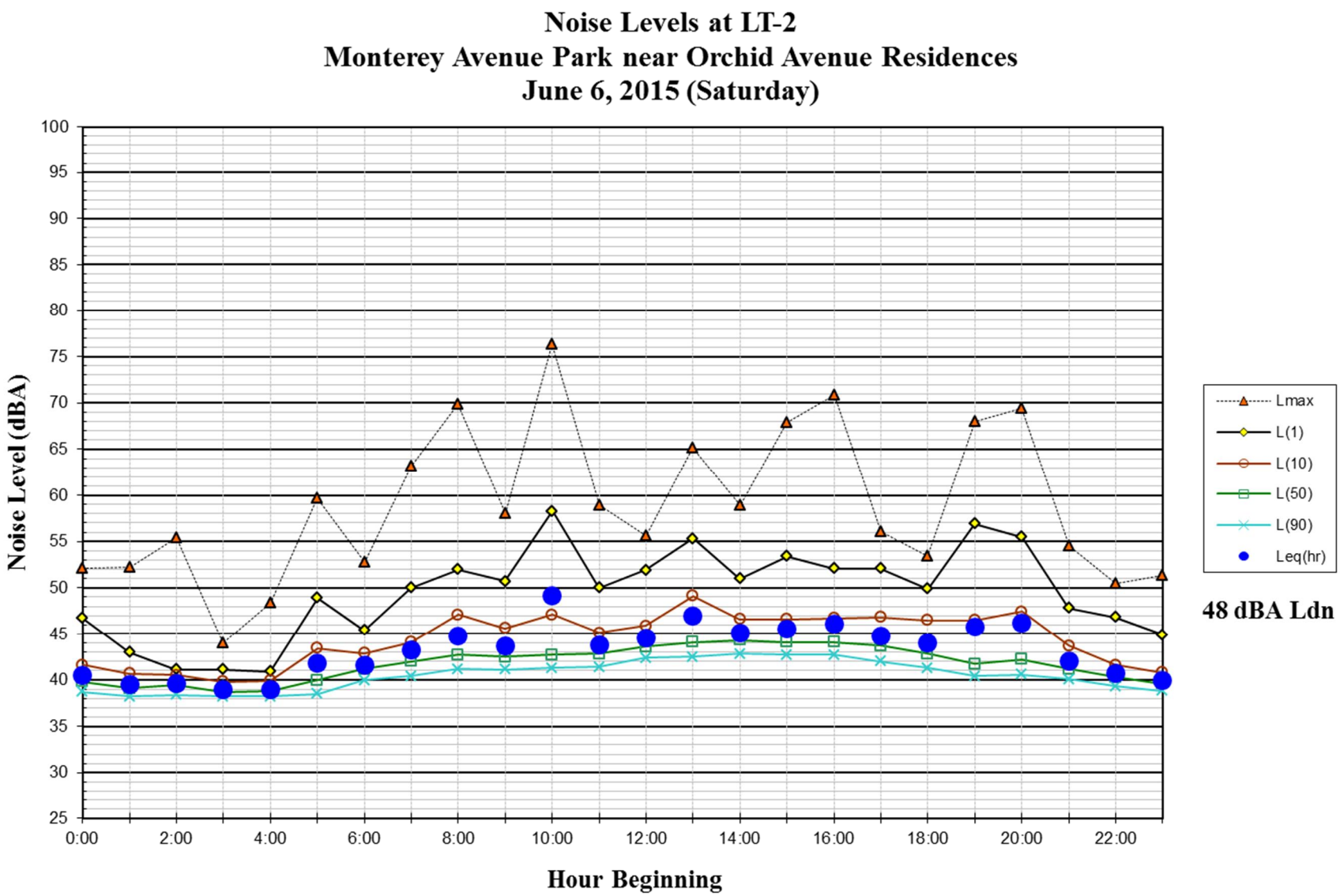

Noise Levels at LT-2
Monterey Avenue Park near Orchid Avenue Residences
June 6, 2015 (Saturday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
48 dBA Ldn

Figure 8

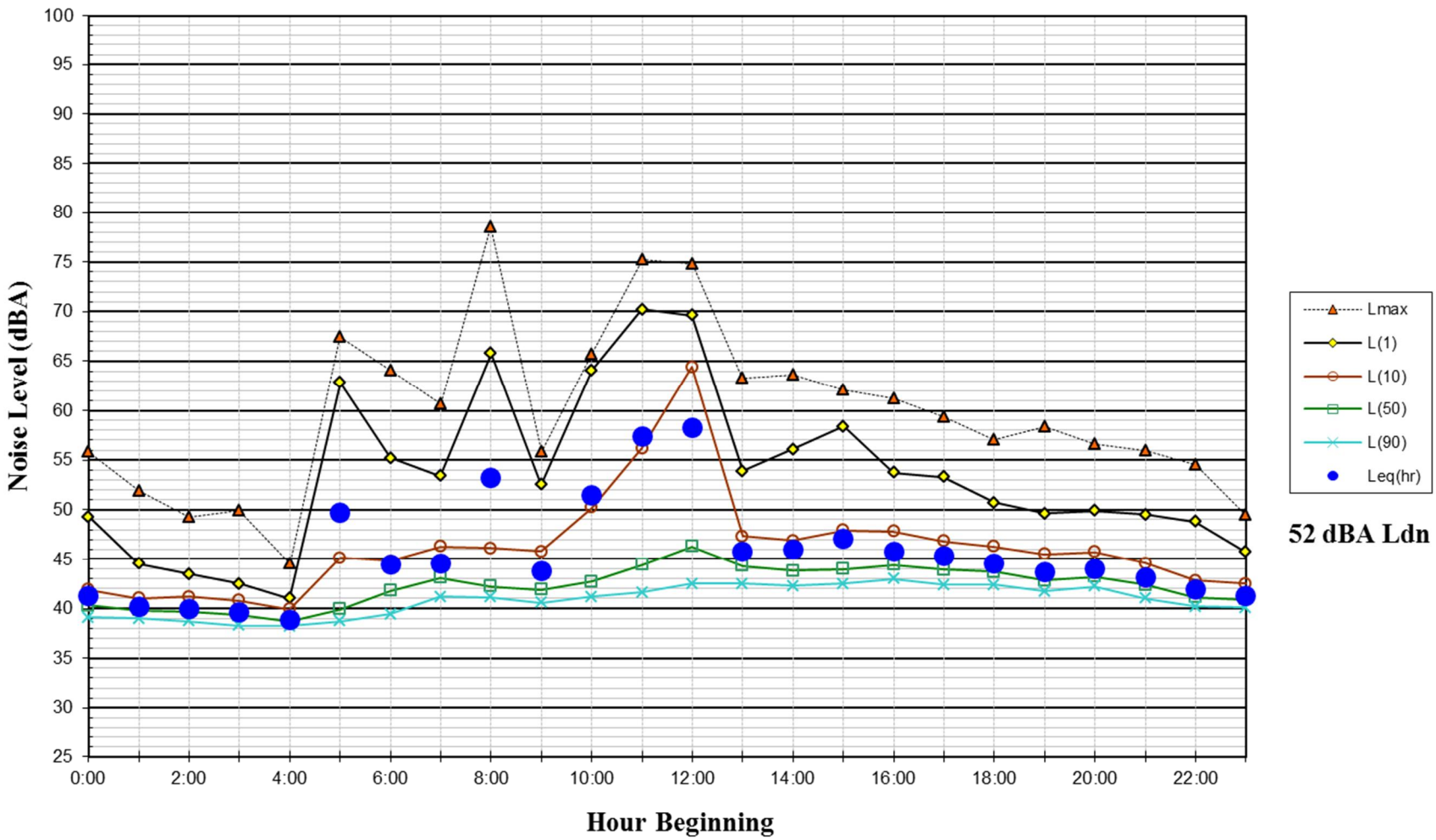

Noise Levels at LT-2
Monterey Avenue Park near Orchid Avenue Residences
June 7, 2015 (Sunday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
52 dBA Ldn

Figure 9

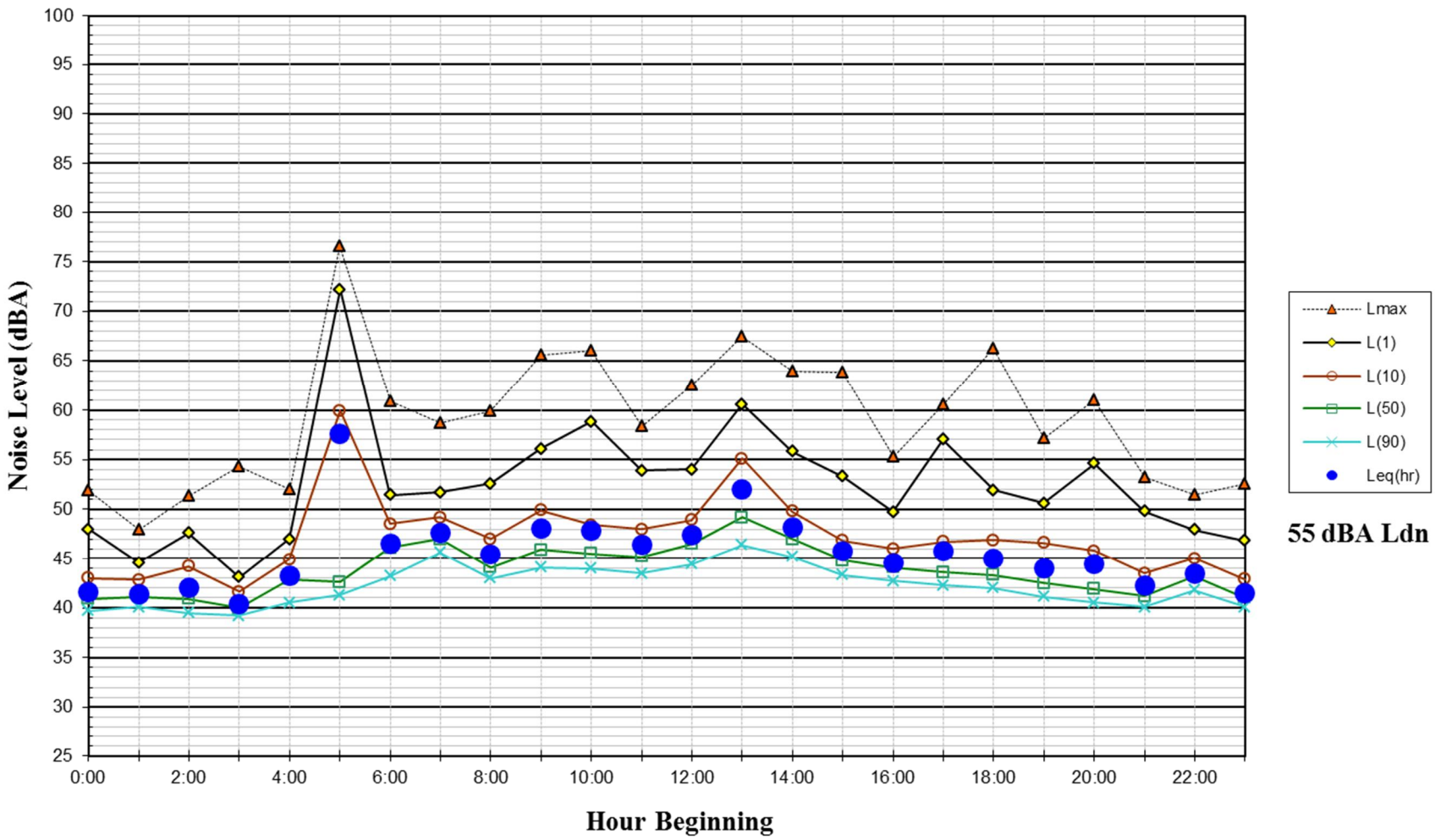

Noise Levels at LT-2
Monterey Avenue Park near Orchid Avenue Residences
June 8, 2015 (Monday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
55 dBA Ldn

Figure 10

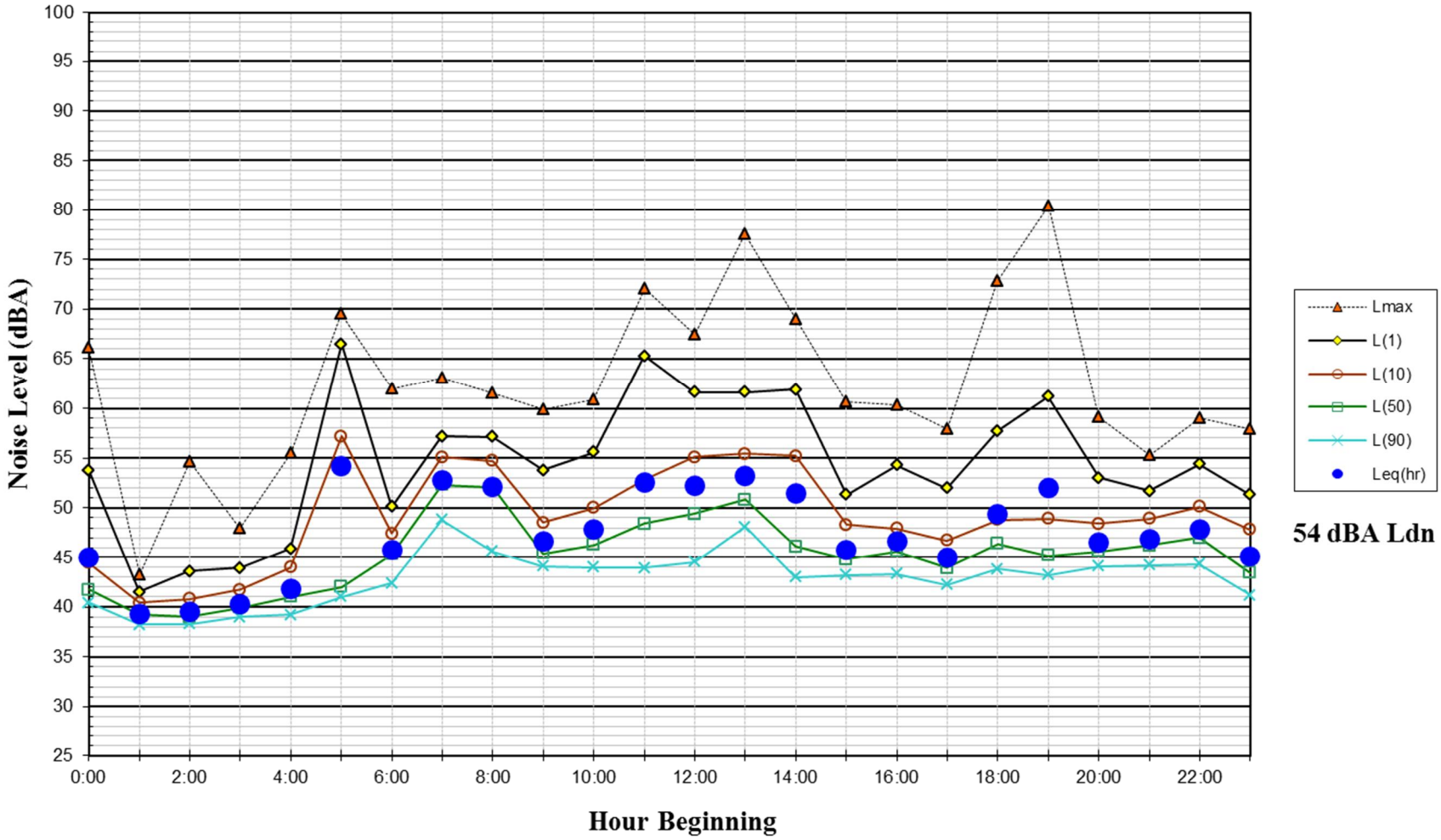

Noise Levels at LT-2
Monterey Avenue Park near Orchid Avenue Residences
June 9, 2015 (Tuesday)
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Leq(hr)
54 dBA Ldn

Figure 11

Customer:
City of Capitola
Project: Monterey Avenue Skatepark Project
Project-No. 15-095

Figure

12

Maximum Noise Generated at Locations in Proposed Monterey Avenue Skate Park

Calculated at 5 feet above ground

Project engineer: Jordan L. Roberts
Created: 8/20/2015
Processed with SoundPLAN 7.3, Update 2/26/2014

Skate Park Noise
in dB(A) Lmax

= 70
= 65
= 60
= 55
= 50

Point Source
Line Source
6-foot Barriers

N

0 35 70 140 210 feet

Customer:
City of Capitola
Project: Monterey Avenue Skatepark Project
Project-No. 15-095

Figure

13

Average Noise Generated Throughout Proposed Monterey Avenue Skate Park

Calculated at 5 feet above ground

Project engineer: Jordan L. Roberts
Created: 8/20/2015
Processed with SoundPLAN 7.3, Update 2/26/2014

Skate Park Noise
in dB(A) Leq

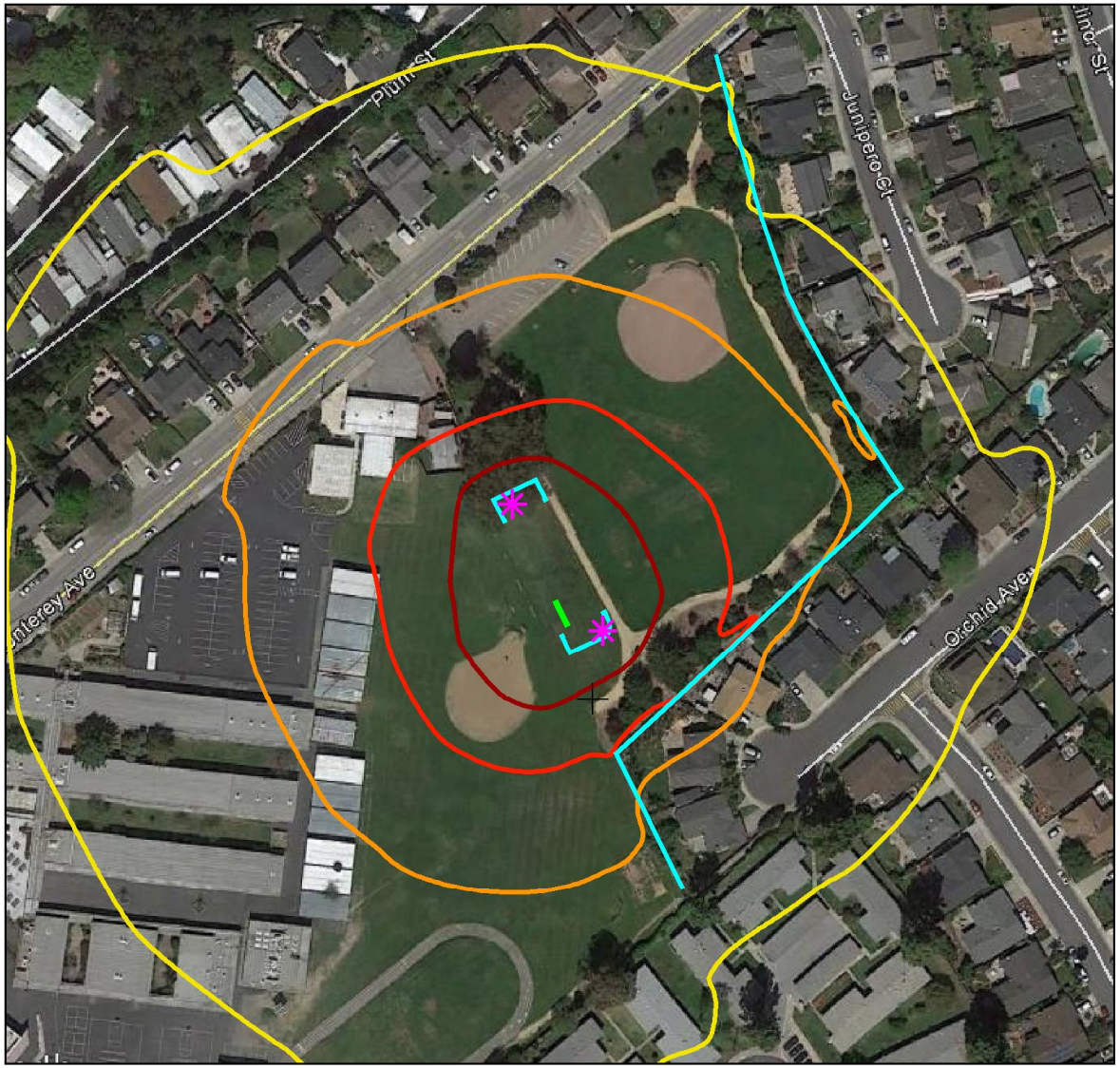
= 70
= 65
= 60
= 55
= 50

Area Source

6-foot Barriers

N

0 35 70 140 210 feet



Customer:
City of Capitola
Project: Monterey Avenue Skatepark Project
Project-No. 15-095

Figure

14

Maximum Noise Generated at Locations in Proposed Monterey Avenue Skate Park With two 6-foot Barriers

Calculated at 5 feet above ground

Project engineer: Jordan L. Roberts
Created: 8/20/2015
Processed with SoundPLAN 7.3, Update 2/26/2014

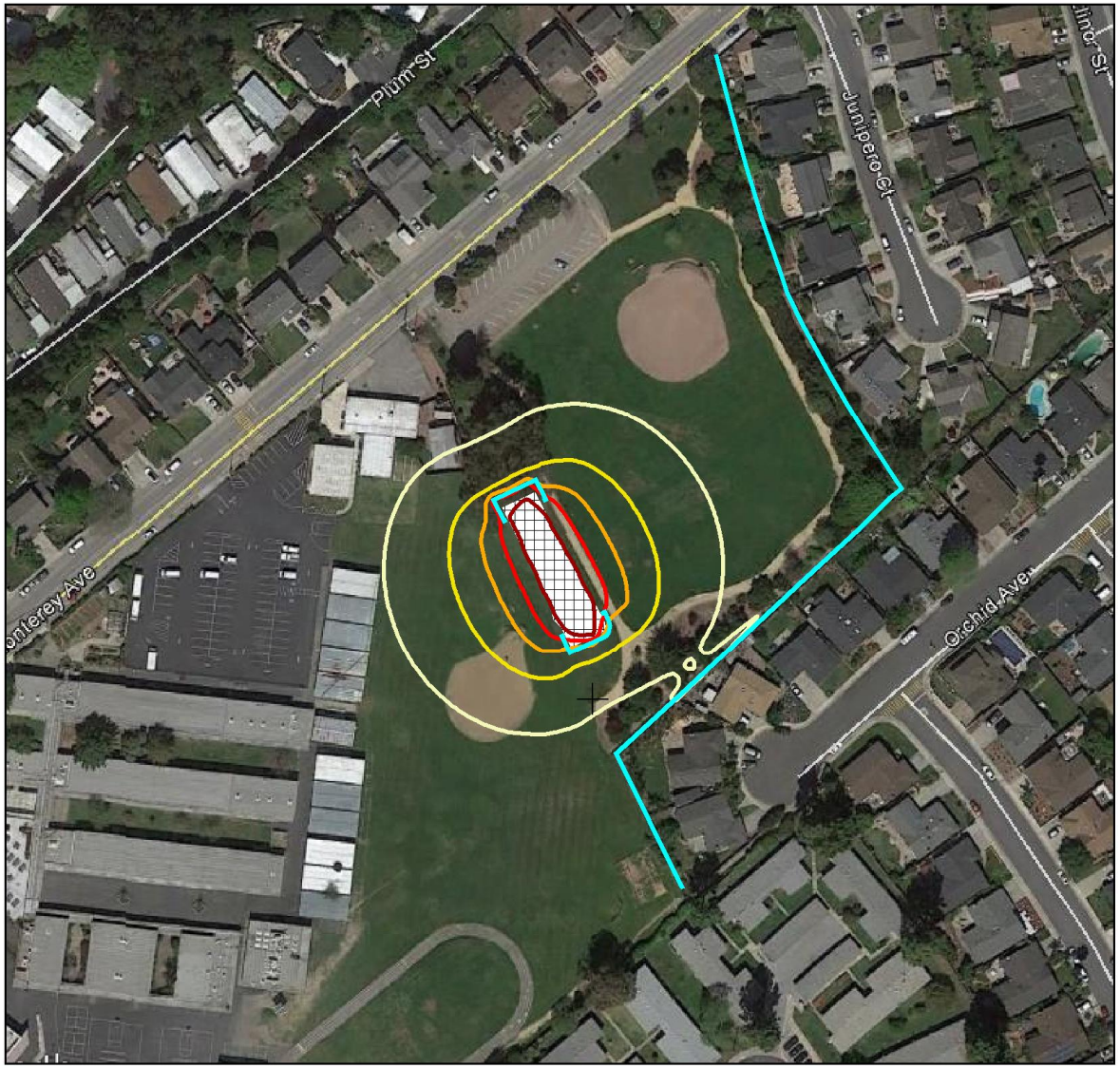
Skate Park Noise
in dB(A) Lmax

= 70
= 65
= 60
= 55
= 50

Point Source
Line Source
6-foot Barriers

N

0 35 70 140 210 feet



Customer:
City of Capitola
Project: Monterey Avenue Skatepark Project
Project-No. 15-095

Figure

15

Average Noise Generated Throughout Proposed Monterey Avenue Skate Park With two 6-foot Barriers

Calculated at 5 feet above ground

Project engineer: Jordan L. Roberts
Created: 8/20/2015
Processed with SoundPLAN 7.3, Update 2/26/2014

Skate Park Noise
in dB(A) Leq

= 70
= 65
= 60
= 55
= 50

Area Source

6-foot Barriers

N

0 35 70 140 210 feet