Appendix F: Noise and Vibration Assessment

GATEWAY CROSSINGS PROJECT NOISE AND VIBRATION ASSESSMENT

Santa Clara, California

January 22, 2018

Prepared for:

Kristy Weis
Senior Project Manager
David J. Powers & Associates, Inc.
1871 The Alameda, Suite 200
San José, CA 95126

Prepared by:

Casey T. Zaglin and
Michael S. Thill

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

1 Willowbrook Court, Suite 120
Petaluma, CA 94954
(707) 794-0400

I&R Project: 16-075

INTRODUCTION

The approximately 24-acre Gateway Crossings project site is currently undeveloped and located at the southwest corner of Coleman Avenue and Brokaw Road in the City of Santa Clara. The project proposes to develop four, four to eight-story podium residential buildings with semi-subterranean parking and one to two levels of above ground parking, and up to 215,000 square feet of commercial uses including a nine-story hotel building above a podium with three levels of above ground parking and one level of semi-subterranean parking. The proposed residential and hotel buildings would be situated around a publicly accessible park. Common open spaces would be provided in the residential buildings on top of the podium structures and may include rooftop outdoor amenity space.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency Section discusses the noise and land use compatibility of the proposed project utilizing policies in the City's General Plan; and 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts upon sensitive receivers, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the identified impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

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

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

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

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

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

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn}. At a L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a L_{dn} of 60-70 dBA. Between a L_{dn} of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Ground-borne Vibration

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

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

Railroad and light-rail operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1×10^{-6} in/sec RMS, which equals 0 VdB, and 1 in/sec equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans. Perceptible vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams and foot traffic. Construction activities, train operations, and street traffic are some of the most common external sources of vibration that can be perceptible inside residences. Table 4 illustrates common sources of vibration and the association to human perception or the potential for structural damage.

TABLE 1 Definition of Acoustical Terms Used in this Report

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

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

TABLE 2 Typical Noise Levels in the Environment

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

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

TABLE 3 Reactions of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

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

TABLE 4 Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level, VdB	Typical Events (50-foot setback)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment
		Heavy tracked vehicles (Bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	
		Commuter rail, upper range
Residential annoyance, infrequent events	80	Rapid transit, upper range
Residential annoyance, occasional events		Commuter rail, typical Bus or truck over bump or on rough roads
Residential annoyance, frequent events	70	Rapid transit, typical
Approximate human threshold of perception to vibration		Buses, trucks and heavy street traffic
	60	
		Background vibration in residential settings in the absence of activity
Lower limit for equipment ultra-sensitive to vibration	50	

Source: Transit Noise and Vibration Impact Assessment, US Department of Transportation Federal Transit Administration, May 2006.

Regulatory Background

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

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

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

(b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels;

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

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

(e) For a project located within an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels; or

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

Pursuant to recent court decisions, the impacts of site constraints such as exposure of the proposed project to excessive levels of noise and vibration identified in Checklist Questions (a), (b), (e), and (f) are not included in the Impacts and Mitigation Section of this report. These items are discussed in a separate section addressing Noise and Land Use Compatibility for consistency with the policies set forth in the City's General Plan.

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

2016 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn}/CNEL in any habitable room.

2016 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\,(1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan adopted by the Santa Clara County Airport Land Use Commission (ALUC) contains standards for projects within the vicinity of San José International Airport which are relevant to this project:

<u>4.3.2 Noise Compatibility</u>

> The objective of noise compatibility criteria is to minimize the number of people exposed to frequent and/or high levels of aircraft noise.

<u>4.3.2.1 Policies</u>

N-1 The Community Noise Equivalent Level (CNEL) method of representing noise levels shall be used to determine if a specific land use is consistent with the CLUP.

N-2 In addition to the other policies herein, the Noise Compatibility Policies presented in Table 4-1 shall be used to determine if a specific land use is consistent with this CLUP.

N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5.

N-4 No residential or transient lodging construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential portion of a mixed use residential project or a multi-unit residential project. (Sound wall noise mitigation measures are not effective in reducing noise generated by aircraft flying overhead.)

N-5 All property owners within the Airport Influence Area who rent or lease their property for residential use shall include in their rental/lease agreement with the tenant, a statement advising that they (the tenants) are living within a high noise area and the exterior noise level is predicted to be greater than 65 dB CNEL in a manner that is consistent with current state law including AB2776 (2002).

N-6 Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. Table 4-1 presents acceptable noise levels for other land uses in the vicinity of the Airport.

N-7 Single-event noise levels (SENL) from single aircraft overflights are also to be considered when evaluating the compatibility of highly noise-sensitive land uses such as schools, libraries, outdoor theaters, and mobile homes. Single-event noise levels are especially important in the areas regularly overflown by aircraft, but which may not produce significant CNEL contours, such as the down-wind segment of the traffic pattern, and airport entry and departure flight corridors.

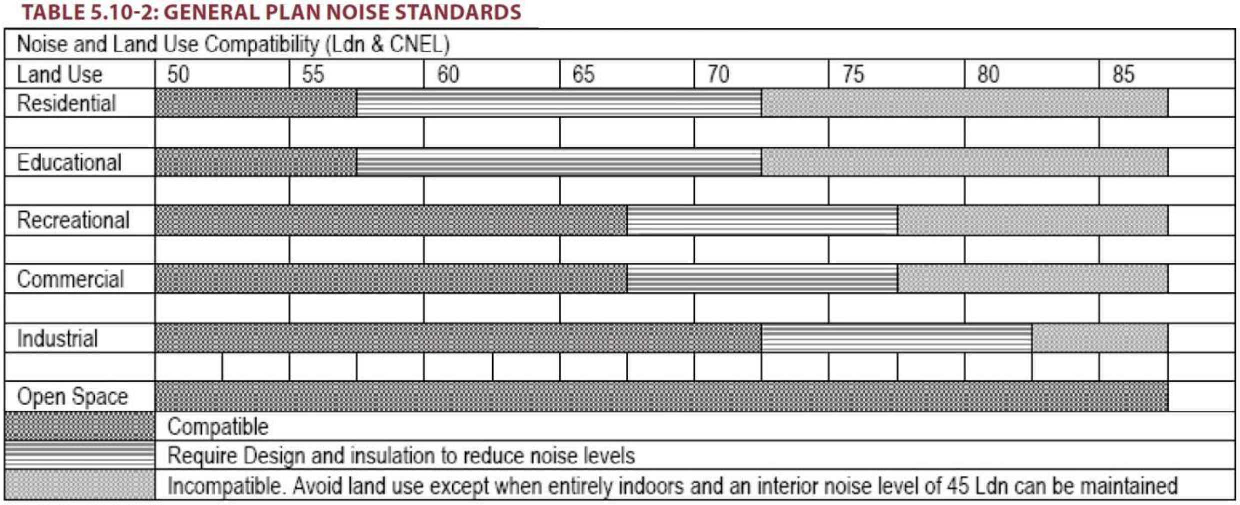
Table 4 - 1 NOISE COMPATIBILITY POLICIES

LAND USE CATEGORY	CNEL					
	55-60	60-65	65-70	70-75	75-80	80-85
Residential – low density Single-family, duplex, mobile homes	*	**	***	****	****	****
Residential – multi-family, condominiums, townhouses	*	**	***	****	****	****
Transient lodging - motels, hotels	*	*	**	****	****	****
Schools, libraries, indoor religious assemblies, hospitals, nursing homes	*	***	****	****	****	****
Auditoriums, concert halls, amphitheaters	*	***	***	****	****	****
Sports arena, outdoor spectator sports, parking	*	*	*	**	***	****
Playgrounds, neighborhood parks	*	*	***	****	****	****
Golf courses, riding stables, water recreation, cemeteries	*	*	*	**	***	****
Office buildings, business commercial and professional, retail	*	*	**	***	****	****
Industrial, manufacturing, utilities, agriculture	*	*	*	***	***	****
* Generally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements. Mobile homes may not be acceptable in these areas. Some outdoor activities might be adversely affected.					
** Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Outdoor activities may be adversely affected. Residential: Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.					
*** Generally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor activities are likely to be adversely affected.					
**** Unacceptable	New construction or development shall not be undertaken.					

Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1.

City of Santa Clara General Plan. The City of Santa Clara's General Plan identifies noise and land use compatibility standards for various land uses and establishes policies to control noise within the community. Table 5.10-2 from the General Plan shows acceptable noise levels for various land uses. Residential land uses are considered compatible in noise environments of 55 dBA L_{dn}/CNEL or less. The guidelines state that where the exterior noise levels are greater than 55 dBA L_{dn}/CNEL and less than 70 dBA L_{dn}/CNEL, the design of the project should include measures to reduce noise levels to acceptable levels. Noise levels exceeding 70 dBA L_{dn}/CNEL at residential land uses are considered incompatible. Residential land uses proposed in noise environments exceeding 70 dBA L_{dn}/CNEL should generally be avoided, except when the residential use is entirely indoors and where interior noise levels can be maintained at 45 dBA L_{dn}/CNEL or less. Commercial land uses are considered compatible in noise environments of 65 dBA L_{dn}/CNEL or less.

TABLE 5.10-2: GENERAL PLAN NOISE STANDARDS



Applicable goals and policies presented in the General Plan are as follows:

5.10.6-G1 Noise sources restricted to minimize impacts in the community.

5.10.6-G2 Sensitive uses protected from noise intrusion.

5.10.6-G3 Land use, development and design approvals that take noise levels into consideration.

5.10.6-P1 Review all land use and development proposals for consistency with the General Plan compatibility standards and acceptable noise exposure levels defined on Table 5.10-1.

5.10.6-P2 Incorporate noise attenuation measures for all projects that have noise exposure levels greater than General Plan "normally acceptable" levels, as defined on Table 5.10-1.

5.10.6-P3 New development should include noise control techniques to reduce noise to acceptable levels, including site layout (setbacks, separation and shielding), building treatments (mechanical ventilation system, sound-rated windows, solid core doors and baffling) and structural measures (earthen berms and sound walls).

5.10.6-P4 Encourage the control of noise at the source through site design, building design, landscaping, hours of operation and other techniques.

5.10.6-P5 Require noise-generating uses near residential neighborhoods to include solid walls and heavy landscaping along common property lines, and to place compressors and mechanical equipment in sound-proof enclosures.

5.10.6-P6 Discourage noise sensitive uses, such as residences, hospitals, schools, libraries, and rest homes, from areas with high noise levels, and discourage high noise generating uses from areas adjacent to sensitive uses.

5.10.6-P7 Implement measures to reduce interior noise levels and restrict outdoor activities in areas subject to aircraft noise in order to make Office/Research and Development uses compatible with the Norman Y. Mineta International Airport land use restrictions.

City of Santa Clara Code. The City Code establishes noise and vibration level performance standards for fixed sources. Section 9.10.40 of the City Code limits noise levels at residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.), noise levels at commercial uses to 65 dBA during daytime hours and 60 dBA during nighttime hours, and noise levels at light industrial uses to 70 dBA at any time. The noise limits are not applicable to emergency work, licensed outdoor events, City-owned electric, water, and sewer utility system facilities, construction activities occurring within allowable hours, permitted fireworks displays, or permitted heliports. The City Code does not define the acoustical time descriptor such as L_{eq} (the average noise level) or L_{max} (the maximum instantaneous noise level) that is associated with the above limits. A reasonable interpretation of the City Code would identify the ambient base noise level criteria as an average or median noise level (L_{eq}/L_{50}).

Section 9.10.230 of the City Code states construction activities are not permitted within 300 feet of residentially zoned property except within the hours of 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

Section 9.10.050 of the City Code states "It shall be unlawful for any person to operate or cause, permit, or allow the operation of, any fixed source of vibration of disturbing, excessive, or offensive vibration on property owned, leased, occupied, or otherwise controlled by such person, such that the vibration originating from such source is above the vibration perception threshold of an individual at the closest property line point to the vibration source on the real property affected by the vibration."

Existing Noise Environment

The project site is located south of the intersection of Coleman Avenue and Brokaw Road in the City of Santa Clara. Figure 1 shows the project site plan overlaid on an aerial image of the site vicinity. As shown on Figure 1, the project site is bounded by Brokaw Road and commercial uses to the west, Coleman Avenue and commercial and industrial uses to the north, a parking lot and undeveloped land to the east, and a storage area and railroad tracks to the south. The Santa Clara Transit Station is located to the southwest of the project site and the Mineta San José International Airport is located to the northeast of the project site.

A noise monitoring survey was performed to quantify and characterize ambient noise levels at the site and in the project vicinity between Thursday, March 16, 2017 and Monday, March 20, 2017. The monitoring survey included four long-term noise measurements (LT-1 through LT-4) and three short-term measurements (ST-1 through ST-3), as shown in Figure 1. The noise environment at the site and at the nearby land uses in the project vicinity results primarily from vehicular traffic along Coleman Avenue and Brokaw Road. Aircraft associated with Mineta San José International Airport and trains along the Union Pacific Railroad (UPRR) also contribute to the noise environment in the area.

Long-term noise measurement LT-1 was made along the northwest project boundary, approximately 30 feet southeast of the Brokaw Road centerline. Hourly average noise levels at this location typically ranged from 55 to 67 dBA L_{eq} during the day, and from 49 to 64 dBA L_{eq} at night. The Community Noise Equivalent Level from Thursday, March 16, 2017 through Monday, March 20, 2017 ranged from 62 to 66 dBA CNEL.

Long-term noise measurement LT-2 was made along the southeast project boundary, approximately 290 feet southwest of the Coleman Avenue centerline. Hourly average noise levels at this location typically ranged from 54 to 69 dBA L_{eq} during the day, and from 46 to 64 dBA L_{eq} at night. The Community Noise Equivalent Level from Thursday, March 16, 2017 through Monday, March 20, 2017 ranged from 61 to 65 dBA CNEL.

Long-term noise measurement LT-3 was made along the northeast project boundary, approximately 50 feet south of the Coleman Avenue centerline. Hourly average noise levels at this location typically ranged from 64 to 72 dBA L_{eq} during the day, and from 54 to 70 dBA L_{eq} at night. The Community Noise Equivalent Level from Thursday, March 16, 2017 through Monday, March 20, 2017 ranged from 69 to 73 dBA CNEL.

Long-term noise measurement LT-4 was made near the southwest project boundary, approximately 510 feet southeast of the Brokaw Road centerline and approximately 340 feet northeast of the closest railroad track. Hourly average noise levels at this location typically ranged from 53 to 65 dBA L_{eq} during the day, and from 44 to 61 dBA L_{eq} at night. The Community Noise Equivalent Level from Thursday, March 16, 2017 through Monday, March 20, 2017 ranged from 58 to 63 dBA CNEL. The daily trends in noise levels at LT-1 through LT-4 are shown in Appendix A.

Short-term noise measurements ST-1 and ST-2 were conducted on Thursday, March 16, 2017 in ten-minute intervals starting at 2:40 p.m. and concluding at 3:10 p.m. ST-1 was approximately 80 feet east of the centerline of Brokaw Road and approximately 110 feet south of the centerline of Coleman Avenue. The ten-minute average noise level measured at ST-1 was 61 dBA $L_{eq(10\text{-}min)}$, and the estimated average community noise equivalent level at ST-1 was 68 dBA CNEL. ST-2 was in the northeast corner of the project site, approximately 75 feet southwest of the Coleman Avenue centerline. The ten-minute average noise level measured at ST-2 was 70 dBA $L_{eq(10\text{-}min)}$, and the estimated average community noise equivalent level at ST-2 was 72 dBA CNEL. During the measurement at ST-2, a motorcycle passing by produced maximum noise levels of 97 dBA L_{max}.

Short-term noise measurement ST-3 was conducted between 12:20 p.m. and 12:30 p.m. on Monday, March 20, 2017. ST-3 was made near the southwest project property boundary, approximately 620 feet southeast of the Brokaw Road centerline and approximately 350 feet northeast of the closest railroad track. The ten-minute average noise level measured at ST-3 was 56 dBA $L_{eq(10\text{-}min)}$, and the estimated average community noise equivalent level at ST-3 was 63 dBA CNEL. Before and during the measurement at ST-3, airplanes passing overhead produced maximum noise levels of 76 dBA L_{max}, trains passing along the UPRR produced maximum noise levels of 65 dBA L_{max}, and construction equipment produced maximum noise levels of 60 dBA L_{max}. Table 5 summarizes the results of the short-term measurements.

TABLE 5 Summary of Short-Term Noise Measurement Data (dBA)

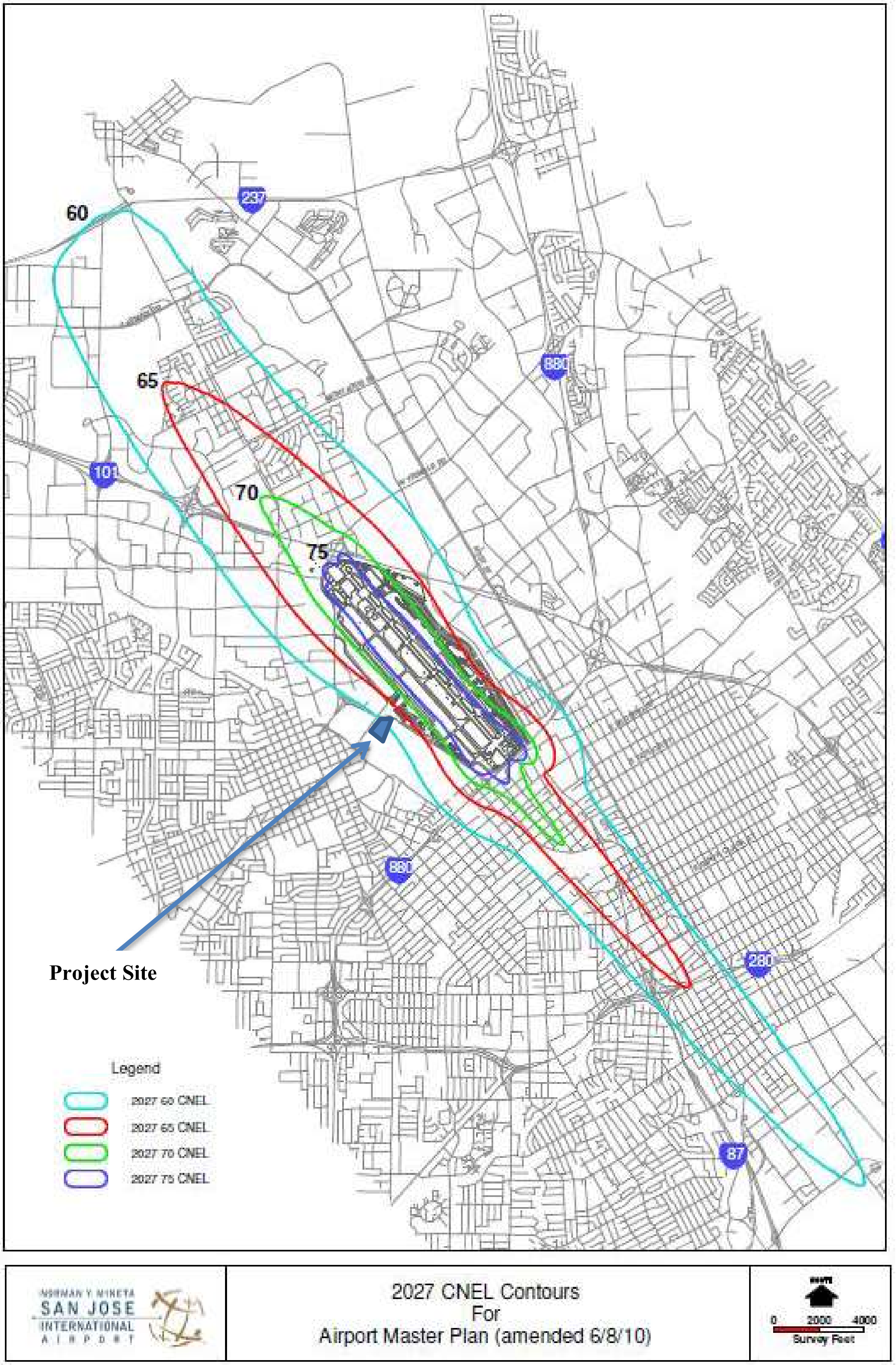
Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10)}$	CNEL
ST-1: Coleman Ave and Brokaw Rd intersection. (3/16/2017, 2:40-2:50 p.m.)	72	69	64	59	55	61	68
ST-2: Northeast corner of the project site. (3/16/2017, 3:00-3:10 p.m.)	97	85	73	70	58	74	72
ST-3: Near the southwest site property boundary. (3/20/2017, 12:20-12:30 p.m.)	68	64	60	52	50	56	63

As noted in the Comprehensive Land Use Plan for Mineta San Jose International Airport, the noise impact of an airport is a direct result of the number and types of aircraft operations at the airport. Updated aviation activity forecasts for the airport show the same level of activity is expected for the years 2017 through 2027. Figure 2 shows the noise exposure contours resulting exclusively from aircraft operations over this time period. The project site straddles the 60 CNEL noise exposure contour indicating that aircraft noise exposure ranges from about 58 CNEL to 62 CNEL.

FIGURE 1 Gateway Crossings Noise Measurement Locations

Source: Google Earth

FIGURE 2 Aircraft Noise Exposure 2017 - 2027



PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

Future Exterior Noise Environment

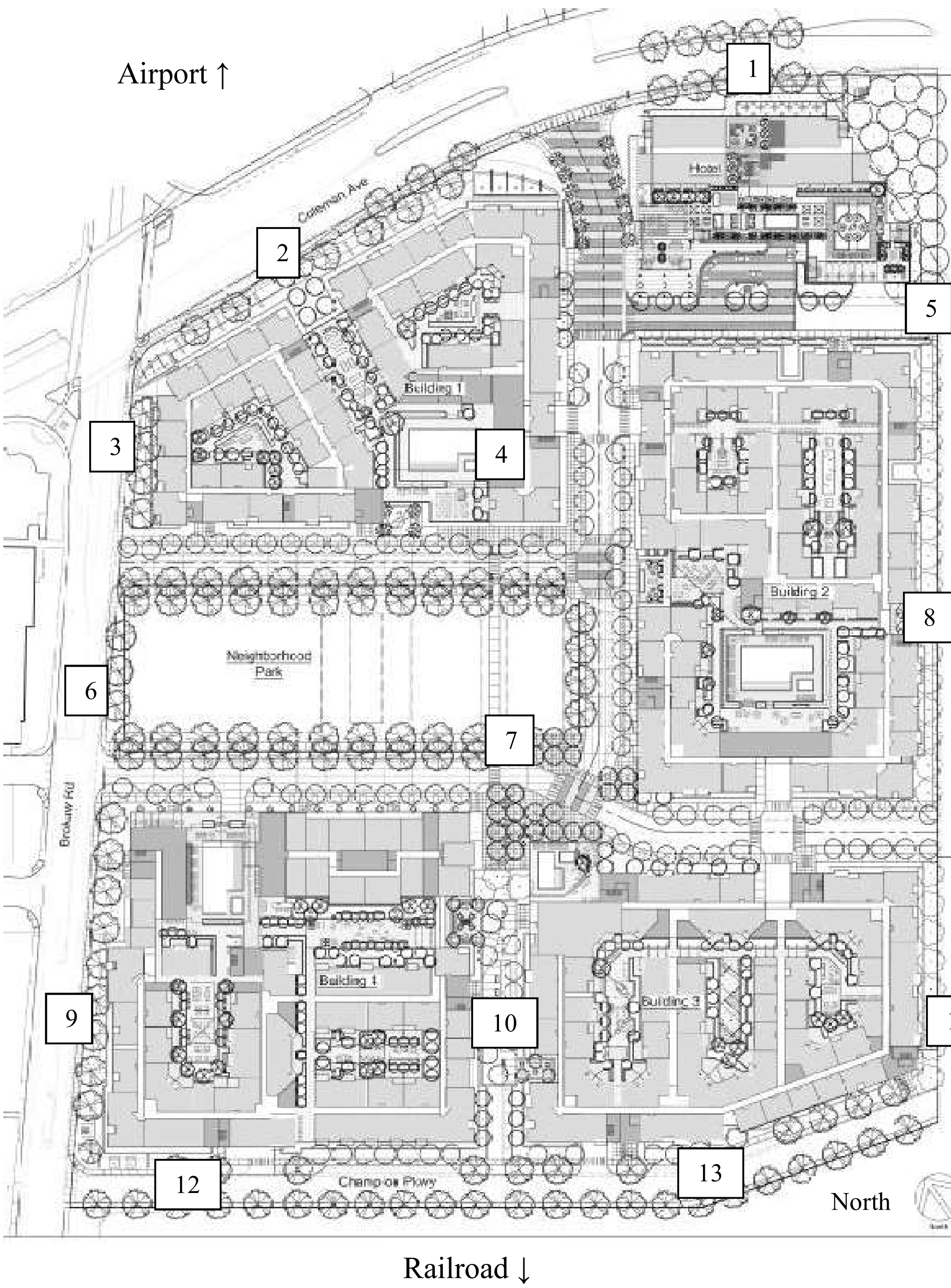
As established in Table 5.10-2 of the City's General Plan, exterior noise environments at common outdoor use areas located within residential developments should be maintained at or below 55 dBA CNEL to be considered by the City of Santa Clara to be "normally acceptable." Outdoor use areas located at commercial and recreational land uses should be maintained at or below 65 dBA CNEL to be considered "normally acceptable."

The future noise environment at the project site would continue to result primarily from vehicular traffic along Coleman Avenue and Brokaw Road, aircraft associated with Mineta San José International Airport, and trains along the UPRR. In addition, the future Bay Area Rapid Transit (BART) Silicon Valley Extension and Santa Clara Station would be located adjacent to the project site to the south. Traffic volumes in the project vicinity were calculated and provided by *Hexagon Transportation Consultants, Inc*. According to the traffic volumes, the future cumulative plus project conditions are expected to increase traffic noise levels along Coleman Avenue by up to 2 dBA CNEL and along Brokaw Road, adjacent to the project site, by up to 3 dBA CNEL. To estimate the future noise environment at the project site, these increases are applied to the results of the existing measurements described above. Therefore, at a distance of 50 feet from the centerline of Coleman Avenue, the future unmitigated noise environment would be 75 dBA CNEL (LT-3 measurement location) and at a distance of 30 feet from the centerline of Brokaw Road, the future unmitigated noise environment would be 69 dBA CNEL (LT-1 measurement location). The project site straddles the 60 CNEL aircraft noise exposure contour indicating that aircraft noise exposure ranges from about 58 CNEL to 62 CNEL throughout the project site. Based on *Illingworth & Rodkin, Inc.* data on train noise along this UPRR corridor, train noise levels are calculated to be 70 dBA CNEL at a distance of 140 feet from the center of the train tracks, which correlates with the measured sound level at site LT-4. Based on data from the "VTA's BART Silicon Valley – Phase II Extension Project Noise and Vibration Technical Report",[1] BART train noise levels are calculated to be 63 dBA CNEL at a distance of 300 feet.

The future noise levels from traffic along Coleman Avenue and Brokaw Road, aircraft, and trains were calculated to determine the future exterior noise exposure levels at key locations on the project site. These locations and future exterior noise levels are shown in Figure 3, in which some of the locations represent building façade exposures and some represent outdoor common use areas. Future exterior noise levels take into account the distances of the key locations to the noise sources and the shielding from the proposed buildings themselves. The noise levels are the total noise exposure from all noise sources at each location.

[1] Wilson Ihrig. "VTA's BART Silicon Valley – Phase II Extension Project Noise and Vibration Technical Report". November 2016.

FIGURE 3 Exterior Noise Exposure Map



Legend
Location) Noise Level
Noise Source

1) 73 dBA CNEL Traffic/Aircraft
2) 72 dBA CNEL Traffic /Aircraft
3) 70 dBA CNEL Traffic/Aircraft
4) 61 dBA CNEL Aircraft
5) 64 dBA CNEL Traffic/Aircraft
6) 67 dBA CNEL Traffic/Aircraft
7) 60 dBA CNEL Aircraft
8) 64 dBA CNEL Traffic/Aircraft/ Trains
9) 68 dBA CNEL Traffic/Aircraft/ Trains
10) 59 dBA CNEL Aircraft
11) 64 dBA CNEL Aircraft/Trains
12) 67 dBA CNEL Traffic/ Trains/ Aircraft
13) 66 dBA CNEL Trains/Aircraft

<u>Residential Outdoor Use Areas</u>

The proposed project would have outdoor pool areas and outdoor common use areas located on the 2nd and 3rd floor podium levels of residential Buildings 1 through 4. The City's residential exterior noise threshold of 55 dBA CNEL would apply to these outdoor residential recreational areas; however, noise standards typically are not applied at private decks or balconies. In addition, a neighborhood park would be located in the center of the project site, and the City's threshold of

65 dBA CNEL for recreational exterior noise would apply. The City's exterior noise standards are typically calculated at the center of each outdoor use area.

The outdoor podium level pools and common use areas in the residential Buildings 1 through 4 would be acoustically shielded, and the neighborhood park would be partially shielded, by the proposed buildings themselves from traffic noise along the roadways and BART/train noise from the tracks south of the site. However, the proposed buildings would not provide any acoustic shielding from aircraft noise. Therefore, outdoor use areas around Location 4 in Figure 3, including outdoor use areas in Building 1 and in the northeast section of Building 2, would have exterior noise levels of 61 dBA CNEL due to aircraft noise; outdoor use areas around Location 7 in Figure 3, including outdoor use areas in the southwest section of Building 2, would have exterior noise levels of 60 dBA CNEL due to aircraft noise; and outdoor use areas around Location 10 in Figure 3, including outdoor use areas in Building 3 and Building 4, would have exterior noise levels of 59 dBA CNEL due to aircraft noise. Traffic noise along Brokaw Road and aircraft noise would produce exterior noise levels of 63 dBA CNEL at the center of the neighborhood park.

The project site is located in proximity to major ground transportation sources and a regional airport. Noise from these sources will be audible throughout the project site. In addition, noise from special events at Avaya Stadium would be expected to be intermittently audible. The proposed building layout from the site plan would substantially reduce ground transportation noise (traffic and train) at outdoor activity areas to below the City's 55 dBA CNEL threshold for the residential outdoor areas. However, aircraft noise would range from 59 to 61 dBA CNEL in the outdoor activity areas. Even though the aircraft noise exposure would be under and consistent with the Santa Clara County ALUC Comprehensive Land Use Plan's 65 dBA CNEL contour line (see aircraft noise discussion below), it would exceed the City's 55 dBA CNEL goal. Although the portion of the neighborhood park nearest to Brokaw Road would have exterior noise levels that would exceed the City's 65 dBA CNEL threshold for recreational use areas, the majority of the neighborhood park would have exterior noise levels below the City's 65 dBA CNEL goal.

Hotel Outdoor Use Areas

The proposed hotel would have an outdoor common use area on the 4th and 6th floor podium level of the building and an outdoor roof deck. The 4th and 6th floor outdoor common use and pool area would be set back approximately 230 and 190 feet, respectively, from the centerline of Coleman Avenue and would be acoustically shielded by the proposed hotel building itself from traffic noise along Coleman Avenue. The outdoor roof deck would be set back approximately 120 feet from the centerline of Coleman Avenue and located on the 14th floor of the hotel. The setbacks from the nearest roadways, the shielding from the proposed building itself, the height of the 4th, 6th, and 14th floor outdoor use areas relative to the adjacent roadways, and the shielding from solid parapet barriers that are assumed to be along the edges of all the outdoor use areas would reduce traffic noise levels to below 60 dBA CNEL at all outdoor use areas at the hotel. The hotel's outdoor use areas would also be exposed to aircraft noise levels, which would result in a total noise exposure of 64 dBA CNEL or lower at all outdoor use areas. The noise environment at the hotel's 4th and 6th floor outdoor common use and pool area and the outdoor roof deck would not exceed the City's 65 dBA CNEL threshold for commercial land uses.

The 4th floor outdoor seating areas along Coleman Avenue are for hotel employees only. Employees would infrequently use these outdoor use areas over short periods of time. Therefore, these outdoor areas would not be considered as areas of frequent human use. The City's exterior threshold would not be applicable to these outdoor use areas.

Noise Insulation Features to Reduce Future Exterior Noise Levels

There are no feasible means to reduce aircraft noise levels at the proposed residential outdoor use areas. Because aircraft noise sources will be audible throughout the site, potential residents and buyers should be provided with a real estate disclosure statement and buyer deed notices which would offer comprehensive information about the noise environment of the project site.

Future Interior Noise Environment

The City of Santa Clara requires that interior noise levels be maintained at 45 dBA CNEL or less within residences. The State Building Code requires that interior noise levels within the proposed hotel be maintained at 45 dBA CNEL. In addition, the Cal Green Code requires interior noise levels at commercial uses to be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation. Future exterior noise levels at the buildings' facades were calculated and are shown in Figure 3.

<u>Residential and Hotel Land Uses</u>
Interior noise levels would vary depending upon the design of the buildings (relative window area to wall area) and the selected construction materials and methods. Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA CNEL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA CNEL, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound-rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

There are no buildings on the project site that are exposed to levels below 60 dBA CNEL. Therefore, forced-air mechanical ventilation or air conditioning systems will be required at all the buildings on the project site so that windows may be kept closed at the discretion of the occupants to control noise and meet the 45 dBA CNEL interior noise limit. The facades of the hotel building and Building 1 facing Coleman Avenue (Locations 1, 2, and 3 in Figure 3) would be exposed to noise levels ranging from 70 to 73 dBA CNEL. The perpendicular facing units would be exposed to noise levels ranging from 65 to 70 dBA CNEL. The facade of Building 4 facing Brokaw Road (Locations 6 and 9) would be exposed to noise levels ranging from 67 to 68 dBA CNEL. The southern facing façade of Building 4 (Location 12) would be exposed to noise levels of 67 dBA CNEL. The southern facing façade of Building 3 (Location 13) would be exposed to noise levels of 66 dBA CNEL. In addition to having forced-air mechanical ventilation or air conditioning systems, sound-rated construction methods would be required for these buildings to meet the 45 dBA CNEL interior noise limit. Standard construction with adequate forced-air mechanical ventilation for would be suitable throughout the remainder of the project.

Commercial Land Uses

Commercial and retail uses at the project site are located on the 4th floor of the hotel building and on the ground floor of Buildings 1 and 4 facing the neighborhood park. The worst case exterior noise exposure levels at the commercial and retail uses would range from 60 to 65 dBA L_{eq}. Standard commercial construction provides at least 30 dBA of outdoor to indoor noise reduction assuming that the building includes adequate forced-air mechanical ventilation systems so that the windows and doors may remain closed to control noise. Assuming standard commercial construction methods with the windows and doors closed, interior noise levels are calculated to range from 30 to 35 dBA $L_{eq(1\text{-}hr)}$ during daytime hours, which would be below the Cal Green Code standard of 50 dBA $L_{eq(1\text{-}hr)}$.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA CNEL or less:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, so that windows can be kept closed to control noise.

- A qualified acoustical specialist shall prepare a detailed analysis of interior residential noise levels resulting from all exterior sources during the design phase pursuant to requirements set forth in the State Building Code. The study will also establish appropriate criteria for noise levels inside the commercial spaces affected by environmental noise. The study will review the final site plan, building elevations, and floor plans prior to construction and recommend building treatments to reduce residential interior noise levels to 45 dBA CNEL or lower. Treatments would include, but are not limited to, STC sound-rated windows and doors, sound-rated wall and window constructions, acoustical caulking, protected ventilation openings, etc. The specific determination of what noise insulation treatments are necessary shall be conducted on a unit-by-unit basis during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, shall be submitted to the City, along with the building plans and approved design, prior to issuance of a building permit.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA CNEL or less.

Aircraft Noise

The Mineta San José International Airport is located north of the project site. Noise from aircraft operations is audible at the project site. Although located nearly adjacent to Airport, the project site lies outside the 2027 65 CNEL noise contour, shown in Figure 2, because the site is not located under a flight path. Residential development on the site is consistent with the policies set forth in the Santa Clara County ALUC Comprehensive Land Use Plan and is an allowable use.

Vibration and Land Use Compatibility

The U.S. Department of Transportation, Federal Transit Administration's (FTA) vibration impact assessment criteria[2] were used to evaluate vibration levels produced by light-rail trains at the project site. The FTA vibration impact criteria are based on maximum overall levels for a single event. The impact criteria for groundborne vibration are shown in Table 6. Note that there are criteria for frequent events (more than 70 events of the same source per day), occasional events (30 to 70 vibration events of the same source per day), and infrequent events (less than 30 vibration events of the same source per day).

The frequency of the railway and BART pass-bys would place the level of train activity in the "frequent events" category and the applicable threshold is 72 VdB. According to the FTA Generalized Ground Surface Vibration Curves,[3] vibration levels would be below 70 VdB or less at a distance of 330 feet from the centerline of the nearest proposed UPRR railroad train track to the project site. The nearest buildings would be 300 feet from the centerline of the nearest proposed BART track, which is beyond the 200 foot screening distance for a rail rapid transit system such as BART. Vibration levels produced by BART would also be below the 72 VdB threshold level. Persons at rest may perceive the vibration; however, vibration controls are not required.

TABLE 6 Groundborne Vibration Impact Criteria

Land Use Category	Groundborne Vibration Impact Levels (VdB re 1 µinch/sec, RMS)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1 Buildings where vibration would interfere with interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category 2 Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3 Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research should always require detailed evaluation to define the acceptable vibration levels. Ensuring low vibration levels in a building requires special design of HVAC systems and stiffened floors.

NOISE IMPACTS AND MITIGATION MEASURES

[2] U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.
[3] U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006, FTA-VA-90-1003-06.

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

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

- A significant impact would be identified if the construction of the project would expose persons to excessive vibration levels. Ground-borne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

- A significant impact would be identified if traffic generated by the project or project improvements/operations would substantially increase noise levels at sensitive receivers in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA CNEL or greater, with a future noise level of less than the "normally acceptable" standard, or b) the noise level increase is 3 dBA CNEL or greater, with a future noise level equal to or greater than the "normally acceptable" standard.

- A significant noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq}, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase at adjacent residential land uses. Where noise from construction activities exceeds 70 dBA L_{eq} and the ambient noise environment by at least 5 dBA L_{eq} at commercial land uses in the project vicinity for a period exceeding one year, the impact would be considered significant.

Impact 1: **Noise Levels in Excess of Standards.** The proposed project could potentially generate noise in excess of standards established in the City's Municipal Code at the nearby sensitive receptors. **This is a potentially significant impact.**

Section 9.10.40 of the City's Municipal Code limits noise levels at residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.), noise levels at commercial uses to 65 dBA during daytime hours and 60 dBA during nighttime hours, and noise levels at light industrial uses to 70 dBA at any time. However, these noise limits are not applicable to construction activities that occur within the allowable hours of 7:00 a.m. to 6:00 p.m. on weekdays and 9:00 a.m. to 6:00 p.m. on Saturdays.

Construction Noise

Construction activities would occur between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday, between 9:00 a.m. and 6:00 p.m. on Saturdays, and would not occur on Sundays or holidays, as outlined in the City Code. All construction noise would be exempt from the City's limits for fixed noise sources when conducted during allowable hours; therefore the potential impact would be less-than-significant impact.

Stationary Equipment Noise

Off-Site Impacts

The proposed project would include mechanical equipment, such as heating and air conditioning systems. Information regarding the number, type, location, and size of the mechanical equipment units to be used in the proposed project was not available at the time of this study.

Typical air conditioning units and heat pumps for multi-family and hotel complexes would be about 60 dBA L_{eq} at a distance of 50 feet. This type of equipment could run continuously during the daytime and nighttime. The closest building to the project site would be the commercial building to the west across Brokaw Road. At a distance of 125 feet from the worst-case location for a stationary noise source, the worst-case project-generated mechanical equipment noise is calculated to be 52 dBA L_{eq}, and would be below the 65 dBA daytime noise limit and 60 dBA nighttime noise limit for commercial uses as established in the City Code. This would be a less-than-significant impact.

The hotel would also include a 100 kW diesel emergency backup generator located either in the hotel garage or service area. This type of generator would produce a noise level of approximately 72 dBA L_{eq} at 23 feet, and would produce noise levels of approximately 56 dBA L_{eq} at a distance of 150 feet to the commercial buildings to the north across Coleman Avenue and approximately 42 dBA L_{eq} at a distance of 700 feet to the commercial buildings to the west across Brokaw Road. Both noise levels would be below the 65 dBA daytime noise limit and 60 dBA nighttime noise limit for commercial uses established in the City Code. The approved Coleman Highline project's property line would be located approximately 30 feet to the east of the project site. At this distance, the generator would produce noise levels of approximately 70 dBA L_{eq} at the shared property line, which would exceed the City's noise level thresholds for commercial land uses. This is a potentially significant impact.

On-Site Impacts

Once the project site is operational, the hotel building and the residential buildings may have stationary noise sources that could affect on-site adjacent residential buildings. In addition to typical air conditioning units and heat pumps discussed above, the hotel's mechanical equipment would also include a 100 kW diesel emergency back-up generator located in either the garage or service area. This type of generator would produce a noise level of approximately 72 dBA L_{eq} at 23 feet. The testing of this generator, which is assumed to be during the daytime, would be subject to the City's daytime noise level limit. At a typical minimum distance of 80 feet from the worst-case location for a stationary noise source to the adjacent residential building, the worst-case project-generated air conditioning and heat pump noise is calculated to be 56 dBA L_{eq} and generator noise is calculated to be 61 dBA L_{eq}. These noise levels would be above the 55 dBA daytime noise limit and 50 dBA nighttime noise limit for residential uses as established in the City Code.

As a standard condition of approval, mechanical equipment shall be selected and designed to reduce impacts on-site uses to meet the City's noise level requirements. A qualified acoustical consultant shall be retained to review mechanical noise as these systems are selected to determine specific noise reduction measures necessary to reduce noise to comply with the City's noise level requirements. Noise reduction measures could include, but are not limited to, selection of equipment that emits low noise levels, installation of muffles or sound attenuators, and/or installation of noise barriers such as enclosures and parapet walls to block the line-of-sight between the noise source and the nearest receptors. Alternate measures may include locating equipment further away from noise-sensitive receptors or in less noise-sensitive areas, where feasible.

Mitigation Measure 1: No further mitigation required.

Impact 2: Exposure to Excessive Ground-borne Vibration. Construction-related vibration would not exceed the 0.3 in/sec PPV threshold at nearby land uses. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include site preparation work, foundation work, paving, and new building framing and finishing. The proposed project would not require pile driving, which can cause excessive vibration.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.08 in/sec PPV for ancient buildings or buildings that are documented to be structurally weakened. No ancient buildings or buildings that are documented to be structurally weakened adjoin the project site. Therefore, ground-borne vibration levels exceeding 0.3 in/sec PPV at buildings in the vicinity would have the potential to result in a significant vibration impact.

Table 7 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

TABLE 7 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Approximate L_v at 25 ft. (VdB)
Pile Driver (Impact)	upper range	1.158	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

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

The nearest structure to the project site is the commercial building to the west of the project site across Brokaw Road. The commercial building is approximately 110 feet from the primary work area and vibration levels produced by a vibratory roller would be up to 0.04 in/sec PPV at this distance. This vibration level would be below the 0.3 in/sec PPV significance threshold. All other construction activities would generate substantially lower vibration levels. This is a less-than-significant impact.

At the surrounding areas where vibration would not be expected to cause structural damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high power tools). By use of administrative controls, such as notifying adjacent building occupants of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby occupants, perceptible vibration can be kept to a minimum.

The proposed project would be constructed around the same time as other developments in the area, including the Coleman Highline Project and the BART Santa Clara Station Project. A particular receptor located in the vicinity of these cumulative projects would be most affected by construction vibration emanating from the closest project site. Under a worst-case assumption, the highest vibration generating equipment would be running simultaneously on multiple construction sites at the closest point to any off-site building. For example, construction activities occurring at the BART and Gateway Crossings project sites would result in a cumulative vibration level of 0.05 in/sec PPV at the commercial building to the west opposite Brokaw Road. This cumulative vibration level would be below the 0.3 in/sec PPV significance threshold. All other cumulative construction activities would generate substantially lower vibration levels at sensitive receptors. This is a less-than-significant impact.

Mitigation Measure 2: **None required.**

Impact 3: **Permanent Noise Level Increase.** The proposed project would not result in a substantial permanent noise level increase due to project-generated traffic at the existing noise-sensitive land uses in the project vicinity. **This is a less-than-significant impact.**

A significant impact would occur if the permanent noise level increase due to project-generated traffic was 3 dBA CNEL or greater for ambient noise levels exceeding 55 dBA CNEL or was 5 dBA CNEL or greater for ambient noise levels at or below 55 dBA CNEL. The ambient measurements made for the proposed project indicate that existing noise levels at the noise-sensitive receptors located in the project vicinity exceed 55 dBA CNEL; therefore, a significant impact would occur if project-generated traffic increased levels by 3 dBA CNEL or more. For reference, a 3 dBA CNEL noise increase would be expected if the project would double existing traffic volumes along a roadway.

To determine the effect of the project-generated traffic on the existing residences, the Existing Plus Project traffic volumes included in the traffic data provided by *Hexagon Transportation Consultants* was compared to the Existing traffic volumes. The nearest relevant intersections within a residential area included in the traffic study were along Lafayette Street at El Camino Real and Lewis Street and El Camino Real at Benton Street. Peak hour traffic volumes during both AM and PM indicated a less than 1 dBA CNEL increase along the roadways at these intersections. Project traffic volumes were assumed to be insignificant at other residential areas in the vicinity because they were not included in the traffic study. Therefore, the project-generated traffic would not cause a permanent noise increase at the nearest noise-sensitive receptors. This impact is a less-than-significant impact.

Mitigation Measure 3: **None required.**

Impact 4: **Cumulative Noise Increase.** The proposed project would not make a cumulatively considerable contribution to future noise levels at residential land uses in the vicinity. **This is a less-than-significant impact.**

A significant impact would occur if the cumulative traffic noise level increase was 3 dBA CNEL or greater for existing levels exceeding 55 dBA CNEL or was 5 dBA CNEL or greater for existing levels at or below 55 dBA CNEL and if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA CNEL or more attributable solely to the proposed project.

Cumulative traffic noise level increases were calculated by comparing the Cumulative traffic volumes and the Cumulative Plus Project volumes to Existing traffic volumes. The traffic noise increases calculated under both Cumulative scenarios (with and without the project) were 1 to 2 dBA CNEL along the roadways in the project vicinity. Since the traffic noise level increase of both Cumulative scenarios is less than 3 dBA CNEL, and is the same with and without the project, the proposed project would not make a cumulatively considerable contribution to increased noise levels. This would be a less-than-significant impact.

Mitigation Measure 4: **None required.**

Impact 5: **Temporary Construction Noise.** Existing land uses in the project vicinity would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices as project conditions of approval would result in a **less-than-significant** temporary noise impact.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Where noise from construction activities exceeds 60 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} at noise-sensitive residential uses in the project vicinity for a period exceeding one year, the impact would be considered significant. For commercial uses, a significant impact would be identified if construction noise were to exceed 70 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA L_{eq} for a period exceeding one year. The City exempts noise due to construction activities from the noise level performance standards for fixed sources of noise, assuming all construction falls within the City's allowable hours of between 7:00 a.m. and 6:00 p.m. Monday through Friday, between 9:00 a.m. and 6:00 p.m. on Saturdays, and does not allow construction on Sundays or holidays.

<u>Construction Noise at Off-Site Receptors</u>

Construction noise impacts were assessed at four representative land uses in the project vicinity. Commercial developments are located to the north of the project site across Coleman Avenue. Based on LT-3 measurements, the average ambient daytime noise level would be 71 dBA L_{eq}. The commercial land uses to the west of the project site across Brokaw Road, based on LT-1 measurements, would have average ambient daytime noise levels of about 62 dBA L_{eq}. The Santa Clara train station and Candlewood Suites are located to the south of the project site. Based on measurements conducted for a previous project, the average ambient daytime noise level at both these locations would be 64 dBA L_{eq}.

Construction activities for individual projects are typically carried out in stages. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating. Typical construction noise levels at a distance of 50 feet are shown in Tables 8 and 9. Table 8 shows the average noise level ranges, by construction phase, and Table 9 shows the maximum noise level ranges for different construction equipment.

Most demolition and construction noise falls with the range of 80 to 90 dBA at a distance of 50 feet from the source.

TABLE 8 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 9 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact

Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes: [1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.
[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.
[3]Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Construction activities generate considerable amounts of noise, especially during earth-moving activities and during the construction of the building's foundation when heavy equipment is used. The highest noise levels would be generated during grading, excavation, and foundation construction. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. Construction activities would include site preparation, excavation, grading, trenching, building construction, paving, and architectural coating. During each stage of construction, there would be a different mix of equipment operating, and noise levels would vary by stage and vary within stages, based on the amount of equipment in operation and the location at which the equipment is operating.

The project would construct four residential buildings and a hotel. The buildings would be built one at a time, with some overlap during the construction of the first three residential buildings. The construction of the project is scheduled to begin October 2018 and end in August 2025. Each residential building is scheduled to be constructed over one year, and the hotel is scheduled to be constructed over 20 months. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain can provide an additional 5 to 10 dBA noise reduction at distant receptors. Table 10 shows the average noise level ranges by building. Once construction moves indoors, minimal noise would be generated at off-site locations.

As shown in Table 10, noise levels would exceed the commercial threshold at the commercial land uses across Coleman Avenue and Brokaw Road during the construction of Building 1, across Brokaw Road during the construction of Building 4, and across Coleman Avenue during the construction of the hotel. Noise levels would exceed the noise-sensitive land use threshold at the Candlewood Suites during the one-month of construction of Building 3 when the grading and trenching construction phases overlap. Since construction noise for the proposed project is expected to at times exceed the commercial land use threshold for a period of more than one year, this would be a potentially significant impact.

TABLE 10 Estimated Construction Noise Levels at the Nearby Receptors

Building	Construction Period	Calculated Hourly Average L_{eq} at Receptors, dBA			
		Coleman Commercial	Brokaw Commercial	Train Station	Candlewood Suites Hotel
Building 1[a]	10/1/2018 – 10/1/2019	**77 – 84**	**79 – 86**	57 – 64	56 – 63
Building 2[b]	7/1/2019 – 7/1/2020	67 – 74	62 – 69	60 – 67	59 – 66
Building 4[c]	4/1/2020 – 4/1/2021	58 – 65[d]	**79 – 86**	64 – 71	62 – 69
Building 3	3/1/2022 – 3/1/2023	50 – 57[d]	55 – 62[d]	64 – 71	63 – **70**
Hotel	1/1/2024 – 8/1/2025	74 – **81**	51 – 58[d]	45 – 52[d]	45 – 52[d]

[a] The range of noise levels for Building 1 construction reflects overlap with Building 2 construction.
[b] The range of noise levels for Building 2 construction reflects overlap with Buildings 1 and 4 construction.
[c] The range of noise levels for Building 4 construction reflects overlap with Building 2 construction.
[d] Construction noise levels are reduced by 10 dBA due to shielding from intervening buildings.
BOLD – Exceeds noise threshold of land use and exceeds the ambient noise environment by at least 5 dBA L_{eq} for a period exceeding one year.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life.

Construction activities will be conducted in accordance with the provisions of the City's Municipal Code, which limits temporary construction work to the hours between 7:00 a.m. and 6:00 p.m. Monday through Friday and 9:00 a.m. to 6:00 p.m. on Saturdays. Construction is prohibited on Sundays and all holidays. Further, the City shall require the construction crew to adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity.

Construction Best Management Practices

Develop a construction noise control plan, including, but not limited to, the following available controls:

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receiver and if the barrier is constructed in a manner that eliminates any cracks or gaps.

- 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 should be strictly prohibited (i.e., no more than 2 minutes in duration).

- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used to reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

- Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential and commercial receptors.

- Control noise from construction workers' radios to a point where they are not audible at land uses bordering the project site.
- The contractor shall prepare a detailed construction schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent land uses so that construction activities can be scheduled to minimize noise disturbance.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

The implementation of the reasonable and feasible controls outlined above would reduce construction noise levels emanating from the site in order to minimize disruption and annoyance. With the implementation of these controls, as well as the City Code limits on allowable construction hours, and considering that construction is temporary, the impact would be reduced to a less-than-significant level.

Construction Noise at On-Site Receptors

The buildings in this project will be built sequentially. Once a building is complete, it would then be occupied and the occupants would be exposed to noise during construction of the subsequent buildings. The highest noise levels would occur during construction on an adjacent on-site building when the equipment is closest to the receptor. Noise levels for this worst-case scenario, at an average distance of approximately 100 feet, would range from 78 to 85 dBA L_{eq}. These worst-case noise levels would substantially exceed the noise-sensitive land use threshold. When construction activity occurs at a greater distance noise levels would be lower but at times still exceed the threshold intermittently over a period of serval years.

In addition to implementing allowable construction hours and best management construction practices, potential residents and buyers should be provided with a real estate disclosure statement and buyer deed notices which would offer comprehensive information about the noise during the construction period of the project site.

Mitigation Measure 5: **No further mitigation required.**

Impact 6: **Cumulative Construction Noise.** Existing land uses in the project vicinity would not be exposed to construction noise levels that would be considered cumulatively significant. **This is a less-than-significant impact.**

The proposed project may contribute to cumulative construction noise levels resulting from the development of pending projects, and projects that are approved, but have not started construction. The construction of the proposed project is scheduled to begin October 2018 and end in August 2025. In light of the proximity and scale of surrounding development, construction of the Coleman Highline Project and the BART Silicon Valley Phase II Extension Project would have the greatest potential for substantial temporary noise increases on receptors near the proposed project site. Phase I construction of the Coleman Highline Project has already begun, but construction applications for Phase II and III of the project have not yet been approved.[4] The BART Santa Clara Station is scheduled to begin construction in 2018 and begin operating in 2026.

A particular receptor located in the vicinity of these cumulative projects would be most affected by construction noise emanating from the closest project site. For example, construction activities occurring at the BART or Coleman Highline project sites are estimated to produce noise levels ranging from 80 to 90 dBA L_{eq} at a distance of 50 feet from the center of the construction site. The nearest noise-sensitive receptor is the Candlewood Suites hotel. The closest project to this particular receptor is BART, which would produce construction noise of approximately 66 to 76 dBA L_{eq} at a distance of 260 feet from the hotel. Assuming simultaneous construction at the southernmost portion of the Gateway Crossings project site and BART, cumulative construction noise levels from BART would increase by at most 2 to 3 dBA, which would not be a noticeable cumulative noise level increase. Similarly, the exiting commercial uses along Brokaw Road and Coleman Avenue would be most affected by construction noise from the Gateway Crossing project. With construction noise levels as high as 86 dBA L_{eq}, a worst case cumulative construction noise increase of less than 3 dBA from BART would not make a noticeable increase to the overall construction noise level.

In addition, the Gateway Crossings project proposes to implement the construction best management practices identified above to reduce construction noise levels emanating from the site. Similar controls are proposed as part of the BART project. Since cumulative construction noise levels would not be noticeably higher than construction noise levels expected from the individual projects alone, the cumulative construction noise impact would be considered less-than-significant.

[4] Personal communications with Josh Rupert, project developer at Hunter Properties Inc.

Mitigation Measure 6: **None required.**

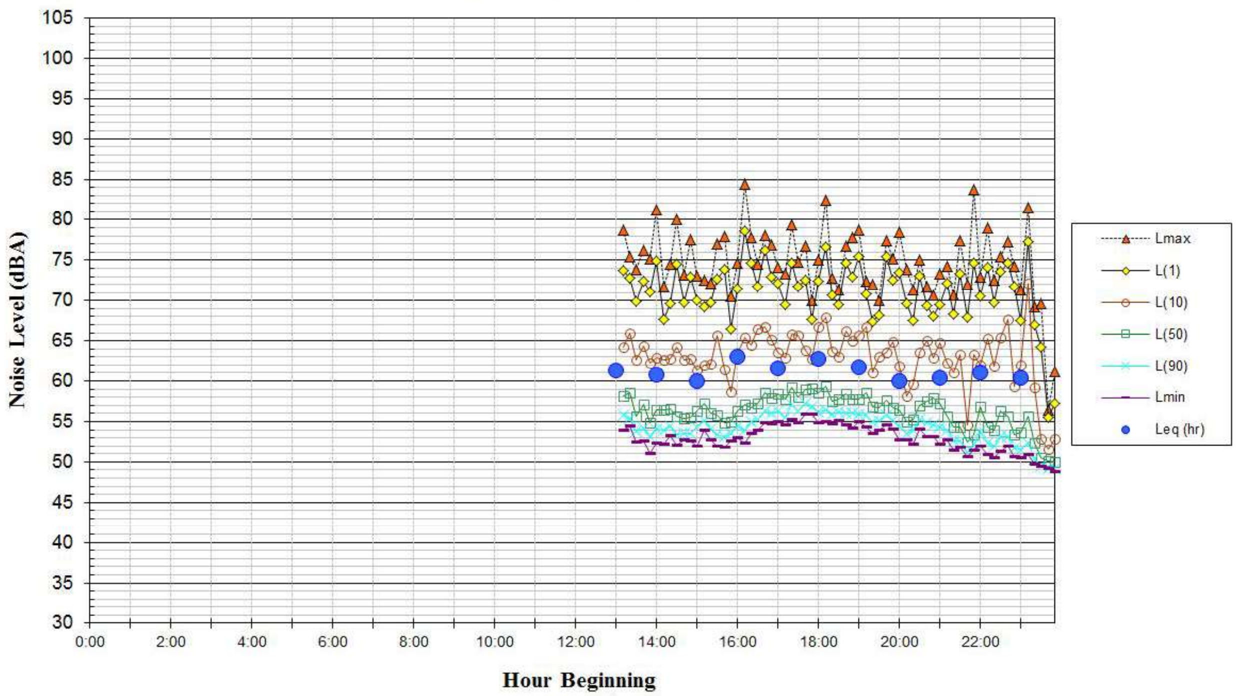
Impact 7: **Noise and Land Use Compatibility (Aircraft).** Residential uses developed at the site would be located in a compatible noise environment with respect to the Santa Clara County ALUC Comprehensive Land Use Plan, but the noise environment due to aircraft would exceed the City's Exterior Land Use Compatibility threshold. **This is a significant and unavoidable impact.**

A review of the ALUC's 2027 CNEL Contour Map for Mineta San José International Airport indicates that the project site, although located nearly adjacent to the Airport, is located outside of the 65 dBA CNEL noise contour because the site is not located under a flight path. Residential development on the site is consistent with the policies set forth in the Santa Clara County ALUC Comprehensive Land Use Plan. However, aircraft noise would range from 59 to 61 dBA CNEL in the outdoor activity areas proposed at the project site. The aircraft noise exposure would be under and consistent with the Santa Clara County ALUC Comprehensive Land Use Plan's 65 dBA CNEL contour line, but would exceed the City's 55 dBA CNEL noise level goal for residential land uses. Therefore, this would be a significant impact.

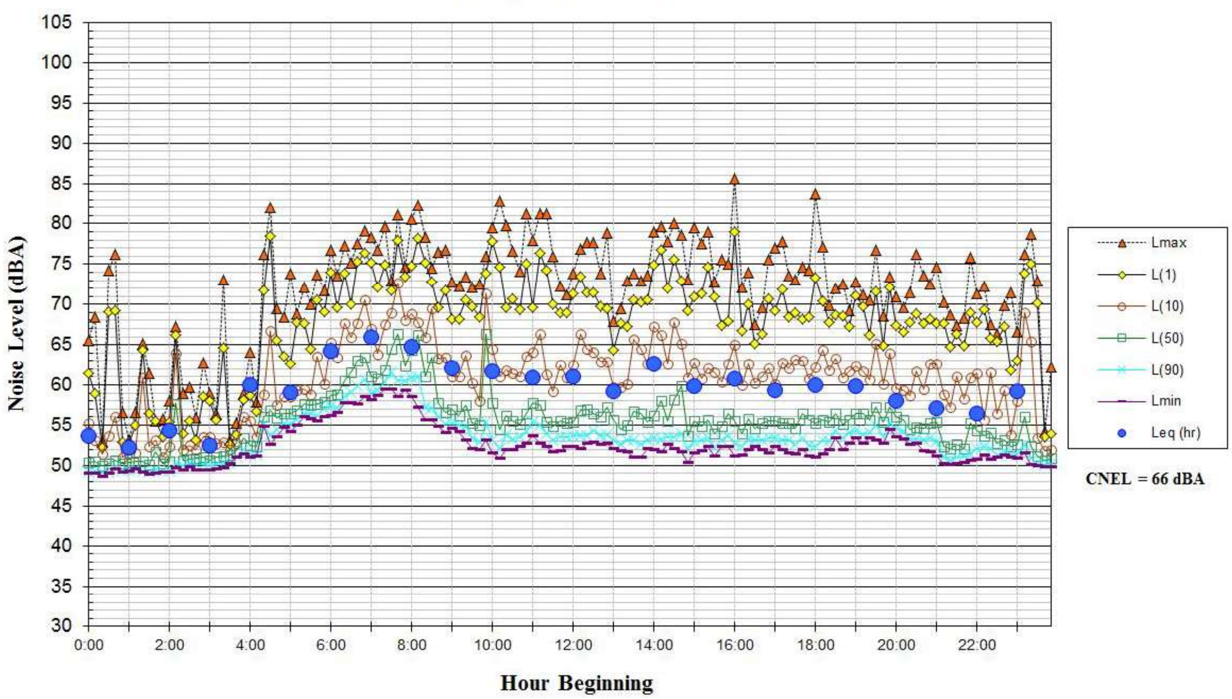
Mitigation Measure 7: There are no mitigation measures available to reduce aircraft noise in outdoor activity areas. This impact is therefore significant and unavoidable.

APPENDIX A: Long Term Noise Level Daily Trends

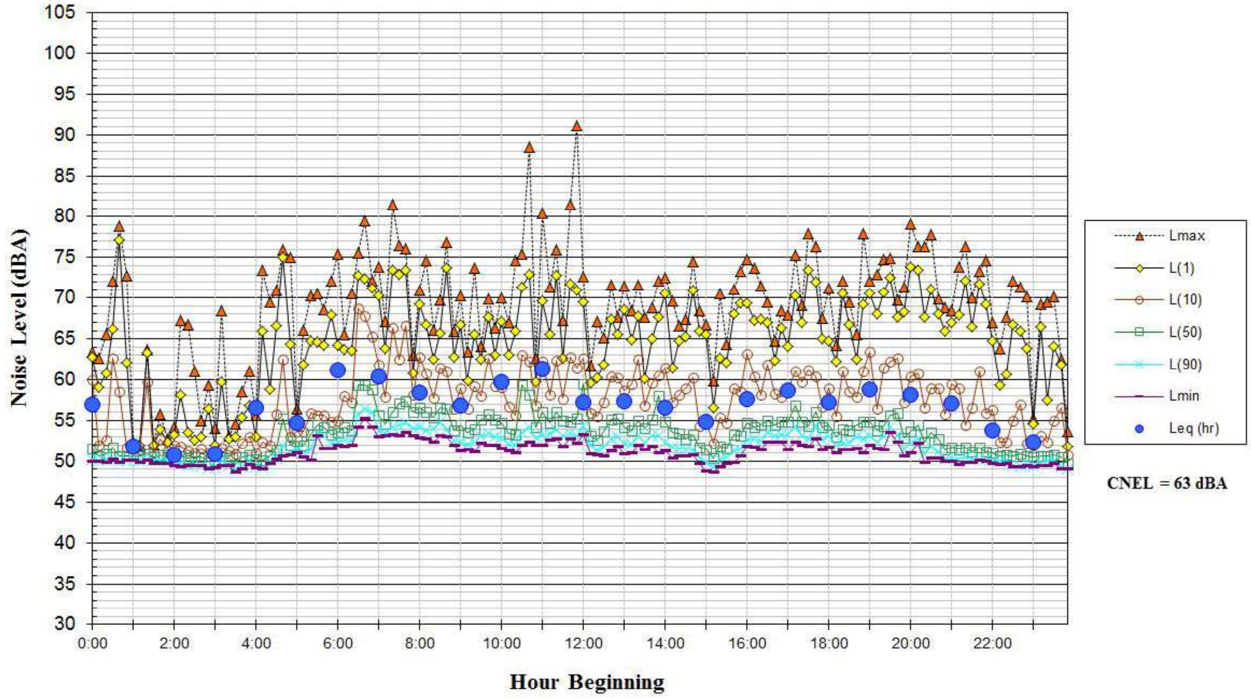
Noise Levels at Noise Measurement Site LT-1
Along Northwest Property Line, ~30 Feet Southeast of Brokaw Road Centerline
Thursday, March 16, 2017



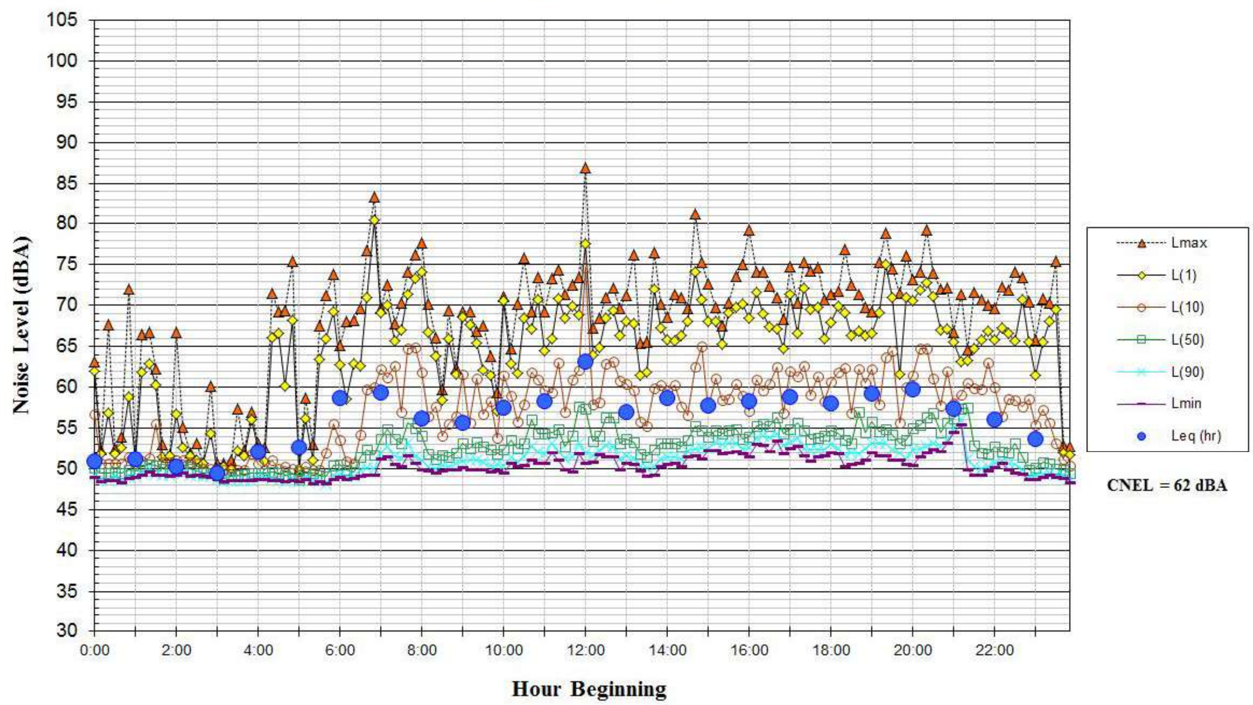
Noise Levels at Noise Measurement Site LT-1
Along Northwest Property Line, ~30 Feet Southeast of Brokaw Road Centerline
Friday, March 17, 2017



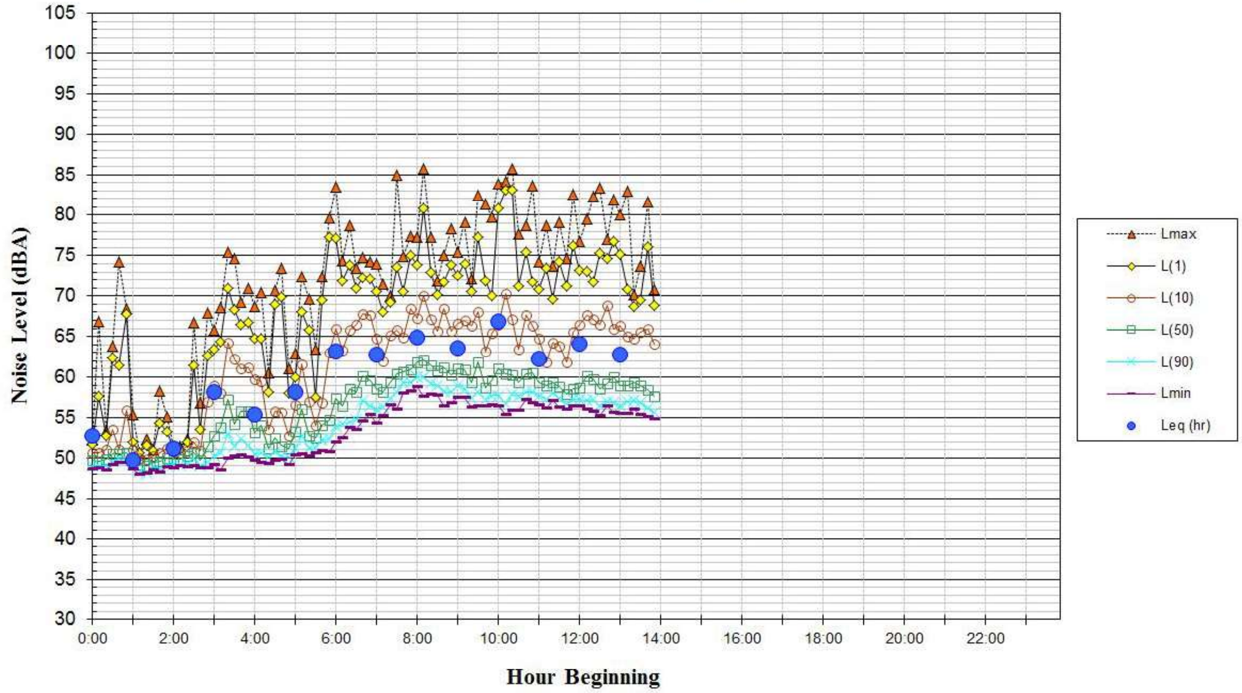
Noise Levels at Noise Measurement Site LT-1
Along Northwest Property Line, ~30 Feet Southeast of Brokaw Road Centerline
Saturday, March 18, 2017



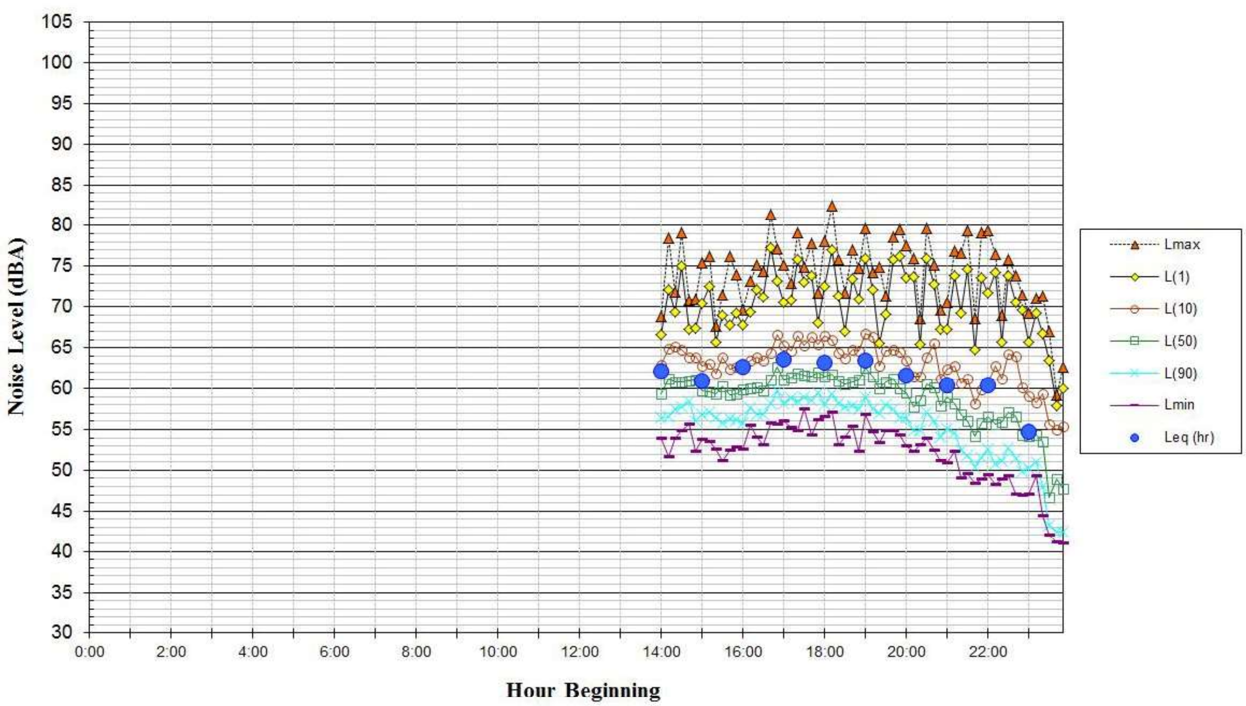
Noise Levels at Noise Measurement Site LT-1
Along Northwest Property Line, ~30 Feet Southeast of Brokaw Road Centerline
Sunday, March 19, 2017



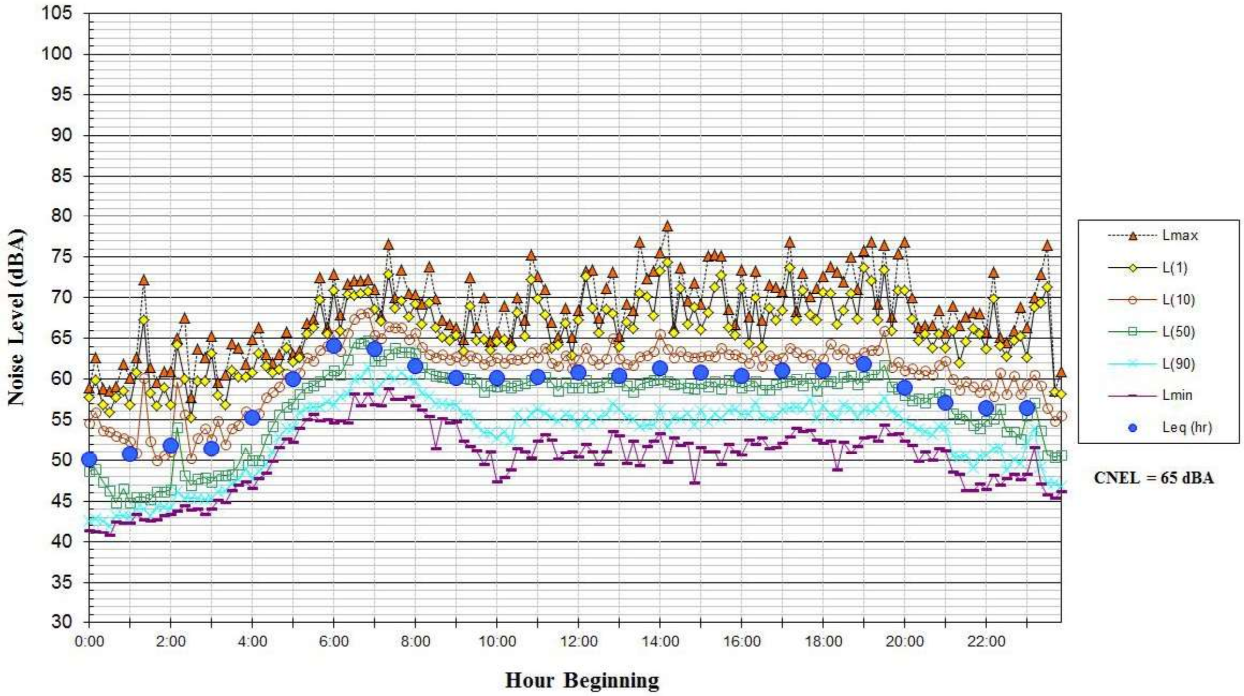
Noise Levels at Noise Measurement Site LT-1
Along Northwest Property Line, ~30 Feet Southeast of Brokaw Road Centerline
Monday, March 20, 2017



Noise Levels at Noise Measurement Site LT-2
Along Southeast Property Line, ~290 Feet Southwest of Coleman Ave Centerline
Thursday, March 16, 2017

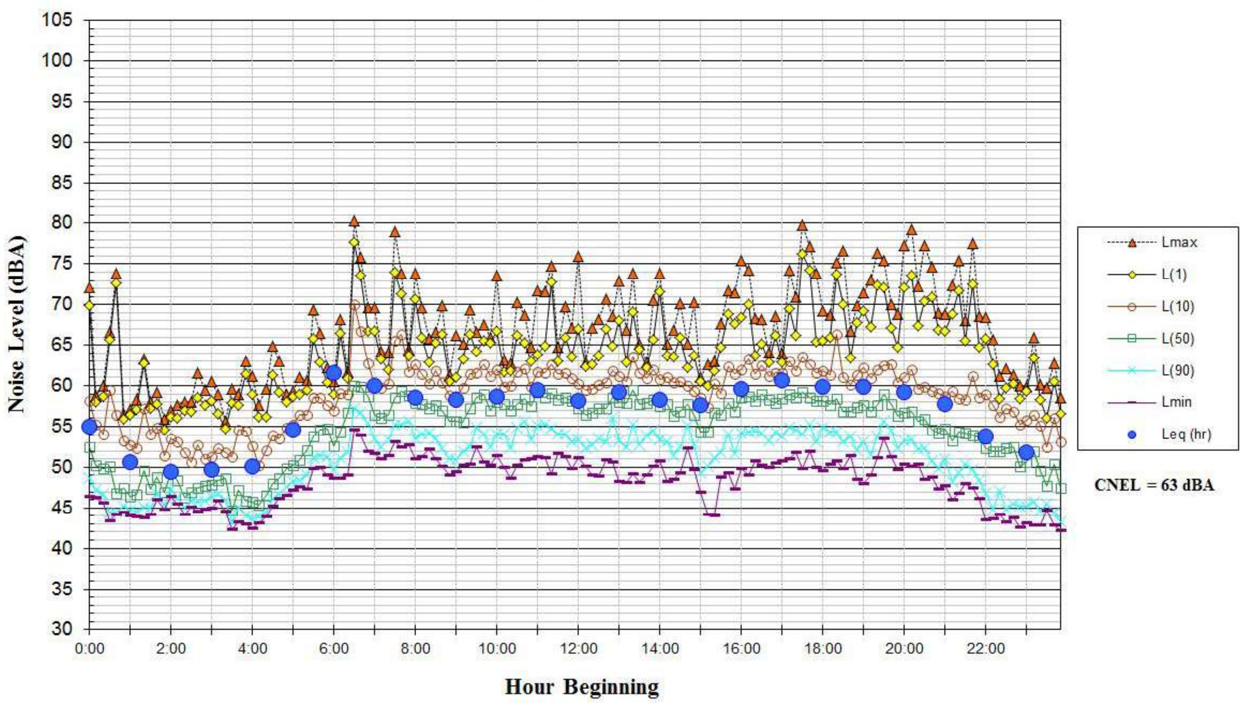


Noise Levels at Noise Measurement Site LT-2
Along Southeast Property Line, ~290 Feet Southwest of Coleman Ave Centerline
Friday, March 17, 2017



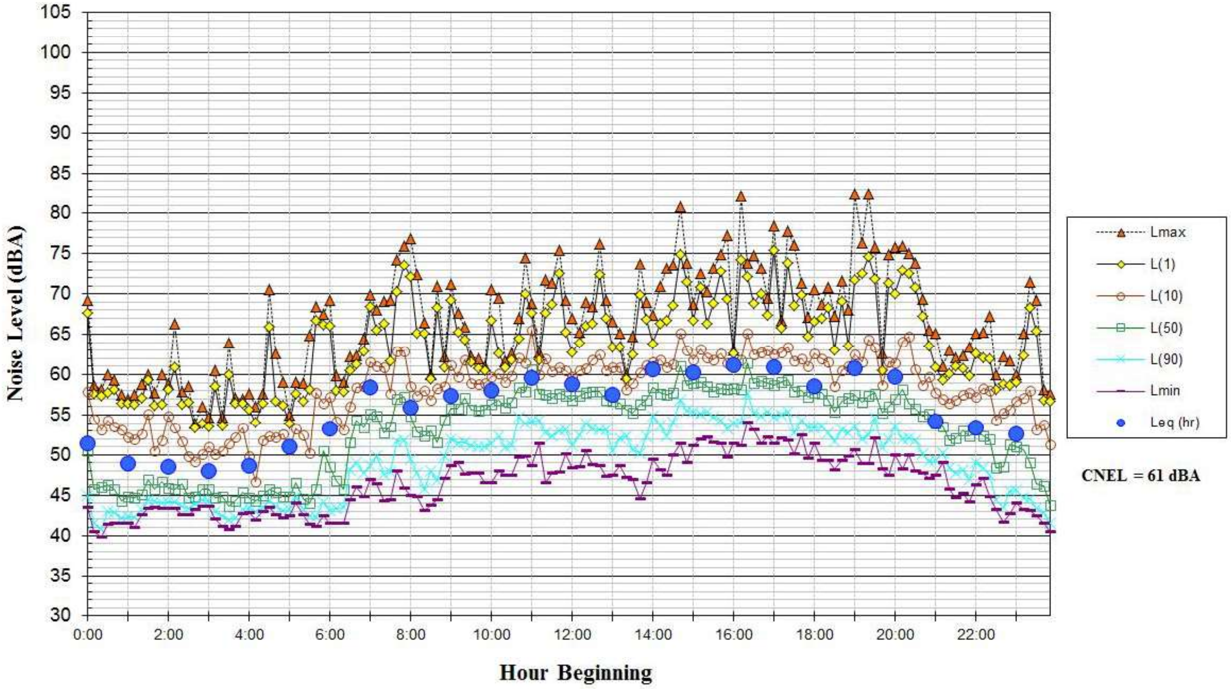
CNEL = 65 dBA

Noise Levels at Noise Measurement Site LT-2
Along Southeast Property Line, ~290 Feet Southwest of Coleman Ave Centerline
Saturday, March 18, 2017

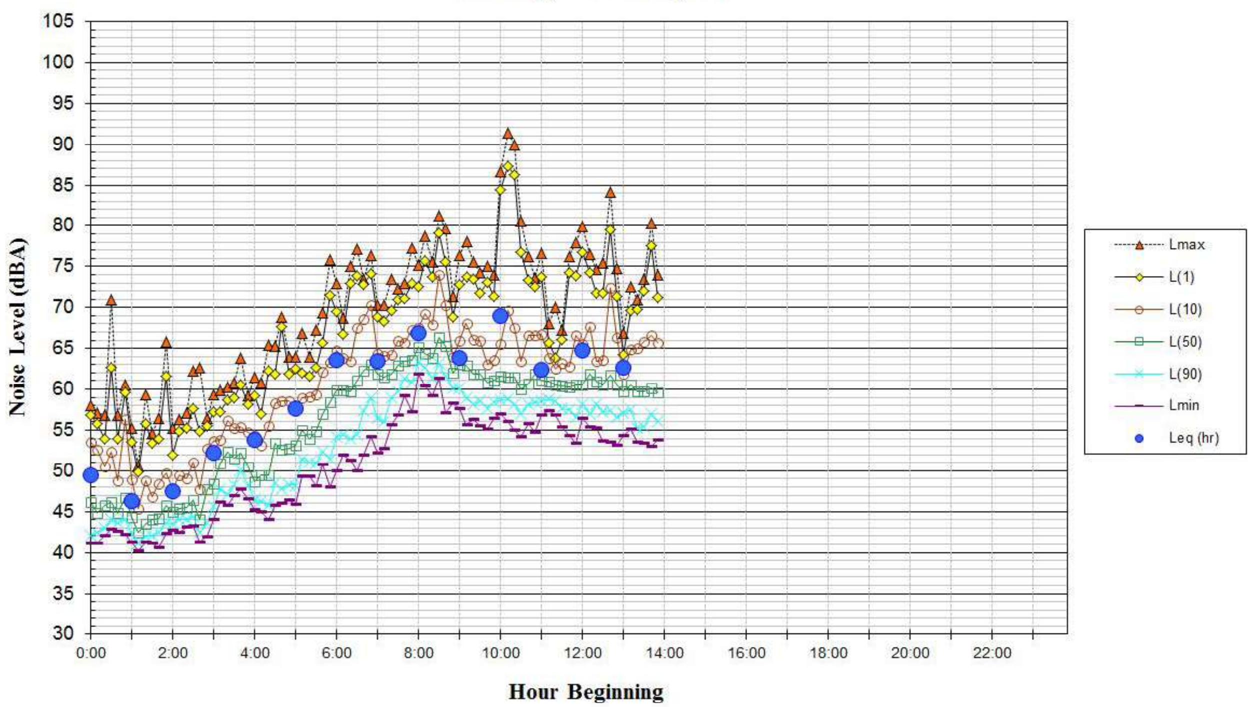


CNEL = 63 dBA

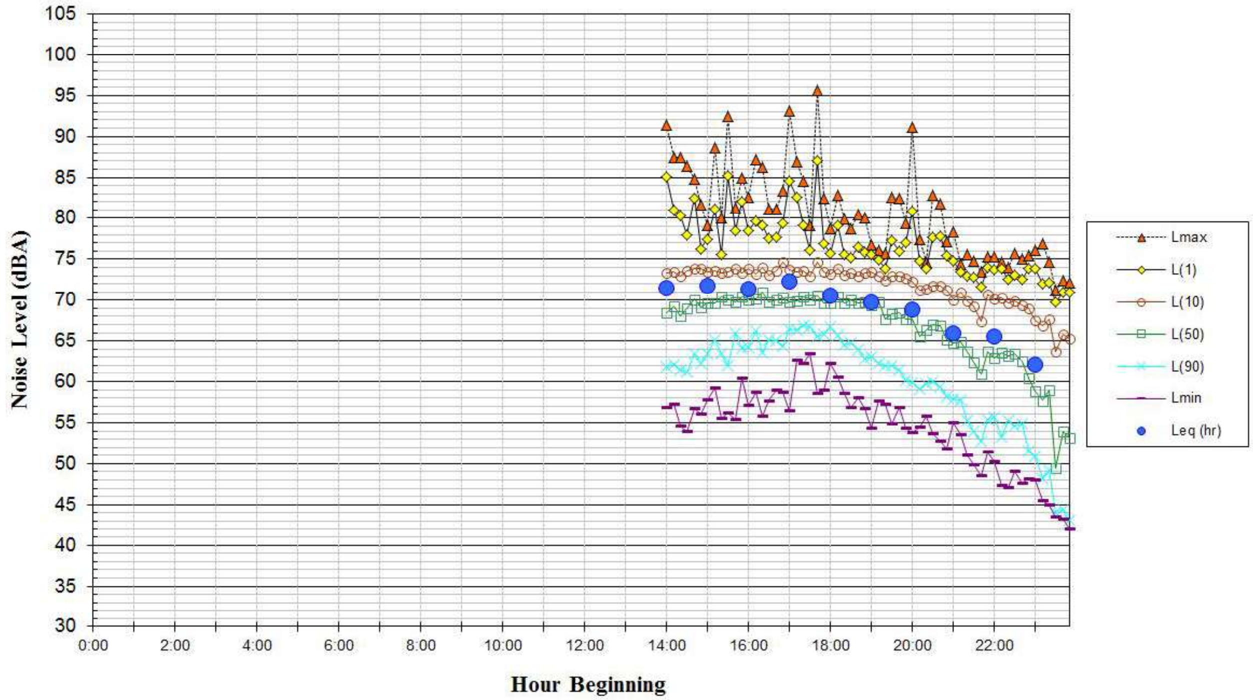
Noise Levels at Noise Measurement Site LT-2
Along Southeast Property Line, ~290 Feet Southwest of Coleman Ave Centerline
Sunday, March 19, 2017



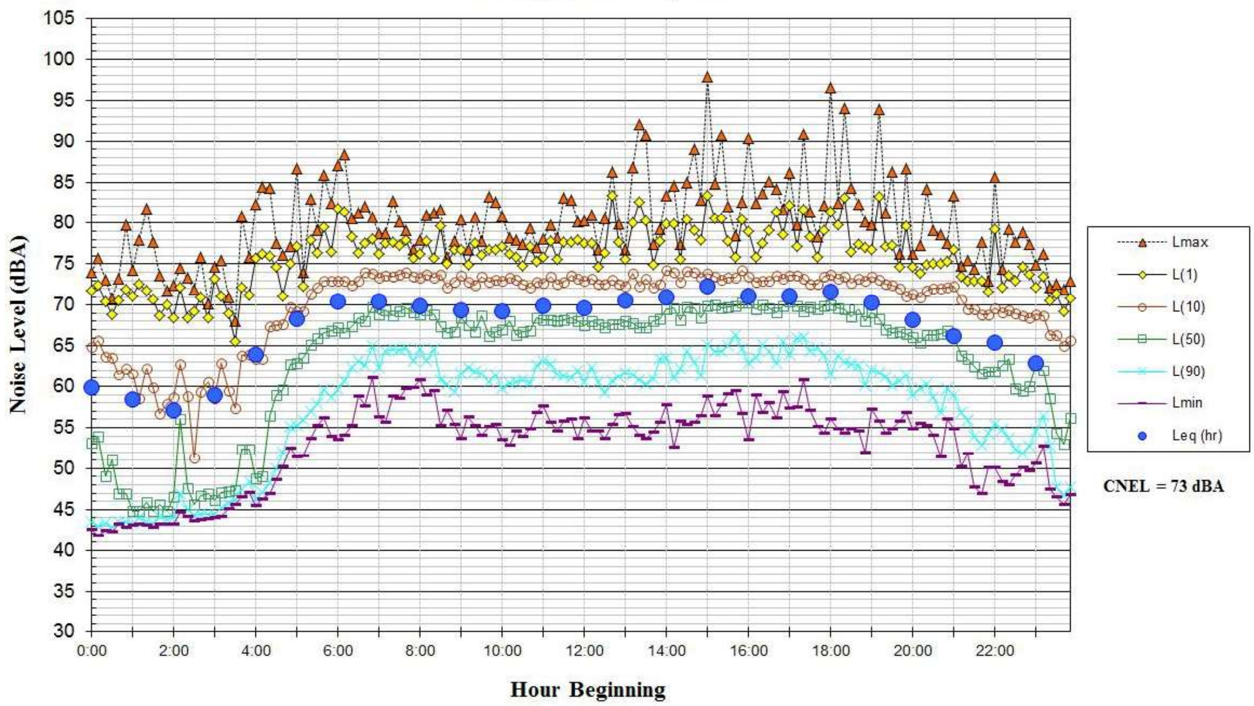
Noise Levels at Noise Measurement Site LT-2
Along Southeast Property Line, ~290 Feet Southwest of Coleman Ave Centerline
Monday, March 20, 2017



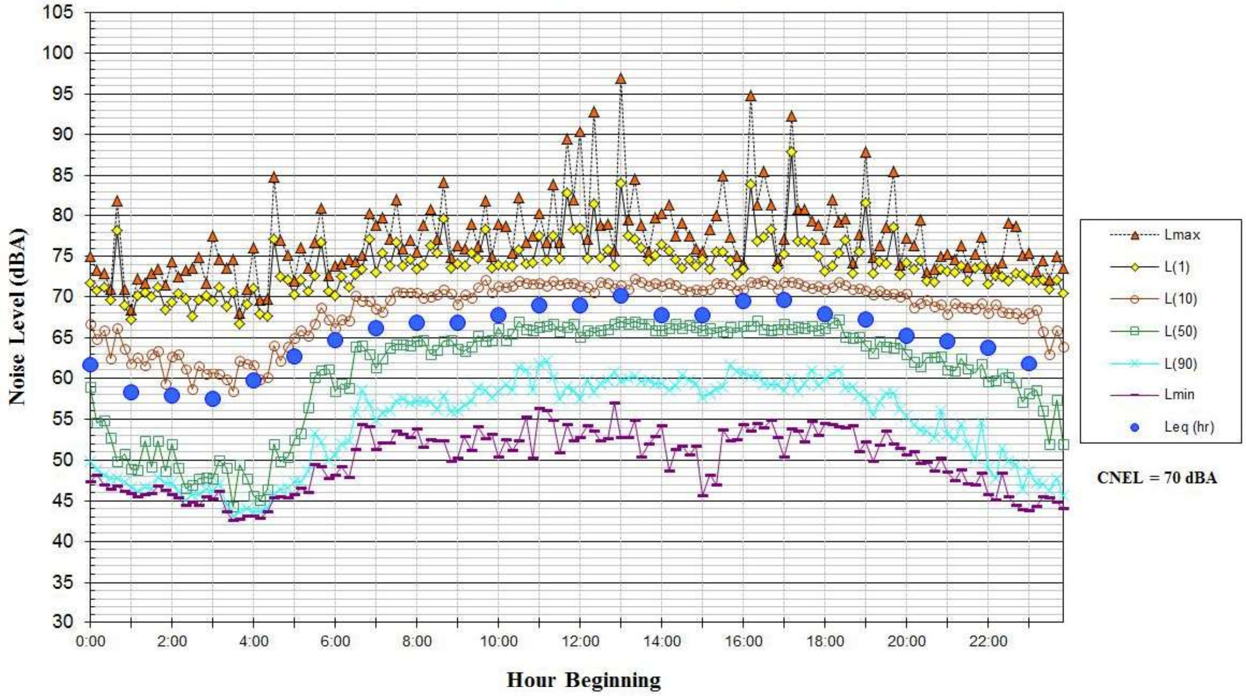
Noise Levels at Noise Measurement Site LT-3
Along Northeast Property Line, ~50 Feet South of Coleman Ave Centerline
Thursday, March 16, 2017



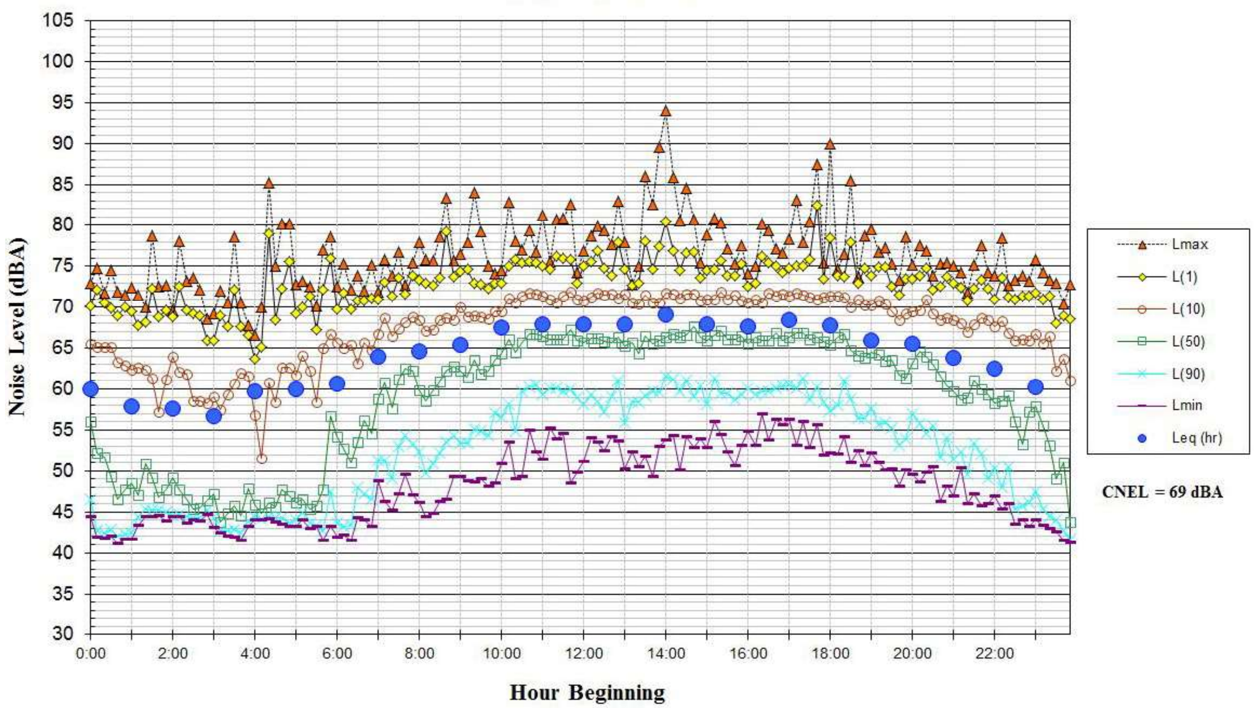
Noise Levels at Noise Measurement Site LT-3
Along Northeast Property Line, ~50 Feet South of Coleman Ave Centerline
Friday, March 17, 2017



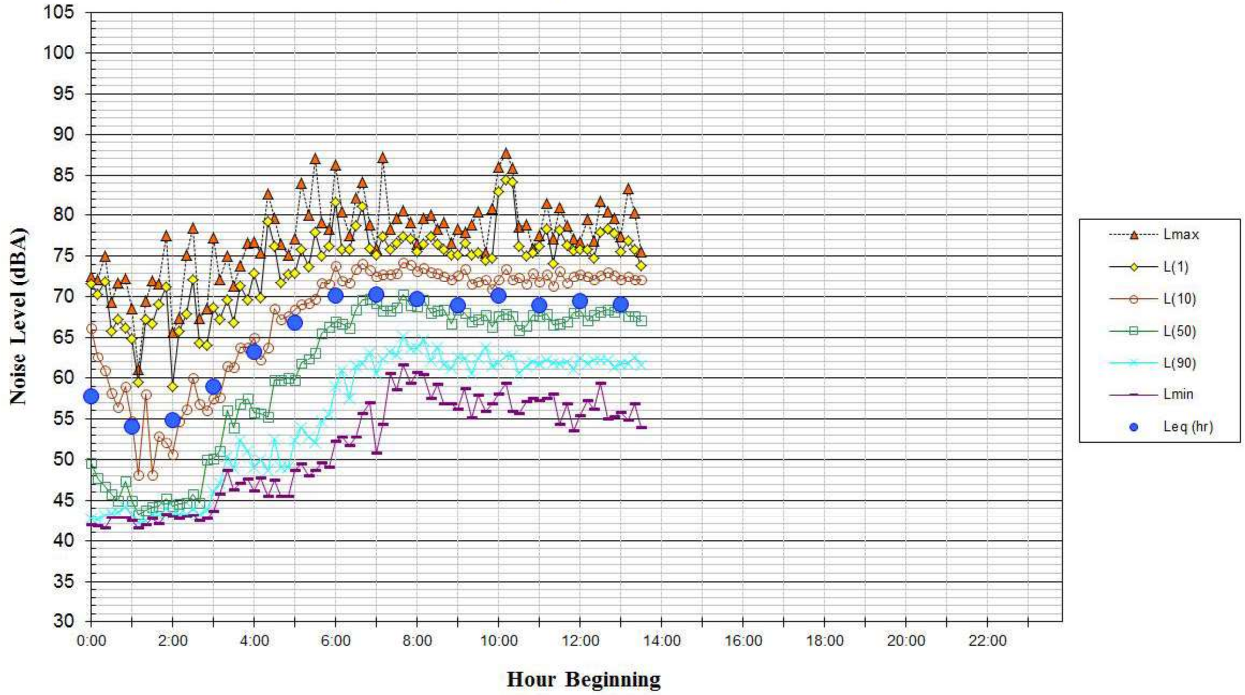
Noise Levels at Noise Measurement Site LT-3
Along Northeast Property Line, ~50 Feet South of Coleman Ave Centerline
Saturday, March 18, 2017



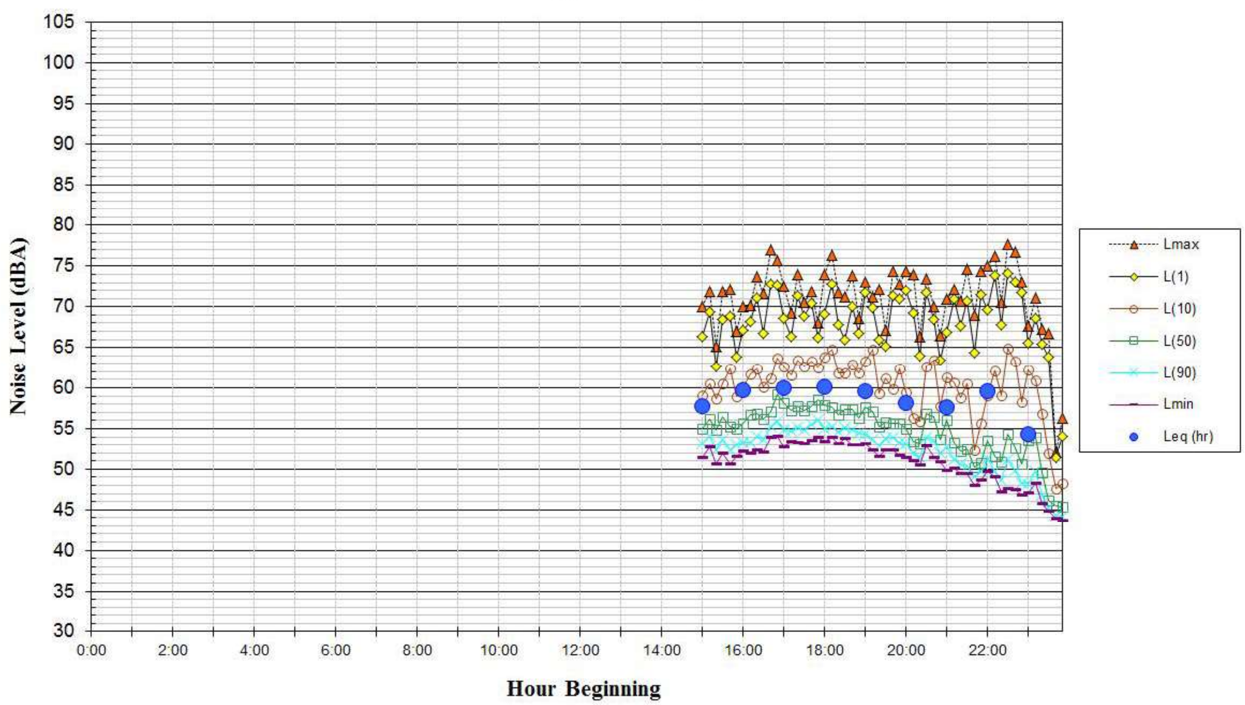
Noise Levels at Noise Measurement Site LT-3
Along Northeast Property Line, ~50 Feet South of Coleman Ave Centerline
Sunday, March 19, 2017



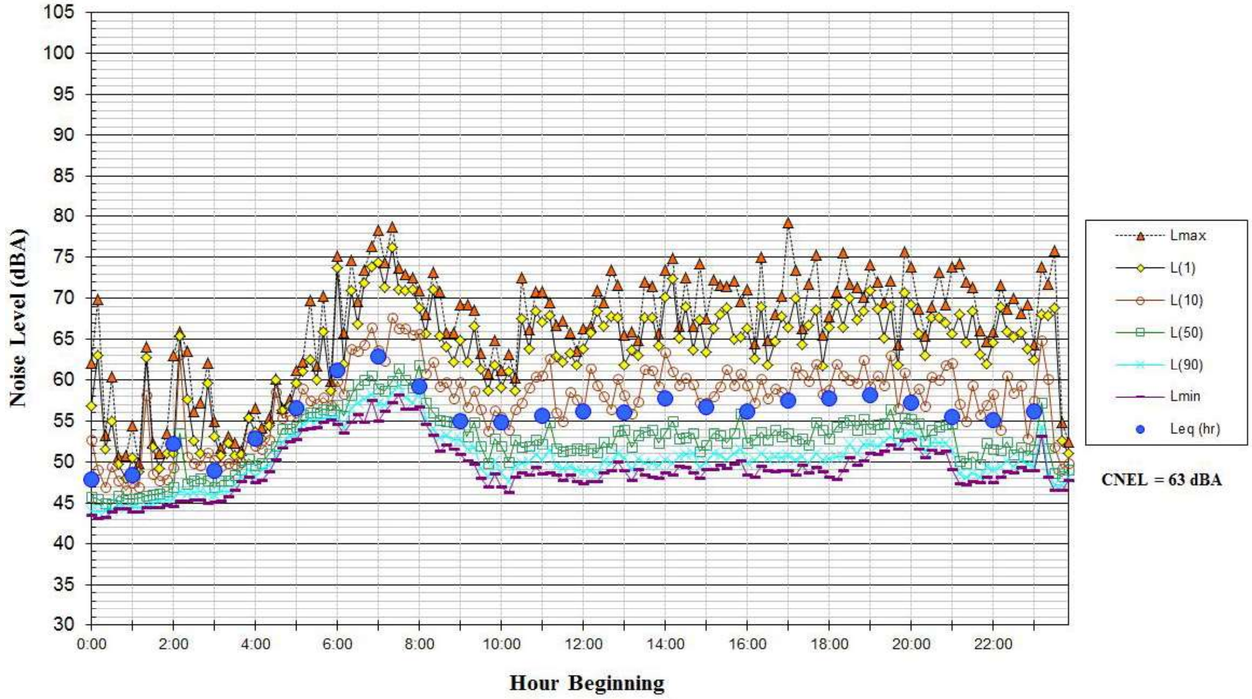
Noise Levels at Noise Measurement Site LT-3
Along Northeast Property Line, ~50 Feet South of Coleman Ave Centerline
Monday, March 20, 2017



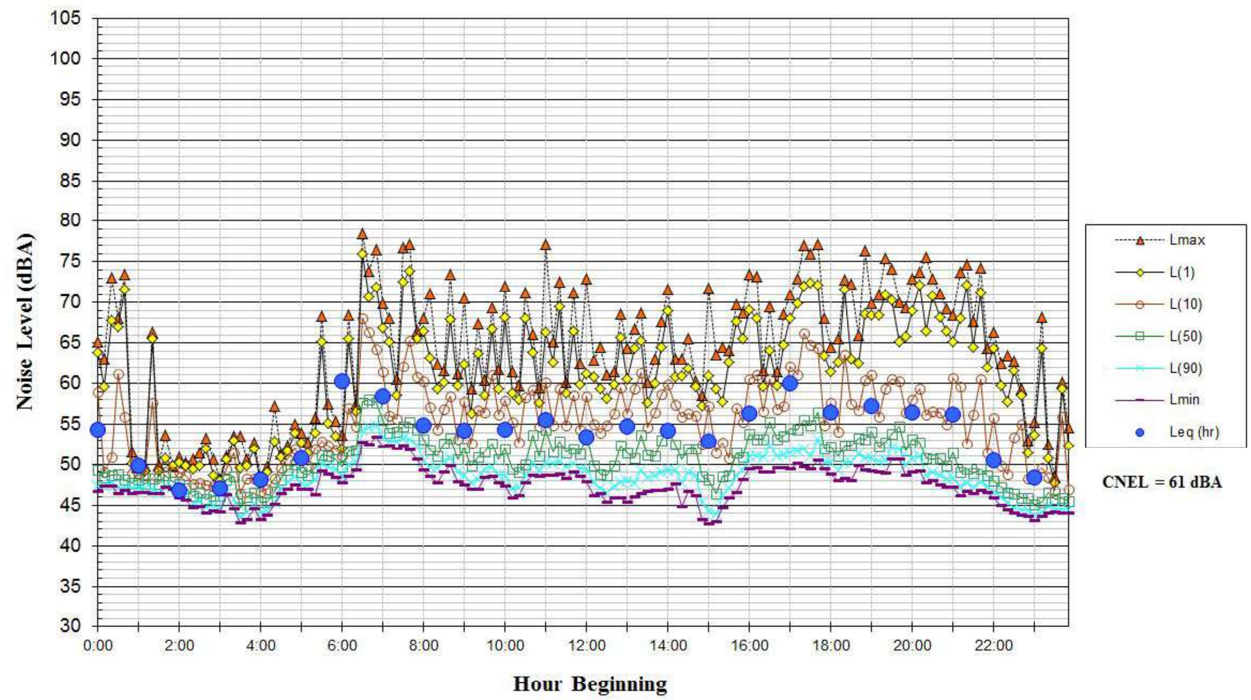
Noise Levels at Noise Measurement Site LT-4
Near Southwest Property Line, ~510 Feet Southeast of Brokaw Road Centerline
Thursday, March 16, 2017



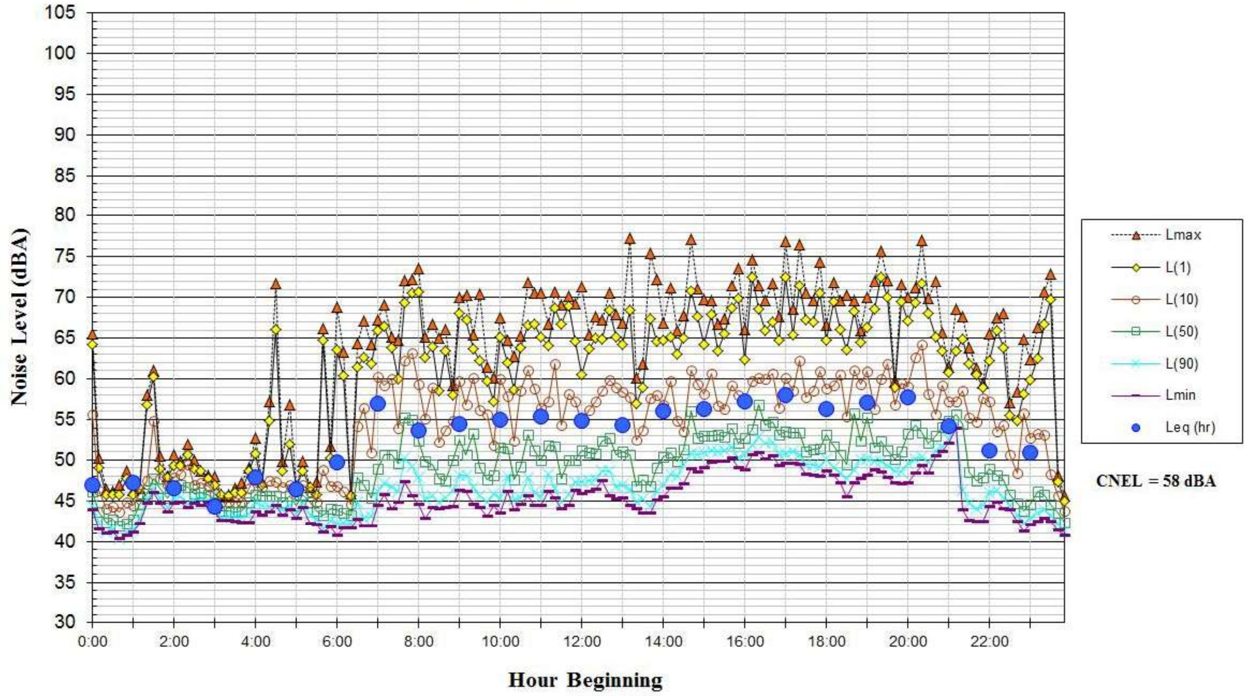
Noise Levels at Noise Measurement Site LT-4
Near Southwest Property Line, ~510 Feet Southeast of Brokaw Road Centerline
Friday, March 17, 2017



Noise Levels at Noise Measurement Site LT-4
Near Southwest Property Line, ~510 Feet Southeast of Brokaw Road Centerline
Saturday, March 18, 2017



Noise Levels at Noise Measurement Site LT-4
Near Southwest Property Line, ~510 Feet Southeast of Brokaw Road Centerline
Sunday, March 19, 2017



Noise Levels at Noise Measurement Site LT-4
Near Southwest Property Line, ~510 Feet Southeast of Brokaw Road Centerline
Monday, March 20, 2017