Appendix G

Noise/Vibration Assessment

Noise & Groundborne Vibration Impact Assessment

For

1655 Lincoln Avenue Project

Santa Jose, CA

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INTRODUCTION

This report discusses the existing noise setting and identifies potential noise and groundborne vibration impacts associated with development of the proposed residential use project located at 1655 Lincoln Avenue, San Jose, CA. Mitigation measures have been identified for potentially significant impacts.

PROJECT OVERVIEW

The project proposes subdivision of the existing parcel into five residential lots and an additional lot containing a private street. The five new lots would each be developed with a new single-family residence. Four of the new single-family residences would include an ADU. The existing single-family residence and accessory structure would be demolished as part of the project. The proposed project's site plan is depicted in Figure 1.

The construction schedule for the project assumes that the earliest possible start date would be November 2023. The development would be built out over a period of approximately five months, with construction concluding in March 2024. The earliest year of full operation for the entire project is assumed to be 2024.

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, or unexpected. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration.

Amplitude

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels (dB) on a logarithmic scale. For example, a 65 dB source of a sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). Amplitude is interpreted by the ear as corresponding to different degrees of loudness. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person.

Frequency

Frequency is the number of fluctuations in the pressure wave per second. The unit of frequency is the Hertz (Hz). One Hz equals one cycle per second. The human ear is not equally sensitive to the sound of different frequencies. Sound waves below 16 Hz or above 20,000 Hz cannot be heard at all, and the ear is more sensitive to sound in the higher portion of this range than in the lower. To approximate this sensitivity, the environmental sound is usually measured in A-weighted decibels (dBA). On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA. Common community noise sources and noise levels are depicted in Figure 2.

Addition of Decibels

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

Sound Propagation & Attenuation

Geometric Spreading

The sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level decreases (attenuates) at a rate of approximately 6 decibels for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 decibels for each doubling of distance from a line source, depending on ground surface characteristics. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water,), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between a line source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation for soft surfaces results in an overall attenuation rate of 4.5 decibels per doubling of distance from a line source.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in an approximate 5 dB of noise reduction. Taller barriers provide increased noise reduction.

Figure 1. Proposed Project Site Plan

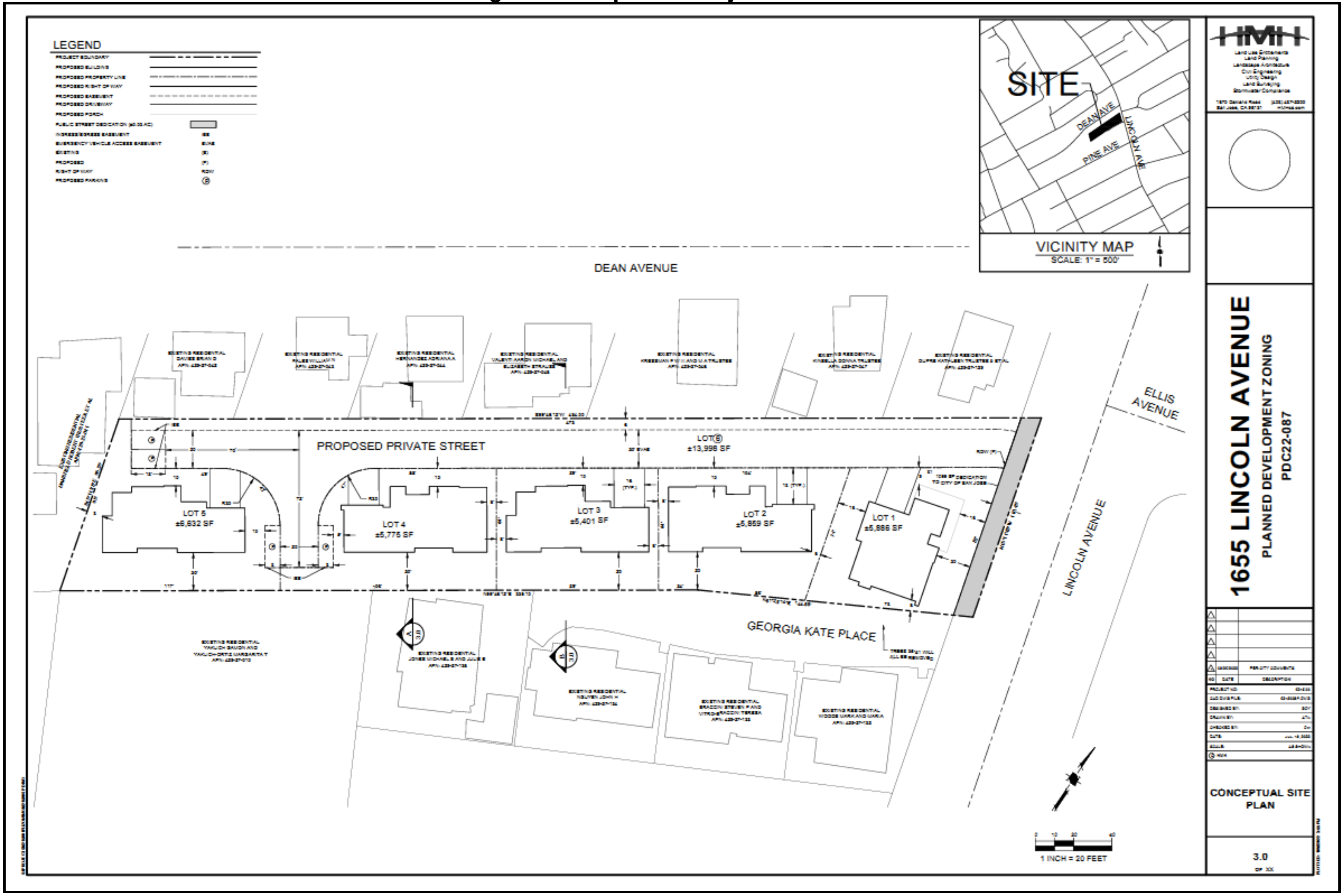
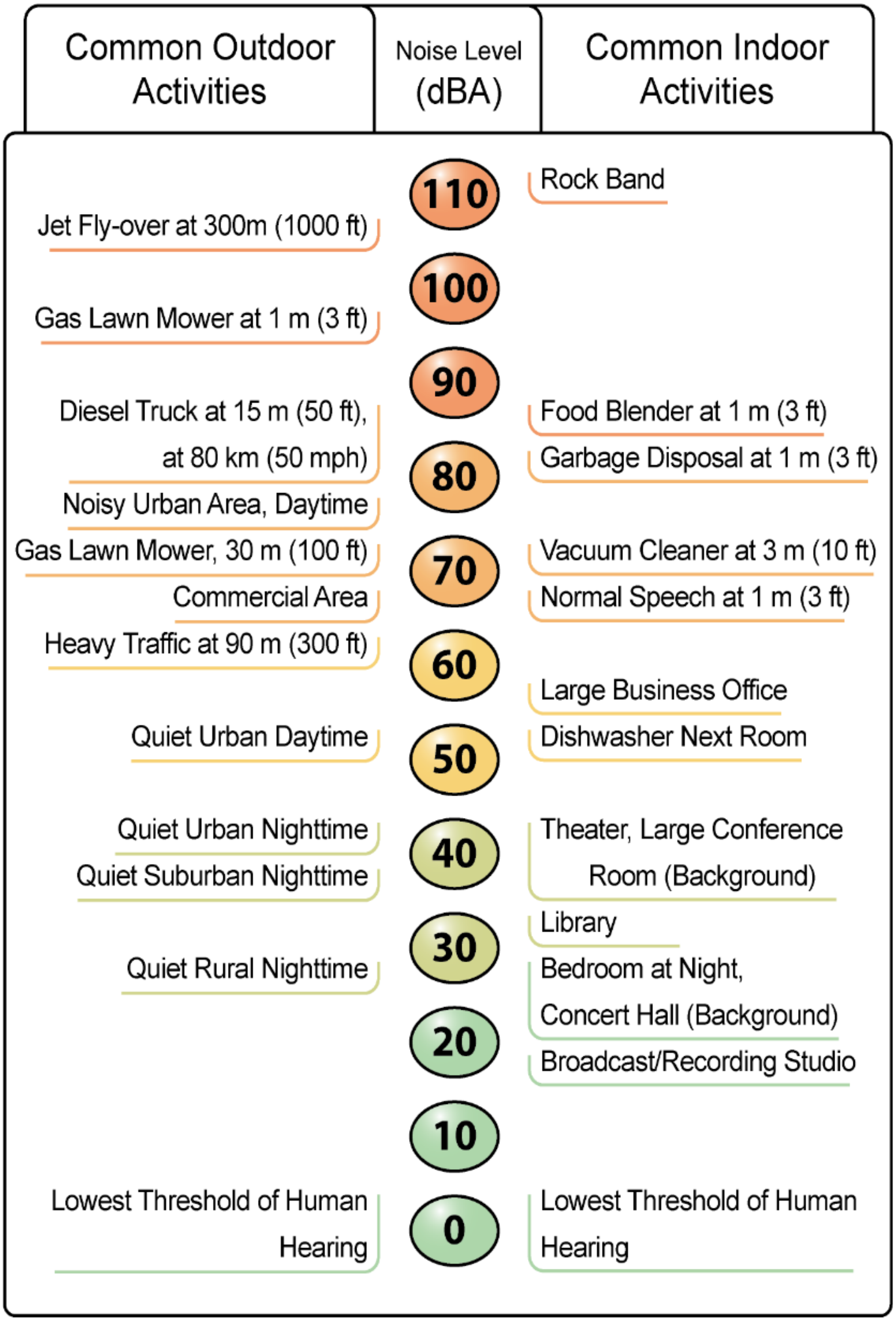


Image Source: HMH, Inc. 2022. Not to Scale.

Figure 2. Common Noise Levels



Source: Caltrans 2022

Noise Descriptors

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

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the sound-pressure level in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz, and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies, which is referred to as the "A-weighted" sound level (expressed in units of dBA). The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted noise scale. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with environmental noise.

The intensity of environmental noise fluctuates over time, and several descriptors of time-averaged noise levels are typically used. For the evaluation of environmental noise, the most commonly used descriptors are L_{eq}, L_{dn}, and CNEL. The energy-equivalent noise level, L_{eq}, is a measure of the average energy content (intensity) of noise over any given period. Many communities use 24-hour descriptors of noise levels to regulate noise. The day-night average noise level, L_{dn}, is the 24-hour average of the noise intensity, with a 10-dBA "penalty" added for nighttime noise (10 p.m. to 7 a.m.) to account for the greater sensitivity to noise during this period. CNEL, the community equivalent noise level, is similar to L_{dn} but adds an additional 5-dBA penalty for evening noise (7 p.m. to 10 p.m.) Common noise descriptors are summarized in Table 1.

Table 1. Common Acoustical Terms and Descriptors

Descriptor	Definition
Decibel (dB)	A unit-less measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to referenced sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Energy Equivalent Noise Level (Leq)	The energy means (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value (in dBA) is calculated.
Day-Night Average Noise Level (DNL or Ldn)	The 24-hour Leq with a 10 dBA "penalty" for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours to account for increased sensitivity to noise during these hours.
Community Noise Equivalent Level (CNEL)	The CNEL is similar to the Ldn described above, but with an additional 5 dBA "penalty" added to noise events that occur between the hours of 7:00 p.m. to 10:00 p.m. The calculated CNEL is typically approximately 0.5 dBA higher than the calculated L_{dn}.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases. The acceptability of noise and the threat to public well-being are the basis for land use planning policies preventing exposure to excessive community noise levels.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and habituation to noise over differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted: the so-called "ambient" environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged. Regarding increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans;
- Outside of the laboratory, a 3-dB change is considered a just-perceivable difference;
- A change in the level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial;
- A 10-dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Speech Communication

For most noise-sensitive land uses, an interior noise level of 45 dB L_{eq} is typically identified for the protection of speech communication in order to provide for 100-percent intelligibility of speech sounds. Assuming a minimum average 20-dB reduction in sound level between outdoors and indoors (which is an average amount of sound attenuation that assumes windows are closed), this interior noise level would equate to an exterior noise level of 65 dBA L_{eq}. (For newer structures subject to current building insulation and energy-efficiency requirements, exterior-to-interior noise reductions typically average 25-30 dB.) For outdoor voice communication, an exterior noise level of 60 dBA L_{eq} allows normal conversation at distances up to 2 meters with 95 percent sentence intelligibility (U.S. EPA 1974.) Based on this information, speech interference begins to become a problem when steady noise levels reach approximately 60 to 65 dBA. Within more noise-sensitive interior environments, such as educational facilities and places of worship, an average-hourly background noise level of 45 dBA L_{eq} is typically recommended. For other somewhat less noise-sensitive land uses, such as commercial offices, an interior noise level of 50 dBA L_{eq} is typically recommended.

Annoyance & Sleep Disruption

With regard to potential increases in annoyance, activity interference, and sleep disruption, land use compatibility determinations are typically based on the use of the cumulative noise exposure metrics (i.e., CNEL or L_{dn}). Perhaps the most comprehensive and widely accepted evaluation of the relationship between noise exposure and the extent of annoyance was one originally developed by Theodore J. Schultz in 1978. In 1978 the research findings of Theodore J. Schultz provided support for L_{dn} as the descriptor for environmental noise. Research conducted by Schultz identified a correlation between the cumulative noise exposure metric and individuals who were highly annoyed by transportation noise. The Schultz curve, expressing this correlation, became a basis for noise standards. When expressed graphically, this relationship is typically referred to as the Schultz curve. The Schultz curve indicates that approximately 13 percent of the population is highly annoyed at a noise level of 65 dBA L_{dn}. It also indicates that the percentage of people describing themselves as being highly annoyed accelerates smoothly between 55 and 70 dBA L_{dn}. A noise level of 65 dBA L_{dn} is a commonly referenced dividing point between lower and higher rates of people describing themselves as being highly annoyed.

The Schultz curve and associated research became the basis for many of the noise criteria subsequently established for federal, state, and local entities. Most federal and state of California regulations and policies related to transportation noise sources establish a noise level of 65 dBA CNEL/L_{dn} as the basic limit of acceptable noise exposure for residential and other noise-sensitive land uses. For instance, with respect to aircraft noise, both the Federal Aviation Administration (FAA) and the State of California have identified a noise level of 65 dBA L_{dn} as the dividing point between normally compatible and normally incompatible residential land use generally applied for the determination of land use compatibility. For noise-sensitive land uses exposed to aircraft noise, noise levels in excess of 65 dBA CNEL/L_{dn} are typically considered to result in a potentially significant increase in levels of annoyance.

Allowing for an average exterior-to-interior noise reduction of 20 dB, an exterior noise level of 65 dBA CNEL/L_{dn} would equate to an interior noise level of 45 dBA CNEL/L_{dn}. An interior noise level of 45 dB CNEL/L_{dn} is generally considered sufficient to protect against long-term sleep interference (U.S. EPA, 1974.) Within California, the California Building Code establishes a noise level of 45 dBA CNEL as the maximum acceptable interior noise level for residential uses (other than detached single family dwellings). Use of the 45 dBA CNEL threshold is further supported by recommendations provided in the State of California Office of Planning and Research's *General Plan Guidelines*, which recommend an interior noise level of 45 dB CNEL/L_{dn} as the maximum allowable interior noise level sufficient to permit "normal residential activity" (OPR 2017).

The cumulative noise exposure metric is currently the only noise metric for which there is a substantial body of research data and regulatory guidance defining the relationship between noise exposure, people's reactions, and land use compatibility. However, when evaluating environmental noise impacts involving intermittent noise events, such as aircraft overflights and train pass by, the use of cumulative noise metrics may not provide a thorough understanding of the resultant impact. The general public often finds it difficult to understand the relationship between intermittent noise events and cumulative noise exposure metrics. In such instances, supplemental use of other noise metrics, such as the L_{eq} or L_{max} descriptor, are sometimes used as a means of increasing public understanding regarding the relationship between these metrics and the extent of the resultant noise impact.

EXISTING SETTING

Noise-Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are also considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

Noise-sensitive land uses in the project vicinity consist predominantly of residential land uses. The nearest residential land uses are located adjacent to the northern, western, and southern project site boundaries.

Ambient Noise Environment

To document the existing noise environment in the project vicinity, four short-term (i.e., 10-minutes) noise measurements were conducted. Ambient noise measurement surveys were conducted on March 1st, 2023, using a Larson Davis LxT Type I sound-level meter. Measured short-term noise measurements are summarized in Table 2. As noted in Table 2, measured short-term daytime average-hourly noise levels in the project area generally range from approximately 49.6 to 68.5 dBA L_{eq}. Measured ambient noise levels in the vicinity of the project site were predominantly influenced by vehicle traffic on Lincoln Avenue. To a lesser extent, vehicle traffic on Pine Avenue and activities conducted at nearby land uses (e.g. landscaping, dogs barking) also contributed to ambient noise levels on an occasional basis.

Table 2. Summary of Measured Short-Term Ambient Noise Levels

Monitoring Location	Monitoring Date/Period	Monitoring Location	Primary Noise Source	Noise Level (dBA)	
				Average-Hourly (L_{eq})	Instantaneous (L_{max})
ST-1	3/1/23 12:46-12:56	SW corner off Lincoln Ave/ Dean Ave	Traffic, birds, distant leaf blower	67.3	76.8
ST-2	83/1/23 1:00-1:10	In front of 1136 Dean Ave	Traffic, birds, distant leaf blower	49.6	55.4
ST-3	3/1/23 1:11-1:21	SW corner off Lincoln Ave/ Georgia Kate Pl	Traffic, dog barking	67.1	75.8
ST-4	3/1/23 1:21-1:31	NW corner of Lincoln Ave/ Pine Ave	Traffic, car sound system	68.5	84.9
Noise measurement surveys were conducted on March 1st, 2023, using a Larson Davis Laboratories, Type I, Model LxT integrating sound-level meter positioned at a height of approximately 5 feet above ground level. Refer to Figure 3 for noise measurement locations.					

Figure 3. Noise Measurement Locations

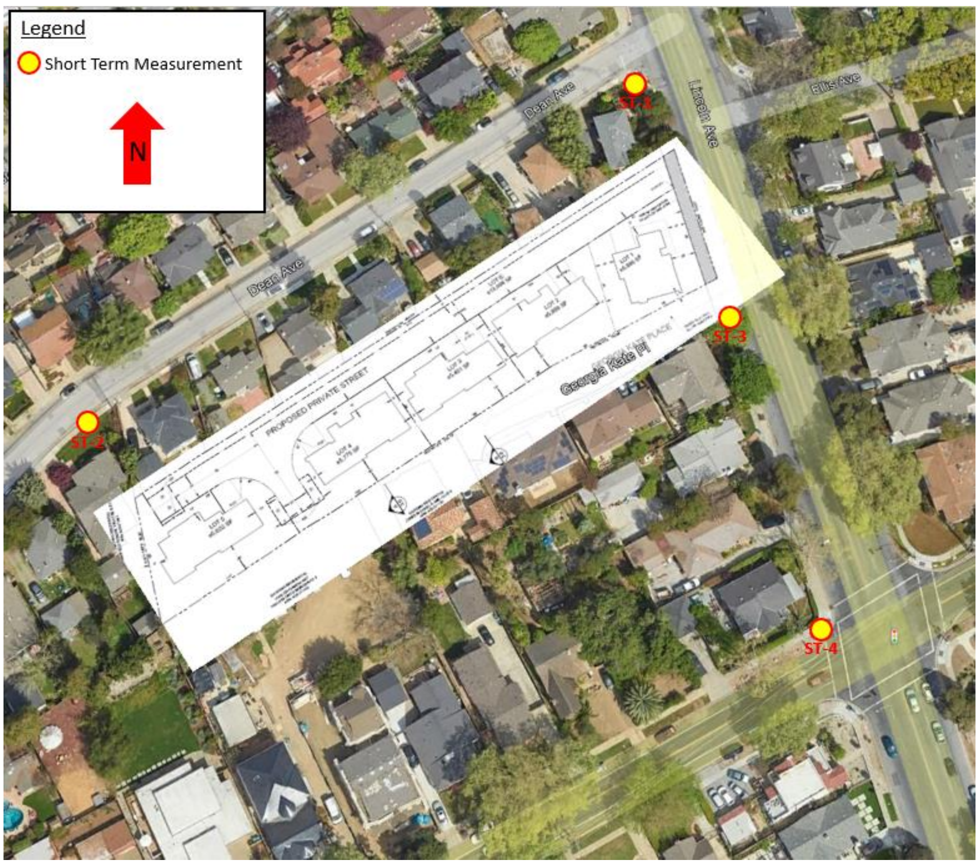


Image Source: HMH Land Planning. 2023. Locations are approximate. Not to scale.

Groundborne Vibration

No major existing sources of groundborne vibration were identified in the project area. Vehicle traffic on area roadways, particularly heavy-duty trucks, can result in increased groundborne vibration. However, groundborne vibration levels associated with vehicle traffic is typically considered minor and would not exceed applicable criteria at the project site boundaries.

REGULATORY FRAMEWORK

Noise

Noise Control Act of 1972

The Noise Control Act of 1972 establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The Act also serves to (1) establish a means for effective coordination of Federal research and activities in noise control; (2) authorize the establishment of Federal noise emission standards for products distributed in commerce; and (3) provide information to the public respecting the noise emission and noise reduction characteristics of such products.

Department of Housing and Urban Development (HUD)

HUD guidelines for the acceptability of residential land use are set forth in the Code of Federal Regulations Title 24, Part 51, "Environmental Criteria and Standards." These guidelines parallel those suggested in the FICUN report: noise exposure of 65 dBA CNEL/L_{dn}, or less, is acceptable and between 65 and 75 dBA CNEL/L_{dn} noise exposure is considered normally acceptable provided appropriate sound-reduction measures are provided. Above 75 dBA CNEL/L_{dn} noise exposure is generally considered unacceptable. The guidelines also identify the recommended interior noise levels of 45 dBA CNEL/L_{dn}. These guidelines apply only to new construction supported by HUD grants and are not binding upon local communities.

California Code of Regulations, Title 24

Title 24 of the California Code of Regulations contains standards for allowable interior noise levels associated with exterior noise sources (California Building Code, 1998 edition, Volume 1, Appendix Chapter 12, Section 1208A). The standards apply to new hotels, motels, dormitories, apartment houses, and dwellings other than detached single family residences. The standards state that the interior noise level attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room. Proposed residential structures to be located where the CNEL exceeds 60 dBA are required to prepare an acoustical analysis showing that the proposed building design would achieve the prescribed allowable interior noise standard. Worst-case noise levels, either existing or future, shall be used as the basis for determining compliance with these standards.

California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The "State of California General Plan Guidelines" (OPR 2017), published by the Governor's Office of Planning and Research, also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

2019 California Green Building Standards

The *2019 California Green Building Standards* (California Code of Regulations Title 24, Part 11, Section 5.507) requires that the wall and roof-ceiling assemblies making up a building envelope to have a minimum Sound Transmissions Class (STC) of 50, and exterior windows to have a minimum STC of 40 or equivalent for any of the following building locations:

- Within 65 CNEL noise contour of an airport.
- Within the 65 CNEL or L_{dn} noise contour of a free-way or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

The above standards do not apply to buildings with few or no occupants or where occupants are not likely to be affected by exterior noise (as determined by the enforcement authority), such as factories, stadiums, storage, enclosed parking structures, and utility buildings. This section also identifies a minimum STC of 40 for interior walls and floor-ceiling assemblies that separate tenant spaces and public spaces (CBSC 2019).

City of San Jose General Plan

The City of Santa Jose's General Plan identifies noise standards for determination of land use compatibility and includes policies to reduce noise exposure for community residents. The City's noises standards for land use compatibility are summarized in Table 3. As depicted, newly proposed residential land uses are considered compatible in noise environments of 60 dBA L_{dn}/CNEL, or less. Where the exterior noise levels are greater than 60 L_{dn}/CNEL and less than 75 L_{dn}/CNEL, the design of the project should include measures to reduce noise levels to acceptable levels. Noise levels exceeding 75 L_{dn}/CNEL at residential land uses are typically considered incompatible. Residential land uses proposed in noise environments exceeding 75 L_{dn}/CNEL should generally be avoided, except when the residential land use is entirely indoors and where interior noise levels can be maintained at 45 dBA L_{dn}/CNEL, or less. The City's interior noise standard for residential land uses is 45 dBA L_{dn}/CNEL.

Table 3. Santa Jose General Plan Noise Standards for Land Use Compatibility

LAND USE CATEGORY	EXTERIOR NOISE EXPOSURE (DNL IN DECIBELS (DBA)) — Normally Acceptable	Conditionally Acceptable	Unacceptable
1. Residential, Hotels and Motels, Hospitals and Residential Care[1]	up to 60	60–75	above 75
2. Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds	up to 65	65–80	above 80
3. Schools, Libraries, Museums, Meeting Halls, Churches	up to 60	60–75	above 75
4. Office Buildings, Business Commercial, and Professional Offices	up to 70	70–80	above 80
5. Sports Arena, Outdoor Spectator Sports	up to 70	70–80	above 80
6. Public and Quasi-Public Auditoriums, Concert Halls, Amphitheaters	—	up to 70	above 70

[1]Noise mitigation to reduce interior noise levels pursuant to Policy EC-1.1 is required.

Normally 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.

Conditionally Acceptable:
- Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

Unacceptable:
- New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies.

Source: City of San Jose 2022

The City's General Plan does not include policies that specifically address operational noise generated by residential land uses. However, the City's General Plan does includes policies related to increases in ambient noise levels associated with new development and construction-related activities. Applicable General Plan noise policies include the following (City of San Jose 2022):

- **Policy EC-1.2.** Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Categories 1, 2, 3 and 6) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable;" or
- Cause the DNL at noise sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

- **Policy EC-1.7.** Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would: • Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months. For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

City of San Jose Municipal Code

The City's municipal code includes performance standards for the control of operational noise levels. Within residential zoning districts, the City's Municipal Code, Section 20.30.700, limits noise levels to 55 dBA at the property line (City of San Jose 2023).

Groundborne Vibration

City of San Jose General Plan

The City of San Jose General Plan includes policies to achieve the goal of minimizing vibration impacts on people, residences, and business operations. The following policy is applicable to the proposed project:

- **Policy EC-2.3.** Require new development to minimize continuous vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, including ruins and ancient monuments or building that are documented to be structurally weakened, a continuous vibration limit of 0.08 in/sec PPV (peak particle velocity) will be used to minimize the potential for cosmetic damage to a building. A continuous vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to: excavation equipment; static compaction equipment; vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of cosmetic damage to sensitive buildings from the new development during demolition and construction.

IMPACTS AND MITIGATION MEASURES

Significance Criteria

Criteria for determining the significance of noise impacts were developed based on information contained in the California Environmental Quality Act Guidelines (CEQA Guidelines, Appendix G). According to the guidelines, a project may have a significant effect on the environment if it would result in the following conditions:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b) Generation of excessive groundborne vibration or groundborne noise levels.

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

Short-Term Construction Noise Impacts

The City has not adopted noise standards that apply to short-term construction activities. However, based on screening noise criteria commonly recommended by federal agencies, construction activities would generally be considered to have a potentially significant impact if average daytime noise levels would exceed 90 dBA L_{eq} when averaged over a 1-hour period ($L_{eq}^{(1)}$), or 80 dBA L_{eq} when averaged over an 8-hour period ($L_{eq}^{(8)}$) (FTA 2018). Because some activities may not occur over a full 8-hour day and to be conservative, construction-generated noise levels would be considered to have a potentially significant impact if predicted noise levels at noise-sensitive land uses would exceed 80 dBA L_{eq} when averaged over a 1-hour period.

Long-Term Operational Noise Impacts

The *CEQA Guidelines* do not define the levels at which increases in ambient noise would be considered "substantial." As discussed previously in this section, a noise level increase of 3 dBA is barely perceptible to most people, a 5 dBA increase is readily noticeable, and a difference of 10 dBA would be perceived as a doubling of loudness. For purposes of this analysis, a substantial increase in ambient noise levels would be defined as an increase of 3 dBA, or greater. Substantial increases in ambient noise levels that would exceed applicable noise standards for existing land uses would be considered to have a potentially significant impact.

The compatibility of the future planned land uses were evaluated based on predicted future on-site noise conditions and in comparison to the City's noise compatibility standards (refer to Table 3). Proposed residential land uses would be considered acceptable within exterior noise environments of 60 dBA L_{dn}/CNEL, or less; conditionally acceptable between 60 L_{dn}/CNEL and 75 L_{dn}/CNEL; and normally unacceptable at exterior levels exceeding 75 L_{dn}/CNEL.

Exposure to non-transportation noise sources would be considered potentially significant if noise levels would exceed the City's noise exposure standards for non-transportation noise sources of 55 dBA L_{eq} at the property line.

Groundborne Vibration Impacts

Groundborne vibration levels would be considered potentially significant if predicted short-term construction or long-term operational groundborne vibration levels attributable to the proposed project would exceed the City of San Jose's groundborne vibration criteria at nearby structures. No historic, fragile, or older residential structures were identified in the project area. For purposes of this analysis, groundborne vibration levels would be considered to have a potentially significant impact if predicted levels would exceed 0.2 in/sec ppv. This level represents the level at which vibration could result in minor structural damage to nearby buildings; as well as, increased levels of annoyance to individuals located at nearby properties.

Methodology

Short-Term Construction Noise

Short-term noise impacts associated with construction activities were analyzed based on typical construction equipment noise levels derived from the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* and the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual*. Typical equipment use for various phases of construction were based on default assumptions identified in the *California Emissions Estimator Model* (CAPCOA 2022) for representative development projects. Predicted average-hourly construction noise levels (in dBA L_{eq}) were calculated assuming the two loudest pieces of construction equipment operating simultaneously at 50 feet from source center (FTA 2018). Noise levels at nearby residential land uses were predicted based on an average noise-attenuation rate of 6 dB per doubling of distance from the source.

Long-term Operational Noise

Based on the noise measurement surveys conducted, noise at the project site is predominantly influenced by vehicle traffic on Lincoln Avenue and Pine Avenue. Traffic noise levels for Lincoln Avenue and Pine Avenue were calculated using the Federal Highway Administration (FHWA) roadway noise prediction model (FHWA-RD-77-108) based on California vehicle reference noise levels. Modeling was conducted for both with and without project, based on traffic data obtained from the *City of San Jose (San Jose 2023)*.

The noise model was compared to measurement data obtained at the project site to ensure accuracy. The project's contribution to traffic noise levels along area roadways was assessed by comparing the estimated increases in vehicle traffic to vehicle traffic on adjacent roadways. As noted earlier in this report, a doubling of vehicle traffic would be required before a noticeable increase (i.e., 3 dBA, or greater) would be expected to occur. Project-generated vehicle traffic was derived from the Institute of Engineers trip generation rates for similar land uses (ITE 1997).

Impact Discussions and Mitigation Measures

IMPACT A.	**Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.**

Long-Term Exposure to Traffic Noise

Increases in Traffic Noise Levels

Implementation of the proposed project would result in increased traffic volumes on area roadways. The increase in traffic volumes resulting from implementation of the proposed project would, therefore, contribute to increases in traffic noise levels.

Based on vehicle trip-generation rates derived from the Institute of Engineers for similar land uses, the proposed project would result a total of approximately 71 vehicle trips per day (ITE 1997). Based on traffic data derived from the City of San Jose Traffic Volumes Map, existing vehicle traffic on nearby segments of Lincoln Avenue and Pine Avenue typically average several thousands of vehicles/day. Existing traffic volumes average approximately 15,301 to 15,981 vehicles/day on nearby segments of Lincoln Avenue and approximately 5,360 to 9,740 vehicles/day along nearby segments of Pine Avenue (City of San Jose 2023).

Predicted traffic noise levels, with and without the implementation of the proposed project, are summarized in Table 4. In comparison to existing traffic noise levels, the proposed project would result in a predicted increase in traffic noise levels of 0.01 to 0.05 dBA along nearby roadways.

Typically, a doubling of vehicle traffic would be required before a noticeable increase (i.e., 3 dBA, or greater) would occur. In comparison to existing conditions, implementation of the proposed project would not result in a doubling of vehicle traffic along nearby roadways. In addition, assuming an average of 71 vehicle trips/day, predicted traffic noise levels along the east boundary of the proposed site would be approximately 64.6 dBA CNEL at 50 feet from the centerline, or less.

Table 4. Predicted Increase in Traffic Noise Levels

Roadway Segment	Predicted Noise Level at 50 feet from Centerline of Near Travel Lane (dBA CNEL/L_{dn})[1]			Substantial Increase?[3]
	Without Project	With Project	Difference[2]	
Lincoln Ave, (North of Pine Ave)	64.54	64.56	0.02	No
Lincoln Ave, (South of Pine Ave)	64.73	64.74	0.01	No
Pine Ave, (West of Lincoln Ave)	60.03	60.06	0.03	No
Pine Ave, (East of Lincoln Ave)	57.44	57.49	0.05	No

Ave=Avenue
1. Traffic noise levels were calculated using FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108).
2. Difference in noise levels reflect the incremental increase attributable to the proposed project.
3. A substantial increase in noise levels is an increase of 3 dB or greater.

Based on the above information, the proposed project would not result in noticeable increases in vehicle traffic noise levels along area roadways. The increase in predicted traffic noise associated with the project would increase by less than 3 dBA, which the city considers to be significant noise impact. As a result, this impact would be considered ***less than significant***.

Compatibility of Proposed Land Uses with Traffic Noise Levels

In accordance with the City's noise standards for determination of land use compatibility (refer to Table 3), proposed residential land uses would be considered acceptable within exterior noise environments of 60 dBA L_{dn}/CNEL, or less; conditionally acceptable between 60 L_{dn}/CNEL and 75 L_{dn}/CNEL, provided noise-reduction measures have been incorporated and interior noise levels would not exceed 45 dBA L_{dn}/CNEL; and normally unacceptable at exterior levels exceeding 75 L_{dn}/CNEL.

Table 5. Predicted Existing Traffic Noise Level

Roadway Segment	Noise Level (dBA CNEL)				
	at 50 Feet from Near-Travel-Lane Centerline	Distance (Feet) to CNEL/L_{dn} Contours From Roadway Centerline			
		70	65	60	55
Lincoln Ave, (North of Pine Ave)	64.5	WR	69.5	142.4	303.4
Lincoln Ave, (South of Pine Ave)	64.7	WR	71.3	146.5	312.2
Pine Ave, (West of Lincoln Ave)	60.0	WR	WR	62.3	123.1
Pine Ave, (East of Lincoln Ave)	57.4	WR	WR	WR	89.2

Traffic noise levels were calculated using the FHWA roadway noise prediction model based on traffic data obtained from the traffic analysis prepared for this project. WR = Within Road Right-of-Way

Ambient noise levels at the project site are primarily influenced by vehicle traffic on Lincoln Avenue, which extends in a general north-to-south direction along the eastern boundary of the project site. Based on the traffic noise modeling conducted, the predicted 65 and 60 dBA CNEL noise contours for Lincoln Avenue would extend to approximately 69.5 feet and 142.4 feet from the centerline of the roadway. Based on these levels, predicted exterior traffic noise levels at the building façade of the nearest proposed residence located along the eastern-most portions of the project site would be 63 dBA CNEL. Future traffic volumes could not be obtained, so to ensure compatibility for future years this analysis conservatively assumes a potential increase of local vehicle traffic of 50 percent. A 50 percent increase in traffic volumes would equate to an increase in exterior noise levels of 1.5 dBA. Based on an existing predicted traffic noise level of 63 dBA CNEL, the predicted future year noise level at the exterior of the nearest proposed residence would be 64.5 dBA CNEL. Based on this predicted exterior noise level and assuming an average exterior-to-interior noise reduction of 15 dBA with windows partially open, predicted interior noise levels would be approximately 50 dBA CNEL. Predicted interior noise levels could potentially exceed the City's interior noise standard of 45 dBA CNEL.

Based on the proposed site design, the outdoor activity areas of the proposed residences would be largely shielded from direct line-of-sight of Lincoln Avenue. Predicted exterior noise levels within outdoor activity areas would be approximately 60 dBA CNEL, or less, which would not exceed the City's exterior noise standard of 60 dBA CNEL.

Because predicted interior noise levels at the nearest residence would exceed the City's interior noise standard of 45 dBA CNEL, this impact would be considered ***potentially significant***.

Mitigation Measures

Noise-1: The proposed residences shall include air circulation systems sufficient to allow windows to remain closed during inclement weather conditions.

Significance After Mitigation

Implementation of Mitigation Measure Noise-1 would require the installation of air circulation systems that would allow occupants of proposed residential dwellings to keep windows closed during inclement weather conditions. With windows closed and compliance with current building standards, average exterior-to-interior noise reductions typically range from approximately 25-30 dBA. Assuming a minimum average exterior-to-interior noise reduction of 25 dBA, predicted interior noise levels at the nearest proposed residential uses would be approximately 39.5 dBA CNEL, or less, and would not exceed the City's interior noise threshold of 45 dBA CNEL. With mitigation this impact would be considered ***less than significant***.

Long-Term Exposure to Non-Transportation Noise

Non-transportation noise sources commonly associated with residential development include landscape maintenance equipment, voices, and exterior air conditioning equipment. Noise generated by landscape maintenance equipment and occasional voices would result in only minor intermittent increases in ambient noise levels, primarily during the day and evening hours and less frequently at night. Noise levels associated with these activities would be similar to those associated with the existing land use. For these reasons, noise associated with landscape maintenance and voices would have a negligible impact on increases in on-site noise levels and were not analyzed further in this report. Non-transportation noise sources having a potential to result in increases in ambient noise levels, in comparison to existing conditions, would be predominantly associated the outdoor air conditioning equipment. Noise levels typically associated with air conditioners and associated impacts are discussed as follows:

Air Conditioning Units

Proposed structures would be anticipated to include the use of building mechanical equipment, such as air conditioning units and exhaust fans. The specific building mechanical equipment to be installed and the locations of such equipment have not yet been identified. Building mechanical equipment (e.g., air conditioning units, exhaust fans) would typically be located within the structures, enclosed, or placed on rooftop areas away from direct public exposure. The closest existing residential building to a potential AC unit placement is approximately 22 feet away. Exterior air conditioning units and exhaust fans for residential land uses can generate noise levels up to approximately. Air conditioning units typically generate noise levels of approximately 60 dBA L_{eq} at 3 feet when operating. Typical operational cycles for residential units occur for periods of approximately 10 minutes in 20 to 30 minute intervals. Based on this noise level and assuming that equipment is exposed and within line-of-sight of nearby land uses, predicted operational noise levels at the nearest existing residence would be approximately, 43 dBA L_{eq}, or less. Actual noise levels after taking into account structural shielding and cycling periods of the air conditioning units would be less. Predicted noise levels associated with building air conditioning units would not exceed what the City considers a significant noise impact. As a result, increased noise levels associated with proposed residential land uses would be ***less than significant***.

Short-Term Exposure to Construction Noise

Construction noise typically occurs intermittently and varies depending upon the nature or phase of construction (e.g., land clearing, grading, excavation, and paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Although noise ranges are generally similar for all construction phases, the initial site preparation phase tends to involve the most heavy-duty equipment having a higher noise-generation potential. Noise levels associated with individual construction equipment are summarized in Table 6.

As depicted in Table 6, maximum noise levels generated by individual pieces of construction equipment typically range from approximately 77 dBA to 90 dBA L_{max} at 50 feet (FTA 2018). Average-hourly noise levels for individual construction equipment generally range from approximately 72 to 81 dBA L_{eq}. Based on these equipment noise levels and assuming the two loudest pieces of equipment operating simultaneously in close proximity, predicted average-hourly noise levels occurring during the loudest phases of construction generally range from approximately 78 to 84 dBA L_{eq} at 50 feet (refer to Table 7). Short-term increases in vehicle traffic, including worker commute trips and haul truck trips may also result in temporary intermittent increases in ambient noise levels at nearby land uses, but would not be anticipated to contribute substantially to overall ambient noise levels.

Table 6. Construction Equipment Noise Levels

Equipment	Noise Level (dBA at 50 feet)	
	L_{max}	L_{eq}
Backhoes	78	74
Bulldozers	82	78
Compressors	78	74
Cranes	81	73
Concrete Pump Truck	81	74
Dump Trucks	77	73
Excavator	81	77
Generator	81	78
Gradall	83	79
Grader	85	81
Hydraulic Break Rams	90	80
Front End Loaders	79	75
Pneumatic Tools	85	82
Pumps	81	78
Rollers	80	73
Scrapers	84	80
Tractor	84	80

Based on measured instantaneous noise levels (L_{max}), average equipment usage rates, and calculated average-hourly (Leq) noise levels derived from the FHWA Road Construction Noise Model (FHWA 2008)

Table 7. Typical Construction Phase Equipment & Noise Levels

Construction Phase	Typical Equipment	Noise Level (dBA L_{eq}) at 50 feet from Source Center
Demolition	Concrete Saws, Excavators, Dozers	81
Site Preparation	Dozers, Tractors, Loaders, Backhoes	83
Grading	Dozers, Tractors, Loaders, Backhoes, Graders, Scrapers, Excavators	84
Building Construction/Architectural Coating	Cranes, Forklifts, Tractors, Loaders, Backhoes, Generators, Welders	83
Paving	Pavers, Rollers, Paving Equipment	78

1. Represents equipment typically associated with community development projects derived from the California Emissions Estimator Model.
2. Based on equipment noise levels identified in Table 6. Assumes the two loudest pieces of equipment operating simultaneously.
Sources: FTA 2018, FHWA 2008, CAPCOA 2016

Depending on the location and types of activities conducted (e.g., demolition, site preparation, grading), predicted noise levels at the nearest residences, which are located adjacent to the southern, western, and northern property lines of the project site, could potentially exceed 80 dBA L_{eq}, particularly when activities occur within approximately 50 feet of these nearest land uses. Furthermore, with regard to residential land uses, activities occurring during the more noise-sensitive evening and nighttime hours could result in increased levels of annoyance and potential sleep disruption. For these reasons, noise-generating construction activities would be considered to have a **potentially significant** short-term noise impact.

<u>Mitigation Measures</u>

Noise-2: The following mitigation measures shall be implemented to reduce exposure to short-term construction noise.

a. Unless otherwise provided for in a validly issued City permit or approval, noise-generating construction activities, including the hauling of materials to and from the project site, shall be limited to the hours of 7:00 a.m. to 7:00 p.m. on weekdays. Noise-generating construction activities shall be prohibited on weekends and holidays.

b. Construction equipment should be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment-engine shrouds should be closed during equipment operation.

c. Equipment shall be turned off when not in use for an excess of five minutes, except for equipment that requires idling to maintain performance.

d. Stationary equipment (e.g., generators, compressors) shall be located at the furthest distance possible from nearby noise-sensitive land use identified in the project area at the time of construction.

e. Temporary construction noise barriers shall be constructed along the southern, western, and northern property lines of the project site. The barriers shall be constructed of plywood (or material of similar density and usage), sound blankets, or a combination of these materials, to a minimum height of 6 feet above ground level with on visible gaps between barrier construction components or at the base of the barrier.

<u>Significance After Mitigation</u>

With the implementation of Mitigation Measure Noise-2, construction activities would be limited to the less noise-sensitive daytime hours. The proper maintenance of construction equipment and use of manufacturer-recommended mufflers and engine shrouds would reduce equipment noise levels by approximately 10 dB. The installation of temporary noise barriers would decrease noise level by approximately 5 dBA. With mitigation and given that noise-generating construction activities would be temporary, sporadic, and of short duration, this impact would be considered **less than significant**.

IMPACT B. Generation of excessive groundborne vibration or groundborne noise levels.

Increases in groundborne vibration levels attributable to the proposed project would be primarily associated with short-term construction-related activities. Construction activities associated with the proposed project would likely require the use of various off-road equipment, such as tractors, concrete mixers, and haul trucks.

Groundborne vibration levels associated with representative construction equipment are summarized in Table 8. Based on the vibration levels presented, ground vibration generated by construction equipment would not exceed approximately 0.09 inches per second ppv at 25 feet. Predicted vibration levels at the nearest offsite structures, which are located as close as 14 feet from onsite construction areas, would be anticipated to experience vibration levels up to 0.189 in/sec ppv. Vibration levels from construction would not exceed the City's threshold of 0.20 in/sec PPV for the buildings of normal conventional construction located adjacent to the project site. As a result, this impact would be considered **less than significant**.

Table 8. Representative Vibration Levels for Construction Equipment

	Peak Particle Velocity (In/Sec)	
Equipment	**at 25 Feet**	**at Nearest Existing Residence**
Large Bulldozers	0.089	0.189
Loaded Trucks	0.076	0.161
Jackhammer	0.035	0.074
Small Bulldozers	0.003	0.006

1. *Based on typical ground vibration levels for construction equipment (FTA 2018, Caltrans 2020).*
2. *Based on an estimated distance of 14 feet from onsite construction activities to the nearest existing structure.*

IMPACT C. For a project located within the vicinity of a private airstrip or 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, would the project expose people residing or working in the project area to excessive noise levels.

The project site is not located within two miles of a public airport or private airstrip. The nearest airports is the Norman Y. Mineta San Jose International Airport, which is located approximately three miles northeast of the project site. The project site is not located within the airport land use planning areas or the existing or projected future year 2037 CNEL contours of this airport (BridgeNet 2019). As a result, the project site is not subject to high levels of aircraft noise. This impact is considered **less than significant**.

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APPENDIX A
Ambient Noise Monitoring Surveys

NOISE MEASUREMENT SURVEY FORM

SHEET 1 OF 2

DATE:	3/1/2023
PROJECT:	Lincoln Ave
LOCATION:	San Jose, CA
MONITORING STAFF:	Trevor Burmester

LOCATION MAP: (Include a map of noise measurement locations AND photographs for measurement locations on attached worksheet. Include additional sheets as necessary. Where possible include GPS coordinates.)

SITE PHOTO(S):

NOISE MEASUREMENT CONDITIONS & EQUIPMENT

MET CONDITIONS & MONITORING EQUIPMENT:	TEMP: 48 - 50 F. | HUMIDITY: 48-50% | WIND SPEED: 1 - 15 MPH | WIND DIR: W - Nw | GROUND: Dry				
	CLOUD COVER BY CLASS (OC=OVERCAST):	3	(1. HEAVY OC, 2. LIGHT OC, 3. SUNNY, 4. CLEAR NIGHT, 5. OC NIGHT)		
	MET. METER:				
NOISE MONITORING EQUIPMENT:	LARSON DAVIS SLM MODEL:	LxT		S/N:	5560
	MICROPHONE:			S/N:	
	CALIBRATOR:	CAL200		S/N:	2744
NOISE MONITORING SETUP:	WITHIN 10 FT OF REFLECTIVE SURFACE?:	NO	MICROPHONE HEIGHT AGL (FT):		5
	CALIBRATED PRIOR TO AND UPON COMPLETION OF MEASUREMENTS:	YES	METER SETTINGS:	A-WHT	SLOW

NOISE & TRAFFIC MEASUREMENTS

MEASUREMENT LOCATION	MEASUREMENT DATE/TIME	DURATION (Minutes)	MEASUREMENT LOCATION	PRIMARY NOISE SOURCES NOTED	MEASURED NOISE LEVELS LEQ	MEASURED NOISE LEVELS Lmax
ST1	3/1/2023 12:46	10	SW corner off Lincoln Ave/ Dean Ave	Traffic, birds, distant leaf blower	67.3	76.8
ST2	3/1/2023 13:00	10	In front of 1136 Dean Ave	Traffic, birds, distant leaf blower	49.6	55.4
ST3	3/1/2023 13:11	10	SW corner off Lincoln Ave/ Georgia Kate Pl	Traffic, dog barking	67.1	75.8
ST4	3/1/2023 13:21	10	NW corner of Lincoln Ave/ Pine Ave	Traffic, car sound system	68.5	84.9

TRAFFIC COUNTS LOCATION	TRAFFIC COUNTS DATE/TIME	DURATION (Minutes)	TRAFFIC DIRECTION/ LANE ASSIGNMENT	VEHICLE CLASSIFICATION LDV	MDV	HDV	BUS	AVG. VEHICLE SPEEDS

VEHICLE COUNTS: ☐ MANUALLY ☐ VIDEO

VEHICLE SPEEDS: ☐ IN TRAFFIC ☐ RADAR

NOISE MEASUREMENT SURVEY FORM

	SHEET	2	**OF**	2
DATE:	3/1/2023			
PROJECT:	Lincoln Ave			
LOCATION:	San Jose, CA			
MONITORING STAFF:	Trevor Burmester			

SITE PHOTO(S): (Refer to data sheets for noise measurement locations)

MEASUREMENT LOCATION 1

MEASUREMENT LOCATION 2

MEASUREMENT LOCATION 3

MEASUREMENT LOCATION 4

MEASUREMENT LOCATION 5

MEASUREMENT LOCATION 6

APPENDIX B
Noise Modeling & Supportive Documentation

AVERAGE-DAILY VEHICLE TRIP GENERATION

NUMBER OF SINGLE-FAMILY DWELLING UNITS:	5
NUMBER OF ACCESSORY DWELLING UNITS:	4

AVERAGE VEHICLE TRIP-GENERATION RATES

SINGLE-FAMILY DWELLING UNIT	9.52
CONDO/TOWNHOUSE (ACCESSORY DWELLING UNIT)	5.81

DAILY TRIP-GENERATION:

SINGLE-FAMILY DWELLING UNIT	47.6
CONDO/TOWNHOUSE (ACCESSORY DWELLING UNIT)	23.24
TOTAL	71

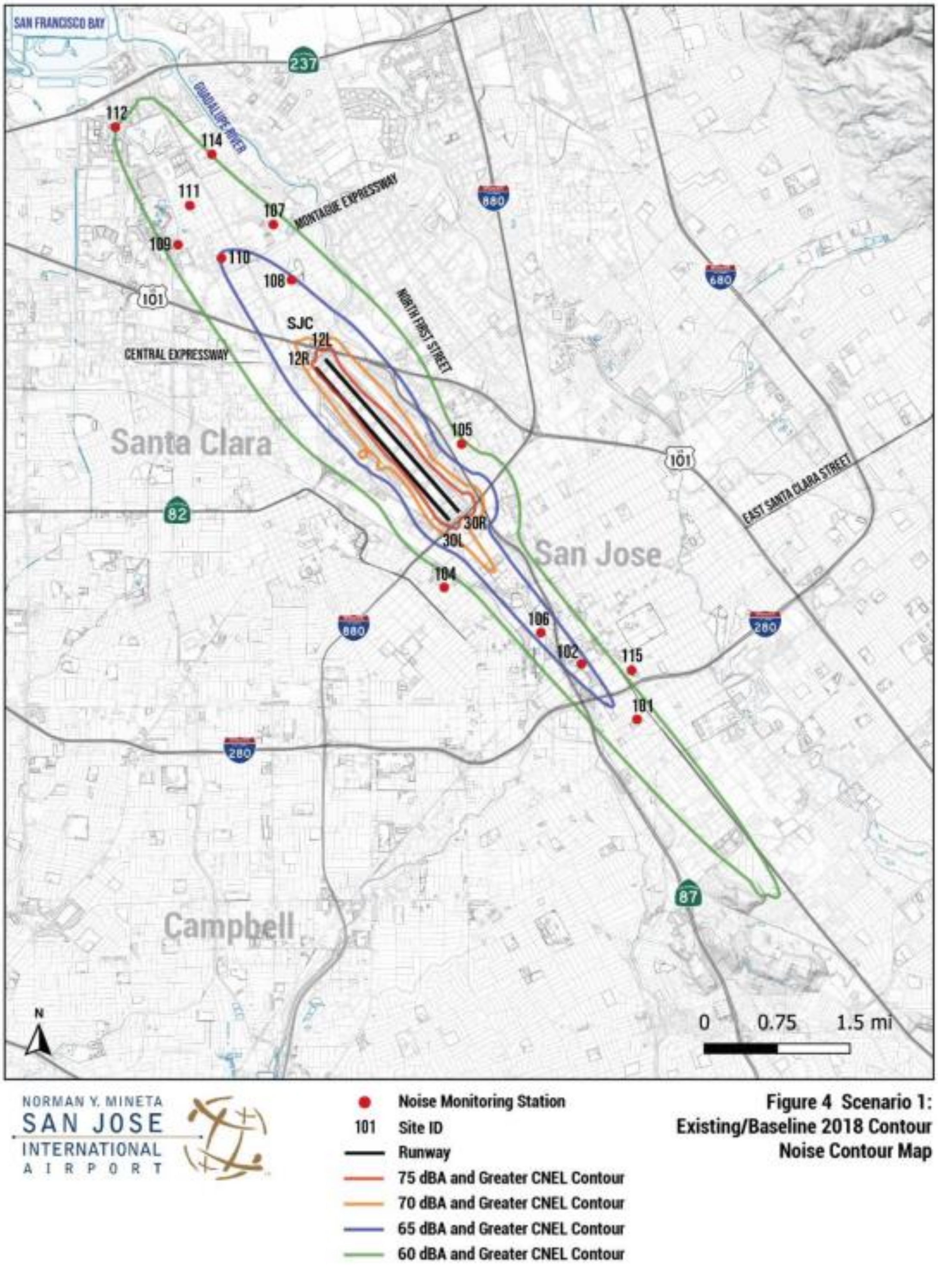
Institute of Transportation Engineers Trip Generation Manual, 9th Edition

Based on the ITE Trip Generation Manual (Institute of Transportation Engineers Trip Generation Manual, 9th Edition), the number of average daily trips for a condo/townhouse is 5.81 and 9.52 for a single family dwelling. Based on these rates, estimated average daily trips would total approximately 71 trips/day.

Predicted Traffic Noise Levels

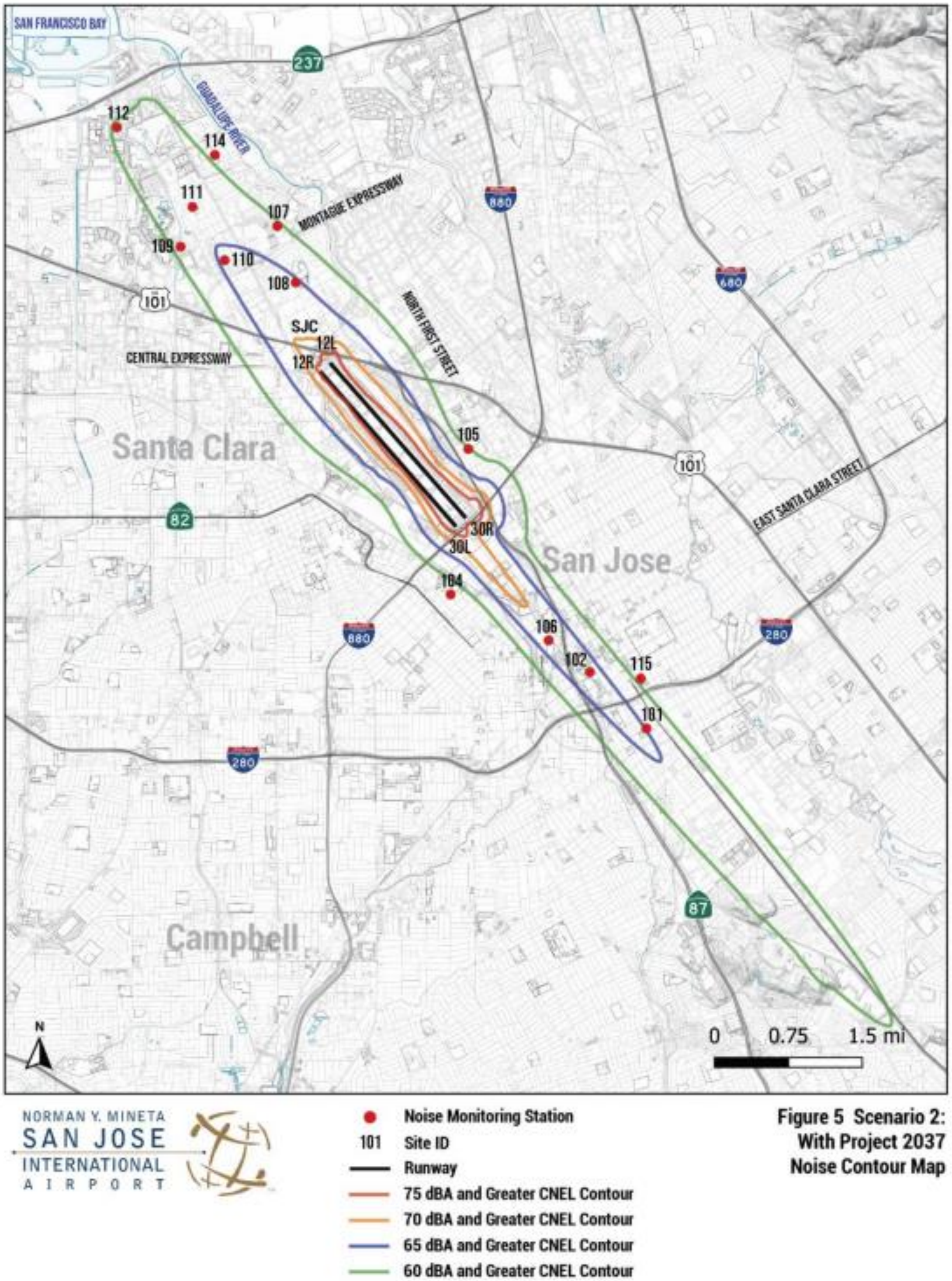
Roadway Segment	Speed	Predicted Noise Level at 50 feet from Centerline of Near Travel Lane (dBA CNEL/L_{dn})[1] Without Project	With Project
Lincoln Ave, (North of Pine Ave)	35	64.54	64.56
Lincoln Ave, (South of Pine Ave)	35	64.73	64.74
Pine Ave, (West of Lincoln Ave)	25	60.03	60.06
Pine Ave, (East of Lincoln Ave)	25	57.44	57.49

PROJECTED SAN JOSE INTERNATIONAL AIRPORT NOISE CONTOURS – EXISTING/BASELINE YEAR 2018



Source: BridgeNet International. October 2019. Norman Y. Mineta San Jose International Airport Noise Assessment for the Master Plan Environmental Impact Report.

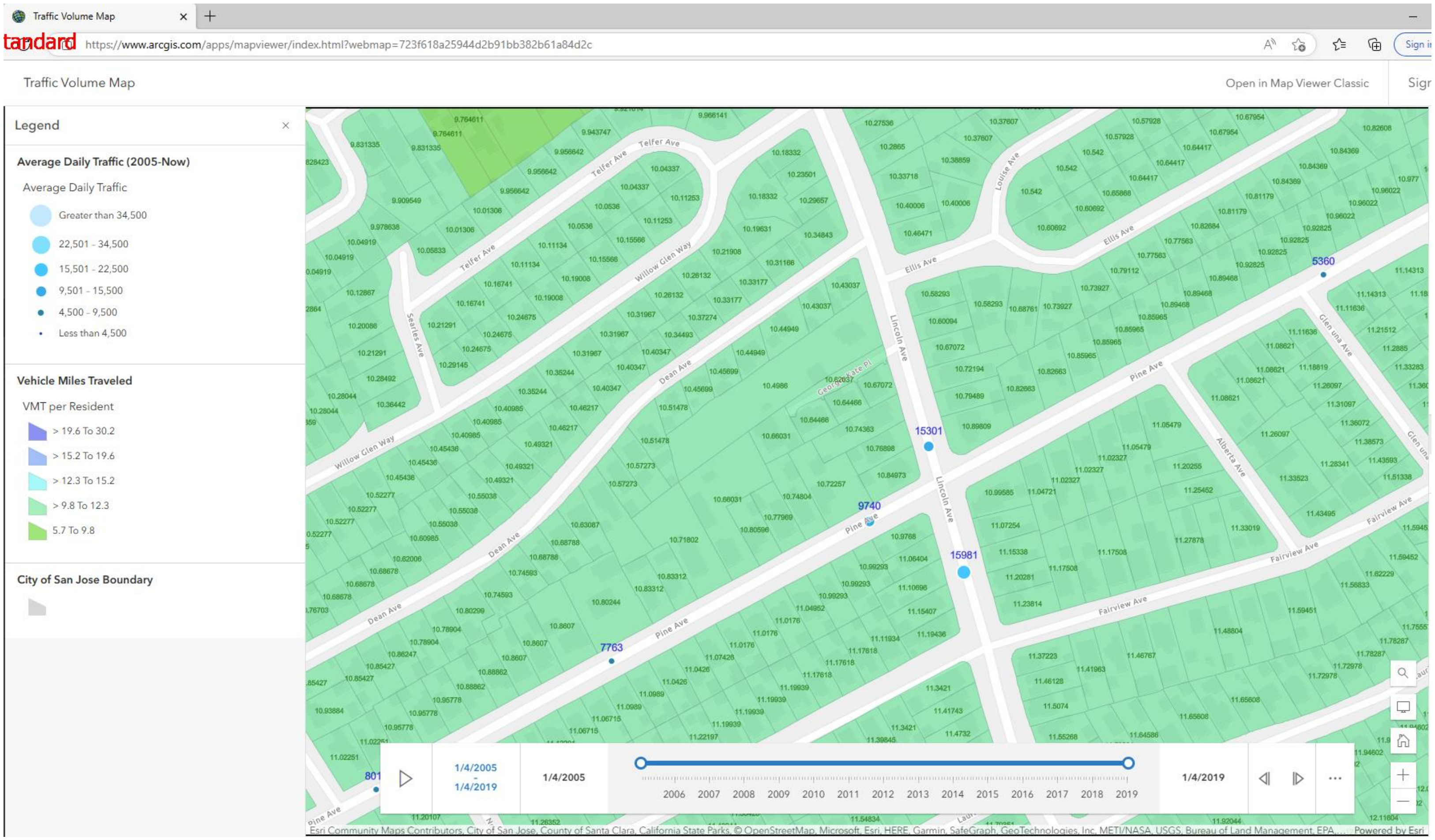
PROJECTED SAN JOSE INTERNATIONAL AIRPORT NOISE CONTOURS – FUTURE YEAR 2037



Source: BridgeNet International. October 2019. Norman Y. Mineta San Jose International Airport Noise Assessment for the Master Plan Environmental Impact Report.

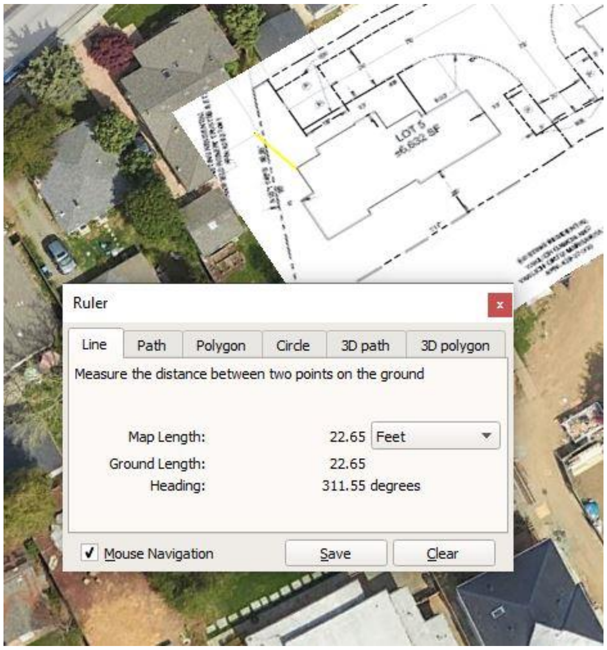
EXISTING AVERAGE-DAILY TRAFFIC VOLUMES

LINCOLN AVENUE, NORTH OF PINE AVENUE: 15,301
LINCOLN AVENUE, SOUTH OF PINE AVENUE: 15,981
PINE AVENUE, WEST OF LINCOLN AVENUE: 9,740
PINE AVENUE, EAST OF LINCOLN AVENUE: 5,360



Source: City of San Jose Traffic Volume Map. Website url: https://www.arcgis.com/home/item.html?id=723f618a25944d2b91bb382b61a84d2c

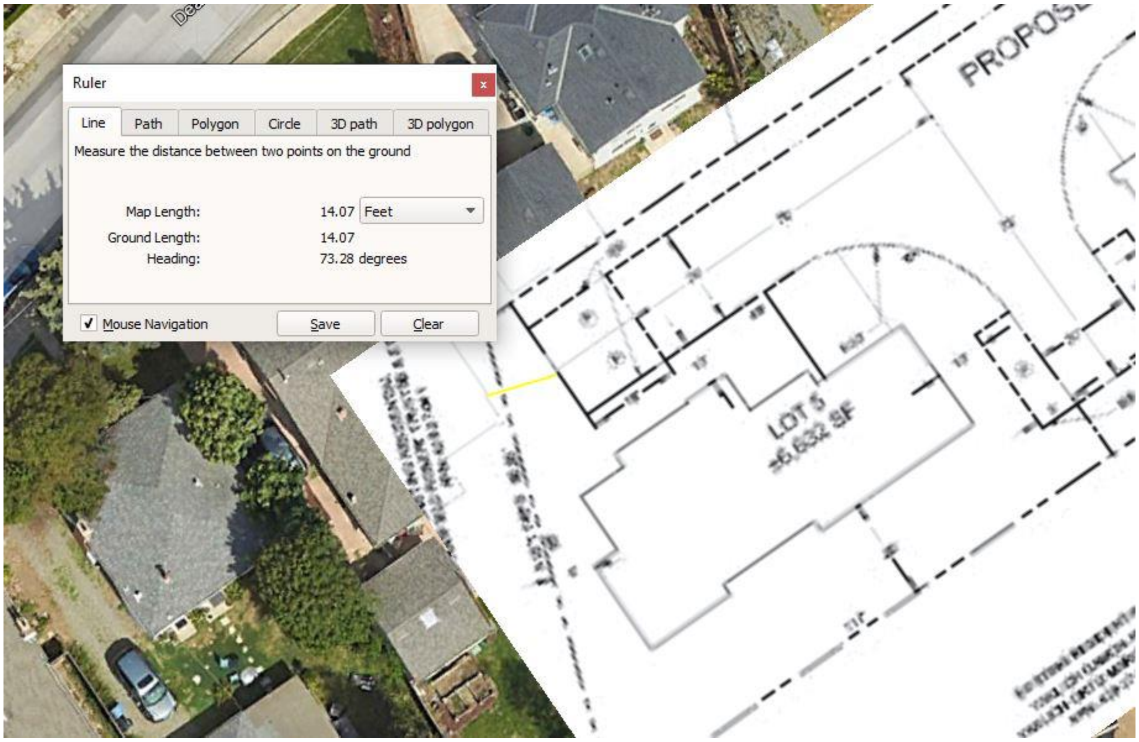
Distance from potential AC unit to nearest residence.



AC Unit noise level at nearest residence.

NOISE PREDICTION CALCULATION				
Distance from Source Center (feet)	(dB)			
3	60	Reference Distance and Noise Level (All Sources)		
	(dB)	Shielding	(dB)	Receiver Description
22	43	0	43	Nearest Residence to Potential HVAC
30	40	0	40	

Distance from potential construction to nearest residence.



Construction vibration level at nearest residence.

REFERENCE VIBRATION LEVELS	
PILE DRIVER-IMPACT	PPV IN/SEC AT 25 FT
UPPER RANGE	1.518
TYPICAL	0.644
PILE DRIVER-SONIC	
UPPER RANGE	0.734
TYPICAL	0.17
CLAM SHOVEL DROP (SLURRY WALL)	0.202
HYDROMILL (SLURRY WALL)	
IN SOIL	0.008
IN ROCK	0.017
HOE RAM	0.089
LARGE BULLDOZER	0.089
CAISSON DRILLING	0.089
LOADED TRUCKS	0.076
JACKHAMMER	0.035
SMALL BULLDOZER	0.003

SOURCE:	Bulldozer
REFERENCE LEVEL:	0.089
ATTENUATION RATE*:	1.3
DISTANCE	14
PREDICTED GROUND-BORNE VIBRATION LEVEL:	0.189
SOURCE:	Loaded Truck
REFERENCE LEVEL:	0.076
ATTENUATION RATE*:	1.3
DISTANCE	14
PREDICTED GROUND-BORNE VIBRATION LEVEL:	0.161
SOURCE:	Jackhammer
REFERENCE LEVEL:	0.035
ATTENUATION RATE*:	1.3
DISTANCE	14
PREDICTED GROUND-BORNE VIBRATION LEVEL:	0.074
SOURCE:	Small Bulldozer
REFERENCE LEVEL:	0.003
ATTENUATION RATE*:	1.3
DISTANCE	14
PREDICTED GROUND-BORNE VIBRATION LEVEL:	0.006

*USE 1.1 FOR MORE CONSERVATIVE ANALYSIS WHEN SOIL CONDITIONS ARE

Caltrans 2020