APPENDIX G

Noise Assessment

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
505 Petaluma Boulevard South
Petaluma, California 94952
Tel: 707-766-7700 *Fax: 707-766-7790*
www.illingworthrodkin.com *illro@illingworthrodkin.com*

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Jeff Panek
Essex Property Trust, Inc.
925 East Meadow Drive
Palo Alto, CA 94303

VIA E-Mail: jpanek@essexpropertytrust.com

SUBJECT: Cadence Campus, San Jose, CA -- Environmental Noise Assessment

Dear Jeff:

This report presents the results of the environmental noise assessment of the Cadence Campus residential project proposed east of the River Oaks Parkway/ Seely Avenue intersection in San Jose, California. Included in the report are the fundamentals of environmental acoustics, applicable regulatory criteria established in the State Building Code and City of San Jose General Plan, and a description of existing noise levels at the project site. The report summarizes the results of calculations of future noise levels at proposed noise sensitive receptors and describes measures to control exterior and interior noise levels to acceptable levels.

Fundamentals of Environmental Acoustics

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 or 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,* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

TABLE 1 Definitions of Acoustical Terms Used in this Report

Term	Definitions
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.
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, Leq	The average A-weighted noise level during the measurement period. The hourly Leq used for this report is denoted as dBA $L_{eq[h]}$.
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 in the night between 10:00 pm and 7:00 am.
Day/Night Noise Level, DNL or L_{dn}	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.
Ln Values 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.
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.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level	Common Indoor Noise Source
	120 dBA	
Jet fly-over at 300 meters		Rock concert
	110 dBA	
Pile driver at 20 meters	100 dBA	
		Night club with live music
	90 dBA	
Large truck pass by at 15 meters		
	80 dBA	Noisy restaurant
		Garbage disposal at 1 meter
Gas lawn mower at 30 meters	70 dBA	Vacuum cleaner at 3 meters
Commercial/Urban area daytime		Normal speech at 1 meter
Suburban expressway at 90 meters	60 dBA	
Suburban daytime		Active office environment
	50 dBA	
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
		Quiet bedroom at night
Wilderness area	20 dBA	Quiet recording studio
Most quiet remote areas	10 dBA	
		Threshold of human hearing
	0 dBA	

Regulatory Criteria

Section 1208 of the 2001 California Building Code

New multi-family housing in the State of California is subject to the environmental noise limits set forth in Appendix Chapter 1208A.8.4 of the California Building Code. The noise limit is a maximum interior noise level of 45 dBA DNL attributable to exterior noise sources. Where exterior noise levels exceed 60 dBA DNL, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the noise limit.

City of San Jose General Plan

The Noise Element of the City of San Jose's 2020 Plan identifies noise and land use compatibility standards for various land uses. The City's goal is to, "...minimize the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies."

Policies presented in the Noise Element applicable to this project are as follows:

> **Policy 1.** The City's acceptable noise level objectives are 55 dBA DNL as the long-range exterior noise quality level, 60 dBA DNL as the short-range exterior noise quality level, 45 dBA DNL as the interior noise quality level, and 76 dBA DNL as the maximum exterior noise level necessary to avoid significant adverse health effects. These objectives are established for the City, recognizing that the attainment of exterior noise quality levels in the environs of the San Jose International Airport, the Downtown Core Area, and along major roadways may not be achieved in the time frame of this Plan. To achieve the noise objectives, the City should require appropriate site and building design, building construction and noise attenuation techniques in new residential development.
>
> **Policy 18.** To the extent feasible, sound attenuation for development along city streets should be accomplished through the use of landscaping, setback, and building design rather than the use of sound attenuation walls. Where sound attenuation walls are deemed necessary, landscaping and an aesthetically pleasing design shall be used to minimize visual impact.

Existing Noise Environment

The project site is located at the Cadence Campus east of the intersection of River Oaks Parkway and Seely Avenue. The predominant source of noise affecting the westernmost portion of the project site is vehicular traffic along River Oaks Parkway and Seely Avenue. Other ambient noise sources include distant vehicular traffic, aircraft, and activities at adjacent industrial uses. Existing noise levels at the project site were monitored continuously at one location near River Oaks Parkway from August 29, 2006 to September 1, 2006 to document the daily trend in noise levels generated by vehicle traffic. Two short-term noise measurements were also made to

quantify noise levels on portions of the project site away from River Oaks Parkway. Noise measurement locations are shown in Figure 1.

The long-term noise measurement (LT-1) was made approximately 50 feet from the center of River Oaks Parkway. Noise levels at this location resulted primarily from local vehicular traffic. In the absence of local traffic, background noise levels were primarily the result of distant vehicular traffic and commercial aircraft. Daytime hourly average noise levels typically ranged from 57 to 65 dBA L_{eq}. At night, hourly average noise levels ranged from 49 to 63 dBA L_{eq}. The day-night average noise level calculated based on the data gathered at LT-1 ranged from 63 to 64 dBA DNL. The daily trend in noise levels at location LT-1 is shown on Figures 2-5.

The first short-term noise measurement (ST-1) was made at the northernmost portion of the project site near Coyote Creek trail. Noise levels measured at this location were primarily the result of aircraft overflights and distant vehicular traffic noise. The average-equivalent noise level measured at site ST-1 was 53 dBA L_{eq}. Aircraft generated maximum instantaneous noise levels ranging from about 53 dBA to 64 dBA. The second short-term noise measurement (ST-2) was made near the southernmost property line of the project site, approximately 100 feet from the industrial building and mechanical equipment located to the south. Mechanical equipment operating at the adjacent industrial use generated a noise level of 50 dBA. The average-equivalent noise level measured at site ST-2 was 51 dBA L_{eq}.

Future Exterior Noise Environment

The project proposes the construction of noise-sensitive multi-family residential units in a noise environment greater than 60 dBA DNL. The future noise environment at the project site would continue to result from vehicular traffic along River Oaks Parkway and Seely Avenue. Future noise levels along River Oaks Parkway are calculated to be 64 dBA DNL at a distance of 60 feet from the centerline of the roadway. Exterior noise levels would be as high as 67 dBA DNL at the façade of the residential units located nearest the intersection of River Oaks Parkway and Seely Avenue assuming similar traffic volumes and traffic patterns along Seely Avenue.

Exterior noise levels at decks oriented toward River Oaks Parkway and Seely Avenue would exceed 60 dBA DNL. The implementation of solid deck rails would not result in measurably lower noise levels at receivers located on these decks because of reflections off of the building itself and the build-up of reverberant sound energy within the shielded area. The Composite Building Floor Plan indicates that common outdoor use areas would be provided in well-shielded courtyards. These outdoor use areas would be effectively shielded from transportation noise by the buildings themselves and exterior noise levels are calculated to be below 60 dBA DNL. Although exterior noise levels at decks would exceed 60 dBA DNL, common use areas are provided where exterior noise levels would be less than 60 dBA DNL.

Future Interior Noise Environment

Interior noise levels attributable to exterior noise sources are required by the State of California Noise Insulation Standards and the City of San Jose's General Plan to be maintained at or below

45 dBA DNL within new multiple-family residential units. In buildings of typical construction, with the windows partially open, interior noise levels are generally 15 dBA lower than exterior noise levels. With the windows maintained closed, standard residential construction typically provides about 20 to 25 decibels of noise reduction. For example, a unit exposed to exterior noise levels of 67 dBA DNL would be 52 dBA DNL inside with the windows partially open and 42 to 47 dBA DNL with the windows shut.

Exterior noise levels at residential façades of Buildings 1 and 2 adjoining River Oaks Parkway and Seely Avenue (northernmost and westernmost facades) would range from 64 to 67 dBA DNL. Where exterior day-night average noise levels are 65 dBA DNL or less, interior noise levels can typically be maintained below 45 dBA DNL with the incorporation of forced air mechanical ventilation systems in residential units. These systems allow the occupant the option of controlling noise by maintaining the windows shut. Where noise levels exceed 65 dBA DNL, sound-rated building elements may also be required. The exact specifications of window and wall systems cannot be accurately predicted at this time, but once building elevations, and floor plans are developed, the specifications can be made. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable with proper wall construction techniques, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems to allow occupants to control noise by closing the windows.

Preliminary calculations indicate that the units nearest River Oaks Parkway and Seely Avenue would require windows and doors with a minimum Sound Transmission Class rating of 28 STC. The windows and doors of these units would be required to be shut to control noise, therefore a form of forced-air mechanical ventilation, satisfactory to the local building official, would be required to maintain a habitable interior environment. The final detailed design of the noise insulation features shall be completed at the time floor plans and building elevations are available. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans, and approved prior to issuance of a building permit.

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This concludes our environmental noise assessment for the Cadence Campus residential project. If you have any questions or comments regarding this analysis, please do not hesitate to call.

Sincerely yours,

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

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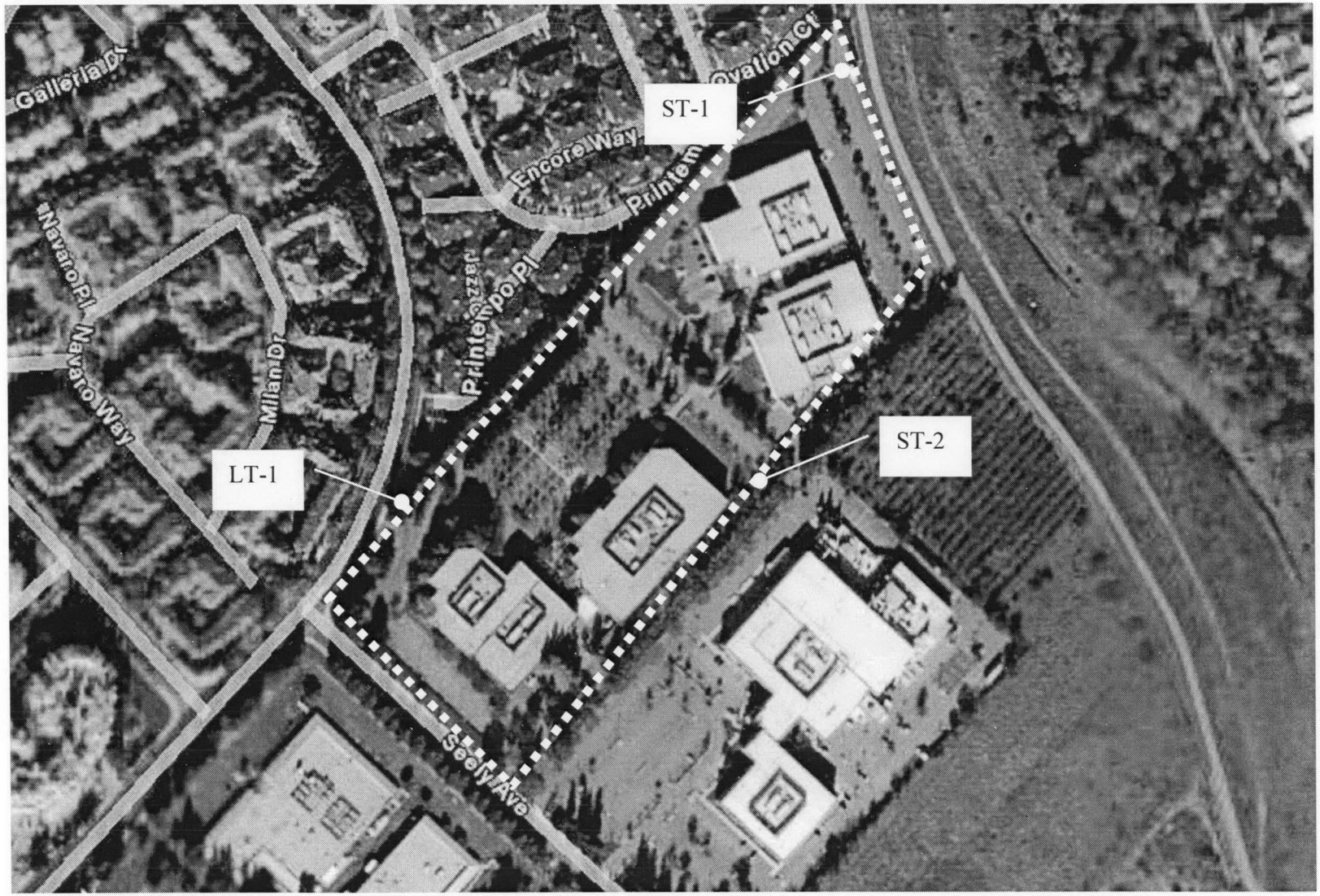
Figure 1 Noise Measurement Locations



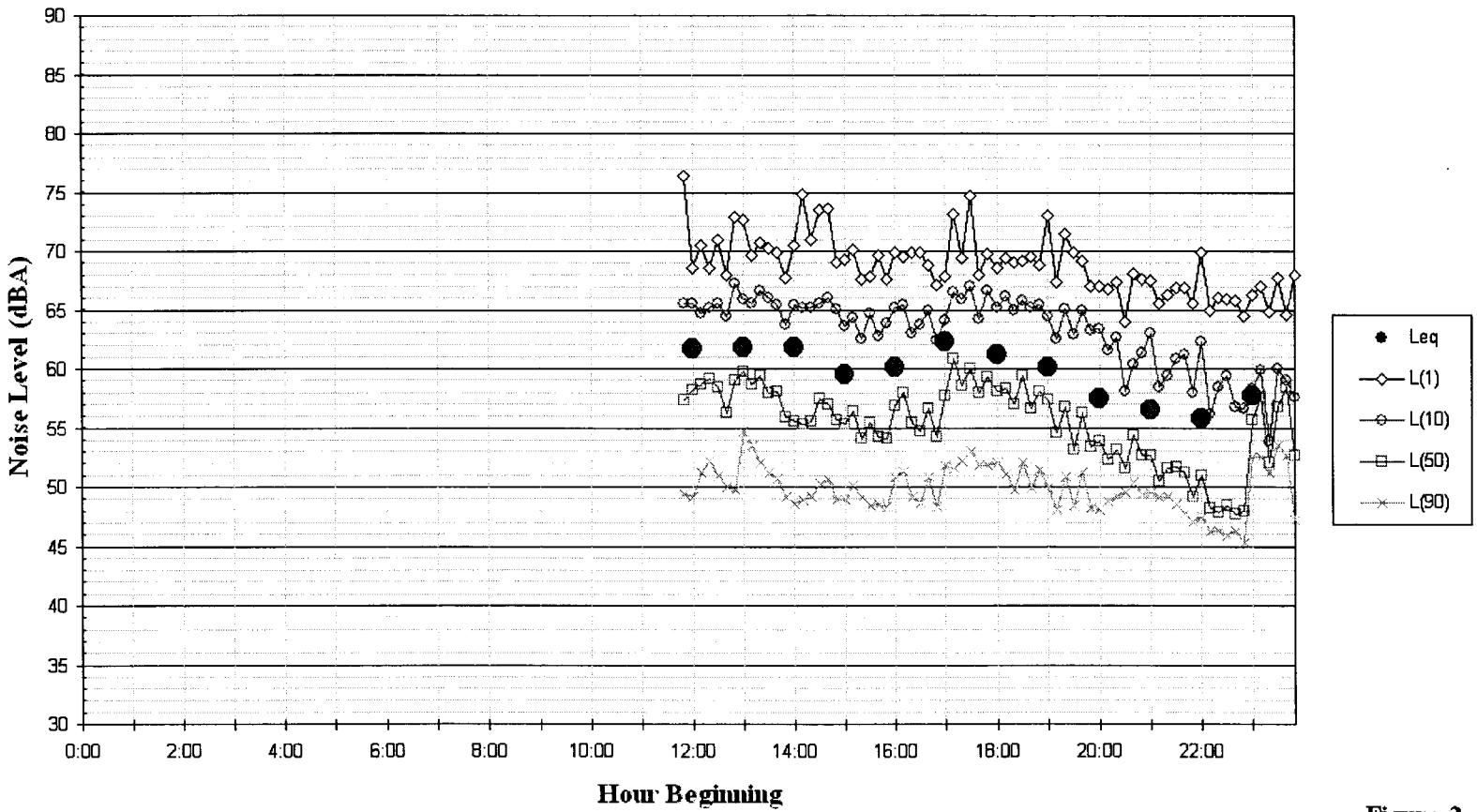

Noise Levels at LT-1
~50 feet from the Center of River Oaks Parkway
Tuesday, August 29, 2006
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)

Figure 2

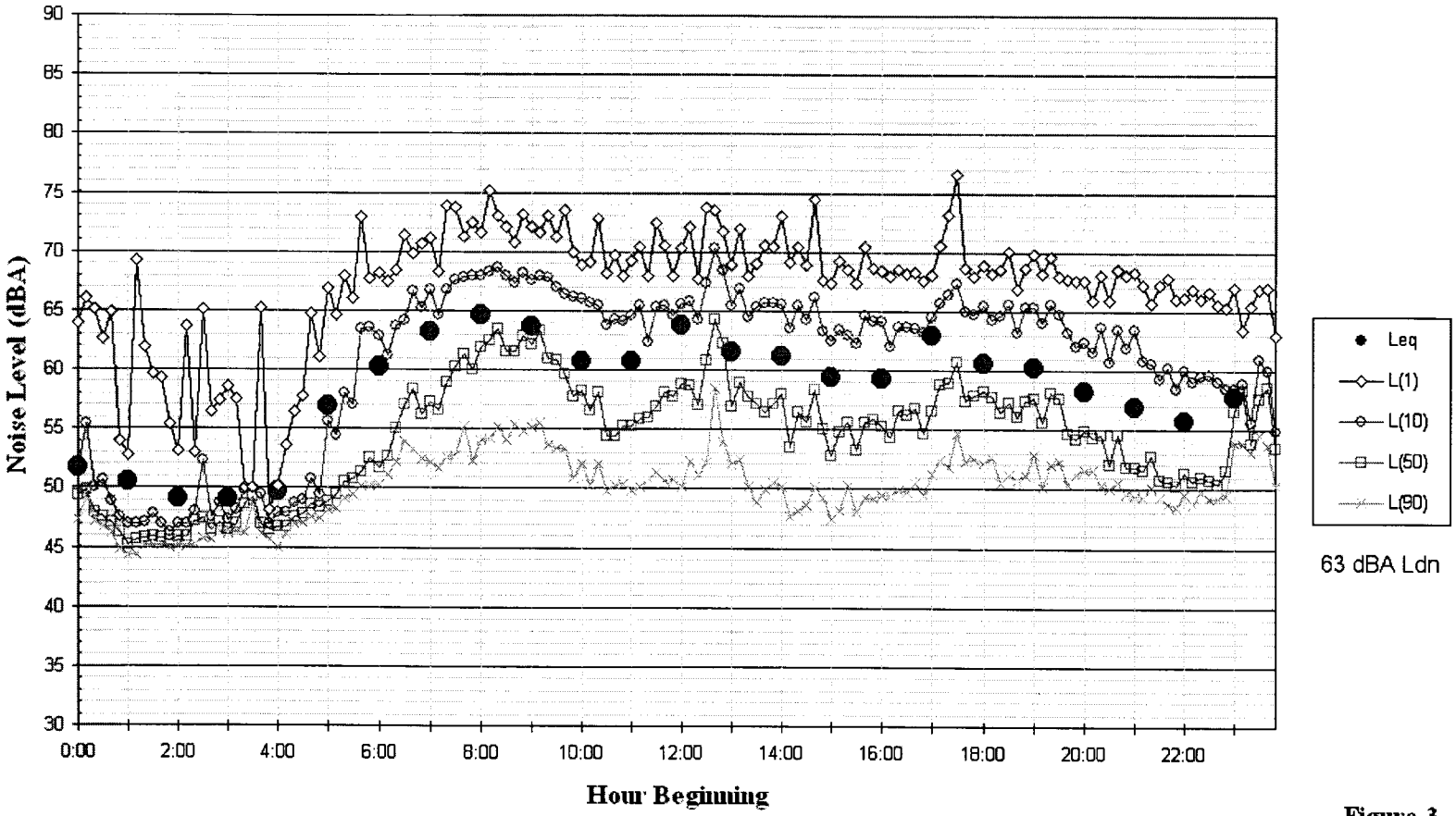

Noise Levels at LT-1
~50 feet from the Center of River Oaks Parkway
Wednesday, August 30, 2006
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
63 dBA Ldn

Figure 3

Noise Levels at LT-1
~50 feet from the Center of River Oaks Parkway
Thursday, August 30, 2006

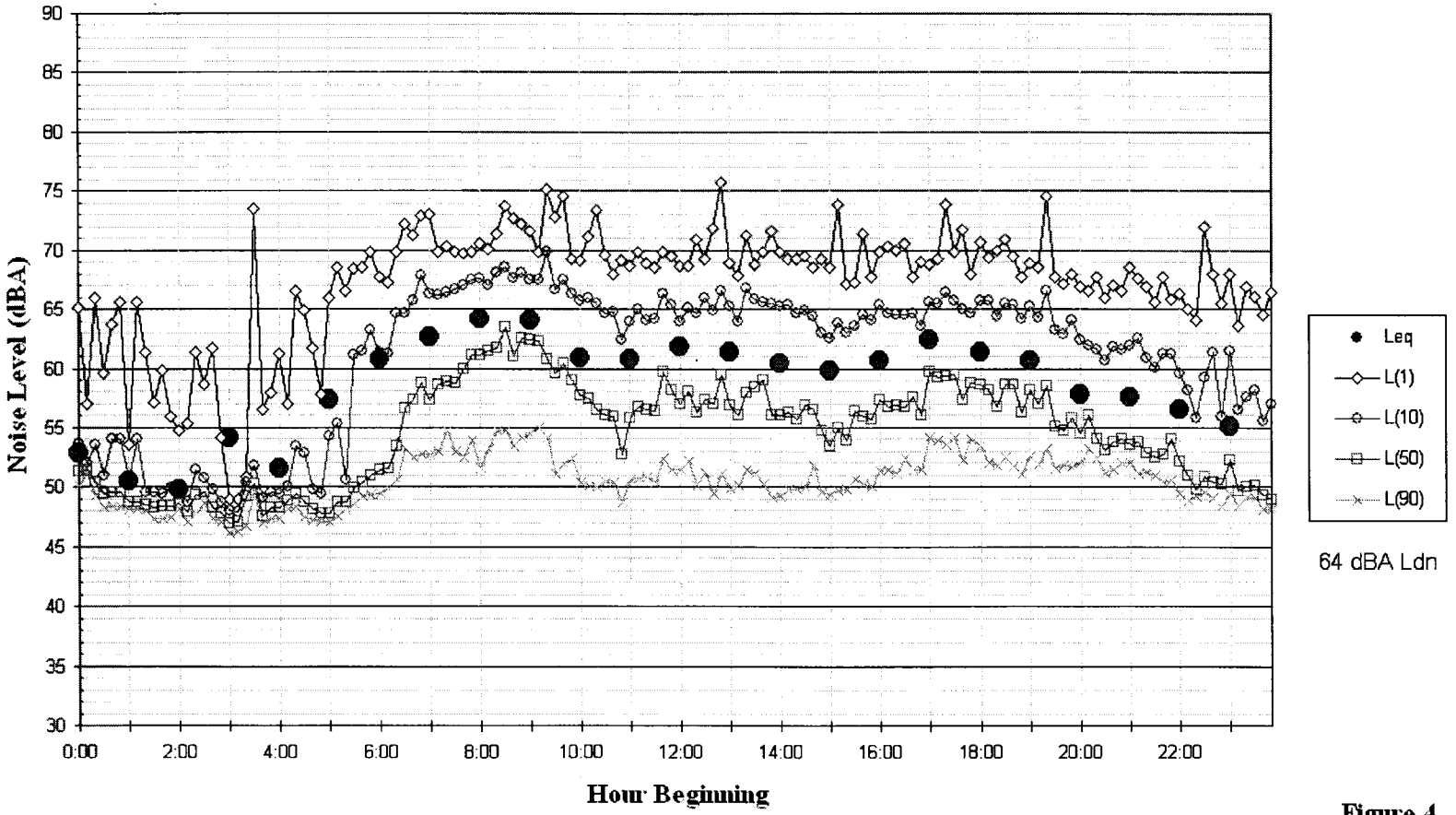


Figure 4

Noise Levels at LT-1
~50 feet from the Center of River Oaks Parkway
Friday, September 1, 2006

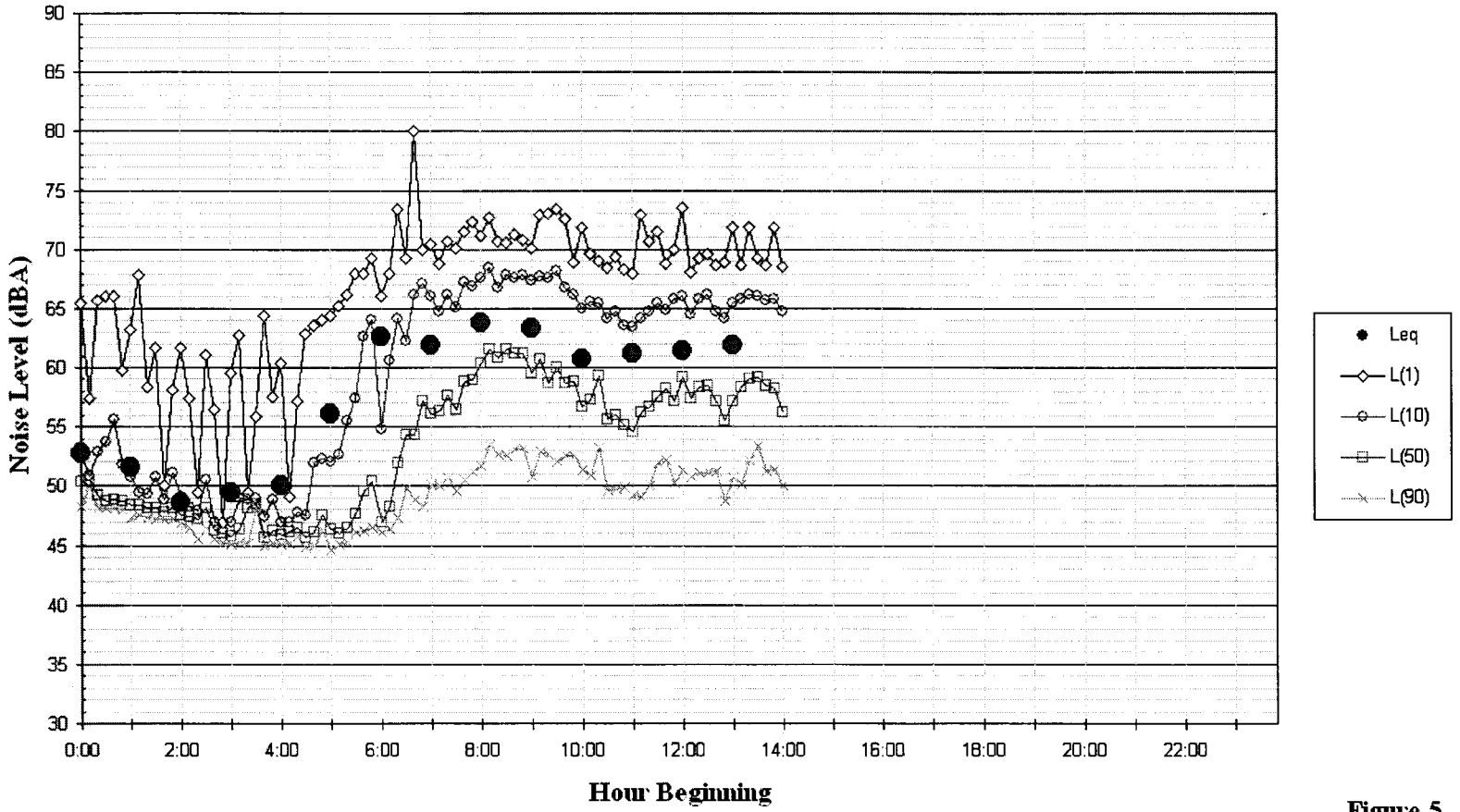


Figure 5