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July 1, 2022

Stephen Avis
P.O. Box 777
Ferndale CA 95536

VIA E-MAIL: **ferndale1057@gmail.com**

SUBJECT: **Flat Track Racing at the Humboldt County Fairgrounds**
Peer Review of the Noise Analysis

Dear Stephen:

This letter presents our peer-review of the noise analysis[1] and supplemental letter[2] related to Flat Track Racing at the Humboldt County Fairgrounds in Ferndale, California, prepared by Whitchurch Engineering, Inc. The analysis has been reviewed for approach, accuracy, and completeness. The key issues for the peer review were to confirm that the correct significance criteria were used and that key issues have been properly evaluated. Limited quantitative analyses were completed to confirm predicted noise levels.

The following are our specific comments related to the February 11, 2020 noise analysis:

Section 4.2.1, Ambient Noise Impact. As part of the noise analysis, noise measurements were made at one location south of the fairgrounds along Arlington Avenue to establish ambient noise levels. The measurements were made over two, two-hour periods (8:00 – 10:00 am and 2:00 – 4:00 pm). The measured average noise level (L_{eq}) data were used to roughly estimate CNEL noise levels in the project vicinity. However, based on our review of the supplied data, the study incorrectly assumed that the average noise levels measured during the two, two-hour periods were representative of noise levels throughout the day. The assumption overstated noise levels, particularly during the evening and night, when ambient noise levels are less. Based on this incorrect assumption, the ambient CNEL noise level was estimated to range from 61 to 62 dBA CNEL. No ambient noise measurements were made as part of the noise analysis to represent the nearest sensitive receptors to the east.

Noise measurement data collected by our firm (summarized in Appendix A) show that ambient noise levels vary throughout the day and night, with CNEL noise levels ranging from 54 to 58

[1] Noise Impact Study, Flat Track Racing at Humboldt County Fairgrounds, Whitchurch Engineering, Inc., February 11, 2020.
[2] Tailpipe Noise Level Estimation for Race Testing, Humboldt County Fairgrounds Noise Study, Whitchurch Engineering, Inc., July 13, 2021.

dBA CNEL at the Arlington Avenue location south of the fairgrounds. Noise levels were even less to the east at the Highway 211 location, ranging from 51 to 53 dBA CNEL.

The ambient noise environment was incorrectly established in the noise analysis based on a very limited data set and incorrect assumptions about how noise levels vary over the course of a 24-hour period. The flawed methodology yielded CNEL noise levels 3 to 11 dBA higher than the CNEL noise levels measured by our firm.

Recommendation: Subsequent noise studies should adequately quantify ambient noise levels in the area through comprehensive noise measurements. CNEL noise levels should not be estimated based on limited data. The size of the study area should also be increased to assess potential impacts at more distant receptors.

Section 4.2.2, Exceedance Testing. The noise analysis measured noise levels produced by three motorcycles during simulated racing conditions. The measured noise data were then adjusted to account for additional racers, with up to 18 motorcycles during each race. The supplied data indicates that the CNELs attributable to racing events assumed that racing would occur between the hours of 2:00 pm and 11:00 pm. Based on the methodology and assumptions, CNEL noise levels were estimated to range from 76 dBA at the Arlington Avenue receptor position to 77 dBA at the Highway 211 receptor position. The noise analysis used mathematical models to adjust the data generated by a small number of motorcycles. It would have been more appropriate to collect data during a similar racing event, with a similar numbers of riders, and use that data to estimate noise levels from the proposed racing events.

As noted above, noise measurement data collected by our firm show that ambient noise levels range from 54 to 58 dBA CNEL at Arlington Avenue receptors to the south and from 51 to 53 dBA CNEL at Highway 211 receptors to the east. The predicted CNEL noise levels attributable to racing would produce noise levels that would exceed ambient conditions by 18 to 22 dBA CNEL at receptors to the south and by 24 to 26 dBA CNEL at receptors to the east. 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. Therefore, these noise increases due to racing events would be considered substantial, and would cause annoyance and disruption in the surrounding community.

The noise analysis also makes a faulty assumption that noise levels within residences would be 40 dB less than exterior noise levels based on the "assumed wall construction of an average single-family residence." The 40 dB estimate used in the noise analysis assumes the reduction provided by a standard wall, but completely ignores the fact that there are openings in the residential walls for windows and doors, and that these windows and doors may be open during the races for ventilation. Windows and doors are the acoustical weak link in a wall system. When accounting for windows and doors, typical attenuation indoors 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.

Therefore, assuming exterior noise levels reaching 93 dBA L_{max} at the exterior of the buildings, as presented in the noise analysis, interior noise levels within residences could be expected to range from 68 dBA L_{max} with the windows closed to 78 dBA L_{max} with the windows open for ventilation. Such noise levels would result in activity interference indoors and outdoors. On days with motorcycle racing, interior CNEL noise levels would range from 52 to 62 dBA at residences to the south and from 51 to 61 dBA CNEL at residences to the east. Interior noise levels would clearly exceed the 45 dBA CNEL noise limit established in the Humboldt County General Plan.

Recommendation: Subsequent noise studies should quantify noise levels from a similar level of racing and not rely on adjustments to account for the increased numbers of riders. Predicted noise levels should also carefully consider the increase in ambient noise levels due to the project in addition to the absolute noise limits established by Humboldt County (see *King and Gardiner Farms, LLC v. County of Kern, 45 Cal. App. 5th 814 - Cal: Court of Appeal, 5th Appellate Dist. 2020*). The interior noise calculations should also be revised to correctly account for windows and doors within the "assumed wall construction of an average single-family residence."

Section 5, Potential Attenuation Measures. Section 5 describes potential attenuation measures including reducing the number of racers, ending racing earlier, and modifications to racing exhausts. A sound wall is also discussed, but is dismissed because it would be cost prohibitive. Reducing the number of racers or ending the racing earlier in the day would only extend the overall duration of the event, assuming that the same number of races would occur and the same number of racers would participate the event. In such cases, a one day event may be stretched to a two day event, doubling the number of days affected by racing and increasing the potential for annoyance and disruption. Modifications to racing exhausts would also not likely be feasible in all cases, as these modifications could be cost prohibitive to the racers or not possible to install on short notice. Even with the implementation of all best available controls, exterior noise levels continue to exceed 60 dBA CNEL and interior noise levels continue to exceed 45 dBA CNEL assuming that residential windows are open for ventilation purposes. Racing noise would substantially increase ambient noise levels and would cause annoyance and disruption in the surrounding community.

Recommendation: Subsequent noise studies should demonstrate that the mitigation proposed by the project would be sufficient to reduce exterior and interior noise levels to acceptable levels and to avoid a substantial increase to ambient noise levels at nearby sensitive receptors.

The following are our specific comments related to the July 13, 2021 supplemental letter:

Tailpipe Noise Level Estimation. The July 13, 2021 letter is highly technical and difficult to follow. If interpreted correctly by our firm, noise measurements were made at distant sites during the exceedance testing (three motorcycle race simulation) discussed in the February 11, 2020 noise analysis. The measured noise levels from the three motorcycles were then mathematically reduced to simulate a single motorcycle, and then, noise levels were mathematically increased to represent noise levels at a distance of 20 inches from the tailpipe.

It is apparent that the consultant did not have the time or resources to conduct appropriate tests, but relied on "mathematical gymnastics" to arrive at a source level that was derived based on measurements made at locations several hundred feet away. This is analogous to measuring the noise level of a highway at several hundred feet and trying to estimate the noise level produced by one car through mathematical adjustments considering the number of vehicles and distance. This methodology defies logic and is unreliable in terms of accuracy. A simple measurement at the tailpipe of one motorcycle would have provided more valuable data.

Further, an assumption is made that a full exhaust system would provide 20 dB of noise reduction, which leads to a recommended 100 dB L_{max} limit be enforced to ensure the CNEL remains below the County limit. It is not known if the motorcycles that were evaluated had racing exhaust reduction measures in place during the testing, so the 20 dB noise reduction that is assumed to be readily achievable is suspect.

Recommendation: Subsequent noise studies should quantify noise levels from a similar level of racing (both at the source and at the receptors) and not rely on multiple mathematical adjustments to account for varying conditions. Given the importance of the tailpipe noise limit, additional noise measurements and analysis are warranted. Optimistic noise level reductions should also be fully supported by appropriate measurements and modeling.

♦ ♦ ♦

This concludes our comments. Please feel free to contact us with any questions.

Sincerely yours,

Michael S. Thill
Principal Consultant
ILLINGWORTH & RODKIN, INC.

(22-087)

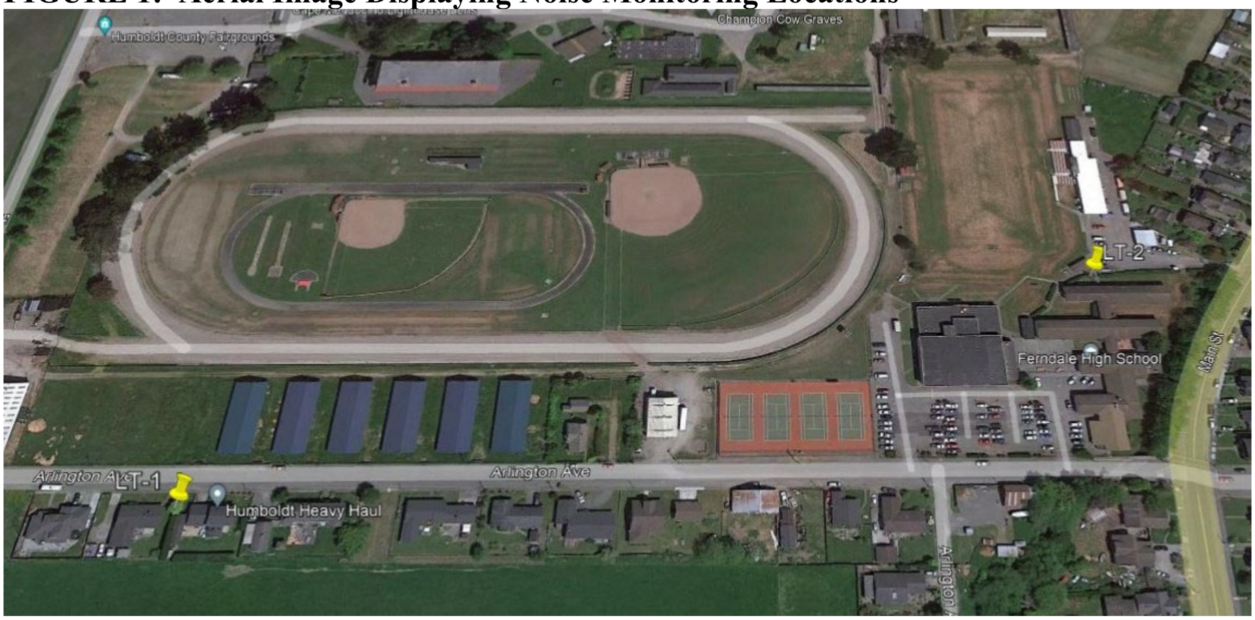
Attachments – Appendix A

APPENDIX A

Existing Noise Environment

Figure 1 shows the Humboldt County Fairgrounds, bordering land uses, and source locations of nearby traffic noise. Ferndale High School borders the fairgrounds to the southeast. A blend of residential and agricultural land uses surround the site with agricultural practices dominating land uses directly to the west. Ferndale High School is a primary noise source during hours of operation while sporadic traffic noise exists along Arlington Avenue.

FIGURE 1: Aerial Image Displaying Noise Monitoring Locations



Source: Google Earth, 2022.

An environmental noise monitoring survey was conducted between Friday, June 10th, 2022, and Tuesday, June 14th, 2022, to determine ambient noise levels at receptors near the Humboldt County Fairgrounds. The survey included two long-term noise measurements (LT-1 and LT-2) and two additional short-term noise measurements conducted at 540 Arlington Avenue and the parking lot of Ferndale High School. All noise measurements were conducted with Larson Davis Laboratories (LDL) Model LxT1 Type I Sound Level Meters fitted with ½-inch pre-polarized condenser microphones and windscreens. The meters were calibrated with a Larson Davis precision acoustic calibrator prior to and following the measurement survey. Weather conditions were good for conducting noise measurements during the survey.

Long-term noise measurement LT-1 was made from the front yard of a residence located at 400 Arlington Avenue, southwest of the fairgrounds. Average noise levels recorded from LT-1 ranged from 46 to 60 dBA L_{eq} during daytime hours (7:00 am and 10:00 pm) while nighttime hours ranged from 31 to 56 dBA L_{eq} (10:00 pm to 7:00 am). CNEL noise levels ranged from 54 to 58 dBA CNEL at the Arlington Avenue location south of the fairgrounds. These data are summarized in Figures 2-6.

Short-term noise measurement (ST-1) was conducted at 540 Arlington Avenue on Tuesday, June 14th, 2022, between 11:50 am and 12:00 pm. Ambient noise levels within the ten-minute measurement period registered between 45 and 48 dBA. The primary noise sources were from automobiles traveling on Arlington Avenue. Passing trucks measured in ranges between 70 to 72 dBA while smaller vehicles (cars) measured in ranges between 65 to 68 dBA. The ten-minute L_{eq} measured at ST-1 was 58 dBA.

Long-term noise measurement LT-2 was made from a utility pole on the campus of Ferndale High School, directly to the west of the fairgrounds. Average noise levels recorded at LT-2 ranged from 40 to 65 dBA L_{eq} during daytime hours while nighttime hours ranged from 36 to 48 dBA L_{eq}. CNEL noise levels at this location ranged from 51 to 53 dBA CNEL. These data are summarized in Figures 7-11.

The second short-term noise measurement (ST-2) was conducted from the staff parking lot at Ferndale High School on Tuesday, June 14th, 2022, between 12:20 pm and 12:30 pm. Ambient noise levels within the ten-minute measurement period registered between 46 and 48 dBA. Primary noise sources were traffic in the distance along Main Street and birds near the meter. Additionally, students and staff members in conversation were measured between 54 and 56 dBA while the birds ranged between 52 and 54 dBA. The ten-minute L_{eq} at ST-2 measured at 51 dBA.

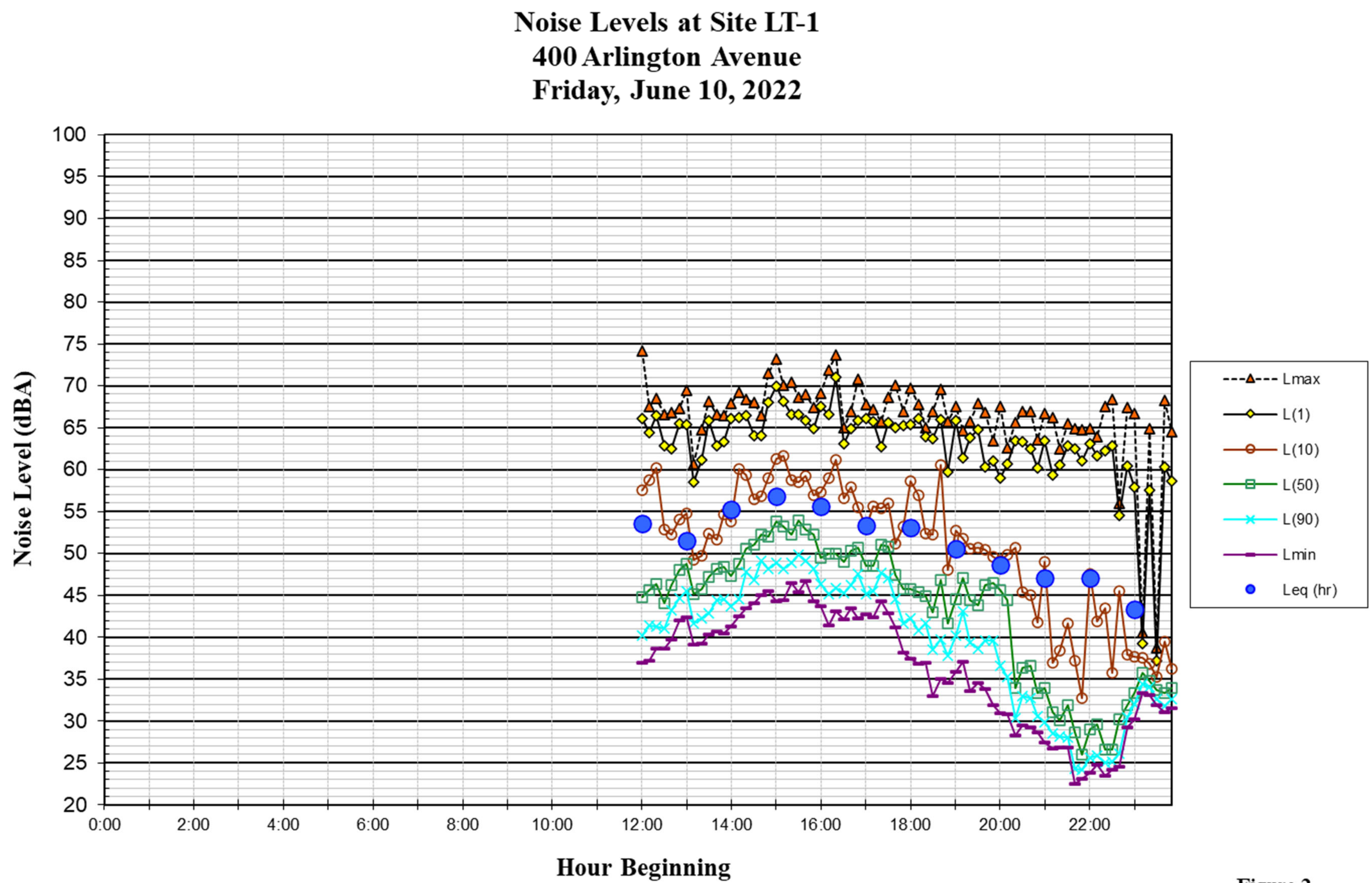
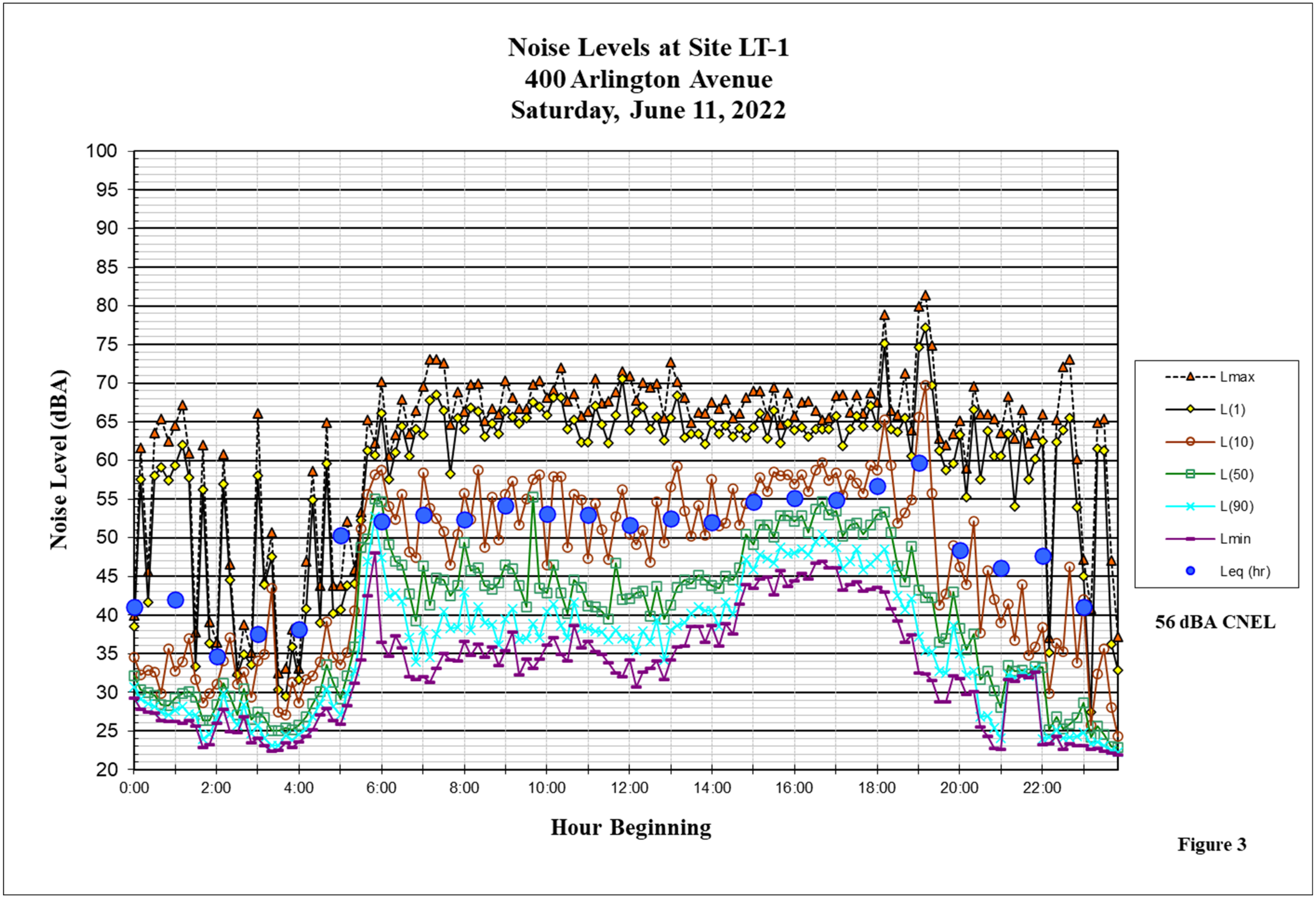
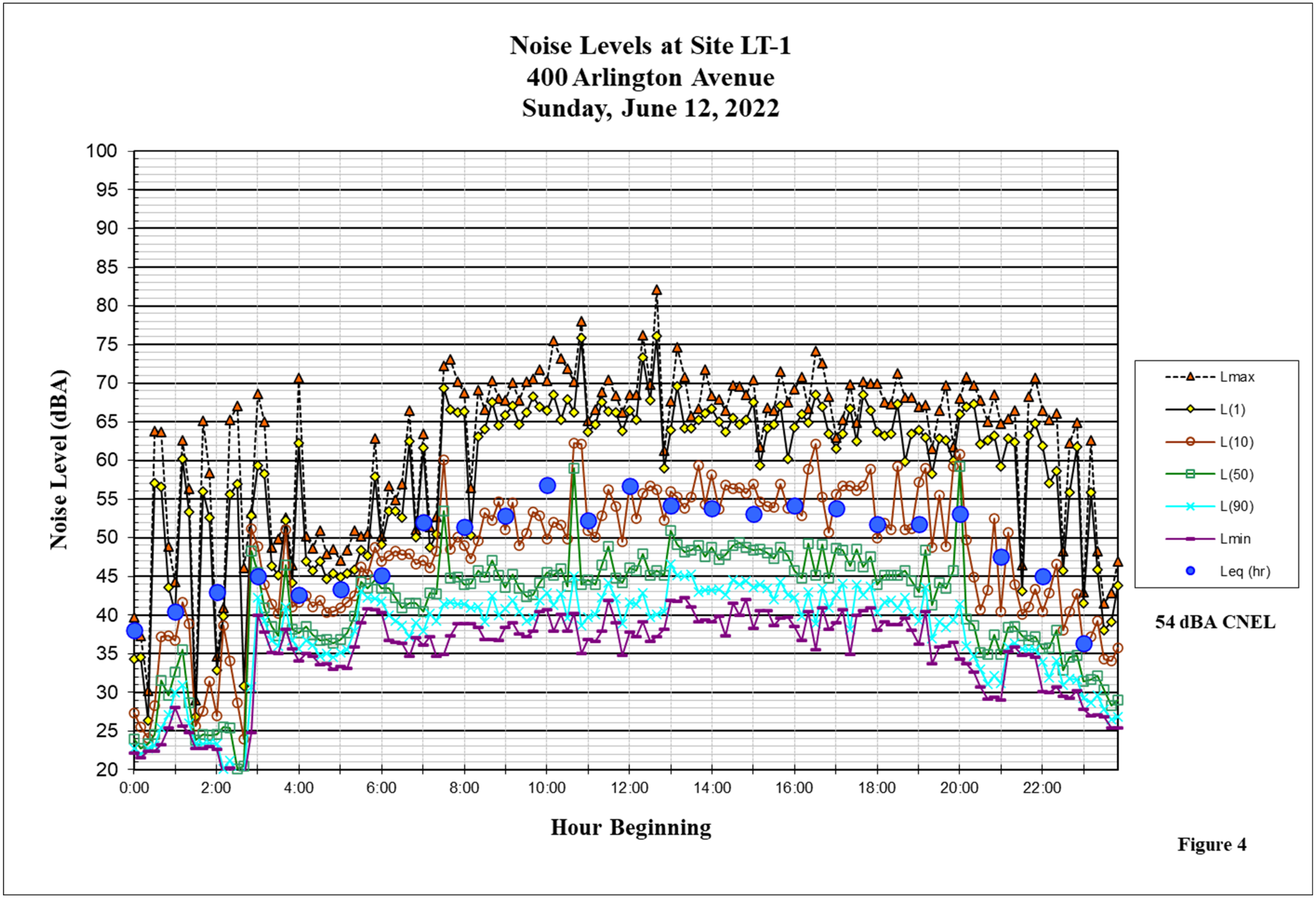

Noise Levels at Site LT-1
400 Arlington Avenue
Friday, June 10, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

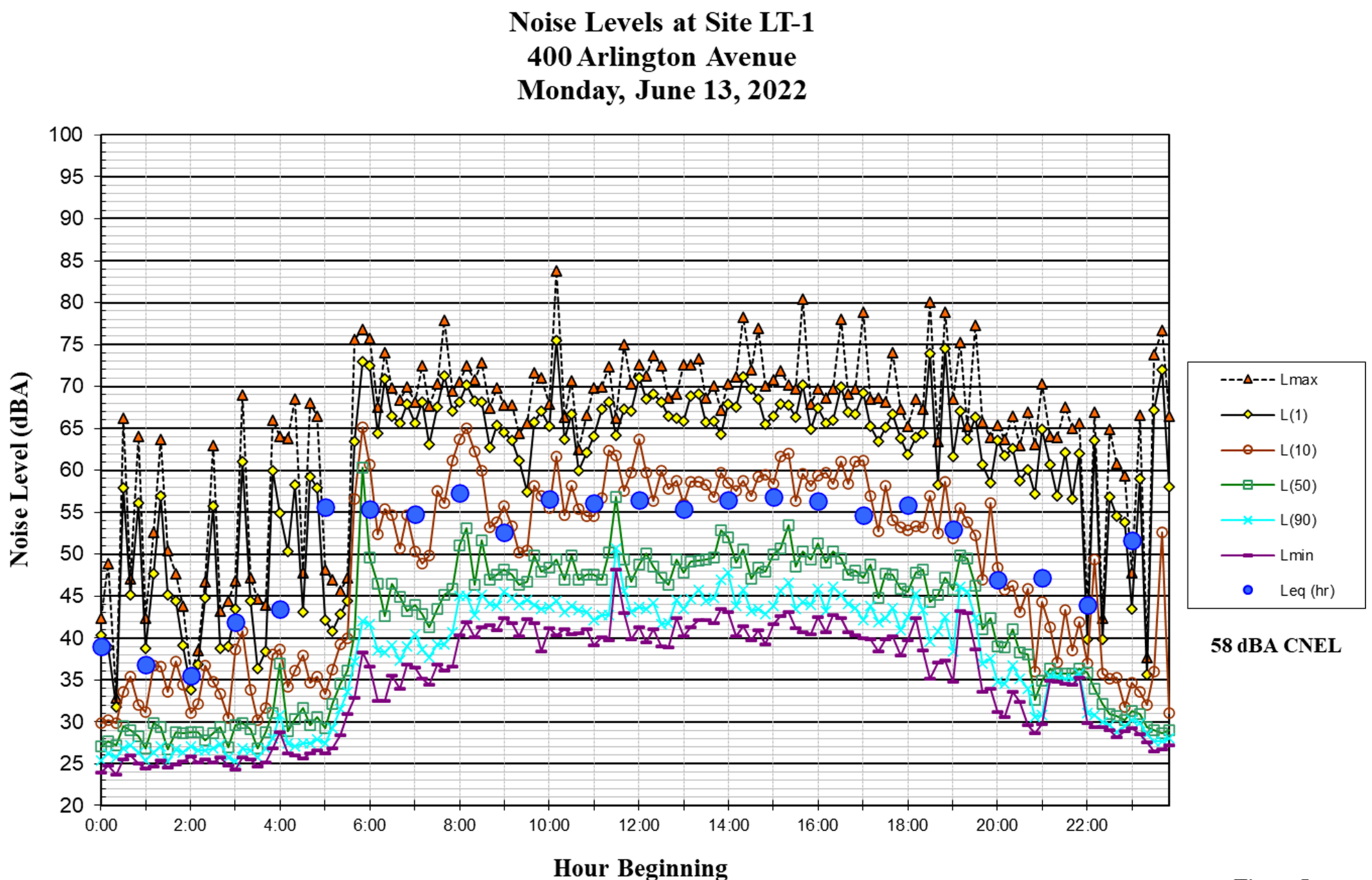
Figure 2



Noise Levels at Site LT-1
400 Arlington Avenue
Saturday, June 11, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
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)
Lmin
Leq (hr)
56 dBA CNEL

Figure 3


Noise Levels at Site LT-1
400 Arlington Avenue
Sunday, June 12, 2022
Noise Level (dBA)
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
54 dBA CNEL
Figure 4



Noise Levels at Site LT-1
400 Arlington Avenue
Monday, June 13, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
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)
Lmin
Leq (hr)
58 dBA CNEL

Figure 5

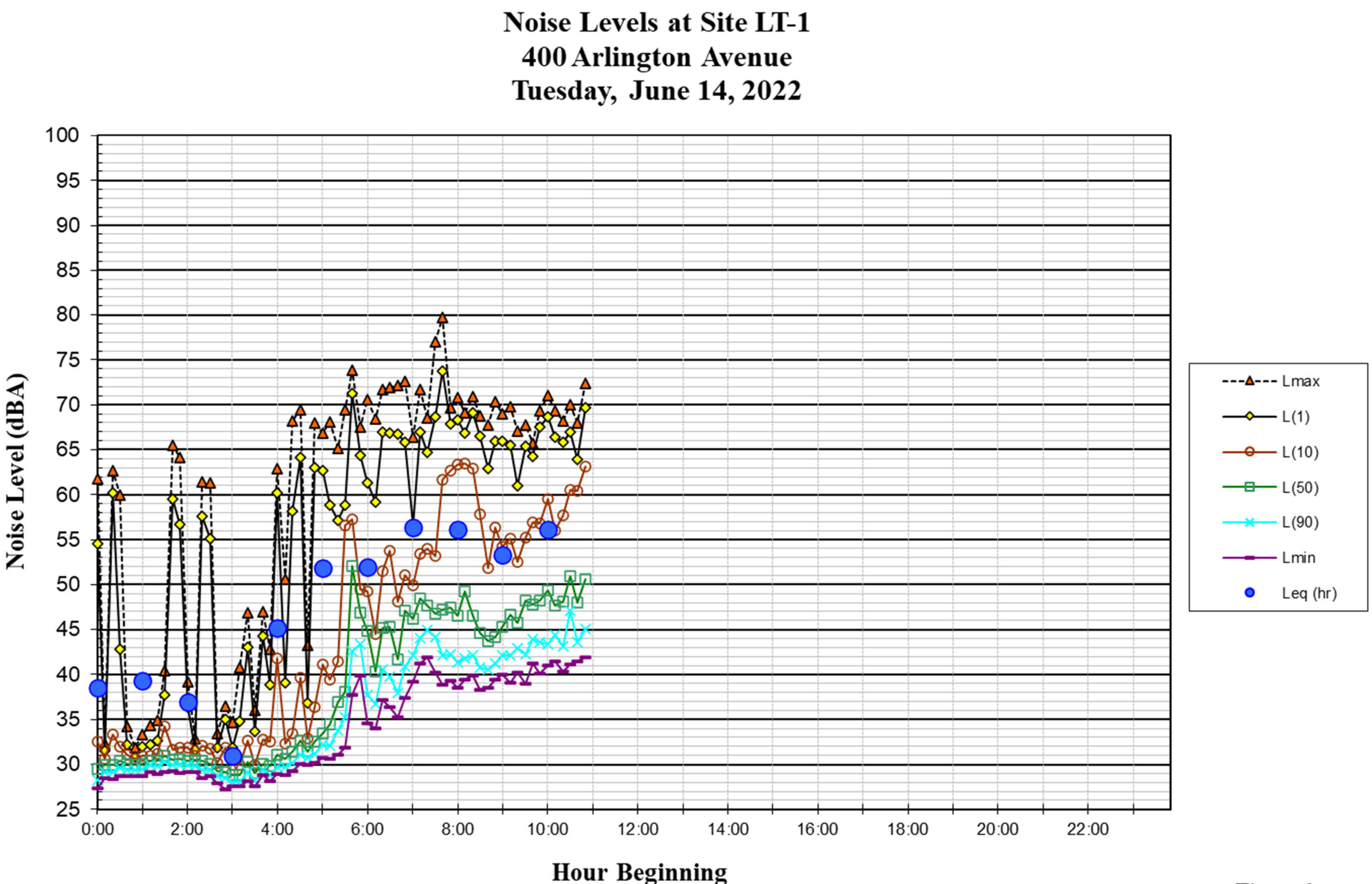
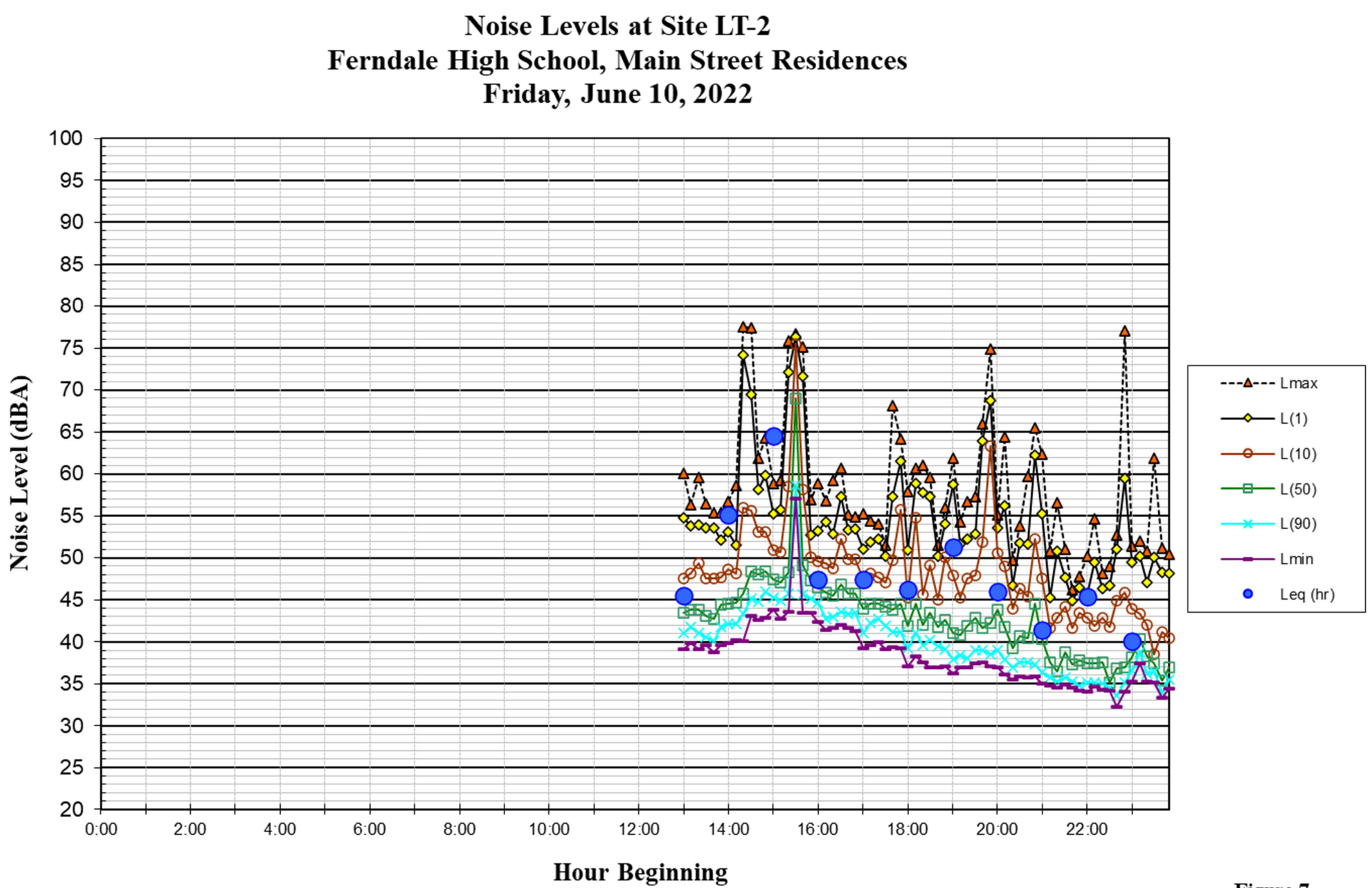
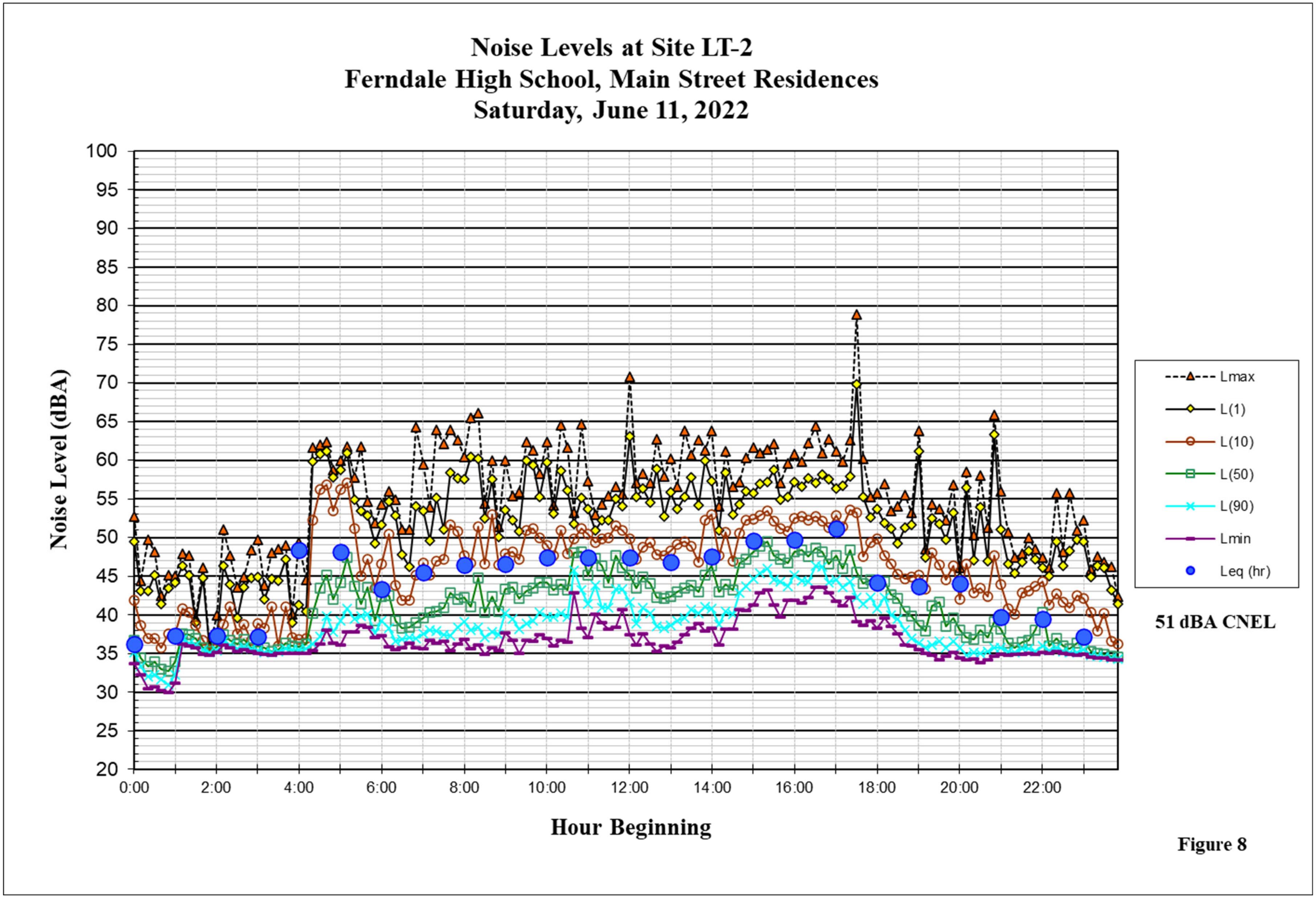

Noise Levels at Site LT-1
400 Arlington Avenue
Tuesday, June 14, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure 6



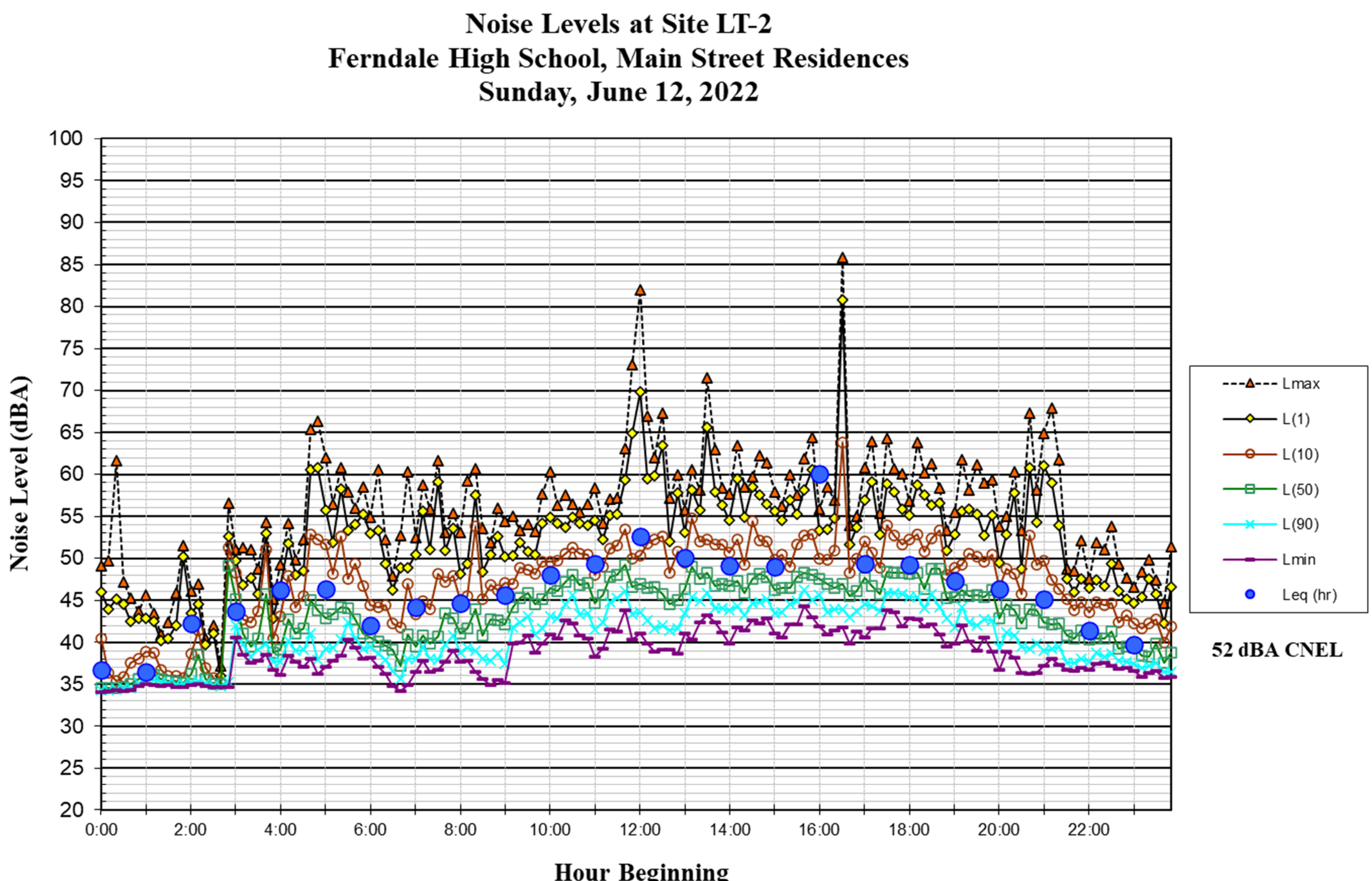
Noise Levels at Site LT-2
Ferndale High School, Main Street Residences
Friday, June 10, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

Figure 7



Noise Levels at Site LT-2
Ferndale High School, Main Street Residences
Saturday, June 11, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
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)
Lmin
Leq (hr)
51 dBA CNEL

Figure 8



Noise Levels at Site LT-2
Ferndale High School, Main Street Residences
Sunday, June 12, 2022
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
Noise Level (dBA)
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)
Lmin
Leq (hr)
52 dBA CNEL

Figure 9

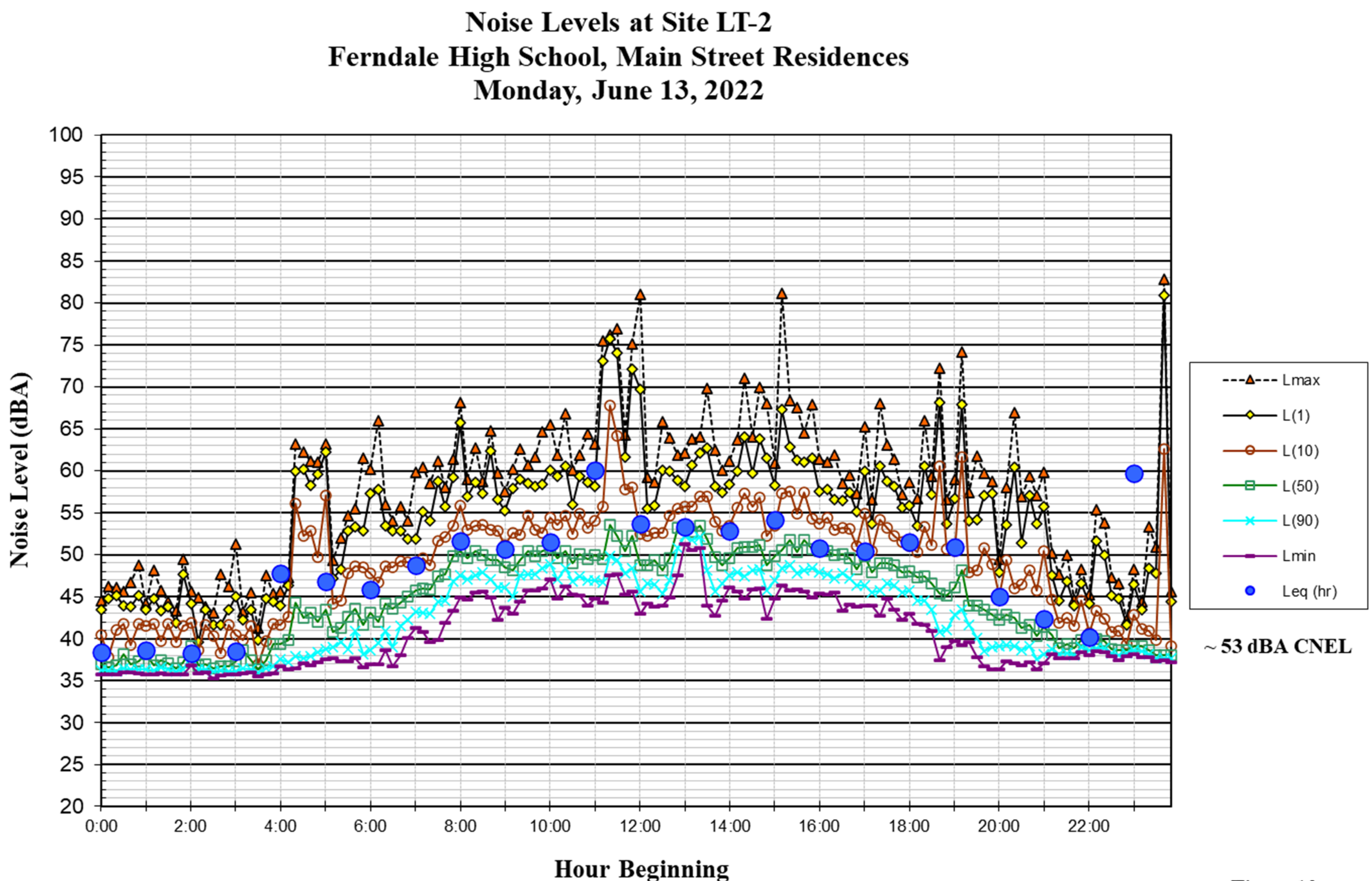
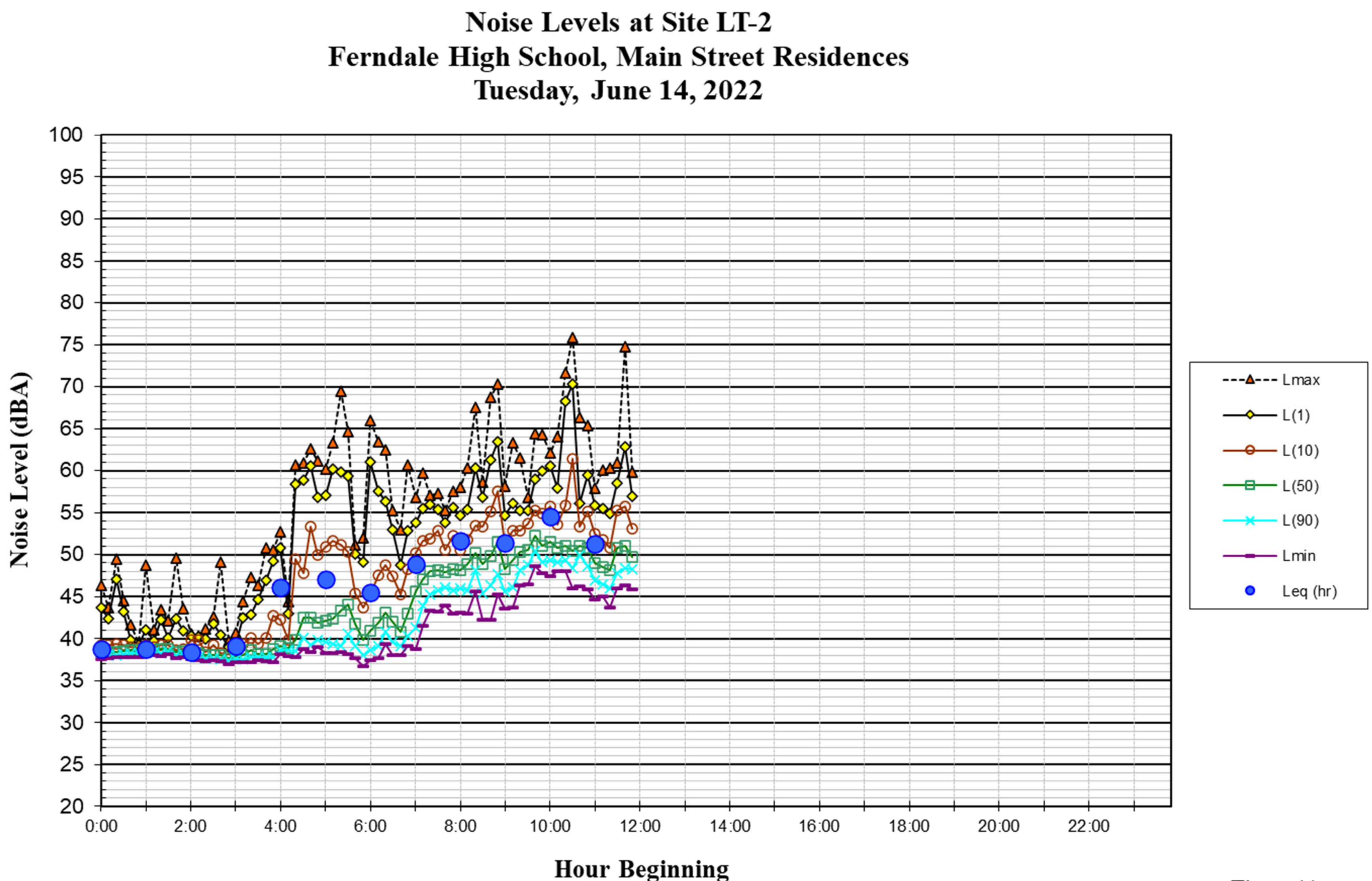

Noise Levels at Site LT-2
Ferndale High School, Main Street Residences
Monday, June 13, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
~ 53 dBA CNEL

Figure 10



Noise Levels at Site LT-2
Ferndale High School, Main Street Residences
Tuesday, June 14, 2022
Noise Level (dBA)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
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)
Lmin
Leq (hr)

Figure 11

Fundamentals of Environmental Noise

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

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

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

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA DNL. Typically, the highest steady traffic noise level during the daytime is about equal to the DNL 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 DNL with open windows and 65-70 dBA DNL 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 DNL 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 DNL. At a DNL of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the DNL 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 DNL of 60-70 dBA. Between a DNL 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 DNL 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.