Appendix H
Noise Technical Report

1111 South Hill Street Project
Draft Noise Technical Report

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Contents

Tables

Figures

Acronyms and Abbreviations

µPa	microPascal
ADT	average daily traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Los Angeles
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
EIR	Environmental Impact Report
EV	electric vehicle
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air-conditioning
Hz	Hertz
I-	Interstate
in/s	inches per second
kHz	kilohertz
LAMC	City of Los Angeles Municipal Code
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
L_{V}	vibration velocity level
L_{xx}	percentile-exceeded sound level
PDF	project design feature
PPV	instantaneous maximum peak levels
PPV	peak particle velocity
project	1111 South Hill Street Project
rms	root-mean-square
sf	square feet
SPL	sound pressure level
TA	Transportation Assessment

Chapter 1
Introduction

The purpose of this Noise Technical Report is to analyze potential noise or vibration impacts that would result from the proposed 1111 South Hill Street Project (project) in the Central City Community Plan area within the City of Los Angeles (City). The analysis provided in this report evaluates the potential for short- and long-term noise and vibration impacts associated with the construction and operation of the project. The analysis includes a description of the environmental setting for the project, including existing noise conditions, as well as applicable laws and regulations. It also documents the assumptions, methodologies, and findings used to evaluate the impacts. Further, this report discusses the project's contribution to potential cumulative noise impacts, and details project design features implemented as part of the project.

1.1 Project Description

The project consists of the development of a 40-story mixed-use building on an approximately 0.63-acre site that is located in an urban setting of varied development. Properties surrounding the project Site are developed with commercial, institutional, residential, and industrial buildings, as well as surface parking lots. To the north of the project site, across West 11th Street, are two one-story commercial buildings (Patio Restaurant and Blue Moon Hookah Lounge) and a surface parking lot. Bordering the project site to the southwest is a surface parking lot and a one-story commercial building (Bank of America); farther to the southwest on the same block is a 12-story office building (Eleven49) adjacent to a 32-story office building (USC Tower). Across South Hill Street to the southeast is a recently constructed seven-story mixed-use building (Axis Apartments) and historic restoration of the Herald Examiner Building to be a mixed-used property for Arizona State University's satellite School of Journalism, creative office suites, retail shops and restaurants, and a 10-story Public Works office building. An alley abuts the project site to the northwest, across from which is a surface parking lot. The project site is currently developed with a two-story warehouse building that has a total area of 81,993 square feet (sf) and has been vacant since approximately 2013, when the building was last occupied by warehouse uses.

The project proposes to remove the existing warehouse and construct a 40-story mixed-use building. The building would include one level of subterranean parking, one level of ground floor commercial uses, three levels of aboveground parking, and 36 stories of residential and Transient Oriented Residential Structure (TORS) uses. The project would provide up to 319 multi-family residential units, 160 rooms designated as TORS units[1], and up to 3,429 sf of ground floor commercial uses. It is anticipated that the residential unit count would comprise 24 studio units, 144 one-bedroom units, 127 two-bedroom units, 20 three-bedroom units, and four penthouse units. Residential units will be located in levels 14 through 38 with the TORS

[1] Per LAMC Section 12.03 a Transient Occupancy Residential Structure (TORS) is, "A residential building designed or used for one or more dwelling units or a combination of three or more dwelling units and not more than five guest rooms or suites of rooms wherein occupancy, by any person by reason of concession, permit, right of access, license, or other agreement is for a period of 30 consecutive days or less, counting portions of calendar days as full days." The 160 TORS units, will be operated as a commercial hotel as further described and delineated herein. Specifically, the TORS units will operate as extended-stay units with kitchens, operating as a commercial hotel. Because the units include kitchens, according to the LAMC they are considered dwelling units.

levels located on levels six through 13. The ground floor commercial uses would consist of restaurant uses. The project would provide up to 436 vehicle parking spaces, including 325 residential parking spaces and 111 TORS parking spaces. The project would provide parking within three stories of above grade automated parking with stackers and overhead lifts with valet in one subterranean level. The project would provide 131 Electric Vehicle Ready Parking Spaces including 44 Electric Vehicle Charging Stations. In addition, the project would provide bike parking pursuant to the City of Los Angeles Municipal Code (LAMC), including up to 347 bicycle parking spaces (up to 56 short-term and 291 long-term) within the one level of subterranean parking, the ground level, and the second level of above grade parking. On levels five and 40, outdoor amenities would include a pool and spa, lounge deck, garden, children's play area, a rooftop garden, viewing and lounge decks, and landscaping, for a total of 20,555 sf. Overall, the proposed high-rise building would comprise up to 491,977 sf of floor area and would reach a maximum height of 520 feet above ground level when accounting for rooftop structures.

Energy-saving features and sustainable design would be incorporated throughout the project. The project would be designed to meet the requirements of the Los Angeles Green Building Code, which incorporates the Cal Green and Title 24 Building Standards Code (CALGreen Code). In so doing the project would include features to enhance sustainability, including energy efficiency, water efficiency, material conservation, and resource efficiency. Energy conservation would be achieved through the use of Energy Star appliances and energy efficient heating, ventilation, and air-conditioning (HVAC) and lighting and plumbing systems, while water conservation would be achieved through the use of low flow plumbing fixtures, high efficiency irrigation systems and indoor appliances, and native/drought resistant landscaping. As discussed previously, the project would provide 131 Electric Vehicle Ready Parking Spaces including 44 Electric Vehicle Charging Stations. This equates to approximately 30 percent of the project's parking capacity being prewired for electric vehicle (EV) charging, of which 10 percent will be installed with chargers for immediate use by EVs. The project would also include designated parking for fuel-efficient, ride sharing, and alternative fuel vehicles. Furthermore, the project will provide trash collection that facilitates the separation of organic, recyclable, and non-recyclable trash streams and will divert at least 65 percent of all construction and demolition waste from landfills.

Chapter 2
Noise Fundamentals

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

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receptor, and the propagation path between the two. The loudness of the noise source and the obstructions or atmospheric factors, which affect the propagation path to the receptor, determine the sound level and the characteristics of the noise perceived by the receptor.

The following sections provide an explanation of key concepts and acoustical terms used in the analysis of environmental and community noise.

2.1 Frequency, Amplitude, and Decibels

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

The amplitude of pressure waves generated by a sound source correlates with the loudness of that source. The amplitude of a sound is typically described in terms of *sound pressure level* (SPL), also referred to simply as the sound level. The SPL refers to the root-mean-square (rms)[2] pressure of a sound wave and is measured in units called microPascals (μPa). One μPa is approximately one hundred-billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to over 100,000,000 μPa. Because of this large range of values, sound is rarely expressed in terms of μPa. Instead, a logarithmic scale is used to describe the SPL in terms of decibels, abbreviated dB. The decibel is a logarithmic unit that describes the ratio of the actual sound pressure to a reference pressure (20 μPa is the standard reference pressure level for acoustical measurements in air). Specifically, an SPL, in decibels, is calculated as follows:

$$SPL = 20 \times \log_{10}\left(\frac{X}{20\mu Pa}\right)$$

where *X* is the actual sound pressure and 20 μPa is the reference pressure. The threshold of hearing for young people is about 0 dB, which corresponds to 20 μPa.

[2] Root-mean-square (rms) is defined as the square root of the mean (average) value of the squared amplitude of the noise signal.

2.1.1 Decibel Calculations

Because decibels represent noise levels using a logarithmic scale, SPLs cannot be added, subtracted, or averaged through ordinary arithmetic. On the dB 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, their combined sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one bulldozer produces an SPL of 80 dB, two bulldozers would not produce a combined sound level of 160 dB. Rather, they would combine to produce 83 dB. The cumulative sound level of any number of sources, such as excavators, can be determined using decibel addition. The same decibel addition is used for A-weighted decibels described below.

Similarly, the arithmetic mean (average) of a series of noise levels does not accurately represent the overall average noise level. Instead, the values must be averaged using a linear scale before converting the result back into a logarithmic (dB) noise level. This method is typically referred to as calculating the "energy average" of the noise levels.

2.1.2 A-Weighting

The dB 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 characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000 to 8,000 Hz and perceive sounds within that range better than sounds of the same amplitude at higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted (i.e., adjusted), depending on human sensitivity to those frequencies. The resulting SPL is expressed in A-weighted decibels, or dBA.

The A-weighting scale approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments regarding the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted sound levels of those sounds. Table 2-1 describes typical A-weighted sound levels for various noise sources.

Table 2-1. Typical A-Weighted Sound Levels

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

Source: Caltrans 2013a.

2.2 Noise Descriptors

Because sound levels can vary markedly over a short period of time, various descriptors or noise "metrics" have been developed to quantify environmental and community noise. These metrics generally describe either the average character of the noise or the statistical behavior of the variations in the noise level. Some of the most common metrics used to describe environmental noise, including those metrics used in this report, are described below.

- **Equivalent Sound Level (L_{eq})** is the most common metric used to describe short-term average noise levels. Many noise sources produce levels that fluctuate over time; examples include mechanical equipment that cycles on and off, or construction work, which can vary sporadically. The L_{eq} describes the average acoustical energy content of noise for an identified period of time, commonly 1 hour. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustical energy over the duration of the exposure. For many noise sources, the L_{eq} will vary, depending on the time of day. A prime example is traffic noise, which rises and falls, depending on the amount of traffic on a given street or freeway.

- **Maximum Sound Level (L_{max})** and **Minimum Sound Level (L_{min})** refer to the maximum and minimum sound levels, respectively, that occur during the noise measurement period. More specifically, they describe the rms sound levels that correspond to the loudest and quietest 1-second intervals that occur during the measurement.[3]
- **Percentile-Exceeded Sound Level (L_{xx})** describes the sound level exceeded for a given percentage of a specified period. For example, the L_{50} is the sound level exceeded 50 percent of the time (such as 30 minutes per hour), and L_{25} is the sound level exceeded 25 percent of the time (such as 15 minutes per hour).
- **Community Noise Equivalent Level (CNEL)** is a measure of the 24-hour average A-weighted noise level that is also time-weighted to "penalize" noise that occurs during the evening and nighttime hours when noise is generally recognized to be more disturbing (because people are trying to rest, relax, and sleep during these times). In order to account for this in calculating the CNEL, 5 dBA is added to the L_{eq} during the evening hours of 7 p.m. to 10 p.m.; 10 dBA is added to the L_{eq} during the nighttime hours of 10 p.m. to 7 a.m.; and the energy average is then taken for the whole 24-hour day.
- **Day-Night Sound Level (L_{dn})** is similar to the CNEL described above. L_{dn} is also a time-weighted average of the 24-hour A-weighted noise level. The only difference is that no "penalty" is applied to the evening hours of 7 p.m. to 10 p.m. 10 dBA is added to the L_{eq} during the nighttime hours of 10 p.m. to 7 a.m., and the energy average is then taken for the whole 24-hour day.

It is noted that various federal, state, and local agencies have adopted CNEL or L_{dn} as the measure of community noise. While not identical, CNEL and L_{dn} are normally within 1 dBA of each other when measured in typical community environments, and many noise standards/regulations use the two interchangeably.

2.3 Sound Propagation

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise is reduced with distance depends on the following important factors.

- **Geometric Spreading**. Sound from a single source (i.e., a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of approximately 6 dBA for each doubling of distance. Highway noise is not a single stationary point source of sound. The movement of vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a "line" source) rather than from a point. This results in cylindrical spreading rather than the spherical spreading resulting from a point source. The change in sound level (i.e., attenuation or decrease) from a line source is approximately 3 dBA doubling of distance.
- **Ground Absorption**. Usually the noise path between the source and the observer is very close to the ground. The excess noise attenuation from ground absorption occurs due to acoustic energy losses on sound wave reflection. Traditionally, the excess attenuation has also been

[3] One-second intervals correspond to a "slow" time weighting on a sound level meter. For a sound level meter set to a "fast" time weighting, the corresponding interval is 1/8-second.

expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of fewer than 200 feet, prediction results based on this scheme are sufficiently accurate. For acoustically "hard" sites (i.e., sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receptor), no excess ground attenuation is assumed because the sound wave is reflected without energy losses. For acoustically absorptive or "soft" sites (i.e., sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

- **Atmospheric Effects**. Research by the California Department of Transportation (Caltrans) and others has shown that atmospheric conditions can have a major effect on noise levels. Wind has been shown to be the single most important meteorological factor within approximately 500 feet, whereas vertical air temperature gradients are more important over longer distances. Other factors, such as air temperature, humidity, and turbulence, may also have a major effect on sound. Receptors downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas receptors upwind can have lower noise levels. Increased sound levels can also occur because of temperature inversion conditions (i.e., increasing temperature with elevation, with cooler air near the surface) as the warmer air at the higher elevation acts as a cap and causes a reflection of sound that is generated below at the ground level.
- **Shielding by Natural or Human-Made Features**. A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by this shielding depends on the size of the object, proximity to the noise source and receptor, surface weight, solidity, and the frequency content of the noise source. Natural terrain features (such as hills and dense woods) and human-made features (such as buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor with the specific purpose of reducing noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. A higher barrier may provide as much as 20 dB of noise reduction.

2.4 Human Response to Noise

Noise can have a range of effects on people including hearing damage, sleep interference, speech interference, performance interference, physiological responses, and annoyance. Each of these is briefly described below:

- **Hearing Damage.** A person exposed to high noise levels can suffer hearing damage, either gradual or traumatic. Gradual hearing loss occurs with repeated exposure to excessive noise levels and is most commonly associated with occupational noise exposures in heavy industry or other very noisy work environments. Traumatic hearing loss is caused by sudden exposure to an extremely high noise level, such as a gunshot or explosion at very close range. The potential for noise-induced hearing loss is not generally a concern in typical community noise environments. Noise levels in neighborhoods, and even in very noisy airport environments, are not sufficiently loud as to cause hearing loss.

- **Sleep Interference.** Exposure to excessive noise levels at night has been shown to cause sleep disturbance. Sleep disturbance refers not only to awakening from sleep, but also to effects on the quality of sleep, such as altering the pattern and stages of sleep. Interior noise levels between 50 and 55 dBA L_{max} during nighttime hours (10 p.m. to 7 a.m.) were found to result in sleep disturbance and annoyance (Nelson 1987).
- **Speech Interference.** Speech interference can be a problem in any situation where clear communication is desired, but is often of particular concern in learning environments (such as schools) or situations where poor communication could jeopardize safety. Normal conversational speech is in the range of 60 to 65 dBA and any noise in this range or louder may interfere with speech. As background noise levels rise, the intelligibility of speech decreases and the listener will fail to recognize an increasing percentage of the words spoken. A speaker may raise his or her voice in an attempt to compensate for higher background noise levels, but this in turn can lead to vocal fatigue for the speaker.
- **Performance Interference.** Excessive noise has been found to have various detrimental effects on human performance, including information processing, concentration, accuracy, reaction times, and academic performance. Intrusive noise from individual events can also cause distraction. These effects are of obvious concern for learning and work environments.
- **Physiological Responses.** Noise has been shown to cause measurable physiological responses in humans, including changes in stress hormone levels, pulse rate, and blood pressure. The extent to which these responses cause harm or are signs of harm is not clearly defined, but they could contribute to stress-related diseases, such as hypertension, anxiety, and heart disease.
- **Annoyance.** The subjective effects of annoyance, nuisance, and dissatisfaction are possibly the most difficult to quantify, and no completely satisfactory method exists to measure these effects. This difficulty arises primarily from differences in individual sensitivity and habituation to sound, which can vary widely from person to person. What one person considers tolerable can be unbearable to another of equal hearing acuity. An important tool in estimating the likelihood of annoyance due to a new sound is by comparing it to the existing baseline or “ambient” environment to which that person has adapted. In general, the more the level or tonal (frequency) variations of a sound exceed the previously existing ambient sound level or tonal quality, the less acceptable the new sound will be.

In most cases, effects from sounds typically found in the natural environment would be limited to annoyance or interference. Physiological effects and hearing loss would be more commonly associated with human-made noise, such as in an industrial or occupational setting.

Studies have shown that under controlled conditions in an acoustics laboratory, a healthy human ear is able to discern changes in sound levels of 1 dBA. In the normal environment, the healthy human ear can detect changes of about 2 dBA. However, it is widely accepted that a doubling of sound energy, which results in a change of 3 dBA in a normal environment, is considered to be barely perceptible to most people. A change of 5 dBA is readily perceptible, and a change of 10 dBA is perceived as being twice as loud. Accordingly, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) resulting in a 3 dBA increase in sound would generally be barely detectable.

2.5 Noise-Sensitive Land Uses

Noise-sensitive land uses are the locations most likely to be adversely affected by excessive noise levels, as well as places where quiet is an essential element of their intended purpose. As defined in the Noise Element of the City of Los Angeles General Plan, land uses that are sensitive to noise include single- and multi-family dwellings, long-term care facilities (including convalescent and retirement facilities), dormitories, motels, hotels, transient lodgings, and other residential uses; houses of worship; hospitals; libraries; schools; auditoriums; concert halls; outdoor theaters; nature and wildlife preserves; and parks (City of Los Angeles 1999).

Chapter 3
Groundborne Vibration Fundamentals

This chapter describes basic concepts related to groundborne vibration. Groundborne vibration is a small, rapidly fluctuating motion transmitted through the ground. The effects of groundborne vibrations are typically limited to causing nuisance or annoyance to people, but at extreme vibration levels, damage to buildings may also occur.

In contrast to airborne sound, groundborne vibration is not a phenomenon that most people experience every day. The ambient groundborne vibration level in residential areas is usually much lower than the threshold of human perception. Most perceptible indoor vibration is caused by sources within buildings, such as mechanical equipment while in operation, people moving, or doors slamming. Typical outdoor sources of perceptible groundborne vibration are heavy construction activity (such as blasting, pile driving, or earthmoving), steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible, even in locations close to major roads. The strength of groundborne vibration from typical environmental sources diminishes (or attenuates) fairly rapidly over distance.

For the prediction of groundborne vibration, the fundamental model consists of a vibration source, a receptor, and the propagation path between the two. The power of the vibration source and the characteristics and geology of the intervening ground, which affect the propagation path to the receptor, determine the groundborne vibration level and the characteristics of the vibration perceived by the receptor.

The following sections provide an explanation of key concepts and terms used in the analysis of environmental groundborne vibration.

3.1 Displacement, Velocity, and Acceleration

When a vibration source (blasting, dynamic construction equipment, train, etc.) impacts the ground it imparts energy to the ground, creating vibration waves that propagate away from the source along the surface and downward into the earth. As vibration waves travel outward from a source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The distance that these particles move is referred to as the *displacement* and is typically very small, usually only a few ten-thousandths to a few thousandths of an inch. *Velocity* describes the instantaneous speed of the motion, and *acceleration* is the instantaneous rate of change of the speed. Each of these measures can be further described in terms of *frequency* and *amplitude*, as discussed below.

Although displacement is generally easier to understand than velocity or acceleration, it is rarely used to describe groundborne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement.

3.2 Frequency and Amplitude

The frequency of a vibrating object describes how rapidly it is oscillating. The unit of measurement for the frequency of vibration is Hz (the same as used in the measurement of noise), which describes the number of cycles per second.

The amplitude of displacement describes the distance that a particle moves from its resting (or equilibrium) position as it oscillates and can be measured in inches. The amplitude of vibration velocity (the speed of the movement) can be measured in inches per second (in/s). The amplitude of vibration acceleration (the rate of change of the speed) can be measured in inches per second per second.

3.3 Vibration Descriptors

As noted above, there are various ways to quantify groundborne vibration based on its fundamental characteristics. Because vibration can vary markedly over a short period of time, various descriptors have been developed to quantify vibration. The two most common descriptors used in the analysis of groundborne vibration are peak particle velocity and vibration velocity level, each of which are described below:

- **Peak Particle Velocity (PPV)** is defined as the maximum instantaneous positive or negative peak amplitude of the vibration velocity. The unit of measurement for PPV is in/s. Unlike many quantities used in the study of environmental acoustics, PPV is typically presented using linear values and does not employ a dB scale. Because it is related to the stresses that are experienced by buildings, PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage (both Federal Transit Administration [FTA] and Caltrans guidelines recommend using PPV for this purpose). It is also used in many instances to evaluate the human response to groundborne vibration (Caltrans guidelines recommend using PPV for this purpose).
- **Vibration Velocity Level (L_V)** describes the rms vibration velocity. Due to the typically small amplitudes of groundborne vibrations, vibration velocity is often expressed in decibels, calculated as follows.

  $$L_V = 20 \times \log_{10}\left(\frac{V}{V_{ref}}\right)$$

  where *V* is the actual rms velocity amplitude and V_{ref} is the reference velocity amplitude. It is important to note that there is no universally accepted value for V_{ref}, but the accepted reference quantity for vibration velocity in the U.S. is 1 micro-inch per second (1×10^{-6} inches/second). The abbreviation VdB is commonly used for vibration decibels to distinguish from noise level decibels. L_V is often used to evaluate human response to vibration levels (FTA guidelines recommend using L_V for this purpose).

3.4 Vibration Propagation

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations reduce much more rapidly than low frequencies so that low frequencies tend to dominate the spectrum at large distances from the source. The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform medium, while groundborne vibrations travel through the earth, which may contain significant geological differences. Geological factors that influence the propagation of groundborne vibration include the following:

- **Soil conditions.** The type of soil is known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil. Hard, dense, and compacted soil, stiff clay soil, and hard rock transmit vibration more efficiently than loose, soft soils, sand, or gravel.
- **Depth to bedrock.** Shallow depth to bedrock has been linked to efficient propagation of groundborne vibration. One possibility is that shallow bedrock acts to concentrate the vibration energy near the surface, reflecting vibration waves back toward the surface that would otherwise continue to propagate farther down into the earth.
- **Soil strata.** Discontinuities in the soil strata (i.e., soil layering) can also cause diffractions or channeling effects that affect the propagation of vibration over long distances.
- **Frost conditions.** Vibration waves typically propagate more efficiently in frozen soils than in unfrozen soils. Propagation also varies depending on the depth of the frost.
- **Water conditions.** The amount of water in the soil can affect vibration propagation. The depth of the water table in the path of the propagation also appears to have substantial effects on groundborne vibration levels.

Specific conditions at the source and receptor locations can also affect the vibration levels. For instance, how the source is connected to the ground (e.g., direct contact, through rails, or via a structure) will affect the amount of energy transmitted into the ground. There are also notable differences when the source is underground (such as in a tunnel) versus on the surface. At the receptor, vibration levels can be affected by variables such as the foundation type, the building construction, and the acoustical absorption inside the rooms where people are located. When vibration encounters a building, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under certain circumstances, the ground-to-foundation coupling may also amplify the vibration level due to structural resonances of the floors and walls.

3.5 Effects of Groundborne Vibration

Vibration can result in effects that range from annoyance to structural damage. Annoyance or disturbance of people may occur at vibration levels substantially below those that would pose a risk of damage to buildings. Each of these effects is discussed below.

3.5.1 Potential Building Damage

When groundborne vibration encounters a building, vibrational energy is transmitted to the structure, causing it to vibrate. If the vibration levels are high enough, damage to the building may occur. Depending on the type of building and the vibration levels, this damage could range from cosmetic architectural damage (e.g., cracked plaster, stucco, or tile) to more severe structural damage (e.g., cracking of floor slabs, foundations, columns, beams, or wells). Buildings can typically withstand higher levels of vibration from transient sources than from continuous or frequent intermittent sources. Transient sources are those that create a single, isolated vibration event, such as blasting or drop balls. Continuous or frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment. Older, fragile buildings (which may include important historical buildings) are of particular concern. Modern commercial and industrial buildings can generally withstand much higher vibration levels before potential damage becomes a problem.

3.5.2 Human Disturbance or Annoyance

Groundborne vibration can be annoying to people and can cause serious concern for nearby neighbors of vibration sources, even when vibration is well below levels that could cause physical damage to structures. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible but there is less adverse reaction without the effects associated with the shaking of a building. The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz.

When groundborne vibration waves encounter a building, vibrational energy is transmitted to the building foundation and then propagates throughout the remainder of the structure, causing building surfaces (walls, floors, and ceilings) to vibrate. This movement may be felt directly by building occupants and may also generate a low-frequency rumbling noise as sound waves are radiated by the vibrating surfaces. At higher frequencies, building vibration can cause other audible effects, such as the rattling of windows, building fixtures, or items on shelves or hanging on walls. These audible effects due to groundborne vibration are referred to as groundborne noise. Groundborne vibration levels that result in groundborne noise are often experienced as a combination of perceptible vibration and low-frequency noise. However, sources that have the potential to generate groundborne noise are likely to produce airborne noise impacts that mask the radiated groundborne noise. Any perceptible effect (vibration or groundborne noise) can lead to annoyance. The degree to which a person is annoyed depends on the activity in which they are participating at the time of the disturbance. For example, someone sleeping or reading will be more sensitive than someone who is engaged in any type of physical activity. Reoccurring vibration effects often lead people to believe that the vibration is damaging their home, even though vibration levels are well below minimum thresholds for damage potential (Caltrans 2013b).

Numerous studies have been conducted to characterize the human response to vibration, and, over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. These studies suggest that the thresholds for perception and annoyance vary according to duration, frequency, and amplitude of vibration. For transient vibration sources (single, isolated vibration events such as blasting), the human response to vibration varies from barely perceptible at a PPV of 0.04 in/s, to distinctly perceptible at a PPV of 0.25 in/s, and severe at a PPV of 2.0 in/s. For continuous or frequent intermittent vibration sources (such as impact pile driving or vibratory compaction equipment), the human response to vibration varies from barely perceptible at a PPV of 0.01 in/s, to distinctly perceptible at a PPV of 0.04 in/s, and severe at a PPV of 0.4 in/s (Caltrans 2013b).

3.6 Vibration-Sensitive Land Uses

As noted above, the potential effects of groundborne vibration can be divided into two categories: building damage and potential human annoyance. Because building damage would be considered a permanent negative effect at any building, regardless of land use, any type of building would typically be considered sensitive to this type of impact. Fragile structures, which often include historical buildings, are most susceptible to damage and are of particular concern.

Human annoyance effects from groundborne vibration are typically only considered inside occupied buildings and not at outside areas such as residential yards, parks, or open space. Buildings that would be considered sensitive to human annoyance caused by vibration are generally the same as those that would be sensitive to noise and would typically include residences, schools, hospitals, assisted living facilities, mental care facilities, places of worship, libraries, performing arts facilities, and hotels and motels.

Chapter 4
Existing Noise Environment

The project site is located in an urbanized area surrounded by a mix of land uses, including commercial, institutional, residential, and industrial uses situated in low-, mid-, and high-rise buildings, as well as surface parking lots. As discussed previously, the Hill Grill and Blue Moon Hookah Lounge commercial buildings and a surface parking lot are located north of the project site, across West 11th Street. To the east of the project site, across South Hill Street, is the seven-story Axis Apartments mixed-use building, beyond which is the historic five-story Herald Examiner Building. Across South Hill Street to the southeast is a 10-story Public Works office building. A one-story Bank of America building and surface parking lot borders the project site to the south, beyond which is the 12-story Eleven49 office building. To the southwest of the project site and adjacent to the Eleven49 office building is the 32-story USC Tower office building. An alley abuts the project site to the west, across from which is a surface parking lot. The Belasco and Mayan theaters are located to the northeast of the project site, across the intersection of South Hill and West 11th Streets.

Given the urbanized area where the project site is located, the existing noise environment in the project vicinity would generally be dominated by traffic noise on local streets. However, due to the current COVID-19 pandemic at the time that writing of this technical report began and the reduction in active uses, including associated changes to traffic patterns and other activities resulting from the state's shelter in place order, no noise measurements were conducted to document existing noise levels in the project study area as such measurements would not provide a proper representation of the project area's noise environment. Due to these circumstances, noise measurements that were taken in the project site vicinity for the 1045 Olive Project Draft Environmental Impact Report (EIR) that was certified in February 2020 was used for the purpose of analyzing potential noise impacts for the project in this technical report (City of Los Angeles 2019). The 1045 Olive Project site is located approximately 260 feet from the project site to the northwest and, like the project, also fronts 11th Street. Given the proximity of these two sites, the selected noise measurement locations at identified sensitive land uses for that project would also provide coverage of noise-sensitive land uses near the project site. The nearest sensitive receptors located within 500 feet of the project site, and the noise measurement locations where measured noise levels from the 1045 Olive Project were used for the project's noise analysis in this report, are shown on Figure 4-1. The measured noise levels at the noise measurement locations shown on Figure 4-1 are summarized in Table 4-1.

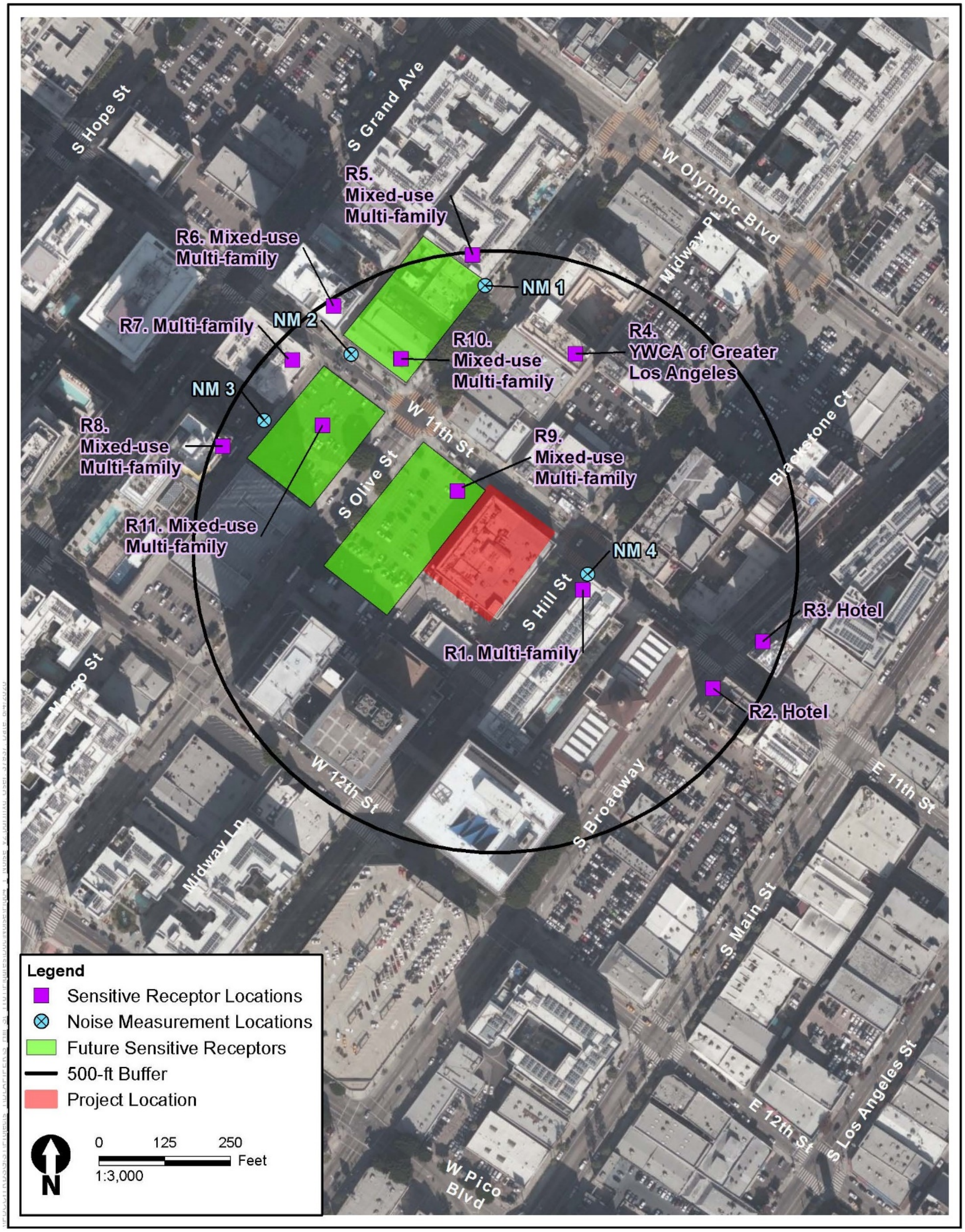
Table 4-1. Summary of Measured Ambient Noise Levels in Project Area

Location	Date Measurement Conducted	Time[a]	Noise Levels (dBA)		
			Hourly L_{eq}	Average Hourly L_{eq}	CNEL
NM1[a]	1/31/2018 to 2/1/2018	Daytime[b]	63–76[c]	69	70.6
		Nighttime[b]	54–68[d]	62	
NM2[a]	1/31/2018 to 2/1/2018	Daytime[a]	63–76[c]	69	72.0
		Nighttime[a]	54–69[d]	64	
NM3[e]	1/31/2018	9:02 a.m. to 9:17 a.m.	65.6	NA	NA
NM4[e]	4/24/2019	9:39 a.m. to 9:54 a.m.	71.8	NA	NA

Note: NA = Not applicable
[a] Long-term noise measurement that was conducted over a 24-hour period.
[b] Daytime = 7 a.m. to 10 p.m. Nighttime = 10 p.m. to 7 a.m.
[c] The value represents the range of hourly noise levels measured across the daytime period (i.e., 7 a.m. to 10 p.m.).
[d] The value represents the range of hourly noise levels measured across the nighttime period (i.e., 10 p.m. to 7 a.m.).
[e] Short-term noise measurement that was conducted over a 15-minute period.

As shown in Table 4-1, the daytime ambient noise levels in the project vicinity generally ranged between approximately 63 and 76 dBA L_{eq} in the project area. The two long-term (i.e., 24-hour) noise measurements indicate that the average hourly noise levels during daytime hours were 69 dBA L_{eq} at both the NM1 and NM2 locations, while the average hourly noise levels during nighttime hours were 62 dBA L_{eq} at the NM1 location and 64 dBA L_{eq} at the NM2 location.

Figure 4-1. Existing Project Area Noise Conditions and Nearby Sensitive Receptors



Chapter 5
Regulatory Framework

5.1 Federal

There are no federal noise standards or regulations that directly regulate environmental noise related to the construction or operation of the proposed project. There are also no federal vibration standards or regulations adopted by an agency that are applicable to evaluating vibration impacts from land use development projects such as the proposed project. As such, noise impacts produced by the project would be regulated or evaluated by State of California and City of Los Angeles standards designed to protect public well-being and health.

5.2 State

5.2.1 Noise

The state of California has not adopted statewide standards for environmental noise. However, the *State of California General Plan Guidelines,* published and updated by the Governor's Office of Planning and Research, provides guidelines for evaluating the compatibility of various land uses as a function of community noise exposure. These are guidelines for general land use planning that describe noise acceptability categories for different types of land uses considered by the state. The evaluation contained in the guidelines has been incorporated into the City of Los Angeles Guidelines for Noise Compatible Land Use provided in Table 5-3, to follow.

California also requires each local government entity to perform noise studies and implement a noise element as part of its general plan. The purpose of the noise element is to limit the exposure of the community to excessive noise levels; the noise element must be used to guide decisions concerning land use. A discussion of relevant noise-related policies in the Noise Element of the City of Los Angeles General Plan is provided in Section 5.3.1, *Noise*, below.

5.2.2 Vibration

California Department of Transportation

There are no state vibration standards that directly apply to the project. As noted below, there are also no quantitative local standards that can be used to assess project-related vibration. Therefore, while the project would not be subject to Caltrans oversight, guidance published by the agency nonetheless provides groundborne vibration criteria that are useful in establishing thresholds for significant impacts. Caltrans' widely referenced *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013b) provides guidance for two types of potential vibration impacts: (1) damage to structures, and (2) annoyance to people. Guideline criteria for each are provided in Table 5-1 and Table 5-2.

Table 5-1. Caltrans Guideline Vibration Damage Criteria

Structure and Condition	Maximum PPV (in/s) Transient Sources	Maximum PPV (in/s) Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans 2013b.
Notes:
Transient sources create a single, isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 5-2. Caltrans Guideline Vibration Annoyance Criteria

Human Response	Maximum PPV (in/s) Transient Sources	Maximum PPV (in/s) Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: Caltrans 2013b.
Notes:
Transient sources create a single, isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

5.3 Local

5.3.1 Noise

Noise Element of the City of Los Angeles General Plan

The Noise Element of the General Plan serves to identify sources of noise and provide objectives and policies that ensure that noise from various sources does not create an unacceptable noise environment. Overall, the City's Noise Element describes the noise environment (including noise sources) in the City; addresses noise mitigation regulations, strategies, and programs; and delineates federal, state, and City jurisdiction relative to rail, automotive, aircraft, and nuisance noise. The goal, objectives, and policies of the Noise Element that are relevant to the project are provided below.

Goal

A city where noise does not reduce the quality of urban life.

Objectives and Policies

Objective 2 (Non-airport): Reduce or eliminate non-airport related intrusive noise, especially relative to noise sensitive uses.

Policy 2.2: Enforce and/or implement applicable city, state and federal regulations intended to mitigate proposed noise producing activities, reduce intrusive noise and alleviate noise that is deemed a public nuisance.

Objective 3 (Land Use Development): Reduce or eliminate noise impacts associated with proposed development of land and changes in land use.

Policy 3.1: Develop land use policies and programs that will reduce or eliminate potential and existing noise impacts.

Implementation Programs

P11: For a proposed development project that is deemed to have a potentially significant noise impact on noise sensitive uses, as defined by this chapter, require mitigation measures, as appropriate, in accordance with California Environmental Quality Act and city procedures.

Examples of mitigation measures to consider:

a) Increase the distance from the noise source and the receptor by providing land use buffers, e.g., parking lots, landscaped setbacks or open areas, utility yards, maintenance facilities, etc.;

b) Orient structures, use berms or sound walls, utilize terrain or use other means to block or deflect noise, provided it is not deflected to other noise-sensitive uses and that the barrier does not create a hiding place for potential criminal activity;

c) Require projects with noise generating components (e.g., auto repair and maintenance facilities) to have no openings in building walls that face sensitive uses;

d) Limit the hours of operation of a noise generating use;

e) Limit the use of the site to prohibit potential noise generating uses that otherwise are allowed by right within the zone classification of the project site;

f) Require that potential noise impacts associated with project construction be minimized by such measures as designating haul routes, requiring less noisy equipment, enclosing or orienting noisy equipment (e.g., electrical generators) away from noise sensitive uses, imposing construction hours that are more restrictive than those set forth in the Los Angeles Municipal Code, requiring vehicle parking and deployment activities to be separated and buffered from sensitive uses; or

g) Determine impacts on noise sensitive uses, such as public school classrooms, which are active primarily during the daytime and evening hours, by weighting the impact measurement to the potential interior noise level (or for exterior uses, e.g., outdoor theaters, to the exterior noise level) over the typical hours of use, instead of using a 24-hour measurement.

h) Other appropriate measures.

P12: When issuing discretionary permits for a proposed noise-sensitive use (as defined by this chapter) or a subdivision of four or more detached single-family units and which use is determined to be potentially significantly impacted by existing or proposed noise sources, require mitigation measures, as appropriate, in accordance with procedures set forth in the California Environmental Quality Act so as to achieve an interior noise level of a CNEL of 45 dB, or less, in any habitable room, as required by Los Angeles Municipal Code Section 91.

Examples of mitigation measures to consider:

a) Impose project orientation and buffering measures similar to those cited in the prior program;

b) Orient the project so as to use structures, terrain or building design features (e.g., windowless walls or non-opening windows facing the noise source) so as to block or reduce noise impacts;

c) Orient interior features of the project to reduce or eliminate noise impacts on particularly noise sensitive portions of the project (e.g., locate bedrooms and balconies away from the noise source);

d) Require insulation and/or design measures, attested to by an acoustical expert, to the satisfaction of the city's Department of Building and Safety, to identify and mitigate potential noise impacts;

e) Determine impacts on noise sensitive uses, such as public school classrooms, which are active primarily during the daytime and evening hours, by weighting the impact measurement to the potential interior noise level (or for exterior uses, e.g., outdoor theaters, to the exterior noise level) over the typical hours of use, instead of using a 24-hour measurement.

f) Other appropriate measures.

The Noise Element also provides land use/noise compatibility guidelines, as shown in Table 5-3. These are not strict standards, but rather are intended to help guide the determination of appropriate land use and mitigation measures relative to existing or anticipated ambient noise levels. These guidelines are most commonly applied to noise from mobile (transportation) noise sources, such as traffic, rail, and aircraft noise. Stationary noise sources are most commonly addressed using the municipal code standards described below.

Table 5-3. City of Los Angeles Guidelines for Noise Compatible Land Use

	Day-Night Average Exterior Sound Level (CNEL dB)						
Land Use Category	**50**	**55**	**60**	**65**	**70**	**75**	**80**
Residential Single-Family, Duplex, Mobile Home	A	C	C	C	N	U	U
Residential Multi-Family	A	A	C	C	N	U	U
Transient Lodging, Motel, Hotel	A	A	C	C	N	U	U
School, Library, Church, Hospital, Nursing Home	A	A	C	C	N	N	U
Auditorium, Concert Hall, Amphitheater	C	C	C	C/N	U	U	U
Sports Arena, Outdoor Spectator Sports	C	C	C	C	C/U	U	U

Land Use Category	Day-Night Average Exterior Sound Level (CNEL dB)						
	50	55	60	65	70	75	80
Playground, Neighborhood Park	A	A	A	A/N	N	N/U	U
Golf Course, Riding Stable, Water Recreation, Cemetery	A	A	A	A	N	A/N	U
Office Building, Business, Commercial, Professional	A	A	A	A/C	C	C/N	N
Agriculture, Industrial, Manufacturing, Utilities	A	A	A	A	A/C	C/N	N

Source: City of Los Angeles General Plan, Noise Element, 1999.
Notes:
A = Normally acceptable. Specified land use is satisfactory, based on the assumption that the buildings involved are conventional construction, without any special noise insulation.
C = Conditionally acceptable. New construction or development only after a detailed analysis of noise mitigation is made and needed noise insulation features are included in project design. Conventional construction; closed windows and fresh air supply systems or air-conditioning normally will suffice.
N = Normally unacceptable. New construction or development generally should be discouraged. A detailed analysis of noise reduction requirements must be made and noise insulation features included in the design of a project.
U = Clearly unacceptable. New construction or development generally should not be undertaken.

City of Los Angeles Municipal Code

Construction Noise

Section 41.40(a) of the LAMC prohibits the use, operation, repair, or servicing of construction equipment, as well as job-site delivery of construction materials, between the hours of 9:00 p.m. and 7:00 a.m. where such activities would disturb "persons occupying sleeping quarters in any dwelling hotel or apartment or other place of residence." Under Section 41.40(b), construction noise emanating from property zoned for manufacturing or industrial uses is exempted from the Section 41.40(a) standards. Additionally, Section 41.40(b) also states that construction, repair, or excavation work occurring outside of the permitted hours identified in Section 41.40(a) is allowed if written permission from the Board of Police Commissioners (through its Executive Director) is obtained. In particular, permission can be granted in instances where the construction work is deemed to be in the public interest, or where hardship or injustice, or unreasonable delay would result from its interruption outside of the permitted hours identified in Section 41.40(a). In addition, Section 41.40(c) prohibits construction, grading, and related job-site deliveries on or within 500 feet of land developed with residential structures before 8:00 a.m. or after 6:00 p.m. on any Saturday or national holiday or at any time on Sunday.

Section 112.05 of the LAMC places a noise level limit of 75 dBA at a distance of 50 feet for powered equipment or tools, which includes construction equipment in, or within 500 feet of, any residential zone between the hours of 7 a.m. and 10 p.m. Under the code, such limits shall not apply where compliance is technically infeasible. Technical infeasibility means that the noise limit cannot be achieved despite the use of mufflers, shields, sound barriers, and/or other noise reduction devices or techniques during operation of the equipment. Section 111.02 of the LAMC provides guidance on conducting sound level measurements pursuant to City noise regulations. The guidance from this section states, in part:

> "…the level of a particular noise being measured shall be the numerical average of noise measurements taken at a given location during a given time period."

The LAMC does not state a specific averaging time to be used for a noise measurement conducted pursuant to City noise regulations. However, as indicated in Section 111.02(b) of the LAMC in regard to sound level measurement procedure and criteria, the City references a period of "60 consecutive minutes" as a criterion in assessing an alleged offensive noise. Therefore, for the purpose of assessing construction activities, the L_{eq} for a 1-hour period is appropriate to assess project impacts.

Operational Noise

Chapter XI, *Noise Regulation (Noise Ordinance)*, of the LAMC regulates noise from non-transportation noise sources such as commercial or industrial operations, mechanical equipment, or residential activities. Although these regulations do not apply to vehicles operating on public rights-of-way, it is noted that they do apply to noise generated by vehicles on private property, such as in parking lots or parking structures. The exact noise standards vary, depending on the type of noise source; however, the allowable noise levels are generally determined relative to the existing ambient noise levels at the affected location. Section 111.01(a) defines ambient noise as "the composite of noise from all sources near and far in a given environment, exclusive of occasional and transient intrusive noise sources and the particular noise source or sources to be measured. Ambient noise shall be averaged over a period of at least 15 minutes."

Section 111.02 provides procedures and criteria for measuring the sound level of noise sources that are alleged to be "offending." Section 111.02 states that under conditions where noise alleged to be offending occurs for more than five but less than 15 minutes in any 1-hour period between the hours of 7:00 a.m. and 10:00 p.m. of any day, a five dBA allowance should be provided to the noise source (i.e., a value of -5 dBA would be added to the sound level measurement of the offending noise source). Additionally, under conditions where the offending noise occurs for five minutes or less in any 1-hour period between the hours of 7:00 a.m. and 10:00 p.m. of any day, an additional five dBA allowance can be provided to the noise source. However, under conditions where the offending noise source generates either repeated impulsive noise levels or steady-tone noise levels with an audible fundamental frequency or overtones (except for noise emanating from any electrical transformer or gas-metering and pressure-control equipment existing and installed prior to September 8, 1986), a five dBA penalty should be accounted for in the noise levels (i.e., a value of +5 dBA would be added to the sound level measurement of the offending noise source).

Section 111.03 provides minimum ambient noise levels for various land uses, as described in Table 5-4 below. In the event that the actual measured ambient noise level at a subject location is lower than that provided in the table, the level in the table shall be assumed.

Table 5-4. City of Los Angeles Assumed Minimum Ambient Noise Levels

	Assumed Minimum Ambient Noise (L_{eq}), dBA[a]	
Zone	**Daytime (7 a.m. – 10 p.m.)**	**Nighttime (10 p.m. – 7 a.m.)**
A1, A2, RA, RE, RS, RD, RW1, RW2, R1, R2, R3, R4, and R5	50	40
P, PB, CR, C1, C1.5, C2, C4, C5, and CM	60	55
M1, MR1, and MR2	60	55
M2 and M3	65	65

Source: Los Angeles Municipal Code, Section 111.03.

[a] At the boundary line between two zones, the ambient noise level of the quieter zone shall be used.

As discussed previously, the LAMC is not explicit with respect to defining the length of time over which an average noise level should be assessed. However, based on the noted reference to "60 consecutive minutes" in Section 111.02 of the LAMC, the 1-hour L_{eq} metric is used as the length of time to determine an average noise level.

Section 112.01 of the Noise Ordinance addresses noise from radios, television sets, and similar devices that are used for the producing, reproducing, or amplification of the human voice, music, or any other sound. This section states that any noise level caused by these devices that is audible to the human ear at a distance in excess of 150 feet from the property line of the noise source, within any residential zone of the City or within 500 feet thereof, would be a noise violation. Additionally, these devices may not generate noise that exceeds the ambient noise level at any adjacent property by more than 5 dBA.

Section 112.02 of the Noise Ordinance addresses noise from air-conditioning, refrigeration, heating, pumping, and filtering equipment. This section states that such equipment may not generate noise that would exceed the ambient noise level at any adjacent property by more than 5 dBA.

Section 112.04 of the Noise Ordinance addresses noise from powered equipment intended for repetitive use in residential areas (e.g., lawn mower, backpack blower, lawn edger, riding tractor) and other machinery, equipment, and devices. This section states that the operation of said equipment between the hours of 10:00 p.m. and. 7:00 a.m. within any residential zone or within 500 feet of a residence is prohibited. Additionally, noise levels associated with the operation of this type of equipment may not generate noise that would exceed the ambient noise level at any adjacent property by more than 5 dBA.

Section 114.02 of the Noise Ordinance addresses noise from motor-driven vehicles. (It is noted that the requirement applies to vehicles on private property only, and does not apply to vehicles operated within public rights-of-way.) This section states that such vehicles may not generate noise that would exceed the ambient noise level at any occupied residential property by more than 5 dBA.

Section 114.03 of the Noise Ordinance addresses noise from vehicle loading and unloading. This section prohibits the loading or unloading of any vehicle, or operation of any dollies, carts, forklifts, or other wheeled equipment, between the hours of 10:00 p.m. and 7:00 a.m. of the following day that causes any impulsive sound or raucous or unnecessary noise within 200 feet of any residential building.

5.3.2 Vibration

There are currently no local regulatory standards for groundborne vibration that are applicable to the project.

Chapter 6
Impacts and Mitigation Measures

6.1 Methodology

6.1.1 Construction Noise and Vibration

A combination of existing literature, published noise level measurements conducted in the project vicinity for the certified 1045 Olive Project EIR, and application of accepted noise and vibration prediction and propagation algorithms were used for the prediction of short-term construction and long-term non-transportation and transportation source noise levels, as well as for the evaluation of groundborne vibration impacts. The evaluation of potential noise and vibration impacts associated with project construction was based on the construction schedule, phasing, and equipment assumptions provided by the Applicant for the project.

Using the construction assumptions provided for the project, noise and vibration levels were estimated using the methods described below.

Noise

Construction-related noise was analyzed using data and modeling methodologies from the Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (FHWA 2008), which predicts average noise levels at nearby receptors by analyzing the type of equipment, the distance from source to receptor, usage factor (the fraction of time the equipment is operating in its noisiest mode while in use), and the presence or absence of intervening shielding between source and receptor. This methodology is conservative, as it calculates the composite average noise levels for all equipment items scheduled during each construction phase to be operated at the same time, which would seldom, if ever, occur during construction. Construction noise levels were predicted assuming an average noise attenuation rate of 6 dB per doubling of distance from the source. Based on guidance from Section 111.02(a) of the LAMC (which indicates an average value should be used to describe sound levels), Section 111.02(b) of the LAMC (which references a period of "60 consecutive minutes") and Section 112.05 of the LAMC (which describes a noise limit of 75 dBA for construction equipment), a noise limit of 75 dBA 1-hour L_{eq} is used as the criterion to define a noise exceedance associated with construction activities. Thus, to analyze the project's potential noise impacts, the average 1-hour L_{eq} construction noise level generated during each phase of construction was estimated at each analyzed receptor based on their distance to the construction phase activity. To reflect the assumed distribution of equipment across the project site, source-to-receptor distances used in the analysis were the acoustical average distances between the project site and each receptor.[4]

[4] The acoustical average distance is used to represent noise sources that are mobile or distributed over an area (such as the analyzed construction area within the Project Site); it is calculated by multiplying the shortest distance between the receptor and construction area boundary by the farthest distance and then taking the square root of the product.

During project construction, noise levels would also be generated from construction-related traffic associated with worker trips and haul truck trips on local roadways. The analysis of roadway noise levels from the project's construction traffic was conducted using a proprietary traffic noise model, with calculations based on data from the FHWA Traffic Noise Model, Version 2.5, Look-Up Tables (FHWA 2004). This model allows for the calculation of noise levels at specific distances from the center of the roadway based on traffic volumes, average speeds, and site environmental conditions. For the purpose of this analysis, the highest daily worker and haul truck trips that would occur during project construction are assessed. The construction-related off-site worker trip and haul truck volumes were obtained from the project Applicant. The predicted roadway noise levels resulting from the addition of the project's construction-related traffic volumes to existing traffic volumes along segments of the potential haul routes used during project construction were assessed against the existing roadway noise levels without the project's construction traffic.

Vibration

Construction-related vibration resulting from the project was analyzed using data and modeling methodologies provided by Caltrans' *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013b). This guidance manual provides typical vibration source levels for various types of construction equipment, as well as methods for estimating the propagation of groundborne vibration over distance. The project would not require high-impact construction methods, such as pile driving or blasting. Therefore, the highest groundborne vibration levels would be associated with conventional heavy construction equipment, such as bulldozers, backhoes, and loaders. According to Caltrans data, the largest generally available models of each of these heavy pieces of equipment can generate a PPV of 0.089 in/s at a reference distance of 25 feet, while smaller versions of this equipment can generate a PPV of 0.003 in/s at a reference distance of 25 feet. All of the analyzed equipment is classified as continuous/frequent intermittent vibration sources based on Caltrans' vibration criteria.

The following equation from the guidance manual was used to estimate the change in PPV levels over distance:

$$PPV_{rec} = PPV_{ref} \times (25/D)^{n}$$

where PPV_{rec} is the PPV at a receptor; PPV_{ref} is the reference PPV at 25 feet from the equipment; D is the distance from the equipment to the receptor, in feet; and n is a value related to the vibration attenuation rate through ground (the default recommended value for n is 1.1). This equation was used to estimate the PPV at each of the closest vibration-sensitive receptors based on the worst-case (closest) distance between each source and receptor.

6.1.2 Operational Noise

The analysis of traffic noise in the study area was based on data from the Transportation Assessment (TA) for the project (Fehr & Peers 2020). The analysis was conducted using a proprietary traffic noise model, with calculations based on data from the FHWA Traffic Noise Model, Version 2.5, Look-Up Tables (FHWA 2004). The inputs used in the traffic noise modeling included average daily traffic (ADT) volumes, assumed traffic mix and daily distribution (the percentage of automobiles versus medium trucks and heavy trucks during each hour of the day), and traffic speeds, based on the posted speed limits. The TA does not directly analyze ADT; therefore, based on guidance from Fehr & Peers, these values were estimated by assuming that the peak PM traffic volumes reported in the TA represented 10 percent of the ADT. To quantify the effects of the project, traffic noise was analyzed using four different scenarios: (1) existing, (2) existing plus project, (3) future (2026) without project, and (4) future (2026) with project. The first two scenarios were used to analyze the direct traffic noise impacts of the project; scenarios 3 and 4 were used to analyze the future/cumulative impacts. The noise modeling is provided in Appendix A.

Aside from traffic noise associated with the project that would be generated off-site, onsite noise levels would also be generated by stationary noise sources such as mechanical equipment (HVAC equipment, dry coolers, and emergency generators), the onsite parking structure, the loading area serving the proposed TORS and restaurant uses at the project site, and the outdoor amenity areas located on levels five (i.e., landscaped pool amenity deck), 39 (balconies) and 40 (i.e., landscaped amenity roof deck) of the building. Using noise level data from published sources as well as from noise measurements, impacts from these onsite stationary noise sources are evaluated by estimating the noise levels that each noise source would generate at the nearest noise-sensitive receptors to the project site. The estimated noise level from each noise source takes into account the distance from source to receptor and the presence or absence of intervening shielding between source and receptor.

With regard to mechanical equipment, noise level data for the project's four dry coolers, which would be located out in the open at the project's rooftop, and two emergency generators, which would be located in a mechanical room on the ground-floor level of the project site that has a garage door opening toward the alleyway, were obtained from the project's mechanical, electrical, and plumbing engineer. All HVAC equipment such as air handling units, fans, and generators would be located in mechanical rooms within the project building and would be equipped with silencers to reduce noise levels.[5] As such, the analysis of mechanical equipment noise for the project is only conducted for the rooftop dry coolers and emergency generators, as these sources would likely be audible at adjacent and surrounding properties.

The project's onsite parking structure noise level was estimated using FTA's recommended methodology for stationary source general assessment, which uses the following equation to estimate noise levels for parking garages:

$$L_{eq}(h) = SEL_{ref} + 10\log(N_A/1000) - 35.6$$

where $L_{eq}(h)$ is the hourly L_{eq} noise level at 50 feet; SEL_{ref} is the reference noise level for a stationary noise source represented in sound exposure level at 50 feet from the noise source;[6] and N_A is the number of automobiles per hour.

For the project's loading area, which would be used by delivery vehicles serving the project, previously measured noise level data collected at a loading dock for a retail warehouse were used to estimate the noise levels at the nearest off-site sensitive receptors.

5 Personal communication with John Gautrey of Integral Group on June 29, 2020.

6 A SEL_{ref} of 92 dBA is cited by the FTA for a parking garage with 1,000 cars during the peak activity hour. Although the Project's peak hour vehicle trips would be much less than 1,000 vehicles, the 92 dBA SEL_{ref} is used for the noise analysis of the Project's onsite parking garage for the purposes of conducting a conservative analysis.

As the project's noise levels associated with the outdoor amenities (i.e., landscaped pool amenity deck on Level five; balconies on Level 39; and landscaped amenity roof deck on Level 40) would consist primarily of people congregating and conversing in those areas, published data for human speech noise levels for males, females, and children were obtained and noise levels were estimated based on assumptions of the number of people who are expected to gather in each of the project's outdoor amenity areas. The speech noise levels for people in various noise environments used for analysis in this report are shown in Table 6-1.

Table 6-1. Average A-Weighted Sound Levels of Speech for Different Vocal Efforts[a]

	Sound Levels (dBA L_{eq})		
Voice Effort	**Male**	**Female**	**Children**
Casual	53	50	50
Normal	58	55	55
Raised	65	62	62
Loud	75	71	71
Shout	88	82	82

Sources: Harris 1998; U.S. Environmental Protection Agency 1977.
a Measured at a distance of 1 meter.

Additionally, the landscaped pool amenity decks on Level five would be equipped with an outdoor speaker system for the purposes of providing ambient background music. The speaker system would be operated in manner such that background music is provided to complement an outdoor environment that is conducive for TORS guests and residents to gather and converse comfortably. As such, music from the speaker system would not be played at such volumes that would dominate the noise environment and interfere with the ability for residents and guests to have normal conversational speech. Thus, for the purpose of this analysis, the noise level generated from the outdoor speaker system is assumed to be equivalent to the noise level generated from people congregating and conversing on Level five.

6.2 Project Design Features

The following project design feature (PDF) would be implemented as part of the project:

PDF-NOI-1: Each mechanical room shall be outfitted with sound attenuation measures to further minimize noise levels at neighboring properties in accordance with Section 112.02 of the LAMC, which prohibits noise from mechanical equipment from exceeding the ambient noise level on the premises of other occupied properties by more than 5 dBA.

PDF-NOI-2: The mechanical room at the ground-floor level of the project building adjacent to the alleyway housing the emergency generators shall be designed with sufficient noise attenuation features (e.g., silencers, generator enclosures, insulation, etc.) to provide compliance with Section 112.02 of the LAMC, which prohibits noise from mechanical equipment from exceeding the ambient noise level on the premises of other occupied properties by more than 5 dBA.

6.3 Thresholds of Significance

Appendix G of the California Environmental Quality Act (CEQA) Guidelines presents screening questions lead agencies can utilize to analyze the significance of project impact, and are as follows:[7]

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 2 miles of a public airport or public use airport, exposure of people residing or working in the project area to excessive noise levels.

6.3.1 Short-term Construction Noise Criteria

As discussed previously in Section 5.3, the City regulates construction noise levels per the requirements of the LAMC, which establishes permissible hours for construction activities under Section 41.40 and noise level limits for construction equipment under Section 112.05. As such, the construction noise levels generated by the project would be assessed against these noise regulations and standards of the LAMC to determine whether potential noise impacts would occur. It should be noted that both Sections 41.40 and 112.05 of the LAMC also identify conditions where their respective provisions would not apply. With respect to permissible hours for construction activities, Section 41.40(b) states that construction work occurring outside of the hours between 7:00 a.m. to 9:00 p.m. is allowed if written permission from the Board of Police is obtained. With respect to noise level limits for construction equipment, Section 112.05 of the LAMC also states that its noise limit "shall not apply where compliance is technically infeasible. Technical infeasibility means that the noise limit cannot be achieved despite the use of mufflers, shields, sound barriers, and/or other noise reduction devices or techniques during operation of the equipment." Therefore, construction activities that either occur outside of the City's permitted construction hours and days identified in Section 41.40 of the LAMC without written permission from the Board of Police, or generate noise levels in excess of the 75 dBA 1-hour L_{eq} noise limit established under Section 112.05 of the LAMC without implementation of technically feasible noise-reduction measures or techniques, are considered to result in significant impacts. Section 112.05 of the LAMC indicates that the 75 dBA L_{eq} noise limit applies at a distance of 50 feet. However, for the purpose of conducting a conservative analysis, the noise limit is applied at the nearest sensitive receptors to the project site even though these existing noise-sensitive receptors are located further than 50 feet from the project site.

[7] The Appendix G questions presented were included as part of the most recent comprehensive update to the CEQA Guidelines and Appendix G released by the Governor's Office of Planning and Research that took effect in January 2019. The City of Los Angeles Department of City Planning has adopted the 2019 Appendix G as the Department's CEQA thresholds of significance in order to comply with state law (Los Angeles City Planning Commission 2019). The use of the 2019 Appendix G as the Department's CEQA thresholds serve to replace the former 2006 L.A. CEQA Thresholds Guide and Appendix G thresholds.

6.3.2 Long-Term Operational Noise Criteria

In accordance with Chapter XI, Noise Regulation, of the LAMC, a noise level increase of 5 dBA over the existing average ambient noise level at an adjacent property line is considered a noise violation for most operational noise sources (City of Los Angeles 2019). This standard applies to: (1) radios, television sets, and similar devices defined in LAMC Section 112.01; (2) air conditioning, refrigeration, heating, pumping, and filtering equipment defined in LAMC Section 112.02; (3) powered equipment intended for repetitive use in residential areas and other machinery, equipment, and devices defined in LAMC Section 112.04; and (4) motor vehicles driven on site as defined in LAMC Section 114.02. As such, based on the regulations of the LAMC, a significant operational noise impact would occur if project-related operational onsite (i.e., non-roadway) noise sources such as building mechanical/electrical equipment, parking facilities, outdoor gathering areas, and loading dock areas increase the existing ambient noise level at noise-sensitive uses by more than 5 dBA.

6.3.3 Traffic Noise Criteria

With respect to roadway noise, which is a continual noise source that occurs throughout the day, a 24-hour average noise level metric (i.e., dBA CNEL) is used to assess noise impacts associated with the project based on the City's land use/noise compatibility guidelines shown in Table 5-3.[8] With respect to the community noise assessment, changes in noise levels of fewer than 3 dBA are generally not discernable to most people, while changes greater than 5 dBA are readily noticeable and would be considered a significant increase. For the purpose of this analysis, a significant impact related to an increase in traffic noise levels resulting from project-induced vehicle trips during construction and operations would occur if the project causes the ambient noise level at affected sensitive land uses to increase by 3 dBA in CNEL to or within the "normally unacceptable" or "clearly unacceptable" category identified in Table 5-3, or any 5 dBA or greater noise increase if the ambient noise level at the affected sensitive land use is within the "normally acceptable" or "conditionally acceptable" category.

6.3.4 Groundborne Vibration Criteria

As there are currently no local regulatory standards for groundborne vibration that are applicable to the project, the lead agency has determined to use the quantitative criteria published by Caltrans to assess potential structural damage risks and human annoyance resulting from groundborne noise and vibration (refer to Table 5-1 and Table 5-2) as the threshold of significance for this analysis.

[8] As discussed in Section 5.3.1 above, the City's land use/noise compatibility guidelines are most commonly applied to noise from mobile (transportation) noise sources, such as traffic, rail, and aircraft noise. Stationary noise sources are most commonly addressed using the municipal code standards.

6.4 Project Impacts

Impact Noise-1: Would the project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies?

6.4.1 Construction Noise

Onsite Construction Activities

Construction activities associated with the project are anticipated to last approximately 36 months, with completion anticipated in 2025. During this time, temporary increases in noise levels in the project area would occur during certain phases of the construction period due to the operation of various large construction equipment within the project site. Construction of the project would involve demolition of the existing two-story warehouse building followed by construction of a 40-story mixed-use building with TOR units, residential, and commercial uses. Grading activities would include excavation and removal of approximately 58,000 cubic yards of soil from the project site. For any individual off-site receptor located in proximity to the project, noise levels experienced over the construction period would fluctuate depending on the type of construction activity and the location of that activity occurring within the project site. The noise levels generated by each individual piece of construction equipment associated with each of the different construction activities that would occur as part of the project are shown in Table 6-2.

Table 6-2. Project Construction Activities and Equipment Noise Levels

			Individual Equipment Noise Levels (dBA) at 50 Feet
Activity	**Equipment**	**Quantity[a]**	**L_{eq}**
Demolition	Excavator	2	77
Site preparation	Excavator	1	77
Grading	Excavator	1	77
	Dump Truck[b]	2	73
Building Foundation Concrete Pour[c]	Concrete Pump Truck	4	74
	Concrete Mixer Truck	8	75
Building Construction	Tower Crane[d]	1	73
	Manlifts	3	68
	Concrete Trailer Pump	1	74
Paving	Asphalt Paver	1	74

Source: FHWA 2008.

[a] The quantity of each type of equipment that is anticipated to operate at the Project Site during each construction activity.

[b] Assumes two dump trucks would be operating onsite with an excavator at any given time during the grading phase.

[c] The building foundation concrete pour phase will be conducted over approximately 20 hours over the course of one day.

[d] For the purpose of conducting a conservative analysis, the noise level for a mobile crane is used in the analysis. Tower cranes, which are electrically powered, generally produce lower noise levels than diesel-powered cranes.

For the purpose of this analysis, the composite hourly average noise levels for the multiple equipment items associated with each construction activity shown in Table 6-2 were first calculated at a reference distance of 50 feet as part of an intermediary step for use in estimating the noise levels at sensitive off-site receptors. The composite hourly average noise levels for each construction activity are shown in Table 6-3.

Table 6-3. Composite Noise Levels for Each Construction Activity

Construction Activity	Average Composite Hourly Noise Level (L_{eq}) at 50 feet, dBA
Demolition	80
Site preparation	77
Grading	79
Building Foundation Concrete Pour	85
Building Construction	78
Paving	74

As shown in Table 6-3, the average hourly noise levels for the project's construction activities would range from 74 to 85 dBA L_{eq} at the reference distance of 50 feet. The highest noise levels would be associated with the one-day concrete pour activities.

The nearest sensitive land uses in the project site vicinity that could be exposed to increased noise levels during project construction include:[9]

- The seven-story Axis Apartments building located approximately 85 feet to the east of the Project Site, across South Hill Street;
- The Proper Hotel located approximately 395 feet to the east of the Project Site at 1100 South Broadway;
- The Hoxton Hotel located approximately 415 feet to the east of the Project Site at 1060 South Broadway;
- The YWCA Greater Los Angeles campus building, which includes residential units, located approximately 280 feet to the north at 1020 S Olive Street;
- The seven-story mixed-use multi-family development building located approximately 425 feet to the north at 1001 S. Olive Street;
- The 20-story Ten50 mixed-use multi-family development building located approximately 435 feet to the northwest at 1050 S. Grand Avenue;

[9] The distances identified for each off-site sensitive receptor listed below from the Project Site are measured from the receptor buildings to the Project Site. Given the built-out and urban environment of the Project area, none of the identified off-site sensitive receptor locations have outside amenity areas (e.g., lawns) adjacent to their respective buildings where people would congregate and be closer to the Project Site.

- The 13-story Grand Lofts building located approximately 445 feet to the northwest at 1100 S. Grand Avenue; and
- The 38-story Aven Apartments building located approximately 490 feet to the west at 1120 S. Grand Avenue.

In addition to these existing nearby noise-sensitive receptors, there are two future noise-sensitive land uses in proximity to the project site that would have a direct line-of-sight of the project site. One project is the proposed 60-story mixed-use DTLA South Park Project (i.e., the future Mack Urban) located approximately 18 feet away and directly west of the alley adjacent to the project site at 1120 S. Olive Street. The second project is the proposed 1045 S. Olive Street Project, which consists of a 70-story mixed-use building that would include up to 794 residential dwelling units located approximately 265 feet to the northwest of the project site at 1045 S. Olive Street. Given that these two developments could potentially be constructed and in operation by the time project construction commences, these two future sensitive receptors could also be exposed to noise levels generated from project related construction.[10] For the purposes of this analysis, potential construction-related noise impacts were assessed at each of these sensitive receptors. The locations of these receptors are shown on Figure 4-1.

The highest construction noise levels at each of the analyzed receptor locations were estimated based on the composite noise levels shown in Table 6-3 and the distance of each analyzed receptor from the project's construction activities. The estimated construction noise levels experienced by the nearby sensitive receptors are shown in Table 6-4. Detailed calculations are provided in Appendix A.

[10] An additional future nearby sensitive receptor would be the proposed mixed-use development located approximately 255 feet to the northwest at 1105 S. Olive Street (at the southwest corner of W. 11th Street and S. Olive Street). However, this receptor site would be located farther to the west of the project site and would be behind the 60-story DTLA South Park Project that is located directly west (across the alley) from the project site. Thus, the project's potential noise impacts during construction are analyzed at the closer DTLA South Park Project and at the proposed mixed-use 1045 Olive Street Project as these two future projects would have a direct line-of-sight of the project site and would be exposed to higher noise levels from the proposed project.

Table 6-4. Estimated Construction Noise Levels at Nearby Sensitive Receptors – Unmitigated

Receptor	Description/Location	Project Construction Phase	Estimated Average Hourly Noise Level (dBA Leq)[a]	Highest Estimated Average Hourly Noise Level (dBA L_{eq})[b]	Exceed Applicable Noise Standard?
R1	Seven-story Axis Apartments building directly east of project site, across South Hill Street	Demolition	71	76	**Yes**
		Site preparation	68		
		Grading	70		
		Building Foundation Concrete Pour	76		
		Building Construction	69		
		Paving	66		
R2	Proper Hotel located approximately 395 feet to the east of the project site at 1100 South Broadway	Demolition	56	61[c]	No
		Site preparation	53		
		Grading	55		
		Building Foundation Concrete Pour	61		
		Building Construction	54		
		Paving	50		
R3	Hoxton Hotel located approximately 415 feet to the east of the project site at 1060 South Broadway	Demolition	60	65	No
		Site preparation	57		
		Grading	59		
		Building Foundation Concrete Pour	65		
		Building Construction	58		
		Paving	54		

Receptor	Description/Location	Project Construction Phase	Estimated Average Hourly Noise Level (dBA Leq)[a]	Highest Estimated Average Hourly Noise Level (dBA L_{eq})[b]	Exceed Applicable Noise Standard?
R4	YWCA Greater Los Angeles campus building approximately 280 feet north of project site at 1020 S Olive Street	Demolition	58	63[c]	No
		Site preparation	55		
		Grading	57		
		Building Foundation Concrete Pour	63		
		Building Construction	56		
		Paving	52		
R5	Seven-story mixed-use multi-family development building approximately 425 feet to the north of project site at 1001 S. Olive Street	Demolition	54	59[c]	No
		Site preparation	51		
		Grading	53		
		Building Foundation Concrete Pour	59		
		Building Construction	52		
		Paving	49		
R6	20-story Ten50 mixed-use multi-family development building approximately 435 feet northwest of project site at 1050 S. Grand Avenue	Demolition	60	65	No
		Site preparation	57		
		Grading	59		
		Building Foundation Concrete Pour	65		
		Building Construction	58		
		Paving	54		
R7	13-story Grand Lofts building approximately 445 feet northwest of project site at 1100 S. Grand Avenue	Demolition	60	65	No
		Site preparation	57		
		Grading	59		
		Building Foundation Concrete Pour	65		
		Building Construction	58		
		Paving	54		

Receptor	Description/Location	Project Construction Phase	Estimated Average Hourly Noise Level (dBA Leq)[a]	Highest Estimated Average Hourly Noise Level (dBA L_{eq})[b]	Exceed Applicable Noise Standard?
R8	38-story Aven Apartments building approximately 490 feet west of project site at 1120 S. Grand Avenue	Demolition	59	64	No
		Site preparation	56		
		Grading	58		
		Building Foundation Concrete Pour	64		
		Building Construction	57		
		Paving	53		
R9	Future mixed-use DTLA South Park Project located approximately 18 feet away and west of the alley adjacent to the project site at 1120 S. Olive Street	Demolition	69	74	No
		Site preparation	66		
		Grading	68		
		Building Foundation Concrete Pour	74		
		Building Construction	67		
		Paving	63		
R10	Future mixed-use residential and commercial project located approximately 265 feet northwest of the project site at 1045 S. Olive Street	Demolition	53	58	No
		Site preparation	50		
		Grading	52		
		Building Foundation Concrete Pour	58		
		Building Construction	51		
		Paving	42		

[a] The noise levels are estimated using a source-to-receptor distance that represents the acoustical average distance between the construction area and each receptor location.
[b] The highest estimated average hourly noise levels at each of the off-site noise-sensitive receptors are those resulting from the project's one-day concrete pour activities, which generates the highest noise levels when compared to the other construction activities.
[c] The estimated construction noise level at this location takes into account an additional 5 dBA reduction in noise levels due to the presence of intervening building structures that obstruct the line of sight between the receptor and the Project Site.

As shown in Table 6-4, the highest estimated construction-related noise levels that could result at nearby sensitive receptors over the course of project's construction period would range from 58 dBA L_{eq} at sensitive receptor R10 to 76 dBA L_{eq} at sensitive receptor R1. With the exception of sensitive receptor R1, all of the other analyzed sensitive receptors in proximity to the project site would not be exposed to construction noise levels exceeding 75 dBA L_{eq}. The exceedance of the 75 dBA L_{eq} at sensitive receptor R1 occurs during the building foundation concrete pour phase, which would only occur over the course of one day. The noise levels generated from all of the project's remaining construction phases would not exceed 75 dBA L_{eq} at sensitive receptor R1. Thus, aside from the one-day concrete pour, noise levels over the duration of the project's construction schedule would not exceed the applicable noise standard at any of the analyzed sensitive receptors. Additionally, it should be noted that with the exception of the one-day concrete pour, the noise levels shown in Table 6-4 for the other activities are considered to be a conservative estimate as they account for the concurrent operation of all construction equipment for the highest noise-generating construction activity. Throughout the course of a construction day, it would be seldom if ever that all construction equipment would be run simultaneously. Instead, the operation of each piece of construction equipment at the project site is expected to be staggered throughout the construction day and each piece would be turned off when not in use. Furthermore, during the quieter phases of construction or when construction activity moves farther away from a receptor, the noise levels would decrease. As such, the highest construction noise levels experienced at each off-site sensitive receptor would only occur over a temporary period within the project's overall construction schedule.

As discussed above and shown in Table 6-4, the construction noise levels at sensitive receptor R1 during the one-day concrete pour would exceed 75 dBA L_{eq} by 1 dBA. To ensure that construction noise levels would be minimized on surrounding properties, the proposed project would implement Mitigation Measure NOI-1 to reduce construction noise levels at nearby receptors by requiring the implementation of various noise-minimizing measures during the entire duration of the project's construction activities, including the erection of an 8-foot high temporary barrier around the project site. With the implementation of technically feasible measures in accordance with Section 112.05 of the LAMC under Mitigation Measure NOI-1to reduce noise levels at nearby sensitive receptors, the project's construction noise impacts would be reduced to a less-than-significant level.

Furthermore, because the one-day concrete pour would be conducted over approximately 20 hours, the construction activities during that day would occur outside of the City's permissible construction hours (i.e., between 7:00 a.m. to 9:00 p.m.). As such, the proposed project would implement Mitigation Measure NOI-2, which would require the obtainment of a Board of Police Commissioners Permit to allow for the project's one-day continuous concrete pour to occur outside of the hours between 7:00 a.m. to 9:00 p.m. With the obtainment of this permit, the project's concrete pour activities would comply with the provisions of Section 41.40 of the LAMC and impacts associated with violation of the permissible construction hour provisions of the LAMC would be less than significant.

Mitigation Measure NOI-1: The following measures shall be employed during project construction to reduce short-term noise levels at nearby noise-sensitive residential receptors:

a) An 8-foot-high temporary barrier with a minimum sound transmission (STC) rating of 26, shall be erected along eastern and southern side of the project site boundary. The barrier will start at the northern extent of the construction site at the intersection of 11th Street and S. Hill Street and shall continue to the southern terminus of the construction site where it will turn perpendicular to the construction site and continue until the western terminus of the project site at the alley way west of the project site. This barrier shall be constructed in one of the following ways:

- From acoustical blankets hung over or from a supporting frame. The blankets should be firmly secured to the framework. The blankets should be overlapped by at least 4 inches at seams and taped and/or closed with hook-and-loop fasteners (i.e., Velcro®) so that no gaps exist. The largest blankets available should be used in order to minimize the number of seams. The blankets shall be draped to the ground to eliminate any gaps at the base of the barrier.
- From commercially available acoustical panels lined with sound-absorbing material (the sound-absorptive faces of the panels should face the construction equipment).
- From common construction materials such as plywood provided that the barrier is designed with overlapping material at the seams to assure that no gaps exist between the panels.

b) On-site vehicle speeds will be limited to 15 miles per hour or less (except in cases of emergency).

c) Construction-related truck traffic will be routed away from noise-sensitive areas to the extent feasible.

d) All construction equipment shall be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds silencers, wraps). All intake and exhaust ports on power equipment shall be muffled or shielded.

e) Pneumatic tools used at the site shall be equipped with an exhaust muffler on the compressed air exhaust to minimize noise levels.

f) Stationary noise sources shall be located as far from adjacent sensitive receptors as possible and shall be muffled and enclosed within temporary sheds or insulated barriers.

g) Back-up beepers for all construction equipment and vehicles will be broadband sound alarms or adjusted to the lowest noise levels possible, provided that Occupational Safety and Health Administration (OSHA) and California OSHA safety requirements are not violated. On vehicles where back-up beepers are not available, alternative safety measures such as escorts and spotters will be employed.

h) A designated website will be set up during project construction that provides the public with information about the project and its construction schedule as well as opportunities for the public to submit questions on the project.

i) Prior to commencement of construction a designated project contact person will directly notify the management of any surrounding residential properties located within 100 feet of the project site about the construction schedule and activities and provide a contact number to address any noise-related complaints during construction.

j) The construction management company's name and telephone number(s) shall be posted at a least one location along each street frontage that borders the project site.

k) A designated point of contact will be identified to address noise-related complaints during construction. The noise disturbance coordinator will be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler) and will be required to implement reasonable measures such that the complaint is resolved.

Mitigation Measure NOI-2: A Board of Police Commissioners Permit in accordance with the provisions in LAMC Section 41.40 shall be obtained by the project construction contractor to allow for a continuous concrete pour at the project site during hours outside of the period between 7:00 a.m. and 9:00 p.m.

Construction Traffic

Construction worker vehicles and haul trucks, which would transport equipment and materials to and from the project site, would incrementally increase noise levels on the local roads in the project area. The trucks traveling to and from the project site would be required to travel along the haul route approved by the City of Los Angeles for the project. The proposed haul route for the project will require trucks to access the project site from the nearby Interstate (I-) 10, taking the Los Angeles Street exit from the westbound I-10 and the Los Angeles Street entrance onto the eastbound I-10. Trucks will drive along Hill Street to travel between the freeway and the project site. Interstate 10 is located approximately 0.5 mile south of the project site. The construction worker vehicles would not be restricted to travel exclusively on this City-approved haul route, and instead are allowed to access the project site via other routes. However, for the purpose of conducting a conservative traffic noise analysis, all construction traffic for the project (i.e., worker and truck trips) is assumed to travel on this approved haul route.

Based on construction-related information provided by the Applicant, it was determined that the one-day building foundation concrete pour phase for the project would require the heaviest truck trips per day, followed by the grading construction phase. These two phases would contribute most to increased roadway noise levels in the project area. During the concrete pour phase, an estimated 1,152 daily concrete truck trips (576 inbound and 576 outbound) and 10 daily worker trips (5 inbound and 5 outbound) would occur. During the grading phase, an estimated 252 daily haul truck trips (126 inbound and 126 outbound) and 60 daily worker trips (30 inbound and 30 outbound) would occur. To assess the potential traffic noise increase resulting from project construction, the additional daily traffic volumes generated from project construction (i.e., 1,152 concrete truck trips and 10 worker trips during the concrete pour phase and 252 haul truck trips and 60 worker trips during the grading phase) were added to the existing daily traffic volumes on the segments of South Hill Street in the project vicinity to assess the increase in noise levels. The estimated roadway noise levels resulting from the addition of the project's construction-related traffic on these roadway segments are shown in Table 6-5.

Table 6-5. Off-Site Construction Traffic Noise Levels

Roadway	Roadway Segment	Existing Traffic Volume Noise Levels (dBA CNEL)[a]	Existing + Project Construction Traffic Volume Noise Levels (dBA CNEL)[a]	Increase (dBA CNEL)
Building Foundation Concrete Pour Phase[b]				
South Hill Street	South of 11th Street [c]	63.9	67.1	3.2
	North of 12th Street [c]	63.6	67.0	3.4
	South of 12th Street	63.7	67.0	3.3
Grading Phase				
South Hill Street	South of 11th Street [c]	63.9	64.9	1.0
	North of 12th Street [c]	63.6	64.7	1.1
	South of 12th Street	63.7	64.7	1.0

Existing Traffic Information Source: Fehr & Peers 2020.

[a] Noise levels are estimated at 50 feet from the roadway centerline.

[b] The proposed project's building foundation concrete pour phase would only occur over the course of one day.

[c] The stretch of roadway, South Hill Street north of 12th Street and south of 11th Street is the same geographic area. However within this geographic extent, traffic will ingress or egress to parking structures and alleyways which explains the difference in traffic noise levels.

As shown in Table 6-5, the increase in traffic noise levels on Hill Street that could potentially be used as the project's haul route would be below the applicable criterion of 5 dBA CNEL during the concrete pour phase and below the most stringent criterion of 3 dBA CNEL during the grading phase. As such, the project's effect on daily average ambient noise levels related to construction traffic would be slightly perceptible during the one-day concrete pour phase and would be barely noticeable during the grading phase. Overall, impacts would be less than significant.

6.4.2 Project Operation

Operational Traffic

The project would generate new vehicle trips that would incrementally add to traffic levels on surrounding streets and could change the associated traffic noise levels. Based on the project's TA, it is estimated that the project would generate 150 trips in the AM peak hour trips and 181 trips in the PM peak hour trips (Fehr & Peers 2021). As discussed previously, while the TA does not directly analyze ADT on the roadway segments in the project site vicinity, the ADT volumes on these nearby roadway segments were estimated, based on guidance from Fehr & Peers, by assuming that the peak PM traffic volumes at the study intersections reported in the TA represented 10 percent of the ADT.[11]

Table 6-6 summarizes the predicted existing and future noise levels, both with and without the project, from the roadway segments considered in the TA. The results indicate that future traffic noise levels with the project along the studied roadway segments would be 1.3 to 4.1 dBA higher

[11] Personal communication with John Muggridge of Fehr & Peers on March 19, 2020.

than existing baseline conditions.[12] Project-generated traffic results indicate that the project would contribute no more than a 0.4 and 0.2 dBA increase over the existing baseline and future no project conditions, respectively. With respect to the community noise assessment, changes in noise levels of less than 3 dBA are generally not discernable to most people. As such, the small level of traffic noise increase resulting from the project is considered imperceptible to the human ear. Therefore, impacts associated with traffic noise levels from implementation of the project would be less than significant.

[12] It should be noted that increases in traffic noise between the future year and baseline conditions represent traffic from cumulative projects, general growth, and the proposed project. The existing plus project minus baseline and future with project minus future without project (Table 6-29) represent the projects contribution.

Table 6-6. Predicted Traffic Noise Levels

Roadway/Segment	Estimated Traffic Noise Levels at 50 feet from Roadway Centerline (dBA CNEL)						
	Existing (Baseline)	Existing with Project	Increase over Existing (Project Only)[a]	Future without Project	Future with Project	Increase over Existing (Cumulative)[a]	Increase over Future without Project[a]
11th Street							
West of Olive Street	58.3	58.5	0.1	60.8	60.8	2.5	0.1
East of Olive Street	57.7	58.0	0.3	60.0	60.2	2.5	0.2
West of South Hill Street	57.8	58.1	0.4	60.0	60.2	2.4	0.2
East of South Hill Street	57.7	58.0	0.3	59.9	60.1	2.4	0.2
12th Street							
West of Olive Street	55.2	55.5	0.2	59.3	59.3	4.1	0.1
East of Olive Street	54.6	55.0	0.3	56.6	56.8	2.2	0.2
West of South Hill Street	55.2	55.5	0.3	56.9	57.1	1.9	0.2
East of South Hill Street	55.9	56.0	0.2	57.3	57.4	1.6	0.1
Olive Street							
North of 11th Street	62.9	63.0	0.1	64.7	64.8	1.8	0.1
South of 11th Street	63.2	63.2	0.0	65.1	65.1	1.9	0.0
North of 12th Street	62.9	63.0	0.0	65.5	65.5	2.6	0.0
South of 12th Street	62.8	62.8	0.0	64.8	64.8	2.0	0.0
South Hill Street							
North of 11th Street	64.0	64.1	0.1	65.4	65.5	1.5	0.1
South of 11th Street	63.9	64.1	0.1	65.2	65.3	1.4	0.1
North of 12th Street	63.6	63.9	0.3	65.0	65.2	1.6	0.2
South of 12th Street	63.7	63.9	0.2	64.9	65.0	1.3	0.1

[a] Values representing noise increases may not add up exactly due to rounding.

Stationary Noise Sources

Once operational, the project would introduce stationary onsite noise sources at the project site. These would include the onsite parking structure, mechanical equipment (i.e., dry coolers and emergency generators), loading/unloading activities, and activities at the outdoor amenity areas (i.e., landscaped pool amenity deck on Level five; balconies on Level 39; and landscaped amenity roof deck on Level 40).

Parking Noise

The project would include a parking structure consisting of one subterranean levels and three levels of aboveground parking that provides up to 436 parking spaces (325 residential and 111 TORS parking spaces). The parking in the subterranean level would be fully enclosed and the aboveground parking levels would be screened from public view on the north and east side of the building while the south and west sides would be partially enclosed. Vehicular access to the parking structure would be provided at two ingress-egress points: one from the existing alley west of the building and one from South Hill Street. Activities at the parking structure would generate sporadic noise from vehicles starting, car doors slamming, car alarms, people talking, etc. The nearest existing noise-sensitive use to the project's parking structure is the Axis Apartments building located directly to the east, across South Hill Street, followed by the YWCA Greater Los Angeles campus building at 1020 South Olive Street located to the north of the project site. Aside from these nearest existing sensitive receptors, the future mixed-use DTLA South Park Project would also be located directly west of the alley adjacent to the project site and across from two of the ingress/egress points for the project's parking structure.

Based on the peak hour traffic volumes presented in the project's TA, vehicles traveling into and out of the project site would result in approximately 85 AM peak hour and 106 PM peak hour trips at the project's driveway on South Hill Street, and approximately 69 AM peak hour and 80 peak hour trips at the intersection of the alley and 11th Street. It is assumed that all peak hour vehicle trips at the alley and 11th Street driveway would be accessing the project's parking structure entrances off of the alley. For the purposes of this analysis, the PM peak-hour traffic volumes were used to estimate noise levels generated at the parking structure, as they are higher than the traffic volumes for the AM peak hour. Based on the PM peak hour traffic volumes at the parking structure entrances and the distance to the nearest off-site sensitive receptors, it was determined, using FTA's recommended methodology for stationary source general assessment, that the project's highest peak-hour vehicle trips would generate noise levels of approximately 42 dBA L_{eq} at the Axis Apartments building located directly to the east, 31 dBA L_{eq} at the YWCA Greater Los Angeles campus building located to the north, and 33 dBA L_{eq} at the nearest residential floor of the DTLA South Park development located to the west of the project site. As shown in Table 4-1, the existing daytime hourly noise level measured at the NM4 location where the Axis Apartments building is located is approximately 72 dBA L_{eq}, while the existing hourly average daytime noise level measured at the NM1 location that is in proximity to the YWCA building is 69 dBA L_{eq}. Additionally, the average hourly noise levels during nighttime hours were measured at 62 dBA L_{eq} at the NM1 location and 64 dBA L_{eq} at the NM2 location, which are representative of the noise environment in the immediate project area.[13] Thus, because the noise levels generated from the project's parking structure at the nearest off-site sensitive receptors are well below the existing ambient daytime and nighttime noise levels at these receptors, the noise levels generated by the project's parking-related activities would not result in any substantial increase in long-term noise levels at these off-site receptors. As these nearest receptors would not be exposed to a substantial increase in long-term noise levels from the project's parking structure, the noise levels experienced at receptors that are farther from the project site would also not be substantial. While other parking-related noise sources such as tire squeal and car alarms could also be generated within the project's parking structure, these noise sources only happen occasionally and the noise levels generated would not be of a magnitude that would present a nuisance unless sensitive land uses are located immediately adjacent to the parking structure. Although the future DTLA South Park Project building would be located adjacent to the alley to the west of the project site, the future residential uses at that building are set back approximately 72 feet from the edge of the alley and would be located on floors 7 to 60 of the building above six levels of podium parking above the ground floor. With the six-story parking structure located along the entire edge of the alley, this structure would also serve as a noise barrier for the future residential units from noise generated by the project's parking structure. Therefore, this impact would be less than significant.

Mechanical Equipment

As part of the project, noise-generating mechanical equipment at the project site would include numerous HVAC equipment located in mechanical rooms throughout the building, rooftop dry coolers, and emergency generators. As discussed previously, all mechanical rooms within the project building would be outfitted with sound attenuation measures to reduce noise levels at neighboring properties in accordance with Section 112.02 of the LAMC as part of PDF-NOI-1. The other operational equipment that may be audible at nearby sensitive receptors would be the four dry coolers (located on the roof top) and two emergency generators (located on the ground floor mechanical room).

Noise from the rooftop dry coolers would be generated when the equipment is in operation throughout the day. However, because the rooftop level where the dry coolers would be located is beyond 40-stories in height (approximately 451 feet from the ground level), the dry coolers would be situated much higher than the existing nearest sensitive receptor building, which is the seven-story Axis Apartments building located directly to the east of the project site. This vertical distance would attenuate noise levels generated by the dry coolers. Based on the manufacturer's specification sheet for the dry coolers, noise levels generated by a single dry cooler would be approximately 50 dBA at 50 feet. Given this reference noise level, the simultaneous operation of all four dry coolers on the rooftop would generate a composite noise level of approximately 56 dBA at 50 feet. Given this composite noise level and the distance from the approximate center of the project building's rooftop to the seven-story Axis Apartments building, the resulting noise level at this nearest receptor was estimated to be approximately 38 dBA L_{eq}. At the next nearest existing sensitive receptor, which is the seven-story YWCA of Greater Los Angeles campus building, the noise levels from the project's

[13] While existing nighttime ambient noise levels were only measured at the NM1 and NM2 locations shown in Figure 4-1, the measured noise levels at these two locations would still be representative of nighttime noise conditions in the Project study area as the identified offsite sensitive receptor locations to the Project also front the same roadways where the measurements were taken.

rooftop dry coolers would be approximately 36 dBA L_{eq}. Both the 38 dBA L_{eq} and 36 dBA L_{eq} noise levels that would result at the nearest sensitive receptors would be well below both the daytime and nighttime ambient noise levels in the project area and for the receptors (refer to Table 4-1). The future DTLA South Park development would include residential units on levels 7-60 of the building. As such, some of the residential uses located at the highest floors would have a direct line of sight to the project's dry coolers, with the nearest residences located approximately 186 feet (straight line distance) from the noise source. Noise levels from the project's rooftop dry coolers would be approximately 45 dBA L_{eq} at these nearest residences. Noise levels of this magnitude would not exceed the calculated existing daytime or nighttime ambient noise levels of 57 and 52 dBA L_{eq} at this receptor height and therefore would not be obtrusive at the exterior uses located in the DTLA South Park tower. It should also be noted that this noise level estimate is conservative as it does not account for any noise attenuation that may be provided by any screening or parapets at the rooftop. As an industry practice, the design of such mechanical equipment would often be provided with shielding that would further reduce its noise levels. Overall, the operation of the project's rooftop dry coolers would comply with Section 112.02 of the LAMC, which prohibits noise from air conditioning, refrigeration, heating, pumping, and filtering equipment from exceeding the ambient noise level on the premises of other occupied properties by more than 5 dBA, and would not generate substantial noise level increases at nearby off-site sensitive uses. As the two nearest existing receptors would not be exposed to a substantial increase in long-term noise levels from the project's rooftop dry coolers, nor would the closest future development, the noise levels experienced at other receptors farther from the project site would also not be substantial. As such, this impact would be less than significant.

The two emergency generators located on the ground-floor of the project building would be operated periodically for testing and maintenance purposes as well as during times of electrical power failure at the project site. As required under PDF-NOI-2, the mechanical room housing the emergency generators would be designed with sufficient noise attenuation features required to comply with Section 112.02 of the LAMC. These noise attenuation features, which would be selected when the specific generator equipment and design of the mechanical room are finalized, may include use of silencers, generator enclosures, additional room insulation, etc. For the purpose of conducting a quantitative analysis in this report, it is assumed that generator enclosures will be used in the mechanical room to attenuate the noise levels from the two generators. Based on the manufacturer's specification sheet for a generator enclosure, the generator's attenuated noise levels from the enclosure would be approximately 75 dBA at a distance of 23 feet. Under conditions where the two generators are operated concurrently, the resulting noise level would be 78 dBA at 23 feet. While the nearest existing sensitive receptor to the project's emergency generator room based on distance would be the Axis Apartments Building located to the east of the project, across South Hill Street, the emergency generator room is located on the westernmost side of the project building and thus the project building itself, in addition to the mechanical room and other adjacent intervening rooms (i.e., lobby and restaurant), would serve to adequately attenuate the noise levels resulting from operation of the generators to a level that would likely be inaudible at this receptor. The nearest existing receptors that would have a direct line-of-sight of the project's emergency generator room would be the YWCA of Greater Los Angeles campus building to the north and the Grand Lofts building at 1100 S. Grand Avenue to the west that are located approximately 340 feet and 445 feet, respectively, from the project's emergency generator room. Based on these distances, and taking into consideration that the mechanical room housing the generators would generally provide a minimum additional noise attenuation of 10 dBA, the resulting noise levels at these receptors would be approximately 45 dBA L_{eq} at the YWCA of Greater Los Angeles campus building and 42 dBA L_{eq} at the Grand Lofts building when the two generators are operating simultaneously. This noise level would be well below both the daytime and nighttime ambient noise levels in the project area and for these receptors (refer to Table 4-1). As discussed above, the future DTLA South Park Project would be located across the alley to the west of the project site. However, the residential uses at this future development would be located on levels 7–60 of the building and these residential floors would be set back from the building's perimeter at the alley. The nearest residential units at this receptor would be located approximately 127 feet from the location of the emergency generators. Based on the distance from the generators to the receiver, and a liberal estimate of 10 dB attenuation from the building shell, noise levels associated with the operation of the emergency generators would be approximately 53 dBA L_{eq}. As discussed above, NM2 would be representative of the immediate project area. The daytime noise level on the low end was 63 dBA L_{eq}, which would be well above the noise level produced by emergency generators. Nighttime noise levels could be as low as 54 dBA L_{eq} based on measurements at NM2. Therefore, if it were necessary to run generators at night, noise levels would be similar with respect to their intensity but would not dominate the noise environment. It should be further noted that noise levels from these emergency generators would not occur on a frequent basis or for prolonged periods of time at the project site, as their operation would mainly occur during electrical power outages that are often short-lived. Additionally, their operation for the purposes of testing and maintenance would also only occur for a limited duration over the course of a day and would generally would not take place during the more noise-sensitive nighttime hours. Thus, the operation of the project's emergency generators would not generate substantial noise level increases at nearby off-site sensitive uses. This impact would be less than significant.

Loading Area

A loading area serving the project's TORS and restaurant uses would be located on the ground level on the western side of the building that is adjacent to the alley. The ingress/egress point for delivery vehicles accessing this loading area would be from the alley. Noise-generating activities at this loading area would include truck movements and idling along with general loading/unloading operations. Based on previously measured noise level data collected at a loading dock serving a retail warehouse, noise levels generated by loading/unloading activities were measured at approximately 62 dBA L_{eq} at a distance of 66 feet. The nearest existing off-site sensitive receptors that would be exposed to noise levels generated by the project's loading area would be the YWCA of Greater Los Angeles campus building to the north and the Grand Lofts building to the west of the project site, which would be located approximately 354 feet and 445 feet from the project loading area, respectively.[14] Given these distances, the resulting noise levels at these off-site sensitive receptors would be approximately 37 and 45 dBA L_{eq}. The future residential uses at the DTLA South Park Project, which would be located as close as 127 feet from the project's loading area, would be exposed to noise levels of approximately 46 dBA L_{eq}. These noise levels would not exceed either the daytime or nighttime ambient noise levels measured in the project area and for these receptors (refer to Table 4-1). As such, the noise levels generated at the loading area serving the project would not result in any substantial increase in long-term noise levels at the nearest existing and future off-

[14] Although the nearest existing off-site sensitive receptor based on distance would be the Axis Apartments Building located to the east of the Project, across South Hill Street, the loading area is located on the westernmost side of the Project building and thus the Project building itself along with other occupied spaces on the ground-floor level (e.g., residential lobby), would serve to adequately attenuate the noise levels resulting from operation of the loading area to a level that would likely be inaudible at this receptor.

site receptors or at other sensitive receptors that are located farther from the project site. Therefore, this impact would be less than significant.

Outdoor Amenity Areas

The project would include outdoor residential amenity spaces at Levels five, 39, and 40 of the building. The pool amenity deck would be on Level five and would include pool deck and spa area, flexible lawn area, and lounge decks. While Level 39 would primarily consist of enclosed amenity rooms, outdoor spaces on that level would be provided by balconies on each side of the floor. Level 40 would feature an outdoor planting area and an associated outdoor deck as well as roof terraces. The closest existing noise-sensitive use to the project would be the seven-story Axis Apartments building located directly to the east, across South Hill Street, while the closest future noise-sensitive use to the project would be the 60-story mixed-use DTLA South Park Project located west of the project site across the alley. As such, the noise levels generated at the project's outdoor amenity areas would be most perceptible at these two nearest off-site receptors.

The outdoor amenity areas would be shared amongst the project's residents and TORS guests. Noise levels generated at these outdoor amenity areas would primarily consist of conversational speech between people. To conduct a conservative analysis for the nearest off-site receptor to the project site, it is assumed that the various outdoor amenity areas on Levels five, 39, and 40 would all be used concurrently by tenants and guests at full capacity. For this analysis scenario, the following assumptions regarding the number of people at each outdoor amenity area level and their voice levels at each floor was used:

- Level five Pool Amenity Deck – 374 people (half male/half female), with 50 percent of the people talking at a "raised" voice level at any given moment[15]
- Level 39 Balcony Areas – 41 people (half male/half female), with 50 percent of the people talking at a "raised" voice level at any given moment[16]
- Level 40 Tower Amenity Area – 458 people (half male/half female), with 50 percent of the people talking at a "raised" voice level at any given moment[17]

Based on the acoustical average distance from the nearest off-site sensitive receptor to each of the outdoor amenity areas listed above and published data for human speech noise levels, the resulting noise levels at the receptor were estimated. In addition, the amenity areas on Level five would also be equipped with an outdoor speaker system. As discussed previously, the purpose of the speaker system is to provide ambient background music only and would not be played at volumes that would dominate the noise environment where casual conversing amongst residents and guests would be difficult. The individual and combined noise levels generated by the project's outdoor amenity areas at the two nearest existing off-site sensitive receptors, which are the Axis Apartments building to the east and the YWCA of Greater Los Angeles campus building to the north of the project site, as well as the nearest future off-site sensitive receptors at the DTLA South Park Project are shown in Table 6-7.

[15] The occupant design capacity for the outdoor amenity areas on Level five is 374 people.
[16] The occupant design capacity for the balconies on Level 39 is 41 people.
[17] The design occupant capacity for the outdoor amenity area on Level 40 is 458 people.

As shown in Table 6-7, the combined noise levels generated by the project's outdoor amenity areas would not exceed the existing daytime or nighttime ambient noise level at these nearest off-site sensitive receptors to the project site by 5 dBA or more. As such, the project's outdoor amenity noise levels at all other off-site sensitive receptor locations that are located farther away would also be lower than those shown in Table 6-7. As such, this impact would be less than significant. Furthermore, it should be noted that the Level five outdoor amenity area would be installed with either a landscape or water barrier along the westerly, easterly, and southerly facades of the level as part of the project's design, which would increase the distance between the outdoor gathering areas from nearby off-site receptors that in turn would also help to further minimize noise levels at off-site receptors.

Table 6-7. Estimated Noise Levels from Project Outdoor Amenity Areas at Nearest Sensitive Receptor Locations

Noise Source	Estimated Noise Level at Sensitive Receptor (dBA L_{eq})		Existing Average Hourly Daytime (7 a.m. to 10 p.m.) Ambient Noise Level (dBA L_{eq})	Existing Daytime Ambient + Project (dBA L_{eq})	Exceed Ambient Noise Level by 5 dBA?	Existing Average Hourly Nighttime (10 p.m. to 7 a.m.) Ambient Noise Level (dBA L_{eq})	Existing Nighttime Ambient + Project (dBA L_{eq})	Exceed Ambient Noise Level by 5 dBA?
	Individual Sources	Combined Sources						
Axis Apartments Building								
Level five Pool Amenity Deck	57[a]							
Level 39 Balcony Areas	36	57	64[b]	65	No	59[b]	61	No
Level 40 Tower Amenity Area	46							
YWCA of Greater Los Angles Campus Building								
Level five Pool Amenity Deck	49[a]							
Level 39 Balcony Areas	33	50	66[c]	66	No	59[c]	59	No
Level 40 Tower Amenity Area	44							
DTLA South Park Project Building – 7th Level[d]								
Level five Pool Amenity Deck	56[a]							
Level 39 Balcony Areas	36	57	63[e]	64	No	58[e]	61	No
Level 40 Tower Amenity Area	46							
DTLA South Park Project Building – 40th Level[f]								

Noise Source	Estimated Noise Level at Sensitive Receptor (dBA L_{eq}) Individual Sources	Combined Sources	Existing Average Hourly Daytime (7 a.m. to 10 p.m.) Ambient Noise Level (dBA L_{eq})	Existing Daytime Ambient + Project (dBA L_{eq})	Exceed Ambient Noise Level by 5 dBA?	Existing Average Hourly Nighttime (10 p.m. to 7 a.m.) Ambient Noise Level (dBA L_{eq})	Existing Nighttime Ambient + Project (dBA L_{eq})	Exceed Ambient Noise Level by 5 dBA?
Level five Pool Amenity Deck	48	54	57[g]	59	**No**	52[g]	56	**No**
Level 39 Balcony Areas	42							
Level 40 Tower Amenity Area	53							

[a] Noise level accounts for operation of the outdoor speaker system.

[b] For the purpose of this analysis, which analyzes noise sources from the Project that occur during both daytime and nighttime hours, the existing average hourly daytime and nighttime ambient noise levels measured at NM2 (refer to Figure 4-1) are used to represent the existing ambient noise levels at the Axis Apartment building, as the short-term (i.e., 15 minute) measurement at this receptor (i.e., NM4) was only conducted during the daytime. Additionally, the use of the average hourly daytime noise level from NM2 (69 dBA L_{eq}) would also provide a more conservative analysis than the short-term daytime noise level measured by NM4 (72 dBA L_{eq}). As the existing daytime and nighttime levels measured at NM2 were conducted at the street level, these noise levels have been adjusted for the Axis Apartment building to take into account distance attenuation at the seventh floor of this building where receptors would be closest to the project's outdoor amenity areas.

[c] The existing average hourly daytime and nighttime ambient noise levels measured at NM1 (refer to Figure 4-1) are used to represent the existing ambient noise levels at the YWCA of Greater Los Angeles campus building. As the existing daytime and nighttime levels measured at NM1 were conducted at the street level, these noise levels have been adjusted for the YWCA of Greater Los Angeles campus building to take into account distance attenuation at the seventh floor of this building where receptors would be closest to the project's outdoor amenity areas.

[d] The 7th level of the future DTLA South Park Project is analyzed as it is the first level where residential uses would be located in the building.

[e] The existing average hourly daytime and nighttime ambient noise levels measured at NM2 (refer to Figure 4-1) are used to represent the existing ambient noise levels at the future DTLA South Park Project. As the existing daytime and nighttime levels measured at NM2 were conducted at the street level, these noise levels have been adjusted for the DTLA South Park Project to take into account distance attenuation at the seventh floor of this building where the closest residences to the project's Level five podium amenity area are located.

[f] The 40th level of the future DTLA South Park Project is analyzed as the residences on this level would be most exposed to noise levels generated at the outdoor amenity areas on both Levels 39 and 40 of the project building.

[g] Similar to the analysis for the 7th level at this future sensitive receptor, the existing daytime and nighttime ambient noise levels measured at NM2 were used and were adjusted to account for distance attenuation at the 40th floor of this building.

Composite Operational Noise Levels

The composite noise levels experienced by the nearby sensitive receptors due to all of the project's operational noise sources occurring concurrently are also evaluated to assess the potential maximum overall increase in ambient noise levels at these off-site receptor locations. For the purpose of this analysis, the composite noise levels generated during project operations are assessed at the nearest existing off-site sensitive receptors, which include the Axis Apartments building and the YWCA of Greater Los Angeles campus building located to the east and north of the project site, respectively, and the nearest future sensitive receptor, which is the DTLA South Park Project that is located west of the alley adjacent to the project site. These off-site receptor locations would experience noise levels generated by the project's parking structure, rooftop mechanical equipment, and outdoor amenity areas. Additionally, while the Axis Apartments building would be shielded by the project building itself from the noise generated at the loading area, the YWCA of Greater Los Angeles campus building would experience noise levels generated by this noise source as residents situated at the higher floors of this building would have a direct line-of-sight to this noise source. The proposed DTLA South Park Project would also be located in proximity to the project's loading area and would be exposed to noise levels from this noise source, although the resident floors would be located on levels 7 to 60 of this new building above six levels of parking and would be set back from the alley. As the project's emergency generators would only be operated during electrical power failures as well as periodically for testing and maintenance purposes, this equipment is not considered to be part of the project's daily operational noise sources and thus are not assessed as a contributor to the composite noise levels experienced by off-site receptors from project operations. The analysis of the project's composite operational noise levels is evaluated using the CNEL noise metric and is conducted using the following assumptions for each noise source:

- Outdoor Amenity Areas: Noise levels generated on levels five, 39, and 40 of the project building area are assumed to occur continuously between 7 a.m. to 10 p.m. and since there will be less activity at these outdoor areas during the late night, early a.m. hours, for four hours between 10 p.m. to 7 a.m.;
- Parking Structure: Noise levels that would be generated at the project parking structure by peak hour vehicle trips are assumed to occur continuously throughout the hours of 7 a.m. to 10 p.m. and since there will be less activity in the parking garage during the late night, early a.m. hours, for three hours between 10 p.m. to 7 a.m.;
- Rooftop Dry Coolers: Noise levels generated by the project's rooftop dry coolers are assumed to occur continuously for 24 hours per day; and
- Loading Area: Noise levels generated by the project's loading area are assumed to occur for four hours between 7 a.m. to 10 p.m. and one hour between 10 p.m. to 7 a.m.

It should be noted that this analysis of the project's composite operational noise levels is conservative in nature because it assumes that most of the project's stationary noise sources, with the exception of the loading area, are generating noise at the same time throughout the day. In practice, such occurrences are generally rare, as the timing of peak noise levels generated by one noise source typically does not coincide with that of another noise source. For instance, the highest noise levels from the project's parking structure are expected to be generated during the peak weekday morning and evening hours when residents depart for and return from work, which would not normally coincide with the hours when the project's residential tenants are expected to use the outdoor amenity areas. Nonetheless, for the purpose of conducting a conservative analysis, the composite noise levels generated from all of the project's onsite noise sources at the nearest off-site sensitive receptors have been estimated and are shown in Table 6-8.

Table 6-8. Composite Noise Levels from Unmitigated Project Operations at Nearby Sensitive Receptors

	Noise Levels (dBA CNEL)			
		YWCA of Greater Los Angeles campus building to the north of Project Site	DTLA South Park Project Building	
Operational Noise Source	**Axis Apartments building to the east of Project Site**		**7th Level**	**40th Level**
Outdoor Amenity Areas				
Level five Pool Amenity Deck[a]	61.0	52.6	60.5	51.9
Leve 39 Balcony Areas	40.0	37.4	40.0	46.1
Level 40 Tower Amenity Area	50.1	47.7	50.1	56.6
Parking Structure	45.6	33.5	35.7	30.0
Rooftop Equipment (Dry Coolers)	44.9	42.6	44.8	51.6
Loading Area	NA	35.5	44.4	43.8
Project-Related Traffic	49.2	46.4	45.3	38.7
Project Composite Noise Level	**61.8**	**55.0**	**61.2**	**59.2**
Existing Ambient Noise Level	67.3[b]	67.5[c]	66.3[d]	59.7[d]
Existing Ambient Plus Project Composite Noise Level	**68.4**	**67.8**	**67.5**	**62.5**
Increase Over Existing Ambient Noise Level Due to Project	1.1	0.2	1.2	2.8
Exceed 5 dBA?	No	No	No	No

[a] Noise level accounts for the operation of the outdoor speaker system.
[b] Existing 24-hour ambient noise level at Axis Apartments building is based on the long-term noise measurement conducted at the NM2 location (refer to Figure 4-1) and adjusted to take into account distance attenuation at the seventh floor of this building where receptors would be exposed to the highest noise levels generated from the project's operational noise sources.
[c] Existing 24-hour ambient noise level at YWCA of Greater Los Angeles campus building is based on the long-term noise measurement conducted at the NM1 location (refer to Figure 4-1) and adjusted to take into account distance attenuation at the seventh floor of this building where receptors would be exposed to the highest noise levels generated from the project's operational noise sources.
[d] Existing 24-hour ambient noise level at the future DTLA South Park Project location is based on the long-term noise measurement conducted at NM2 location (refer to Figure 4-1) and adjusted to take into account distance attenuation at the 7th and 40th floors where sensitive receptors would experience the highest noise levels from the project's operational noise sources.

As shown in Table 6-8, operation of the project would result in an increase in composite noise levels of 1.1 and 0.2 dBA CNEL at the Axis Apartments building and the YWCA of Greater Los Angeles campus building, which are the two nearest existing sensitive receptors to the project site. The future DTLA South Park Project would experience a maximum noise level increase of 2.8 dBA CNEL from the project's operational noise sources. None of these nearest receptors to the project site would experience an increase in ambient noise levels exceeding 5 dBA. As such, sensitive receptors that are located farther away from the project site would experience even lower composite noise levels as those shown in Table 6-8. Because noise levels at off-site sensitive receptors would not be exceeded by 5 dBA or more during project operations, this impact is less than significant.

Land Use/Noise Compatibility

The project would consist of a 40-story mixed-use building with TORS , residential, and commercial uses. Based on the noise measurement conducted at NM2, which would be representative of the immediate project area, a 24-hour noise level of 72 dBA CNEL was measured. This measured noise level, which was taken at the street level, would be representative of the noise level for the project's ground-floor commercial uses. Both the project's TORS and residential uses would be located on higher floors of the building, and as such noise levels at these rooms and dwelling units would be lower than what was measured at the street level. Given the urbanized area where the project site is located, the existing noise environment in the project vicinity is generally dominated by traffic noise on local streets. To take into account these traffic noise sources and the reflective nature of the project site environment from existing nearby buildings, the noise levels at the project's TORS rooms and dwelling units were conservatively estimated based on noise attenuation provided by distance for a line source, where noise levels are attenuated by approximately 3 dBA per doubling of distance. Given that the noise measurement conducted at NM2 was conducted at approximately 25 feet from the center of 11th Street and that the 6th and 14th floors of the project building would be located at heights of approximately 79 and 164 feet from the ground level, respectively, the ambient noise levels at these floor levels were estimated. By accounting for distance attenuation at the 6th and 14th floors of this building, i.e., the first level of the TORS rooms and dwelling units, respectively, it is estimated that the resulting ambient noise levels would be approximately 67 dBA CNEL at the 6th floor TORS uses and 64 dBA CNEL at the 14th floor residential uses. Based on the City's General Plan Noise Element land use/noise compatibility guidelines that are shown in Table 5-3, the ambient noise levels for the project's commercial, TORS and residential land uses would all fall under the
"conditionally acceptable" range, which indicates that conventional construction (i.e., closed windows and fresh air supply systems or air-conditioning) of new development would suffice. Given that the proposed commercial, TORS, and residential uses associated with the project would be provided with these conventional construction features, the proposed project would be compatible with the City's noise/land use compatibility guidelines. Thus, impacts related to the project's consistency with the City's General Plan's noise/land use compatibility guidelines would be less than significant.

Impact Noise-2: Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Project Construction

The operation of heavy construction equipment at the project site would generate groundborne vibration that could affect structures immediately adjacent to the project site. These vibration levels could also cause an annoyance to people at those locations. The closest existing structures in the vicinity of the project site include:

- Hill Grill restaurant at 1061 South Hill Street located approximately 55 feet from project site
- Los Angeles Job Corps Center at 215 West 11th Street located approximately 55 feet from the project site
- Belasco Theater building at 1050 South Hill Street located approximately 120 feet from the project site
- Axis Apartments building at 1100 South Hill Street located approximately 85 feet from the project site
- Bank of America building at 1127 South Hill Street located approximately 70 feet from the project site

In addition to these existing structures, the future DTLA South Park Project, which could potentially be in operation during project construction, would also be located directly west of the alley adjacent to the project site at 1120 S. Olive Street. For the purpose of this analysis, the Belasco Theater building is considered to fall under the "historic and some old buildings" category under Caltrans vibration guidelines as this theater was built back in 1926. The Axis Apartments building, which was recently constructed, and the future DTLA South Park Project building are both considered to be a "new residential structure," while the Los Angeles Job Corps Center and bank of America buildings are considered to be "modern industrial/commercial buildings under Caltrans vibration guidelines. The Hill Grill, which appears to be an older commercial structure, is conservatively evaluated as a "older residential structure" under the guidelines. Referring to the Caltrans guideline criteria in Table 5-1, the PPV thresholds for potential building damage from continuous and frequent intermittent sources are 0.5 in/s for both modern commercial buildings and new residential structures, 0.3 in/s for older residential structures, and 0.25 in/s for historic buildings.

As discussed previously, construction of the project would not require high-impact construction methods such as pile driving or blasting. As such, groundborne vibration would be generated from conventional heavy construction equipment, such as bulldozers, backhoes, loaders, and excavators, during project construction. Table 6-9 shows the estimated construction-related groundborne vibration levels that could occur at the nearest off-site structures to the project site, based on the use of either large (full-size) or smaller (mini-size) mobile equipment (e.g., bulldozers, backhoes, loaders), and the resulting vibration impacts at these locations related to potential building damage and human annoyance.

Table 6-9. Groundborne Vibration Levels at Off-Site Receptor Locations

Off-Site Receptor Location	Approximate Distance to Project Site (feet)	Large Mobile Equipment[a]			Small Mobile Equipment[b]		
		Estimated PPV (in/s)	Building Damage?[c]	Human Response[d]	Estimated PPV (in/s)	Building Damage?[c]	Human Response[d]
Hill Grill restaurant located north of Project Site	55	0.037	No	Barely perceptible	0.001	No	Below barely perceptible
Los Angeles Job Corps Center located north of Project Site	55	0.037	No	Barely perceptible	0.001	No	Below barely perceptible
Belasco Theater building located northeast of Project Site	120	0.016	No	Barely perceptible	0.001	No	Below barely perceptible
Axis Apartments building located east of Project Site	85	0.023	No	Barely perceptible	0.001	No	Below barely perceptible
Bank of America building located south of Project Site	70	0.029	No	Barely perceptible	0.001	No	Below barely perceptible
Future mixed-use DTLA South Park Project located west of the alley adjacent to the project site at 1120 S. Olive Street	19[e]	0.120	No	NA[f]	0.004	No	NA[f]
	24[g]	0.093	NA	Distinctly perceptible	0.003	NA	Below barely perceptible
	91[h]	0.022	No	Barely perceptible	0.001	No	Below barely perceptible

[a] Representative of any full-size/large excavator, dozer, loader, etc.
[b] Representative of any small excavator, dozer, loader, etc.
[c] Based on Caltrans vibration guidelines, the Belasco Theater is considered to be a historic buildings, the Axis Apartment building and future DTLA South Park Project are considered to be new residential structures, and the Los Angeles Job Corps Center and Bank of America buildings are considered to be modern commercial buildings. The Hill Grill, which is an older commercial structure, is considered to be an "older residential structure" for the purpose of providing a conservative analysis. Referring to the Caltrans guideline criteria shown in Table 5-1, the PPV thresholds for both modern commercial buildings and new residential structures are 0.5 in/s for, the PPV threshold for an older residential structure is 0.3 in/s, and the PPV threshold for a historic building is 0.25 in/s.
[d] Refer to Table 5-2 for Caltrans vibration annoyance criteria.
[e] The presented distance is from the project site to the six-story above-ground parking structure of the DTLA South Park Project.
[f] As the DTLA South Park Project's parking structure is not considered to be a sensitive receptor, only building damage from vibration is analyzed.
[g] As the DTLA South Park Project would have ground-floor retail uses, the vibration impacts related to human annoyance for these non-sensitive receptors are analyzed.
[h] The presented distance is from the project site to the residential floors of the DTLA South Park Project.

As shown in Table 6-9, even with the use of large, full-size mobile equipment at the project site the vibration levels generated during project construction would not exceed the applicable vibration criteria for building damage or human annoyance at the nearest surrounding existing and future off-site structures. Of the nearby receptors analyzed in Table 6-9, only the future ground-floor retail uses at the DTLA South Park Project would experience distinctly perceptible vibration levels, while all of the other receptors would experience vibration levels that are barely perceptible. While vibration during project construction would be distinctly perceptible at times at the future retail uses, these occurrences would only occur briefly throughout the day when a large mobile equipment is operating near the project site boundary directly across the alley from these uses. Once the equipment moves to another location within the project site that is farther away the vibration levels would dissipate rapidly and would be barely perceptible. Additionally, retail land uses are not considered to be vibration-sensitive uses as these locations do not involve people trying to relax or sleep, and patrons are generally transient visitors that do not stay for an extended amount of time. As shown in Table 6-9, the vibration levels at all of the nearby sensitive land uses to the project site would be barely perceptible. Consequently, off-site receptors farther from the project site would also not be exposed to excessive groundborne vibration levels during project construction. Therefore, impacts would be less than significant.

Project Operation

As the project is a mixed-use development a with TORS units, residential, and commercial uses, there would be no major sources of vibration resulting from operation of the project. While operation of onsite mechanical equipment such as HVAC equipment and exhaust fans could produce low levels of vibration, these vibration levels would only occur in the immediate area where the equipment is located within the project building and would not result in any impacts at nearby off-site structures. Given that the operation of construction equipment at the project site would not result in vibration levels that would exceed the applicable vibration criteria for building damage or human annoyance at the nearest surrounding off-site structures (refer to Table 6-9), any vibration levels generated by the project’s onsite mechanical equipment would also not result in perceptible vibration levels at nearby off-site structures. Therefore, impacts related to groundborne vibration and noise during project operations would be less than significant.

Impact Noise-3: 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 2 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 the vicinity of a private airstrip or airport land use plan or located within two miles of a public airport of public use airport. The nearest airport to the project site is the Hawthorne Municipal Airport located approximately 9 miles to the southwest, followed by the Los Angeles International Airport located approximately 10 miles to the southwest. Therefore, the project would not expose people residing or working in the project area to excessive noise levels generated from this airport, and no impacts would occur.

Chapter 7
Cumulative Conditions

Cumulative noise or vibration impacts can occur when two or more projects are under construction simultaneously or generate operational noise or vibration at the same time. Because noise and vibration are localized effects that decrease with distance from the source, significant cumulative impacts do not typically occur unless two or more projects are close to a single receptor. The presence of any natural or manmade barriers (e.g., hills, topography, walls, buildings) between a project site and a receptor will increase the rate of noise reduction over distance and will further reduce any cumulative noise levels.

Related projects in the vicinity of the noise- and vibration-sensitive receptors considered in this analysis include construction activities that could occur simultaneously with construction of the project, depending on project timing. For the reasons discussed above, construction noise and vibration levels at any single receptor are typically dominated by the closest construction activity. As a result, the chances of construction noise from more distant related project sites making a substantial contribution to overall noise levels at the same receptor is generally low. Nonetheless, incremental increases in total construction noise levels could occur. Based on the related projects list provided in the project's TA, the nearest related project to the project site would be the proposed mixed-use DTLA South Park Project at 1120 South Olive Street, which is west of the alley adjacent to the project site. Additionally, other related projects that are also located in the immediate proximity of the project site include the mixed-use project at 1105 South Olive Street located approximately 255 feet to the west, the mixed-use project at 1030 South Hill Street located approximately 330 feet to the northwest, and the mixed-use project at 1111 South Broadway located approximately 215 feet to the east. Given these distances of the nearest related projects in the immediate project site area, a substantial increase in construction noise levels in the project area could potentially occur should construction of these related projects occur at the same time as the project.[18] It should be noted that while the DTLA South Park Project and 1105 South Olive Street related project currently have a direct line-of-sight to the project site, the other related project locations identified (i.e., 1030 South Hill Street and 1111 South Broadway) currently have existing intervening buildings between those sites and the project site. Nonetheless, because some of these intervening structures are sensitive noise uses (e.g., residential), these uses would experience construction noise levels from both the related projects and the project should they be constructed at the same time. Thus, the concurrent construction of the project and nearby related projects could potentially contribute to cumulative construction noise impacts on existing noise-sensitive uses that are currently interspersed throughout the South Park neighborhood in proximity to the project site.

While cumulative construction noise levels could result, each of the related projects would be subject to LAMC Section 41.40, which limits the hours of allowable construction activities, and it is assumed that each of these projects would comply with this regulation. Each of the related projects would also be subject to Section 112.05 of the LAMC, which prohibits any powered equipment or powered hand tool from producing noise levels that exceed 75 dBA at a distance of 50 feet from the

[18] While the future DTLA South Park Project has been analyzed as a sensitive receptor that would be in operation during construction of the proposed project, there is also the potential that this related project could undergo construction during the same time as the proposed project.

noise source within 500 feet of a residential zone. Noise levels are only allowed to exceed this noise limitation under conditions where compliance is technically infeasible. With conformance to LAMC Sections 41.40 and 112.05, construction-related noise levels generated by related projects would not exceed City noise regulations or standards. As discussed under Impact Noise-1, the highest estimated construction-related noise levels that could result from the project would only exceed 75 dBA L_{eq} at the Axis Apartments building during the one-day concrete pour for the project's building foundation while the project's construction noise levels during the rest of the construction schedule would not exceed 75 dBA L_{eq} at any of the nearest surrounding sensitive receptors in the project area. Implementation of Mitigation Measure NOI-1 would reduce the noise levels at the Axis Apartments building by requiring the implementation of various noise-minimizing measures during the concrete pour activities, including the erection of an 8-foot-high temporary barrier around the project site. With implementation of Mitigation Measure NOI-1, technically feasible measures to reduce noise levels in accordance with Section 112.05 of the LAMC would be implemented and impacts would be reduced to a less-than-significant level. Additionally, because the project's one-day concrete pour would be conducted over approximately 20 hours and would involve construction activities occurring outside of the City's permissible construction hours (i.e., between 7:00 a.m. to 9:00 p.m.), the proposed project would also implement Mitigation Measure NOI-2 to require the obtainment of a Board of Police Commissioners Permit for the concrete pour activities. With the obtainment of this permit, the project's concrete pour activities would comply with the provisions of Section 41.40 of the LAMC and impacts associated with violation of the permissible construction hour provisions of the LAMC would be less than significant. Therefore, the project would not result in a cumulatively considerable contribution to construction noise impacts in the vicinity of the project.

With respect to operational noise, onsite noise levels associated with each of the related projects would be subject to the applicable City noise regulations (e.g., such as LAMC Sections 112.01, 112.02, 112.04, 114.02, and 114.03) to ensure that their noise levels would not adversely affect adjacent land uses. While the nearest related project to the project site would be the proposed mixed-use DTLA South Park Project at 1120 South Olive Street, which is directly adjacent to the project site to the west, compliance with City noise regulations would prohibit noise levels from this related project from exceeding the noise levels on adjacent properties by more than 5 dBA. Additionally, while the concurrent operation of the project and other related projects nearby could potentially result in a higher noise environment in the project area, existing sensitive receptors in the area would not necessarily experience a substantial increase in their ambient noise levels as each related project and the project would also serve as physical noise barriers against each other as well. For instance, the project's 40-story building would serve as an intervening structure that would reduce the operational noise levels generated by the DTLA South Park Project that would be experienced at the Axis Apartments building located further to the east. Cumulative mobile source noise impacts would occur primarily as a result of increased traffic on local roadways due to the project and related projects within the study area. However, as shown in Table 6-6, cumulative development along with the project (i.e., "future with project" traffic noise levels) would increase local noise levels by a maximum of 4.1 dBA CNEL at the roadway segment of 12th Street, west of Olive Street, which would be below the applicable threshold of 5.0 dBA CNEL at this roadway segment.[19] As the increase in noise levels at all of the remaining analyzed roadway segments would not exceed 3.0 dBA CNEL,

[19] The 5.0 dBA CNEL threshold is applicable to this roadway as the "future with project" traffic noise level would be 59.3 dBA CNEL, which falls under the "conditionally acceptable" category identified in Table 5-3 for sensitive land uses.

the noise increase on these roadway segments would also not be substantial. Therefore, the cumulative impact associated with mobile source noise would be less than significant.

Because vibration impacts are assessed based on instantaneous maximum peak levels (PPV), worst-case groundborne vibration levels from construction are generally determined by whichever individual piece of equipment generates the highest vibration levels. As a result, the vibration from multiple construction sites, even if the sites are near each other, does not generally combine to raise the maximum PPV, and the cumulative effect is no more severe than the effect from the largest individual contribution. Thus, even though the DTLA South Park Project would be directly adjacent to the project site and construction activities could potentially occur concurrently at these two sites, the maximum PPV generated by any single piece of heavy construction equipment at these two sites would not be combined to result in a greater PPV at any particular off-site receptor. When also taking into account the rapid attenuation of groundborne vibration (e.g., the vibration levels at all immediate nearby structures to the project site would be barely perceptible even with the use of large off-road mobile equipment [refer to Table 6-9]), the project and this nearest related project would not result in more severe vibration levels at nearby sensitive receptor locations should construction of this related project occur at the same time as the project. Therefore, future development would result in a less-than-significant cumulative impact in terms of groundborne vibration.

Chapter 8
References

8.1 References Cited

California Department of Transportation (Caltrans). 2013a. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. Final. CT-HWANP-RT-13-069.25.2. September 2013. Sacramento, CA.

———. 2013b. *Transportation and Construction Vibration Guidance Manual*. Final. CT-HWANP-RT-13-069.25.3. September 2013. Sacramento, CA.

City of Los Angeles. 2019. 1045 Olive Project Draft Environmental Impact Report. ENV-2016-4630-EIR. September. Available: https://planning.lacity.org/development-services/eir/1045-olive-project-0. Accessed July 1, 2020.

———. 1999. *Noise Element of the City of Los Angeles County General Plan*. February 3.

———. 2019. City of Los Angeles Municipal Code. Available: http://library.amlegal.com/nxt/gateway.dll/California/lamc/municipalcode?f=templates$fn=default.htm$3.0$vid=amlegal:losangeles_ca_mc. Accessed: May 2019.

Federal Highway Administration (FHWA). 2004. FHWA Traffic Noise Model®, Version 2.5 Look-Up Tables User's Guide. Final. FHWA-HEP-05-008 / DOT-VNTSC-FHWA-0406. December 2004. Washington, DC. Prepared by U.S. Department of Transportation, Research and Special Programs Administration, John A. Volpe National Transportation Systems Center Acoustics Facility. Cambridge, MA.

———. 2008. Roadway Construction Noise Model.

———. 2011. *Highway Traffic Noise: Analysis and Abatement Guidance.* December.

Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manua*l. September.

Fehr & Peers. 2020. *1111 S. Hill Street Transportation Assessment, Draft*. June.

Fehr & Peers. 2021. *1111 S. Hill Street Addendum Traffic Volumes, Draft*. July.

Harris, Cyril M. 1998. *Handbook of Acoustical Measurements and Noise Control*, Third Edition. McGraw-Hill, Inc.

Los Angeles City Planning Commission. 2019. Official Minutes, Thursday, February 28, 2019. Van Nuys City Council chambers. February 28. Available: https://planning.lacity.org/dcpapi/meetings/document/63456. Accessed: June 30, 2020.

Los Angeles County Airport Land Use Commission. 2003. *Bob Hope Airport – Burbank: Airport Influence Area*. Available: http://planning.lacounty.gov/aluc/airports. Accessed: June 2019.

Nelson, P. M. 1987. *Transportation Noise Reference Book*. Butterworth & Co. (Publishers) Ltd. Cambridge, United Kingdom.

U.S. Environmental Protection Agency. 1977. Speech Levels in Various Noise Environments (EPA-6700/1-77-025). May.

8.2 Persons Consulted

Gautrey, John, Integral Group. Encino, CA. June 29, 2020—personal communication to Terrance Wong.

Muggridge, John, Fehr & Peers. Los Angeles, CA. March 19, 2020—personal communication to Terrance Wong.

Martinez , Lisa Sr. Designer, MVE and Partners, Los Angeles, May 12, 2021 personal communication to Terrance Wong.

Appendix A

Construction, On-Site Operational, and Traffic Noise Levels

Construction Noise Analysis - Demolition

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA	Lmax, dBA
Item No.	Description								
18	Excavator	80.7	0.4	2	50	hard	0	80	81
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
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				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
	Combined Equipment							***80***	***81***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Construction Noise Analysis - Site Preparation

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA	Lmax, dBA
Item No.	Description								
18	Excavator	80.7	0.4	1	50	hard	0	77	81
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
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				1	50	hard	0		
				1	50	hard	0		
	Combined Equipment							***77***	***81***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Construction Noise Analysis - Grading

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA	Lmax, dBA
Item No.	Description								
18	Excavator	80.7	0.4	1	50	hard	0	77	81
61	Truck, Dump	76.5	0.4	2	50	hard	0	76	77
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
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				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
	Combined Equipment							***79***	***81***

1. Obtained or estimated from:
FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
"Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
"Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Construction Noise Analysis - Building Foundation

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA	Lmax, dBA
Item No.	Description								
41	Pump, Concrete (or concrete p	81.4	0.2	4	50	hard	0	80	81
31	Mixer, Concrete (or concrete m	78.8	0.4	8	50	hard	0	84	79
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
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				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
	Combined Equipment							***85***	***81***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Construction Noise Analysis - Building Construction

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA	Lmax, dBA
Item No.	Description								
30	Man Lift	74.7	0.2	3	50	hard	0	72	75
41	Pump, Concrete (or concrete p	81.4	0.2	1	50	hard	0	74	81
12	Crane	80.6	0.16	1	50	hard	0	73	81
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
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				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
	Combined Equipment							***78***	***81***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Construction Noise Analysis - Paving

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA	Lmax, dBA
Item No.	Description								
34	Paver	77.2	0.5	1	50	hard	0	74	77
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
				1	50	hard	0		
	Combined Equipment							***74***	***77***

1. Obtained or estimated from:
FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
"Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
"Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Dist. Attenuation Coefficient: 20

Receptor	Receiver Type/Location	Construction Phase	Closest Approximate Distance	Furthest Approximate Distance	Acoustical Average Distance	Ref. Noise Level @ 50ft. Leq(h), dBA	Dist. Excess Attenuation, dB	Barrier Attenuation, dB	Construction Noise Level - Leq, dBA	Highest Unmitigated Construction Noise Level (Leq, dBA)
1	MFR - SE of project site at 1100 S. Hill St.	Demolition	85	240	143	80	0	0	71	76
		Site Prep & Grading	85	240	143	77	0	0	68	
		Grading	85	240	143	79	0	0	70	
		Building Foundation	85	240	143	85	0	0	76	
		Building Construction	85	240	143	78	0	0	69	
		Paving	65	250	127	74	0	0	66	
2	Proper Hotel at 1100 S. Broadway	Demolition	395	545	464	80	0	5	56	61
		Site Prep & Grading	395	545	464	77	0	5	53	
		Grading	395	545	464	79	0	5	55	
		Building Foundation	395	545	464	85	0	5	61	
		Building Construction	395	545	464	78	0	5	54	
		Paving	375	555	456	74	0	5	50	
3	Hoxton Hotel at 1060 S. Broadway	Demolition	415	615	505	80	0	0	60	65
		Site Prep & Grading	415	615	505	77	0	0	57	
		Grading	415	615	505	79	0	0	59	
		Building Foundation	415	615	505	85	0	0	65	
		Building Construction	415	615	505	78	0	0	58	
		Paving	395	625	497	74	0	0	54	
4	YWCA campus north of project site at 1020 S. Olive St.	Demolition	280	490	370	80	0	5	58	63
		Site Prep & Grading	280	490	370	77	0	5	55	
		Grading	280	490	370	79	0	5	57	
		Building Foundation	280	490	370	85	0	5	63	
		Building Construction	280	490	370	78	0	5	56	
		Paving	275	495	369	74	0	5	52	
5	MFR - North of project site at 1001 S. Olive St.	Demolition	425	660	530	80	0	5	54	59
		Site Prep & Grading	425	660	530	77	0	5	51	
		Grading	425	660	530	79	0	5	53	
		Building Foundation	425	660	530	85	0	5	59	
		Building Construction	425	660	530	78	0	5	52	
		Paving	405	665	519	74	0	5	49	
6	MFR - NW of project site at 1050 S, Grand Ave.	Demolition	435	635	526	80	0	0	60	65
		Site Prep & Grading	435	635	526	77	0	0	57	
		Grading	435	635	526	79	0	0	59	
		Building Foundation	435	635	526	85	0	0	65	
		Building Construction	435	635	526	78	0	0	58	
		Paving	420	650	522	74	0	0	54	
7	MFR - NW of project site at 1100 S. Grand Ave.	Demolition	445	590	512	80	0	0	60	65
		Site Prep & Grading	445	590	512	77	0	0	57	
		Grading	445	590	512	79	0	0	59	
		Building Foundation	445	590	512	85	0	0	65	
		Building Construction	445	590	512	78	0	0	58	
		Paving	430	615	514	74	0	0	54	

8	MFR - West of project site at 1120 S. Grand Ave.	Demolition	490	645	562	80	0	0	59	64
		Site Prep & Grading	490	645	562	77	0	0	56	
		Grading	490	645	562	79	0	0	58	
		Building Foundation	490	645	562	85	0	0	64	
		Building Construction	490	645	562	78	0	0	57	
		Paving	475	660	560	74	0	0	53	
9	Future MRF - West of project site at 1120 S. Olive St.	Demolition	125	259	180	80	0	0	69	74
		Site Prep & Grading	125	259	180	77	0	0	66	
		Grading	125	259	180	79	0	0	68	
		Building Foundation	125	259	180	85	0	0	74	
		Building Construction	125	259	180	78	0	0	67	
		Paving	120	275	182	74	0	0	63	
10	Future MFR - Northeast of project site at 1045 Olive St.	Demolition	265	485	359	80	0	10	53	58
		Site Prep & Grading	265	485	359	77	0	10	50	
		Grading	265	485	359	79	0	10	52	
		Building Foundation	265	485	359	85	0	10	58	
		Building Construction	265	485	359	78	0	10	51	
		Paving	715	495	595	74	0	10	42	

Estimated Ambient Noise Levels at Receptors and Project Site

1045 Olive Project Noise Data:	**Noise Level (CNEL)**	**Daytime Average Hourly Leq**	**Nighttime Average Hourly Leq**	**Height (ft)**	**Approximate distance to roadway center (ft)**	**Approximate distance to roadway center (ft)**
LT Noise Measurement 2	72	69	64	5	25	25.49509757
LT Noise Measurement 1	70.7	69	62	5	38	38.32753579

Sensitive Receptor	Receptor height (ft)	Dist from building property line to middle of 11th St.	Approximate nearest distance to noise source	Estimated ambient noise level (CNEL)	Daytime Leq	Nighttime Leq
	89.6	24	93	66	63	58
1. Mack Urban - 1120 S. Olive St.	426.4	24	427	60	57	52
	441.4	24	442	60	57	52
2. MFR - SE of project site at 1100 S.	67	24	71	67	64	59
3. YWCA - 1020 S Olive Street	70	36	79	68	66	59
Project Site - 10th Floor	110	25	113	65	62	57
Project Site - 17th Floor	180	25	182	63	60	55

Residential Outdoor Amenity Areas

	Male	Female	Children
Voice Level	**(dBA Leq)[a]**	**(dBA Leq)[a]**	**(dBA Leq)[a]**
Casual	53	50	53
Normal	58	55	58
Raised	65	62	65
Loud	75	71	74
Shout	88	82	82

[a] Noise level measured at 1 meter

Source: Cyril M. Harris. 1998. *Handbook of Acoustical Measurements and Noise Control*, Third Edition. McGraw-Hill, Inc.

U.S. EPA. 1977. Speech Levels in Various Noise Environments (EPA-6700/1-77-025). May.

Project On-Site Noise Sources:

Level 8 Podium Amenty Area (10,683 sf)

Total number of people: 477 (477 is the expected occupant capacity for this amenity area)

Number of people talking simultaneously: 238.5

Receptor	Distance[a]	Source	Leq @ 1 meter (3.28 ft.), dBA	Number of Sources	Estimated Noise Level (dBA Leq) at 1 meter (3.23 ft.)	Combined Leq @ Receptor, dBA
MFR - SE of project site at 1100 S. Hill St.	140	Male raised voice	65	119.25	85.76	54.92384866
		Female raised voice	62	119.25	82.76	
	-	Speaker System	-	-	-	54.92384866
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	123	Male raised voice	65	119.25	85.76	56.04830715
		Female raised voice	62	119.25	82.76	
		Speaker System	-	-		56.04830715
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	373	Male raised voice	65	119.25	85.76	46.41223274
		Female raised voice	62	119.25	82.76	
		Speaker System	-	-	-	46.41223274
YWCA Greater Los Angeles campus building at 1020 S Olive Street	384	Male raised voice	65	119.25	85.76	46.15978489
		Female raised voice	62	119.25	82.76	
	-	Speaker System	-	-	-	46.15978489

[a] The distance is from the acoustical average distance between the noise source and receptor.

Level 43 Tower Amenity Area (8,661 sf)

Total number of people: 440 (Assumed 387 based on sf of amenity area compared to Level 8 Amenity Area)

Number of people talking simultaneously: 220

Receptor	Distance[a]	Source	Leq @ 1 meter (3.28 ft.), dBA	Number of Sources	Estimated Noise Level (dBA Leq) at 1 meter (3.23 ft.)	Combined Leq @ Receptor, dBA
MFR - SE of project site at 1100 S. Hill St.	404	Male raised voice	65	110	85.41	45.36812505
		Female raised voice	62	110	82.41	
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	392	Male raised voice	65	110	85.41	45.63003101
		Female raised voice	62	110	82.41	
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	174	Male raised voice	65	110	85.41	52.68476738
		Female raised voice	62	110	82.41	
YWCA Greater Los Angeles campus building at 1020 S Olive Street	510	Male raised voice	65	110	85.41	43.34434883
		Female raised voice	62	110	82.41	

[a] The distance is from the acoustical average distance between the noise source and receptor.

Leve 42 Amenity Deck Area (6,339 sf)

Total number of people: 11 (Assumed 283 based on sf of amenity area compared to Level 8 Amenity Area)

Number of people talking simultaneously: 5.5

Receptor	Distance[a]	Source	Leq @ 1 meter (3.28 ft.), dBA	Number of Sources	Estimated Noise Level (dBA Leq) at 1 meter (3.23 ft.)	Combined Leq @ Receptor, dBA
MFR - SE of project site at 1100 S. Hill St.	390	Male raised voice	65	3	69.39	29.6538603
		Female raised voice	62	3	66.39	
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	379	Male raised voice	65	3	69.39	29.90236824
		Female raised voice	62	3	66.39	
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	174	Male raised voice	65	3	69.39	36.66416747
		Female raised voice	62	3	66.39	
YWCA Greater Los Angeles campus building at 1020 S Olive Street	499	Male raised voice	65	3	69.39	27.51314152
		Female raised voice	62	3	66.39	

[a] The distance is from the acoustical average distance between the noise source and receptor.

Combined Outdoor Noise Levels:

Receptor	Noise Level (dBA Leq)	Existing Daytime (7am - 10pm) Ambient Noise Level (dBA Leq)	Existing Daytime Ambient + Project (dBA Leq)	**Increase over Ambient (dBA Leq)**	Existing Nighttime (10pm - 7am) Ambient Noise Level (dBA Leq)	Existing Nighttime Ambient + Project (dBA Leq)	**Increase over Ambient (dBA Leq)**
MFR - SE of project site at 1100 S. Hill St.	58	64	65	0.9	59	62	2.4
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	59	63	65	1.4	58	62	3.5
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42 floor	54	57	59	2.1	52	56	4.7
YWCA Greater Los Angeles campus building at 1020 S Olive Street	50	66	66	0.1	59	59	0.6

Parking Garage Noise Levels:

Leq(h) = SELref + 10log(N_A/1000) - 35.6

Leq(h) = hourly Leq noise level at 50 feet
SELref = reference noise levcel for stationary noise source represented in sound expsoure level (SE
NA = number of automobiles per hour

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, Se

Hill Street Parking Structure Entrance:

SELref (dBA):	92
N_A:	111
Leq(h) @ 50ft.:	**46.9**

Alley Parking Structure Entrance:

SELref (dBA):	92
N_A:	80
Leq(h) @ 50ft.:	**45.4**

		Estimated Noise Levels (dBA Leq)	
Receptor	Distance[a]	Individual Sources	Composite
MFR - SE of project site at 1100 S. Hill St.	85	42.24	42.2
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	124	32.54	32.5
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	450	26.35	26.3
YWCA Greater Los Angeles campus building at 1020 S Olive Street	280	30.47	30.5
MFR - NW of project site at 1100 S. Grand Ave.	445	26.44	26.5

[a] Distance is from receptor to Project parking garage

Rooftop Dry Coolers:

Single 200-ton dry cooler unit:

	dBA
Sound Power:	82
Directivity Factor Q:	2
Sound Pressure @ 50ft:	50
Project Dry Cooler Unit Quanity:	4
Composite HVAC Noise:	56.4

	Distance (ft.)	Noise Attenuation[a]	Noise Level
MFR - SE of project site at 1100 S. Hill St.	434.89	0	37.59
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	428.55	0	37.72
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42 Floor	184.50	0	45.04
YWCA Greater Los Angeles campus building at 1020 S Olive Street	532.51	0	35.83

[a] Does not accounts for noise attentuation from parapet for conservative analysis.

Loading Area:

	dBA Leq	Distance (ft.)
Reference Noise Level:	61.8	66

	Distance (ft.)	Noise Attenuationa	Noise Level
MFR - SE of project site at 1100	240	-10	40.59
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	124	-10	46.32
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	453	0	45.07
YWCA Greater Los Angeles campus building at 1020 S Olive Street	344	-10	37.46
MFR - NW of project site at 1100 S. Grand Ave.	445	0	45.22

Emergency Generator:

	dBA Leq	Distance (ft.)
Reference Noise Level:	75	22.96
Number of generators onsite:	2	
Composite noise level:	78	

	Distance (ft.)	Noise Attenuationa	Noise Level
MFR - SE of project site at 1100	240	-10	47.63
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St.	124	-10	53.36
YWCA Greater Los Angeles campus building at 1020 S Olive Street	280	-10	46.29
MFR - NW of project site at 1100 S. Grand Ave.	445	-10	42.26

*Emergency generator would be located in a mechanical room within the project building.

Composite Noise Levels from Project Operations

Noise Source: Level 8 Podium Amenty Area

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	54.9	**59.0**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	56.0	**60.1**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	46.4	**50.5**	4	12	3
YWCA Greater Los Angeles campus building at 1020 S Olive Street	46.2	**50.2**	4	12	3

Noise Source: Level 43 Tower Amenity Area

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	45.4	**49.5**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	45.6	**49.7**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42 Floor	52.7	**56.8**	4	12	3
YWCA Greater Los Angeles campus building at 1020 S Olive Street	43.3	**47.4**	4	12	3

Noise Source: Level 8 Podium Outdoor Speaker System

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	54.9	**59.0**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	56.0	**60.1**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42 Floor	46.4	**50.5**	4	12	3

YWCA Greater Los Angeles campus building at 1020 S Olive Street	46.2	**50.2**	4	12	3

Noise Source: Level 42 Tower Amenity Area

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	29.7	**33.7**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	29.9	**34.0**	4	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42 Floor	36.7	**40.8**	4	12	3
YWCA Greater Los Angeles campus building at 1020 S Olive Street	27.5	**31.6**	4	12	3

Noise Source: Parking Structure

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	42.2	**45.6**	3	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	32.5	**35.9**	3	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	26.3	**29.7**	3	12	3
YWCA Greater Los Angeles campus building at 1020 S Olive Street	30.5	**33.8**	3	12	3

Noise Source: Rooftop Dry Coolers

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	37.59	**44.3**	9	12	3
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	37.72	**44.4**	9	12	3

Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42 Floor	45.04	**51.7**	9	12	3
YWCA Greater Los Angeles campus building at 1020 S Olive Street	35.83	**42.5**	9	12	3

Noise Source: Loading Area

Receptor	Noise Source Hourly Leq	CNEL	Nighttime Hours Active	Daytime Hours Active	Evening Hours Active
MFR - SE of project site at 1100 S. Hill St.	40.59	**38.9**	1	3	1
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th Floor	46.32	**44.6**	1	3	1
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th Floor	45.07	**43.4**	1	3	1
YWCA Greater Los Angeles campus building at 1020 S Olive Street	37.46	**35.7**	1	3	1

Receptor	Noise Levels (dBA CNEL) On-Site Noise Sources[a]	Project-Only Traffic Noise Level	Existing Ambient Noise[b]	Existing Plus Project Composite Noise Level	Project Increase
MFR - SE of project site at 1100 S. Hill St.	62.4	49.4	67.5	68.7	1.2
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 7th floor	63.5	45.3	66.3	68.1	1.8
Future MFR (Mack Urban) - W of project site at 1120 S. Olive St. - 42th floor	59.5	38.5	59.5	62.5	3.0
YWCA Greater Los Angeles campus building at 1020 S Olive Street	54.7	46.4	67.5	67.8	0.2

This spreadsheet calculates traffic noise levels based on TNM Version 2.5 Lookup Tables.

**** Type in yellow cells only.**

Traffic Data:

- Enter ADT Traffic
- Enter Loudest-hour Traffic

Units:

- Metric
- English

Calculate

Link	Roadway	Segment Location	Hard or Soft Ground (H or S)	BARRIER Present 1=yes	BARRIER Height min. 7 ft. max. 32 ft.	BARRIER Distance 35 ft. or 100 ft.	Total Daily Traffic Volumes (ADT)	Traffic Mix Number #	Traffic Mix Description	Vehicle Speed mph max. 80	Sound Levels at Receiver Locations: Distance feet, min. 33 max. 1000	Sound Levels at Receiver Locations: dB CNEL
1	S. Olive Street (Existing)	North of 11th St.	H				10,370	1	Generic - Arterial Roadways (From	30	50	62.9
2	S. Olive Street (Existing)	South of 11th St.	H				11,050	1	Generic - Arterial Roadways (From	30	50	63.2
3	S. Olive Street (Existing)	North of 12th St.	H				10,380	1	Generic - Arterial Roadways (From	30	50	62.9
4	S. Olive Street (Existing)	South of 12th St.	H				10,060	1	Generic - Arterial Roadways (From	30	50	62.8
5	S. Hill Street (Existing)	North of 11th St.	H				13,260	1	Generic - Arterial Roadways (From	30	50	64.0
6	S. Hill Street (Existing)	South of 11th St.	H				13,040	1	Generic - Arterial Roadways (From	30	50	63.9
7	S. Hill Street (Existing)	North of 12th St.	H				12,180	1	Generic - Arterial Roadways (From	30	50	63.6
8	S. Hill Street (Existing)	South of 12th St.	H				12,350	1	Generic - Arterial Roadways (From	30	50	63.7
9	11th Street (Existing)	West of Olive St.	H				4,890	4	Generic - Local (From Local/Lodi)	25	50	58.3
10	11th Street (Existing)	East of Olive St.	H				4,210	4	Generic - Local (From Local/Lodi)	25	50	57.7
11	11th Street (Existing)	West of Hill St.	H				4,290	4	Generic - Local (From Local/Lodi)	25	50	57.8
12	11th Street (Existing)	East of Hill St.	H				4,230	4	Generic - Local (From Local/Lodi)	25	50	57.7
13	12th Street (Existing)	West of Olive St.	H				2,320	4	Generic - Local (From Local/Lodi)	25	50	55.2
14	12th Street (Existing)	East of Olive St.	H				2,000	4	Generic - Local (From Local/Lodi)	25	50	54.6
15	12th Street (Existing)	West of Hill St.	H				2,310	4	Generic - Local (From Local/Lodi)	25	50	55.2
16	12th Street (Existing)	East of Hill St.	H				2,700	4	Generic - Local (From Local/Lodi)	25	50	55.9

Link	Roadway	Segment Location	Hard or Soft Ground (H or S)	BARRIER Present 1=yes	BARRIER Height min. 7 ft. max. 32 ft.	BARRIER Distance 35 ft. or 100 ft.	Total Daily Traffic Volumes **(ADT)**	Traffic Mix Number #	Traffic Mix Description	Vehicle Speed mph max. 80	Sound Levels at Receiver Locations Distance feet, min. 33 max. 1000	Sound Levels at Receiver Locations dB CNEL
17	**S. Olive Street (Existing with Project)**	**North of 11th St.**	H				10,610	1	Generic - Arterial Roadways (From	30	50	**63.0**
18	**S. Olive Street (Existing with Project)**	**South of 11th St.**	H				11,100	1	Generic - Arterial Roadways (From	30	50	**63.2**
19	**S. Olive Street (Existing with Project)**	**North of 12th St.**	H				10,430	1	Generic - Arterial Roadways (From	30	50	**63.0**
20	**S. Olive Street (Existing with Project)**	**South of 12th St.**	H				10,150	1	Generic - Arterial Roadways (From	30	50	**62.8**
21	**S. Hill Street (Existing with Project)**	**North of 11th St.**	H				13,560	1	Generic - Arterial Roadways (From	30	50	**64.1**
22	**S. Hill Street (Existing with Project)**	**South of 11th St.**	H				13,460	1	Generic - Arterial Roadways (From	30	50	**64.1**
23	**S. Hill Street (Existing with Project)**	**North of 12th St.**	H				12,960	1	Generic - Arterial Roadways (From	30	50	**63.9**
24	**S. Hill Street (Existing with Project)**	**South of 12th St.**	H				12,830	1	Generic - Arterial Roadways (From	30	50	**63.9**
25	**11th Street (Existing with Project)**	**West of Olive St.**	H				5,060	4	Generic - Local (From Local/Lodi)	25	50	**58.5**
26	**11th Street (Existing with Project)**	**East of Olive St.**	H				4,570	4	Generic - Local (From Local/Lodi)	25	50	**58.0**
27	**11th Street (Existing with Project)**	**West of Hill St.**	H				4,690	4	Generic - Local (From Local/Lodi)	25	50	**58.1**
28	**11th Street (Existing with Project)**	**East of Hill St.**	H				4,590	4	Generic - Local (From Local/Lodi)	25	50	**58.0**
29	**12th Street (Existing with Project)**	**West of Olive St.**	H				2,450	4	Generic - Local (From Local/Lodi)	25	50	**55.5**
30	**12th Street (Existing with Project)**	**East of Olive St.**	H				2,170	4	Generic - Local (From Local/Lodi)	25	50	**55.0**
31	**12th Street (Existing with Project)**	**West of Hill St.**	H				2,480	4	Generic - Local (From Local/Lodi)	25	50	**55.5**
32	**12th Street (Existing with Project)**	**East of Hill St.**	H				2,830	4	Generic - Local (From Local/Lodi)	25	50	**56.0**

Link	Roadway	Segment Location	Hard or Soft Ground (H or S)	BARRIER Present 1=yes	BARRIER Height min. 7 ft. max. 32 ft.	BARRIER Distance 35 ft. or 100 ft.	Total Daily Traffic Volumes **(ADT)**	Traffic Mix Number #	Traffic Mix Description	Vehicle Speed mph max. 80	Sound Levels at Receiver Locations Distance feet, min. 33 max. 1000	Sound Levels at Receiver Locations dB CNEL
65	**S. Olive Street (Future without Project)**	**North of 11th St.**	H				15,700	1	Generic - Arterial Roadways (From	30	50	**64.7**
66	**S. Olive Street (Future without Project)**	**South of 11th St.**	H				17,180	1	Generic - Arterial Roadways (From	30	50	**65.1**
67	**S. Olive Street (Future without Project)**	**North of 12th St.**	H				18,770	1	Generic - Arterial Roadways (From	30	50	**65.5**
68	**S. Olive Street (Future without Project)**	**South of 12th St.**	H				15,840	1	Generic - Arterial Roadways (From	30	50	**64.8**
69	**S. Hill Street (Future without Project)**	**North of 11th St.**	H				18,360	1	Generic - Arterial Roadways (From	30	50	**65.4**
70	**S. Hill Street (Future without Project)**	**South of 11th St.**	H				17,710	1	Generic - Arterial Roadways (From	30	50	**65.2**
71	**S. Hill Street (Future without Project)**	**North of 12th St.**	H				16,840	1	Generic - Arterial Roadways (From	30	50	**65.0**
72	**S. Hill Street (Future without Project)**	**South of 12th St.**	H				16,350	1	Generic - Arterial Roadways (From	30	50	**64.9**
73	**11th Street (Future without Project)**	**West of Olive St.**	H				8,720	4	Generic - Local (From Local/Lodi)	25	50	**60.8**
74	**11th Street (Future without Project)**	**East of Olive St.**	H				7,240	4	Generic - Local (From Local/Lodi)	25	50	**60.0**
75	**11th Street (Future without Project)**	**West of Hill St.**	H				7,240	4	Generic - Local (From Local/Lodi)	25	50	**60.0**
76	**11th Street (Future without Project)**	**East of Hill St.**	H				7,130	4	Generic - Local (From Local/Lodi)	25	50	**59.9**
77	**12th Street (Future without Project)**	**West of Olive St.**	H				6,120	4	Generic - Local (From Local/Lodi)	25	50	**59.3**
78	**12th Street (Future without Project)**	**East of Olive St.**	H				3,190	4	Generic - Local (From Local/Lodi)	25	50	**56.5**
79	**12th Street (Future without Project)**	**West of Hill St.**	H				3,500	4	Generic - Local (From Local/Lodi)	25	50	**56.9**
80	**12th Street (Future without Project)**	**East of Hill St.**	H				3,810	4	Generic - Local (From Local/Lodi)	25	50	**57.3**

Link	Roadway	Segment Location	Hard or Soft Ground (H or S)	BARRIER Present 1=yes	BARRIER Height min. 7 ft. max. 32 ft.	BARRIER Distance 35 ft. or 100 ft.	Total Daily Traffic Volumes **(ADT)**	Traffic Mix Number #	Traffic Mix Description	Vehicle Speed mph max. 80	Sound Levels at Receiver Locations Distance feet, min. 33 max. 1000	Sound Levels at Receiver Locations dB CNEL
81	**S. Olive Street (Future with Project)**	**North of 11th St.**	H				15,940	1	Generic - Arterial Roadways (From	30	50	**64.8**
82	**S. Olive Street (Future with Project)**	**South of 11th St.**	H				17,230	1	Generic - Arterial Roadways (From	30	50	**65.1**
83	**S. Olive Street (Future with Project)**	**North of 12th St.**	H				18,820	1	Generic - Arterial Roadways (From	30	50	**65.5**
84	**S. Olive Street (Future with Project)**	**South of 12th St.**	H				15,930	1	Generic - Arterial Roadways (From	30	50	**64.8**
85	**S. Hill Street (Future with Project)**	**North of 11th St.**	H				18,660	1	Generic - Arterial Roadways (From	30	50	**65.5**
86	**S. Hill Street (Future with Project)**	**South of 11th St.**	H				18,130	1	Generic - Arterial Roadways (From	30	50	**65.3**
87	**S. Hill Street (Future with Project)**	**North of 12th St.**	H				17,620	1	Generic - Arterial Roadways (From	30	50	**65.2**
88	**S. Hill Street (Future with Project)**	**South of 12th St.**	H				16,830	1	Generic - Arterial Roadways (From	30	50	**65.0**
89	**11th Street (Future with Project)**	**West of Olive St.**	H				8,890	4	Generic - Local (From Local/Lodi)	25	50	**60.8**
90	**11th Street (Future with Project)**	**East of Olive St.**	H				7,600	4	Generic - Local (From Local/Lodi)	25	50	**60.2**
91	**11th Street (Future with Project)**	**West of Hill St.**	H				7,640	4	Generic - Local (From Local/Lodi)	25	50	**60.2**
92	**11th Street (Future with Project)**	**East of Hill St.**	H				7,490	4	Generic - Local (From Local/Lodi)	25	50	**60.1**
93	**12th Street (Future with Project)**	**West of Olive St.**	H				6,250	4	Generic - Local (From Local/Lodi)	25	50	**59.3**
94	**12th Street (Future with Project)**	**East of Olive St.**	H				3,360	4	Generic - Local (From Local/Lodi)	25	50	**56.7**
95	**12th Street (Future with Project)**	**West of Hill St.**	H				3,670	4	Generic - Local (From Local/Lodi)	25	50	**57.1**
96	**12th Street (Future with Project)**	**East of Hill St.**	H				3,940	4	Generic - Local (From Local/Lodi)	25	50	**57.4**
129	**Construction - Grading**	**All segments**	H				312	13	Construction Traffic - Grading	30	50	**57.9**
130	**Construction - Building**	**All segments**	H				520	14	Construction Traffic - Building	35	50	**51.9**
131	**Construction - Concrete Pour**	**All segments**	H				1,162	15	Construction Traffic - Concrete Po	30	50	**64.3**

Construction Traffic

Construction Phase:	dB CNEL
Grading:	57.9
Concrete Pour:	64.3

Concrete Pour Phase

Roadway	Segment Location	Existing Traffic Noise, dBA CNEL	Construction Traffic Noise, dBA CNEL	Existing + Construction, dBA CNEL	Increase over Ambient, dBA CNEL
	South of 11th St.	63.9	64.3	67.1	3.2
S. Hill Street	North of 12th St.	63.6	64.3	67.0	3.4
	South of 12th St.	63.7	64.3	67.0	3.3

Grading Phase

Roadway	Segment Location	Existing Traffic Noise, dBA CNEL	Construction Traffic Noise, dBA CNEL	Existing + Construction, dBA CNEL	Increase over Ambient, dBA CNEL
	South of 11th St.	63.9	57.9	64.9	1.0
S. Hill Street	North of 12th St.	63.6	57.9	64.7	1.0
	South of 12th St.	63.7	57.9	64.7	1.0

Appendix B
Construction Vibration Levels

Construction Vibration Analysis - Potential Building Damage

Vibration attenuation constant (n):		1.1						
		Building Category:	Extremely fragile historic buildings, ruins, ancient monuments	Fragile buildings	Historic and some old buildings	Older residential structures	New residential structures	Modern industrial/ commercial buildings
Equipment Item	Reference PPV at 25 feet, in/s [a]	Vibration Damage Impact Criteria, PPV, in/s:	0.08	0.1	0.25	0.3	0.5	0.5
Large bulldozer[b]	0.089	Distance to Impact Criteria, feet:	28	23	10	9	6	6
Small bulldozer[c]	0.003		2	2	1	1	1	1

[a] Obtained from "Transportation and Construction Vibration Guidance Manual", Caltrans 2013
[b] Considered representative of other heavy earthmoving equipment such as excavators, graders, backhoes, etc.
[c] Considered representative of smaller equipment such as mini excavators.

Construction Vibration Analysis - Human Response, Distance to Criteria

Vibration attenuation constant (n):		1.1				
		Perceptibility:	Barely perceptible	Distinctly perceptible	Strongly perceptible	Severe
Equipment Item	Reference PPV at 25 feet, in/s [a]	Vibration Damage Impact Criteria, PPV, in/s:	0.01	0.04	0.1	0.4
Large bulldozer[b]	0.089	Distance to Impact Criteria, feet:	183	52	23	7
Small bulldozer[c]	0.003		9	3	2	1

[a] Obtained from "Transportation and Construction Vibration Guidance Manual", Caltrans 2013
[b] Considered representative of any full size/large excavator, dozer, backhoe, etc.
[c] Considered representative of any small excavator, dozer, backhoe, etc.

Construction Vibration Analysis

Receiver	Distance	Large Mobile [1]			Small Mobile [2]		
		Predicted PPV, in/sec	Building Damage?	Human Response	Predicted PPV, in/sec	Building Damage?	Human Response
Reference Location	*25*	*0.089*	*N/A (for reference only)*	*N/A (for reference only)*	*0.003*	*N/A (for reference only)*	*N/A (for reference only)*
MFR - SE of project site at 1100 S. Hill St.	85	0.023	No	Barely perceptible	0.001	No	Below barely perceptible
Belasco Theater building at 1050 S. Hill St.	120	0.016	No	Barely perceptible	0.001	No	Below barely perceptible
Hill Grill at 1061 S. Hill St.	55	0.037	No	Barely perceptible	0.001	No	Below barely perceptible
Los Angeles Job Corps Center at 215 W. 11th St.	55	0.037	No	Barely perceptible	0.001	No	Below barely perceptible
Bank of America at 1127 S Hill Street	70	0.029	No	Barely perceptible	0.001	No	Below barely perceptible
Future MFR - West of project site at 1120 S. Olive St.	19	0.120	No	NA (parking structure)	0.004	No	Below barely perceptible
	24	0.093	NA	Distinctly perceptible	0.003	No	Below barely perceptible
	90.5	0.022	No	Barely perceptible	0.001	No	Below barely perceptible
Future MFR - Northeast of project site at 1045 Olive St.	265	0.007	No	Below barely perceptible	0.000	No	Below barely perceptible

[1] Considered representative of any full size/large excavator, dozer, backhoe, etc.
[2] Considered representative of any small excavator, dozer, backhoe, etc.