Noise Study Report

State Route 85 Express Lanes Project

Santa Clara County

District 4

04-SCL-85 PM 0.0/R24.1

04-SCL-101 PM 23.1/28.6

04-SCL-101 PM 47.9/52.0

EA 04-4A7900

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August 2012

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Summary

The California Department of Transportation (Department), in cooperation with the Santa Clara Valley Transportation Authority (VTA), proposes to convert the existing High-Occupancy Vehicle (HOV) lanes on State Route 85 (SR 85) to High-Occupancy Toll (HOT) lanes (hereafter known as express lanes). The express lanes would be implemented on northbound and southbound SR 85 from United States Highway 101 (US 101) in southern San Jose to US 101 in Mountain View in Santa Clara County. The express lanes would continue for 5.5 miles on US 101 in southern San Jose. Express lane advance notification signage would also be added in a 4.1-mile segment of US 101 in Mountain View, for a total project length of 33.7 miles. Work on the US 101 segments will mainly include striping and signing and will not include widening or change in system or HOV lane access. The project does not require any right-of-way acquisition.

The purpose of the project is utilize excess capacity in the SR 85 HOV lanes, manage traffic congestion in the most congested HOV segments of the freeway between SR 87 and I-280, and maintain consistency with provisions defined in Assembly Bill 2032 (2004) and Assembly Bill 574 (2007) to implement express lanes in the SR 85 corridor.

The purpose of this Noise Study Report (NSR) is to document the assessment of existing and future (2035) traffic noise levels at noise sensitive receptors in the vicinity of the proposed Project and the identification of whether or not preliminary noise abatement measures are necessary for the project to comply with state and federal noise abatement/mitigation requirements. The primary objective of this study is to identify noise sensitive receptors where noise levels would approach or exceed the noise abatement criteria (NAC; 67 A-weighted decibel equivalent sound level [dBA $L_{eq[h]}$]) with the project or receptors that would experience a substantial increase in noise levels as a result of the project.

The study included noise measurements, prediction of future noise levels with the construction and operation of the project, and identification of measures to reduce construction noise levels and to abate noise at adjacent receptors. This study follows Federal Highway Administration (FHWA) and Caltrans policies to address traffic noise impacts and noise abatement. This includes FHWA regulations (Title 23, Part 772 of the Code of Federal Regulations [23CFR772]) and the Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects (Protocol or TNAP). The Protocol addresses both Federal and State environmental statutes with regard to noise.

The FHWA Traffic Noise Model, TNM 2.5, was used to predict future noise levels, analyze noise impacts, and assess potential abatement options for the project. The model was calibrated and adjusted based on measured noise and traffic conditions documented during the field survey. Following calibration, noise levels were assessed in TNM based on future traffic conditions. Where the freeway mainline traffic would be congested in the future during the peak periods (i.e., demand exceeds capacity of the freeway), free-flowing conditions were used to generate the worst-case peak noise period. Ramp volumes were based on project traffic data provided by URS and CDM Smith.

Typical noise increases resulting from the express lanes project were calculated to be 0 to 1 dBA $L_{eq[h]}$ higher than existing noise levels. In some areas, noise increases are predicted to reach 2 to 3 dBA $L_{eq[h]}$, but these larger predicted increases are primarily attributable to the rounding of the modeled results (i.e., 1.5 decibels rounds to 2 decibels) or attributable to large increases in traffic volumes expected along some on- and off-ramps, not as a result of traffic expected along the mainline. Noise level increases resulting from the project would not be substantial; however, noise levels at many Category B receptors would continue to approach or exceed the NAC.

Noise abatement, in the form of new noise barriers, was assessed for receptors where noise levels would approach or exceed the NAC. A total of 24 potential barriers were evaluated for feasibility at Category B and Category C land uses where the NAC would be approached or exceeded. To be considered feasible, a noise barrier must achieve a minimum of a 5-decibel reduction at a given receptor. Six of the 24 barriers (two barriers along US 101 and four barriers along SR 85) were found to be feasible with the noise reduction provided by barriers of a certain height also achieving the Caltrans noise reduction design goal (minimum 7-decibel reduction for at least one receptor), which is a reasonableness consideration. The total reasonable allowance for each feasible barrier ranged from $55,000 to $2,365,000 depending on the barrier height and number of benefited receptors. This study did not include an analysis of barrier cost-effectiveness, which would be assessed by the project engineers and the project development team. The final decision to include noise barriers in the proposed project design must consider reasonableness factors, such as cost-effectiveness, as well as other feasibility considerations including topography, access requirements, and other noise sources, safety, and information developed during the design and public review process. Table ES-1 summarizes the feasibility of noise barriers and provides the results of the reasonableness allowance calculations.

Construction activities would result in temporary increases to noise levels at noise-sensitive receptor in the project vicinity. Construction activities would be conducted in compliance with applicable regulations and would be short-term and intermittent. Measures to reduce construction noise are included in this report.

Table ES-1: Summary of Barrier Feasibility and Reasonable Allowances

Sound Wall ID	Approximate Stationing / Location	Type of Analysis	Barrier Height (feet)	Insertion Loss (dBA)	Number of Benefited Receptors	Total Reasonable Monetary Allowance
101-SW1	SB 51+00 to 59+00	New Wall	12	6 to 7	4	$220,000
			14	7 to 8	4	$220,000
			16	7 to 8	4	$220,000
101-SW3	SB 169+50 to 177+50	New Wall	10	7 to 8	4	$220,000
			12	9	4	$220,000
			14	10	4	$220,000
			16	11	4	$220,000
SW1	SB ROW El Camino Real to Existing Noise Barrier (2,925 feet)	New Wall	10	6 to 7	29	$1,595,000
			12	6 to 9	43	$2,365,000
			14	7 to 10	43	$2,365,000
			16	8 to 11	43	$2,365,000
SW2	NB On-Ramp Fremont Avenue to Existing Noise Barrier (450 feet)	New Wall	16	7	1	$55,000
SW5	NB ROW McClellan Road to Stevens Creek Boulevard (2,490 feet)	New Wall	10	7	1	$55,000
			12	5 to 7	2	$110,000
			14	5 to 8	2	$110,000
			16	6 to 9	2	$110,000
SW17	NB ROW SR 85 to SR 87 Connector (1,675 feet)	New Wall	10	5 to 7	20	$1,100,000
			12	5 to 8	21	$1,155,000
			14	5 to 9	21	$1,155,000
			16	5 to 10	21	$1,155,000

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List of Abbreviated Terms

23CFR772	Title 23, Part 772 of the Code of Federal Regulations
ADT	Average Daily Traffic
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	A-Weighted Decibel
Department	California Department of Transportation
DNL	Day-Night Level
FHWA	Federal Highway Administration
HOT	High-occupancy toll lane, Express lane
HOV	High-occupancy vehicle lane
Hz	Hertz
kHz	Kilohertz
L_{dn}	Day-Night Level
L_{eq}	Equivalent Sound Level
$L_{eq[h]}$	Equivalent Sound Level over one hour
L_{xx}	Percentile-Exceeded Sound Level
LT	Long-Term Reference Noise Measurement
L_{max}	Maximum Instantaneous Sound Level
L_{xx}	Percentile-Exceeded Sound Level
mPa	micro-Pascals
mph	miles per hour
NAC	Noise Abatement Criteria
NEPA	National Environmental Policy Act
NSR	Noise Study Report
Protocol	Caltrans Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects
RCNM	FHWA Roadway Construction Noise Model v.1.0
SLM	Sound Level Meter
SOV	Single-occupancy vehicle
SPL	sound pressure level
SR	State Route
ST	Short-Term Noise Measurement
TeNS	Caltrans' Technical Noise Supplement
TNAP	Caltrans' Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects
TNM	FHWA Traffic Noise Model Version 2.5
US 101	United States Highway 101
VTA	Santa Clara Valley Transportation Authority

Chapter 1. Introduction

1.1. Purpose of the Noise Study Report

This NSR evaluates noise impacts and noise abatement under the requirements of 23CFR772, “Procedures for Abatement of Highway Traffic Noise.” 23CFR772 provides procedures for preparing noise studies and evaluating noise abatement for federal and federal-aid highway projects. According to 23CFR772.3, all highway projects that are developed in conformance with this regulation are deemed to be in conformance with FHWA noise standards.

The Protocol provides Caltrans policy for implementing 23CFR772 in California and outlines the requirements for preparing NSRs. Noise impacts associated with this project under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) are not evaluated in the NSR. The determination of CEQA significance and NEPA noise impacts are determined by the Project Development Team and will be disclosed in the project’s environmental document.

The purpose of this NSR is to document the assessment of existing and future traffic noise levels at noise sensitive receptors in the vicinity of the proposed Project and the identification of whether or not preliminary noise abatement measures are necessary for the project to comply with state and federal noise abatement/mitigation requirements. The primary objective of this study is to identify noise sensitive receptors where noise levels would approach or exceed the noise abatement criteria with the project or receptors that would experience a substantial increase in noise levels as a result of the project.

Chapter 2. Project Description

2.1. Project Description

The project would include the entire length of SR 85, along with 5.5 miles on US 101 in southern San Jose. Express lane advance notification signage would also be added in a 4.1-mile segment of US 101 in Mountain View, for a total project length of 33.7 miles. The purpose of the project is utilize excess capacity in the SR 85 HOV lanes, manage traffic congestion in the most congested HOV segments of the freeway between SR 87 and I-280, and maintain consistency with provisions defined in Assembly Bill 2032 (2004) and Assembly Bill 574 (2007) to implement express lanes in the SR 85 corridor.

The project would convert the existing single HOV lanes in each direction into express lane facilities that would have one lane between US 101 in southern San Jose and SR 87, two lanes between SR 87 and I-280, and one lane between I-280 and US 101 in Mountain View. Conversion of the HOV lanes to express lanes would allow use by SOVs with active FasTrak accounts and transponders. The project would include multiple intermediate access points between the express lanes and the adjacent mixed-flow lanes. The access points would consist of entrance and exit openings in a striped 2-foot-wide buffer zone where traffic can enter and exit the express lane facility.

Chapter 3. Fundamentals of Traffic Noise

The following is a brief discussion of fundamental traffic noise concepts. For a detailed discussion, please refer to Caltrans' Technical Noise Supplement (TeNS), a technical supplement to the Protocol, which is available on the Caltrans Web site (http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf). A glossary of technical terms is also provided in Appendix A.

3.1. Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receptor, and the transfer path between the two. Loudness of the noise source and obstructions or environmental factors affect the path of transfer from the source, and therefore, contribute to the measured sound levels, as well as other characteristics perceived by the receptor. The field of acoustics deals primarily with the propagation and control of sound.

3.2. Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound, for example, is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

3.3. Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Due to the large range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level

(SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 mPa.

3.4. Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted using ordinary arithmetic means. For the decibel scale, doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same level, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For instance, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than a single source of the same type.

3.5. A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear and may vary with user.

Human hearing is limited in the range of audible frequencies, as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range between 1,000 and 8,000 Hz, indicating sound perception within the range to be more critical than noise of equal amplitude occurring at frequencies below 1,000 Hz and/or above 8,000 Hz. Based on human sensitivity to such frequencies, an "A-weighted" filter has been developed to approximate the response of the human ear. A-weighted sound levels are expressed in units of dBA.

The A-weighting network approximates the frequency response of the average ear when listening to common sound. Relative loudness, or annoyance, of a sound, as determined by listeners, correlates fairly well with A-weighted sound levels. Other weighted filters have been formulated to address higher noise levels or other specialized situations (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway-traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. Table 3-1 describes typical A-weighted noise levels for various noise sources.

Table 3-1. Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher next room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	— 20 —	
		Broadcast/recording studio
	— 10 —	
	— 0 —	

Source: Caltrans 2009.

3.6. Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in SPL. However, given a sound level change measured with precise instrumentation, the subjective human perception to doubling the loudness will usually be different than what was measured.

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern 1 dB changes in sound levels, when exposed to steady, single-frequency (i.e., “pure-tone”) signals in the mid-frequency range (i.e., 1,000 Hz–8,000 Hz). In typical noisy environments, noise changes from 1 to 2 dB are generally not noticeable; however, in typical noisy environments, there is a general acceptance that increases as minor as 3 dB are detectable by the human ear. Furthermore, increases of 5 dB are generally considered to be distinctly noticeable, while a 10 dB increase is perceived as twice as loud as the original. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3 dB increase in sound would generally be perceived as barely detectable.

3.7. Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, while others can be substantial; some noise levels follow regular patterns or trends, and others are random; some noise levels fluctuate rapidly, and others are slower; some noise levels vary widely, while others are relatively constant. Various noise metrics have been developed to describe time-varying noise levels. The following are those most commonly used in traffic noise analysis:

- **Equivalent Sound Level (L_{eq}) –** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The one-hour A-weighted equivalent sound level ($L_{eq[h]}$) is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise abatement criteria (NAC) used by both Caltrans and FHWA. The noise levels in this report are based on the $L_{eq[h]}$ descriptor.

- **Percentile-Exceeded Sound Level (L_{xx}) –** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).

- **Maximum Sound Level (L_{max}) –** L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-Night Level (L_{dn}) –** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 p.m. and 7 a.m.

- **Community Noise Equivalent Level (CNEL) –** Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10 p.m. and 7 a.m., and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7 p.m. and 10 p.m.

3.8. Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the factors described in this section of the report.

3.8.1. Geometric Spreading

Sound from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) 6 dB when the distance from the source to the receptor doubles. Highways consist of several localized noise sources on a defined path, and hence, can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. In contrast to point sources, sound levels attenuate 3 dB as the distance from a line source to the receptor doubles.

3.8.2. Ground Absorption

The acoustical transfer path of noise from a highway to a receptor is usually very close, in proximity to the ground. Noise attenuation from ground absorption and reflective-wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficient for distances less than 200-feet. Difficulties can arise at sites with reflective surfaces between the source and the receptor (i.e., parking lots, bodies of water, etc.), and at such sites, no excess ground attenuation is assumed. For acoustically absorptive or soft sites, which have an absorptive ground surface between the source and the receptor (i.e., soft dirt, grass, scattered bushes/trees, etc.), an excess ground-attenuation value of 1.5 dB is assumed for each doubled distance from the source. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 decibels per doubling of distance.

3.8.3. Atmospheric Effects

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500-feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects on perceived noise.

3.8.4. Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels measured at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least a 5 dB reduction in noise. Taller barriers provide increased noise reduction. Vegetation between the highway and receptor is rarely effective in reducing noise because it does not create a solid barrier.

Chapter 4. Federal Regulations and State Policies

This report focuses on the requirements of 23CFR772, as discussed below.

4.1. Federal Regulations

23CFR772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23CFR772.7, projects are categorized as Type I, Type II or Type III projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, the physical alteration of an existing highway where there is either a substantial horizontal or substantial vertical alteration, or other activities discussed in the definition of a Type I project, below. A Type II project involves construction of noise abatement on an existing highway with no changes to highway capacity or alignment. Type III projects do not require a noise analysis.

23CFR772 defines a Type I project as a project that involves:

1. The construction of a highway on a new location or

2. The physical alteration of an existing highway where there is either:

    A. Substantial horizontal alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition, or

    B. Substantial vertical alteration. A project that removes shielding thereby exposing the line-of-sight between the receptor and the traffic noise source. This is done by altering either the vertical alignment of the highway or the topography between the highway traffic noise source and the receptor; or

3. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a high-occupancy vehicle (HOV) lane, high-occupancy toll (HOT) lane, bus lane, or truck climbing lane; or

4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or

5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or

6. Restriping existing pavement for the purpose of adding a through traffic lane or an auxiliary lane; or

7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

Under 23CFR772.13, noise abatement must be considered for Type I projects if the project is predicted to result in a traffic noise impact. In such cases, 23CFR772 requires that the project sponsor “consider” noise abatement before adoption of the final NEPA document. This process involves identification of noise abatement measures that are feasible, reasonable, and likely to be incorporated into the project, and noise impacts for which no noise abatement measures are feasible and reasonable.

Traffic noise impacts, as defined in 23CFR772.5, occur when the predicted noise level in the design year approaches or exceeds the NAC specified in 23CFR772, or a predicted noise level substantially exceeds the existing noise level (a “substantial” noise increase). 23CFR772 does not specifically define the terms “substantial increase” or “approach”; these criteria are defined in the Protocol, as described below.

Table 4-1 summarizes NAC corresponding to various land use activity categories. Activity categories and related traffic noise impacts are determined based on the actual land use in a given area.

In identifying noise impacts, primary consideration is given to exterior areas of frequent human use. In situations where there are no exterior activities, or where the exterior activities are far from the roadway or physically shielded in a manner that prevents an impact on exterior activities, the interior criterion (Activity Category D) is used as the basis for determining a noise impact. Indoor analysis is conducted at Category D land uses only after all outdoor analysis options have been exhausted and after a determination has been made that exterior abatement measures will not be feasible and reasonable.

Table 4-1. Activity Categories and Noise Abatement Criteria (23CFR772)

Activity Category	Activity $L_{eq[h]}$[1]	Evaluation Location	Description of Activities
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	Exterior	Residential.
C[2]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties, or activities not included in A-D or F.
F			Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G			Undeveloped lands that are not permitted.

Source: Caltrans, 2011.
[1] The $L_{eq[h]}$ activity criteria values are for impact determination only and are not design standards for noise abatement measures. All values are A-weighted decibels (dBA).
[2] Includes undeveloped lands permitted for this activity category.

4.2. State Regulations and Policies

4.2.1. Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retofit Barrier Projects

The Protocol specifies the policies, procedures, and practices to be used by agencies that sponsor new construction or reconstruction of federal or federal-aid highway projects. The NAC specified in the Protocol are the same as those specified in 23CFR772. The Protocol defines a noise increase as substantial when the predicted worst-hour design year noise levels exceed existing worst-hour noise levels by 12 dBA. The Protocol also states that a sound level is considered to approach an NAC level when the sound level is within 1 dBA of the NAC identified in 23CFR772 (e.g., 66 dBA is considered to approach the NAC of 67 dBA, but 65 dBA is not).

The TeNS and the Protocol provide detailed technical guidance for the evaluation of highway traffic noise. That technical guidance was followed for this study, including field measurement methods, noise modeling methods, and report preparation guidance.

4.2.2. Section 216 of the California Streets and Highways Code

Section 216 of the California Streets and Highways Code relates to the noise effects of a proposed freeway project on public and private elementary and secondary schools.

Under this code, a noise impact occurs if, as a result of a proposed freeway project, noise levels exceed 52 dBA $L_{eq[h]}$ in the interior of public or private elementary or secondary classrooms, libraries, multipurpose rooms, or spaces. This requirement does not replace the “approach or exceed” NAC criterion for FHWA Activity Category D for classroom interiors, but it is a requirement that must be addressed in addition to the requirements of 23CFR772.

If a project results in a noise impact under this code, noise abatement must be provided to reduce classroom noise to a level that is at or below 52 dBA $L_{eq[h]}$. If the noise levels generated from freeway and nonfreeway sources exceed 52 dBA $L_{eq[h]}$ prior to the construction of the proposed freeway project, then noise abatement must be provided to reduce the noise to the level that existed prior to construction of the project.

Public and private elementary or secondary schools identified within the project limits where noise levels at classrooms, libraries, multipurpose rooms, or spaces may approach or exceed the NAC include:

- Emerson School – 2800 West Bayshore Road, Palo Alto
- The Girls’ Middle School – 3400 West Bayshore Road, Palo Alto
- Alta Vista High School – 1325 Bryant Avenue, Mountain View
- Cupertino Middle School – 1650 South Bernardo Avenue, Sunnyvale

The remaining public and private elementary or secondary schools along the project corridor are located at sufficient distance from SR 85 and are shielded by existing noise barriers such that exterior noise levels do not exceed the NAC, and therefore, would not have interior noise levels that exceed 52 dBA $L_{eq[h]}$.

Chapter 5. Study Methods and Procedures

5.1. Methods for Identifying Land Uses and Selecting Noise Measurement and Modeling Receptor Locations

Receptor locations are described by different NAC activity categories (see Table 4-1). Noise receptor locations exposed to potential traffic noise impacts were identified along the project corridor through a review of project mapping, aerial photos, and field reconnaissance. Noise-sensitive Category B, Category C, and Category D land uses border the project corridor. As stated in the Protocol, noise abatement is only considered for Category B and Category C areas of frequent human use that would benefit from a lowered noise level. Accordingly, this impact analysis focuses on locations with defined outdoor activity areas, such as residential outdoor use areas, parks and recreation areas, trails, etc. In situations where no exterior activity areas exist or are far from or shielded from the roadway, the interior NAC limit applies.

5.2. Field Measurement Procedures

Noise measurements were made with Larson Davis Model 700 or Model 820 Integrating Sound Level Meters (SLMs) set at "slow" response. The sound level meters were equipped with G.R.A.S. Type 40AQ or Bruel & Kjaer Type 4176 ½-inch random incidence microphones fitted with windscreens. The sound level meters were calibrated prior to the noise measurements using a Larson Davis Model CAL200 or Model CA250 acoustical calibrator. The response of the system was checked after each measurement session and was always found to be within 0.2 dBA. No calibration adjustments were made to the measured sound levels. At the completion of each monitoring event, the measured interval noise level data were obtained from the SLM using the Larson Davis SLM utility software program.

5.2.1. Long-Term Reference Measurements

Long-term (LT) reference noise measurements were made at 11 locations along the US 101 and SR 85 corridors to quantify the daily trend in noise levels and to establish the peak traffic noise hour. The noise measurements were made in October and November 2011, and in March 2012, typically over periods ranging from one to three days. Long-term noise measurement locations were selected to generally represent human activity areas such as trails, parks, and residential rear yard areas adjoining US 101 and SR 85, or in areas considered to be acoustically equivalent to noise-sensitive exterior use areas. Care was taken to select sites that were primarily affected by highway traffic noise and to avoid those sites where extraneous noise sources such as barking dogs, pool pumps, or air conditioning units could contaminate the noise data. After the data was downloaded from the sound level meter, the data was reviewed to identify any time periods possibly contaminated by local noise sources. Data points were excluded from the dataset where significant contamination was noted. The trends in ambient noise levels measured at locations LT-1 through LT-11 are summarized graphically in Appendix E.

5.2.2. Short-Term Measurements

One hundred forty-one (141) short-term (ST) noise measurements were made along the US 101 and SR 85 corridors in concurrent time intervals with the data collected at the long-term reference measurement sites. This method facilitates a direct comparison between both the short-term and long-term noise measurements and allows for the identification of the worst-hour noise levels at Category B and C land uses in the project vicinity where long-term noise measurements were not made. On US 101, five short-term noise measurements were made along the corridor in Palo Alto and Mountain View, and eight short-term noise measurements were made along the corridor in San Jose. Two consecutive 10-minute measurements were made at each noise measurement site. At all locations, noise levels were measured 5 feet above the ground surface and at least 10 feet from structures or barriers. Noise measurement locations were used as noise modeling receptors for the prediction of existing and future worst-hour traffic noise levels. Photographs of the measurement sites are provided in Appendix B.

Traffic counts and speed observation were also made during the short-term noise measurements for model calibration purposes. Traffic volumes were classified into five vehicle types: (1) light-duty autos and trucks, (2) medium-duty trucks (typically trucks with two axles and more than four wheels), (3) heavy-duty trucks (typically trucks with more than two axles), (4) buses, and (5) motorcycles.

5.2.3. Meteorology

Meteorological conditions were observed during the long-term and short-term noise measurements and generally consisted of clear to partly cloudy skies, calm to moderate winds, and seasonable temperatures. Noise monitoring did not occur if weather conditions consisted of rain or high winds (i.e., greater than 11 mph).

5.3. Traffic Noise Level Prediction Methods

Traffic noise levels were predicted using the Federal Highway Administration's Traffic Noise Model (TNM). Due to the reliability constraints of TNM to accurately calculate noise levels at great distances from the roadway, Caltrans limits noise assessments to approximately 500 feet of the roadway source.

TNM calculates traffic noise levels based on the geometry of the site, which includes the positioning of travel lanes, receptors, barriers, terrain, ground type, buildings, etc. The noise source is the traffic flow, as defined by the user, in terms of hourly volumes of automobiles (autos), medium-duty trucks (medium), heavy-duty trucks (heavy), buses, and motorcycles. *CDM Smith* provided AM and PM peak hour traffic volume data for existing conditions and year 2035. Travel speeds were input into the model based on observations made during the noise monitoring surveys.

URS provided the geometric plans used to create the traffic noise model. The roadway, receptors, terrain lines, ground zones, and noise barriers were digitized and input into the traffic noise model.

TNM cannot accurately account for pavement types and conditions, atypical vehicle noise populations, transparent shielding (such as wood fences with shrinkage gaps), reflections from nearby buildings and structures, or meteorological conditions. For these reasons, noise measurements are conducted and traffic noise model adjustments and calibration factors are developed. For each measured condition, the corresponding observed traffic conditions are used in the model to calculate the noise level. The calculated and measured noise levels are compared to assess differences and validate the traffic noise model.

Traffic counts were adjusted to reflect one-hour conditions, assuming that the traffic volumes during the noise measurement interval (10 minutes) were equal during the six 10-minute intervals of an hour. These adjusted one-hour volumes were input into the model for calibration.

The calibration factors or model adjustments developed from this process were used to modify the model to more closely represent measured conditions. Modeled results that vary from measurements by more than 2 dB are adjusted after a careful review of all measurement and modeled data. The adjustment was calculated as follows:

- Where modeled levels are more than 2 dB lower than measured levels, the modeled results are adjusted to measured conditions: Adjustment = Measured – Modeled

- Where the modeled result is 0 to +2 dB lower than the measured level, no adjustment is made: Adjustment = 0

- Where the modeled result is 0 to +2 dB higher than the measured level, no adjustment is made: Adjustment = 0

- Where the modeled result is more than +2 dB higher than the measured level, an adjustment is made to bring the modeled result to within 2 dB of measured conditions: Adjustment = (Measured + 2) – Modeled.

5.4. Methods for Identifying Traffic Noise Impacts and Consideration of Abatement

The Noise Abatement Criterion, established by FHWA, for various land uses (known as activity categories) is shown in Table 4-1. The presented noise criteria are assigned to both exterior and interior activities. Caltrans has further defined the definition of approaching the NAC to be 1 dBA below the NAC (e.g., 66 dBA is considered approaching the NAC for Category B activity areas). Caltrans defines a substantial noise increase to occur when predicted worst-hour noise levels exceed existing worst-hour noise levels by 12 dBA $L_{eq[h]}$.

Noise abatement is only considered where frequent human usage occurs and where a lowered noise level would be of benefit. Areas of frequent human usage are considered to occur at exterior locations where people are exposed to traffic noise for an extended period of time on a regular basis. Therefore, impacts are typically assessed at locations with defined outdoor activity areas, such as residential backyards, common exterior use areas, pools, patios, and parks (e.g., playfields, playgrounds, or picnic tables). Other examples are outdoor seating areas at restaurants or outdoor use areas at hotels.

Caltrans policies and procedures for traffic noise analysis are contained in the Protocol and TeNS. The feasibility of noise abatement is an engineering consideration. Noise abatement must be predicted to reduce noise by at least 5 dB at an impacted receptor to be considered feasible. Once all feasible noise abatement is identified, a procedure is conducted to assess the reasonableness of noise abatement. NSRs calculate the reasonable cost allowance for feasible noise barriers, but do not determine whether a feasible barrier would be reasonable.

The determination of the reasonableness of noise abatement is more subjective than the determination of its feasibility. As defined in Section 772.5 of the regulation, reasonableness is the combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.

The overall reasonableness of noise abatement is determined by the following three factors.

- The noise reduction design goal (a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors).
- The cost of noise abatement (2011 allowance of $55,000 per benefited receptor).
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

The Project Development Team will make the proposed noise abatement decisions that will be incorporated into the final environmental documentation. Any proposed changes to the noise abatement decision subsequent to adoption of the final environmental document must be reviewed with the Caltrans noise specialists to ensure adequate acoustic performance.

Chapter 6. Existing Noise Environment

6.1. Existing Land Uses

A field investigation was conducted to identify land uses that could be subject to traffic and construction noise impacts from the proposed project. Single- and multi-family residences (Category B land uses), active recreational areas (Category C land uses), schools (Activity Category D land uses), churches (Activity Category D land uses), and hospitals (Activity Category D land uses) are located along the project corridor. Churches, schools and hospitals with active outdoor use areas were evaluated under Activity Category C. However, churches, schools and hospitals without active outdoor use areas were evaluated under Activity Category D. This is described in further detail in Chapter 7. No other noise-sensitive land uses types were identified.

6.2. Existing Noise Levels at Receptors

The existing noise environment throughout the project corridor varies by location, depending on site characteristics such as proximity to State Routes 17, 82, 85, 87, 237, US 101 and I-280, and other noise sources, the relative elevation of roadways and receptors, and any intervening structures or barriers. The project area was divided into 15 study segments: Segment A along US 101 in Palo Alto and Mountain View, Segments 1 through 13 along SR 85 from Mountain View to San Jose, and Segment B along US 101 in San Jose. These segments were necessary to easily categorize study areas and receptors within each study area as well as to keep the traffic noise modeling computer files to manageable sizes. The results of the long- and short-term field measurements are summarized in Table 6-1 and Table 6-2. The estimated existing worst-hour noise levels at short-term receptor locations are based on TNM modeling using existing traffic volumes provided in the project traffic report.

Table 6-1. Summary of Long-Term Noise Measurements

Receptor ID	Segment Number	Location	Date	Time	Worst Hour $L_{eq[h]}$, dBA
LT-1	1	Central Avenue trail entrance to Stevens Creek Trail, Mountain View.	10/18/2011	4:00 p.m.	63
			10/19/2011	4:00 p.m.	63
			10/20/2011	8:00 a.m.	63
LT-2	2	Rear yard of 579 McCarty Avenue, Mountain View.	10/18/2011	5:00 p.m.	54
			10/19/2011	12:00 p.m.	53
LT-3	3	Rear yard of 1105 Remington Court, Sunnyvale.	10/19/2011	5:00 p.m.	62
			10/20/2011	10:00 a.m.	63
LT-4	5	Rear yard of 10480 Stokes Avenue, Cupertino.	10/24/2011	2:00 p.m.	63
			10/25/2011	5:00 p.m.	63
			10/26/2011	7:00 a.m.	65
			10/27/2011	7:00 a.m.	64
LT-5	6	Congress Springs Park, Saratoga.	10/24/2011	6:00 p.m.	64
			10/25/2011	5:00 p.m.	64
			10/26/2011	8:00 a.m.	65
			10/27/2011	6:00 a.m.	66
LT-6	9	Rear yard of 1860 Little Branham Lane, San Jose.	10/31/2011	5:00 p.m.	53
			11/1/2011	6:00 a.m.	57[1]
			11/2/2011	6:00 a.m.	55
LT-7	10	Rear yard of 5071 Las Cruces Court, San Jose.	10/31/2011	4:00 p.m.	66
			11/1/2011	4:00 p.m.	65[2]
			11/2/2011	9:00 a.m.	66
			11/3/2011	2:00 p.m.	66
LT-8	11	Rear yard at 5464 Chesbro Avenue, San Jose.	11/2/2011	7:00 p.m.	57
			11/3/2011	3:00 p.m.	61
			11/4/2011	8:00 a.m.	57
LT-9	12	Rear yard at 218 Herlong Avenue, San Jose.	11/7/2011	5:00 p.m.	60[3]
			11/8/2011	7:00 a.m.	61
LT-10	13	Monterey Grove Apartment Complex, San Jose.	11/7/2011	4:00 p.m.	66
			11/8/2011	7:00 a.m.	65
LT-11	B	Rear yard of 251 Crestridge Court.	3/7/2012	7:00 a.m.	64

Notes:
[1] L_{eq} data from the 9:00 a.m. hour on November 1, 2011 were contaminated by non-traffic noise.
[2] Estimated based on available data.
[3] L_{eq} data from the 4:00 p.m. hour on November 7, 2011 were contaminated by non-traffic noise.

Table 6-2. Summary of Short-Term Measurements and Existing Noise Levels

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-1	1	Front yard of 751 San Carlos Avenue.	B(67)	10/19/11	10:30 a.m.	51	54
ST-2	1	Rear Yard of 861 San Luppe Drive.	B(67)	10/19/11	10:20 a.m.	54	57
					10:30 a.m.	53	
ST-3	1	500 W. Middlefield Road - Willow Creek Apartments.	B(67)	10/19/11	1:50 p.m.	65	59
					2:00 p.m.	65	
ST-4	1	Equivalent to pool/common area of 500 W. Middlefield Road.	B(67)	10/19/11	11:00 a.m.	50	55
					11:10 a.m.	52	
ST-5	1	Alamo Court Park	C(67)	10/19/11	12:40 p.m.	61	63
ST-6	1	West end of Creekside Park. Representative of park and adjacent residential apartments.	B(67)/ C(67)	10/19/11	12:30 p.m.	60	61
					12:40 p.m.	61	
ST-7	1	179 B Central Avenue condos.	B(67)	10/19/11	11:40 a.m.	57	59
					11:50 a.m.	56	
ST-8	1	117 Easy Street – Church of Scientology.	C(67)	10/19/11	1:00 p.m.	61	64
					1:10 p.m.	60	
ST-9	2	120 Pioneer Way – Jehovah's Witness Church. No sensitive outdoor uses.	D(52)	10/19/11	1:50 p.m.	69	**--**
					2:00 p.m.	70	
ST-10	2	Avalon Apartments.	B(67)	10/19/11	12:00 p.m.	56	61
ST-11	2	Equivalent to apartments adjoining SR 85 along Alice Avenue.	B(67)	10/19/11	11:00 a.m.	55	**68**
					11:10 a.m.	56	
ST-12	3	150 Kings Row in Sahara Mobile Home Park.	B(67)	12/13/11	10:50 a.m.	62	64
					11:00 a.m.	62	
ST-12a	3	Stevens Creek Trail.	C(67)	12/13/11	12:00 p.m.	66	**71**
					12:10 p.m.	67	
ST-12b	3	271 Kings Row in Sahara Mobile Home Park.	B(67)	12/13/11	10:20 a.m.	57	59
					10:30 a.m.	57	

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-13	3	Pool area of Americana Apartments.	B(67)	10/20/11	10:40 a.m.	55	57
					10:50 a.m.	55	
ST-14	3	Park along Franklin Avenue.	C(67)	10/20/11	11:00 a.m.	59	62
ST-15	3	1240 Dale - Delmonico Apartments.	B(67)	10/20/11	11:30 a.m.	63	64
					11:40 a.m.	63	
ST-16	3	Rear yard of 1317 Brook Place.	B(67)	10/20/11	11:00 a.m.	62	63
					11:10 a.m.	62	
ST-17	3	Rear yard of 877 Heatherstone - Heatherstone Apartments.	B(67)	10/20/11	12:10 p.m.	61	63
					12:20 p.m.	62	
ST-18	3	End of Mockingbird Lane.	B(67)	10/20/11	12:40 p.m.	62	64
					12:50 p.m.	63	
ST-19	3	Alta Vista High School at setback of nearest classrooms to SR 85. Equivalent to Lubich Drive residential rear yards.	B(67)/C(67)/D(52)	10/20/11	11:40 a.m.	67	**69**
					11:50 a.m.	67	
ST-20	3	Rear yard of 1429 Brookmill Road.	B(67)	10/20/11	11:50 a.m.	62	**66**
					12:00 p.m.	63	
ST-21	3	Bernardo Avenue - Assisted living facility, adjacent to outdoor use area.	B(67)	10/20/11	12:50 p.m.	68	**71**
					1:00 p.m.	69	
ST-22	4	Front of 1090 Butte Court.	B(67)	10/20/11	1:40 p.m.	63	65
					1:50 p.m.	62	
ST-23	4	Rear yard of 1272 Brookings.	B(67)	10/20/11	1:00 p.m.	63	**66**
					1:10 p.m.	63	
ST-24	4	Equivalent to 1112/1113 The Dalles Ave.	B(67)	10/20/11	1:30 p.m.	66	**68**
					1:40 p.m.	66	
ST-25	4	Rear yard of 1624 Bellville Way.	B(67)	10/20/11	1:40 p.m.	67	**69**
					1:50 p.m.	67	
ST-26	4	Equivalent to rear yard of 1494 S. Bernardo Avenue.	B(67)	10/25/11	10:10 a.m.	61	62
					10:30 a.m.	61	
ST-27	4	10901 Maxine Avenue.	B(67)	10/25/11	10:10 a.m.	63	64
					10:20 a.m.	63	
ST-28	4	Rear yard of 1739 Banff Drive.	B(67)	10/25/11	10:40 a.m.	62	65
					10:50 a.m.	62	

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-29	4	Front yard of 10760 Maxine Avenue.	B(67)	10/25/11	10:10 a.m.	57	59
					10:20 a.m.	57	
ST-30	5	10700 Stokes Avenue - Somerset Park. Receptor outside of study area.	N/A	10/25/11	11:30 a.m.	60	--
					11:40 a.m.	59	
					11:50 a.m.	59	
ST-31	5	Small park next to Casa de Anza Apartments on Mary Avenue.	C(67)	10/25/11	11:50 a.m.	62	65
					12:00 p.m.	63	
ST-32	5	End of Fitzgerald Avenue.	B(67)	10/25/11	11:40 a.m.	59	63
					11:50 a.m.	60	
ST-33	5	Glenbrook Apartments.	B(67)	10/25/11	12:20 p.m.	52	57
ST-34	5	De Anza College, Campus Drive.	C(67)	10/25/11	1:00 p.m.	66	**69**
ST-35	5	Home of Christ Church on Bubb Street. No sensitive outdoor uses.	D(52)	10/25/11	12:50 p.m.	69	**74**
					1:00 p.m.	69	
ST-36	5	South end of Campus Drive - Child Development Center.	C(67)	10/25/11	1:50 p.m.	70	**74**
ST-36a[1]	5		C(67)	N/A	N/A	N/A	60
ST-37	5	Rear yard of 826 September Drive.	B(67)	10/25/11	12:50 p.m.	60	64
					1:00 p.m.	60	
ST-38	5	Equivalent to rear yard of 7855 Festival Drive.	B(67)	10/25/11	1:20 p.m.	64	**67**
					1:30 p.m.	64	
ST-39	5	Park across from 7704 Orogrande Place.	C(67)	10/25/11	1:30 p.m.	63	**68**
					1:40 p.m.	63	
ST-40	5	Rear yard of 7726 Tonki Court.	B(67)	10/26/11	10:10 a.m.	65	**67**
					10:20 a.m.	65	
ST-41	5	Rear yard of 1101 Kentwood Avenue.	B(67)	10/26/11	10:40 a.m.	62	63
					10:50 a.m.	61	
ST-42	5	Rear yard of 114 Scotland Drive.	B(67)	10/26/11	10:10 a.m.	65	**68**
					10:20 a.m.	65	
ST-43	6	7150 Rainbow Drive, Building 1.	B(67)	10/26/11	11:50 a.m.	64	**66**
					12:00 p.m.	64	

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-44	5	Gardenside Lane at Kingsbury Place. Equivalent to outdoor use areas of residences.	B(67)	10/26/11	10:00 a.m.	64	**66**
					10:10 a.m.	64	
ST-45	5	Water Lily Way - townhomes.	B(67)	10/26/11	10:50 a.m.	64	64
					11:00 a.m.	64	
ST-46	6	Rear yard of 20167 Pampas Court.	B(67)	10/26/11	12:30 p.m.	56	62
					12:40 p.m.	57	
ST-47	6	Equivalent to rear yard of 7168 Shanon Court.	B(67)	10/26/11	11:30 a.m.	59	64
					11:40 a.m.	59	
ST-48	6	1507 Eddington Place.	B(67)	10/26/11	11:50 a.m.	52	56
					12:00 p.m.	51	
ST-49	6	Prospect Corners Apartments.	B(67)	10/26/11	11:30 a.m.	58	60
					11:40 a.m.	58	
ST-50	6	Rear yard of 19782 Solana Drive.	B(67)	10/26/11	1:40 p.m.	63	64
					1:50 p.m.	62	
ST-51	6	Rear yard of 20159 Marilla Court.	B(67)	10/26/11	12:20 p.m.	59	61
					12:30 p.m.	58	
ST-52	6	South corner of Kevin Moran Park.	C(67)	10/26/11	12:30 p.m.	60	63
					12:40 p.m.	60	
ST-53	6	Rear yard of 19899 Seagull Way.	B(67)	10/26/11	12:30 p.m.	61	65
ST-54	6	13149 Anza Court.	B(67)	10/26/11	1:40 p.m.	56	61
ST-55	6	Rear yard of 19729 Yuba Court.	B(67)	10/26/11	1:10 p.m.	63	**67**
					1:20 p.m.	63	
ST-56	6	Front yard of 19201 Vineyard Lane – Vineyards of Saratoga condos.	B(67)	10/27/11	10:20 a.m.	57	62
					10:30 a.m.	58	
ST-57	7	19110 Bonnet Way. Represents both rear yards and front yards.	B(67)	10/27/11	10:10 a.m.	56	55
					10:20 a.m.	55	
ST-58	7	Park across from 18906 Bellgrove Circle.	C(67)	10/27/11	11:10 a.m.	59	62
					11:20 a.m.	60	

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-59	7	Alvarado Place.	B(67)	10/27/11	10:10 a.m.	55	58
					10:20 a.m.	55	
ST-60	7	14035 Abdulla Way.	B(67)	10/27/11	11:40 a.m.	57	59
					11:50 a.m.	56	
ST-61	7	Rear yard of 18581 Lyons Court.	B(67)	10/27/11	10:50 a.m.	51	51
					11:00 a.m.	50	
ST-62	7	5104 Westmont Avenue – Hacienda Quito Apartments.	B(67)	10/27/11	12:40 p.m.	56	58
ST-63	7	Rear yard of 18669 Casa Blanca Lane.	B(67)	10/27/11	10:50 a.m.	57	59
					11:00 a.m.	57	
ST-64	7	Rear yard of 1380 Elwood Drive.	B(67)	10/27/11	11:50 a.m.	58	59
					12:00 p.m.	59	
ST-65	7	5036 Pinetree Terrace – Roundtree Apartments.	B(67)	10/27/11	1:00 p.m.	57	59
					1:10 p.m.	57	
ST-66	7	Los Gatos Estates on Pollard Road.	B(67)	10/27/11	11:40 a.m.	58	60
					11:50 a.m.	58	
ST-67	7	Palmer Drive apartments, swimming pool.	B(67)	10/27/11	12:40 p.m.	55	56
ST-68	7	Equivalent to residential yards at end of Mulberry Avenue.	B(67)	10/27/11	12:30 p.m.	56	58
ST-69	7	Equivalent to rear yard of 748 Pollard Road.	B(67)	10/27/11	1:10 p.m.	58	58
					1:20 p.m.	59	
ST-70	7	Elmwood Court apartments.	B(67)	10/27/11	1:10 p.m.	58	60
					1:20 p.m.	58	
ST-71	7	End of Del Loma Drive.	B(67)	10/27/11	1:30 p.m.	60	60
					1:40 p.m.	61	
ST-72	8	Aventino Apartments, pool/playground.	B(67)	11/1/11	10:35 a.m.	52	57
					10:45 a.m.	53	
ST-73	8	Bonnie View mobile home park, #58.	B(67)	11/1/11	10:10 a.m.	58	56
					10:20 a.m.	51	
ST-74	8	Los Gatos Swim and Racquet Club, tennis courts.	C(67)	12/20/11	1:40 p.m.	64	65
					1:50 p.m.	63	
ST-75	8	Front yard of 106 Pso Laura Court.	B(67)	11/1/11	11:00 a.m.	54	54

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-76	8	Across from 16260 Burton Road.	B(67)	11/1/11	11:40 a.m.	58	57
					11:50 a.m.	57	
ST-77	8	16160 East Mozart Avenue.	B(67)	11/1/11	11:40 a.m.	55	56
					11:50 a.m.	54	
ST-78	8	Ashbrook Circle.	B(67)	11/1/11	11:50 a.m.	61	61
ST-79	8	Rear side of Good Samaritan Hospital.	D(52)	11/1/11	12:10 p.m.	68	--
					12:20 p.m.	72	
ST-80	8	Equivalent to 2313 Clydelle Avenue.	B(67)	11/1/11	12:40 p.m.	63	62
					12:50 p.m.	63	
ST-81	8	Equivalent to rear yard of 4643 Marbella Drive.	B(67)	11/1/11	12:20 p.m.	57	59
					12:30 p.m.	57	
ST-82	8	Carolyn Norris Park.	C(67)	11/1/11	1:10 p.m.	60	59
					1:20 p.m.	59	
ST-83	9	Front yard of 4840 Anna Drive.	B(67)	11/1/11	1:40 p.m.	64	65
					1:50 p.m.	64	
ST-84	9	Standish Drive.	B(67)	11/1/11	12:31 p.m.	57	57
ST-85	9	Equivalent to rear yard of 4794 Sally Drive.	B(67)	11/1/11	1:10 p.m.	58	61
					1:20 p.m.	58	
ST-86	9	Rosswood Drive.	B(67)	11/1/11	1:50 p.m.	62	64
					2:00 p.m.	61	
ST-87	10	Lawson Court, rear patio.	B(67)	11/1/11	1:20 p.m.	62	64
ST-88	10	Rear yard of 1599 Rebel Way	B(67)	11/2/11	10:30 a.m.	63	64
					10:40 a.m.	64	
ST-89	10	5055 Dent Avenue.	B(67)	11/2/11	10:10 a.m.	58	59
					10:20 a.m.	59	
ST-90	10	Appleseed School field.	C(67)	11/2/11	11:20 a.m.	57	58
					11:30 a.m.	57	
ST-91	10	Rear yard of 5141 Yucatan Way.	B(67)	11/2/11	10:25 a.m.	63	65
ST-92	10	Rear yard of 1373 Dentwood Drive.	B(67)	11/2/11	12:10 p.m.	58	62
					12:20 p.m.	58	
ST-93	10	Rear yard of 5098 Tifton Way.	B(67)	11/2/11	11:00 a.m.	50	54
					11:10 a.m.	50	

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-94	10	5304 Ayrshire, equivalent to Almaden Elementary School playground.	B(67)/C(67)	11/2/11	1:14 p.m.	55	58
ST-95	10	Russo Park.	C(67)	11/2/11	10:55 a.m.	64	**68**
ST-96	11	Sanchez Drive.	B(67)	11/2/11	12:15 p.m.	59	62
ST-97	11	5403-5435 Sanchez Drive – apartments.	B(67)	11/2/11	12:10 p.m.	61	65
					12:20 p.m.	62	
ST-98	11	Rear yard of 5283 Fell Avenue.	B(67)	11/2/11	11:35 a.m.	63	65
ST-99	10	Rear yard of 1265 Dentwood Drive.	B(67)	11/2/11	1:10 p.m.	63	62
					1:20 p.m.	61	
ST-100	11	5220 Terner Way, setback of Ohlone Court apartments.	B(67)	11/2/11	11:30 a.m.	56	58
ST-101	11	Rear yard of 5371 Glenbury Way	B(67)	11/3/11	10:40 a.m.	62	60
					10:50 a.m.	61	
ST-102	11	Gunderson High School, large baseball field.	C(67)	11/3/11	10:50 a.m.	60	64
					11:00 a.m.	60	
ST-102a[1]	11	Gunderson High School, small baseball field.	C(67)	N/A	N/A	N/A	59
ST-102b[1]	11	Gunderson High School, open field closest SR 85.	C(67)	N/A	N/A	N/A	**71**
ST-102c[1]	11	Gunderson High School, tennis courts.	C(67)	N/A	N/A	N/A	64
ST-103	11	In cul-de-sac near 772 Glenbury Way.	B(67)	11/3/11	10:38 a.m.	54	57
ST-104	11	End of Rutherglen Place, rear yard pool.	B(67)	11/3/11	11:30 a.m.	57	61
					11:40 a.m.	58	
ST-105	11	Rear yard of 685 Glenbury Way, patio.	B(67)	11/3/11	11:08 a.m.	62	64
ST-106	11	Rear yard on Gaundebert Lane.	B(67)	11/3/11	12:00 p.m.	60	62
					12:10 p.m.	59	
ST-107	11	Rear yard of 579 Glenbury Way	B(67)	11/3/11	11:00 a.m.	66	**66**
					11:10 a.m.	65	
ST-108	11	Rear yard of 5452 Chesbro Avenue.	B(67)	11/3/11	11:40 a.m.	61	61
					11:50 a.m.	60	

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-109	11	Rear yard of 5536 Chesbro Avenue.	B(67)	11/3/11	11:50 a.m.	61	64
ST-110	11	Front yard of 495 Velasco Drive.	B(67)	11/3/11	12:50 p.m.	57	60
					1:00 p.m.	57	
ST-111	11	425 Don Fernando Way - Kinderwood Children's Center.	C(67)	11/3/11	12:30 p.m.	52	55
ST-112	12	Rear yard of 5614 New Court.	B(67)	11/3/11	12:20 p.m.	56	56
					12:30 p.m.	51	
ST-113	12	Rear yard of 5684 Crow Lane.	B(67)	11/3/11	1:30 p.m.	61	64
					1:40 p.m.	61	
ST-114	12	Front yard of 5787 Ribchester Court.	B(67)	11/3/11	1:40 p.m.	53	57
					1:50 p.m.	53	
ST-115	12	Rear yard of 5733 Hillbright Circle, patio.	B(67)	11/3/11	1:35 p.m.	62	62
					1:40 p.m.	61	
ST-116	12	Rear yard of 5834 Bridle Way.	B(67)	11/8/11	10:24 a.m.	59	63
					10:30 a.m.	58	
ST-117	12	Rear yard of 5871 Herma Street.	B(67)	11/8/11	10:30 a.m.	62	64
					10:40 a.m.	62	
ST-118	12	Rear yard of 5874 Bufkin Court.	B(67)	11/8/11	10:23 a.m.	56	62
ST-119	12	Rear yard of 294 Herlong Avenue.	B(67)	11/8/11	10:30 a.m.	58	63
					10:40 a.m.	60	
ST-120	12	Rear yard of 5858 Treetop Court.	B(67)	11/8/11	11:12 a.m.	58	63
					11:20 a.m.	57	
ST-121	12	End of Pala Mesa Drive.	B(67)	11/8/11	11:04 a.m.	59	62
					11:10 a.m.	58	
					11:20 a.m.	58	
ST-122	12	Palm Valley townhomes, common use area/pool.	B(67)	11/8/11	11:10 a.m.	56	61
ST-123	13	Kaiser Permanente, picnic area.	C(67)	11/8/11	11:52 a.m.	56	59
ST-124	13	Kaiser Permanente, picnic area.	C(67)	11/8/11	12:10 p.m.	59	63
ST-125	13	End of Holly Gillingham Lane.	B(67)	11/8/11	12:01 p.m.	60	62
					12:10 p.m.	58	
ST-126	13	Front of 5983 Breeze Court.	B(67)	11/8/11	12:00 p.m.	52	54

Receptor ID	Segment Number	Location	Noise Abatement Criteria	Date	Time	10-minute L_{eq}, dBA	Worst-Hour Existing Traffic Noise Level
ST-127	13	Monterey Grove Apartments.	B(67)	11/8/11	12:30 p.m.	57	59
ST-128	13	Setback of mobile homes nearest US 101 in Monterey Circle.	B(67)	11/8/11	12:30 p.m. 12:40 p.m.	57 57	64
ST-129	B	Swimming pool at 449 Danna Court	B(67)	3/7/12	10:50 a.m. 11:00 a.m.	54 54	56
ST-130	B	Rear yard of 404 Birkhaven Place	B(67)	3/7/12	10:10 a.m. 10:20 a.m.	59 59	61
ST-131	B	Rear yard of 7032 Basking Ridge Avenue	B(67)	3/7/12	10:20 a.m. 10:30 a.m.	60 60	64
ST-132	B	Rear yard of 7406 Basking Ridge Avenue	B(67)	3/7/12	10:10 a.m. 10:20 a.m.	55 55	60
ST-133	B	Coyote Creek Trail near Metcalf Park	C(67)	3/7/12	11:20 a.m. 11:30 a.m.	57 57	62
ST-134	B	Parkway Fishing Lakes	C(67)	3/7/12	11:20 a.m.	60	62
ST-135	B	Parkway Fishing Lakes	C(67)	3/7/12	11:30 a.m.	62	64
ST-136[2]	B	Calibration point for residences on Malech Road	G	3/7/12	12:10 p.m. 12:20 p.m.	66 67	**69**
ST-136a[1]	B	Rural residence on Malech Road	B(67)	N/A	N/A	N/A	**66**
ST-136b[1]	B	Rural residence on Malech Road	B(67)	N/A	N/A	N/A	**67**
ST-136c[1]	B	Rural residence on Malech Road	B(67)	N/A	N/A	N/A	**66**
ST-137[1]	B	Rural residence off Coyote Creek Ranch Road	B(67)	N/A	N/A	N/A	63

Notes: N/A = Not applicable
BOLD font indicates noise levels approaching or exceeding NAC.
[1] Non-measurement receptor location added to the model.
[2] Used as calibration point for ST-136a, ST-136b, and ST-136c.

6.2.1. Segment A – US 101 – Oregon Expressway to SR 85

Category B land uses (residences), Category C land uses (Greer Park), and Category D Land uses (Emerson School and the Girls' Middle School), are located southwest of US

101 from Oregon Expressway to San Antonio Road and from Rengstorff Avenue to Shoreline Boulevard. Ten-foot to 16-foot noise barriers currently shield the majority of these land uses. Noise barriers do not shield Greer Park, the Emerson School, or the Girls' Middle School.

Ambient traffic noise levels in the area were documented in April 2008 as part of the US 101 Auxiliary Lanes Project (EA 4A330K). Four short-term noise measurements (ST-a, ST-b, ST-c, and ST-d) were made in December 2011 to update the 2008 data. A comparison of the 2008 and 2011 data show that the data correlates well with one another indicating that existing ambient noise levels have not measurably changed in the three year time period. Worst-hour noise levels were 56 to 58 dBA $L_{eq[h]}$ in areas representative of the outdoor use areas of the Emerson School, which are shielded from US 101 traffic by the school building. Worst-hour noise levels were 62 to 64 dBA $L_{eq[h]}$ at the measurement locations selected in the central portion of Greer Park, and reached 69 dBA $L_{eq[h]}$ at the receptor representing the ball field nearest US 101. Measurements were attempted at the Girls' Middle School located at 3400 West Bayshore Road, but permission to measure at the property was not granted. Measurements were made near the US 101 right-of-way fence adjacent to 1950 Leghorn Street at the request of VTA. Worst-hour noise levels at the right-of-way fence were 80 dBA $L_{eq[h]}$, and were consistent with 2008 measurements made approximately 25 feet from the right-of-way fence.

6.2.2. Segment 1– SR 85 – US 101 to Central Expressway

Category B land uses within this segment of the project are residences located east and west of SR 85. Category C land uses within this segment include Alamo Court Park, Creekside Park, and the outdoor use area of the Church of Scientology at 117 Easy Street. One long-term noise measurement (LT-1) was made at the Central Avenue trail entrance to Stevens Creek Trail. Worst-hour noise levels over the three-day testing period were 63 dBA $L_{eq[h]}$. Eight short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-1 through ST-8. As indicated in Table 6-2, existing worst-hour noise levels at short-term measurement locations within this segment range from 54 to 64 dBA $L_{eq[h]}$. Currently, 14-foot noise barriers shield these Category B and C land uses (ST-7 and LT-1 are partially shielded).

6.2.3. Segment 2 – SR 85 – Central Expressway to El Camino Real

Category B land uses within this segment of the project are residences located east and west of SR 85. One Category D land use, the Jehovah's Witness Church on Pioneer Way, is located within this segment. The church has no active outdoor use area, and interior noise impacts are discussed in Chapter 7. One long-term noise measurement

(LT-2) was made in the rear yard of 579 McCarty Avenue. Worst-hour noise levels over the two-day testing period ranged from 53 to 54 dBA $L_{eq[h]}$. Three short-term noise measurements were made in Category B and D land uses within this segment at Receptors ST-9 through ST-11. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 61 to 68 dBA $L_{eq[h]}$. Currently, a 12-foot noise barrier shields ST-10 and LT-2, and a 16-foot noise barrier shields ST-11. There are no noise barriers currently shielding ST-9.

6.2.4. Segment 3 – SR 85 – El Camino Real to West Fremont Avenue

Category B land uses within this segment of the project are residences located east and west of SR 85. Category C land uses within this segment include Steven's Creek Trail, Franklin Avenue Park, and Alta Vista High School. Alta Vista High School classrooms are also evaluated under Category D, as discussed in Chapter 7. One long-term noise measurement (LT-3) was made in the rear yard of 1105 Remington Court. Worst-hour noise levels over the two-day testing period ranged from 62 to 63 dBA $L_{eq[h]}$. Twelve short-term noise measurements were made in Category B, C, and D land uses within this segment at Receptors ST-12, ST-12a, ST-12b, and ST-13 through ST-21. As indicated in Table 6-2, existing worst-hour noise levels at short-term measurement locations within this segment range from 57 to 71 dBA $L_{eq[h]}$. Currently, a 16-foot noise barrier shields ST-16 and ST-19; a 12-foot barrier shields ST-20; and a 16-foot noise barrier shields ST-13, ST-15, ST-17 and ST-18. There are no noise barriers currently shielding ST-12, ST-12a, ST-12b, ST-14, or ST-21.

6.2.5. Segment 4 – SR 85 – West Fremont Avenue to Interstate 280

Category B land uses within this segment of the project are residences located east and west of SR 85. Eight short-term noise measurements were made in Category B land uses within this segment at Receptors ST-22 through ST-29. As indicated in Table 6-2, existing worst-hour noise levels at short-term measurement locations within this segment range from 59 to 69 dBA $L_{eq[h]}$. Currently, a 12- to 16-foot noise barrier shields ST-23 through ST-25; a 16-foot noise barrier shields ST-22 and ST-26; a 12.5-foot noise barrier shields ST-27 and ST-29; and a 14-foot noise barrier shields ST-28.

6.2.6. Segment 5 – SR 85 – Interstate 280 to South De Anza Boulevard

Category B land uses within this segment of the project are residences located east and west of SR 85. Category C land uses within this segment include Mary Avenue Park, De Anza College, the Child Development Center at the south end of Campus Drive, and the Orogrande Place Park. One Category D land use, the Home of Christ Church, is located within this segment. The church has no active outdoor use area, and interior noise impacts are discussed in Chapter 7. One long-term noise measurement (LT-4) was made in the rear yard of 10480 Stokes Avenue. Worst-hour noise levels over the four-day testing period ranged from 63 to 65 dBA $L_{eq[h]}$. Fourteen short-term noise measurements were made in Category B, C and D land uses within this segment at Receptors ST-31 through ST-42, ST-44 and ST-45. In addition, ST-36a was added to the model as a non-measurement receptor in the vicinity of ST-36 at the Child Development Center outdoor use area. As indicated in Table 6-2, existing worst-hour noise levels at short-term measurement locations within this segment range from 57 to 74 dBA $L_{eq[h]}$. Currently, a 16-foot noise barrier shields ST-32 and LT-4; a 12- to 14-foot noise barrier shields ST-37 through ST-39; a 12-foot noise barrier shields ST-42 and ST-44; a 16-foot noise barrier shields ST-31 and ST-33; a 10.5- to 12-foot barrier shields ST-40; and a 12-foot noise barrier shields ST-41 and ST-45. There are no noise barriers currently shielding ST-34 through ST-36, or ST-36a.

6.2.7. Segment 6 – SR 85 – South De Anza Boulevard to Saratoga Avenue

Category B land uses within this segment of the project are residences located east and west of SR 85. Two Category C land uses, Kevin Moran Park and Congress Springs Park, are also located within this segment. One long-term noise measurement (LT-5) was made at Congress Springs Park. Worst-hour noise levels over the four-day testing period ranged from 64 to 66 dBA $L_{eq[h]}$. Twelve short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-43, and ST-46 through ST-56. As indicated in Table 6-2, existing worst-hour noise levels at short-term measurement locations within this segment range from 56 to 67 dBA $L_{eq[h]}$. Currently, 12-foot noise barriers shield ST-43, and ST-46 through ST-56; and a 14-foot noise barrier shields LT-5.

6.2.8. Segment 7 – SR 85 – Saratoga Avenue to Winchester Boulevard

Category B land uses within this segment of the project are residences located north and south of SR 85. One Category C land use, Bellgrove Circle Park, is located within this segment. Fifteen short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-57 through ST-71. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 51 to 62 dBA $L_{eq[h]}$. Currently, 14-foot noise barriers shield ST-57, ST-59, ST-61, and ST-63; a 6-foot noise barrier on an 8-foot berm shields ST-64 and ST-66; a 16-foot noise barrier shields ST-68; 12-foot noise barriers shield ST-67; a 14- to 16-foot noise barrier shields ST-58 and ST-60; a 10-foot noise barrier shields ST-62; a 10- to 12-foot noise barrier shields ST-65 and ST-71; and an 8-foot noise barrier and a 6-foot property barrier shield ST-70. An 8-foot to 10-foot berm shields ST-69.

6.2.9. Segment 8 – SR 85 – Winchester Boulevard to Union Avenue

Category B land uses within this segment of the project are residences located north and south of SR 85. Category C land uses within this segment include the Los Gatos Swim and Racquet Club and Hendy Lane Park. One Category D land use, Good Samaritan Hospital, is also located within this segment. The hospital has no active outdoor use area, and interior noise impacts are discussed in Chapter 7. Eleven short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-72 through ST-82. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations representative of outdoor use areas within this segment range from 54 to 65 dBA $L_{eq[h]}$. Currently, a 10-foot noise barrier and the 15-foot mobile home park wall shield ST-73 (the 10-foot noise barrier partially shields ST-74a); 14-foot noise barriers shield ST-76 and ST-80; 15.5-foot noise barriers shield ST-82 and partially shield ST-79; 10-foot noise barriers partially shield ST-75; a 16-foot noise barrier shields ST-77; and 12-foot noise barriers shield ST-78 and ST-81. There are no noise barriers currently shielding ST-72.

6.2.10. Segment 9 – SR 85 – Union Avenue to Camden Avenue

Category B land uses within this segment of the project are residences located north and south of SR 85. One long-term noise measurement (LT-6) was made at 1860 Little Branham Lane. Worst-hour noise levels over the three-day testing period ranged from 53 to 57 dBA $L_{eq[h]}$. Four short-term noise measurements were made in Category B land uses within this segment at Receptors ST-83 through ST-86. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 57 to 65 dBA $L_{eq[h]}$. Currently, a 10-foot noise barrier shields ST-83; 10- to 14-foot noise barriers shield ST-85, ST-86 and LT-6; and a 5-foot noise barrier shields ST-84.

6.2.11. Segment 10 – SR 85 – Camden Avenue to Almaden Avenue

Category B land uses within this segment of the project are residences located north and south of SR 85. Category C land uses within this segment include the Appleseed School field, Almaden Elementary School, and Russo Park. One long-term noise measurement (LT-7) was made at 5071 Las Cruces Court. Worst-hour noise levels over the four-day testing period ranged from 65 to 66 dBA $L_{eq[h]}$. Ten short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-87 through ST-95, and ST-99. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 54 to 68 dBA $L_{eq[h]}$. Currently, a 10- to 12-foot noise barrier shields ST-88 and ST-90; and 10- to 14-foot noise barriers shield ST-87, ST-89, ST-91 through ST-95, ST-99 and LT-7.

6.2.12. Segment 11 – SR 85 – Almaden Avenue to Blossom Hill Road

Category B land uses within this segment of the project are residences located north and south of SR 85. Category C land uses within this segment include Gunderson High School sports fields and Kinderwood Children's Center. One long-term noise measurement (LT-8) was made in the rear yard of 5464 Chesbro Avenue. Worst-hour noise levels over the three-day testing period ranged from 57 to 61 dBA $L_{eq[h]}$. Fifteen short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-96 through ST-98, and ST-100 through ST-111. In addition, ST-102a, ST-102b and ST-102c were added to the model as non-measurement receptors in the vicinity of ST-102 at additional outdoor use areas (sports fields) associated with Gunderson High School. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 55 to 71 dBA $L_{eq[h]}$. Currently, 6-foot parapets shield ST-96 through ST-98, and ST-100; a 14- to 16-foot noise barrier shields ST-101, ST-103 and ST-105; and 12-foot noise barriers shield ST-104, ST-106, ST-107, ST-108, ST-111 and LT-8 (ST-109, ST-110 and ST-102b are partially shielded). No noise barriers currently shield ST-102, ST-102a or ST-102c.

6.2.13. Segment 12 – SR 85 – Blossom Hill Road to Cottle Road

Category B land uses within this segment of the project are residences located north and south of State Route 85. One long-term noise measurement (LT-9) was made at 218 Herlong Avenue. Worst-hour noise levels over the two-day testing period ranged from 60 to 61 dBA $L_{eq[h]}$. Eleven short-term noise measurements were made in Category B land uses within this segment at Receptors ST-112 through ST-122. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 56 to 64 dBA $L_{eq[h]}$. Currently, a 12-foot barrier shields ST-112 and ST-113; and 14-foot barriers shield ST-114 through ST-122, and LT-9.

6.2.14. Segment 13 – SR 85 – Cottle Road to US 101

Category B land uses within this segment of the project are residences located south of State Route 85 and northwest of the SR 85/US 101 interchange. Category C land uses within this segment include Kaiser Permanente picnic areas. One long-term reference noise measurement (LT-10) was made at the Monterey Grove apartment complex. Worst-hour noise levels over the two-day testing period ranged from 65 to 66 dBA $L_{eq[h]}$. Six short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-123 through ST-128. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 54 to 64 dBA $L_{eq[h]}$. Currently, a 12-foot noise barrier shields ST-123 and ST-124; 16-foot noise barriers shield ST-125, ST-127 and LT-10; an 8-foot barrier shields ST-126; and a 14-foot noise barrier shields ST-128.

6.2.15. Segment B – US 101 – South of SR 85/US 101 Interchange to Bailey Avenue

Category B land uses (residences) in this segment are primarily on the east side of US 101 along Basking Ridge Avenue. A few rural residences are also located off of Malech Road, east of US 101, and one residence is located between the freeway and Coyote Ranch Road, west of US 101. Category C land uses include the Coyote Creek Trail, Coyote Creek Park, and Metcalf Park. Large areas east of US 101 in this segment are undeveloped. One long-term reference noise measurement (LT-11) was made in the rear yard of 251 Crestridge Lane, and worst-hour noise levels were 64 dBA $L_{eq[h]}$. Eight short-term noise measurements were made in Category B and C land uses within this segment at Receptors ST-129 through ST-136. In addition, ST-136a, ST-136b, and ST-136c were added to the model as non-measurement receptors at residences in the vicinity of ST-136. Receptor ST-137 was also added to the model as a non-measurement receptor at the location representative of the residence west of US 101 between the highway and Coyote Creek Road. As indicated in Table 6-2, existing worst-hour noise levels at ST measurement locations within this segment range from 56 to 69 dBA $L_{eq[h]}$. Noise barriers in the form of berms shield the residences off of Malech Road and Coyote Ranch Road. The trail and park areas are not shielded by noise barriers.

6.3. Model Calibration to Existing Conditions

TNM was used to calculate existing noise levels at field measurement locations during those periods when the measurements were made and traffic was counted. Adjustments or "K factors" were then developed where the traffic noise model and the measured levels varied by 2 dBA or greater. The development of each K factor followed the methodology detailed in Section 5.3. The adjustment is added to modeled results for existing and future worst-hour traffic conditions. The K factor for each receptor can be found in Table 6-3. As a conservative measure, when modeled traffic noise levels exceeded corresponding measured levels by 2 dBA or more, a K factor was developed to bring modeled noise level predictions 2 dBA higher (e.g., if measured was 60 dBA and modeled was 64 dBA, K factor = -2 dBA; whereas, if measured was 60 dBA and modeled was 56 dBA, K factor = 4 dBA). Measurement locations in which K factors were found to be (+/-) 5 dBA or greater were investigated for modeling error or data contamination. Field measurements and site surveying was repeated, as necessary. In many areas, the type of pavement on SR 85 affected the modeling results. Per FHWA and Caltrans direction, only "average pavement" can be used in the TNM model. In some situations, however, existing concrete pavement, which typically results in higher sound-intensity levels as compared to average pavement or new "quiet pavement" substantially affected the measured noise levels. Appendix F details sound intensity measurements made along the corridor that were used to justify some of the larger K-factors. Locations at which K factors are still 5 dBA or greater have been field verified and are considered accurate.

Table 6-3. TNM Adjustment Factors

Receptor ID	10-min L_{eq} Noise Level, dBA			K Factor, dBA
	Measured Level	TNM Validation	Difference	
LT-1	62	62.1	0.1	0
LT-2	53	58.2	5.2	-3.2
LT-3	62.6	60.1	-2.5	2.5
LT-4	61.3	59.6	-1.7	1.7
LT-5	61.9	57	-4.9	4.9
LT-6	55.4	59.1	3.7	-1.7
LT-7	64.2	61.3	-2.9	2.9
LT-8	55.4	59	3.6	-1.6
LT-9	58.6	57.6	-1	0
LT-10	63	59.4	-3.6	3.6
ST-1	51.4	52.6	1.2	0
ST-2	53.6	56.2	2.6	-0.6
ST-3	54.6	57.8	3.2	-1.2
ST-4	51.5	54.1	2.6	-0.6
ST-5	60.7	53.2	-7.5	7.5
ST-6	60.1	59.8	-0.3	0
ST-7	56.7	58	1.3	0
ST-8	61.1	61.3	0.2	0
ST-9	69.4	68.1	-1.3	0
ST-10	56.3	58.8	2.5	-0.5
ST-11	65	59.1	-5.9	5.9
ST-12	62	61.7	-0.3	0
ST-12a	68	68.8	0.8	0
ST-12b	58	56.9	-1.1	0
ST-13	54.8	55.8	1	0
ST-14	58.5	63.4	4.9	-2.9
ST-15	62.8	59.9	-2.9	2.9
ST-16	61.6	61.4	-0.2	0
ST-17	61.4	58.2	-3.2	3.2
ST-18	62.5	60.2	-2.3	2.3
ST-19	67.1	60.2	-6.9	6.9
ST-20	62.4	64.1	1.7	0
ST-21	68.4	69.2	0.8	0
ST-22	62.7	58.7	-4	4

Receptor ID	10-min L_{eq} Noise Level, dBA			K Factor, dBA
	Measured Level	TNM Validation	Difference	
ST-23	63.3	63.7	0.4	0
ST-24	65.5	61.3	-4.2	4.2
ST-25	67.4	61.4	-6	6
ST-26	60.9	60.3	-0.6	0
ST-27	62.8	63.9	1.1	0
ST-28	62.4	64.2	1.8	0
ST-29	56.9	60.1	3.2	-1.2
ST-30	--	--	--	--
ST-31	62.4	58.3	-4.1	4.1
ST-32	59.5	57.3	-2.2	2.2
ST-33	51.5	54.4	2.9	-0.9
ST-34	65.8	65.4	-0.4	0
ST-35	69.1	70.6	1.5	0
ST-36	70.4	70.1	-0.3	0
ST-36a[1]	N/A	N/A	N/A	0
ST-37	60.2	57.4	-2.8	2.8
ST-38	63.6	59.1	-4.5	4.5
ST-39	62.9	67.8	4.9	-2.9
ST-40	65.4	61.2	-4.2	4.2
ST-41	61.7	61.3	-0.4	0
ST-42	65.1	60.3	-4.8	4.8
ST-43	63.5	59.5	-4	4
ST-44	63.7	61.3	-2.4	2.4
ST-45	63.8	63	-0.8	0
ST-46	56.8	60	3.2	-1.2
ST-47	58.8	60.8	2	0
ST-48	51.6	54.7	3.1	-1.1
ST-49	58.3	56.9	-1.4	0
ST-50	62.8	61.3	-1.5	0
ST-51	58.4	53.6	-4.8	4.8
ST-52	60.1	57.5	-2.6	2.6
ST-53	60.6	61.7	1.1	0
ST-54	56.2	59.7	3.5	-1.5
ST-55	63.3	59.9	-3.4	3.4
ST-56	57.5	59.2	1.7	0
ST-57	55	54.5	-0.5	0
ST-58	59.1	61.3	2.2	-0.2
ST-59	55	58.6	3.6	-1.6
ST-60	55.9	60.7	4.8	-2.8
ST-61	49.9	58.2	8.3	-6.3
ST-62	56.4	58.6	2.2	-0.2
ST-63	56.5	58.4	1.9	0
ST-64	58.4	58.3	-0.1	0
ST-65	57.4	58.8	1.4	0

Receptor ID	10-min L_{eq} Noise Level, dBA			K Factor, dBA
	Measured Level	TNM Validation	Difference	
ST-66	57.8	59.9	2.1	-0.1
ST-67	55.4	61.2	5.8	-3.8
ST-68	55.5	58.2	2.7	-0.7
ST-69	58.1	58	-0.1	0
ST-70	57.9	61.2	3.3	-1.3
ST-71	59.8	59.4	-0.4	0
ST-72	53.2	55.1	1.9	0
ST-73	50.8	52.5	1.7	0
ST-74	63.0	63.1	0.1	0
ST-75	54.1	54.8	0.7	0
ST-76	57.9	58.8	0.9	0
ST-77	55	58.3	3.3	-1.3
ST-78	60.5	60.2	-0.3	0
ST-79	67.5	69.3	1.8	0
ST-80	62.7	61	-1.7	0
ST-81	56.5	58.9	2.4	-0.4
ST-82	59.5	58.4	-1.1	0
ST-83	63.5	59.1	-4.4	4.4
ST-84	56.5	56.1	-0.4	0
ST-85	58	61.5	3.5	-1.5
ST-86	62.2	63.2	1	0
ST-87	62.2	61.9	-0.3	0
ST-88	63.4	62.2	-1.2	0
ST-89	58.4	57.8	-0.6	0
ST-90	56.9	56.9	0	0
ST-91	63.3	61.1	-2.2	2.2
ST-92	58.3	59.8	1.5	0
ST-93	50.2	55.5	5.3	-3.3
ST-94	54.6	57.8	3.2	-1.2
ST-95	63.9	68.1	4.2	-2.2
ST-96	58.7	65.8	7.1	-5.1
ST-97	62.2	64.9	2.7	-0.7
ST-98	62.5	63.9	1.4	0
ST-99	61.4	59.9	-1.5	0
ST-100	56.4	60.9	4.5	-2.5
ST-101	61.4	59.6	-1.8	0
ST-102	60.2	61.4	1.2	0
ST-102a[2]	N/A	N/A	N/A	0
ST-102b[2]	N/A	N/A	N/A	0
ST-102c[2]	N/A	N/A	N/A	0
ST-103	53.7	56.8	3.1	-1.1
ST-104	56.5	56.5	0	0
ST-105	62.4	59.5	-2.9	2.9
ST-106	59.7	60.5	0.8	0

Receptor ID	10-min L_{eq} Noise Level, dBA			K Factor, dBA
	Measured Level	TNM Validation	Difference	
ST-107	65.1	63.7	-1.4	0
ST-108	60.1	58.9	-1.2	0
ST-109	61	63.2	2.2	-0.2
ST-110	56.6	61.4	4.8	-2.8
ST-111	52	56.9	4.9	-2.9
ST-112	55.9	53.8	-2.1	2.1
ST-113	60.9	62.2	1.3	0
ST-114	52.8	54.7	1.9	0
ST-115	61.1	60.5	-0.6	0
ST-116	58.2	58.4	0.2	0
ST-117	62.2	58.5	-3.7	3.7
ST-118	55.7	57.9	2.2	-0.2
ST-119	58.2	58.1	-0.1	0
ST-120	57.5	58.6	1.1	0
ST-121	58.3	58.1	-0.2	0
ST-122	56	60	4	-2
ST-123	55.7	56	0.3	0
ST-124	59.2	59.9	0.7	0
ST-125	60	59.1	-0.9	0
ST-126	51.6	52.5	0.9	0
ST-127	57.4	58.3	0.9	0
ST-128	57.4	57.9	0.5	0
ST-129	54.3	54.1	-0.2	0
ST-130	58.7	59.3	0.6	0
ST-131	60	61.5	1.5	0
ST-132	55	58.7	3.7	-1.7
ST-133	56.8	61.1	4.3	-2.3
ST-135	61.9	60.5	-1.4	0
ST-136	66.8	65.2	-1.6	0
ST-136a[3]	N/A	N/A	N/A	0
ST-136b[3]	N/A	N/A	N/A	0
ST-136c[3]	N/A	N/A	N/A	0
ST-137[4]	N/A	N/A	N/A	0

Notes:

[1] ST-36a K-factor based on ST-36 K-factor.

[2] ST-102a, ST-102b and ST-102c K-factors based on ST-102 K-factor.

[3] ST-136a, ST-136b and ST-136c K-factors based on ST-136 K-factor.

[4] ST-137 K-factor based on ST-135 K-factor.

6.4. Future Undeveloped Land Uses

The Caltrans Protocol requires that the NSR discuss the development of future land uses in the vicinity of the project. Most of the areas adjacent to SR 85 are built-out. Lists of approved and proposed projects in the Cities of Palo Alto, Mountain View, Sunnyvale, Cupertino, Saratoga, Los Altos, and San Jose were reviewed to identify undeveloped lands for which development is planned, designed, and programmed so that it may be considered approved prior to project approval. According to the Protocol, future development would be considered planned, designed, and programmed once it has received final development approval. The review focused on projects within approximately 500 feet of the centerline of SR 85 where traffic noise levels from the highway could dominate the noise environment. Projects located beyond this distance were excluded from further analysis.

Palo Alto

A review of the City of Palo Alto's new planning applications through February 2012 found no noise-sensitive projects proposed near US 101.

Mountain View

A review of the City of Mountain View Planning Division's project list identified one project near SR 85. A residential subdivision is proposed at 1991 Sun Mor Avenue, approximately 530 feet from the center of SR 85 and in an area shielded by an existing noise barrier. Noise levels measured and modeled at ST-7 represent this proposed future project and show that worst-hour noise levels would be 60 dBA $L_{eq[h]}$ or less, below the NAC for Category B residential land uses.

Sunnyvale

A review of the City of Sunnyvale's development update list found no noise-sensitive projects proposed near SR 85.

Cupertino

The City of Cupertino Community Development Department's Development Activity Report was reviewed to identify projects containing noise-sensitive land uses proposed near SR 85. Two projects were identified during the review: 1) The Oaks Shopping Center Mixed Use Project, and 2) The Cleo Avenue Housing Development. Further discussions with City Staff indicated that a dog park is being considered along Mary Avenue adjacent to SR 85.

The Oaks Shopping Center Mixed Use Project includes a 122-room hotel east of SR 85 and west of Mary Avenue. An outdoor swimming pool is proposed at the northernmost portion of the site in an area shielded by an existing 16-foot noise barrier. Existing noise levels at acoustically equivalent receptors in the vicinity (ST-31 and ST-33) range from 57 to 65 dBA $L_{eq[hr]}$, and do not approach or exceed the Category E NAC of 72 dBA $L_{eq[hr]}$.

A four-unit residential subdivision is proposed at the terminus of Cleo Avenue adjacent to SR 85. This proposed subdivision is shielded by an existing 10-foot noise barrier. Illingworth & Rodkin, Inc. evaluated exterior noise levels for this project in 2011. Noise levels are projected to be 65 dBA $L_{eq[h]}$ or less in private exterior use areas shielded by the existing 10-foot noise barrier and the residential unit, and would remain below the NAC for Category B residential land uses.

The Mary Avenue Dog Park project is being considered on a small parcel east of SR 85 and west of Mary Avenue, just south of Lubec Street. The project is in the early planning stages and needs to secure funding to move forward. A 16-foot barrier would shield the park from SR 85 traffic noise. Existing noise levels are 65 dBA $L_{eq[hr]}$, and do not approach or exceed the Category C NAC of 67 dBA $L_{eq[hr]}$.

Saratoga

The City of Saratoga identified one future sensitive land use, a four-unit residential subdivision, proposed south of SR 85 and east of Quito Road. The residential project would be located approximately 200 feet from the southbound edge of SR 85 and would be shielded by intervening topography. Illingworth & Rodkin, Inc. evaluated exterior noise levels for a project proposed at this site this project in 2006. Worst-hour noise levels from SR 85 traffic were 62 dBA $L_{eq[hr]}$, below the NAC for Category B residential land uses.

Los Altos

There are no noise-sensitive projects proposed near SR 85 in the City of Los Altos. The nearest proposed project is located approximately 2,000 feet from SR 85 near the intersection of Homestead Road and Foothill Expressway.

San Jose

A review of the City of San Jose Department of Planning, Building, and Code Enforcement's Development Activity Highlights and Five-Year Forecast (2012-2016) was made to identify projects containing noise-sensitive land uses proposed near SR 85. Three projects were identified during the review, 1) The Lester Property Housing Project, 2) The Hitachi Site Mixed-Use Project, and 3) The iStar Site Housing Project.

The Lester Property Housing Project would be developed on a site currently shielded by a noise barrier. Noise levels measured and modeled at ST-109 represent this proposed future project and show that worst-hour noise levels would be 64 dBA $L_{eq[h]}$ or less, below the NAC for Category B residential land uses.

The Hitachi Site Mixed-Use Project and the iStar Site Housing Project propose Category B residential land uses north of SR 85 and east of Cottle Road. There are no existing noise barriers along northbound SR 85 that would shield proposed sensitive land uses. Illingworth & Rodkin, Inc. evaluated exterior noise levels for these projects in 2004 and 2009. Mitigation measures contained in the CEQA documents require that private or common outdoor use areas be located in shielded areas, set back as far as possible from SR 85, and mitigated to not exceed 60 dBA DNL. Under the City General Plan requirements, noise levels in common outdoor use areas that would experience frequent human use would be required to be maintained at or below 60 dBA DNL. Based on the relationship between worst-hour noise levels and the DNL, noise levels at these use areas, if properly designed and mitigated, are not projected to exceed the NAC.

Chapter 7. Future Noise Environment, Impacts, and Considered Abatement

7.1. Traffic Inputs Used for Noise Modeling

Once the traffic noise model was calibrated, baseline, future no-project (2035), and future with-project (2035) worst-hour traffic noise levels were calculated. The noisiest hour is not necessarily the hour with peak traffic volumes. Congestion results in slower speeds, which substantially reduces traffic noise levels. The worst hour is typically an hour where traffic flows freely at or near capacity conditions.

Traffic volume inputs for the traffic noise model were taken from the traffic projections provided by Wilbur Smith Associates and confirmed by URS for the project. Free-flowing capacity traffic conditions were used for the traffic noise modeling of existing and future noise levels where demand volumes exceeded capacity. Under this assumption, Level-of-Service C traffic volumes were used, which correspond with the following traffic volumes:

- 1,800 vehicles per hour per lane for mixed through freeway lanes
- 1,500 vehicles per hour per lane for high occupancy vehicle lanes
- 1,400 vehicles per hour per lane for express lanes
- 1,000 vehicles per hour per lane for auxiliary lanes
- 1,000 vehicles per hour per lane for freeway ramps

Traffic mix information reported by the California Department of Transportation was used for both existing and future scenarios expected by 2035. All freeway traffic was modeled at 65 miles per hour (mph) for autos and light trucks, 60 mph for medium trucks and heavy trucks, and 45 mph for all on and off-ramps.

7.2. Noise Level Calculations and Assessment of Noise Impacts

Noise levels were predicted within two segments along US 101, between Oregon Expressway and SR 85 (Segment A) and between SR 85 and Bailey Road (Segment B), and within 13 segments along SR 85, between US 101 in Mountain View and US 101 in San Jose (Segments 1 to 13). Each area is discussed below in detail. Impacted receptors were identified by Activity Category and the total number of impacted receptors is summarized for reasonableness allowance calculations. Noise levels discussed in this section are based on the adjusted model results, using worst-case traffic conditions (in terms of noise generation) for the Future No Build as well as the Future Build scenarios.

7.2.1. Segment A – US 101 – Oregon Expressway to SR 85

Conversion of the HOV lanes into single express lanes on US 101 in Palo Alto and Mountain View would not change the roadway geometry as the project would only include restriping and installation of overhead signs and tolling devices in the median. Traffic noise modeling results, as summarized in the US 101 Auxiliary Lanes Project NSR (EA 4A330K), would continue to credibly represent future conditions, as the only difference between the modeling scenarios would be the number of vehicles anticipated per hour in the express lanes. The traffic noise modeling completed for the US 101 Auxiliary Lanes Project assumed capacity conditions during the peak traffic hour. 1,500 vehicles per hour per lane were assumed for HOV lanes. The express lanes proposed by the SR 85 project are projected to have a slightly reduced capacity of 1,400 vehicles per hour per lane, therefore, the US 101 Auxiliary Lanes Project's traffic noise modeling results slightly overestimate traffic noise levels along US 101. The change in predicted noise levels would be 0.1 dBA $L_{eq[h]}$ or less, well within the accuracy of the traffic noise model itself.

Table 7-1 summarizes the traffic noise modeling results for Category B, and C land uses located along US 101 between Oregon Expressway and SR 85 (Segment A) exposed to noise levels above the NAC. Noise levels are expected to increase by 0 to 2 dBA $L_{eq[h]}$ throughout the project corridor under future build conditions. The projected noise level increase is not considered substantial as it does not exceed 12 dBA $L_{eq[h]}$.

Category D land uses in this segment include the Emerson School located at 2800 West Bayshore Avenue and the Girls' Middle School located at 3400 West Bayshore Road. The construction of a noise barrier to benefit a single receptor would not be reasonable based only on cost of construction. A visual inspection of these Category D land uses was made to estimate the noise reduction provided by the building structure. The visual inspection revealed that both schools have mechanical ventilation and fixed windows. This type of construction provides a minimum noise reduction of 30 dBA indoors. Traffic noise modeling results show that exterior noise levels at the façade of the two schools would reach 77 dBA $L_{eq[h]}$ under the Build scenario. Interior noise levels would be expected to be a minimum of 30 dBA lower, or 47 dBA $L_{eq[h]}$, which is at least 5 dBA below the interior criterion of 52 dBA $L_{eq[h]}$. Category D land uses along the segment of US 101 between Oregon Expressway and SR 85 are not impacted as noise levels do not approach or exceed the NAC.

Table 7-1: Modeled Noise Levels: Oregon Expressway to SR 85

Receptor ID	Worst-Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [3]	Activity Category
	Existing	Future No Build [1]	Future Build [2]			
R20	69	70	70	1	A/E	C(67)
R21	67	69	69	2	A/E	C(67)
R22 [4]	76	77	77	1	None	D(52)
R24	78	78	78	0	A/E	B(67)
R25	65	66	66	1	A/E	B(67)
R27	73	74	74	1	A/E	B(67)
R27A	73	74	74	1	A/E	B(67)
R29	67	68	68	1	A/E	B(67)
R34	68	68	68	0	A/E	B(67)
R35	68	68	68	0	A/E	B(67)
R36	67	68	68	1	A/E	B(67)

[1] Assumes construction of US 101 Auxiliary Lanes Project (EA 4A330K.)
[2] Assumes construction of US 101 Auxiliary Lanes Project (EA 4A330K) and SR 85 Express Lanes Project (EA 04-4A7900).
[3] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC.
[4] Represents exterior façade of Category D land uses.

7.2.2. Segment 1 – SR 85 – US 101 to Central Expressway

Traffic noise modeling results and predicted traffic noise impacts for Segment 1 are shown in Table 7-2. One long-term measurement (LT-1) and eight short-term measurements (ST-1, ST-2, ST-3, ST-4, ST-5, ST-6, ST-7, and ST-8) were made within this area. Existing barriers shield noise sensitive receptors. As shown in Table 7-2, the worst-hour noise level for the Existing condition range from 54 to 64 dBA $L_{eq[h]}$. The Future No Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 1 dBA $L_{eq[h]}$ over Existing conditions as a result of increasing traffic volumes over time. Under the Future No Build conditions, noise levels at receptor locations are calculated to range from 55 to 65 dBA $L_{eq[h]}$. Noise levels under the Future Build condition are not anticipated to increase above the Future No Build condition and worst hour noise levels at receptor locations are calculated to continue to range from 55 to 65 dBA $L_{eq[h]}$. The noise level increase is not considered substantial and all noise sensitive receptors are predicted to experience Future Build noise levels that are more than 1 dB below the NAC of 67 dBA. As a result, noise abatement was not considered in this area.

Table 7-2: Modeled Noise Levels: US 101 to Central Expressway

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact[1]	Activity Category
	Existing	Future No Build	Future Build			
LT-1	64	65	65	1	None	C(67)
ST-1	54	55	55	1	None	B(67)
ST-2	57	58	58	1	None	B(67)
ST-3	59	59	59	0	None	B(67)
ST-4	55	56	56	1	None	B(67)
ST-5	63	63	63	0	None	C(67)
ST-6	61	62	62	1	None	B(67), C(67)
ST-7	59	60	60	1	None	B(67)
ST-8	64	65	65	1	None	C(67), D(52)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.3. Segment 2 – SR 85 – Central Expressway to El Camino Real

Table 7-3 shows the traffic noise modeling results and predicted traffic noise impacts for Segment 2. One long-term measurement (LT-2) and three short-term measurements (ST-9, ST-10, and ST-11) were made within this area. Receptor ST-9 represents a church, which did not have any identifiable outdoor use areas that would benefit from a lowered noise level. ST-9 is discussed further below.

The remaining noise sensitive receptors in Segment 2 are shielded by existing noise barriers. As shown in Table 7-3, the worst-hour noise levels were calculated to range from 57 to 68 dBA $L_{eq[h]}$ under Existing conditions, from 58 to 68 dBA $L_{eq[h]}$ under Future No Build conditions, and from 57 to 68 dBA $L_{eq[h]}$ under Future Build conditions. The Future No Build and Future Build conditions are anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 1 dBA $L_{eq[h]}$ over Existing conditions as a result of increasing traffic volumes over time. The noise level increase is not considered substantial. Future Build noise levels are predicted to approach or exceed the NAC at single-family residences located east of SR 85 and north of El Camino Real (ST-11). However, the existing noise barrier at this location is already at the maximum allowable height of 16 feet.

Receptor ST-9 represents the Kingdom Hall of Jehovah's Witnesses that is located at 120 Pioneer Way. No exterior uses were identified at this land use; therefore the Category D NAC would apply. A visual inspection of this Category D land use was made to estimate the noise reduction provided by the building structure. The visual inspection revealed that the building is mechanically ventilated and has fixed windows. This type of construction provides a minimum noise reduction of 30 dBA indoors. Measurements were also made indoors. The results of the measurements indicated that worst-hour noise levels in the sanctuary are 40 dBA $L_{eq[h]}$ or less. Interior noise levels at this Category D land use do not approach or exceed the NAC of 52 dBA $L_{eq[h]}$. As a result, noise abatement was not considered in this area.

Table 7-3: Modeled Noise Levels: Central Expressway to El Camino Real

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact[1]	Activity Category
	Existing	Future No Build	Future Build			
LT-2	57	58	57	0	None	B(67)
ST-9 [2]	71	72	71	0	None	D(52)
ST-10	61	62	62	1	None	B(67)
ST-11	68	68	68	0	A/E	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

[2] Represents exterior façade of Category D land use.

7.2.4. Segment 3 – SR 85 – El Camino Real to West Fremont Avenue

Traffic noise modeling results and predicted traffic noise impacts for Segment 3 are shown in Table 7-4. One long-term measurement (LT-3) and 10 short-term measurements (ST-12, ST-13, ST-14, ST-15, ST-16, ST-17, ST-18, ST-19, ST-20, and ST-21) were made within this area, and there are two additional modeled receptor locations (ST-12a and ST-12b). There are five existing barriers within this segment.

As shown in Table 7-4, worst-hour noise levels are not anticipated to change from the Existing levels under either Future Build or Future No Build conditions. The worst-hour noise levels for the Existing, Future No Build, and Future Build conditions range from 57 to 71 dBA $L_{eq[h]}$. Future Build noise levels are predicted to approach or exceed the NAC at four modeled receptor locations in this segment, including the Stevens Creek Trail (ST-12a), Alta Vista High School and residences located to the west of SR 85 and north of West Fremont Avenue (ST-19 and ST-20), and at the Sunnyvale Healthcare Center located east of SR 85, just north of West Fremont Avenue (ST-21). Some of these impacted receptors, represented by ST-19, ST-20, and ST-21, are located behind existing noise barriers. Noise abatement in the form of new and replacement sound walls was considered throughout this area.

Alta Vista High School, located at 1325 Bryant Avenue, was identified as a Category D land use in this segment. A 16-foot noise barrier currently shields this Category D land use. A visual inspection of this Category D land use revealed that the school is mechanically ventilated, of light frame construction, with dual thermal-pane insulating windows. This type of construction provides a minimum noise reduction of 25 dBA indoors. Traffic noise modeling results show that exterior noise levels at the façade of the school would reach 69 dBA $L_{eq[h]}$ under the Build scenario. Interior noise levels would be expected to be 44 dBA $L_{eq[h]}$ or less. Interior noise levels at this Category D land use do not approach or exceed the NAC of 52 dBA $L_{eq[h]}$.

Table 7-4: Modeled Noise Levels: El Camino Real to West Fremont Avenue

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-3	64	64	64	0	None	B(67)
ST-12	64	64	64	0	None	B(67)
ST-12a	71	71	71	0	A/E	C(67)
ST-12b	59	59	59	0	None	B(67)
ST-13	57	57	57	0	None	B(67)
ST-14	62	62	62	0	None	C(67)
ST-15	64	64	64	0	None	B(67)
ST-16	63	63	63	0	None	B(67)
ST-17	63	63	63	0	None	B(67)
ST-18	64	64	64	0	None	B(67)
ST-19	69	69	69	0	A/E	B(67), C(67), D(52)
ST-20	66	66	66	0	A/E	B(67)
ST-21	71	71	71	0	A/E	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.5. Segment 4 – SR 85 – West Fremont Avenue to Interstate 280

Table 7-5 shows the traffic noise modeling results and predicted traffic noise impacts for Segment 4. Eight short-term measurements (ST-22, ST-23, ST-24, ST-25, ST-26, ST-27, ST-28, and ST-29) were made within this area, and there are five existing noise barriers along SR 85. As shown in Table 7-5, worst-hour noise levels under Future Build and Future No Build conditions are not anticipated to change from Existing levels. The worst-hour for the Existing, Future No Build, and Future Build conditions range from 59 to 69 dBA $L_{eq[h]}$. Future Build noise levels are predicted to approach or exceed the NAC at three receptor locations in this segment (ST-23, ST-24, and ST-25), representing single-family residences located west of SR 85 between West Fremont Avenue and Homestead Road. An existing barrier that ranges from 12 to 16 feet in height currently shields these receptors. Noise abatement in the form of replacement noise barriers of increased height was considered in this area.

Cupertino Middle School, located at 1650 South Bernardo Avenue, was identified as a Category D land use in this segment. A 16-foot noise barrier currently shields this Category D land use. A visual inspection of this Category D land use revealed that the school is mechanically ventilated, of light frame construction, with dual thermal-pane insulating windows. This type of construction provides a minimum noise reduction of 25 dBA indoors. Traffic noise modeling results show that exterior noise levels at the façade of the school would reach 69 dBA $L_{eq[h]}$ under the Build scenario. Interior noise levels would be expected to be 44 dBA $L_{eq[h]}$ or less. Interior noise levels at this Category D land use do not approach or exceed the NAC of 52 dBA $L_{eq[h]}$.

Table 7-5: Modeled Noise Levels: West Fremont Avenue to Interstate 280

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
ST-22	65	65	65	0	None	B(67)
ST-23	66	66	66	0	A/E	B(67)
ST-24	68	68	68	0	A/E	B(67)
ST-25 [2]	69	69	69	0	A/E	B(67), D(52)
ST-26	62	62	62	0	None	B(67)
ST-27	64	64	64	0	None	B(67)
ST-28	65	65	65	0	None	B(67)
ST-29	59	59	59	0	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC
[2] Represents exterior façade of Category D land use.

7.2.6. Segment 5 – SR 85 – Interstate 280 to South De Anza Boulevard

Traffic noise modeling results and predicted traffic noise impacts for Segment 5 is shown in Table 7-6. One long-term measurement (LT-4) and 14 short-term measurements (ST-31, ST-32, ST-33, ST-34, ST-35, ST-36, ST-37, ST-38, ST-39, ST-40, ST-41, ST-42, ST-44, and ST-45) were made within this area, and there is one additional modeled receptor location (ST-36a). There are seven existing barriers within this segment. In addition, land uses located south of Stevens Creek Boulevard are shielded from SR 85 by an earth berm.

As shown in Table 7-6, the worst-hour $L_{eq[h]}$ for the Existing condition ranges from 57 to 74 dBA $L_{eq[h]}$. Under the Future No Build conditions, noise levels at receptor locations would continue to range from 57 to 74 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 2 dBA $L_{eq[h]}$ over Future No Build conditions. This increase in noise levels is the result of the additional capacity from the second express lane in part of this segment. Under Future Build conditions, noise levels at receptor locations are predicted to range from 58 to 76 dBA $L_{eq[h]}$. The noise level increase is not considered substantial. Future build noise levels are predicted to approach or exceed the NAC at eight modeled receptor locations in this segment, including first-row single and multi-family residences located east of SR 85 between Interstate 280 and Stevens Creek Boulevard (ST-31), De Anza College (ST-34 and ST-36), first-row single family residences located north of South Stelling Road to the east (ST-40) and west (ST-38 and ST-39) of SR 85, and first-row single and multi-family homes located west of SR 85 and north of South De Anza Boulevard (ST-42 and ST-44). With the exception of De Anza College, most of these impacted receptors are located behind existing barriers that range in height from 12 to 16 feet. Noise abatement in the form of new and replacement sound walls was considered throughout this area.

ST-35 represents the Home of Christ Church located at 10340 Bubb Road. No exterior uses were identified at this land use; therefore the Category D NAC would apply. A visual inspection of this Category D land use was made to estimate the noise reduction provided by the building structure. The visual inspection revealed that the building is mechanically ventilated and has fixed windows. This type of construction provides a minimum noise reduction of 30 dBA indoors. Measurements were also made indoors. The results of the measurements indicated that worst-hour noise levels in the sanctuary are 40 dBA $L_{eq[h]}$ or less. Interior noise levels at this Category D land use do not approach or exceed the NAC of 52 dBA $L_{eq[h]}$.

Table 7-6: Modeled Noise Levels: Interstate 280 to South De Anza Boulevard

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-4	62	62	63	1	None	B(67)
ST-31	65	65	66	1	A/E	C(67)
ST-32	63	63	63	0	None	B(67)
ST-33	57	57	58	1	None	B(67)
ST-34	69	69	70	1	A/E	C(67), D(52)
ST-35	74	74	76	2	--	D(52)
ST-36	74	74	75	1	A/E	C(67), D(52)
ST-36a	60	60	60	0	None	C(67), D(52)
ST-37	64	64	65	1	None	B(67)
ST-38	67	67	68	1	A/E	B(67)
ST-39	68	68	68	0	A/E	C(67)
ST-40	67	67	68	1	A/E	B(67)
ST-41	63	63	64	1	None	B(67)
ST-42	68	68	69	1	A/E	B(67)
ST-44	66	66	67	1	A/E	B(67)
ST-45	64	64	65	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.7. Segment 6 – SR 85 – South De Anza Boulevard to Saratoga Avenue

Traffic noise modeling results and predicted traffic noise impacts for Segment 6 is shown in Table 7-7. One long-term measurement (LT-5) and 12 short-term measurements (ST-43, ST-46, ST-47, ST-48, ST-49, ST-50, ST-51, ST-52, ST-53, ST-54, ST-55, and ST-56) were made within this study segment. There are 16 existing barriers within this segment. The worst-hour $L_{eq[h]}$ for the Existing condition, as shown in Table 7-7, ranges from 56 to 67 dBA $L_{eq[h]}$. Under the Future No Build conditions, noise levels at receptor locations would range from 57 to 67 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 1 dBA $L_{eq[h]}$

over Existing conditions, resulting from the additional capacity due to the double express lanes in this segment. The noise level increase is not considered substantial. Future Build noise levels are predicted to approach or exceed the NAC at four modeled receptors in this segment, including some first-row receptors located east of SR 85 between Prospect Road and Saratoga Avenue (LT-5, ST-53, and ST-55) and first-row receptors located east of SR 85 between South De Anza Boulevard and Prospect Road (ST-43). These receptors are all located behind existing 12-foot-high noise barriers. Noise abatement in the form of replacement sound walls of increased height was considered in this area.

Table 7-7: Modeled Noise Levels: South De Anza Boulevard to Saratoga Avenue

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-5	65	65	66	1	A/E	C(67)
ST-43	66	66	67	1	A/E	B(67)
ST-46	62	62	63	1	None	B(67)
ST-47	64	64	65	1	None	B(67)
ST-48	56	57	57	1	None	B(67)
ST-49	60	60	61	1	None	B(67)
ST-50	64	64	65	1	None	B(67)
ST-51	61	61	62	1	None	B(67)
ST-52	63	63	64	1	None	C(67)
ST-53	65	65	66	1	A/E	B(67)
ST-54	61	61	62	1	None	B(67)
ST-55	67	67	68	1	A/E	B(67)
ST-56	62	62	63	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.8. Segment 7 – SR 85 – Saratoga Avenue to Winchester Boulevard

Traffic noise modeling results and predicted traffic noise impacts for Segment 7 is shown in Table 7-8. Fifteen short-term measurements (ST-57, ST-58, ST-59, ST-60, ST-61, ST-62, ST-63, ST-64, ST-65, ST-66, ST-67, ST-68, ST-69, ST-70 and ST-71) were made within this area. Existing barriers shield noise sensitive receptors in Segment 7. As shown in Table 7-8, the worst-hour $L_{eq[h]}$ for the Existing condition range from 51 to 62 dBA $L_{eq[h]}$. Under the Future No Build conditions, noise levels at receptor locations would continue to range from 51 to 62 dBA $L_{eq[h]}$. Under Future Build conditions, noise levels at receptor locations are predicted to range from 52 to 62 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 3 dBA $L_{eq[h]}$ over Existing conditions, resulting from the increased traffic volumes due to the double express lanes in this segment. Noise level increases are not considered substantial at noise sensitive receptors in this segment and none of the noise sensitive receptors are predicted to experience future build noise levels that approach or exceed the NAC. As a result, noise abatement was not considered in this area.

Table 7-8: Modeled Noise Levels: Saratoga Avenue to Winchester Boulevard

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
ST-57	55	55	56	1	None	B(67)
ST-58	62	62	62	0	None	C(67)
ST-59	58	58	59	1	None	B(67)
ST-60	59	59	60	1	None	B(67)
ST-61	51	51	52	1	None	B(67)
ST-62	58	58	59	1	None	B(67)
ST-63	59	59	60	1	None	B(67)
ST-64	59	59	60	1	None	B(67)
ST-65	59	59	62	3	None	B(67)
ST-66	60	60	62	2	None	B(67)
ST-67	56	56	57	1	None	B(67)
ST-68	58	58	59	1	None	B(67)
ST-69	58	58	59	1	None	B(67)
ST-70	60	60	61	1	None	B(67)
ST-71	60	60	61	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.9. Segment 8 – SR 85 – Winchester Boulevard to Union Avenue

Traffic noise modeling results and predicted traffic noise impacts for Segment 8 is shown in Table 7-9. Eleven short-term measurements (ST-72, ST-73, ST-74, ST-75, ST-76, ST-77, ST-78, ST-79, ST-80, ST-81, and ST-82) were made within this area and there is one additional modeled receptor location (ST-74a). This segment contains 11 existing noise barriers, which shield most of the noise sensitive receptors in this area. As shown in Table 7-9, the worst-hour $L_{eq[h]}$ for the Existing condition range from 54 to 69 dBA $L_{eq[h]}$. Under the Future No Build conditions, noise levels at receptor locations would continue to range from 54 to 69 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 2 dBA $L_{eq[h]}$ over Existing conditions. This increase in noise levels is the result of additional traffic volumes resulting in this segment from the double express lanes in this segment. Under Future Build conditions, noise levels at receptor locations are predicted to range from 54 to 70 dBA $L_{eq[h]}$. The noise level increase is not considered substantial. Future build noise levels are predicted to approach or exceed the NAC at the Los Gatos Swim and Racquet Club, represented by receptors ST-74 and ST-74a and located southwest of the SR 85 and SR 17 interchange. Noise abatement in the form of a new sound wall for the Los Gatos Swim and Racquet Club was considered in this area.

Good Samaritan Hospital is located at 2425 Samaritan Drive and is represented by receptor ST-79. No exterior uses were identified at this land use; therefore the Category D NAC would apply. A visual inspection of this Category D land use was made to estimate the noise reduction provided by the building structure. The visual inspection revealed that the building is mechanically ventilated and has fixed windows. This type of construction provides a minimum noise reduction of 30 dBA indoors. Traffic noise modeling results show that exterior noise levels at the façade of the hospital would reach 70 dBA $L_{eq[h]}$ under the Build scenario. Interior noise levels would be expected to be 40 dBA $L_{eq[h]}$ or less. Interior noise levels at this Category D land use do not approach or exceed the NAC of 52 dBA $L_{eq[h]}$.

Table 7-9: Modeled Noise Levels: Winchester Boulevard to Union Avenue

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
ST-72	57	57	59	2	None	B(67)
ST-73	56	56	57	1	None	B(67)
ST-74	65	65	66	1	A/E	C(67)
ST-74a	64	64	65	1	None	C(67)
ST-75	54	54	54	0	None	B(67)
ST-76	57	57	57	0	None	B(67)
ST-77	56	56	57	1	None	B(67)
ST-78	61	61	62	1	None	B(67)
ST-79 [2]	69	69	70	1	--	D(52)
ST-80	62	62	63	1	None	B(67)
ST-81	59	59	60	1	None	B(67)
ST-82	59	59	60	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC
[2] Represents exterior façade of Category D land use.

7.2.10. Segment 9 – SR 85 – Union Avenue to Camden Avenue

Table 7-10 presents the traffic noise modeling results and predicted traffic noise impacts for Segment 9. One long-term measurement (LT-6) and four short-term measurements (ST-83, ST-84, ST-85, and ST-86) were made within this area. Noise sensitive receptors within this segment are shielded behind eight existing barriers. As shown in Table 7-10, the worst-hour $L_{eq[h]}$ for Existing and Future No Build conditions ranges from 57 to 65 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ - noise levels in this segment by 1 dBA $L_{eq[h]}$ over Existing conditions. This increase in noise levels is the result of the additional traffic volume resulting from the double express lanes in this segment. Under Future Build conditions, noise levels at receptor locations are predicted to range from 58 to 66 dBA $L_{eq[h]}$. The noise level increase is not considered substantial. Future build noise levels are predicted to approach or exceed the NAC at one receptor in this segment (ST-83), representing first-row residences located south of SR 85 between Union Avenue and Leigh Avenue. These receptors are located behind an existing 10-foot high noise barrier. Noise abatement in the form of a replacement noise barrier was considered at this location.

Table 7-10: Modeled Noise Levels: Union Avenue to Camden Avenue

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-6	59	59	60	1	None	B(67)
ST-83	65	65	66	1	A/E	B(67)
ST-84	57	57	58	1	None	B(67)
ST-85	61	61	62	1	None	B(67)
ST-86	64	64	65	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.11. Segment 10 – SR 85 – Camden Avenue to Almaden Expressway

The traffic noise modeling results and predicted traffic noise impacts for Segment 10 is shown in Table 7-11. One long-term measurement (LT-7) and 10 short-term measurements (ST-87, ST-88, ST-89, ST-90, ST-91, ST-92, ST-93, ST-94, ST-95, and ST-99) were made within this area. There are six existing barriers within this segment. As shown in Table 7-11, the worst-hour $L_{eq[h]}$ for the Existing and Future No Build conditions range from 54 to 68 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 2 dBA $L_{eq[h]}$ over Existing conditions, as a result of the increased traffic volumes from the double express lanes in most of this segment. Under Future Build conditions, noise levels at receptor locations are predicted to range from 55 to 68 dBA $L_{eq[h]}$. The noise level increase is not considered substantial. Future build noise levels are predicted to approach or exceed the NAC at three modeled receptors in this segment (LT-7, ST-91, and ST-95), representing first-row single-family residences located north of SR 85 between Meridian Avenue and Almaden Expressway. These receptors are located behind an existing noise barrier, which ranges in height from 10 to 14 feet. Noise abatement in the form of a replacement noise barrier was considered for this area.

Table 7-11: Modeled Noise Levels: Camden Avenue to Almaden Expressway

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-7	66	66	67	1	A/E	B(67)
ST-87	64	64	65	1	None	B(67)
ST-88	64	64	65	1	None	B(67)
ST-89	59	59	61	2	None	B(67)
ST-90	58	58	59	1	None	C(67)
ST-91	65	65	66	1	A/E	B(67)
ST-92	62	62	63	1	None	B(67)
ST-93	54	54	55	1	None	B(67)
ST-94	58	58	59	1	None	C(67)
ST-95	68	68	68	0	A/E	B(67)
ST-99	62	62	63	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.12. Segment 11 – SR 85 – Almaden Expressway to Blossom Hill Road

Traffic noise modeling results and predicted traffic noise impacts for Segment 11 is shown in Table 7-12. One long-term measurement (LT-8) and 15 short-term measurements (ST-96, ST-97, ST-98, ST-100, ST-101, ST-102, ST-103, ST-104, ST-105, ST-106, ST-107, ST-108, ST-109, ST-110, and ST-111) were made within this area, and there are three additional modeled receptor locations (ST-102a, ST-102b, and ST-102c). There are eight existing noise barriers within this segment.

As shown in Table 7-12, the worst-hour $L_{eq[h]}$ for the Existing condition ranges from 55 to 71 dBA $L_{eq[h]}$. Under the Future No Build conditions, noise levels at receptor locations would continue to range from 55 to 71 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 2 dBA $L_{eq[h]}$ over Existing conditions. Under Future Build conditions, noise levels at receptor locations are predicted to range from 55 to 71 dBA $L_{eq[h]}$, and are predicted to approach or exceed the NAC at four modeled receptor locations in this segment. The four modeled receptor locations represent multifamily residences located southeast of the interchange between SR 85 and Almaden Expressway (ST-97), first-row single family homes located north of SR 85 between Almaden Expressway and Santa Teresa Boulevard (ST-98), playfields at Gunderson High School (ST-102b), and some first-row single family residences located south of SR 85 between Santa Teresa Boulevard and Blossom Hill Road, near Dunsburry Way (ST-107). With the exception of Gunderson High School, most of these impacted receptors are located behind existing barriers that range in height from 6 to 16 feet. Noise abatement in the form of new and replacement sound walls was considered throughout this area.

Table 7-12: Modeled Noise Levels: Almaden Expressway to Blossom Hill Road

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-8	59	59	59	0	None	B(67)
ST-96	62	62	64	2	None	B(67)
ST-97	65	65	67	2	A/E	B(67)
ST-98	65	65	67	2	A/E	B(67)
ST-100	58	59	60	2	None	B(67)
ST-101	60	60	60	0	None	B(67)
ST-102	64	64	64	0	None	C(67)
ST-102a	59	59	60	1	None	B(67)
ST-102b	71	71	71	0	A/E	B(67)
ST-102c	64	64	65	1	None	B(67)
ST-103	57	57	57	0	None	B(67)
ST-104	61	61	61	0	None	B(67)
ST-105	64	64	64	0	None	B(67)
ST-106	62	62	62	0	None	B(67)
ST-107	66	66	66	0	A/E	B(67)
ST-108	61	61	61	0	None	B(67)
ST-109	64	64	64	0	None	B(67)
ST-110	60	60	60	0	None	B(67)
ST-111	55	55	55	0	None	C(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.13. Segment 12 – SR 85 – Blossom Hill Road to Cottle Road

A summary of the traffic noise modeling results and predicted traffic noise impacts for Segment 12 is shown in Table 7-13. One long-term measurement (LT-9) and 11 short-term measurements (ST-112, ST-113, ST-114, ST-115, ST-116, ST-117, ST-118, ST-119, ST-120, ST-121, and ST-122) were made within this area. Existing barriers shield noise sensitive receptors throughout this segment. As shown in Table 7-13, the worst-hour $L_{eq[h]}$ for the Existing condition ranges from 56 to 64 dBA $L_{eq[h]}$. Under the Future No Build conditions, noise levels at receptor locations are calculated to range from 56 to 65 dBA $L_{eq[h]}$. The Future No Build and Future Build conditions are anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 1 dBA $L_{eq[h]}$ over Existing conditions as a result of traffic volume increases over time. Under Future Build conditions, noise levels at receptor locations are predicted to range from 56 to 65 dBA $L_{eq[h]}$. The noise level increase is not considered substantial and all noise sensitive receptors are predicted to experience Future Build noise levels that are more than 1 dB below the NAC of 67 dBA. As a result, noise abatement was not considered in this area.

Table 7-13: Modeled Noise Levels: Blossom Hill Road to Cottle Road

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-9	63	63	63	0	None	B(67)
ST-112	56	56	56	0	None	B(67)
ST-113	64	64	65	1	None	B(67)
ST-114	57	57	57	0	None	B(67)
ST-115	62	63	63	1	None	B(67)
ST-116	63	63	63	0	None	B(67)
ST-117	64	65	65	1	None	B(67)
ST-118	62	62	62	0	None	B(67)
ST-119	63	64	64	1	None	B(67)
ST-120	63	63	63	0	None	B(67)
ST-121	62	62	62	0	None	B(67)
ST-122	61	62	62	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.14. Segment 13 – SR 85 - Cottle Road to US 101

Traffic noise modeling results and predicted traffic noise impacts for Segment 13 is shown in Table 7-14. One long-term reference measurement (LT-10) and six short-term measurements (ST-123, ST-124, ST-125, ST-126, ST-127 and ST-128) were made within this area. Existing barriers shield noise sensitive receptors. As shown in Table 7-14, the worst-hour $L_{eq[h]}$ for the Existing condition at short-term measurement sites ranges from 54 to 63 dBA $L_{eq[h]}$. The Future No Build and Future Build conditions are anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 1 dBA $L_{eq[h]}$ over Existing conditions as a result of traffic volume increases over time. Under the Future No Build and Future Build conditions, noise levels at receptor locations are calculated to range from 55 to 64 dBA $L_{eq[h]}$. Noise level increases are not considered substantial at noise sensitive receptors in this segment. Future build noise levels are not predicted to approach or exceed the NAC at any noise sensitive receptors located in this segment. As a result, noise abatement was not considered in this area.

Table 7-14: Modeled Noise Levels: Cottle Road to US 101

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
ST-123	59	60	60	1	None	C(67)
ST-124	63	64	64	1	None	C(67)
ST-125	62	63	63	1	None	B(67)
ST-126	54	55	55	1	None	B(67)
ST-127	62	62	63	1	None	B(67)
ST-128	62	62	63	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC

7.2.15. Segment B – US 101 – South of SR 85/US 101 Interchange to Bailey Avenue

Traffic noise modeling results and predicted traffic noise impacts for Segment B are shown in Table 7-15. One long-term reference measurement (LT-11) and eight short-term measurements (ST-129, ST-130, ST-131, ST-132, ST-133, ST-134, ST-135 and ST-136) were made within this area. In addition, ST-136a, ST-136b, and ST-136c were added to the model as non-measurement receptors at residences in the vicinity of ST-136. Receptor ST-137 was also added to the model as a non-measurement receptor representative of the residence west of US 101 between the highway and Coyote Creek Road. As shown in Table 7-15, the worst-hour $L_{eq[h]}$ for the Existing and Future No Build conditions ranges from 56 to 69 dBA $L_{eq[h]}$. The Future Build condition is anticipated to increase the worst-hour $L_{eq[h]}$ noise levels in this segment by 0 to 1 dBA $L_{eq[h]}$ over Existing conditions as a result of traffic volume increases over time. Under the Future Build condition, noise levels at receptor locations are calculated to range from 56 to 70 dBA $L_{eq[h]}$. Noise level increases are not considered substantial at noise sensitive receptors in this segment. Under Future Build conditions, noise levels are predicted to approach or exceed the NAC at three modeled receptor locations in this segment. The three modeled receptor locations represent single-family residences located along Malech Road, northeast of the interchange between US 101 and Bailey Avenue (ST-136a, ST-136b, and ST-136c). Noise abatement in the form of a new sound wall was considered for these receptors.

Table 7-15: Modeled Noise Levels: SR 85 to Bailey Avenue

Receptor ID	Worst Hour Noise Levels, $L_{eq[h]}$ dBA			Noise Increase Over Existing	Impact [1]	Activity Category
	Existing	Future No Build	Future Build			
LT-11	64	64	64	0	None	B(67)
ST-129	56	56	56	0	None	B(67)
ST-130	61	61	61	0	None	B(67)
ST-131	64	64	65	1	None	B(67)
ST-132	60	60	61	1	None	B(67)
ST-133	62	62	63	1	None	C(67)
ST-134	62	62	63	1	None	C(67)
ST-135	64	64	65	1	None	C(67)
ST-136[2]	69	69	70	1	None	G
ST-136a	66	66	67	1	A/E	B(67)
ST-136b	67	67	68	1	A/E	B(67)
ST-136c	66	66	67	1	A/E	B(67)
ST-137	63	63	64	1	None	B(67)

[1] Impact Type: S = Substantial Increase (12 dBA or more), A/E = Approach or Exceed NAC
[2] Used as calibration point for ST-136a, ST-136b, and ST-136c.

7.3. Assessment of Noise Impacts and Abatement Options

Receptors that exceed either state or federal thresholds must be evaluated for potential abatement/mitigation measures. Noise abatement is considered only where frequent human use occurs and where a lowered noise level would be of benefit. Noise abatement must be predicted to provide at least a 5 dB minimum reduction at an impacted receptor to be considered feasible by Caltrans (i.e., the barrier would provide a noticeable noise reduction). Additionally, the Traffic Noise Analysis Protocol acoustical design goal states that the noise barrier must provide at least 7 dB of noise reduction at one or more benefited receptors. Noise abatement measures that provide noise reduction of more than 5 dB are encouraged as long as they meet the reasonableness guidelines.

Potential noise abatement measures identified in the Protocol include:

- Avoiding the project impact by using design alternatives, such as altering the horizontal and vertical alignment of the project;
- Constructing noise barriers;
- Using traffic management measures to regulate types of vehicles and speeds;
- Acquiring property to serve as a buffer zone; and/or
- Acoustically insulating Activity Category D land uses.

The chosen abatement type for this project would be the construction of noise barriers. A preliminary noise abatement analysis was conducted that identified the feasibility of constructing or replacing noise barriers to reduce traffic noise levels.

Traffic noise modeling and impact assessment were conducted only at land uses where frequent human usage occurs and a lowered noise level would be of benefit to receptors. The primary focus of this study is on NAC activity Category B land uses that are not protected by Caltrans noise barriers. The noise barriers within the State right-of-way are typically constructed to meet the criteria in Chapter 1100 of the Highway Design Manual. The manual states that noise barriers should not be higher than 14 feet above the pavement when located within 15 feet of the edge of traveled way and 16 feet above ground when located more than 15 feet from the edge of traveled way.

Noise barriers were evaluated at the most acoustically effective location within the State right-of-way. Where SR 85 is at, or elevated above receptors, the most acoustically effective location for a barrier is near the edge of shoulder, either on structure or at the top of slope. Where SR 85 is located in a cut-section, the most acoustically effective location for a barrier is typically at the right-of-way. In many locations, receptors located behind existing noise barriers experience, or would experience in the future, worst-hour noise levels at that approach or exceed the NAC. Increasing the height of the existing barriers (or replacement with larger noise barriers) was assessed in this analysis. Because all existing walls within the project area are structurally in fair or good condition, a replacement wall of equal height to the existing wall would not be anticipated to change the noise environment behind the wall. Therefore, the insertion loss for these sound walls was calculated based on wall height increases over the existing wall height.

Potential noise barriers are discussed below in detail by study area segment. Once a noise barrier achieved the minimum of a 5-decibel reduction at a given receptor and achieved the 7 dB noise reduction design goal for at least one receptor, the reasonableness allowance was determined. Tables 7-16 through 7-38 show the predicted future build worst-hour noise levels and insertion loss for each barrier at various design heights. Table 7-39 summarizes the insertion loss, benefited receptors, and reasonable allowances for each feasible barrier that also met the 7 dB noise reduction design goal. Feasible barrier locations, as well as measured and modeled receptor locations, are indicated in Appendix C for receptors along the US 101 corridor and Appendix D for receptors along the SR 85 corridor.

7.3.1. Segment A – US 101 – Oregon Expressway to SR 85

Five noise barriers (SW1-SW5) were evaluated in 2008 to abate noise impacts as part of the US 101 Auxiliary Lanes Project NSR (EA 4A330K). These same five noise barriers have been re-labeled for clarification purposes (101-SW1 through 101-SW5). The noise barriers were calculated to reduce noise levels by 0 to 12 decibels at noise-impacted receptors. Tables 7-16 to 7-20 show the Build loudest-hour noise levels and insertion loss (I.L.) for each barrier at various design heights.

<u>Sound Wall 101-SW1:</u> 101-SW1 would be located along the southbound US 101 right-of-way from approximately Station 51+00 to 59+00 as indicated on Sheet 2 of Appendix C. This wall would feasibly abate traffic noise for Greer Park (4 benefited receptors), represented by Receptors R20 and R21. A minimum barrier height of 10 feet would be necessary to be considered feasible, and a minimum height of 12 feet would be required to also meet the noise reduction design goal of 7 dBA for at least one receptor. The reasonable allowance calculated for barriers of 12, 14, and 16 feet is $220,000.

Table 7-16: 101-SW1 Insertion Loss

Receptor ID	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
R20	70	67	3	65	5	64	6	63	7	63	7
R21	69	65	4	64	5	62	7	61	8	61	8

Sound Wall 101-SW2: A 14-foot sound wall (Barrier D) was constructed as part of the Classics at Sterling Park Residential Development along the southbound right-of-way for US 101, extending from approximately Station 77+50 to 89+25. As a result, the existing, future No Build, and Future Build conditions would have noise levels of 66 dBA $L_{eq[h]}$ for R24 and 61 dBA $L_{eq[h]}$ for R25. Even with construction of Barrier D, some receptors behind the wall are calculated to experience noise levels that would approach or exceed the NAC. 101-SW2 analyzes increasing the height of this sound wall to provide a feasible noise reduction. Traffic noise modeling indicates that increasing the wall height from 14 to 16 feet would not further reduce noise levels. 101-SW2 would not achieve a feasible noise reduction.

Table 7-17: 101-SW2 Insertion Loss

Receptor ID	Noise Level With Planned Wall H=14 ft	With Wall H=16 ft	
		$L_{eq[h]}$	I.L.
R24	66	66	0
R25	61	61	0

Sound Wall 101-SW3: 101-SW3 would be located along the southbound US 101 right-of-way south of N. Rengstorff Avenue from approximately Station 169+50 to 177+50. This wall would feasibly abate traffic noise for four single-family homes represented by Receptors R27 and R27A. A minimum barrier height of 8 feet would be required to achieve a feasible noise reduction. A 10-foot barrier would provide at least 7 dBA of noise reduction, meeting the reasonableness design goal. The reasonable allowance calculated for barrier heights of 10 to 16 feet in height is $220,000.

Table 7-18: 101-SW3 Insertion Loss

Receptor ID	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
R27	74	68	6	67	7	65	9	64	10	63	11
R27A	74	68	6	66	8	65	9	64	10	63	11

Sound Wall 101-SW4: 101-SW4 would be located at the southbound US 101 right-of-way south of N. Rengstorff Avenue from approximately Station 183+50 to 188+50. An existing 12-foot wall (Barrier E) shields multi-family residences (indicated on Sheet 6 of Appendix C). Receptors behind the existing wall experience noise levels that exceed the NAC; therefore increasing the height of this wall was studied. It was determined that an increase in height would only reduce noise levels by up to 2 decibels; consequently this barrier was not considered to be feasible.

Table 7-19: 101-SW4 Insertion Loss

Receptor ID	Noise Level With Existing Wall H=12 ft	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
R29	68	67	1	66	2

<u>Sound Wall 101-SW5:</u> 101-SW5 would be located at the right-of-way along the SB US 101 on-ramp from Old Middlefield Road from approximately Station 195+00 to 214+00. An existing 10-foot barrier (Barrier F) shields a residential neighborhood. Receptors behind the existing wall experience noise levels that exceed the NAC; therefore increasing the height of this wall was studied. It was determined that an increase in the height of the barrier would reduce noise levels by up to an additional 4 decibels. Consequently, 101-SW5 was not considered to be feasible.

Table 7-20: 101-SW5 Insertion Loss

Receptor ID	Noise Level With Existing Wall H=10 ft	With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
R30	60	58	2	57	3	56	4
R31	60	58	2	57	3	56	4
R32	62	60	2	59	3	59	3
R33	65	64	1	62	3	61	4
R34	68	66	2	65	3	64	4
R35	68	66	2	65	3	64	4
R36	68	67	1	65	3	64	4
R37	57	57	0	56	1	56	1
R38	58	57	1	57	1	56	2
R39	60	60	0	59	1	59	1
R40	60	60	0	60	0	60	0
R41	64	63	1	62	2	61	3

7.3.2. Segment 1 – SR 85 – US 101 to Central Expressway

Existing barriers shield noise sensitive receptors throughout this segment. Noise level increases are not considered substantial at noise sensitive receptors in this segment and all noise sensitive receptors are predicted to experience future build noise levels that do not approach or exceed the NAC. As a result, noise abatement was not considered in this area.

7.3.3. Segment 2 – SR 85 – Central Expressway to El Camino Real

There are two existing barriers in this segment. Noise level increases are not considered substantial at noise sensitive receptors in this segment. Future build noise levels are predicted to approach or exceed the NAC at single-family residences located east of SR 85 and north of El Camino Real (ST-11). However, the existing noise barrier at this location is already at the maximum allowable height of 16 feet. As a result, noise abatement was not considered in this area.

7.3.4. Segment 3 – SR 85 – El Camino Real to West Fremont Avenue

There are five existing barriers within this segment. Future build noise levels are predicted to approach or exceed the NAC at four modeled receptor locations, including the Stevens Creek Trail (ST-12a), Alta Vista High School and residences located to the west of SR 85 and north of W. Fremont Avenue (ST-19 and ST-20), and at the Sunnyvale Healthcare Center located east of SR 85, just north of West Fremont Avenue (ST-21). Two new barriers, SW1 and SW2, were assessed to abate noise impacts at ST-12a and ST-21. Wall height increases were assessed for the existing 12-foot barrier located along the southbound off-ramp to West Fremont Avenue, SW3, which provides shielding for residences represented by ST-20. The existing noise barrier adjacent to Alta Vista High School and adjacent residences is already constructed to the maximum allowable height of 16 feet. As a result, noise abatement was not considered for receptors represented by ST-19 and ST-20.

Based on preliminary design data, the proposed barriers would reduce noise levels by 0 to 11 decibels at affected receptors. Tables 7-21 to 7-23 show the Future Build worst-hour noise levels and insertion loss for each barrier at various design heights.

Sound Wall SW1: Stevens Creek Trail, the Sahara Mobile Home Park, and single-family residential receptors in the vicinity of Kentmere Court are located west of SR 85 and are not shielded by an existing noise barrier. Worst-hour noise levels are predicted to exceed the Noise Abatement Criteria along Stevens Creek Trail, but not at the residential receptors located further west. A noise barrier was tested for feasibility at the right-of-way line along the western side of the on-ramp from El Camino Real to southbound SR 85 meeting up with the existing barrier located along the southbound right-of-way in this segment.

SW1 would feasibly abate traffic noise levels along the Stevens Creek Trail, represented by ST-12a, and up to 42 first-row single-family residences represented by ST-12 and ST-14. The noise reduction design goal would be met at a minimum height of 10 feet. The noise barrier would not provide a feasible noise reduction at second-row residences represented by ST-12b. The reasonableness allowance calculated for a 10-foot noise barrier is $1,595,000. The reasonableness allowance calculated for barriers ranging from 12 to 16 feet in height is $2,365,000. Table 7-21 summarizes the barrier insertion loss, and Sheets 2 and 3 in Appendix D shows the location of the sound wall.

Table 7-21: SW1 Insertion Loss

Receptor ID	Units Represented	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
			$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-12	28	64	58	6	58	6	57	7	56	8	55	9
ST-12a	1	71	65	6	64	7	62	9	61	10	60	11
ST-12b	21	59	59	0	58	1	57	2	56	3	55	4
ST-14	14	62	58	4	58	4	56	6	55	7	54	8

<u>Sound Wall SW2</u>: The Sunnyvale Healthcare Center, an assisted living and skilled nursing facility, is located east of SR 85 and north of Fremont Avenue and is not shielded by an existing noise barrier. This facility has one common outdoor use area, represented by noise measurement ST-21, located on the west side of the building facing SR 85. Worst-hour noise levels are predicted to exceed the Noise Abatement Criteria at this outdoor use area. A noise barrier was tested for feasibility along the eastern side of the on-ramp from Fremont Avenue to northbound SR 85.

SW2 would feasibly abate traffic noise at the outdoor use area represented by ST-21 and would meet the 7 dB noise reduction design goal at a minimum height of 16 feet. The reasonableness allowance calculated for a 16-foot noise barrier is $55,000. A barrier was also tested along the northbound SR 85 mainline, but was not found to be feasible, as it would not achieve the noise reduction design goal. Table 7-22 summarizes the barrier insertion loss calculations. Sheet 4 in Appendix D shows the location of the sound wall.

Table 7-22: SW2 Insertion Loss

Receptor ID	Units Represented	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
			$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-21	1	71	70	1	67	4	66	5	65	6	64	7

Sound Wall SW3: SW3 is an existing 12-foot noise barrier located along the southbound SR 85 off-ramp to West Fremont Avenue. Some receptors behind the wall still experience noise levels that approach or exceed the NAC of 67 dBA. SW3 analyzes increasing the height of this sound wall. However, increasing the height of this wall would only reduce noise levels by up to 3 decibels; therefore, this barrier is not considered to be feasible. Sheet 4 in Appendix D shows the location of the sound wall.

Table 7-23: SW3 Insertion Loss

Receptor ID	Noise Level w/12ft Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-20	66	65	1	63	3

7.3.5. Segment 4 – SR 85 – West Fremont Avenue to Interstate 280

There are five existing barriers in this segment. Future build noise levels are predicted to approach or exceed the NAC at three modeled receptor locations in this segment (ST-23, ST-24, and ST-25), representing single-family residences located west of SR 85 between West Fremont Avenue and Homestead Road. These receptors are currently shielded by an existing barrier that ranges from 12 to 16 feet in height. Wall increases were assessed for barrier SW4 bringing the entire barrier up to the maximum allowable sound wall height of 16 feet.

Based on preliminary design data, the proposed barrier would reduce noise levels by 0 to 2 decibels at affected receptors. Table 7-24 shows the Future Build worst-hour noise levels and insertion loss for SW4 at a maximum allowable design height of 16 feet.

Sound Wall SW4: SW4 is an existing barrier along the southbound SR 85 right-of-way between West Fremont Avenue and Homestead Road that ranges from 12 to 16 feet in height. Some receptors behind the wall experience noise levels that approach or exceed the NAC of 67 dBA. SW4 was analyzed for a homogeneous increase in height up to the maximum allowable sound wall height of 16 feet. Increasing the height of this wall would only reduce noise levels by up to 3 decibels. As a result, this barrier is not considered to be feasible. Sheets 4 and 5 in Appendix D show the location of the sound wall.

Table 7-24: SW4 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=16 ft	
		$L_{eq[h]}$	I.L.
ST-23	66	63	3
ST-24	68	68	0
ST-25	69	68	1

7.3.6. Segment 5 – SR 85 – Interstate 280 to South De Anza Boulevard

There are seven existing barriers within this segment. In addition, land uses located south of Steven Creek Boulevard are shielded from SR 85 by an earth berm. Future build noise levels are predicted to approach or exceed the NAC at eight modeled receptor locations in this segment, including first-row single and multi-family residences located east of SR 85 between Interstate 280 and Stevens Creek Boulevard (ST-31), De Anza College (ST-34 and ST-36), first-row single family residences located north of South Stelling Road to the east (ST-40) and west (ST-38 and ST-39) of SR 85, and first-row single and multi-family homes located west of SR 85 and north of South De Anza Boulevard (ST-42 and ST-44). Most of these impacted receptors are located behind existing barriers that range in height from 12 to 16 feet. One new barrier, SW5, was assessed to mitigate noise impacts for De Anza College (ST-34 and ST-36). Sound wall height increases were assessed for three additional barriers, SW6, SW7, and SW8 in locations where the existing barrier was below the allowable sound wall height of 14 or 16 feet, depending on its proximity to the edge of traveled way.

Based on preliminary design data, the proposed barriers would reduce noise levels by 1 to 11 decibels at affected receptors. Tables 7-25 through 7-27 show the Future Build worst-hour noise levels and insertion loss for each barrier at various design heights.

Sound Wall SW5: De Anza College is located east of SR 85, between Stevens Creek Boulevard and McClellan Road. The noise monitoring survey identified two outdoor use areas that could benefit from a lowered noise level. The first outdoor use area was a student area represented by ST-34. The second outdoor use area was at a childcare facility represented by ST-36a, which is located behind a 6-foot fence. Receptor location ST-36 was located adjacent to ST-36a, but was not shielded by the fence and is therefore not representative of the noise environment at the childcare center outdoor use area. Worst-hour noise levels are predicted to exceed the NAC at the student area, but not at the outdoor use area for the childcare facility.

SW5 was tested for feasibility along the northbound SR 85 right-of-way between Stevens Creek Boulevard and McClellan Road and was found to feasibly abate traffic noise at the two outdoor use areas represented by ST-34 and ST-36a. The 7 dB noise reduction design goal would be met at a minimum height of 10 feet. Additional indoor classroom uses (Category D) may require additional analysis if exterior noise abatement is not found to be feasible and/or reasonable. The reasonableness allowance calculated for barrier heights of 10 to 16 feet ranges from $55,000 to $110,000. Sheet 6 in Appendix D shows the location of the sound wall.

Table 7-25: SW5 Insertion Loss

Receptor ID	Units Represented	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
			$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-34	1	70	64	6	63	7	63	7	62	8	61	9
ST-36	0	75	70	5	68	7	66	9	65	10	64	11
ST-36a	1	60	57	3	56	4	55	5	55	5	54	6

Sound Wall SW6: SW6 is an existing 14-foot noise barrier located along the southbound SR 85 right-of-way between McClellan Road and South Stelling Road. Even with the shielding provided by SW6, first-row receptors behind the wall, represented by ST-38 and ST-39, would experience noise levels that approach or exceed the NAC of 67 dBA. However, increasing the height of SW6 is calculated to only reduce noise levels by up to 2 decibels. Therefore, this barrier is not considered to be feasible. Sheets 6 and 7 in Appendix D show the location of the sound wall.

Table 7-26: SW6 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=16 ft	
		$L_{eq[h]}$	I.L.
ST-38	68	66	2
ST-39	68	68	0

Sound Wall SW7: SW7 is an existing 11- to 12-foot noise barrier located along the northbound SR 85 right-of-way between McClellan Road and South Stelling Road. Even with the shielding provided by SW7, first-row receptors behind the wall, represented by ST-40, would experience noise levels that approach or exceed the NAC of 67 dBA. However, increasing the height of SW7 is calculated to only reduce noise levels by up to

2 decibels. Therefore, this barrier is not considered to be feasible. Sheets 6 and 7 in Appendix D show the location of the sound wall.

Table 7-27: SW7 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-40	68	67	1	66	2

Sound Wall SW8: SW8 is an existing 12-foot noise barrier located along the southbound SR 85 right-of-way between South Stelling Road and South De Anza Boulevard. Some first-row receptors located behind the existing wall, represented by ST-42 and ST-44, are predicted to experience noise levels that approach or exceed the NAC of 67 dBA. SW8 was analyzed for increases in barrier height, but was calculated to only reduce noise levels by up to 2 decibels. As a result, this barrier is not considered to be feasible. Sheets 7 and 8 in Appendix D show the location of the sound wall.

Table 7-28: SW8 Insertion Loss

Receptor ID	Noise Level w/12ft Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-42	69	68	1	67	2
ST-44	67	66	1	65	2

7.3.7. Segment 6 – SR 85 – South De Anza Boulevard to Saratoga Avenue

Sixteen existing barriers are in this segment. Future build noise levels are predicted to approach or exceed the NAC at four modeled receptors in this segment, including some first-row receptors located east of SR 85 between Prospect Road and Saratoga Avenue (LT-5, ST-53, and ST-55) and first-row receptors located east of SR 85 between South De Anza Boulevard and Prospect Road. These receptors are all located behind existing 12-foot high barriers. Sound wall height increases were assessed for three barriers, SW9, SW10, and SW11, for sound wall heights of 14 and 16 feet.

Based on preliminary design data, the proposed barriers would reduce noise levels by up to 3 decibels at the affected receptors. Tables 7-29 through 7-31 show the Future Build worst-hour noise levels and insertion loss for each barrier at the various barrier heights.

Sound Wall SW9: SW9 is an existing 12-foot noise barrier located along the northbound SR 85 right-of-way between South De Anza Boulevard and Prospect Road. First-row receptors located behind the existing wall and represented by ST-43 are predicted to experience noise levels that approach or exceed the NAC of 67 dBA. SW9 was analyzed by increasing the barrier height to 14 and 16 feet. Barrier height increases for SW9 were calculated to only reduce noise levels by up to 2 decibels. As a result, this barrier is not considered to be feasible. Sheet 8 in Appendix D shows the location of the sound wall.

Table 7-29: SW9 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-43	67	67	0	66	1
ST-48	57	56	1	55	2

Sound Wall SW10: SW10 is an existing 12-foot high noise barrier that provides shielding to receptors located west of SR 85 between Prospect Road and Cox Avenue. Some first-row receptors located behind the existing wall, represented by ST-53 and ST-55, are calculated to experience noise levels that approach or exceed the NAC of 67 dBA. SW10 was analyzed for increases in barrier height, bringing the barrier up to heights of 14 and 16 feet. However, SW10 was calculated to only reduce noise levels by up to 3 decibels. As a result, this barrier is not considered to be feasible. Sheets 8 and 9 in Appendix D show the location of the sound wall.

Table 7-30: SW10 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-51	62	62	0	62	0
ST-53	66	64	2	63	3
ST-55	68	67	1	66	2

Sound Wall SW11: SW11 is an existing 12-foot noise barrier located along the southbound SR 85 right-of-way between Cox Avenue and Saratoga Avenue. This existing barrier provides shielding to single family homes and Congress Springs Park. First-row single-family homes and Congress Springs Park, represented by LT-5, are predicted to experience noise levels that approach the NAC of 67 dBA. SW11 was analyzed by increasing the existing barrier height to 14 and 16 feet. Barrier height increases for SW11 were calculated to only reduce noise levels by 1 to 2 decibels. As a result, this barrier is not considered to be feasible. Sheet 9 in Appendix D shows the location of the sound wall.

Table 7-31: SW11 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
LT-5	66	65	1	64	2

7.3.8. Segment 7 – SR 85 – Saratoga Avenue to Winchester Boulevard

Existing barriers shield noise sensitive receptors throughout this segment. Noise level increases are not considered substantial at noise sensitive receptors and none of the noise sensitive receptors are predicted to experience future build noise levels that approach or exceed the NAC. As a result, noise abatement was not considered in this area.

7.3.9. Segment 8 – SR 85 – Winchester Boulevard to Union Avenue

This segment contains 11 existing barriers, which shield most of the noise-sensitive receptors in this area. Future build noise levels are predicted to approach or exceed the NAC at the Los Gatos Swim and Racquet Club, located southwest of the SR 85 and SR 17 interchange, represented by ST-74 and ST-74a. A new barrier (SW12) was assessed to abate noise impacts. Based on preliminary design data, the proposed barrier would reduce noise levels by 3 to 6 decibels at affected receptors. Table 7-32 shows the Future Build worst-hour noise levels and insertion loss for barrier SW12 at various design heights.

Sound Wall SW12: Worst-hour noise levels at the Los Gatos Swim and Racquet Club are calculated to exceed the Noise Abatement Criteria requiring the consideration of noise abatement. An extension of an existing noise barrier along the southbound SR 85 to southbound SR 17 connector ramp was modeled and found to provide 5 to 6 dB of noise reduction at six tennis courts. The modeling showed that the Caltrans 7 dB noise reduction design goal would not be met at any of the modeled receptors, thus failing the test for reasonableness. Table 7-32 summarizes the insertion loss provided by the noise barrier. Sheet 14 in Appendix D shows the location of the sound wall.

Table 7-32: SW12 Insertion Loss

Receptor ID	Units Represented	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
			$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-74	3	66	62	4	61	5	61	5	60	6	60	6
ST-74a	3	65	62	3	62	3	61	4	61	4	61	4

7.3.10. Segment 9 – SR 85 – Union Avenue to Camden Avenue

Noise sensitive receptors are shielded behind eight existing barriers within this segment. Future build noise levels are predicted to approach or exceed the NAC at one modeled receptor (ST-83), representing first-row residences located south of SR 85 between Union Avenue and Leigh Avenue. These receptors are located behind an existing 10-foot barrier, SW13. Sound wall height increases were assessed for this barrier for heights up to 16 feet.

Based on preliminary design data, the proposed barrier would reduce noise levels by 1 to 2 decibels at the affected receptor. Table 7-33 shows the Future Build worst-hour noise levels and insertion loss for barrier SW13 at various design heights.

Sound Wall SW13: SW13 is an existing 10-foot noise barrier located along the southbound SR 85 right-of-way between Union Avenue and Leigh Avenue. Some first-row receptors located behind the existing wall, represented by ST-83, are predicted to experience noise levels that approach or exceed the NAC of 67 dBA. SW13 was analyzed for increases in barrier height, but was calculated to only reduce noise levels by up to 2 decibels. As a result, this barrier is not considered to be feasible. Sheet 15 in Appendix D shows the location of the sound wall.

Table 7-33: SW13 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-83	66	65	1	65	1	64	2

7.3.11. Segment 10 – SR 85 – Camden Avenue to Almaden Expressway

There are six existing barriers within this segment. Future build noise levels are predicted to approach or exceed the NAC at three modeled receptors (LT-7, ST-91, and ST-95), representing first-row single-family residences located north of SR 85 between

Meridian Avenue and Almaden Expressway. These receptors are located behind an existing barrier, SW14, which ranges in height from 10 to 14 feet. Sound wall height increases were assessed for this barrier, bringing the entire barrier up to a height of 16 feet.

Based on preliminary design data, the proposed barrier would reduce noise levels by up to 2 decibels at the affected receptors. Table 7-34 shows the Future Build worst-hour noise levels and insertion loss barrier SW14 at the maximum allowable height of 16 feet.

Sound Wall SW14: SW14 is an existing 10 to 14-foot high noise barrier located along the northbound SR 85 right-of-way between Meridian Avenue and Almaden Expressway. Some first-row receptors located behind the existing wall and represented by LT-7, ST-91, and ST-95, are predicted to experience noise levels that approach or exceed the NAC of 67 dBA. SW14 was analyzed for an increase in the barrier height bringing the entire barrier up to a height of 16 feet. Barrier height increases for SW14 were calculated to only reduce noise levels by up to 2 decibels. As a result, this barrier is not considered to be feasible. Sheet 17 in Appendix D shows the location of the sound wall.

Table 7-34: SW14 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=16 ft	
		$L_{eq[h]}$	I.L.
LT-7	67	65	2
ST-91	66	64	2
ST-93	55	55	0
ST-95	68	68	0

7.3.12. Segment 11 – SR 85 – Almaden Expressway to Blossom Hill Road

There are eight existing barriers within this segment. Future build noise levels are predicted to approach or exceed the NAC at four modeled receptor locations in this segment, including multifamily residences located southeast of the interchange between SR 85 and Almaden Expressway (ST-97) first-row single family homes located north of SR 85 between Almaden Expressway and Santa Teresa Boulevard (ST-98), Gunderson High School (ST-102b), and some first-row single family residences located south of SR 85 between Santa Teresa Boulevard and Blossom Hill Road, near Dunsburry Way (ST-107). Most of these impacted receptors are located behind existing barriers that range in height from 6 to 16 feet. One new barrier, SW17, was assessed to mitigate noise impacts for Gunderson High School (ST-102, ST-102a, ST-102b, and ST-102c). Sound wall height increases were assessed for three additional barriers, SW15, SW16 and SW18, in locations where the existing barrier was below the allowable sound wall height of 14 or 16 feet, depending on its proximity to the edge of traveled way.

Based on preliminary design data, the proposed barriers would reduce noise levels by 0 to 10 decibels at affected receptors. Tables 7-35 through 7-39 show the Future Build worst-hour noise levels and insertion loss for each barrier at various design heights.

<u>Sound Wall SW15:</u> SW15 is an existing 6-foot high noise barrier located south of SR 85 and east of Almaden Expressway, on structure and at the edge of the roadway shoulder. First-row multifamily receptors, represented by ST-96, receive shielding by the SR 85 bridge structure and would be exposed to noise levels below the NAC. Some second row receptors, represented by ST-97, do not receive as much acoustical shielding as the first-row receptors and are predicted to experience noise levels that approach or exceed the NAC of 67 dBA. SW15 was analyzed for increases in barrier height from 8 to 16 feet, but was not calculated to provide any additional reduction in noise levels. As a result, this barrier is not considered to be feasible. Sheet 18 in Appendix D shows the location of the sound wall.

Table 7-35: SW15 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-96	64	63	1	63	1	63	1	63	1	63	1
ST-97	67	67	0	67	0	67	0	67	0	67	0

<u>Sound Wall SW16:</u> SW16 is an existing 6-foot high noise barrier located north of SR 85 and extending, on structure, from the off-ramp to Almaden Expressway along the SR 85 mainline and along the SR 85 on-ramp from Santa Teresa Boulevard. Some first-row multifamily receptors, represented by ST-98 are calculated to experience noise levels that approach or exceed the NAC of 67 dBA. SW16 was analyzed for increases in barrier height from 8 to 16 feet and was calculated to reduce noise levels by up to 1 decibel. Therefore, this barrier is not considered to be feasible. Sheet 18 in Appendix D shows the location of the sound wall.

Table 7-36: SW16 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-98	67	67	0	67	0	67	0	67	0	67	0
ST-100	60	59	1	59	1	59	1	59	1	59	1

Sound Wall SW17: Gunderson High School, located northeast of the SR 85/SR 87 interchange, includes several outdoor playfields that adjoin SR 85. Worst-hour noise levels modeled at ST-102b indicate that the Noise Abatement Criteria would be exceeded in the large playfield directly adjacent to SR 85, requiring the consideration of noise abatement.

A noise barrier was tested for feasibility along the right-of-way of the northbound SR 85 connector to northbound SR 87. The proposed barrier would feasibly abate traffic noise for three baseball fields (represented by ST-102 and ST-102a), a large playfield (represented by ST-102b), eight tennis courts, and 10 basketball courts (represented by ST-102c). The 7 dB noise reduction design goal would be met at a minimum height of 10 feet. The reasonableness allowance calculated for barrier heights of 10 to 16 feet ranges from $1,100,000 to $1,155,000. Sheets 18 and 19 in Appendix D show the location of the sound wall.

Table 7-37: SW17 Insertion Loss

Receptor ID	Units Represented	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
			$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-102	1	64	60	4	60	4	59	5	59	5	59	5
ST-102a	2	60	56	4	56	4	56	4	56	4	56	4
ST-102b	2	71	65	6	64	7	63	8	62	9	61	10
ST-102c	18	65	60	5	60	5	59	6	59	6	58	7

Sound Wall SW18: Noise sensitive receptors located south of SR 85, between Santa Teresa Boulevard and Blossom Hill Road, are shielded from SR 85 by existing barriers that range in height from 12 to 16 feet. Many of these receptors are calculated to experience noise levels below the NAC of 67 dBA. However, some first-row single-family residences, located behind the 12-foot high barrier segment and represented by ST-107, are calculated to experience noise levels that approach or exceed the NAC. SW18 was analyzed for increases in barrier height from 14 to 16 feet, but was calculated to only reduce noise levels by up to 2 decibels. As a result, this barrier is not considered to be feasible. Sheet 19 in Appendix D shows the location of the sound wall.

Table 7-38: SW18 Insertion Loss

Receptor ID	Noise Level w/Existing Wall	With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-107	66	65	1	64	2
ST-108	61	60	1	59	2
LT-8	59	58	1	58	1

7.3.13. Segment 12 – SR 85 – Blossom Hill Road to Cottle Road

Existing barriers shield noise sensitive receptors throughout this segment. Noise level increases are not considered substantial at noise sensitive receptors and future build noise levels are not predicted to experience that approach or exceed the NAC at noise sensitive receptors. As a result, noise abatement was not considered in this area.

7.3.14. Segment 13 – SR 85 – Cottle Road to US 101

Existing barriers shield noise sensitive receptors throughout this segment. Noise level increases are not considered substantial and future build noise levels are not predicted to approach or exceed the NAC at any noise sensitive receptors. As a result, noise abatement was not considered in this area.

7.3.15. Segment B – US 101 – South of SR 85/US 101 Interchange to Bailey Avenue

Sound Wall 101-SW6: 101-SW6 would be located along the northbound US 101 right-of-way from approximately Station 461+85 to 447+70. Three residences, located along Malech Road and represented by ST-136a, ST-136b, and ST-136c, are calculated to experience noise levels that approach or exceed the NAC of 67 dBA. 101-SW6 was analyzed for barrier heights from 8 to 16 feet, but was calculated to only reduce noise levels by up to 4 decibels. Therefore, this barrier is not considered to be feasible. Sheets 25 and 26 in Appendix D show the location of the sound wall analyzed for noise abatement purposes.

Table 7-39: 101-SW6 Insertion Loss

Receptor ID	Noise Level w/o Wall	With Wall H=8 ft		With Wall H=10 ft		With Wall H=12 ft		With Wall H=14 ft		With Wall H=16 ft	
		$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.	$L_{eq[h]}$	I.L.
ST-136a	67	65	2	65	2	64	3	64	3	64	3
ST-136b	68	65	3	65	3	65	3	64	4	64	4
ST-136c	67	65	2	64	3	63	4	63	4	63	4

7.4. Reasonable Criteria

The determination of the reasonableness of noise abatement is more subjective than the determination of its feasibility. As defined in Section 772.5 of the regulation, reasonableness is the combination of social, economic, and environmental factors considered in the evaluation of a noise abatement measure.

The overall reasonableness of noise abatement is determined by the following three factors.

- The noise reduction design goal (a barrier must be predicted to provide at least 7 dB of noise reduction at one or more benefited receptors).
- The cost of noise abatement (2011 allowance of $55,000 per benefited receptor).
- The viewpoints of benefited receptors (including property owners and residents of the benefited receptors).

The Project Development Team will make the proposed noise abatement decisions that will be incorporated into the final environmental documentation. The final decision to include noise barriers in the proposed project design must consider reasonableness factors, such as cost effectiveness, as well as other feasibility considerations including topography, access requirements, other noise sources, safety, and information developed during the design and public review process. Furthermore, the views of impacted residents will be a major consideration in reaching a decision on the reasonableness of abatement measures to be provided. As discussed previously, a NADR will be prepared for the project and recommendations of this report will be incorporated into the draft environmental document for public review. Any proposed changes to the noise abatement decision subsequent to adoption of the final environmental document must be reviewed with the Caltrans noise specialists to ensure adequate acoustic performance.

The final decision on the noise barriers will be made after completion of the public involvement process during the final project design process.

Table 7-40 lists the feasible barriers and summarizes the reasonable allowance calculations made for each feasible noise barrier that met the 7 dB noise reduction design goal.

Table 7-40: Summary of Barrier Feasibility and Reasonable Allowances

Sound Wall ID	Approximate Stationing / Location	Type of Analysis	Barrier Height (feet)	Insertion Loss (dBA)	Number of Benefited Receptors	Total Reasonable Monetary Allowance
101-SW1	SB 51+00 to 59+00	New Wall	12	6 to 7	4	$220,000
			14	7 to 8	4	$220,000
			16	7 to 8	4	$220,000
101-SW3	SB 169+50 to 177+50	New Wall	10	7 to 8	4	$220,000
			12	9	4	$220,000
			14	10	4	$220,000
			16	11	4	$220,000
SW1	SB ROW El Camino Real to Existing Noise Barrier (2,925 feet)	New Wall	10	6 to 7	29	$1,595,000
			12	6 to 9	43	$2,365,000
			14	7 to 10	43	$2,365,000
			16	8 to 11	43	$2,365,000
SW2	NB On-Ramp Fremont Avenue to Existing Noise Barrier (450 feet)	New Wall	16	7	1	$55,000
SW5	NB ROW McClellan Road to Stevens Creek Boulevard (2,490 feet)	New Wall	10	7	1	$55,000
			12	5 to 7	2	$110,000
			14	5 to 8	2	$110,000
			16	6 to 9	2	$110,000
SW17	NB ROW SR 85 to SR 87 Connector (1,675 feet)	New Wall	10	5 to 7	20	$1,100,000
			12	5 to 8	21	$1,155,000
			14	5 to 9	21	$1,155,000
			16	5 to 10	21	$1,155,000

Chapter 8. Construction Noise

Components of the project are described in detail in Chapter 2. Noise generated by project-related construction activities would be a function of the noise levels generated by individual pieces of construction equipment, the type and amount of equipment operating at any given time, the timing and duration of construction activities, the proximity of nearby sensitive land uses, and the presence or lack of shielding at these sensitive land uses. Construction noise levels would vary on a day-to-day basis during each phase of construction depending on the specific task being completed. In general, noise levels at receptors nearest the project alignment would not be substantially higher than ambient traffic noise levels during the day or night. However, certain construction techniques such as pile driving would generate high, impulsive noise levels that would be substantially higher than existing traffic noise levels and would exceed the absolute noise level limits established by Caltrans and local jurisdictions.

8.1. Construction Phasing and Noise Levels

Construction phases anticipated with the project would include demolition, earthwork, the installation of utilities, construction of noise barriers that are found to be feasible and reasonable, paving, and the installation of overhead signs and tolling devices. The majority of project construction activities would occur in the median of SR 85, a minimum of approximately 75 feet from the right-of-way. The majority of Category B Receptors located adjacent to SR 85 are afforded shielding by existing noise barriers typically ranging from 10 to 16 feet in height. These existing noise barriers would provide a minimum 10 dBA reduction in construction noise levels for those activities occurring on the opposite side of the barrier.

In the section between SR 87 and I-280, where the median width is approximately 46 feet, pavement widening would be conducted in the median to accommodate the second express lane. The median would be paved, and the existing three-beam barrier would be replaced with a Type 60 concrete barrier. In the areas where the median width is less than 46 feet, widening would occur in the available median width. No outside widening is currently proposed. SR 85 bridge decks would be widened at Almaden Expressway (northbound side only), Camden Avenue, Oka Road, Pollard Road, and Saratoga Avenue, as well as at the San Tomas Aquino Creek and Saratoga Creek crossings. The existing gaps between the northbound and southbound bridges at these locations would be closed except at Almaden

Expressway, where the northbound bridge would be widened on the inside (toward the median).

Conversion of the HOV lanes into single express lanes on SR 85 between US 101 in southern San Jose and SR 87 and between I-280 and US 101 in Mountain View would include restriping and installation of overhead signs and tolling devices in the median. The single express lane would continue in both directions of US 101 in southern San Jose and would include the installation of overhead signs in the median.

Overhead signs and tolling devices would be installed in the median. The overhead signs and tolling devices would be mounted on cantilever structures supported on cast-in-drilled-hole or driven piles. The piles for the overhead signs would be from 3 to 6 feet in diameter and extend to approximately 30 feet below ground surface. The piles for the tolling devices would be 1 to 2 feet in diameter and would extend to approximately 10 feet below ground surface. Some Traffic Operations Systems (TOS) equipment such as traffic monitoring stations, Closed Circuit Televisions (CCTVs), cabinets, and controllers would be installed along the outside edge of pavement within the existing right-of-way. Maintenance pullouts would be installed in shoulder areas to allow access to the TOS equipment. The specific locations of these features would be developed during final project design.

Trenching would be conducted along the outside edge of pavement for installation of conduits. The depth of trenching would be approximately 3 to 5 feet below the roadway surface. Conduits would be jacked across the freeway to the median where needed to provide power and communication feeds to the new overhead signage and tolling equipment.

Each construction phase would require a different combination of construction equipment necessary to complete the task and differing usage factors for such equipment.

Construction noise would primarily result from the operation of heavy construction equipment and arrival and departure of heavy-duty trucks. The highest maximum instantaneous noise levels would result from special impact tools such as impact pile drivers used to install the piles that would support the overhead signs. FHWA's Roadway Construction Noise Model (RCNM) was used to calculate the maximum and average noise levels anticipated during each phase of construction. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Vehicles and equipment anticipated during each phase of construction were input into RCNM to calculate noise levels at a distance of 100 feet. Table 8-1 presents the construction noise levels calculated for each major phase of the project. In some instances, maximum instantaneous noise levels are calculated to be slightly lower than hourly average noise levels. This occurs because maximum instantaneous noise levels generated by multiple pieces of construction equipment are not likely to occur at the same time. Hourly average noise levels resulting from multiple pieces of construction equipment would be additive resulting in slightly higher calculated noise levels. Noise generated by construction equipment drops off at a rate of 6 dB per doubling of distance.

Table 8-1. Construction Equipment Noise Levels at 100 feet

Construction Phase	Maximum Noise Level (Lmax, dBA)	Hourly Average Noise Level ($L_{eq[h]}$, dBA)
Demolition	84	78
Earthwork	76	78
Paving	79	79
Structures (with Pile Driving)	95	89
Structures (without Pile Driving)	77	78

8.2. Regulatory Criteria

Caltrans Standard Specifications, or any special requirements developed during the project design phase, would regulate noise from project construction activities. Section 14-8.02 (Noise Control) of the Caltrans Standard Specifications states:

- Do not exceed 86 dBA at 50 feet from the job site activities from 9 p.m. to 6 a.m. Use an alternative warning method instead of a sound signal unless required by safety laws.

- Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

Typically, work taking place within the Caltrans right-of-way is not subject to local noise ordinances; however, Caltrans will work with the contractor to meet local requirements where feasible. The following discussion details relevant local regulatory criteria.

Palo Alto

The City of Palo Alto allows construction operations between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday, and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday. Construction is not allowed on Sundays. Construction, demolition or repair activities during allowable hours must meet the following standards:

- No individual piece of equipment shall produce a noise level exceeding one hundred ten dBA at a distance of twenty-five feet. If the device is housed within a structure on the property, the measurement shall be made out-side the structure at a distance as close to twenty-five feet from the equipment as possible.

- The noise level at any point outside of the property plane of the project shall not exceed one hundred ten dBA.

- The holder of a valid construction permit for a construction project in a non-residential zone shall post a sign at all entrances to the construction site upon commencement of construction, for the purpose of informing all contractors and subcontractors, their employees, agents, materialmen and all other persons at the construction site, of the basic requirements of this chapter.

Mountain View

According to Mountain View City Code, "No construction activity shall commence prior to 7:00 a.m. nor continue later than 6:00 p.m., Monday through Friday, nor shall any work be permitted on Saturday or Sunday or holidays unless prior written approval is granted by the building official."

Sunnyvale

Title 16, Chapter 16.08 of the Sunnyvale Municipal Code presents the following construction noise regulations:

- Construction activity shall be permitted between the hours of 7:00 a.m. and 6:00 p.m. daily Mondays through Fridays. Saturday hours of operation shall be between 8:00 a.m. and 5:00 p.m. There shall be no construction activity on Sundays or national holidays when city offices are closed.

- No loud environmentally disruptive noises, such as air compressors without mufflers, continuously running motors or generators, loud playing musical instruments, radios, etc. will be allowed where such noises may be a nuisance to adjacent residential neighborhoods.

Cupertino

The City of Cupertino regulates noise within the community in Chapter 10.48 (Community Noise Control) of the Municipal Code. Construction noise is limited as follows:

- A. Grading, construction and demolition activities shall be allowed to exceed the noise limits of Section 10.48.040 during daytime hours; provided, that the equipment utilized has high-quality noise muffler and abatement devices installed and in good condition, and the activity meets one of the following two criteria:
    - No individual device produces a noise level more than eighty-seven dBA at a distance of twenty-five feet (7.5 meters); or
    - The noise level on any nearby property does not exceed eighty dBA.
- B. Notwithstanding Section 10.48.053A, it is a violation of this chapter to engage in any grading, street construction, demolition or underground utility work within seven hundred fifty feet of a residential area on Saturdays, Sundays and holidays, and during the nighttime period, except as provided in Section 10.48.030.

Saratoga

Construction noise is regulated in the Saratoga Municipal Code, Section 7-30.060. This section exempts construction from the specific noise level requirements in the municipal code as long as noise generated by construction does not exceed 83 dBA at any point 25 feet from the noise source, and construction is limited to 7:30 a.m. to 6:00 p.m. Monday through Friday with no construction activities occurring on Saturdays, Sundays, or holidays.

Los Altos

The Los Altos Municipal Code prohibits construction activities occurring on weekdays before 7:00 a.m. and after 7:00 p.m. and on Saturdays before 9:00 a.m. or after 6:00 p.m. or any time on Sundays or the city observed holidays if construction noise creates a disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by special exception. The Municipal Code also states that where technically and economically feasible, construction activities shall be conducted in such a manner that the maximum noise levels at affected residential properties will not exceed 75 dBA L_{max} between 7:00 a.m. and 7:00 p.m. daily except Sundays and legal holidays. Maximum instantaneous noise levels at adjacent office and commercial land uses should not exceed 85 dBA L_{max}.

San Jose

The City of San Jose requires construction operations to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. Allowable construction hours are 7:00 a.m. to 7:00 p.m., Monday through Friday.

8.3. Construction Noise Impacts

Roadway construction activities typically occur for relatively short periods of time as construction proceeds along the project's alignment. Construction noise would mostly be of concern in areas where impulse-related noise levels from construction activities would be concentrated for extended periods of time, where noise levels from individual pieces of equipment are substantially higher than ambient conditions, or when construction activities would occur during noise-sensitive early morning, evening, or nighttime hours.

Construction of the project is anticipated to occur during daytime and nighttime hours. As indicated above in Table 8-1, most construction phases would generate average noise levels that would exceed ambient daytime noise levels by 5 to 10 dBA $L_{eq[h]}$. Receptors shielded by noise barriers would be exposed to a similar increase in noise albeit at overall noise levels about 10 dBA lower because the shielding provided by the existing noise barriers would attenuate construction noise at a similar rate. Demolition involving impact tools or pile driving would generate average noise levels approximately 15 to 20 dBA $L_{eq[h]}$ higher than ambient noise conditions.

Maximum instantaneous noise levels generated by typical construction activities would generally be at or below existing maximum noise levels generated by traffic. Shielding provided by existing noise barriers along the corridor would reduce maximum instantaneous noise levels from the majority of construction phases, with the exception of construction phases involving impact tools, such that noise levels would not be expected to exceed the quantitative noise limits established by the Cities of Palo Alto, Cupertino, Saratoga, and Los Altos.

8.4. Construction Noise Mitigation Measures

To reduce the potential for noise impacts resulting from project construction, the following measures should be implemented during project construction.

- Noise-generating construction activities shall be restricted to the allowable hours of construction as identified by local jurisdictions where feasible. Construction is generally allowed to start at 7:00 a.m., Monday through Friday, in most of the communities along the SR 85 corridor. Construction start times are 7:30 a.m. and 8:00 a.m., respectively, in Saratoga and Palo Alto. Construction activities should end by 6:00 p.m., Monday through Friday, in most of the communities along the SR 85 corridor with the exception of Los Altos and San Jose, which allow construction to continue to 7:00 p.m. Sunnyvale allows construction between 8:00 a.m. and 5:00 p.m. on Saturdays. Palo Alto and Lost Altos allow construction between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction activities should occur on Sundays or holidays. If work is necessary outside of these hours, Caltrans shall require the contractor to implement a construction noise monitoring program and, if feasible, provide additional mitigation as necessary (in the form of noise control blankets or other temporary noise barriers, etc.) for affected receptors.

- Pile driving activities should be limited to daytime hours only.

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

- Unnecessary idling of internal combustion engines within 100 feet of residences should be strictly prohibited.

- Locate stationary noise generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area.

- Utilize "quiet" air compressors and other "quiet" equipment where such technology exists.

- Prohibit unnecessary idling of internal combustion engines within 100 feet of residences.

- Avoid staging of construction equipment within 200 feet of residences and locate all stationary noise-generating construction equipment, such as air compressors, portable power generators, or self-powered lighting systems as far practical from noise sensitive receptors.

- Require all construction equipment to conform to Section 14-8.02, Noise Control, of the latest Standard Specifications.

- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities and distribute this plan to adjacent noise-sensitive receptors. The construction plan should also list the construction noise reduction measures identified in this study.

Chapter 9. References

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Wilbur Smith Associates, Technical Memorandum SR 85 Express Lanes Travel Demand Forecasts – December 11, 2011.

Chapter 10. List of Preparers

Illingworth & Rodkin, Inc. completed this NSR under contract to URS. The following individuals had substantial roles in the preparation of this report:

- Michael Thill (Illingworth & Rodkin, Inc. — Senior Consultant, Principal) - Project Manager, noise measurements, data analysis, traffic noise modeling and report preparation.
- Joshua Carman (Illingworth & Rodkin, Inc. — Staff Consultant) - Data analysis, traffic noise modeling and report preparation.
- Dana Lodico (Lodico Acoustics LLC) - Data analysis, traffic noise modeling and report preparation.
- Chris Peters (Illingworth & Rodkin, Inc. — Technician) - Traffic noise measurements.
- Richard B. Rodkin (Illingworth & Rodkin, Inc. — Senior Consultant) – Project oversight and review.

Appendix A
Definitions of Technical Terms

Definitions of Technical Terms

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.
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.

Appendix B
Site Photos

Appendix B Site Photographs 1-25

ST-1: Front yard of 751 San Carlos Avenue.

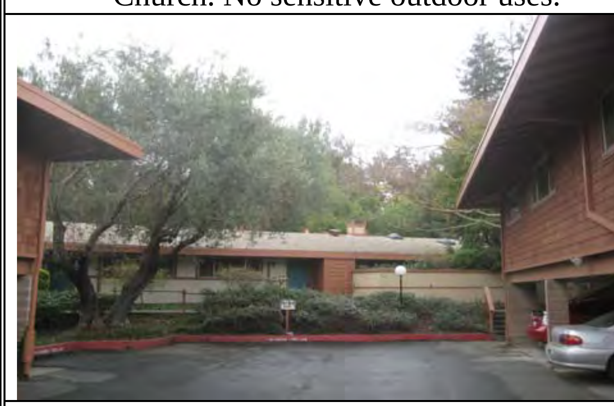
ST-2: Rear Yard of 861 San Luppe Drive.

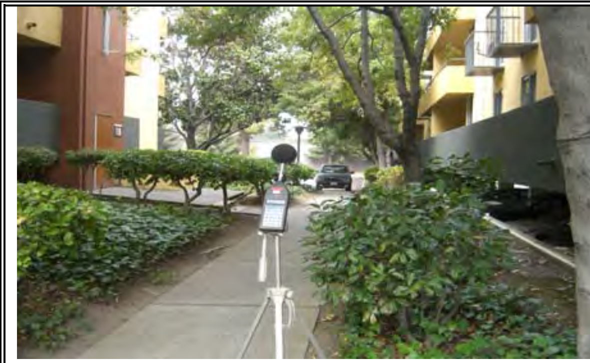
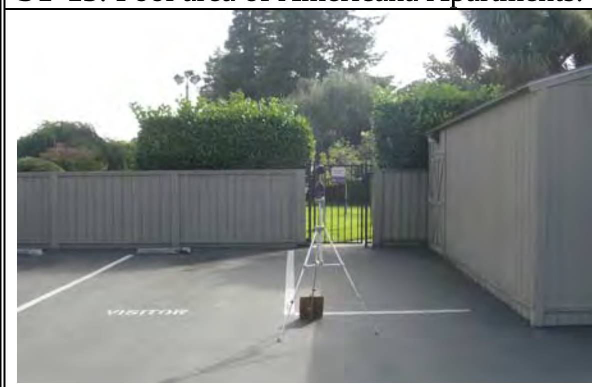
ST-3: 500 W. Middlefield Road - Willow Creek Apartments.

ST-4: Equivalent to pool/common area of 500 W. Middlefield Road.

ST-5: Alamo Court Park.

ST-6: West end of Creekside Park. Representative of park and adjacent residential apartments.

	
ST-7: 179 B Central Avenue condos.	**ST-8:** 117 Easy Street – Church of Scientology.
No Photo Available	
ST-9: 120 Pioneer Way – Jehovah's Witness Church. No sensitive outdoor uses.	**ST-10**: Avalon Apartments.
	
ST-11: Equivalent to apartments adjoining SR 85 along Alice Avenue.	**ST-12**: 150 Kings Row in Sahara Mobile Home Park.

	
ST-13: Pool area of Americana Apartments.	**ST-14**: Park along Franklin Avenue.
	
ST-15: 1240 Dale - Delmonico Apartments.	**ST-16**: Rear yard of 1317 Brook Place. Measurement made in rear yard.
	
ST-17: Rear yard of 877 Heatherstone - Heatherstone Apartments.	**ST-18**: End of Mockingbird Lane.

	
ST-19: Alta Vista High School at setback of nearest classrooms to SR 85. Equivalent to Lubich Drive residential rear yards.	**ST-20**: Rear yard of 1429 Brookmill Road. Measurement made in rear yard.
	
ST-21: Bernardo Avenue - Assisted living facility, adjacent to outdoor use area.	**ST-22**: Front of 1090 Butte Court.
	
ST-23: Rear yard of 1272 Brookings.	**ST-24**: Equivalent to 1112/1113 The Dalles Ave.

	
ST-25: Rear yard of 1624 Bellville Way.	

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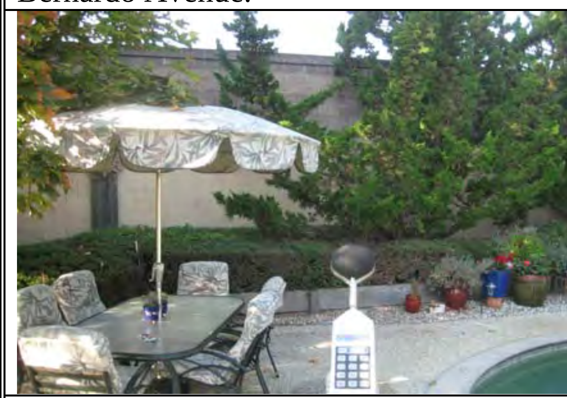
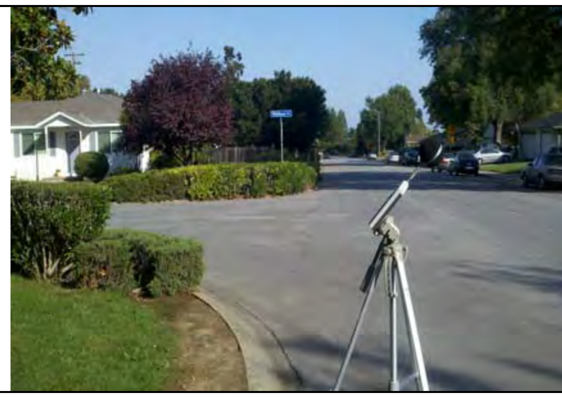
ST-26: Equivalent to rear yard of 1494 S. Bernardo Avenue.

ST-27: 10901 Maxine Avenue.



ST-28: Rear yard of 1739 Banff Drive.

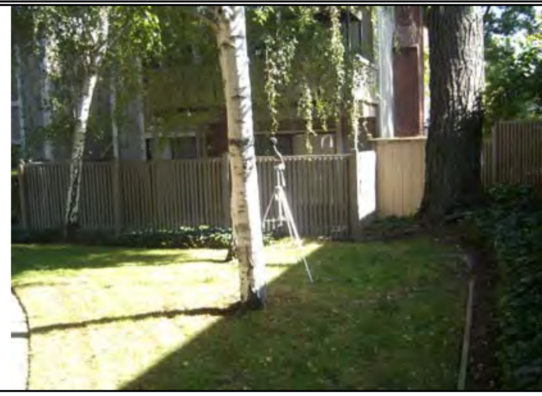


ST-29: Front yard of 10760 Maxine Avenue.

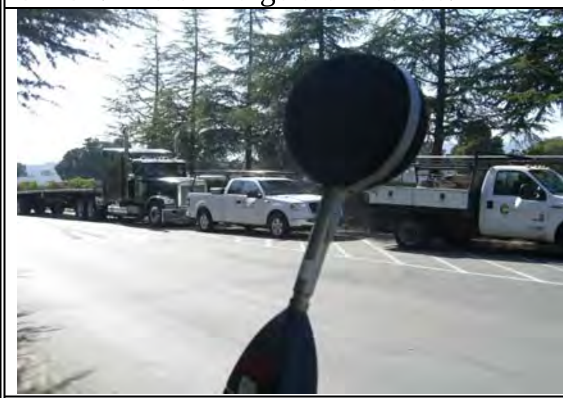
ST-30: 10700 Stokes Avenue - Somerset Park. Receptor outside of study area.

ST-31: Small park next to Casa de Anza Apartments on Mary Avenue.

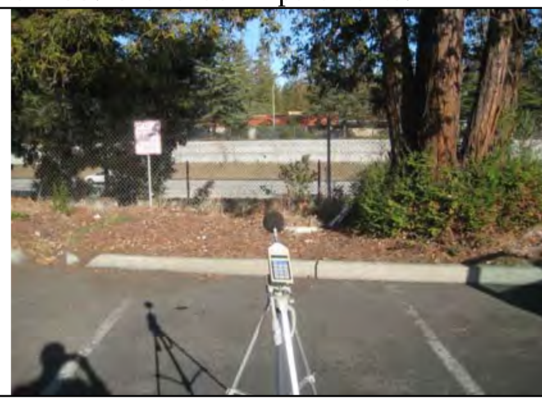
ST-32: End of Fitzgerald Avenue.



ST-33: Glenbrook Apartments.



ST-34: De Anza College, Campus Dr.



ST-35: Home of Christ Church on Bubb Street No sensitive outdoor uses.

ST-36: South end of Campus Drive - Child Development Center.

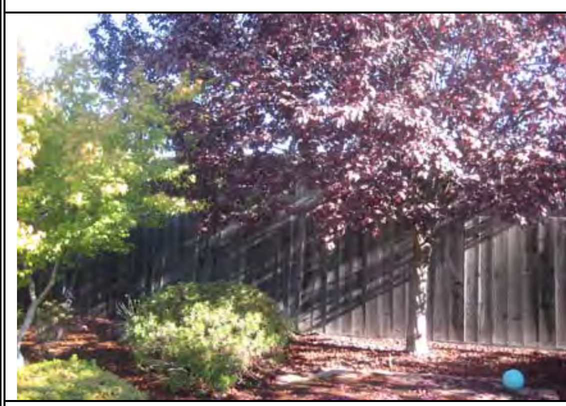
ST-37: Rear yard of 826 September Drive.

ST-38: Equivalent to rear yard of 7855 Festival Drive.

ST-39: Park across from 7704 Orogrande Place.

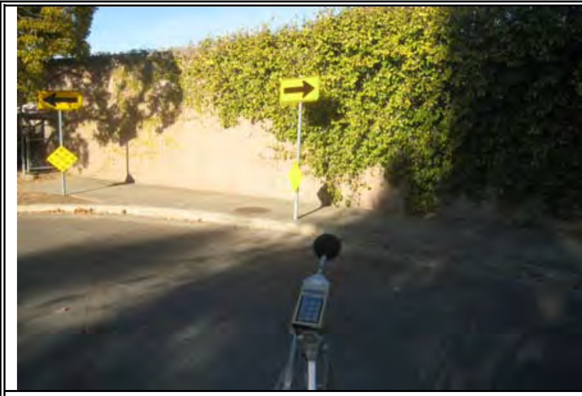
ST-40: Rear yard of 7726 Tonki Court.

ST-41: Rear yard of 1101 Kentwood Avenue.

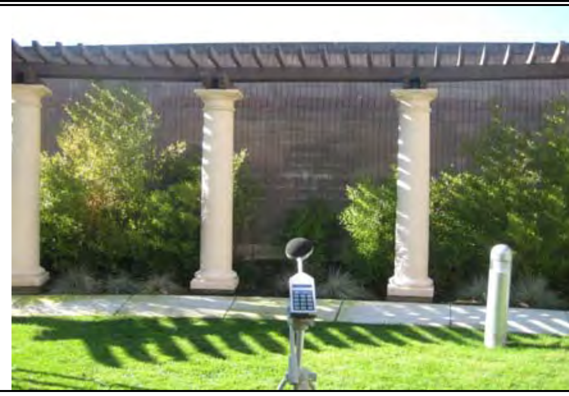


ST-42: Rear yard of 114 Scotland Drive.

ST-43: 7150 Rainbow Drive, Building 1.



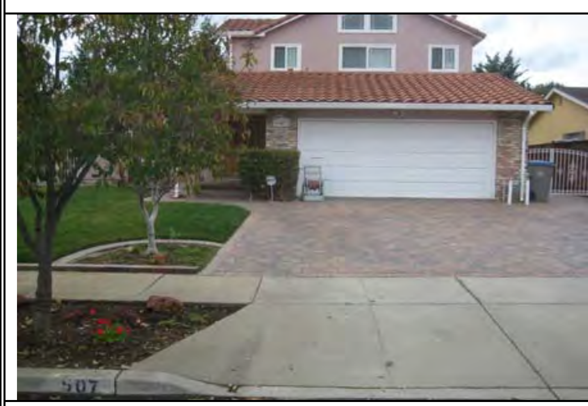
ST-44: Gardenside Lane at Kingsbury Place. Equivalent to outdoor use areas of residences.



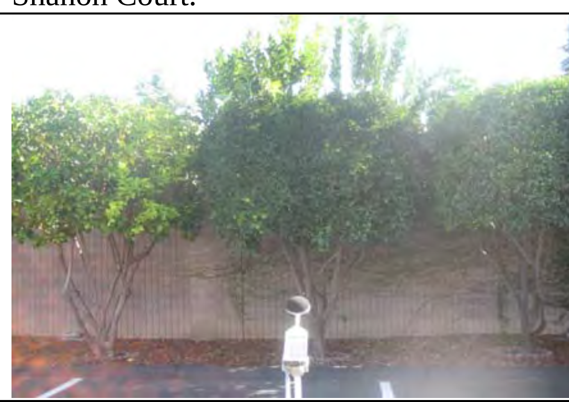
ST-45: Water Lily Way - townhomes.

ST-46: Rear yard of 20167 Pampas Court.

ST-47: Equivalent to rear yard of 7168 Shanon Court.



ST-48: 1507 Eddington Place.



ST-49: Prospect Corners Apartments.

	
ST-50: Rear yard of 19782 Solana Drive.	

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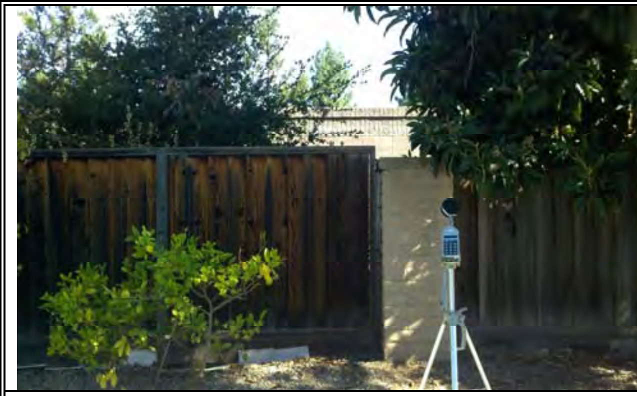
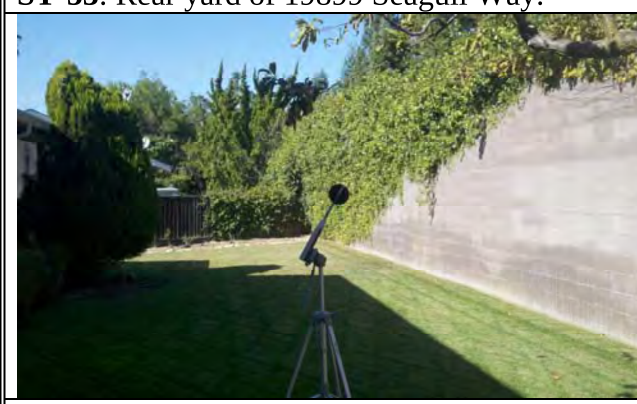
	
ST-51: Rear yard of 20159 Marilla Court.	**ST-52**: South corner of Kevin Moran Park.
	
ST-53: Rear yard of 19899 Seagull Way.	**ST-54**: 13149 Anza Court.
	
ST-55: Rear yard of 19729 Yuba Court.	**ST-56**: Front yard of 19201 Vineyard Lane – Vineyards of Saratoga condos.

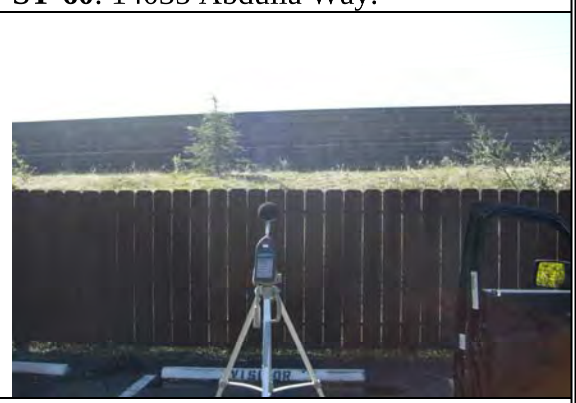
ST-57: 19110 Bonnet Way. Represents both rear yards and front yards.

ST-58: Park across from 18906 Bellgrove Circle.

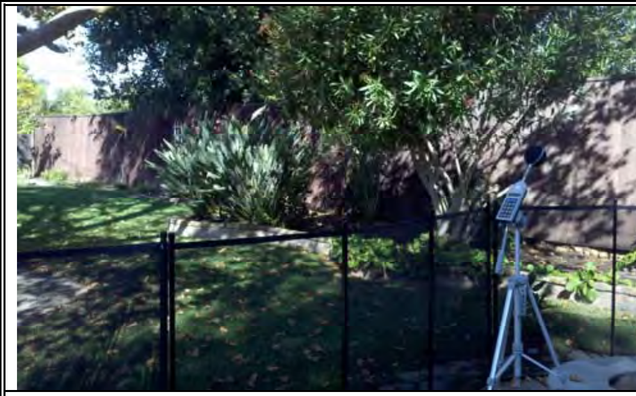
ST-59: Alvarado Place.

ST-60: 14035 Abdulla Way.

ST-61: Rear yard of 18581 Lyons Court.



ST-62: 5104 Westmont Avenue – Hacienda Quito Apartments.



ST-63: Rear yard of 18669 Casa Blanca Lane.

ST-64: Rear yard of 1380 Elwood Drive.

ST-65: 5036 Pinetree Terrace – Roundtree Apartments.

ST-66: Los Gatos Estates on Pollard Road.

ST-67: Palmer Drive apartments, swimming pool.

ST-68: Equivalent to residential yards at end of Mulberry Avenue.

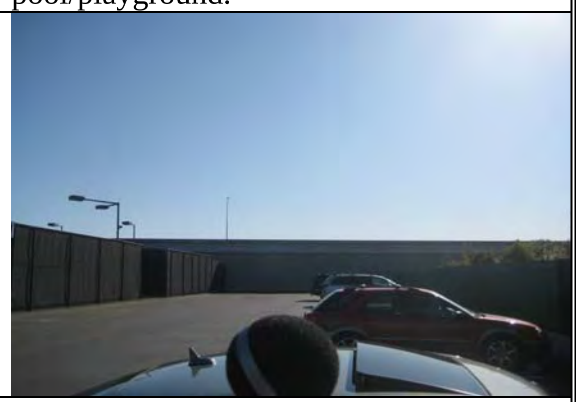
ST-69: Equivalent to rear yard of 748 Pollard Road.

ST-70: Elmwood Court apartments.

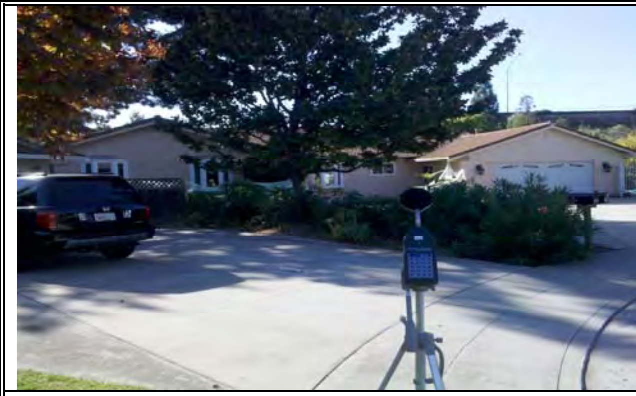
ST-71: End of Del Loma Drive.

ST-72: Aventino Apartments, pool/playground.

ST-73: Bonnie View mobile home park, #58.



ST-74: Los Gatos Swim and Racquet Club. Tennis courts.

	
ST-75: Front yard of 106 Pso Laura Court.	

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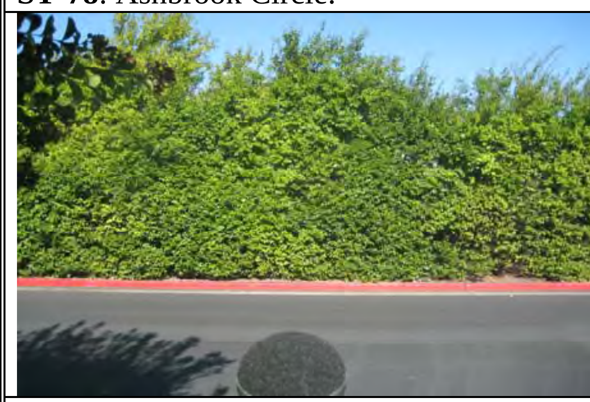
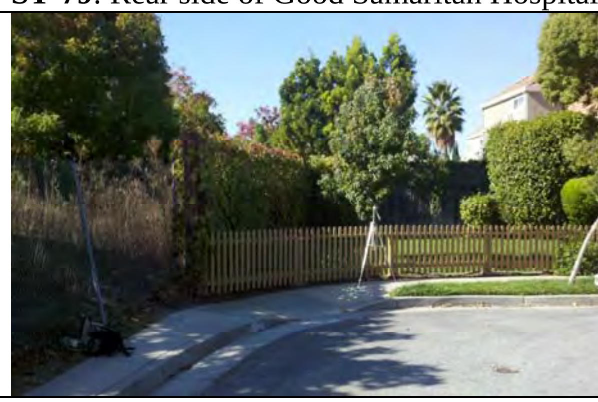
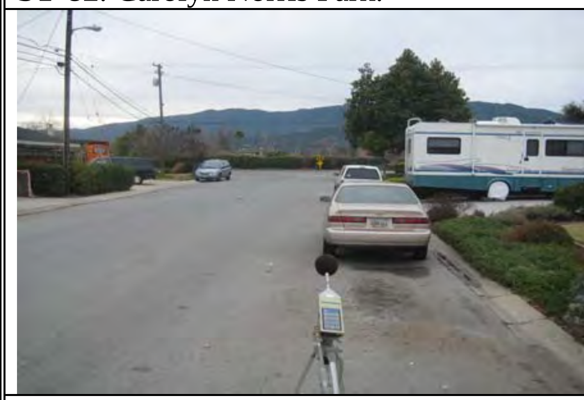
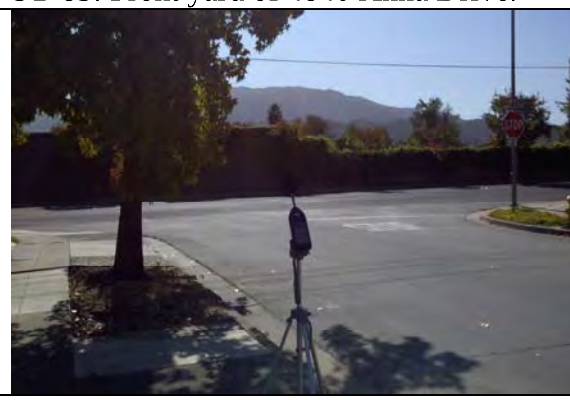
ST-76: Across from 16260 Burton Road.	**ST-77**: 16160 East Mozart Avenue.
	
ST-78: Ashbrook Circle.	**ST-79**: Rear side of Good Samaritan Hospital.
	
ST-80: Equivalent to 2313 Clydelle Avenue.	**ST-81**: Equivalent to rear yard of 4643 Marbella Drive.

ST-82: Carolyn Norris Park.

ST-83: Front yard of 4840 Anna Drive.



ST-84: Standish Drive.



ST-85: Equivalent to rear yard of 4794 Sally Drive.

ST-86: Rosswood Drive.

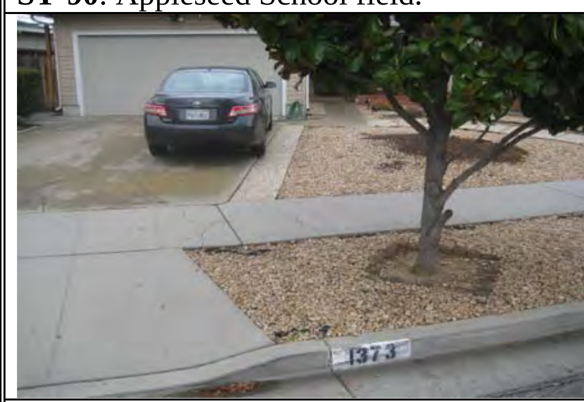
ST-87: Lawson Court, rear patio.

ST-88: Rear yard of 1599 Rebel Way. Measurement made in rear yard.

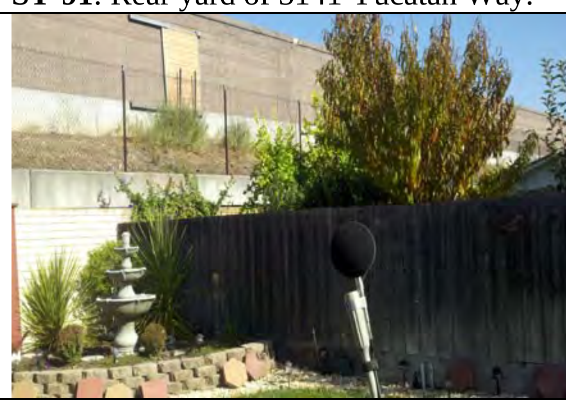
ST-89: 5055 Dent Avenue.

ST-90: Appleseed School field.

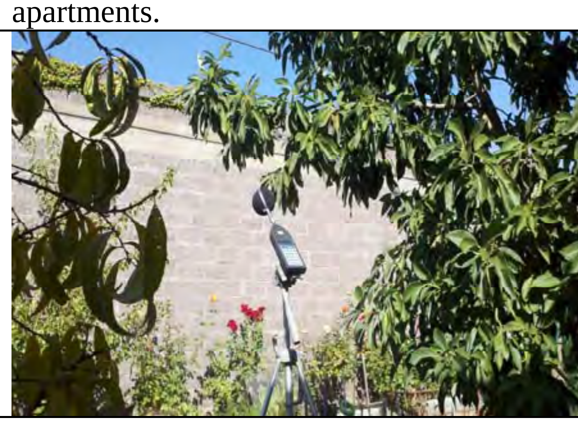
ST-91: Rear yard of 5141 Yucatan Way.

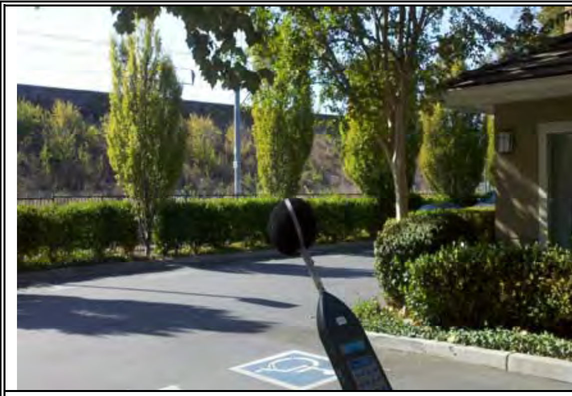


ST-92: Rear yard of 1373 Dentwood Drive. Measurement made in rear yard.

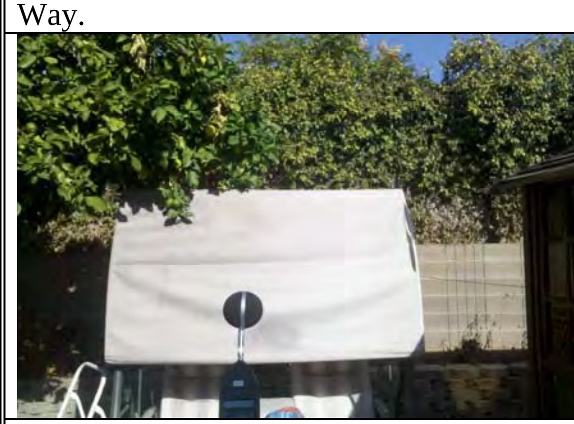


ST-93: Rear yard of 5098 Tifton Way.

	
ST-94: 5304 Ayrshire, equivalent to school playground.	**ST-95**: Russo Park.
	
ST-96: Sanchez Drive.	**ST-97**: 5403-5435 Sanchez Drive – apartments.
	
ST-98: Rear yard of 5283 Fell Avenue.	**ST-99**: Rear yard of 1265 Dentwood Drive.

	
ST-100: 5220 Terner Way, setback of Ohlone Court apartments.	

Appendix B Site Photographs 101-136

	
ST-101: Rear yard of 5371 Glenbury Way.	**ST-102**: Gunderson High School, baseball field.
	
ST-103: In cul-de-sac near 772 Glenburry Way.	**ST-104**: End of Rutherglen Place, rear yard pool.
	
ST-105: Rear yard of 685 Glenbury Way, patio.	**ST-106**: Rear yard on Gaundebert Lane.

ST-107: Rear yard of 579 Glenburry Way.

ST-108: Rear yard of 5452 Chesbro Avenue.

ST-109: Rear yard of 5536 Chesbro Avenue.

ST-110: Front yard of 495 Velasco Drive.

ST-111: 425 Don Fernando Way - Kinderwood Children's Center.

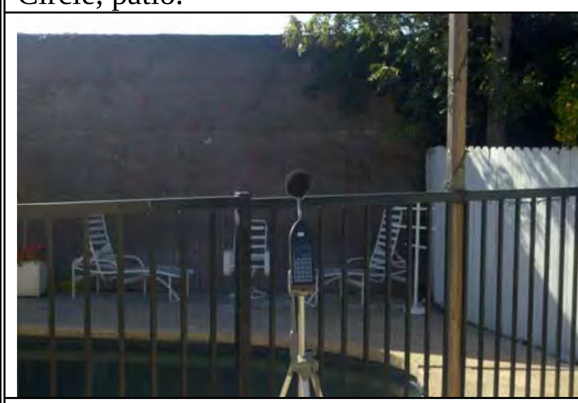
ST-112: Rear yard of 5614 New Court.

ST-113: Rear yard of 5684 Crow Lane.

ST-114: Front yard of 5787 Ribchester Court.

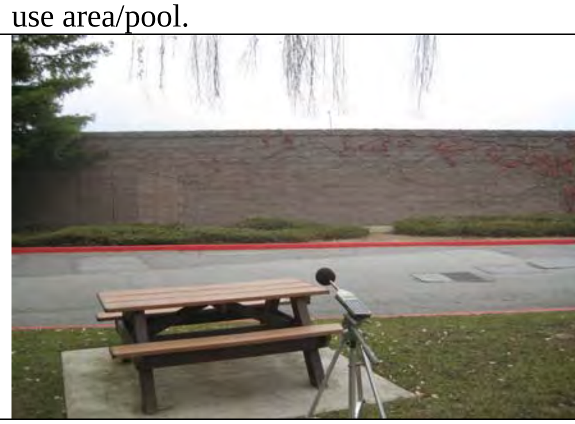
ST-115: Rear yard of 5733 Hillbright Circle, patio.

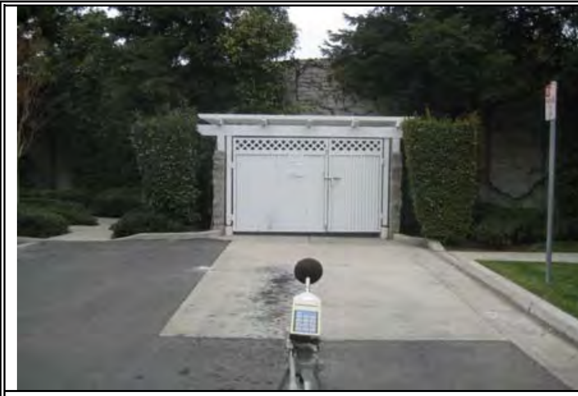
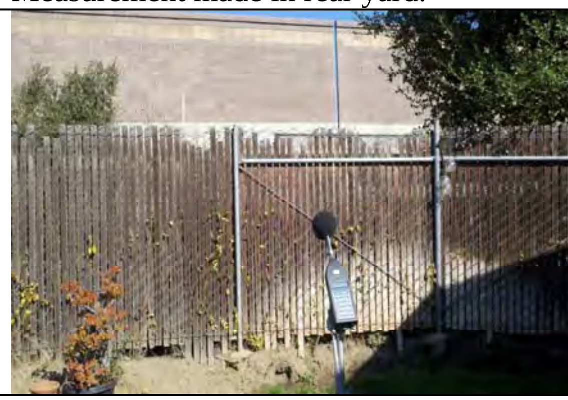
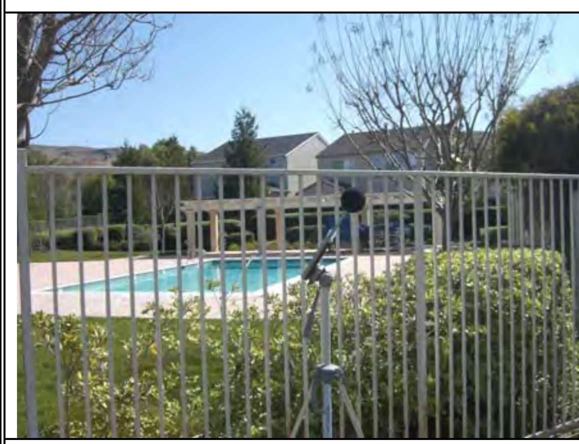
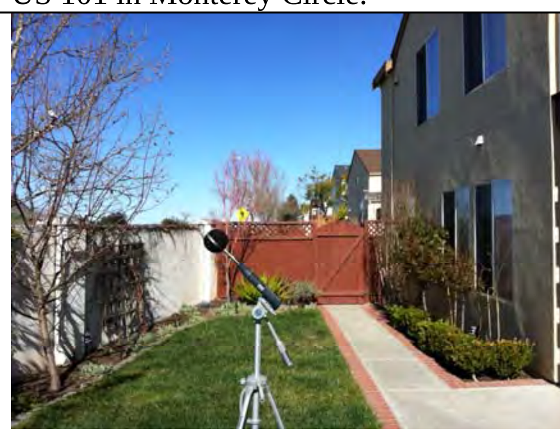
ST-116: Rear yard of 5834 Bridle Way. Measurement made in rear yard.

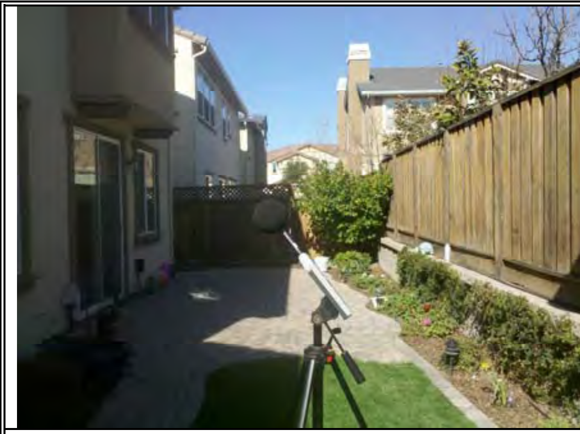


ST-117: Rear yard of 5871 Herma Street.

ST-118: Rear yard of 5874 Bufkin Court. Measurement made in rear yard.

	
ST-119: Rear yard of 294 Herlong Avenue. Measurement made in rear yard.	**ST-120**: Rear yard of 5858 Treetop Court.
	
ST-121: End of Pala Mesa Drive.	**ST-122**: Palm Valley townhomes, common use area/pool.
	
ST-123: Kaiser Permanente, picnic area.	**ST-124**: Kaiser Permanente, picnic area.

	
ST-125: End of Holly Gillingham Lane.	**ST-126**: 5983 South Breeze Court. Measurement made in rear yard.
	
ST-127: Monterey Grove Apartments.	**ST-128**: Setback of mobile homes nearest US 101 in Monterey Circle.
	
ST-129: Swimming pool at 449 Danna Court.	**ST-130**: Rear yard of 404 Birkhaven Place.

	
ST-131: Rear yard of 7032 Basking Ridge Avenue.	**ST-132**: Rear yard of 7406 Basking Ridge Avenue.
	
ST-133: Coyote Creek Trail near Metcalf Park.	**ST-134**: Parkway Fishing Lakes.
	
ST-135: Parkway Fishing Lakes.	**ST-136**: Equivalent to residences on Malech Road.

Appendix C
US 101 Receptor Locations and Noise Barriers

LEGEND

RECIEVER LOCATION	SFR	–SINGLE FAMILY RESIDENCE
FEASIBLE SOUNDWALL	MFR	–MULTI–FAMILY RESIDENCE
EXISTING SOUNDWALL	COMM	–COMMERCIAL

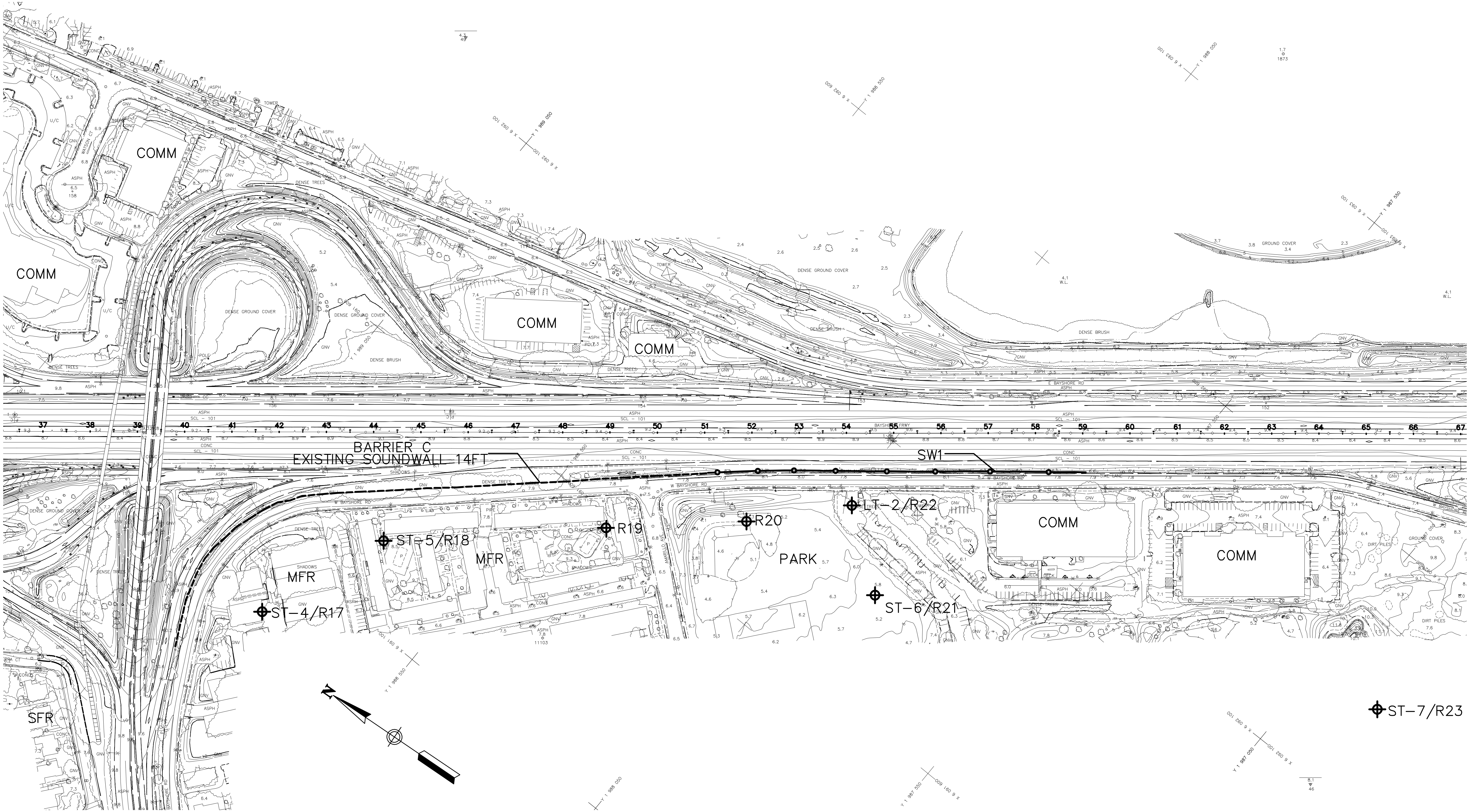
1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILIARY LANES SENSITIVE RECEIVER & NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 1 OF 7



LEGEND

- RECIEVER LOCATION
- FEASIBLE SOUNDWALL
- EXISTING SOUNDWALL

SFR —SINGLE FAMILY RESIDENCE

MFR —MULTI-FAMILY RESIDENCE

COMM —COMMERCIAL

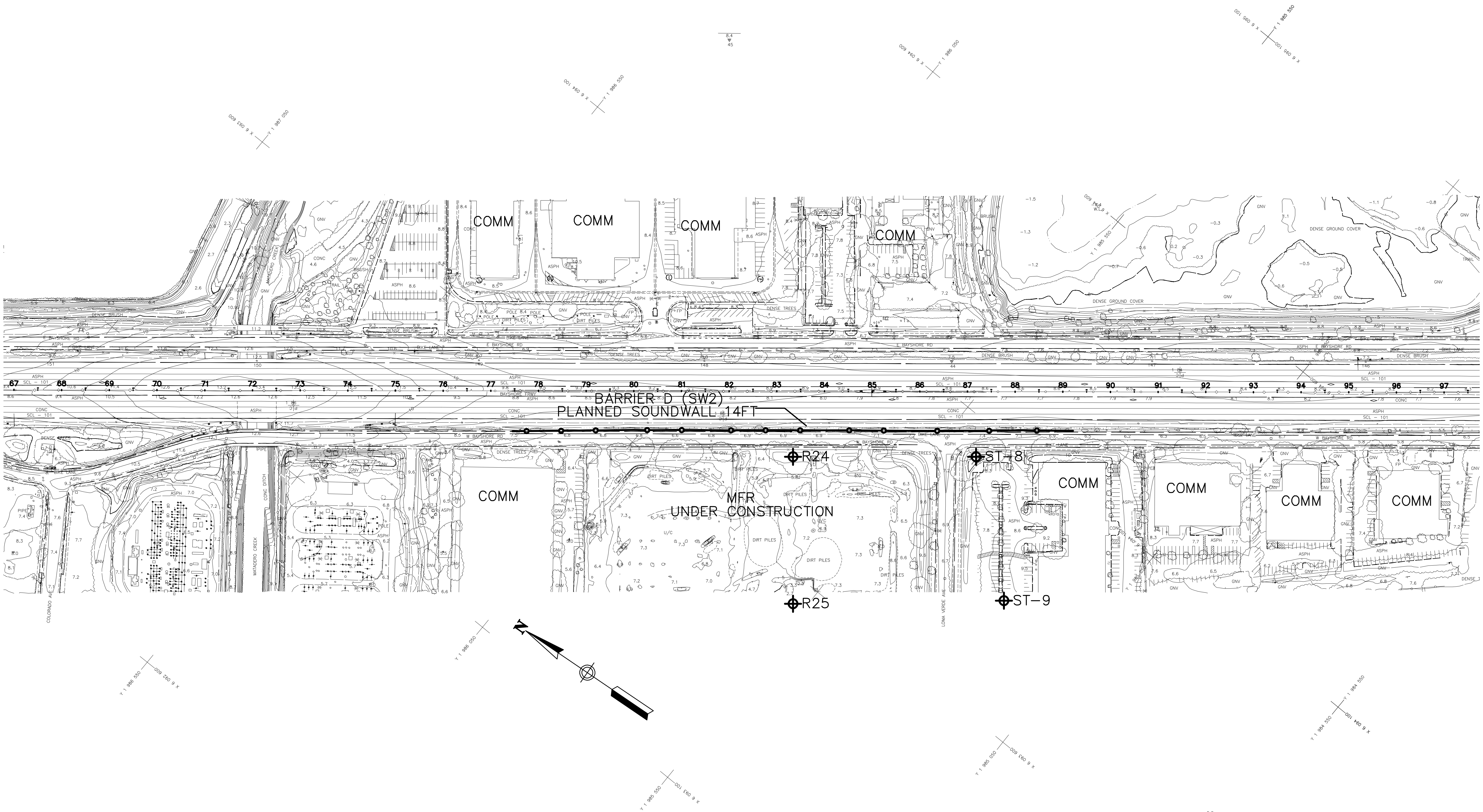
1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILIARY LANES SENSITIVE RECEIVER & NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 2 OF 7



LEGEND

- RECIEVER LOCATION
- FEASIBLE SOUNDWALL
- EXISTING SOUNDWALL

SFR —SINGLE FAMILY RESIDENCE

MFR —MULTI-FAMILY RESIDENCE

COMM —COMMERCIAL

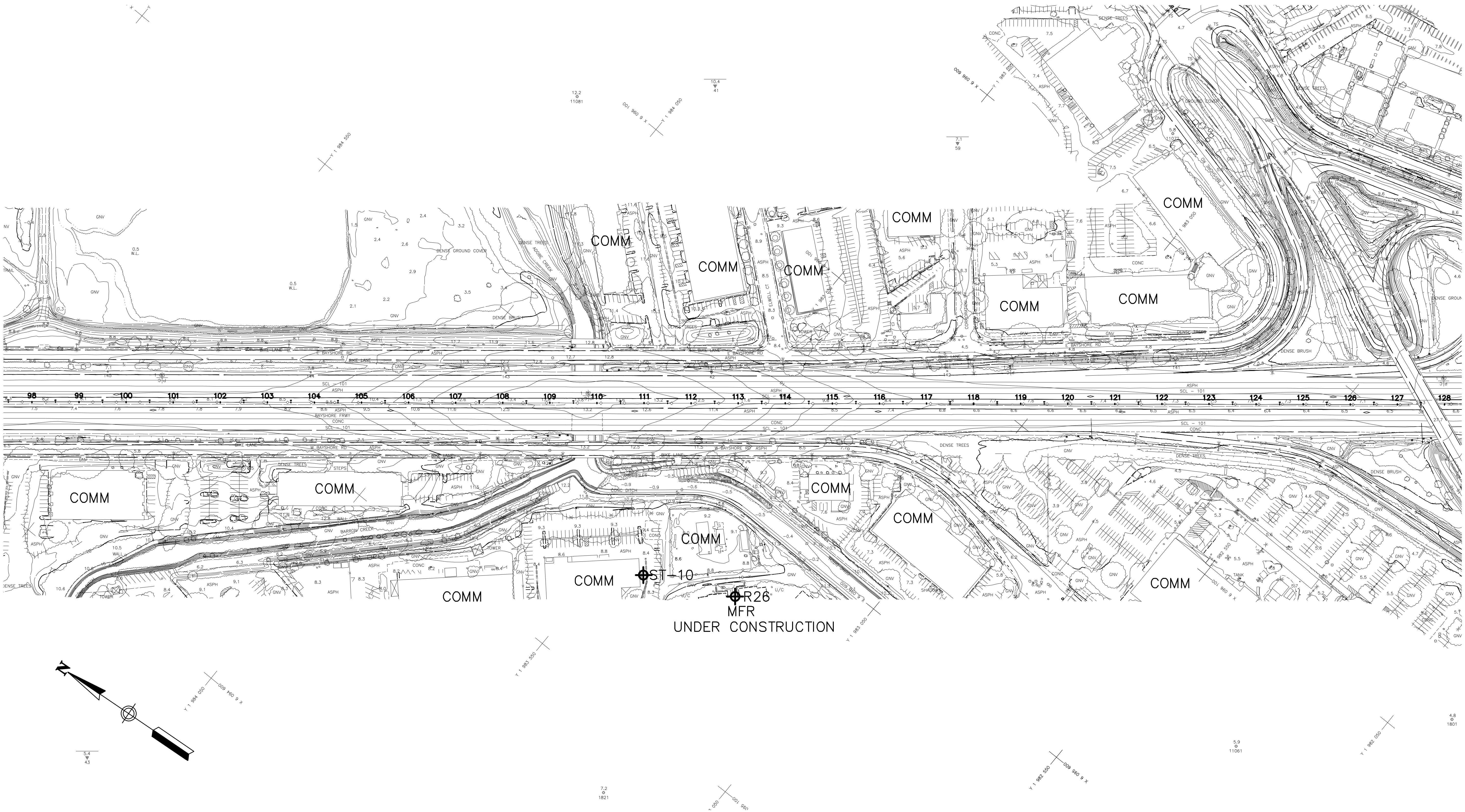
1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILIARY LANES
SENSITIVE RECEIVER &
NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 3 OF 7



LEGEND

RECIEVER LOCATION	
FEASIBLE SOUNDWALL	
EXISTING SOUNDWALL	

SFR	–SINGLE FAMILY RESIDENCE
MFR	–MULTI–FAMILY RESIDENCE
COMM	–COMMERCIAL

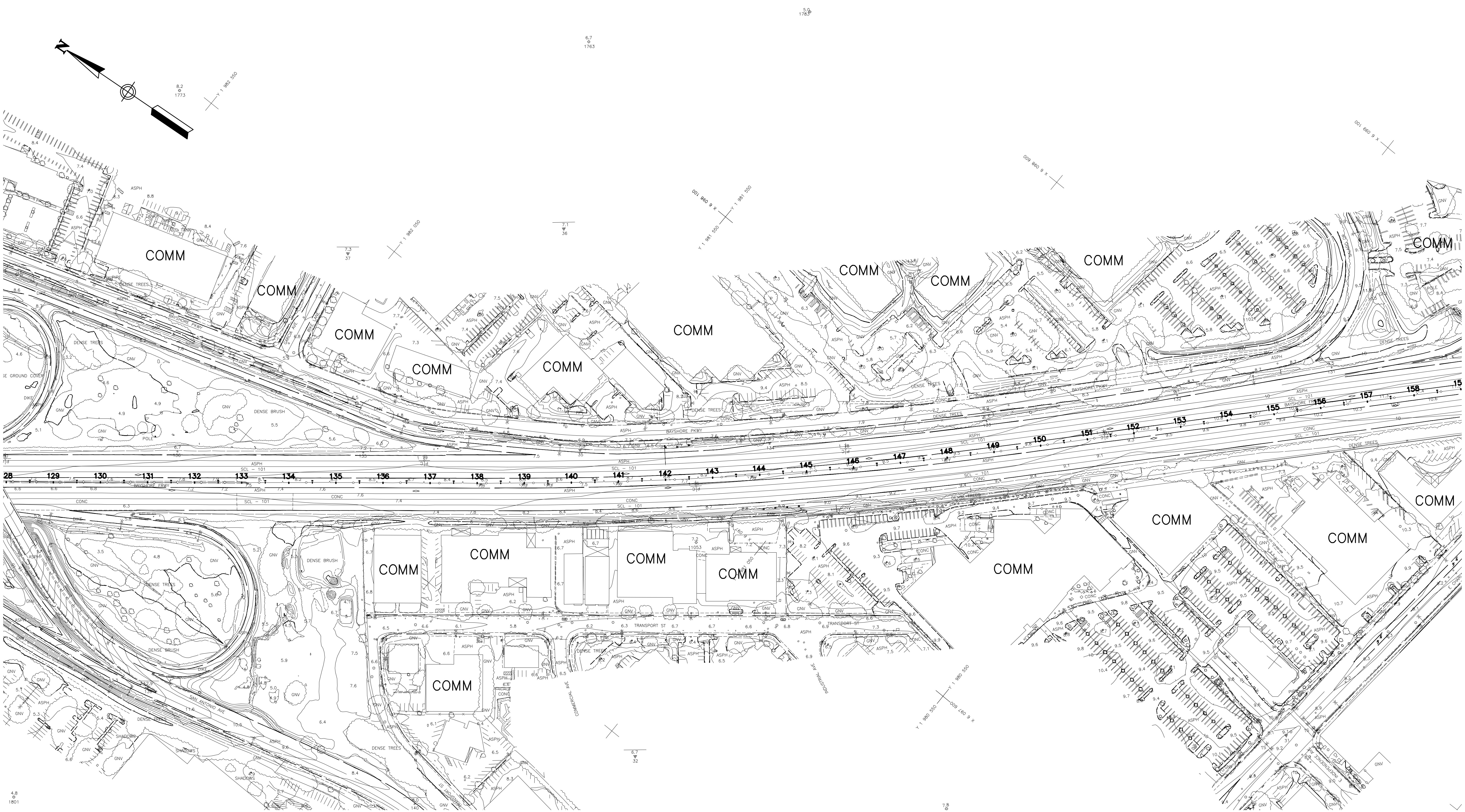
1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILIARY LANES SENSITIVE RECEIVER & NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 4 OF 7



LEGEND

- RECIEVER LOCATION
- FEASIBLE SOUNDWALL
- EXISTING SOUNDWALL

SFR —SINGLE FAMILY RESIDENCE
MFR —MULTI—FAMILY RESIDENCE
COMM —COMMERCIAL

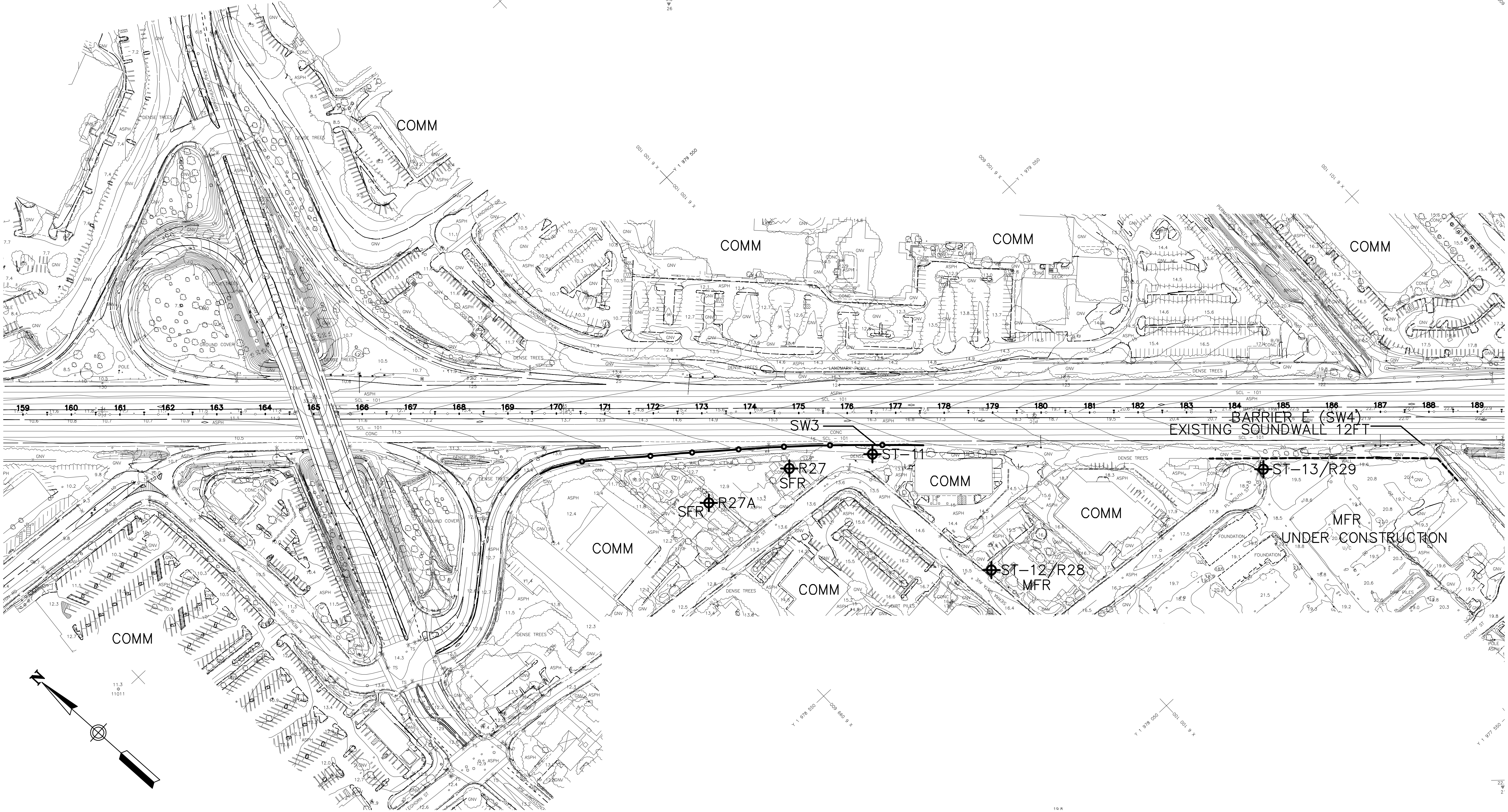
1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILARY LANES
SENSITIVE RECEIVER &
NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 5 OF 7



LEGEND

- RECIEVER LOCATION
- FEASIBLE SOUNDWALL
- EXISTING SOUNDWALL

SFR –SINGLE FAMILY RESIDENCE

MFR –MULTI–FAMILY RESIDENCE

COMM –COMMERCIAL

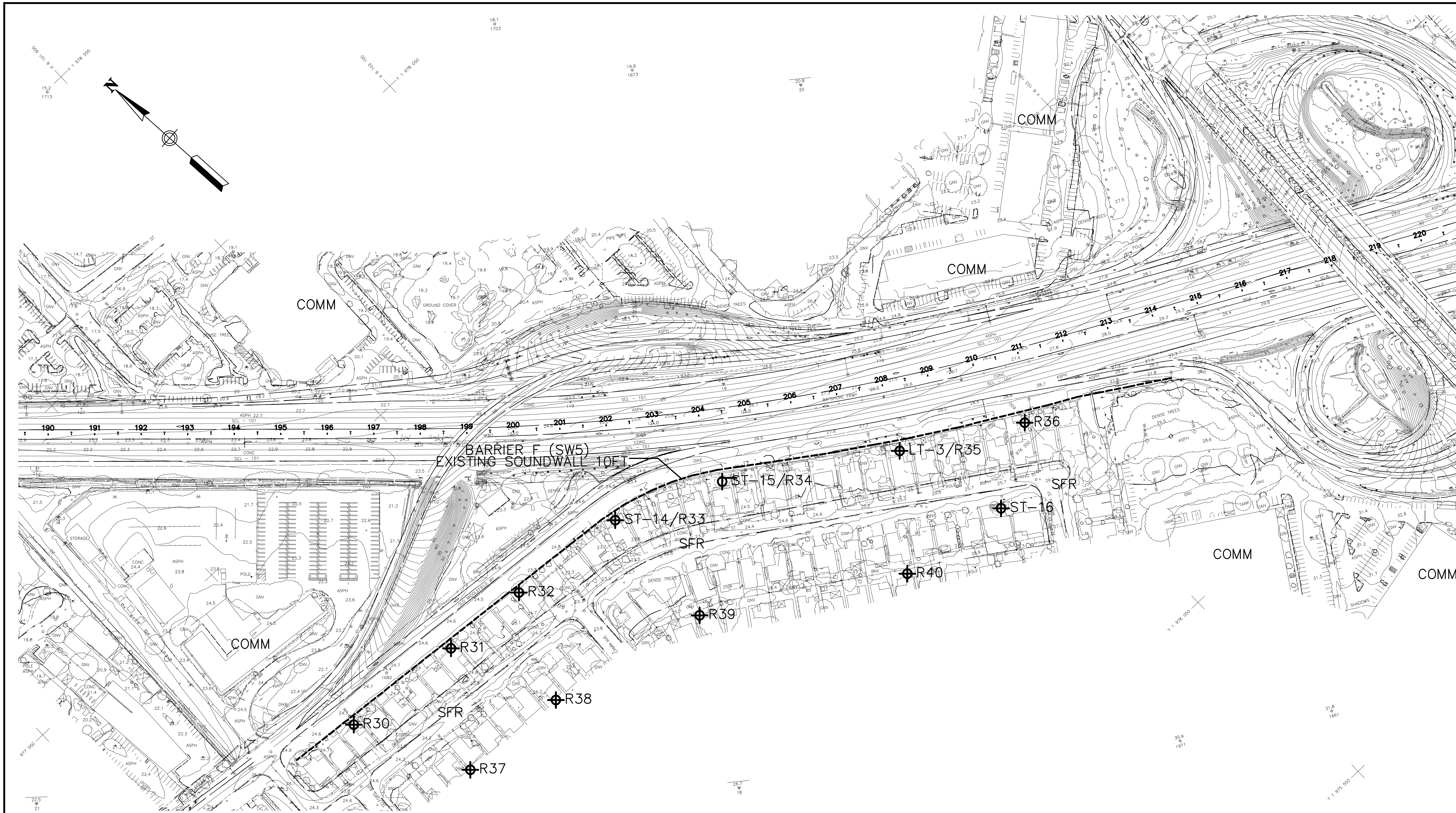
1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILARY LANES
SENSITIVE RECEIVER & NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 6 OF 7



LEGEND

⌖	RECIEVER LOCATION	SFR	–SINGLE FAMILY RESIDENCE
—o—	FEASIBLE SOUNDWALL	MFR	–MULTI–FAMILY RESIDENCE
— —	EXISTING SOUNDWALL	COMM	–COMMERCIAL

1:200
FEET

0 FT 200FT 400FT 800FT

U.S. 101 AUXILARY LANES
SENSITIVE RECEIVER &
NOISE BARRIER LOCATIONS

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 7 OF 7

Appendix D
SR 85 Receptor Locations and Noise Barriers

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT | 400FT | 800FT | 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 1 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

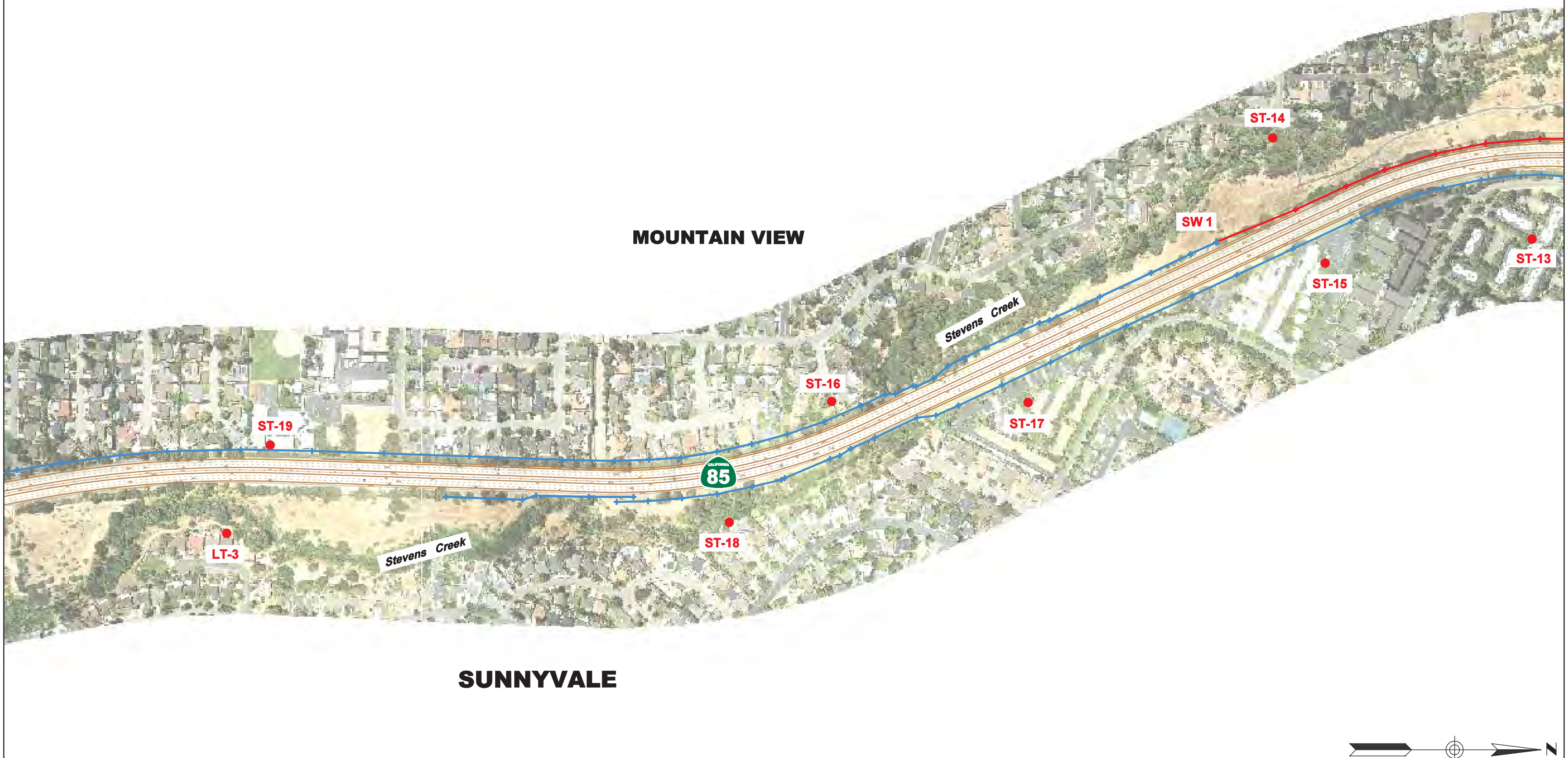
0 FT | 400FT | 800FT | 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 2 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

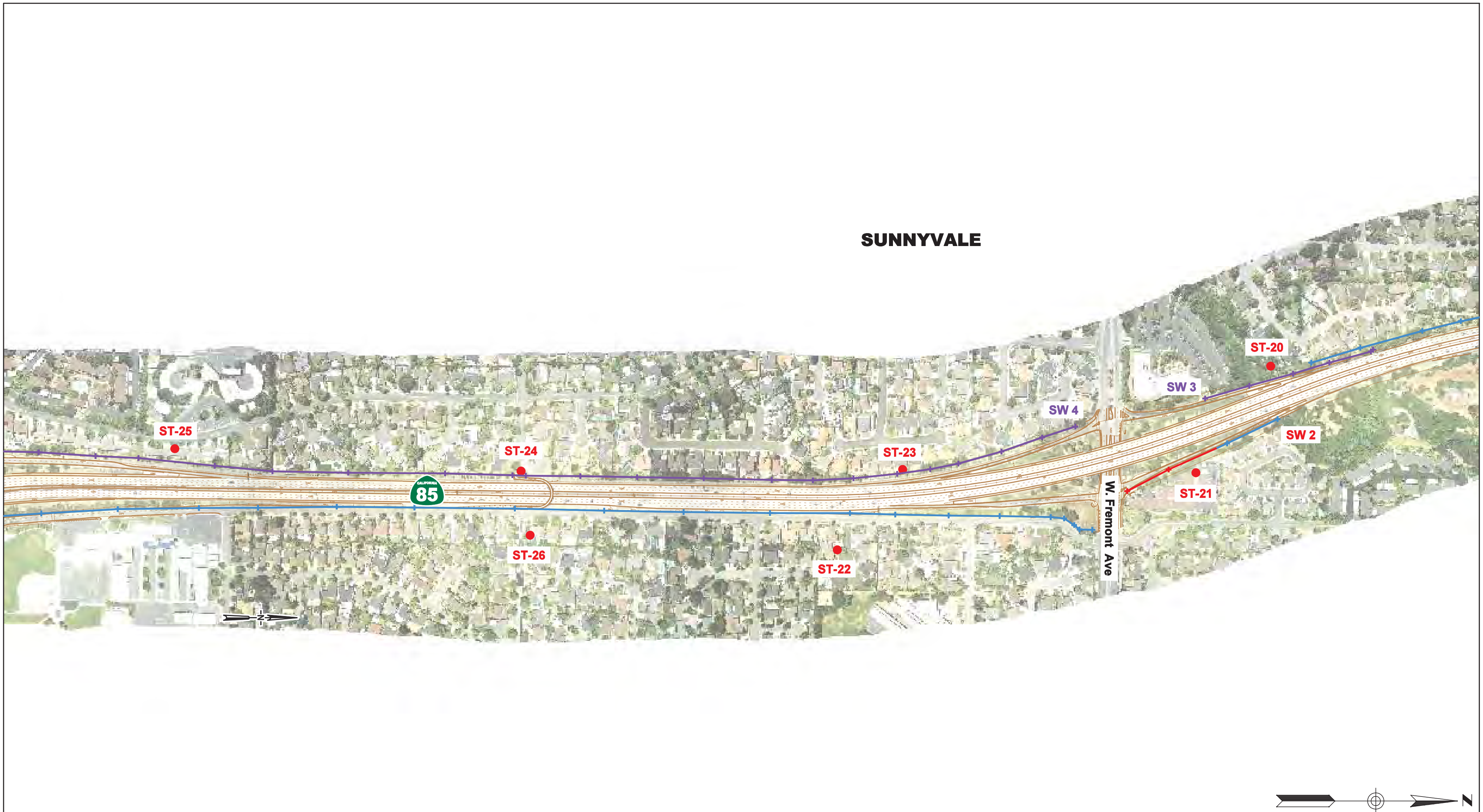
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 3 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

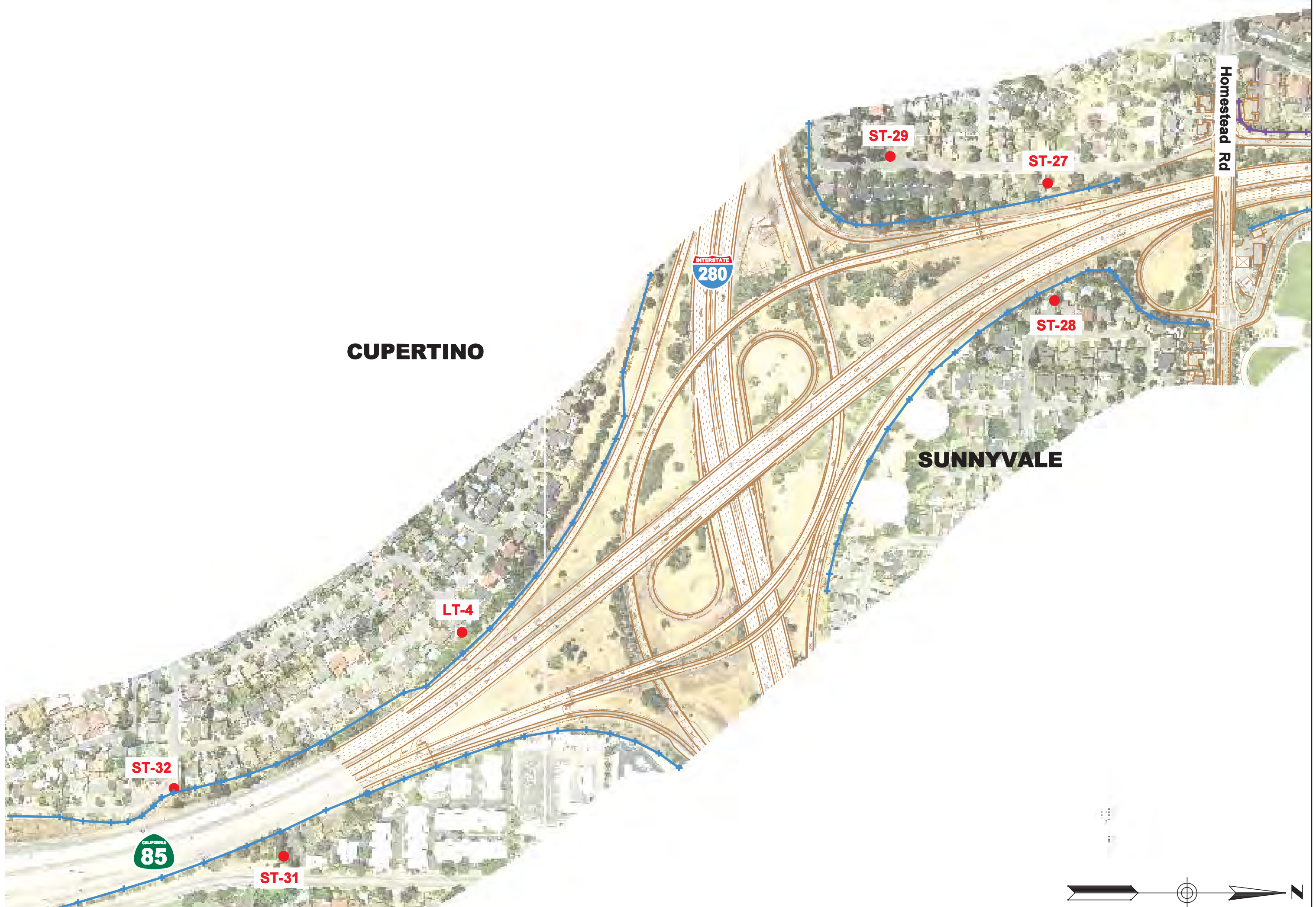
0 FT — 400FT — 800FT — 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 4 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

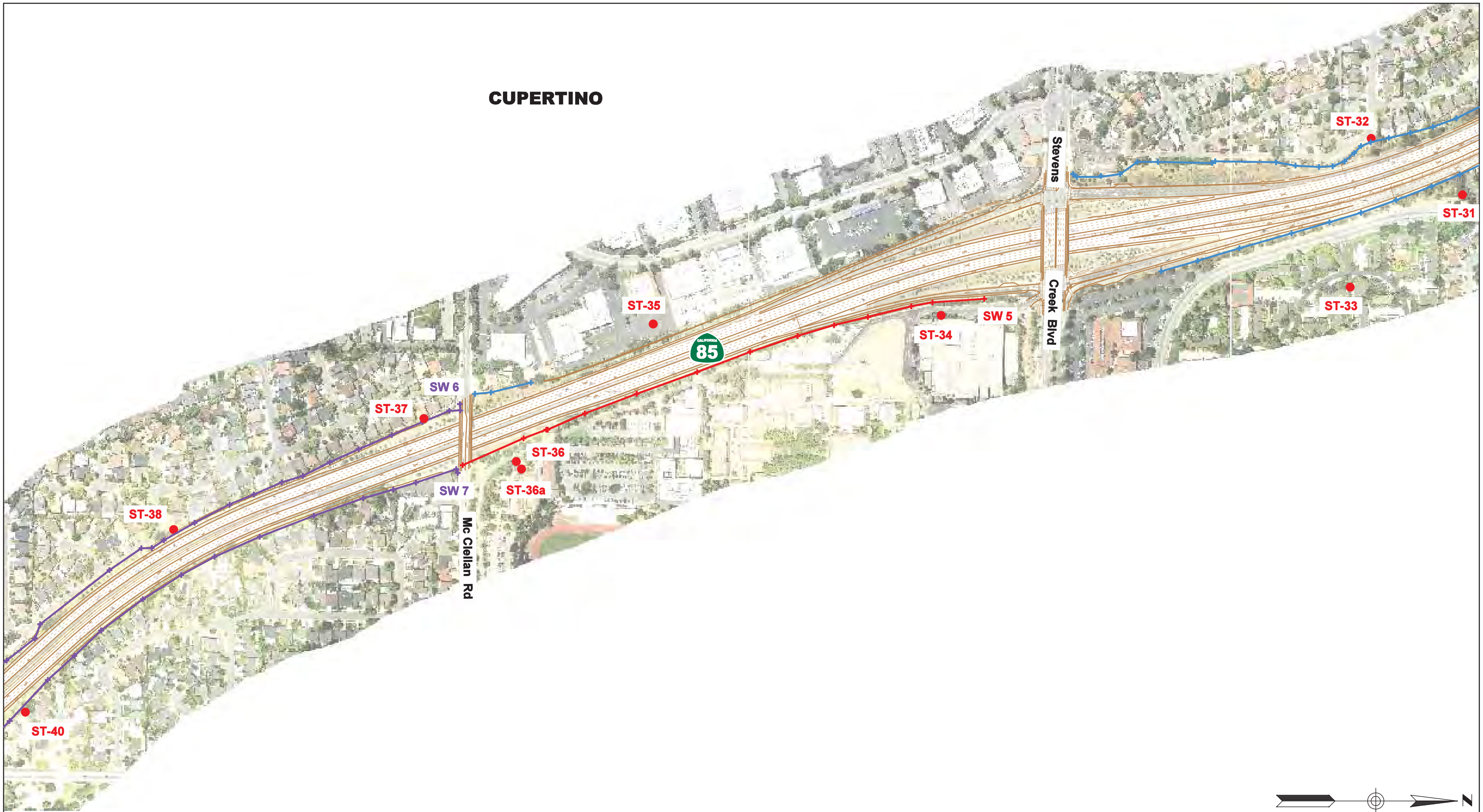
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 5 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

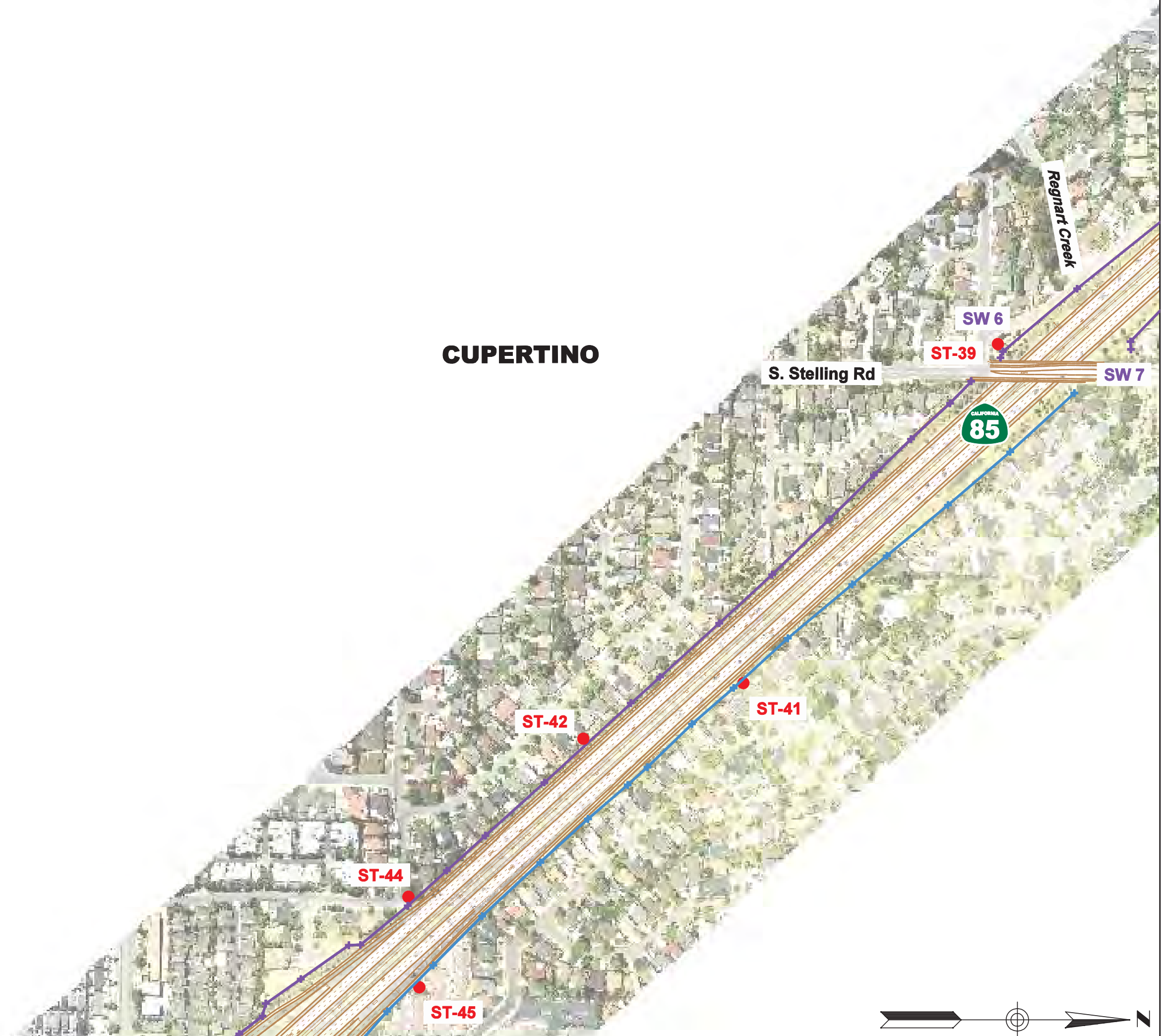
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 6 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

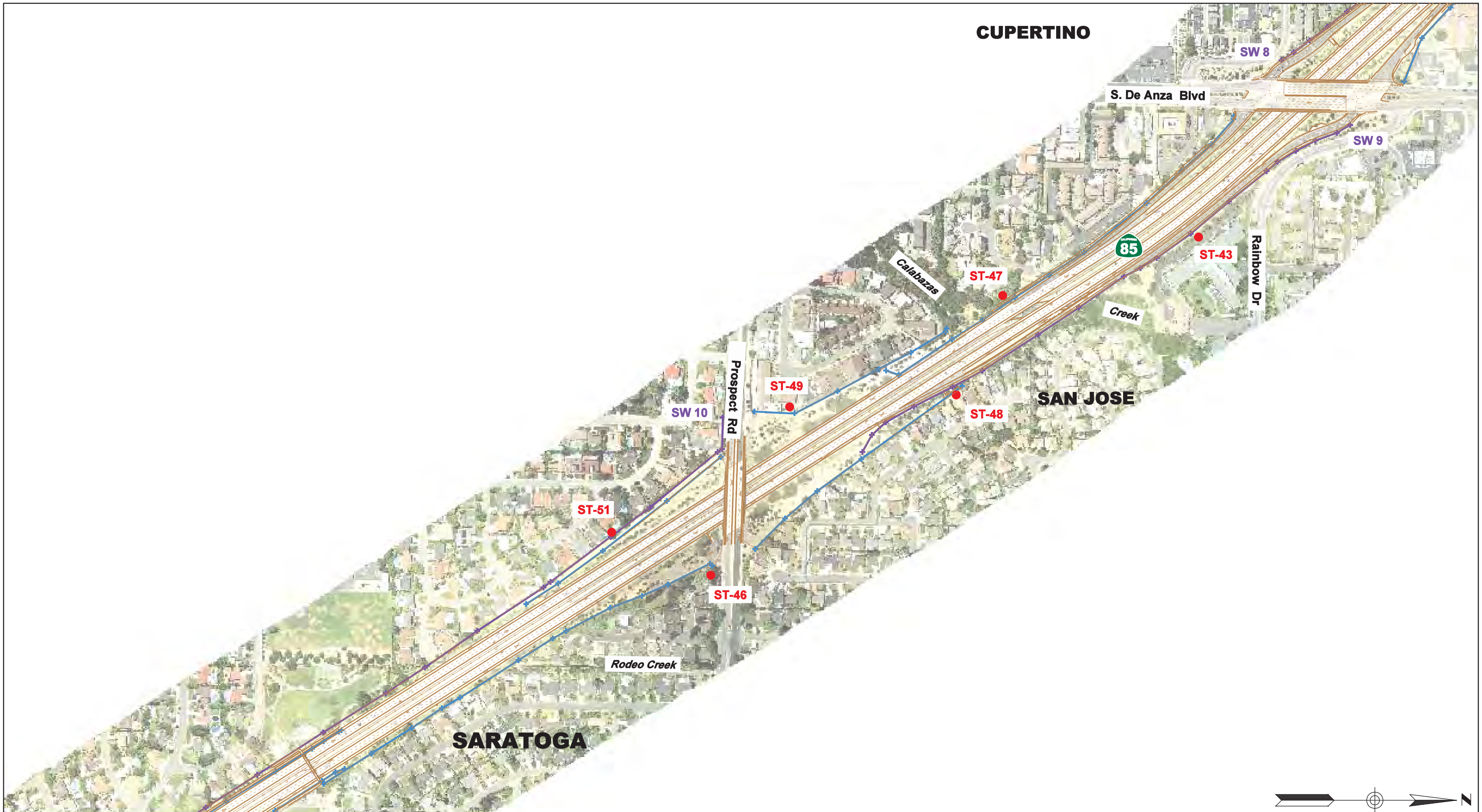
0 FT | 400FT | 800FT | 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 7 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

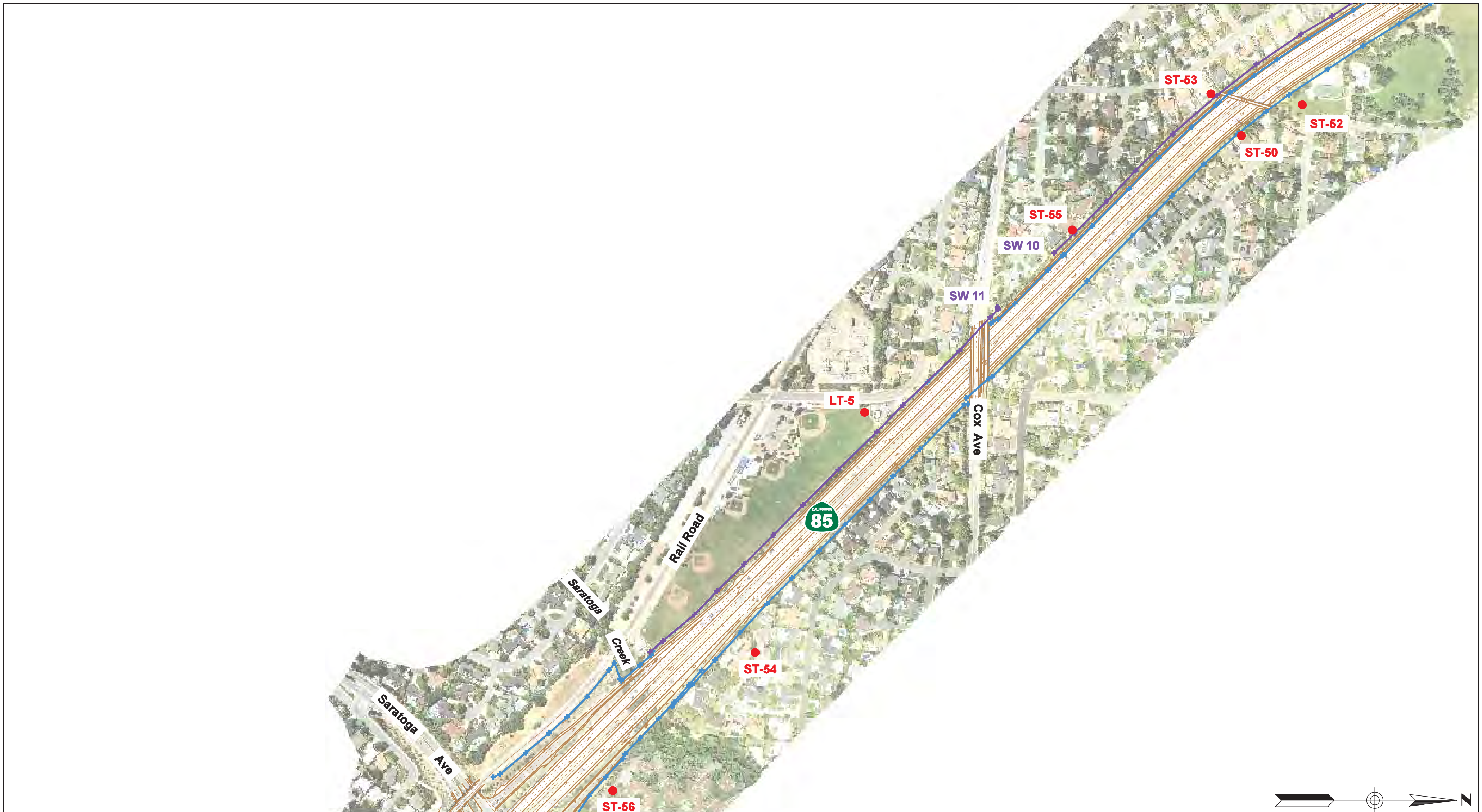
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 8 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

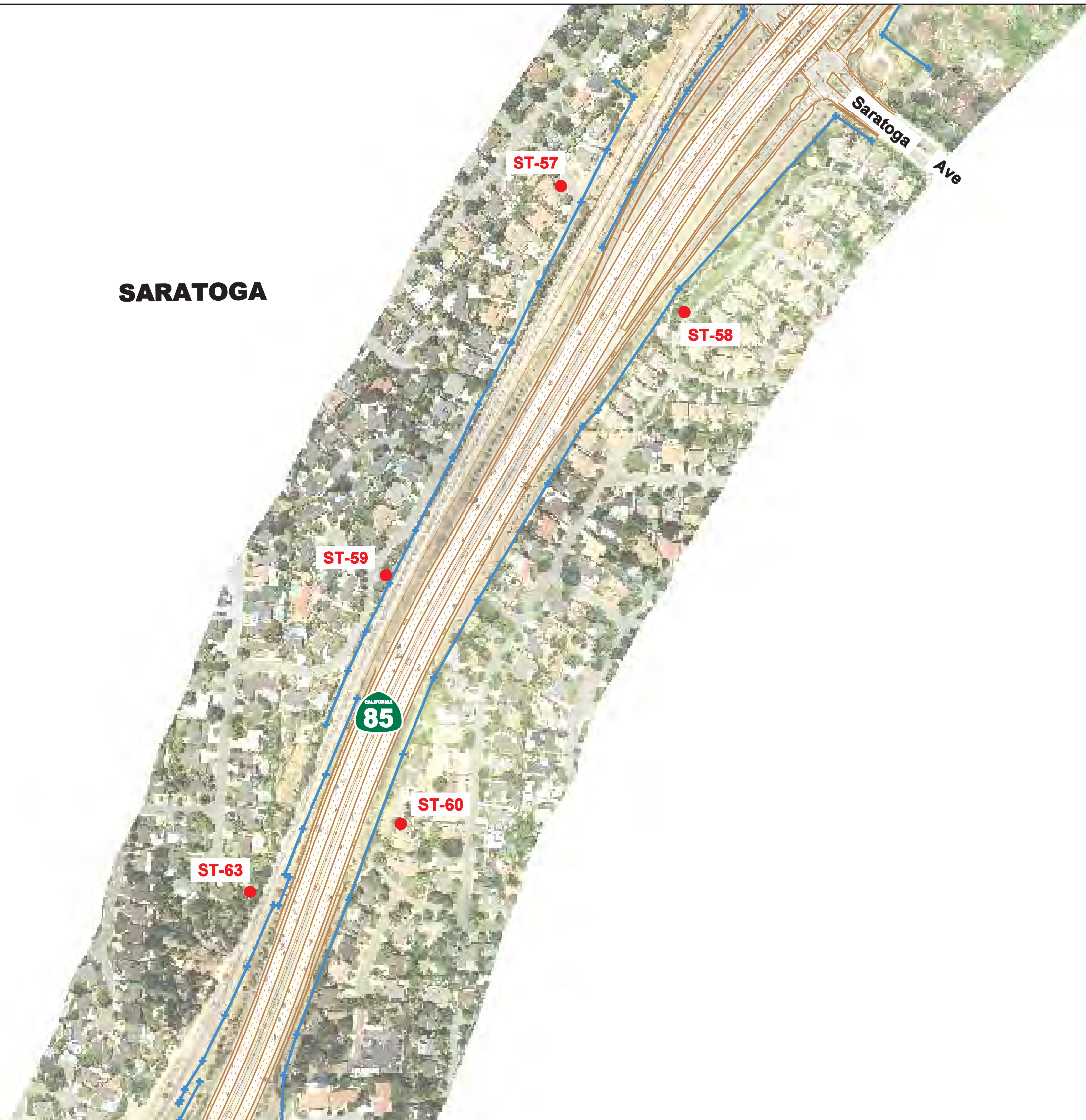
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 9 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 10 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

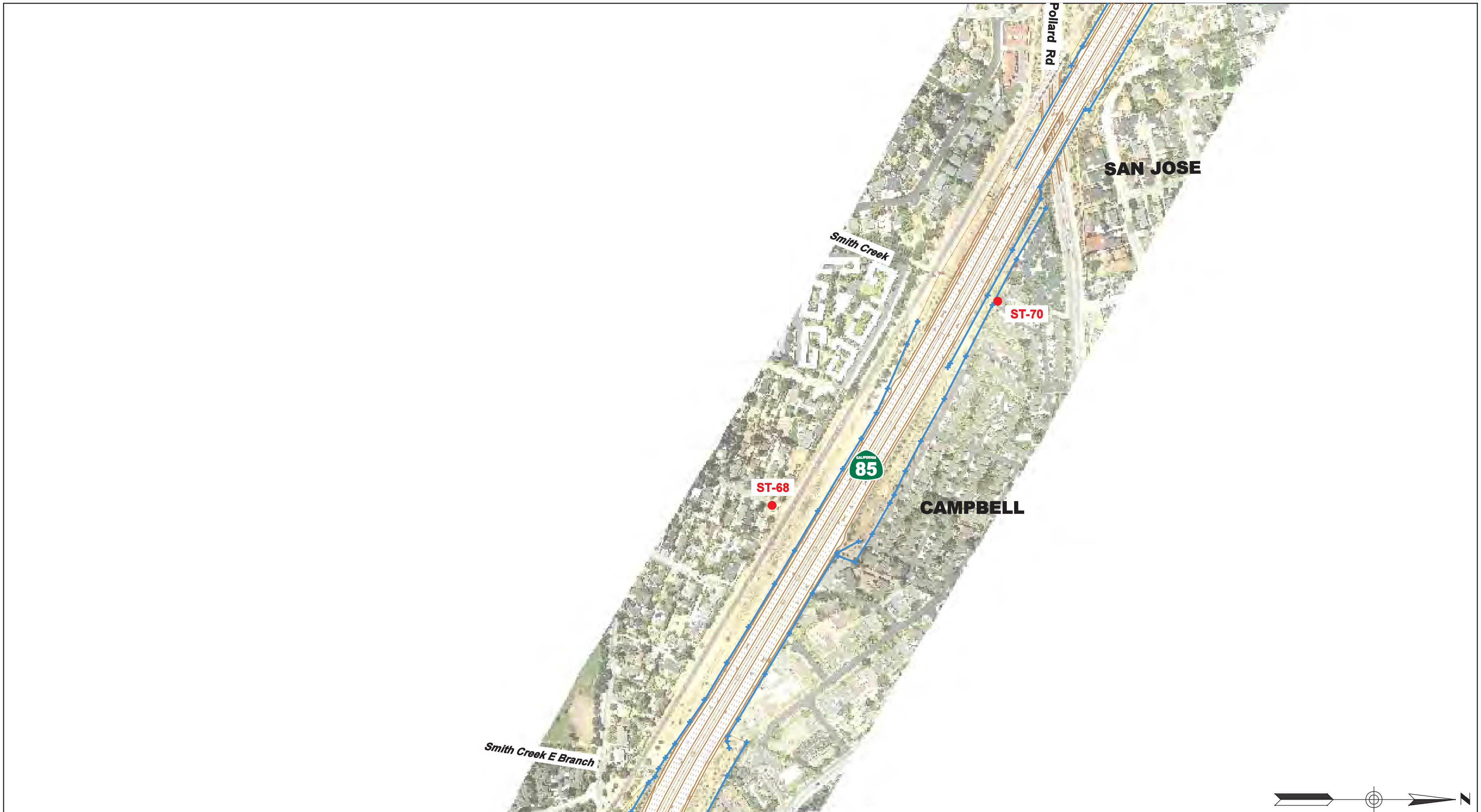
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 11 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

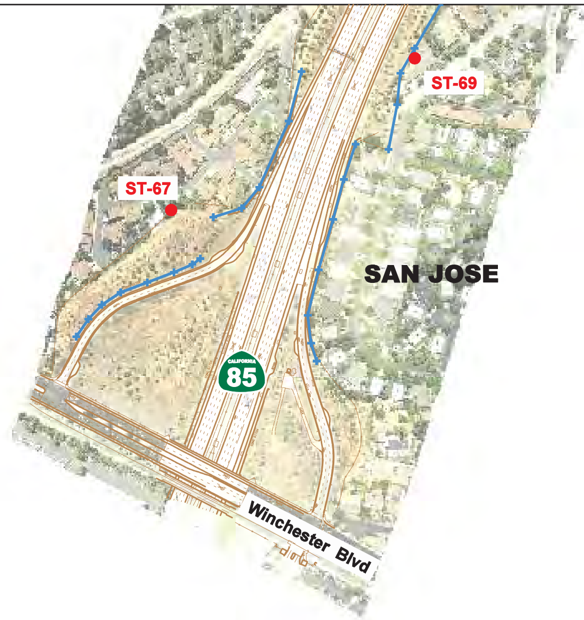
0 FT | 400FT | 800FT | 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 12 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

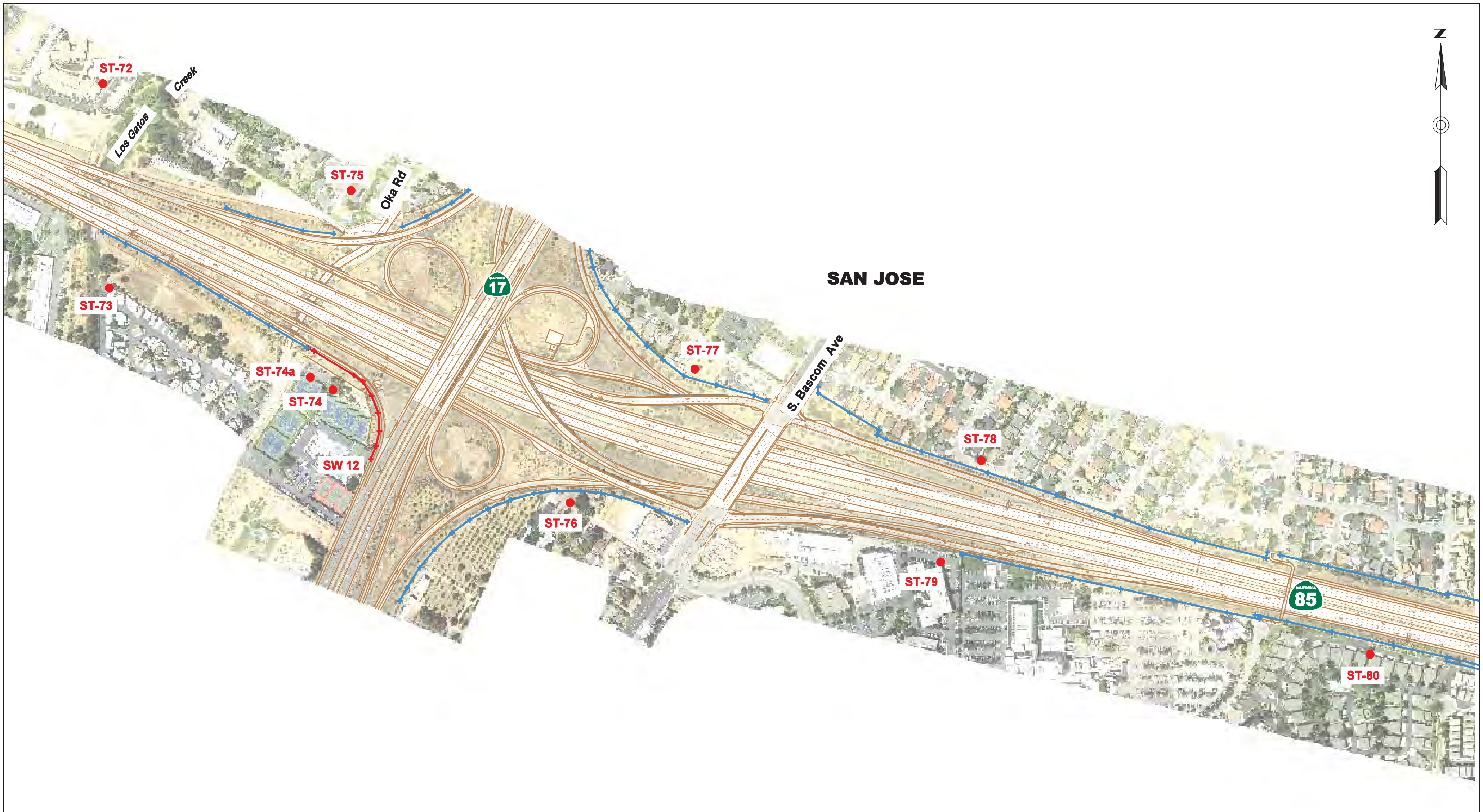
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 13 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

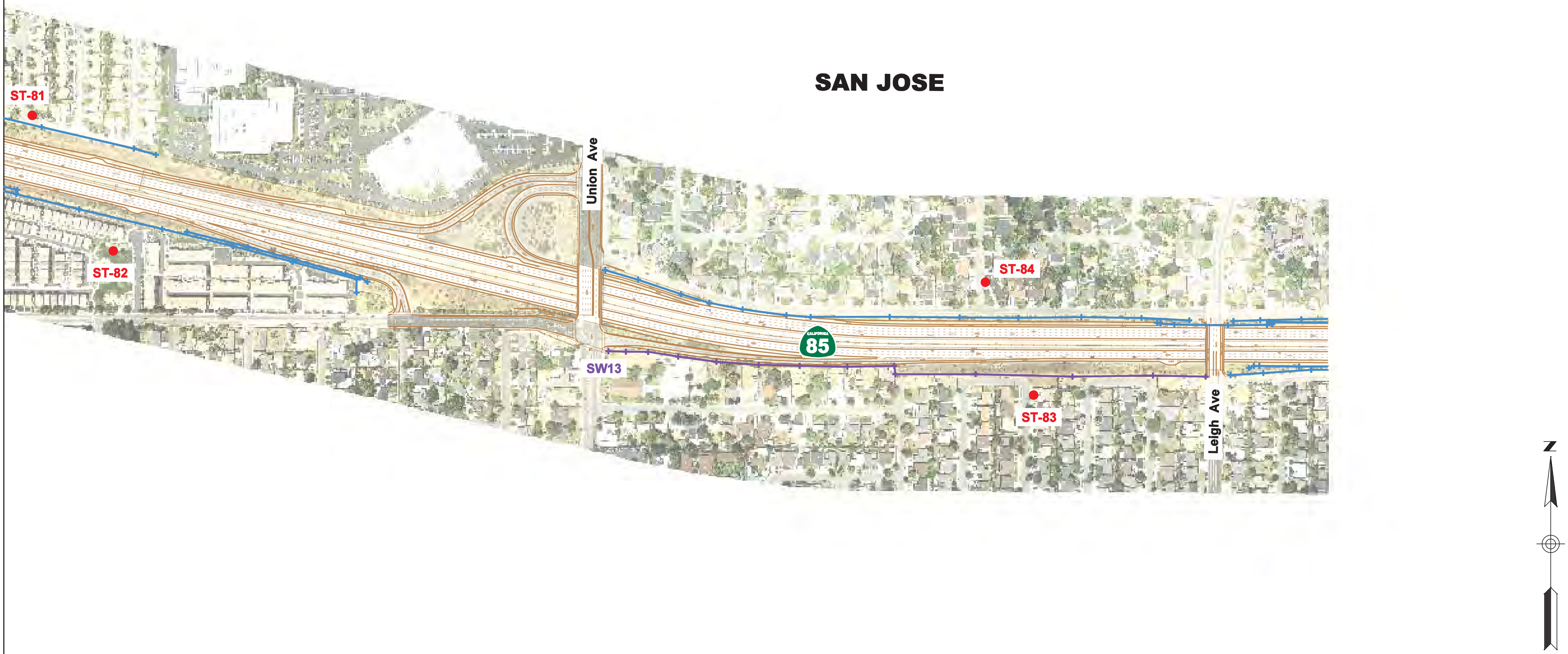
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 14 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 15 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 16 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

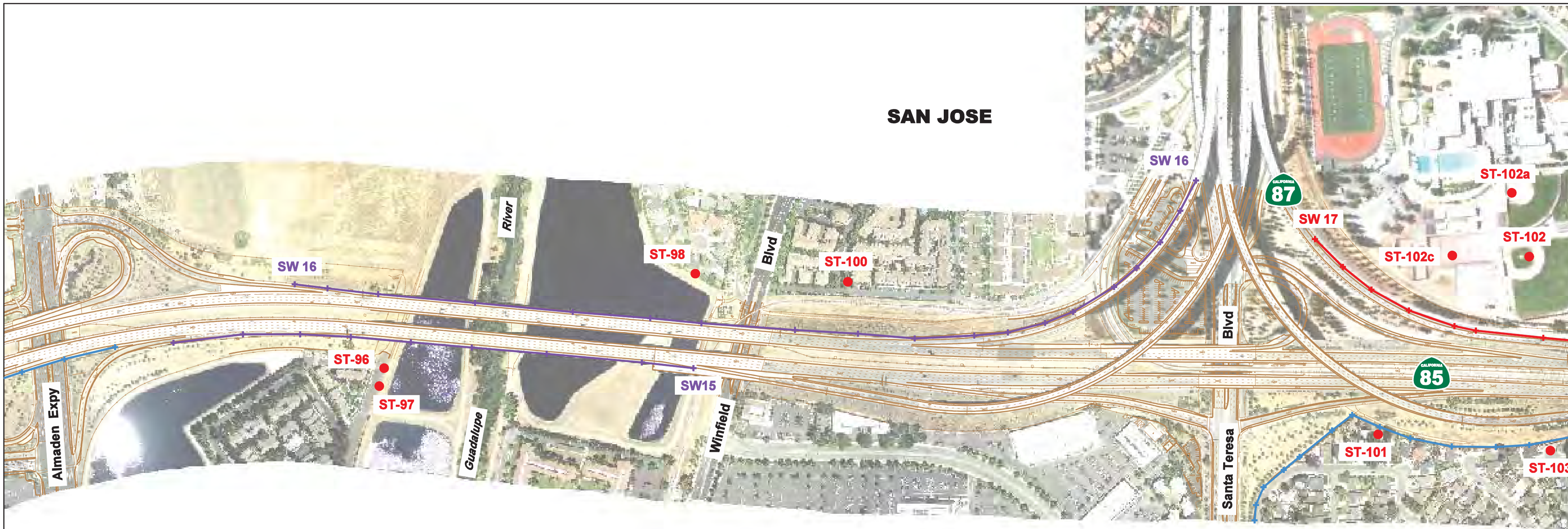
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 17 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

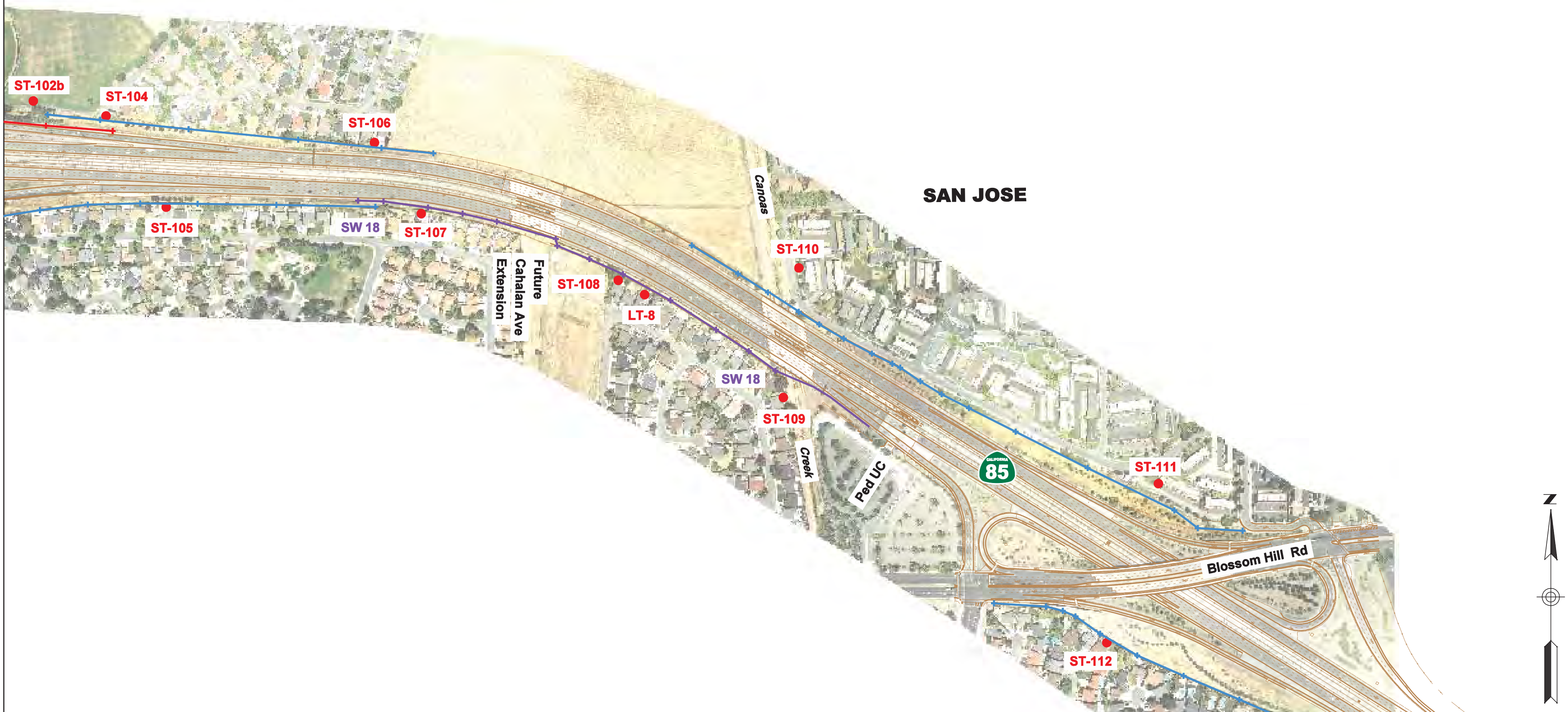
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 18 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

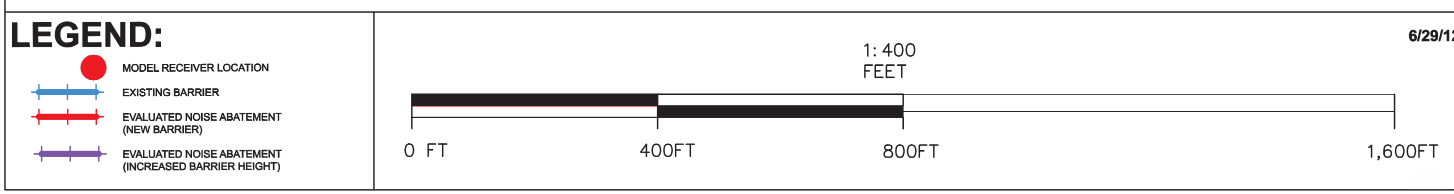
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 19 OF 26

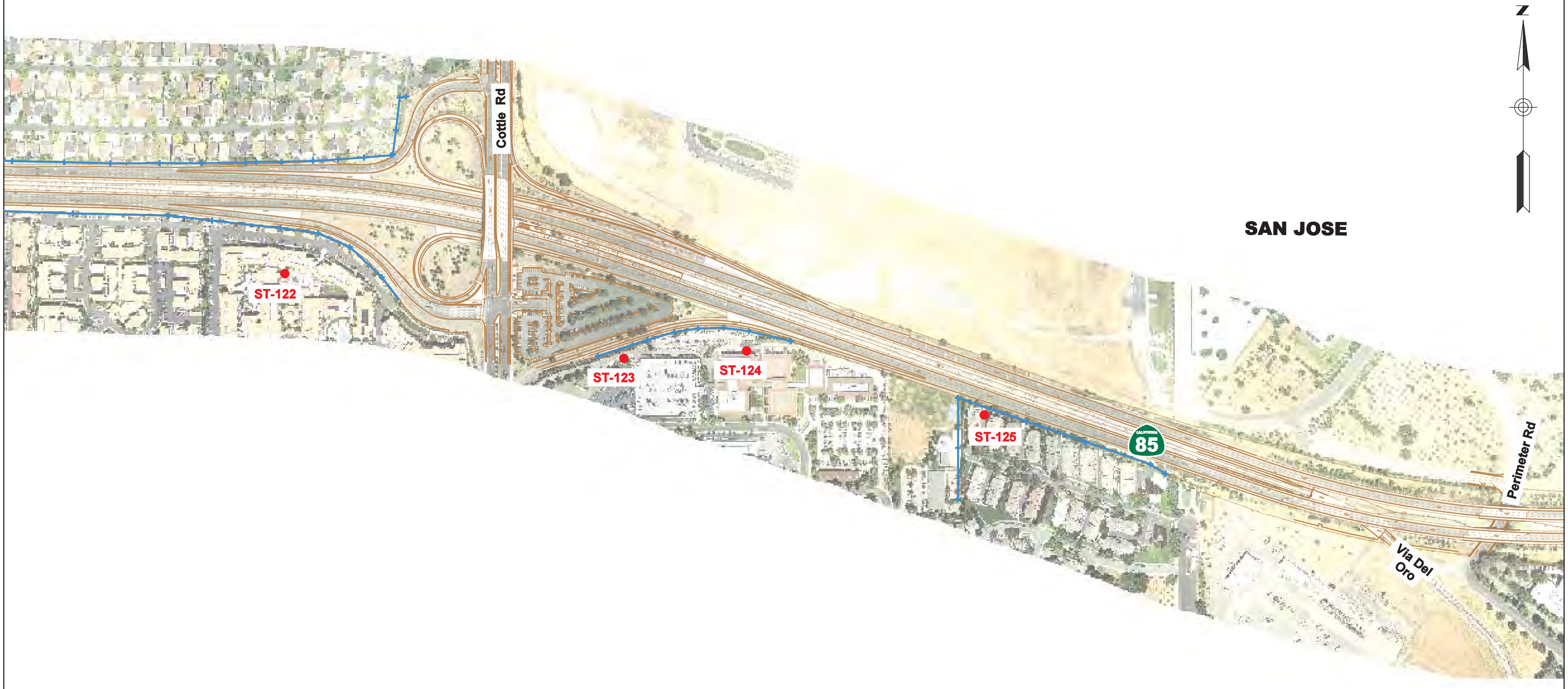


6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 20 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

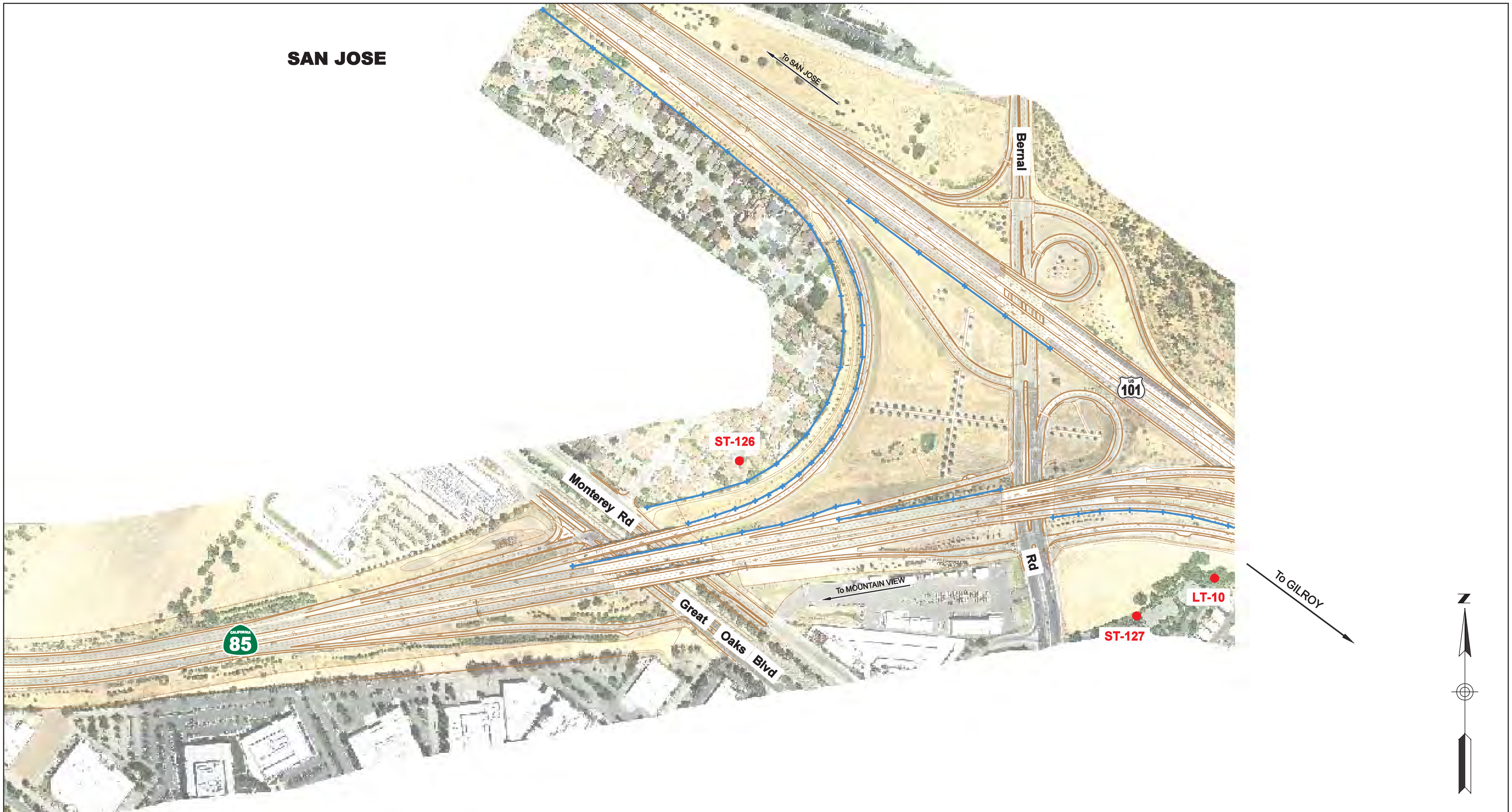
0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

SHEET NO. 21 OF 26



LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 22 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1:400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics - Air Quality

SHEET NO. 23 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 24 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT 400FT 800FT 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 25 OF 26

LEGEND:

- MODEL RECEIVER LOCATION
- EXISTING BARRIER
- EVALUATED NOISE ABATEMENT (NEW BARRIER)
- EVALUATED NOISE ABATEMENT (INCREASED BARRIER HEIGHT)

1: 400
FEET

0 FT | 400FT | 800FT | 1,600FT

6/29/12

MODELED NOISE RECEIVER & BARRIER LOCATION SR 85 EXPRESS LANES PROJECT

ILLINGWORTH & RODKIN, INC.
Acoustics · Air Quality

SHEET NO. 26 OF 26

Appendix E
Long-Term Noise Data

Noise Levels at LT-1
Central Avenue Trail Entrance to Stevens Creek Trail, Mountain View
Tuesday, October 18, 2011

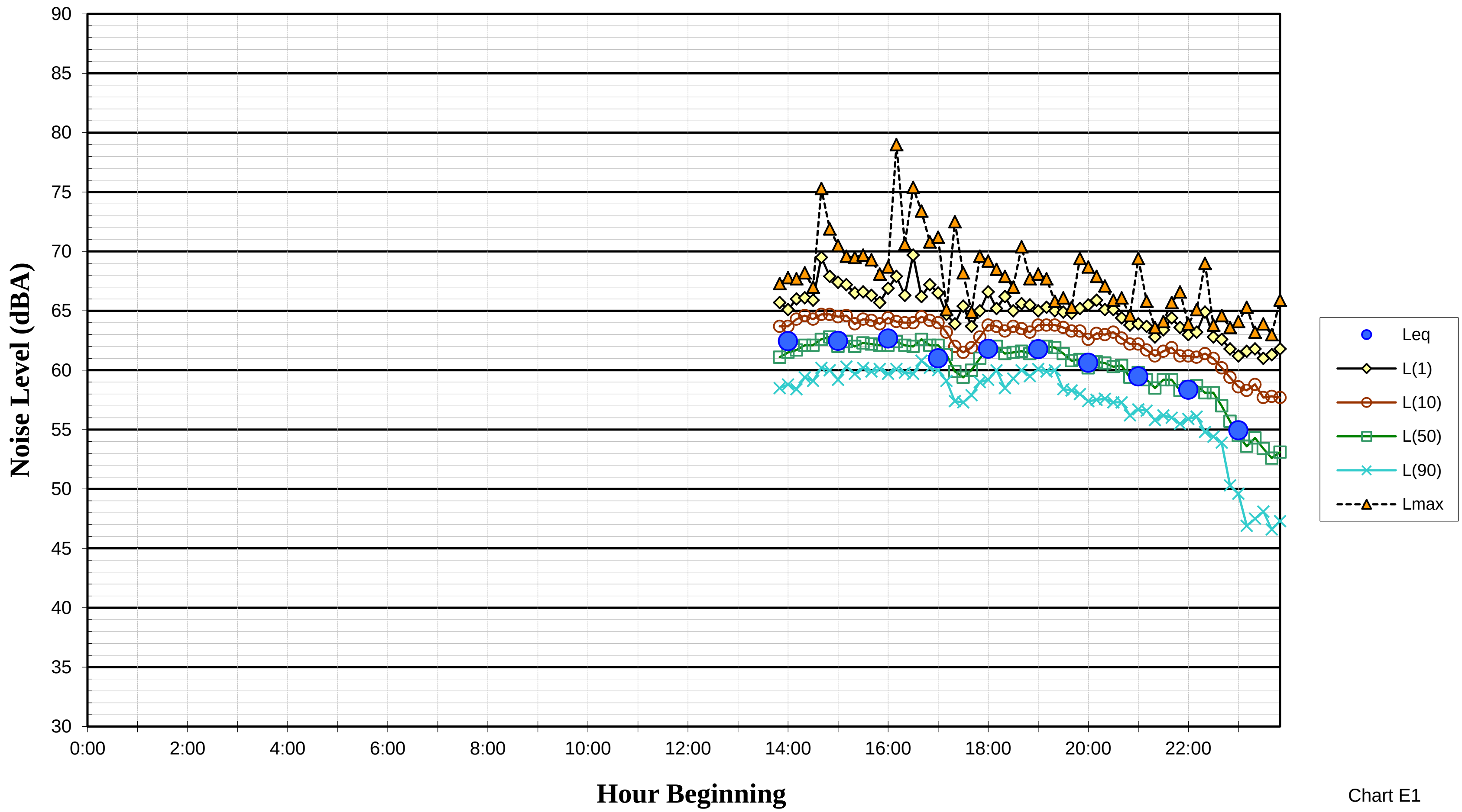


Chart E1

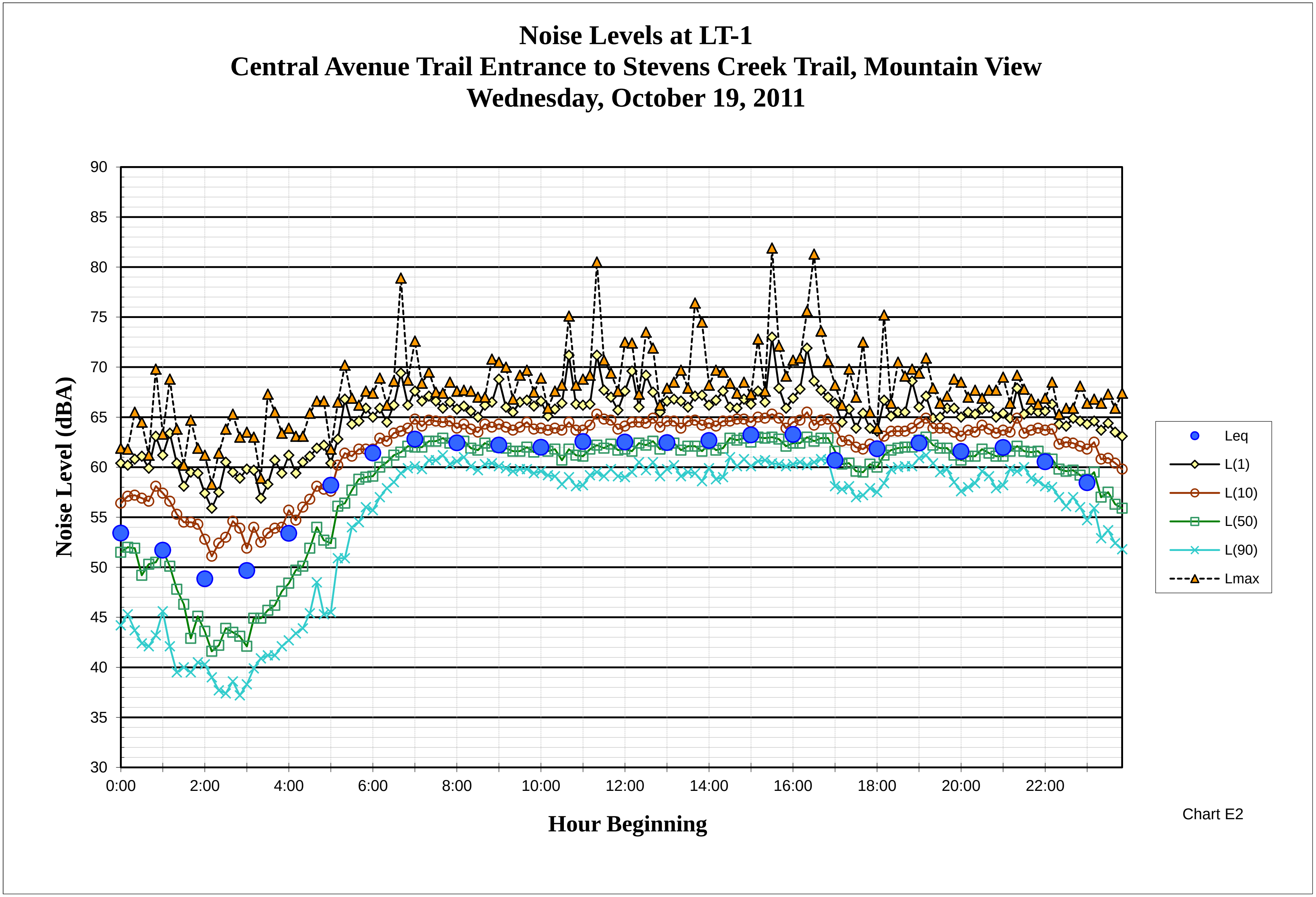

Noise Levels at LT-1
Central Avenue Trail Entrance to Stevens Creek Trail, Mountain View
Wednesday, October 19, 2011
Noise Level (dBA)
Hour Beginning
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

Chart E2

Noise Levels at LT-1
Central Avenue Trail Entrance to Stevens Creek Trail, Mountain View
Thursday, October 20, 2011

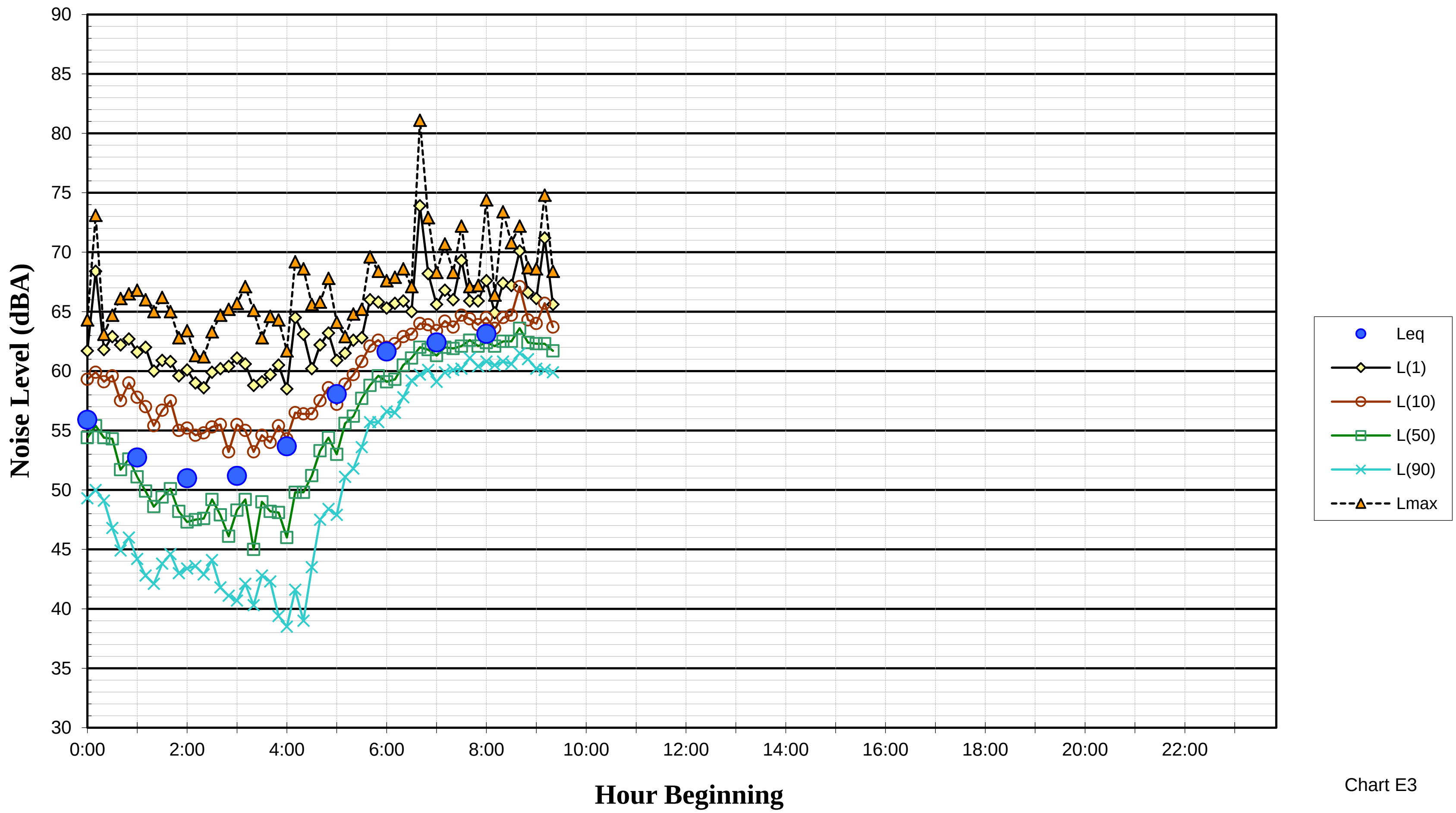
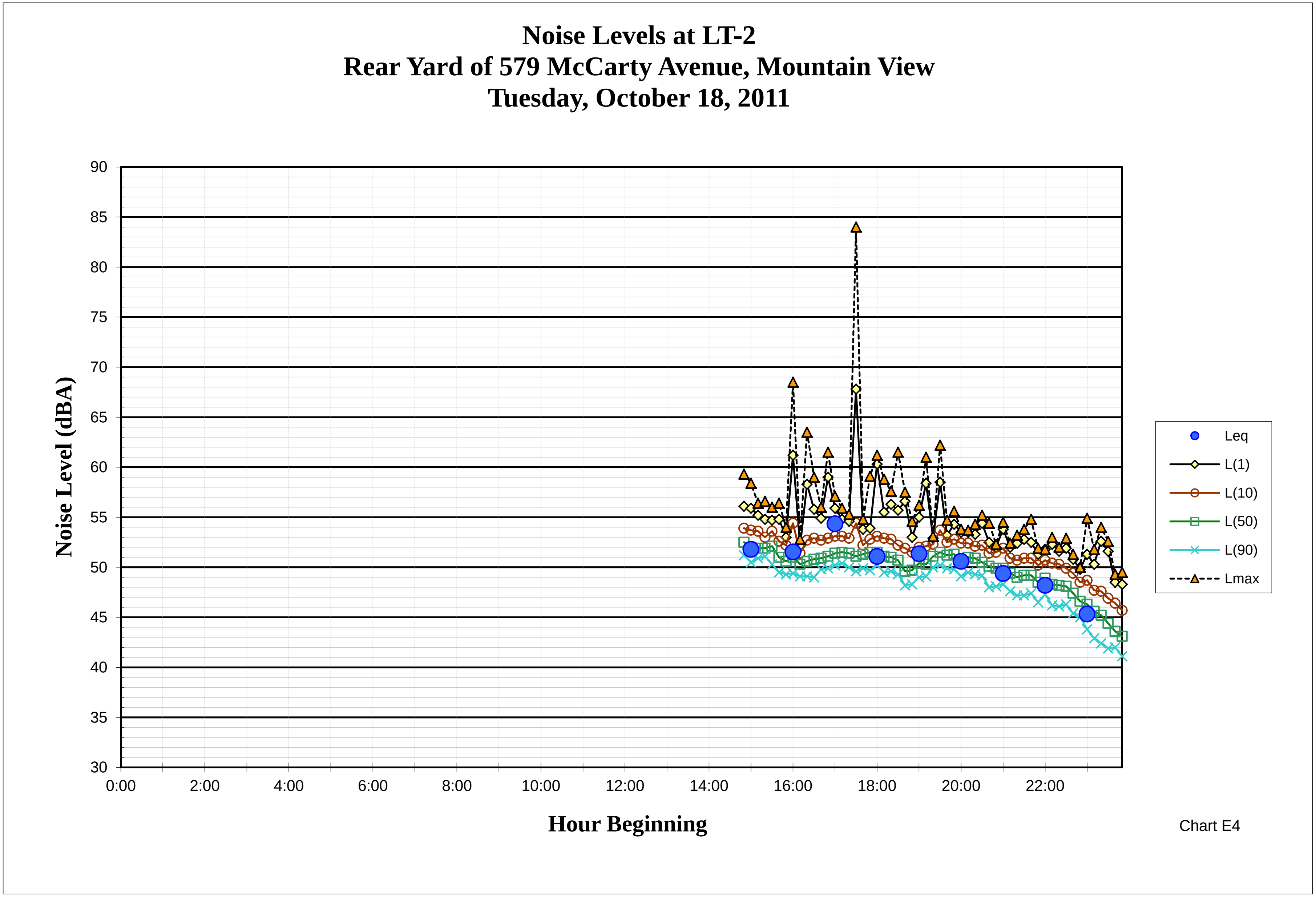
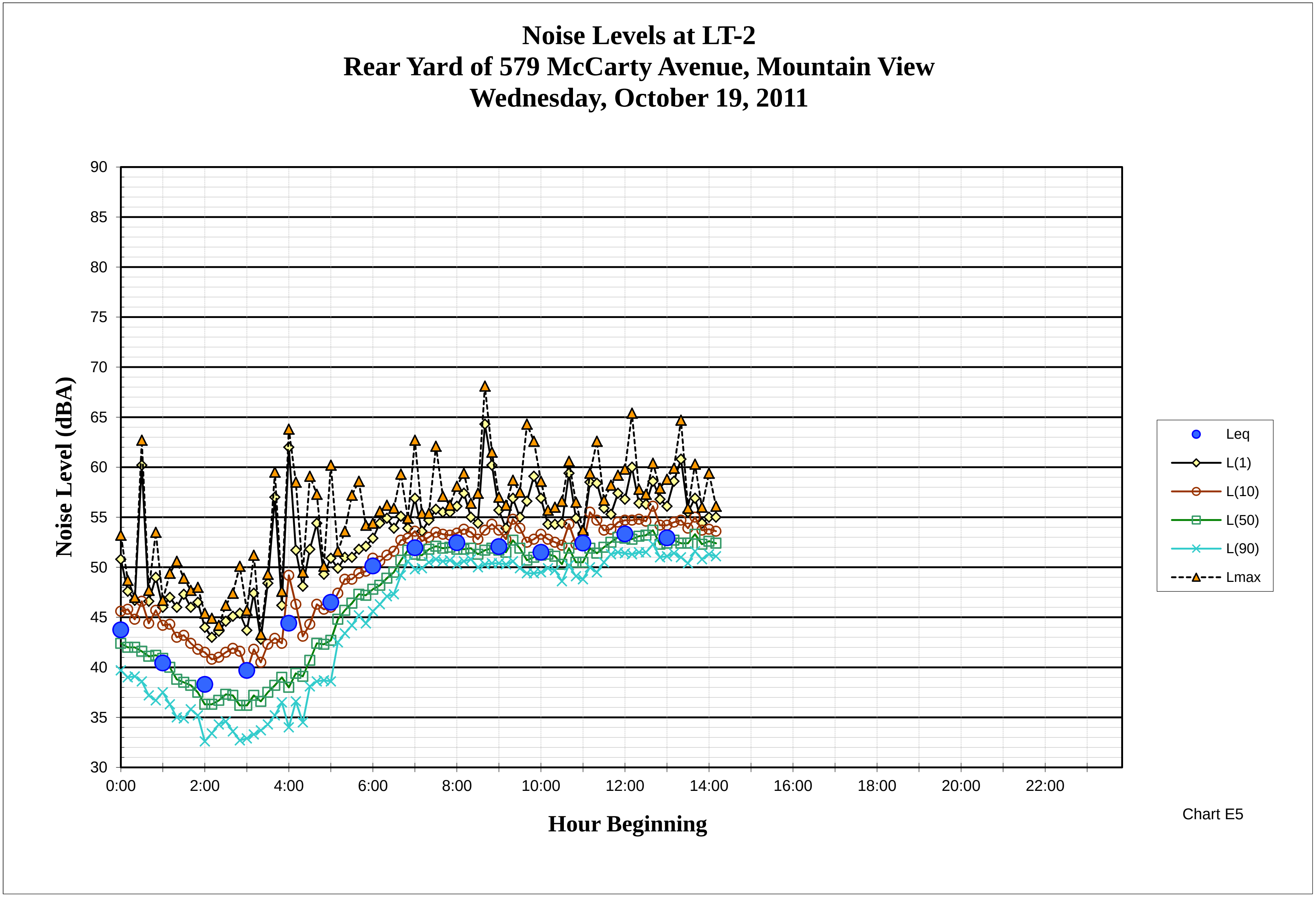


Chart E3

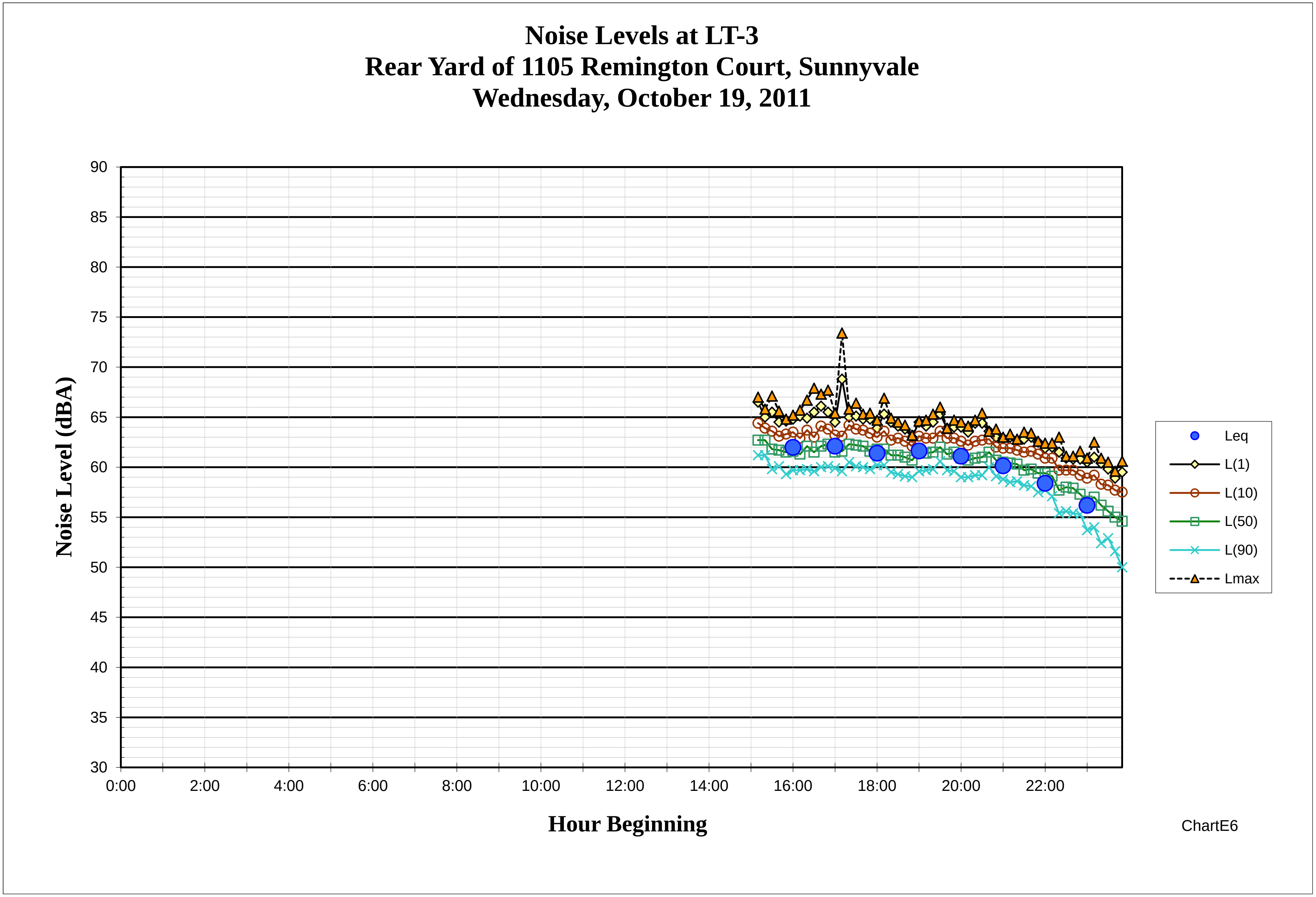


Noise Levels at LT-2
Rear Yard of 579 McCarty Avenue, Mountain View
Tuesday, October 18, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E4

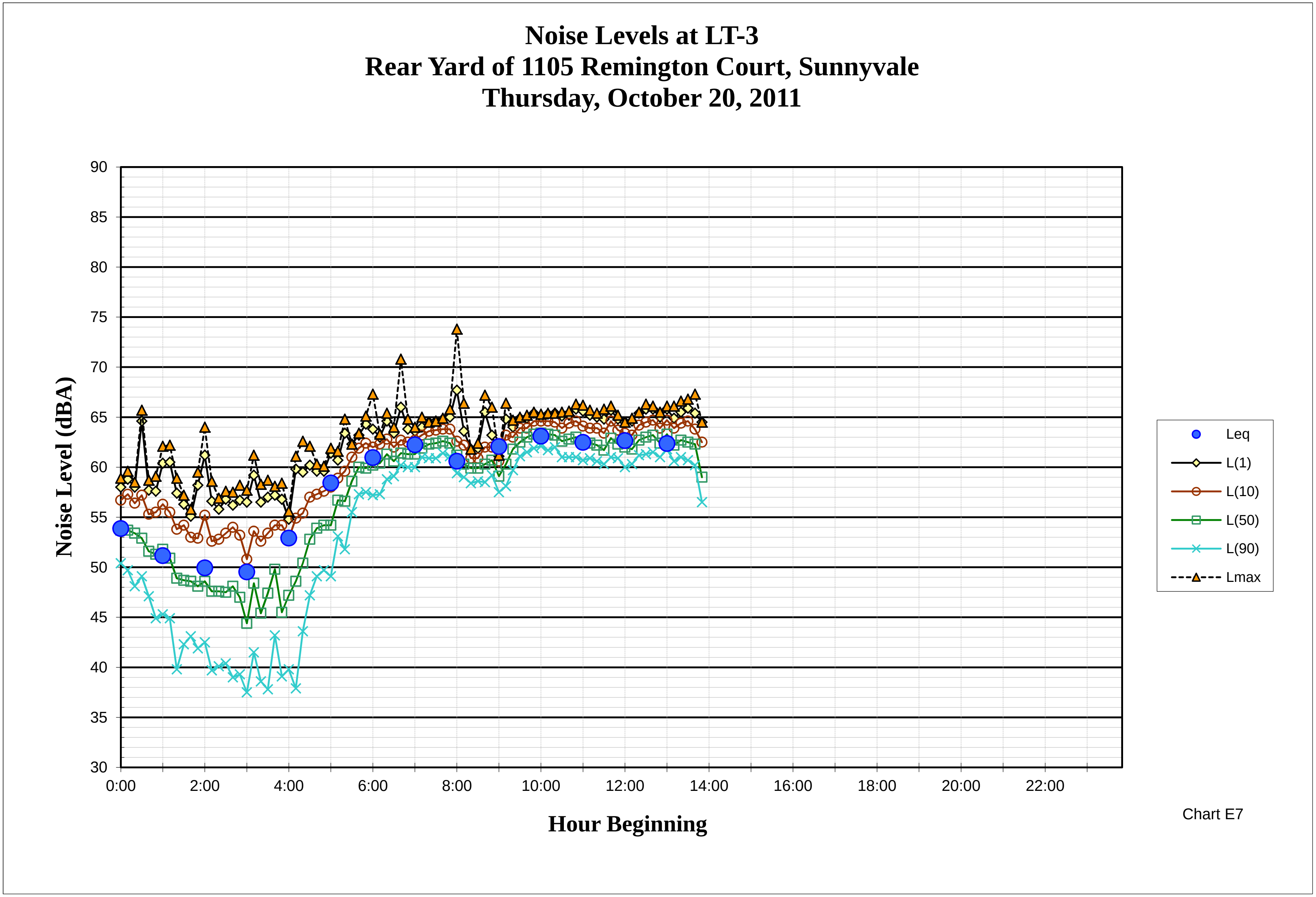


Noise Levels at LT-2
Rear Yard of 579 McCarty Avenue, Mountain View
Wednesday, October 19, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

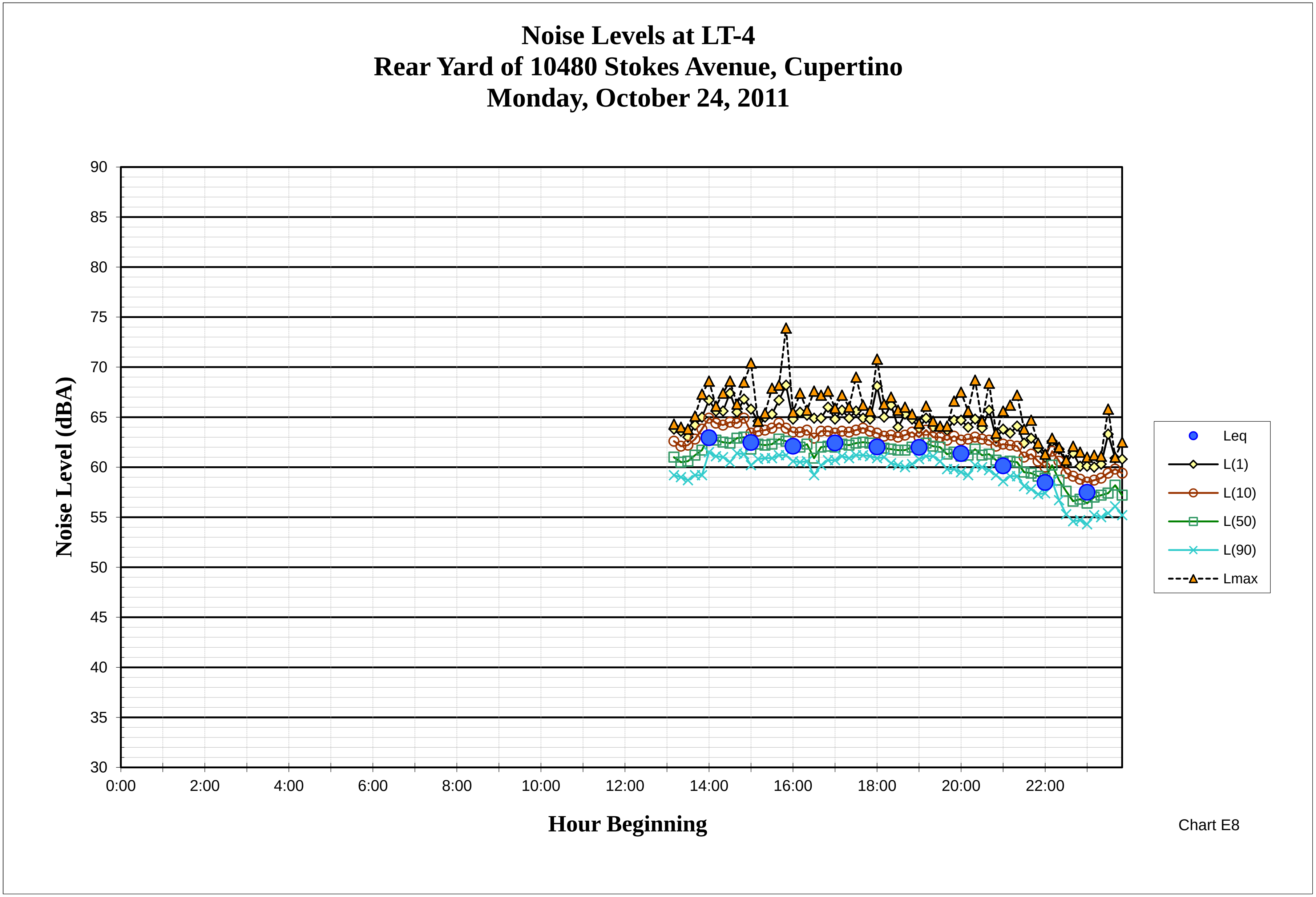
Chart E5



Noise Levels at LT-3
Rear Yard of 1105 Remington Court, Sunnyvale
Wednesday, October 19, 2011
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)
Lmax
ChartE6

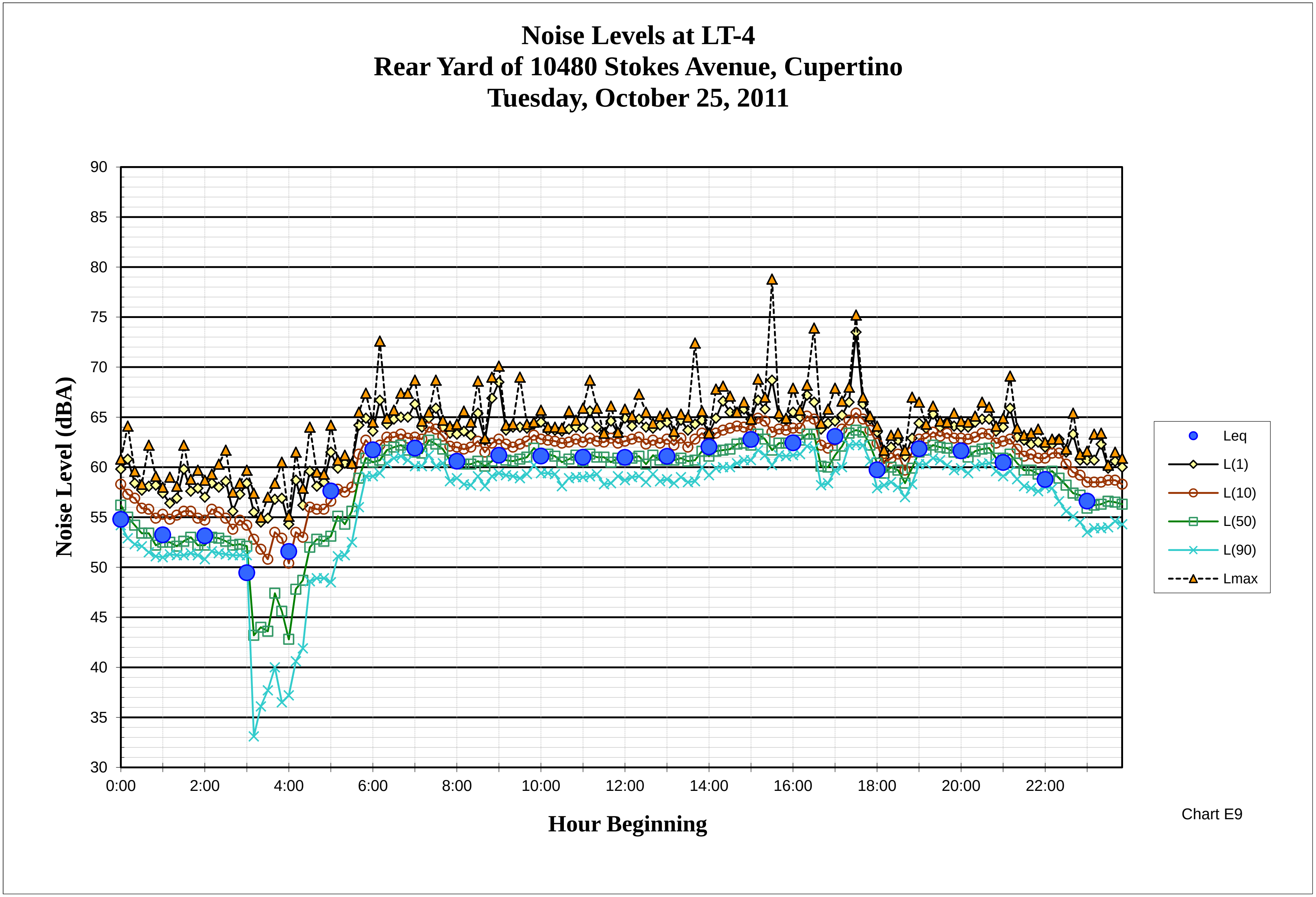


Noise Levels at LT-3
Rear Yard of 1105 Remington Court, Sunnyvale
Thursday, October 20, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E7

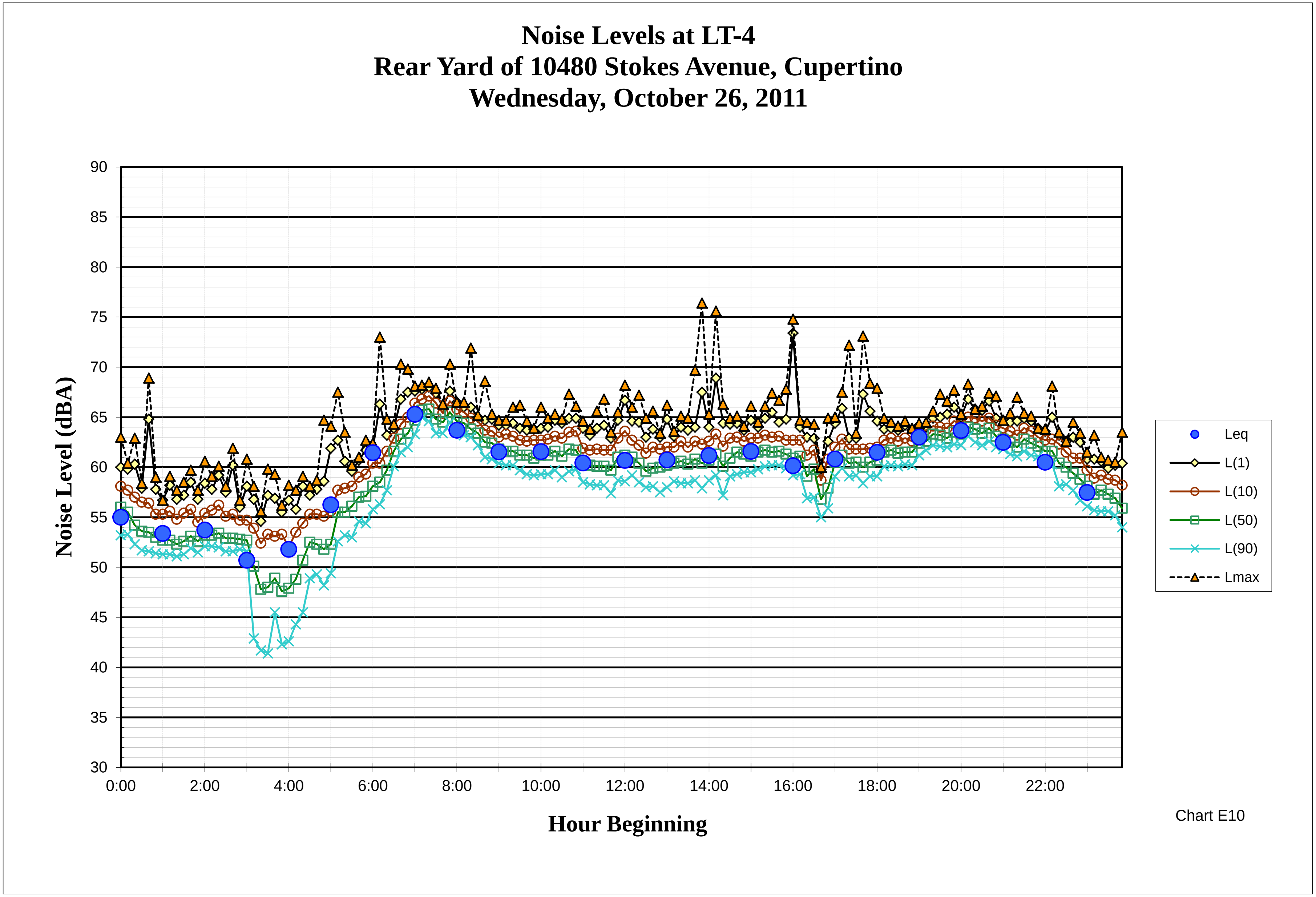


Noise Levels at LT-4
Rear Yard of 10480 Stokes Avenue, Cupertino
Monday, October 24, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

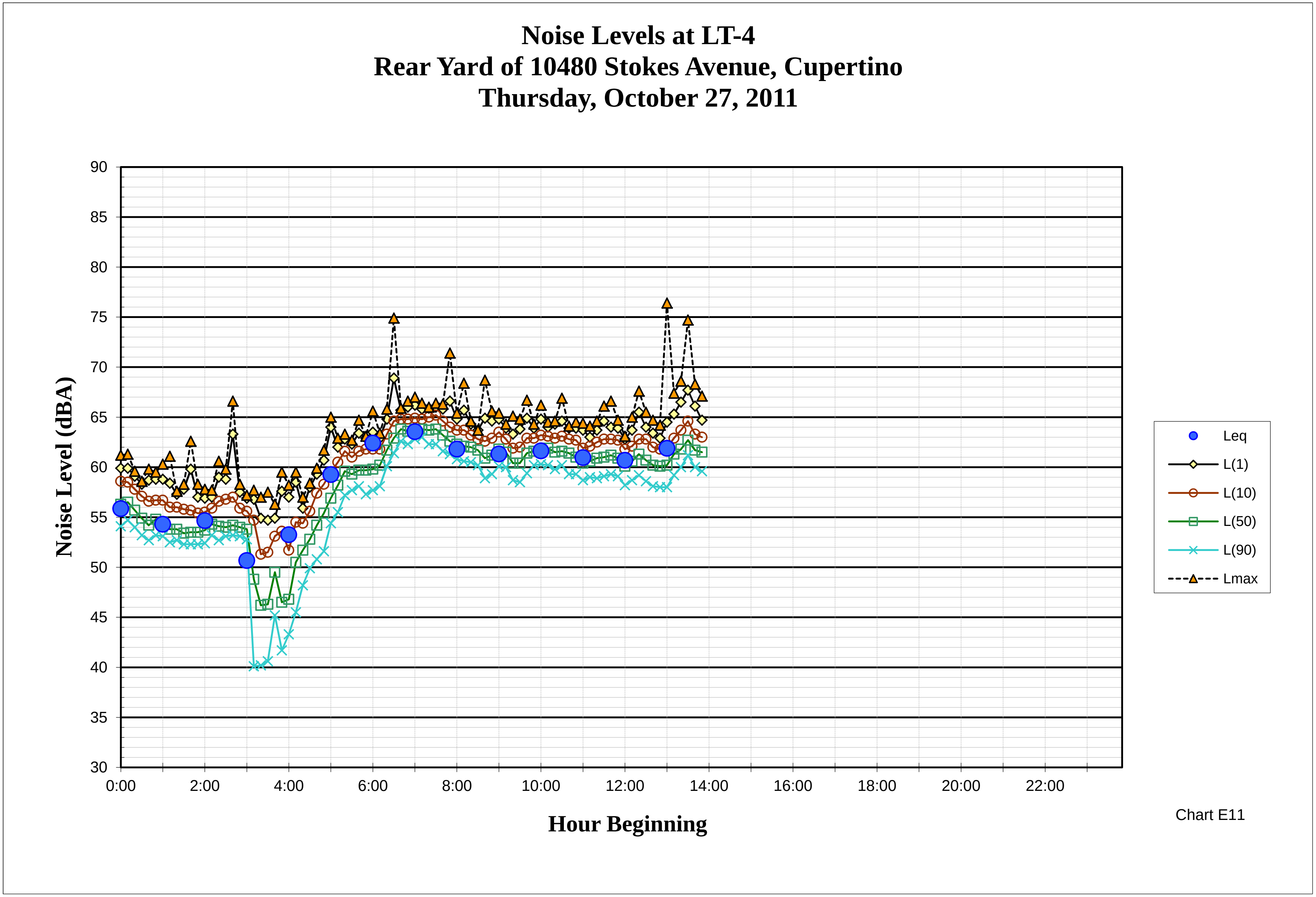
Chart E8

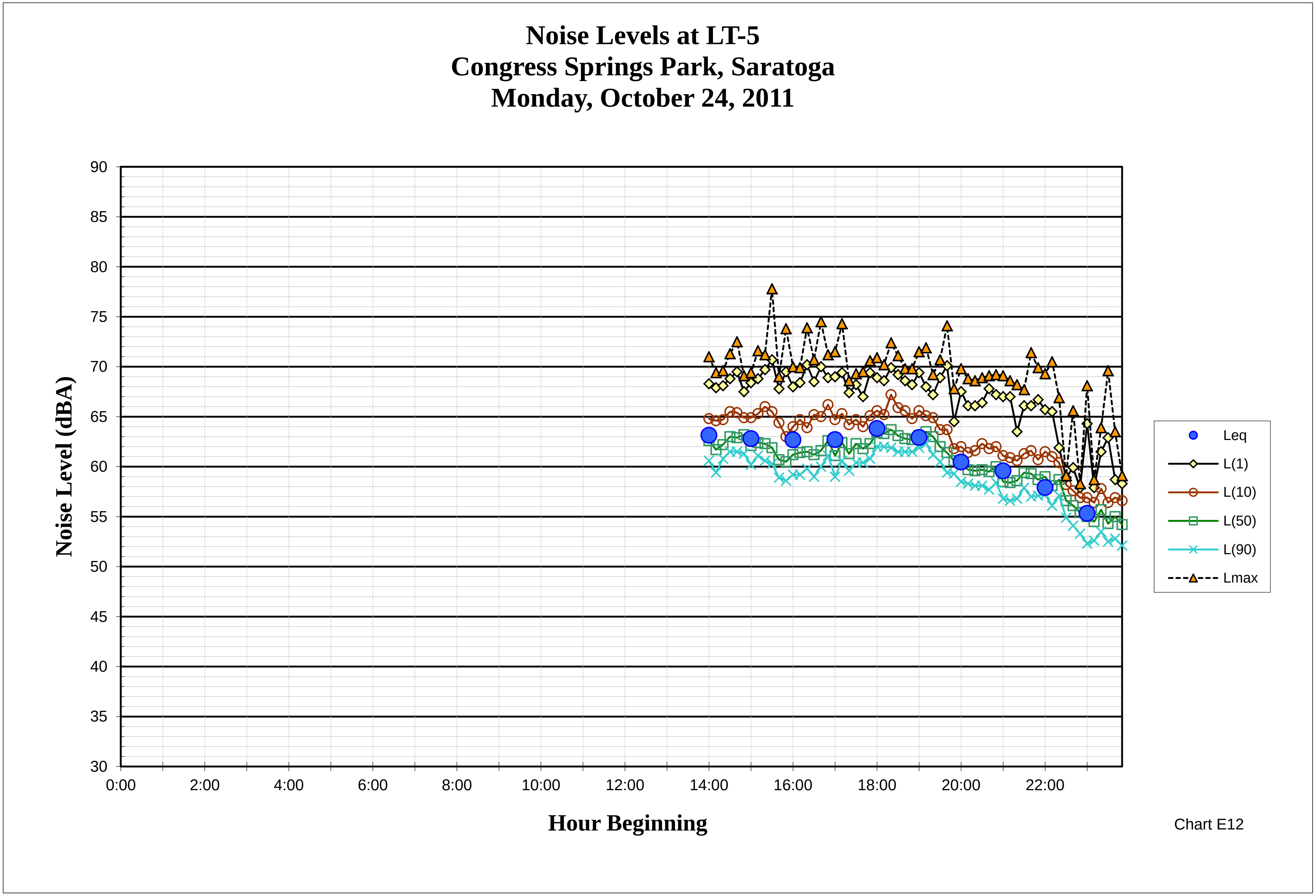


Noise Levels at LT-4
Rear Yard of 10480 Stokes Avenue, Cupertino
Tuesday, October 25, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E9



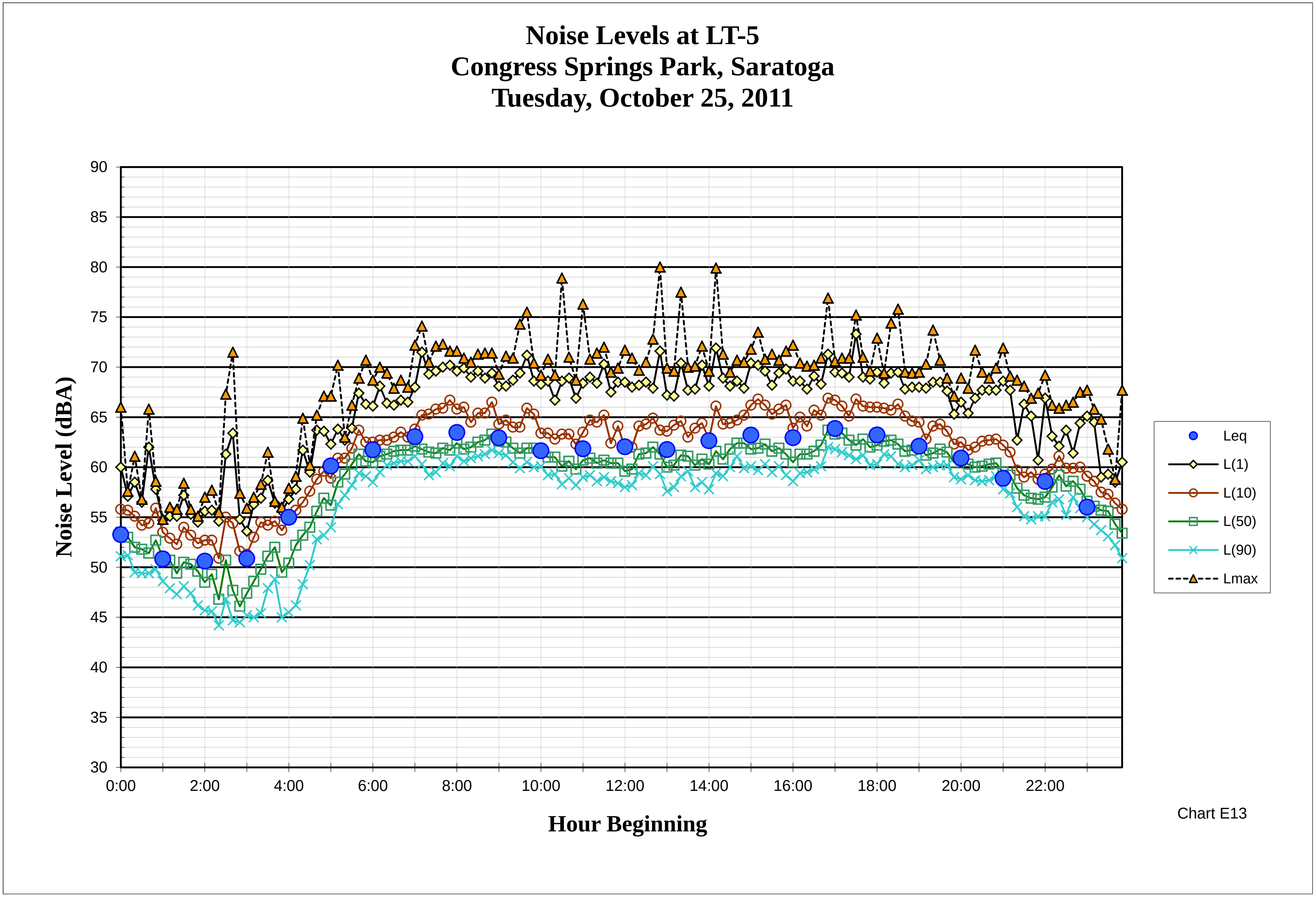
Noise Levels at LT-4
Rear Yard of 10480 Stokes Avenue, Cupertino
Wednesday, October 26, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E10


Noise Levels at LT-4
Rear Yard of 10480 Stokes Avenue, Cupertino
Thursday, October 27, 2011
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)
Lmax
Chart E11



Noise Levels at LT-5
Congress Springs Park, Saratoga
Monday, October 24, 2011
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)
Lmax

Chart E12



Noise Levels at LT-5
Congress Springs Park, Saratoga
Tuesday, October 25, 2011
90
85
80
75
70
65
60
55
50
45
40
35
30
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
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

Chart E13

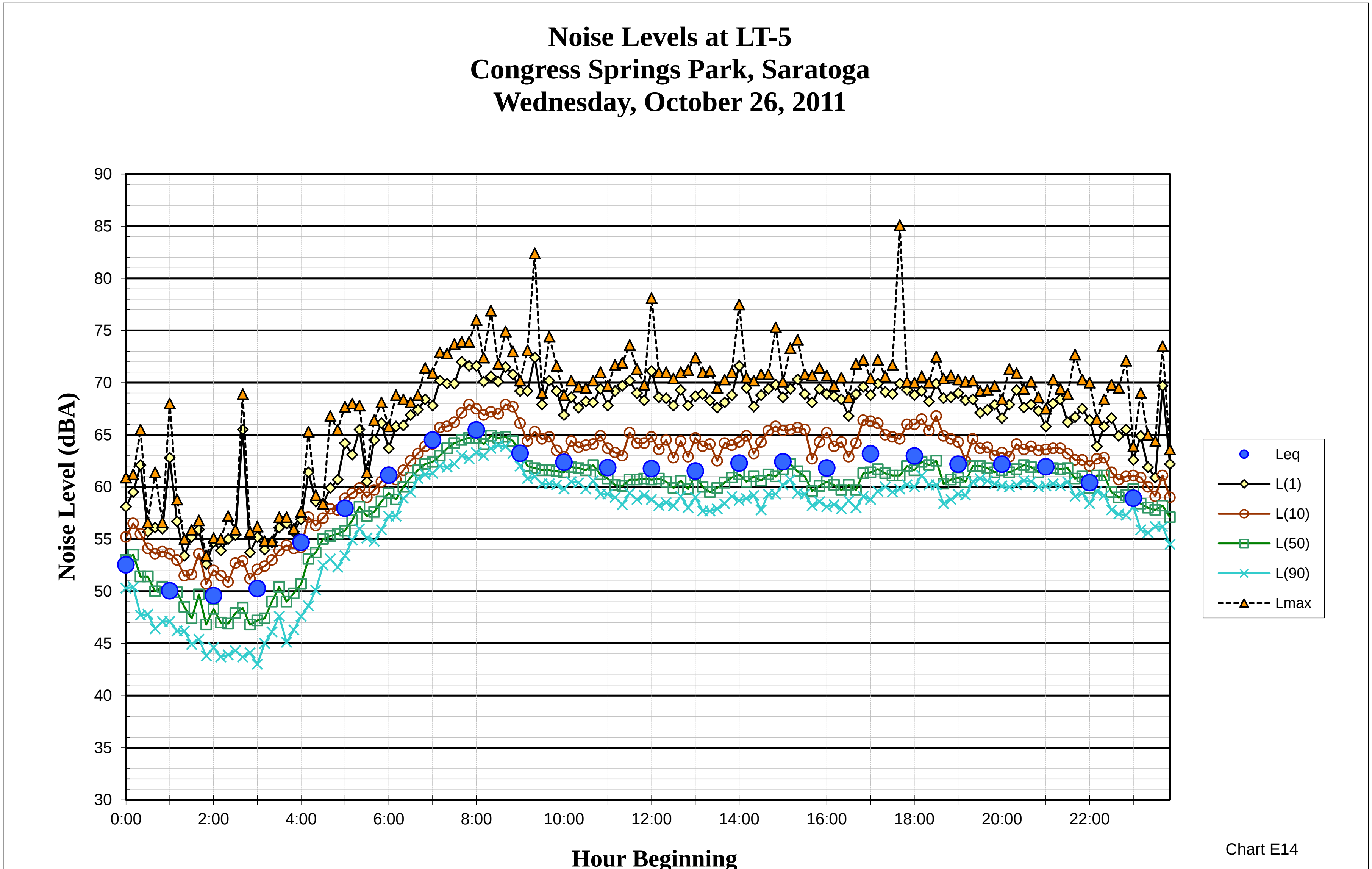
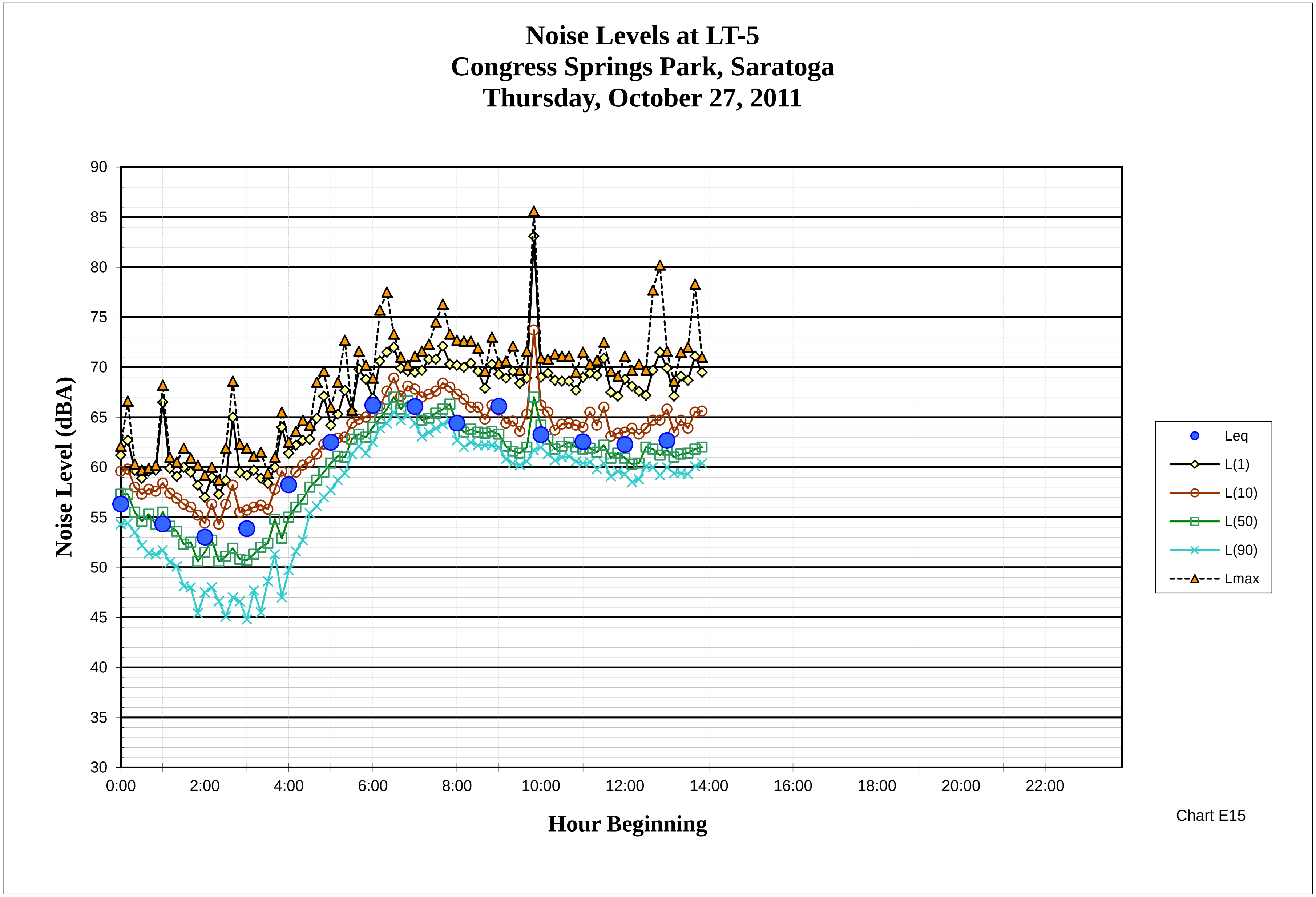
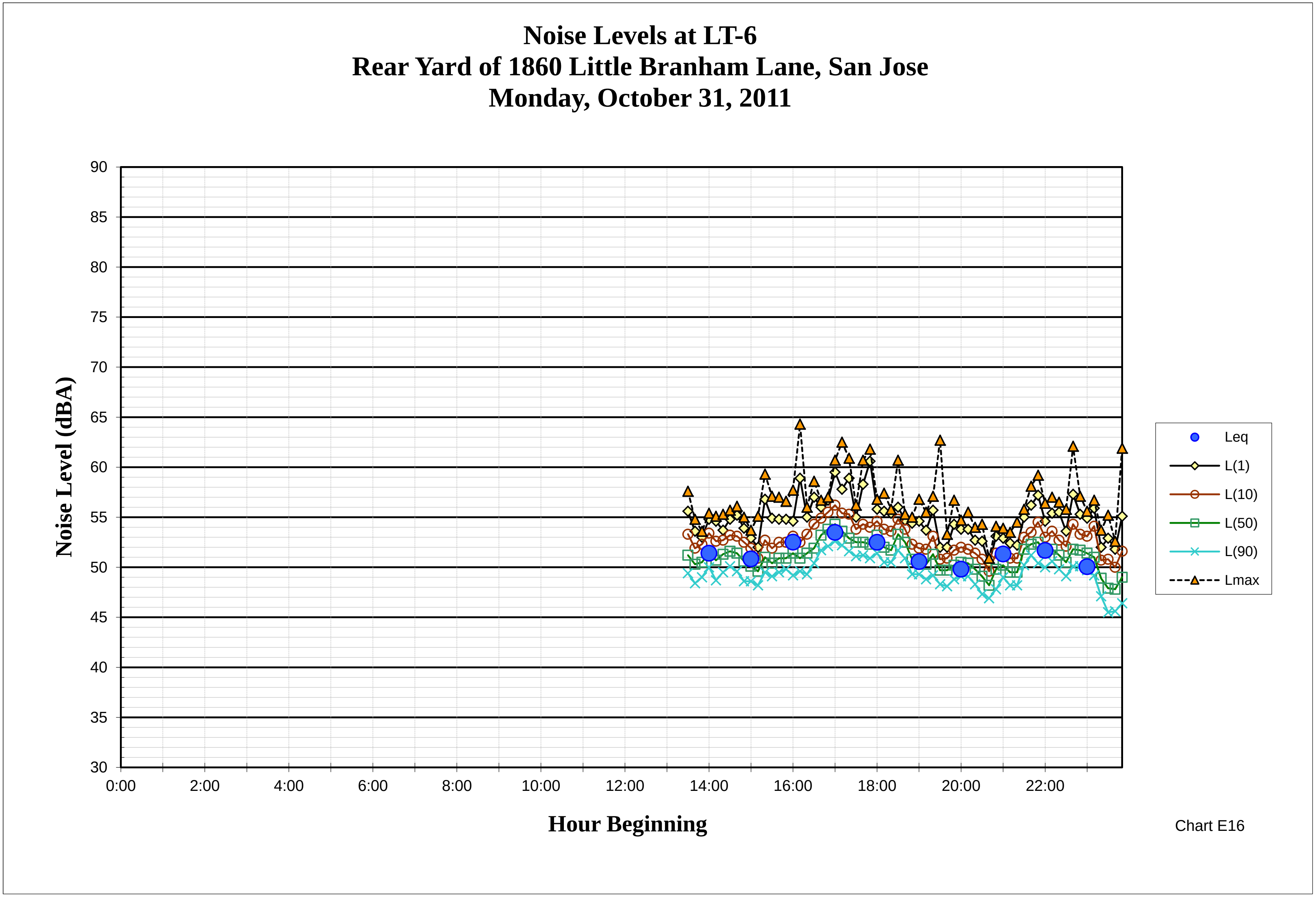

Noise Levels at LT-5
Congress Springs Park, Saratoga
Wednesday, October 26, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

Chart E14

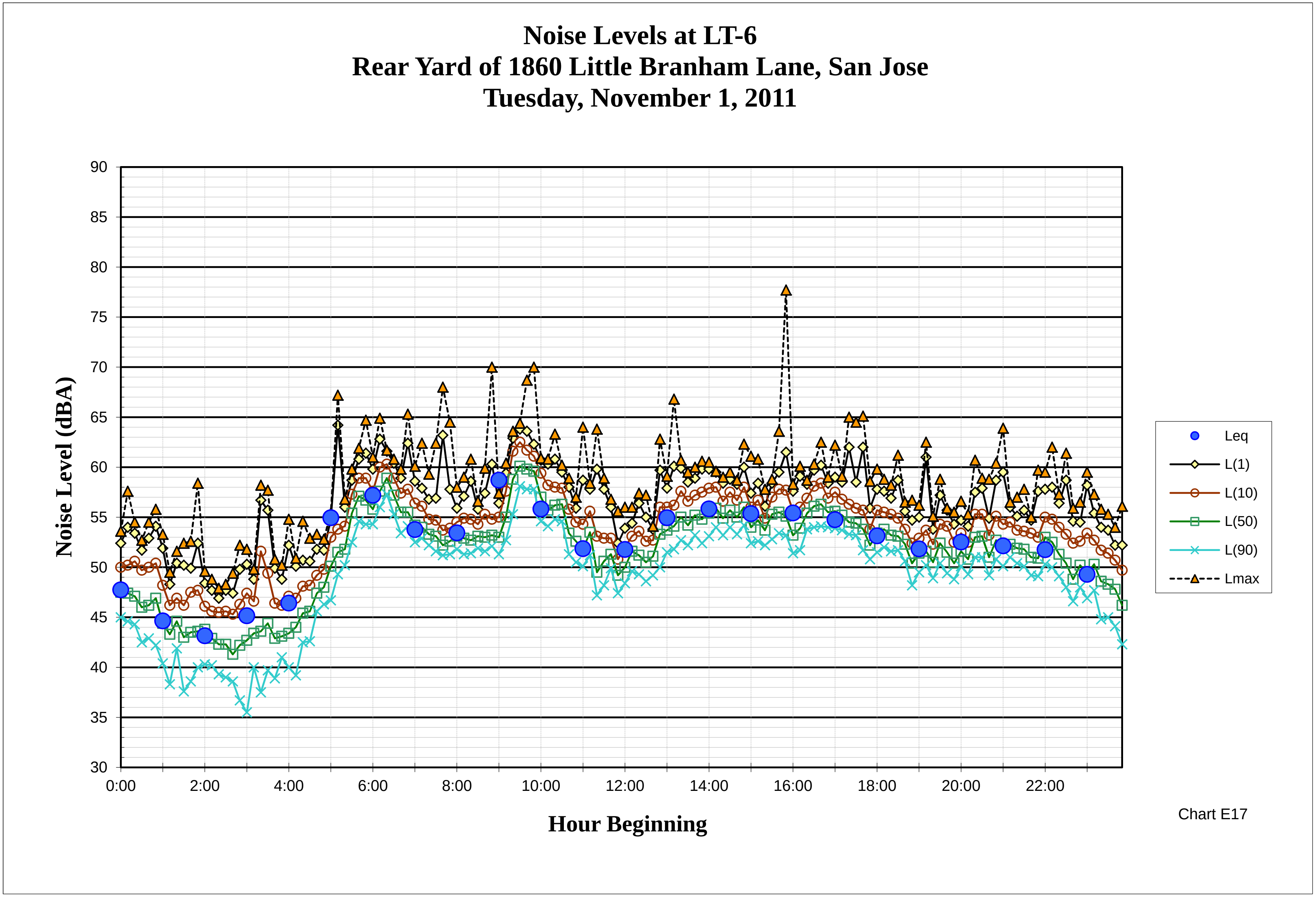


Noise Levels at LT-5
Congress Springs Park, Saratoga
Thursday, October 27, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

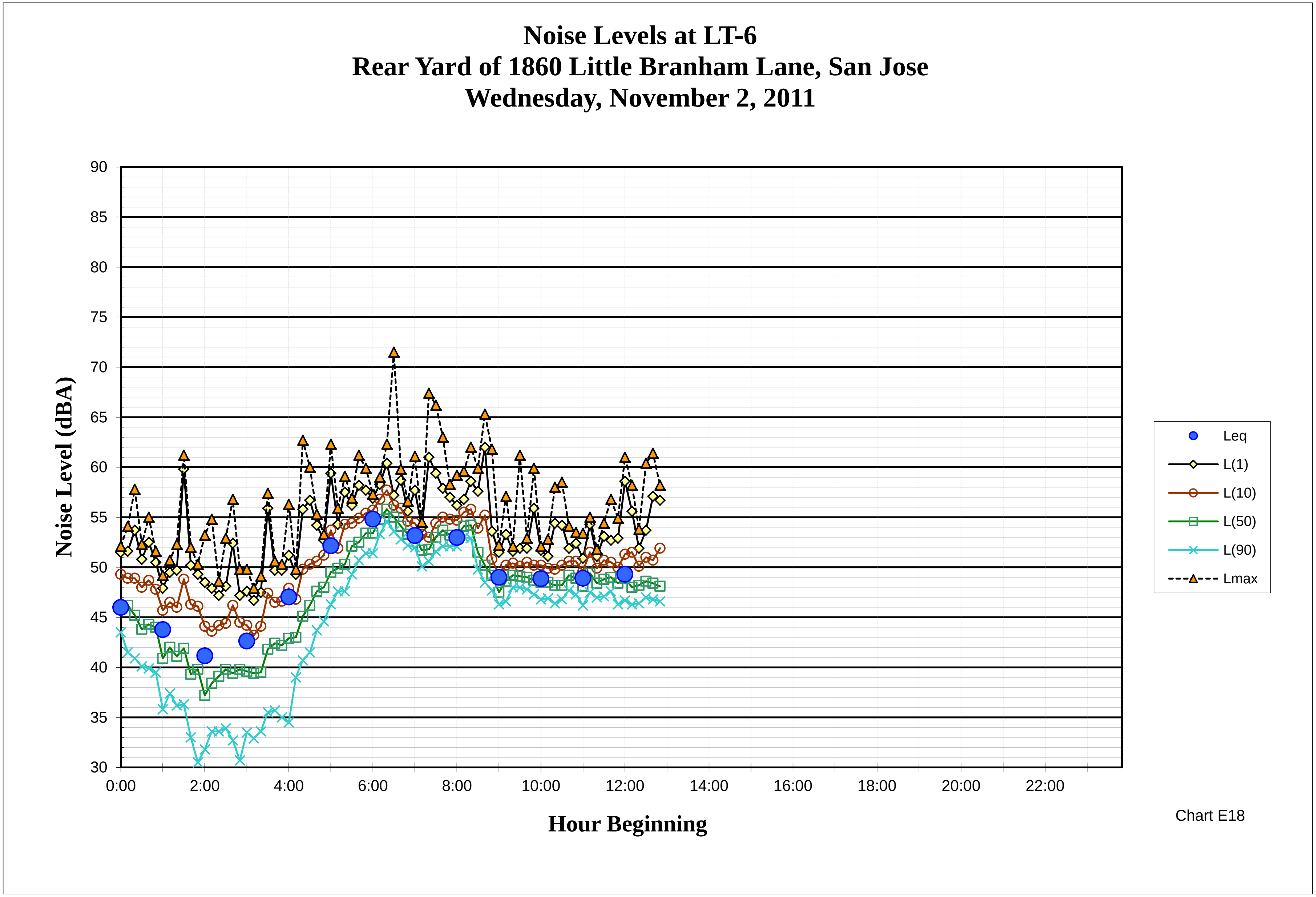
Chart E15



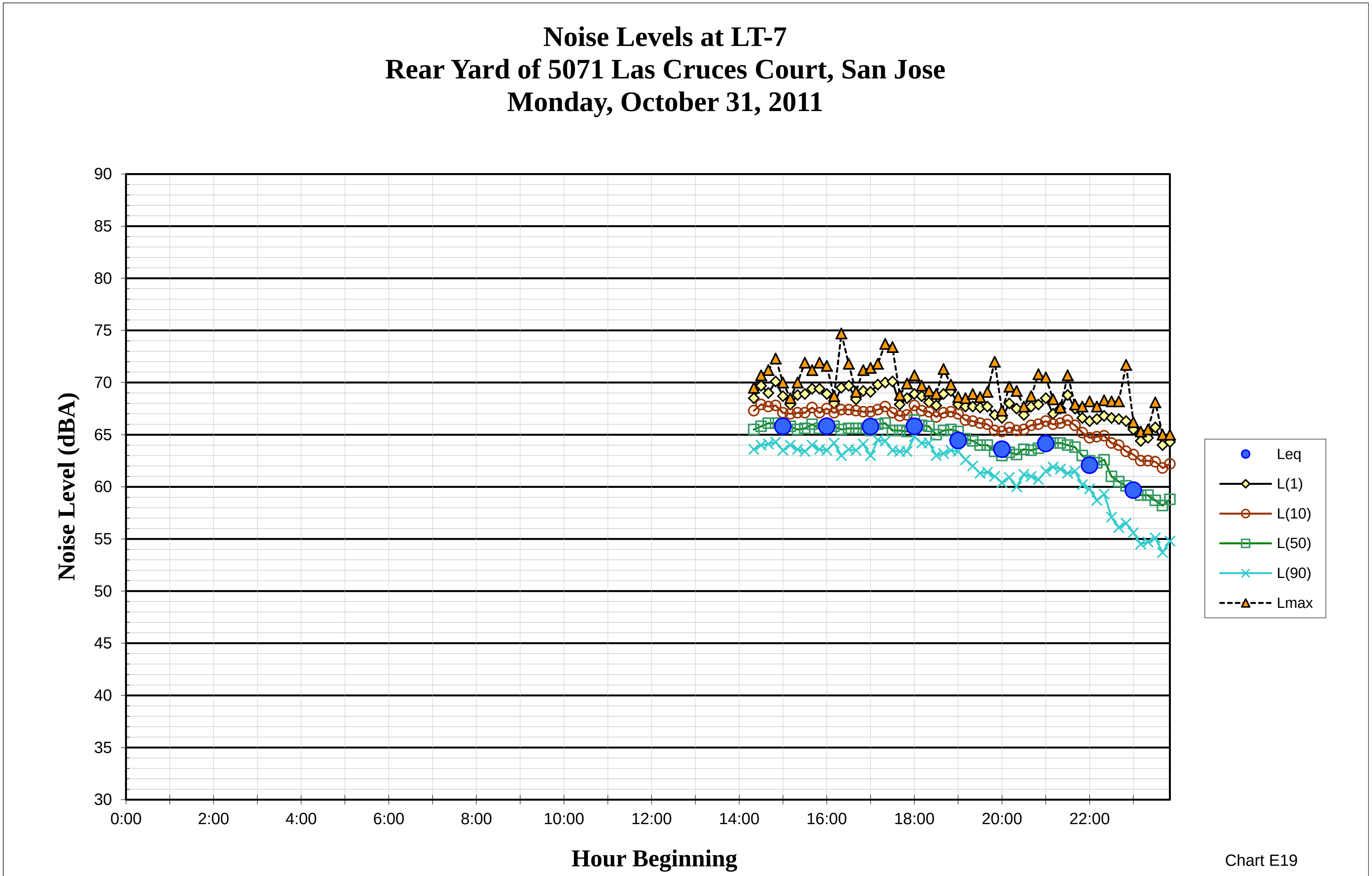
Noise Levels at LT-6
Rear Yard of 1860 Little Branham Lane, San Jose
Monday, October 31, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E16



Noise Levels at LT-6
Rear Yard of 1860 Little Branham Lane, San Jose
Tuesday, November 1, 2011
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)
Lmax
Chart E17

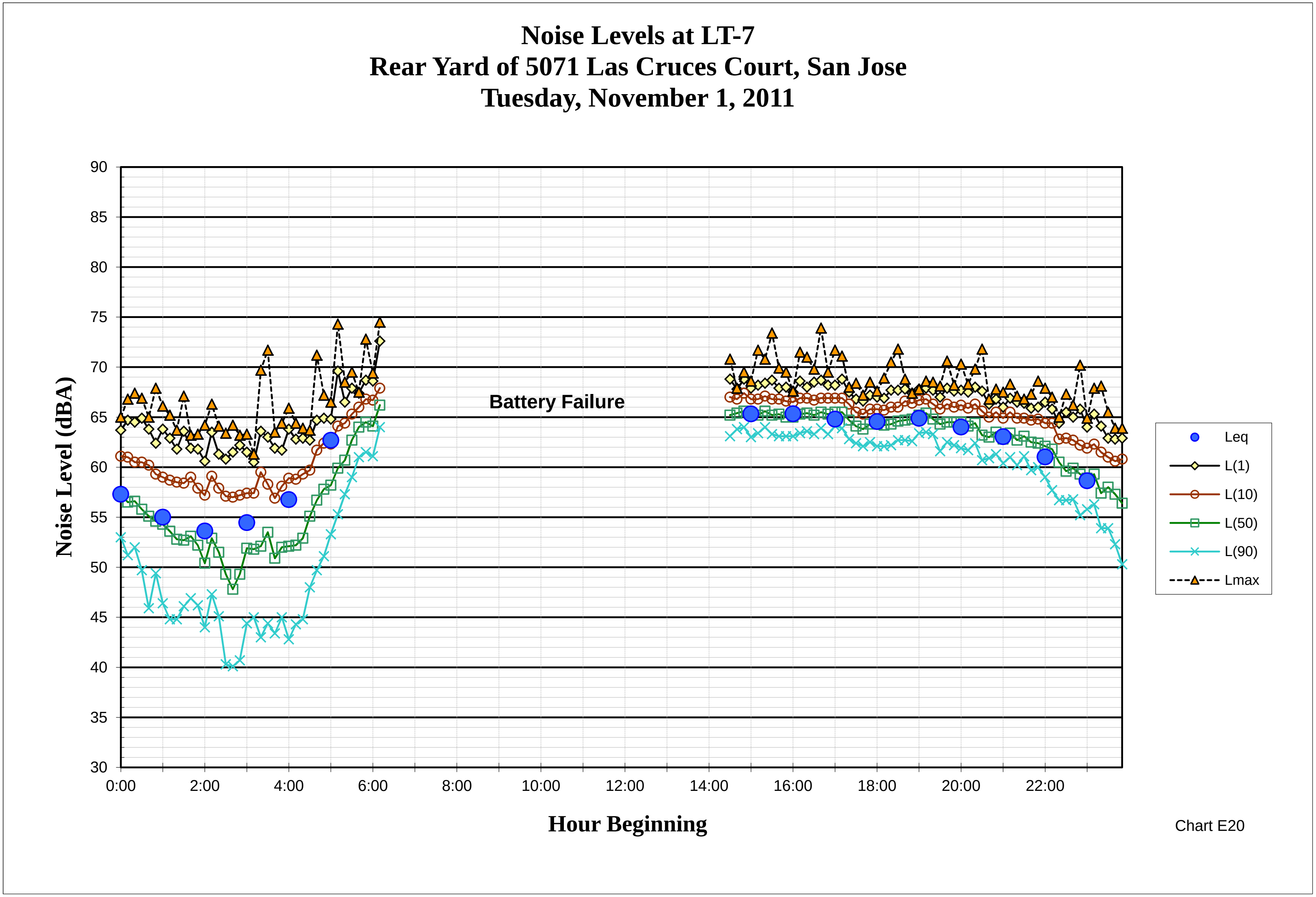


Noise Levels at LT-6
Rear Yard of 1860 Little Branham Lane, San Jose
Wednesday, November 2, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E18

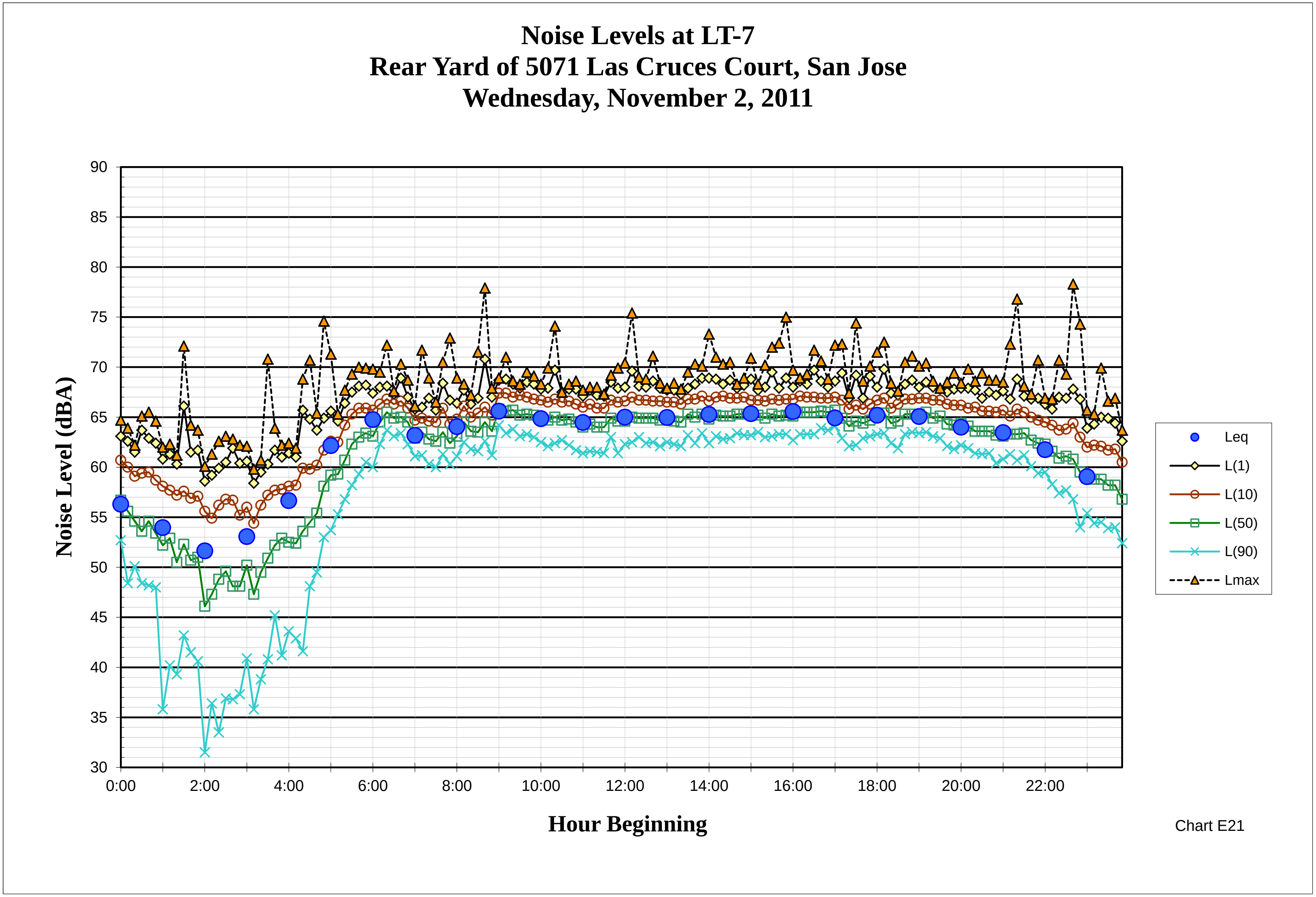


Noise Levels at LT-7
Rear Yard of 5071 Las Cruces Court, San Jose
Monday, October 31, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

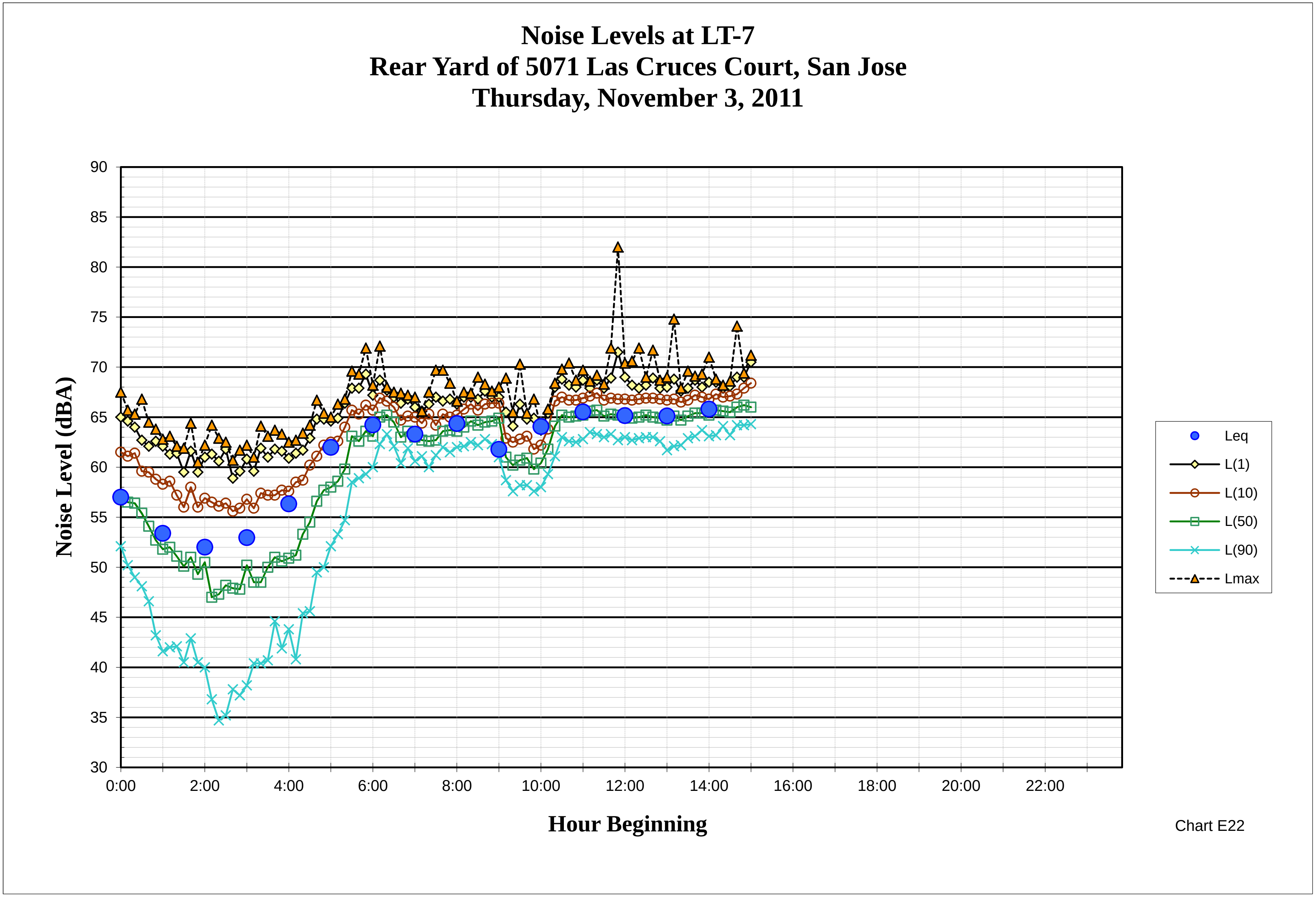
Chart E19



Noise Levels at LT-7
Rear Yard of 5071 Las Cruces Court, San Jose
Tuesday, November 1, 2011
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
Battery Failure
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E20



Noise Levels at LT-7
Rear Yard of 5071 Las Cruces Court, San Jose
Wednesday, November 2, 2011
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)
Lmax
Chart E21



Noise Levels at LT-7
Rear Yard of 5071 Las Cruces Court, San Jose
Thursday, November 3, 2011
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)
Lmax

Chart E22

Noise Levels at LT-8
Rear Yard of 5464 Chesbro Avenue, San Jose
Wednesday, November 2, 2011

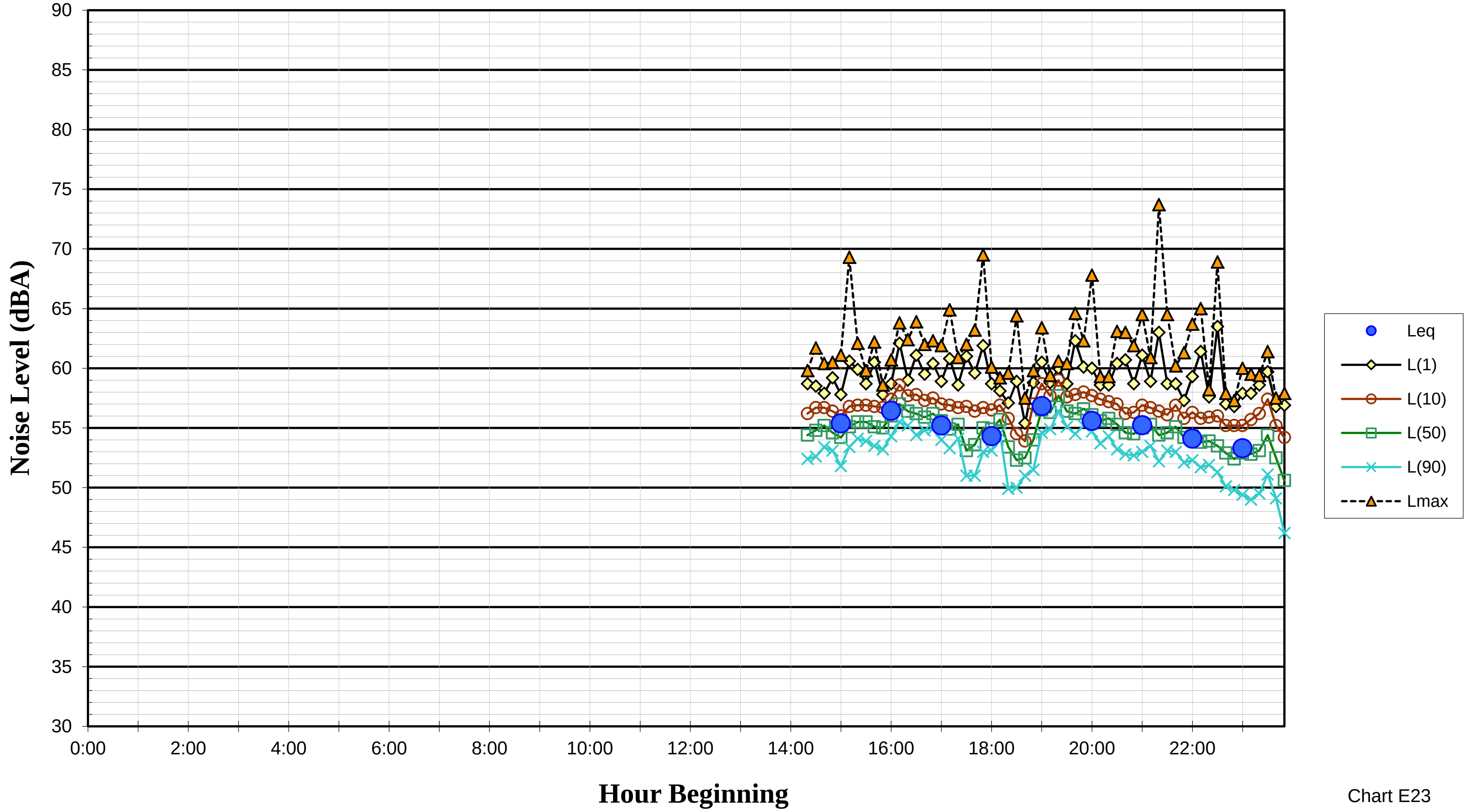


Chart E23

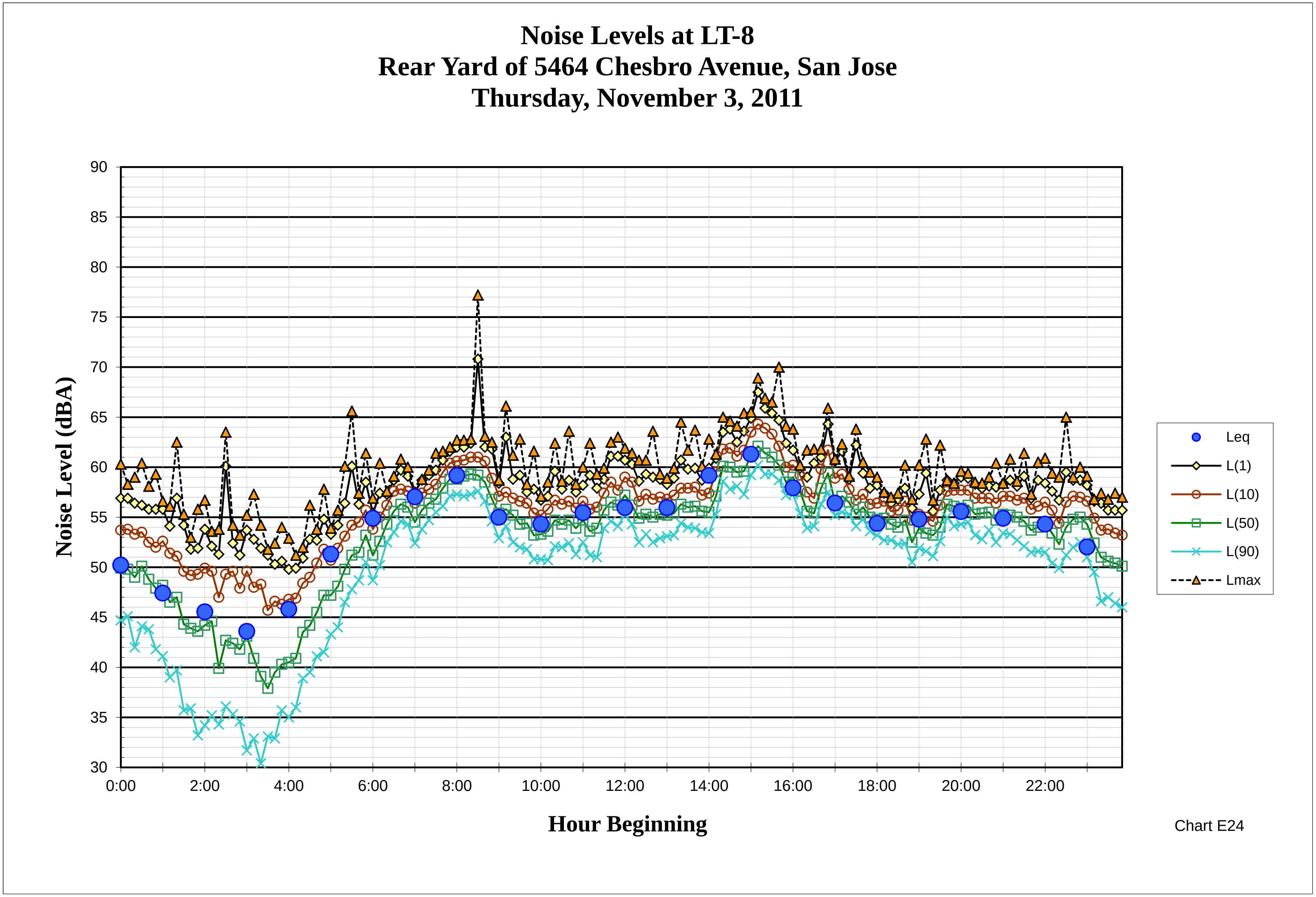
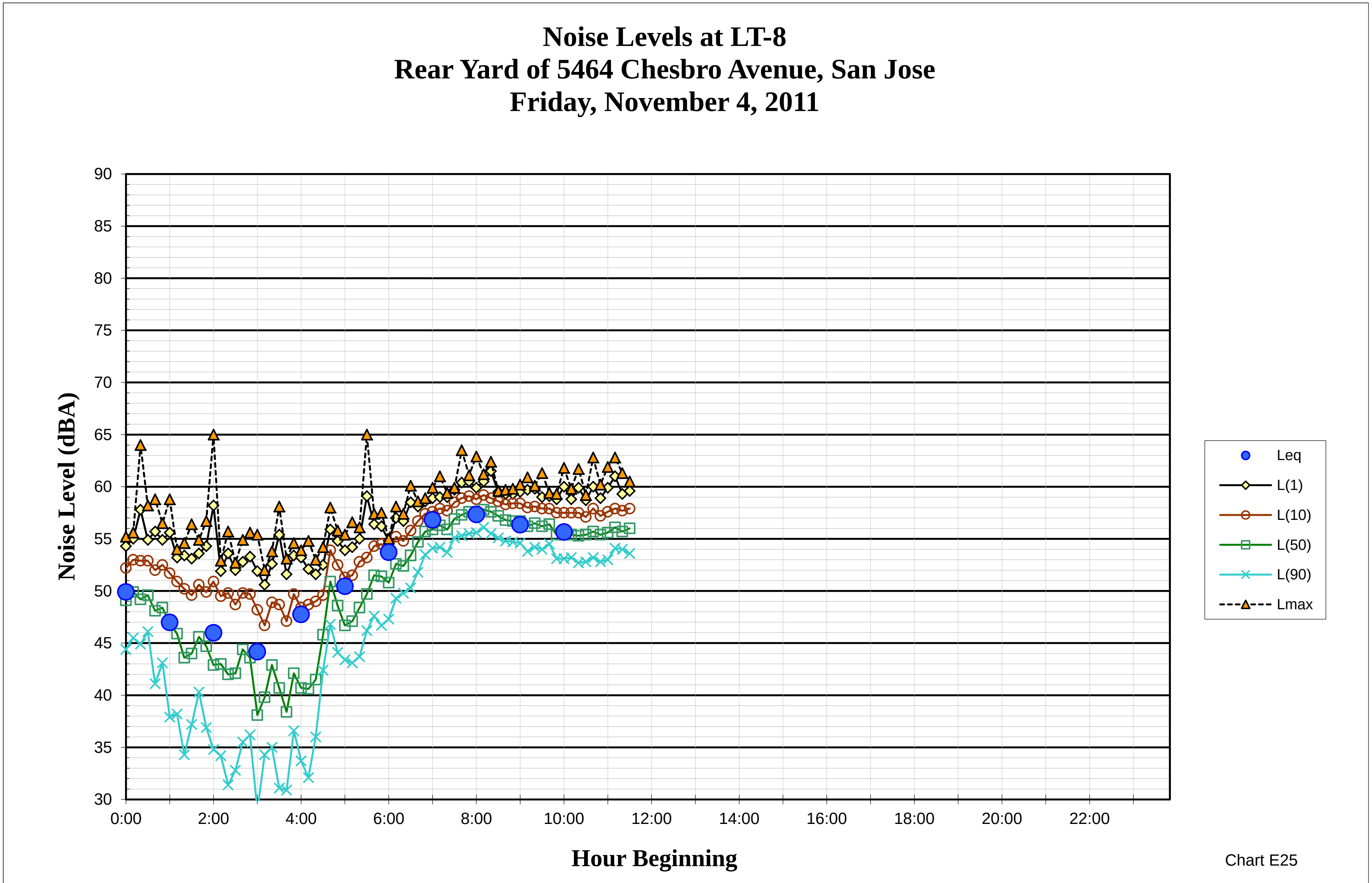

Noise Levels at LT-8
Rear Yard of 5464 Chesbro Avenue, San Jose
Thursday, November 3, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax

Chart E24



Noise Levels at LT-8
Rear Yard of 5464 Chesbro Avenue, San Jose
Friday, November 4, 2011
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)
Lmax

Chart E25

Noise Levels at LT-9
Rear Yard of 218 Herlong Avenue, San Jose
Monday, November 7, 2011 to Tuesday, November 8, 2011

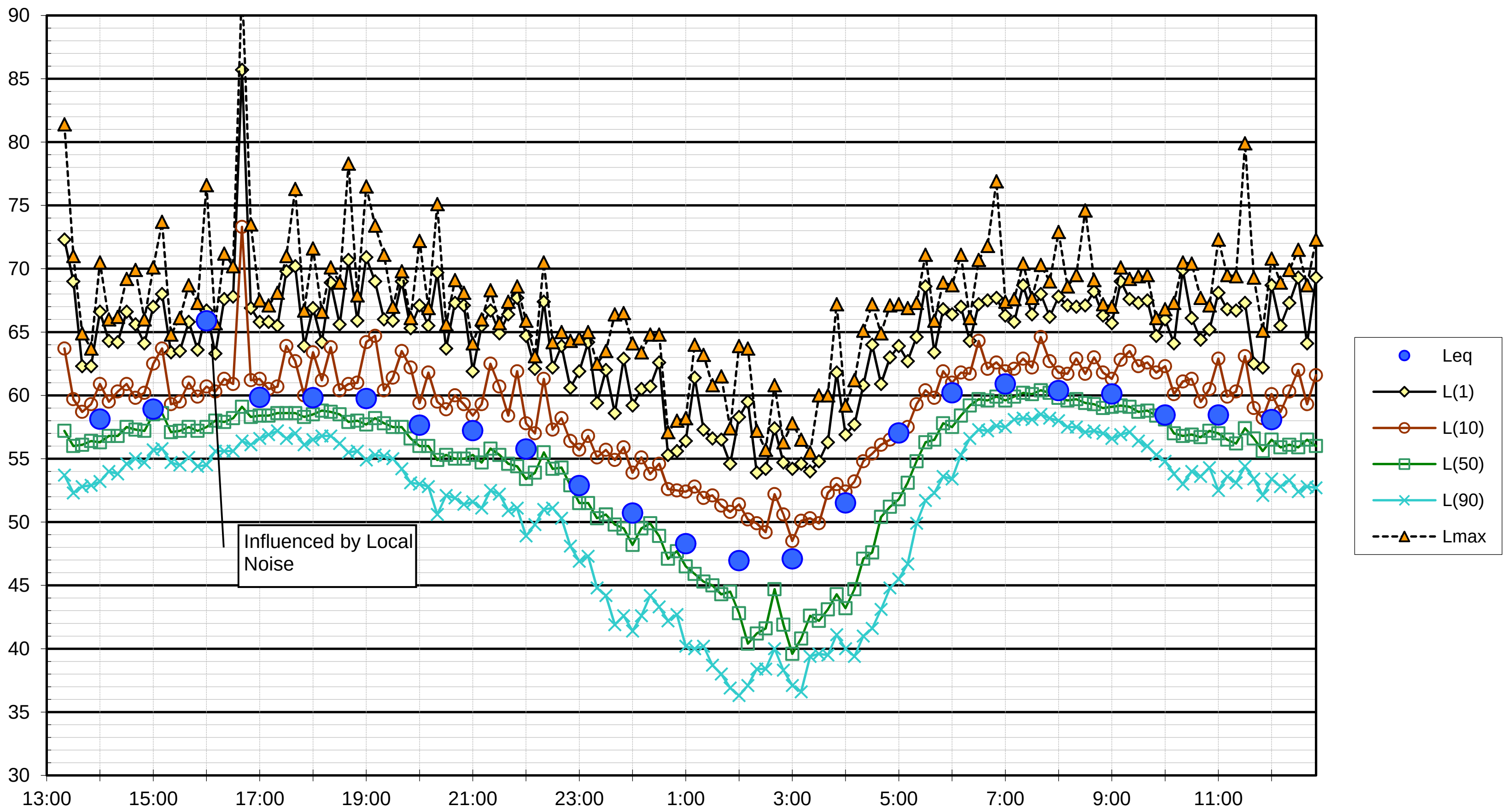
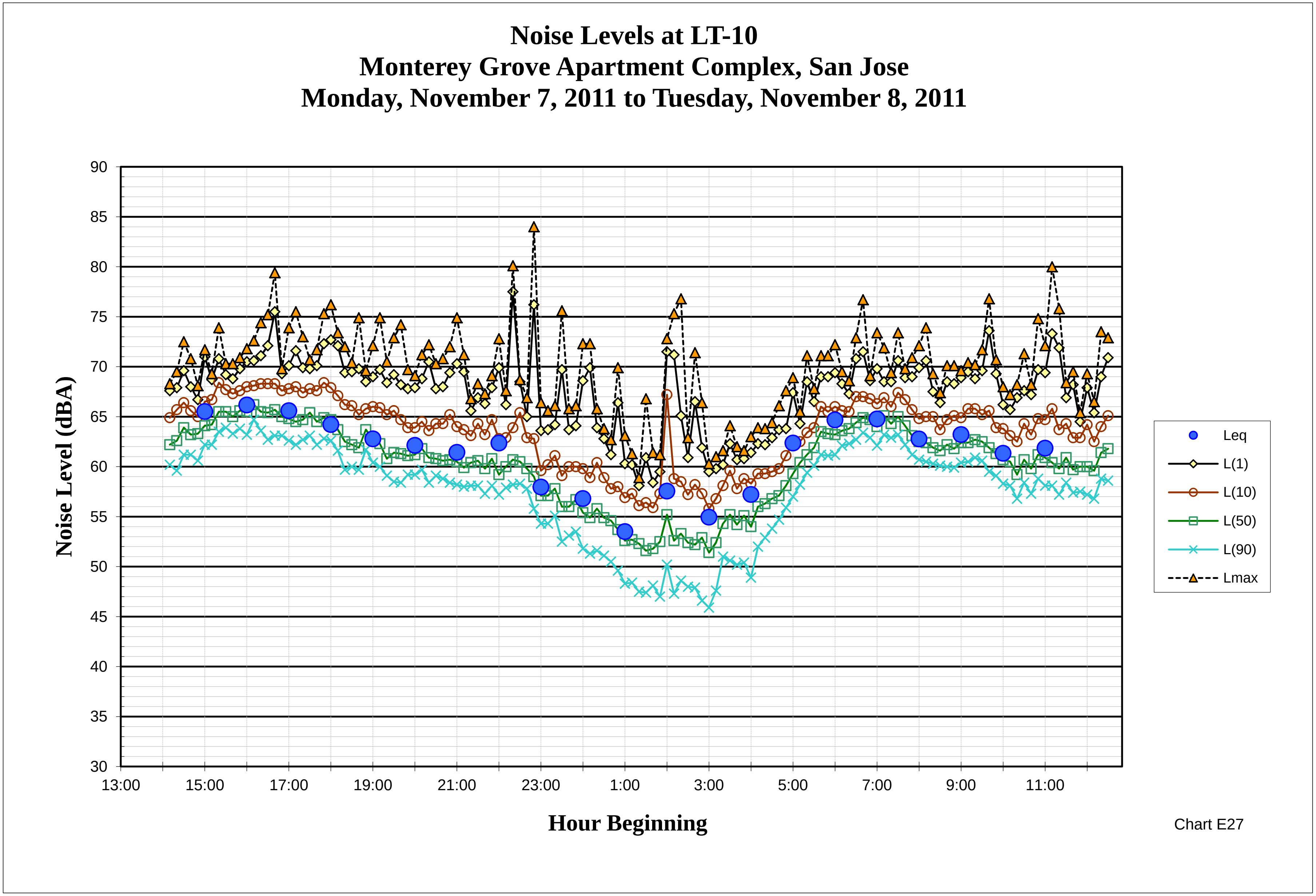
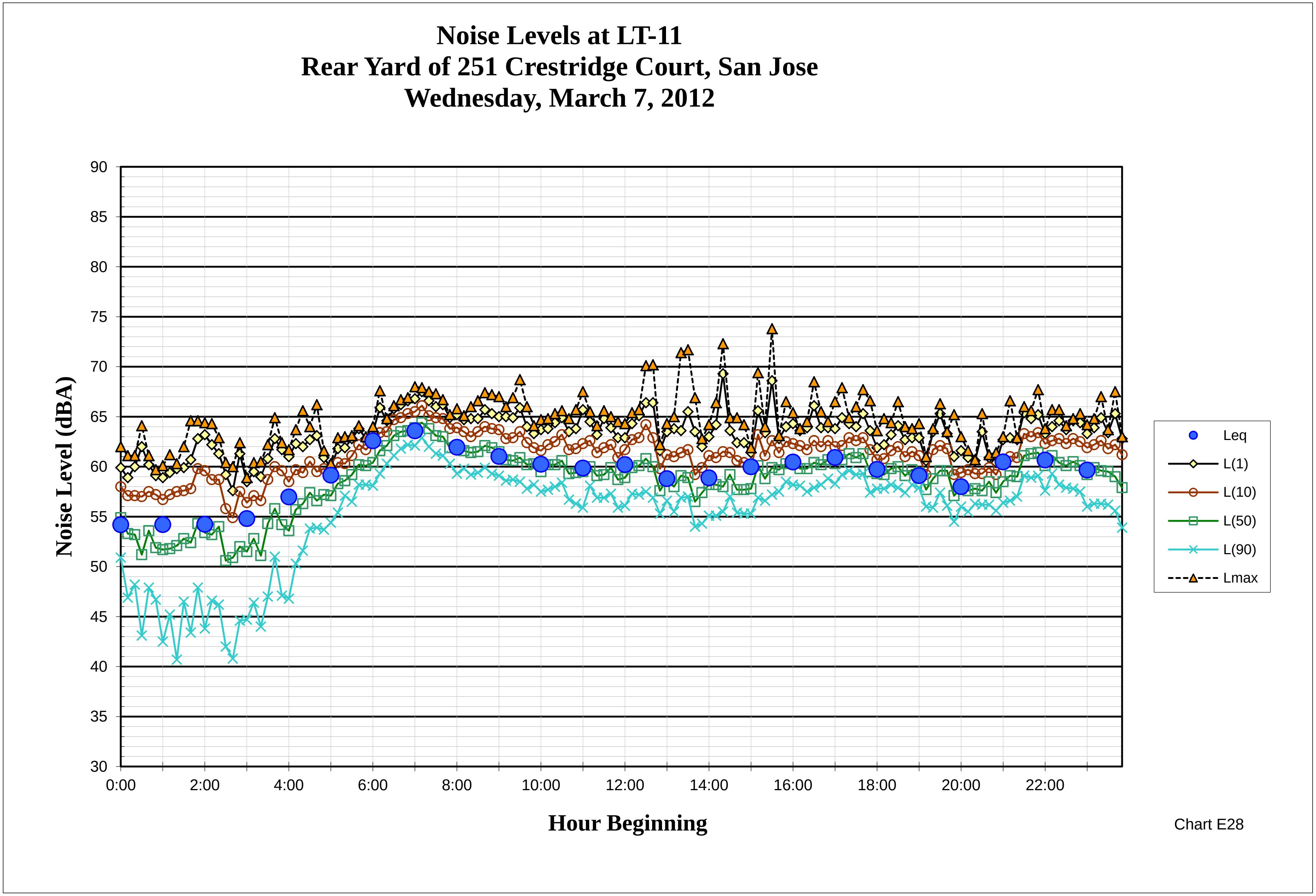


Chart E26



Noise Levels at LT-10
Monterey Grove Apartment Complex, San Jose
Monday, November 7, 2011 to Tuesday, November 8, 2011
Noise Level (dBA)
90
85
80
75
70
65
60
55
50
45
40
35
30
13:00
15:00
17:00
19:00
21:00
23:00
1:00
3:00
5:00
7:00
9:00
11:00
Hour Beginning
Leq
L(1)
L(10)
L(50)
L(90)
Lmax
Chart E27


Noise Levels at LT-11
Rear Yard of 251 Crestridge Court, San Jose
Wednesday, March 7, 2012
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)
Lmax
Chart E28

Appendix F
Sound Intensity Data

APPENDIX F

TIRE/PAVEMENT NOISE SOURCE LEVELS

At highway speeds, tire/pavement noise dominates the noise produced by light vehicles and trucks as shown in the REMELs database results[1]. In order to understand the contribution of the existing pavement to the traffic noise levels produced along the SR 85 corridor, on-board sound intensity (OBSI) measurements were conducted on this section of highway during the early afternoon of November 10, 2011. Measurements were made in both the southbound and northbound directions of travel in outside lane.

The OBSI technique was originally applied to quantifying the noise performance of highway pavements under Caltrans research on Quieter Pavements in 2002[2]. As of 2008, it has been adopted by the American Association of State Highway Transportation Officials as Test Procedure TP76[3]. The measurements reported here were taken following this procedure using sound intensity probes positioned 4" from the test tire sidewall, 3" above the ground with one probe opposite the leading edge of the tire contact patch and one opposite the trailing edge as shown in Figure 1. Under the procedure, the sound intensity is averaged over 5 seconds with a vehicle speed of 60 mph, equivalent to 440 feet of pavement. The levels for each probe are averaged together to determine the average sound intensity produced by the test on the given test section. These on-board measurements have been demonstrated to correlate quite well with wayside pass-by measurements[4]. Recently, the U.S. DOT Volpe Center has developed an experimental version of TNM to account for different pavements by modifying the ground level source strength of the vehicle types include in the model[5]. Using these measurements in TNM has been found to improve the correlation between wayside traffic measurements and traffic noise predictions based on TNM average pavement.

Because of the length of the project, the OBSI measurements were collected using a survey method instead of repeat measurements at few specific pavement sections. Under this method, five-second average samples were captured along the 24 miles of roadway at non-regular intervals for a total of 70 sections in each direction of travel. The overall (400 to 5,000 Hz summation) levels for the north and southbound directions of travel are

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[1] G. Fleming, A. Rapoza, and C. Lee, "Development of National Reference Energy Mean Emission Levels for the FHWA Traffic Noise Model (FHEA TNM), Version 1.0", U.S. Department of Transportation, Report No. DOT-VNTSC-FHWA-96-2, 1996

[2] Donavan, P., and Rymer, B., "Quantification of Tire/Pavement Noise: Application of the Sound Intensity Method", Proceedings of Inter-Noise 2004, Prague, the Czech Republic, August 2004

[3] Standard Practice for Measurement of Tire/Pavement Noise Using the On-Board Sound Intensity (OBSI) Method", TP 76-11 (Proposed), American Association of State Highway and Transportation Officials, 444 North Capitol Street N.W., Suite 249, May 2009.Washington, D.C. 20001

[4] Donavan, P. and Lodico, D., "Measuring Tire-Pavement Noise at the Source", NCHRP Report 630, Transportation Research Board, Washington, D.C., 2009

[5] Rochat, J, Hastings, A., and Ferroni, M. "Investigating the Implementation of Pavement Effects Via OBSI Data inn the FHWA Traffic Noise Model® (FHWA TNM)", Proceedings of NOISE-CON 2007, Reno, Nevada, October 2007.

shown in Figure 2 and 3, respectively, for each sequential sample number taken in the direction of travel. The approximate location of the data samples are indicated by the occurrence of cross streets and highways on each figure. The southbound and northbound data are also compared in Figure 4, however, it should be noted the data do not align spatially due to the nature of the data collection. Excluding the structures in the northbound direction of travel, three distinct regions are apparent. From south to north, between Monterey Road and SR 87, the levels average around 98 dBA in a section that corresponds to newer asphalt. Between the overpass after SR 87 and I-280, the levels hover at about 103 to 104 dBA. In this section, the concrete pavement was ground by Caltrans in the early to mid 2000's producing lower tire/pavement noise levels[6]. North of I-280, the concrete has an aged longitudinal tine texture which produces levels of about 107 dB. In the northbound direction, the trends and levels are about the same except for the southern segment of SR 85, south of SR 87, where the existing asphalt has not been replaced and produces corresponding higher levels of about 102 to 103 dBA. One-third octave band spectra for these three regions in both the northbound and southbound directions are shown in Figures 5 and 6, respectively.

To put these levels in perspective, TNM average pavement corresponds to an OBSI level of about 102 to 103 dBA. This indicates that traffic noise levels along the northern end of the SR 85 project will be higher than those predicted by TNM. In the middle section, levels will closer to TNM predictions while on the southern end, they should be lower especially on the northbound side of the highway.

Figure 1: OBSI measurement fixture mounted on test vehicle

[6] Donavan, P. and Janello, C. "Sound Intensity Tire/Pavement Noise Measurements on SCL 85 in Saratoga, CA", Technical Memorandum prepared for California Department of Transportation, Division of Environmental Analysis, Sacramento, CA, prepared by Illingworth & Rodkin, Inc., Petaluma, CA, June 2011

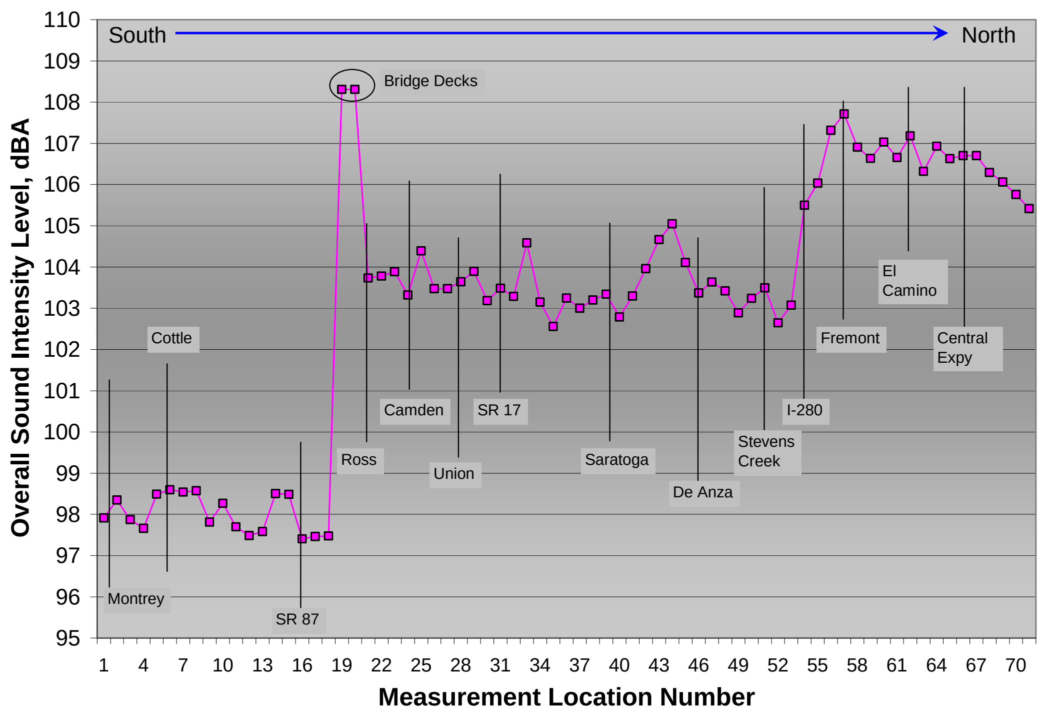

Figure 2: Overall OBSI levels measured on SR 85 in the northbound outer lane of vehicle travel versus measurement location number

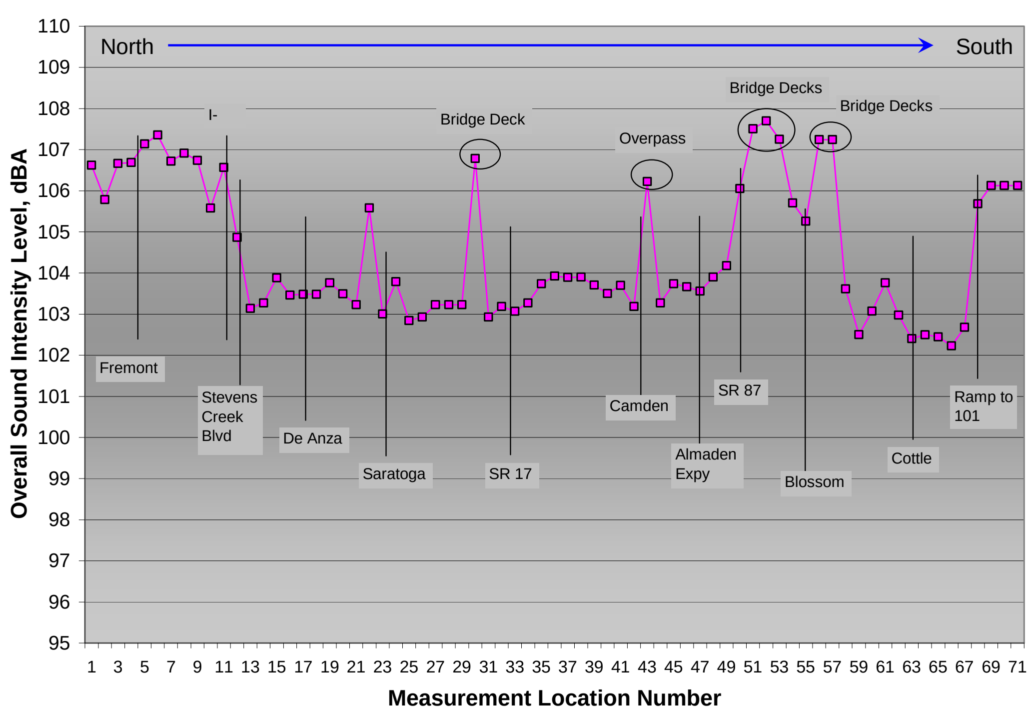

Figure 3: Overall OBSI levels measured on SR 85 in the southbound outer lane of vehicle travel versus measurement location number

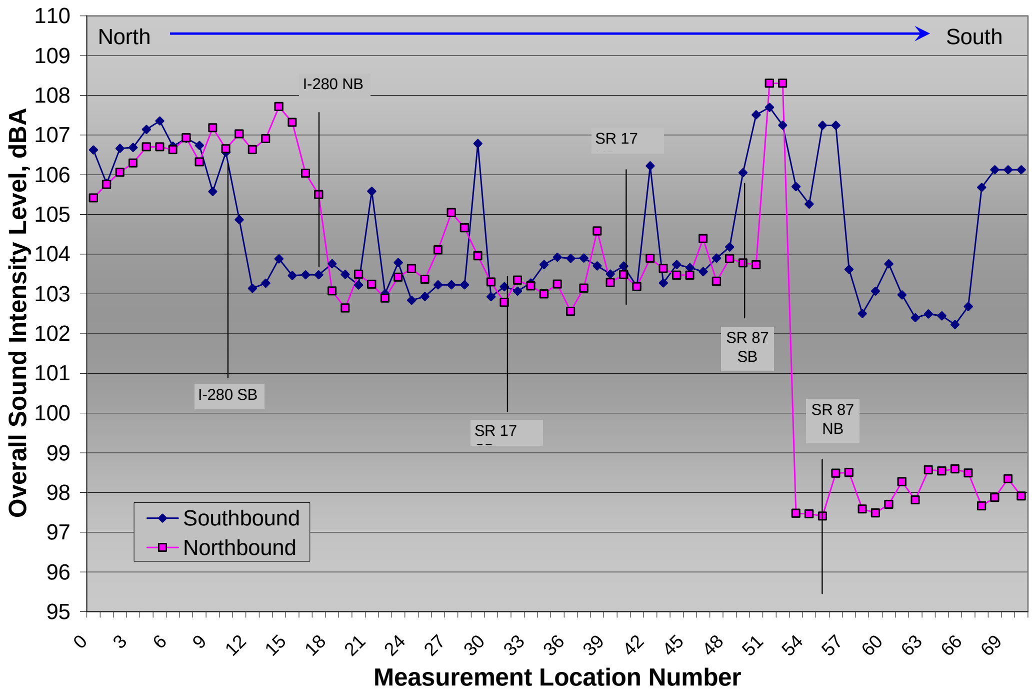

Figure 4: Comparison of overall OBSI levels measured on SR 85 in the northbound and southbound directions of travel

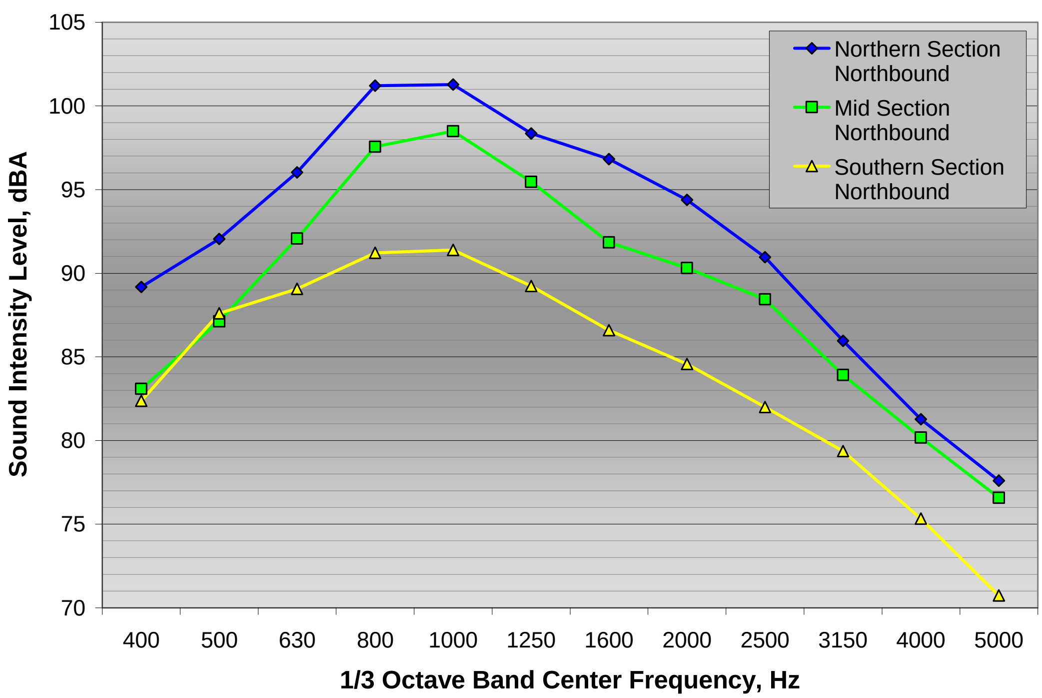

Figure 5: One-third octave band spectra typical of the northern, middle, and southern sections of northbound SR 85

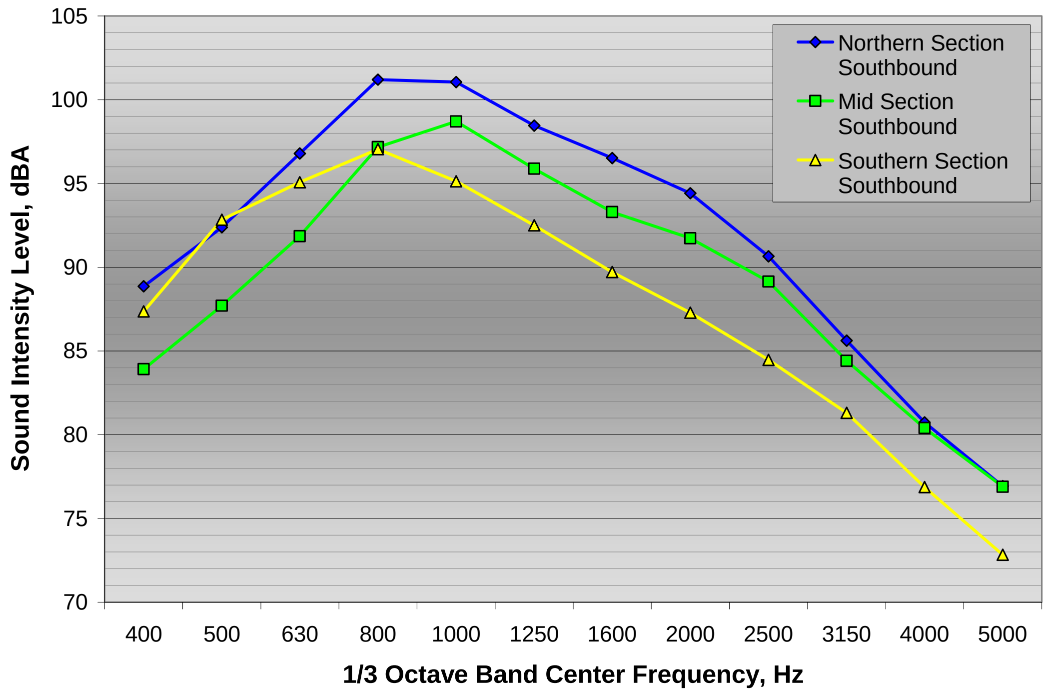

Figure 6: One-third octave band spectra typical of the northern, middle, and southern sections of southbound SR 85