# 3.10 Noise

This chapter describes the potential impacts of the proposed Project (Project) as it relates to noise and vibration. The applicable laws, regulations, and methods used to determine the effect of the Project are described herein. This chapter describes the regulatory setting, existing environmental setting, and analyzes the environmental impacts of the Project associated with construction noise and construction vibration as detailed in the Sidewalk Repair Program Noise and Vibration Technical Report, which is included as Appendix J of this Draft EIR. The noise and vibration modeling evaluates, as a worst case scenario, potential noise exposure to the closest sensitive uses with the maximum use of equipment.

## 3.10.1 Noise Fundamentals

### Characteristics of Sound

Sound is most commonly experienced by people as pressure waves passing through air. These rapid fluctuations in air pressure are processed by the human auditory system to produce the sensation of sound. The rate at which sound pressure changes occur is called the frequency. Frequency is usually measured as the number of oscillations per second or Hertz (Hz). Sound is technically described in terms of the loudness (amplitude) and frequency (pitch).[1] The standard unit of measurement for sound is the decibel (dB). The human ear is not equally sensitive to sound at all frequencies. The A-weighted scale, abbreviated dBA, reflects the normal hearing sensitivity range of the human ear. On this scale, the range of human hearing extends from approximately 3 to 140 dBA. Typical indoor and outdoor A-weighted sound levels are shown in Figure 3.10-1.[2]

Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a stationary noise source, or "point source," decreases by approximately 6 dBA over hard surfaces (e.g., reflective surfaces, such as parking lots or smooth bodies of water) and 7.5 dBA over soft surfaces (e.g., absorptive surfaces, such as soft dirt, grass, or scattered bushes and trees) for each doubling of the distance. For example, if a noise source produces a noise level of 89 dBA at a reference distance of 50 feet, then the noise level is 83 dBA at a distance of 100 feet from the noise source, 77 dBA at a distance of 200 feet, and so on.

### Noise Definitions

This noise analysis discusses sound levels in terms of equivalent noise level ($L_{eq}$). $L_{eq}$ is the average noise level on an energy basis for any specific time period. The $L_{eq}$ for one hour is the average energy noise level during the hour. The average noise level is based on the energy content (acoustic energy) of the sound. $L_{eq}$ can be thought of as the level of a continuous noise which has the same energy content as the fluctuating noise level. The equivalent noise level is expressed in units of dBA.

1 California Department of Transportation, *Technical Noise Supplement*, 2013.
2 Brüel & Kjær, Fundamentals of Environmental Noise Monitoring, 2013.

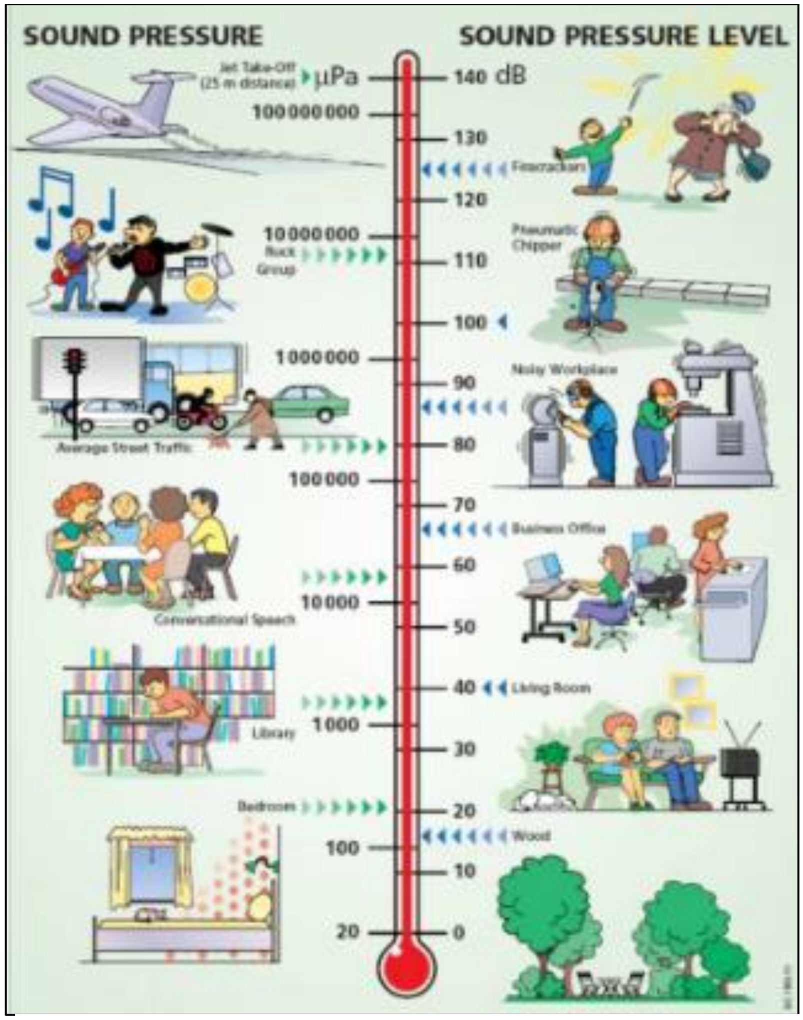


**Figure 3.10-1 Typical Indoor and Outdoor Sound Pressure Levels**

## Effects of Noise

Noise is generally defined as unwanted sound. The degree to which noise can impact the human environment ranges from levels that interfere with speech and sleep (annoyance and nuisance) to levels that cause adverse health effects (hearing loss and psychological effects). Human response to noise is subjective and can vary greatly from person to person. Factors that influence individual response include the intensity, frequency, and pattern of noise, the amount of background noise present before the intruding noise, and the nature of work or human activity that is exposed to the noise source.

Generally, noise is most audible when traveling by direct line-of-sight. In urban environments, barriers, such as walls, berms or buildings, are often present, which breaks the line-of-sight between the source and the receiver, and greatly reduces noise levels from the source since sound can only reach the receiver by bending over the top of the barrier. However, if a barrier is not high or long enough to break the line-of-sight from the source to the receiver, its effectiveness is reduced.

# 3.10.2 Groundborne Vibration Fundamentals

## Characteristics of Vibration

Vibration is an oscillatory motion through a solid medium, such as soil or concrete, in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is also acoustic energy transmitted as waves through the solid medium. The rate at which pressure changes occur is called the frequency of the vibration, measured by the number of oscillations per second or Hertz (Hz). Vibration may be the form of a single pulse of acoustical energy, a series of pulses, or a continuous oscillating motion.

The way that vibration is transmitted through the ground depends on the soil type, the presence of rock formations or man-made features and the topography between the vibration source and the receptor location. As a general rule, vibration waves tend to dissipate and reduce in magnitude with distance from the source. Also, the high frequency vibrations are generally attenuated rapidly as they travel through the ground, so that the vibration received at locations distant from the source tends to be dominated by low-frequency vibration. The frequencies of ground-borne vibration most perceptible to humans are in the range from less than 1 Hz to 100 Hz.

Vibration can be a serious concern, causing buildings to shake and rumbling sounds to be heard. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of vibration are trains, buses on rough roads, and construction activities, such as blasting, pile driving, and heavy earth-moving equipment.

High levels of vibration may cause physical personal injury or damage to buildings. However, groundborne vibration levels rarely affect human health. Instead, most people consider groundborne vibration to be an annoyance that can affect concentration or disturb sleep. In addition, high levels of groundborne vibration can damage fragile buildings or interfere with equipment that is highly sensitive to groundborne vibration (e.g., electron microscopes).

## Vibration Definitions

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings and is usually measured in inches per second (ips). The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (Vdb) is commonly used to measure RMS. The Vdb acts to compress the range of numbers required to describe vibration.

## Effects of Vibration

When ground-borne vibration arrives at a building, a portion of the energy will be reflected or refracted away from the building, and a portion of the energy will typically continue to penetrate through the ground-building interface. However, once the vibration energy is in the building structure, it can be amplified by the resonance of the walls and floors. Occupants can perceive vibration as motion of the building elements (particularly floors) and also rattling of lightweight components, such as windows, shutters, or items on shelves. At very high amplitudes (energy levels), low-frequency vibration can cause damage to buildings.

Unlike noise, groundborne vibration is not a phenomenon that most people experience every day. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people or slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible.

# 3.10.3 Regulatory Setting

## 3.10.3.1 Federal

### Federal Noise Control Act of 1972

The Noise Control Act of 1972 established programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, the U.S. Environmental Protection Agency (U.S. EPA) determined that subjective issues such as noise would be better addressed at local levels of government, thereby allowing more individualized control for specific issues by designated federal, state, and local government agencies. Consequently, in 1982, responsibilities for regulating noise control policies were transferred to specific federal agencies, and state and local governments. However, noise control guidelines and regulations contained in the U.S. EPA rulings in prior years remain in place.

Although the Project is not related to transportation, the Federal Transit Administration (FTA) has published relevant guidance for assessing potential building damage associated with construction activity. According to the FTA, non-engineered timber and masonry buildings can be exposed to groundborne vibration levels of 0.2 ips without experiencing structural damage. Buildings extremely susceptible to vibration damage (e.g., historic buildings) can be exposed to groundborne vibration levels of 0.12 ips without experiencing structural damage.

### Occupational Safety and Health Administration Hearing Conservation

The Occupational Safety and Health Administration (OSHA) has developed permissible noise exposure limits to protect workers from occupational noise. OSHA sets legal limits on noise exposure in the workplace based on a worker's time weighted average over an 8-hour day. The noise limits vary with exposure time and are presented in Table 3.10-1. If noise exposures are above the levels shown below for an employee, hearing protection is required to reduce noise exposure below these levels.

**Table 3.10-1. OSHA Hearing Thresholds**

| Duration, Hours per Day | Sound Level, dBA |
|---|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1.5 | 102 |
| 1 | 105 |
| 0.5 | 110 |
| 0.25 or less | 115 |

### Federal Highway Administration Traffic Noise and Abatement Guidance

The Federal Highway Administration (FHWA) Traffic Noise Analysis and Abatement Guidance presents information related to relative loudness of environmental noise. The relative loudness of environmental noise is shown in the FHWA document and correlates a decibel change in sound levels with a perceived relative loudness. The sound level change is applicable in the field as opposed to a quiet laboratory environment where smaller sound level differences could be perceived. A decrease of 10 dB is perceived as half as loud and similarly a decrease of 20 dB is perceived as 25 percent as loud. Sound level increases are perceived similarly, with a 10 dB increase perceived as a doubling of loudness and a 20 dB increase perceived as 4 times as loud.

The FHWA Traffic Noise Analysis and Abatement Guidance also includes estimated building reduction factors for various construction types. The building reduction factors estimate the noise reduction achieved due to the exterior of the structure. It is important to note that these reductions are estimates as the noise reduction through an exterior façade can vary depending on a range of factors related to the construction assembly of the walls. Door/window dimensions, door/window seals, and absorption inside the room also have an effect on noise reduction. The reduction factors shown in Table 3.10-2 assume that windows and doors are closed. A building reduction factor of 20 dBA is included in this guidance for a light frame building with ordinary sash (closed) window conditions, which is consistent with southern California residential construction standards.

**Table 3.10-2. FHWA Building Reduction Factors**

| Building Type | Window Condition | Noise Reduction Due to Exterior of the Structure |
|---|---|---|
| All | Open | 10 dB |
| Light Frame | Ordinary Sash (closed) | 20 dB |
| | Storm | 25 dB |
| Masonry | Single Glazed | 25 dB |
| | Double Glazed | 35 dB |

## 3.10.3.2 State

### California Department of Transportation Technical Noise Supplement

The California Department of Transportation (Caltrans) Technical Noise Supplement provides numerical estimates of how noise levels affect speech communication. At approximately 5 feet, normal conversation is possible below 65 dBA. Above 65 dBA, more vocal effort is required during conversation. Increased vocal effort correlates with increasing levels of speech interference as conversation is altered, reduced, or simplified to adapt to a noisy environment.

### Caltrans Transportation and Construction Vibration Guidance Manual

Caltrans' construction vibration guidance document presents a detailed synthesis of construction related vibration research over the last few decades and provides recommended vibration criteria for evaluating potential building damage and human annoyance due to vibration from construction activities.

For potential building damage, buildings are categorized based on structure and condition with varying vibration limits associated with each structure and construction type. There are additional vibration criteria presented that categorize the vibration source as a transient source or a continuous/frequent intermittent source. A transient source is defined as a single isolated vibration event whereas a continuous/frequent intermittent source includes a repetitive construction activity like pile driving, even if the source of vibration is impulsive in nature. The Caltrans structural guideline vibration criteria are shown in Table 3.10-3.

**Table 3.10-3. Guideline Vibration Damage Potential Threshold Criteria**

| | Maximum PPV (ips) | |
|---|---|---|
| **Structure and Condition** | **Transient Sources** | **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 structure | 0.5 | 0.3 |
| New residential structure | 1.0 | 0.5 |
| Modern industrial/commercial buildings | 2.0 | 0.5 |

Note: Transient sources create a single isolated vibration event. Continuous/frequent intermittent sources include impact pile drivers, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans Transportation and Construction Vibration Guidance Manual (Table 19).

Caltrans also provides guidance on vibration perceptibility in humans in terms of transient sources and continuous/frequent intermittent sources, as shown in Table 3.10-4.

**Table 3.10-4. Guideline Vibration Annoyance Potential Criteria**

| | Maximum PPV (ips) | |
|---|---|---|
| **Human Response** | **Transient Sources** | **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 |

Note: Transient sources create a single isolated vibration event. Continuous/frequent intermittent sources include impact pile drivers, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans Transportation and Construction Vibration Guidance Manual (Table 20).

## 3.10.3.3 Regional

### Los Angeles County Airport Land Use Commission Comprehensive Land Use Plan

In Los Angeles County, the Regional Planning Commission has the responsibility for acting as the Airport Land Use Commission and for coordinating the airport planning of public agencies within the county. The Airport Land Use Commission coordinates planning for the areas surrounding public use airports. The Comprehensive Land Use Plan provides for the orderly expansion of Los Angeles County's public use airports and the area surrounding them. It is intended to provide for the adoption of land use measures that will minimize the public's exposure to excessive noise and safety hazards. In formulating this plan, the Airport Land Use Commission has established provisions for safety, noise insulation, and the regulation of building heights within areas adjacent to each of the public airports in the County.

## 3.10.3.4 Local

### City of Los Angeles Municipal Code

The City of Los Angeles (City) Municipal Code (LAMC) contains construction noise limits in Chapter XI Noise Regulation Section 112.05 Maximum Noise Level of Powered Equipment or Powered Hand Tools. The regulation states, "Between the hours of 7:00 a.m. and 10:00 p.m., in any residential zone of the City or within 500 feet thereof, no person shall operate or cause to be operated any powered equipment or powered hand tool that produces a maximum noise level exceeding the following noise limits at a distance of 50 feet therefrom:

(a) 75 dB(A) for construction, industrial, and agricultural machinery including crawler-tractors, dozers, rotary drills and augers, loaders, power shovels, cranes, derricks, motor graders, paving machines, off-highway trucks, ditchers, trenchers, compactors, scrapers, wagons, pavement breakers, compressors and pneumatic or other powered equipment;

(b) 75 dB(A) for powered equipment of 20 HP or less intended for infrequent use in residential areas, including chain saws, log chippers and powered hand tools;

(c) 65 dB(A) for powered equipment intended for repetitive use in residential areas, including lawn mowers, backpack blowers, small lawn and garden tools and riding tractors."

Unless technically infeasible, the construction noise limit in the City is, therefore, 75 dBA between the hours of 7:00 a.m. and 10:00 p.m. at a distance of 50 feet from the equipment within a residential zone or within 500 feet of a residential zone. LAMC Section 112.05 defines technical infeasibility to mean that "said noise limitations cannot be complied with despite the use of mufflers, shields, sound barriers and/or other noise reduction device or techniques during the operation of the equipment."

# 3.10.4 Environmental Setting

## 3.10.4.1 Noise

The noise most commonly experienced in the study area is produced by on-road automobiles, trucks and buses. Vehicular noise varies with the volume, speed, and type of traffic. Slower traffic produces less noise than fast moving traffic. Trucks typically generate more noise than cars. Infrequent or intermittent noise is also associated with vehicles, including sirens, vehicle alarms, slamming of doors, garbage and construction vehicle or equipment activity, and honking of horns. Other sources of noise within the study area include construction truck traffic and aircraft fly-overs. Common stationary sources of noise include, but are not limited to, short-term construction activities, mechanical equipment such as heating, ventilation, and air conditioning units and outdoor spaces (e.g., pools, activity in private yards).

In order to provide a snapshot of the existing ambient exterior noise conditions for a range of environments within the City, 10 long-term noise measurements (24 hours or more) were conducted. While it is not practical to capture every noise environment that exists in the study area; the measurement locations were chosen to represent a diverse mix of conditions, both geographically and in terms of the major noise contributors. At least one measurement was obtained in each of the seven Area Planning Commissions (APCs) boundaries within the City. The 10 locations are designated as LT1 through LT10. All measurement locations were within the incorporated City boundaries. Measurement durations ranged from 42 to 51 hours. As shown in Appendix J, Noise and Vibration Technical Report, average noise levels are reported for three different timeframes that are of particular interest for the Project based on the Project description and LAMC. The first time period of interest is between 7:00 a.m. and 3:00 p.m., which is when the majority of sidewalk repair would take place, during daytime hours when certain sensitive receptors, such as residential homes, are typically unoccupied. The second time period is 7:00 a.m. to 10:00 p.m. which is the overall daytime period when construction is permitted by the LAMC. The final time period encompasses the nighttime hours of 9:00 p.m. to 7:00 a.m.; nighttime construction is not part of the Project. Measurement LT5 was conducted using a Rion NL-22 Type 2 sound level meter.[3] All other measurements were conducted using Piccolo SLM-P3 Type 2 sound level meters. The sound level meters for each measurement were field calibrated for accuracy using a Larson Davis CAL200 acoustical calibrator. Table 3.10-5 below summarizes the noise measurement locations and the average noise levels from 7:00 a.m. to 3:00 p.m.

**Table 3.10-5. Sampled Noise Measurement Locations and Noise Levels**

| Location | Description | Address | Average Hourly and (Range of Hourly) Noise Level from 7:00 am to 3:00 pm (dBA) |
|---|---|---|---|
| LT1 | Residence within 500 feet of a regional transit hub | 10127 Remmet Avenue, Chatsworth | 64 (58–67) |
| LT2 | In heavy industrial area | 11202 Tuxford Street, Sun Valley | 73 (72–74) |
| LT3 | Opposite Civic Center | 14401 Sylvan Street, Van Nuys | 71 (64–79) |

3 Type 2 sound level meters are considered “General Purpose Grade” for field use.

| Location | Description | Address | Average Hourly and (Range of Hourly) Noise Level from 7:00 am to 3:00 pm (dBA) |
|---|---|---|---|
| LT4 | Senior living (multi-family) | 10475 Wilshire Boulevard, Los Angeles | 73 (71–78) |
| LT5 | Residence close to LAX | 7601 Earldom Avenue, Playa Del Rey | 68 (66–69) |
| LT6 | In commercial area | 6614 Melrose Avenue, Los Angeles | 75 (73–77) |
| LT7 | LAC+USC Medical Center Hospital Tower | 2051 Marengo Street, Los Angeles | 64 (63–66) |
| LT8 | Residence adjacent to Expo Line light rail | 3778 S Harvard Boulevard, Los Angeles | 69 (68–73) |
| LT9 | Residence adjacent to school | 841 W 134th Street, Gardena | 61 (54–65) |
| LT10 | Residences adjacent to a High Injury Network street | 1020 S Cabrillo Avenue, San Pedro | 61 (58–64) |

### 3.10.4.2 Vibration

Typically, existing vibration along roadways is generated by heavy trucks whose vibration level depends on vehicle type, weight, and pavement conditions. Heavy trucks normally operate on major streets. There are numerous major arterials located within the City on which there is heavy truck activity and where vibration is likely to be perceptible.

### 3.10.4.3 Sensitive Use

The City's 2006 *L.A. CEQA Thresholds Guide* considers noise-sensitive uses as including residences, transient lodgings, schools, libraries, churches, hospitals, nursing homes, auditoriums, concert halls, amphitheaters, playgrounds, and parks. Noise-sensitive uses are considered sensitive receptors and both of these terms are used interchangeable, from herein on, in this document.

## 3.10.5 Environmental Impact Analysis

### 3.10.5.1 Approach

#### Noise

Potential noise impacts associated with continuation of construction activities of the Project were evaluated based on prior and anticipated construction equipment schedule and phasing information. Modeling and analysis was conducted for two typical construction scenarios (Scenario 1 and Scenario 2) presented in Chapter 2, *Project Description.* Construction-related noise was analyzed using data and modeling methodologies from FHWA's Roadway Construction Noise Model (RCNM), which predicts average noise levels at nearby receptors by analyzing the type of equipment, the distance from source to receptor, and usage factor (the fraction of time the equipment is operating in its noisiest mode while in use).[4] This methodology calculates the composite average noise levels for the operation of multiple pieces of equipment at the same time.

The average combined equipment noise levels for an 8-hour work day (i.e., 8-hour $L_{eq}$) during each phase of construction was calculated at a reference distance of 50 feet. Distances from the noise source were then estimated for each phase. Results of the noise modeling at 50 feet are provided in Appendix J, Noise and Vibration Technical Report.

The continuation of sidewalk repair construction activities would, in many instances, take place closer than 50 feet from a sensitive receptor. The City includes buildings of various ages, architecture, and uses. Therefore, in order to standardize such variables for California Environmental Quality Act (CEQA) analysis purposes, location of sensitive receptor (as the most conservative approach) from the repair activities are modeled. This also meets the requirement of the Project threshold discussed below. According to the Los Angeles Zoning Code, a typical setback distance for a residence is 20 feet from the sidewalk and a typical setback distance from daycare, hospitals, and other sensitive receptors is 10 feet from the sidewalk. (See LAMC Sections 12.08 C.1, 12.12 C.1, 12.13 C.1.) Consistent with the RCNM methodology, it was assumed that construction noise levels would be reduced at a rate of 6 dB per doubling of distance from the source. As construction activities would occur fewer than 50 feet from a sensitive receptor, distances of 10 and 20 feet from the noise source were used to determine noise impacts for the Project.

## Vibration

To ensure the vibration thresholds are not exceeded, impact distances have been calculated for each vibration producing equipment item used during the continuation of construction activities associated with the Project. The impact distance represents the minimum distance required between the construction equipment and the foundation of the nearest structure for building damage or the minimum distance required between the construction equipment and the nearest occupied space of a sensitive receptor for human response to comply with the thresholds. Impact distances for vibration producing construction equipment are shown in Table 3.10-6.

**Table 3.10-6. Vibration Impact Distances**

| Construction Equipment | Reference PPV Vibration Level at 25 ft (ips)* | Human Annoyance Impact Distance (ft) | Building Damage Impact Distance (ft) |
|---|---|---|---|
| Skid Steer/Backhoe/Mini Excavator | 0.003 | 1 | 0.4 |
| Excavator | 0.089 | 23 | 8 |
| Truck/Dump Truck/Aggregate Delivery Truck | 0.076 | 20 | 7 |

* Reference PPV levels sourced from FTA document Transit Noise and Vibration Impact Assessment

To calculate the impact distances using a PPV building damage limit of 0.3 ips and PPV human annoyance limit of 0.1 ips, the following formula was adapted from the Caltrans Transportation and Construction Vibration Guidance Manual.

4 Federal Highway Administration. 2008. FHWA Roadway Construction Noise Model (RCNM), Software Version 1.1. December 8, 2008. Prepared by: U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center, Environmental Measurement and Modeling Division.

$$D_{Impact} = 25\left(\frac{PPV_{Ref}}{PPV_{Limit}}\right)^{\frac{1}{n}}$$

Where: $D_{Impact}$ is the impact distance (ft)
$PPV_{Ref}$ is the reference PPV at 25 ft (ips)
$PPV_{Limit}$ is the vibration threshold limit (ips)
$n$ is the vibration attenuation rate though the ground (n=1.1)

The vibration attenuation rate through the ground is assumed to equal 1.1 representing hard soil. This is a conservative assumption that can be used as a basis for estimating vibration attenuation for construction activities within the Project area.

## 3.10.5.2 Project Design Features

**PDF-NOI-1:** As feasible during construction, a 10-foot distance between construction equipment and a commercial use sensitive receptor, and a 20-foot distance between construction equipment and residential sensitive receptor should be maintained, per the Los Angeles Zoning Code typical setback distances for these uses.

**PDF-NOI-2:** As feasible during construction, noise best management practices (BMPs) will be implemented as provided below:

1. Unnecessary idling of internal combustion engines should be strictly prohibited.
2. All equipment should be kept in good repair with all worn, loose and unbalanced machine parts to be replaced.
3. Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from neighboring houses.
4. Construction would occur in the daytime hours as allowable by LAMC Section 41.40 - Construction Noise.
5. Notify all adjacent property owners and land users of the construction length, duration, and hours of noise and vibration producing construction activities, in writing.
6. Provide and make available contact information for Sidewalk Repair concerns, on construction activities, prior to and on-site during construction.

**PDF-NOI-3:** As feasible during construction, vibration BMPs will be implemented as provided below:

1. Use lower powered equipment or techniques such as concrete saws instead of jack hammers, as much as practicable.
2. Minimize the time of use of vibration generating equipment as much as practicable.
3. Notify all adjacent property owners and land users of the construction length, duration, and hours of noise and vibration producing construction activities, in writing.
4. Provide and make available contact information for Sidewalk Repair concerns, on construction activities, prior to and on-site during construction.

## 3.10.5.3 Thresholds of Significance

As part of the Initial Study (see Appendix A), it was determined that the Project would not result in a substantial permanent increase in ambient noise levels in the project vicinity in excess of established standards (operational noise), and would not generate any ground-borne vibration impacts after construction is complete (operational vibration). Accordingly, these issues are not further analyzed in detail in the EIR.

For the Project, the City was guided by the *L.A. CEQA Thresholds Guide*, existing guidance from other agencies, and evidence developed from Appendix J, Noise and Vibration Technical Report, in formulating the thresholds of significance for noise and vibration impacts.

### *L.A. CEQA Thresholds Guide*

The *L.A. CEQA Thresholds Guide* is a "guidance document" that is intended to be available as a voluntary tool for city staff, project applicants, and the public to use when evaluating projects in the City. (Pp. vii, 1-2.) The *L.A. CEQA Thresholds Guide* "recognizes that the impacts resulting from a particular action depend on the project setting, design, and operational components and that the determination of significance and the appropriate criteria for evaluation are the responsibility of the lead agency." (*Id*., p. viii.) The *L.A. CEQA Thresholds Guide* therefore "does not substitute for the use of independent judgment to determine significance or the evaluation of the evidence in the record[.]" (*Id*., p. 2.) This is because the "impact resulting from a particular action depends on the project setting, design, and operational components." (*Id*., p. 4.) The *L.A. CEQA Thresholds Guide* states that a project would normally have a significant impact on noise levels from construction if:

- Construction activities lasting more than one day would exceed existing ambient exterior noise levels by 10 dBA or more at a noise sensitive use;
- Construction activities lasting more than 10 days in a three month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise sensitive use; or
- Construction activities would exceed the ambient noise level by 5 dBA at a noise sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

The *L.A. CEQA Thresholds Guide* further states that ambient noise levels are measured as a Community Noise Equivalent Level (CNEL) which is a 24-hour average sound level with an evening penalty of 5 dB between the hours of 7:00 p.m. and 10:00 p.m. and a nighttime penalty of 10 dB between the hours of 10:00 p.m. and 7:00 am.

The *L.A. CEQA Thresholds Guide* does not provide any specific vibration criteria.

### Evaluation of Noise Thresholds for the Project

The *L.A. CEQA Thresholds Guide* construction noise thresholds are not suitable for the Project as the continuation of construction activities under the Project are not confined to one stationary project area like the usual construction projects contemplated in the guide, and will occur collectively over a longer time period of time. The majority of the construction activities under the Project will be, moreover, short-term, mobile, and limited to daytime hours as provided in the Section 2.1, *Project Description*.

Since the City's adoption of the *L.A. CEQA Thresholds Guide*, the California Natural Resources Agency made revisions to the CEQA Guidelines (December 2018), as found in title 14 of the California Code of Regulations Section 15000 et seq., including to CEQA Guidelines section 15064.7 (Thresholds of Significance) and Section 15064 (Determining Significance), as well as to Appendix G.

Those revisions include clarifications as follows. “A threshold of significance is an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant.” (CEQA Guidelines Section 15064.7(a).) As part of the revisions to the CEQA Guidelines, the Resources Agency also clarified that “[e]ach public agency is encouraged to develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects.” (*Id.*, subd. (b).) Thresholds to be adopted for general use must be adopted by ordinance, resolution, rule, or regulation, and developed through a public review process. (*Ibid.*)

Moreover, CEQA Guidelines Section 15064.7(b), as revised, states that “Lead agencies may also use thresholds on a case-by-case basis as provided in Section 15064(b)(2).” Section 15064(b)(2) also explains that thresholds of significance may assist lead agencies in determining whether a project may cause a significant impact and, when using a threshold, the agency should briefly explain how compliance with the threshold means that the project’s impacts are less than significant. Compliance with the threshold, moreover, does not relieve a lead agency of the obligation to consider substantial evidence indicating that the project’s environmental effects may still be significant. (CEQA Guidelines Section 15064(b)(2).) Finally, the Resources Agency added subdivision (d) to Guidelines Section 15064.7, setting forth the criteria for use of environmental standards as thresholds of significance in environmental documents prepared pursuant to CEQA.

Based on the above, project-specific noise thresholds have been developed to satisfy CEQA Guidelines Sections 15064(f) and 15064.7 for the Project based on the research conducted and outlined in Appendix J, Noise and Vibration Technical Report.

## Evaluation of Vibration Thresholds for the Project

Although the *L.A. CEQA Thresholds Guide* does not include vibration criteria, the CEQA Guidelines, Appendix G sample question asks whether there is generation of excessive groundborne vibration levels. As no further guidance is provided defining excessive groundborne vibration levels, as discussed in Appendix J, vibration thresholds for the Project have been developed based on the 2013 Caltrans document “Transportation and Construction Vibration Guidance Manual.”

## CEQA Significance Thresholds for Noise and Vibration Used in Draft EIR

The project-specific noise and vibration thresholds are as follows. The Project would have a significant noise or vibration impact if the Project construction would result in any of the following:

**NOI-1:** Would the proposed Project exceed an interior noise level of 85 dBA $L_{eq}$ (8-hr) and result in an exterior noise level increase of 10 dBA above the loudest ambient sound level (hourly A-weighted $L_{eq}$) during construction hours as measured or predicted at the closest occupied space façade of the closest sensitive use? *City of Los Angeles.*

**NOI-2:** In terms of potential building damage, would the proposed Project result in ground-borne vibration caused by construction exceeding a velocity of 0.3 ips PPV at the building foundations of the nearest structure? *City of Los Angeles.*

**NOI-3:** In terms of potential human annoyance, would the proposed Project result in ground-borne vibration caused by construction exceeding 0.1 ips PPV at the nearest occupied space of a sensitive use? *City of Los Angeles.*

**NOI-4:** For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed Project expose people residing or working in the project area to excessive noise levels? *CEQA Thresholds Guide.*

### 3.10.5.4 Construction Noise Impacts

Construction noise levels generated by the continuation of construction activities of the Project would fluctuate within the City depending on the particular type, number, and duration of usage for the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day; noise levels generated by those activities; distances to noise sensitive receptors; potential noise attenuating features such as topography, vegetation, and existing structures; and the existing ambient noise environment in the receptor's vicinity. Construction generally occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project site and in the surrounding area for the duration of the construction process.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes, mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations (e.g., a generator). Operational characteristics of heavy construction equipment are additionally typified by short periods of full-power operation followed by extended periods of operation at lower power, idling, or powered-off conditions.

The construction noise modeling is discussed in further detail in Appendix J, Noise and Vibration Technical Report.

**NOI-1: Would the proposed Project result in an interior noise level of 85 dBA $L_{eq}$ (8-hr) to be exceeded and an exterior noise level increase of 10 dBA above the loudest ambient sound level (hourly A-weighted $L_{eq}$) to be exceeded during construction hours as measured or predicted at the closest occupied space façade of the closest sensitive use?**

**The impact would be potentially significant where a 10-foot distance for commercial sensitive uses and a 20-foot distance for residential sensitive uses cannot be maintained from the construction noise source.**

As discussed in Chapter 2, *Project Description*, Scenario 1 includes sidewalk repair, street tree removal and replacement and minor utility work that is expected to occur for approximately 5 days at a minimum. Scenario 2 includes sidewalk repair, street tree removal/replacement, major utility work and crosswalk repaving expected to occur from 5 to 30 days (nonconsecutive) per construction site. The difference between the two scenarios is the additional equipment needed for the major utility work and crosswalk repaving as part of Scenario 2.

As discussed in Section 3.10.5.1 above, since in many instances the continuation of construction activities for Scenario 1 and Scenario 2 would occur fewer than 50 feet from a sensitive receptor, distances of 10 feet from the commercial use and 20 feet from the residential use from the noise source were used to conservatively determine construction noise impacts for the Project based on the City's frontage requirements from the streets. City zoning, over the years, has separated various land uses and required front, rear and side yard setbacks which assists in reducing the adjacent street noise heard in residences. Other sensitive uses typically zoned as commercial have been built with certain provisions of building codes intended to reduce noise including the orientation of the structure, setbacks, shielding and sound insulation of the building. (LAMC Section 91.1207.14.1.) Furthermore, the City of Los Angeles Building Code provides guidelines for residential and commercial building construction including the use of foam plastic insulation to reduce the effects of weather and noise from the outside, as well as noise in between structures. Though sound transmission control requirements were added to the national Uniform Building Code in 1992, and incorporated into the City of Los Angeles Building Code (LAMC Section 91) in 1994, typical older structures would have noise attenuation decrease through walls, doors, windows, etc. The calculated Presumed Interior Sound Level (dBA) discussed in this section considers the noise attenuation of 20 dBA as a result of the walls or the façade of the sensitive receptor with a typical setback of 10 feet (less than 20 feet).

Tables 3.10-7 and 3.10-8 for Scenarios 1 and 2, respectively, show the results of noise modeling at 10-foot and 20-foot setbacks from the construction noise source, along with the 20-dBA reduction in noise due to the building façade, which acts as a noise barrier to muffle sound.

For Scenarios 1 and 2, respectively, the calculated interior sound level would not exceed the project-specific interior threshold of 85 dBA $L_{eq}$ (8-hr) through the various phases of construction activities. It is recognized that speech may be interrupted; however, construction would be short-term in duration and no hearing damage would occur. Construction of both scenarios would likely result in a an exterior noise level increase of more than 10 dBA above the loudest ambient sound level (hourly A-weighted $L_{eq}$) during construction hours as measured or predicted at the closest occupied space façade of the closest sensitive receptor depending on the setback.

**Table 3.10-7. Scenario 1 Noise Modeling Results (10 Feet and 20 Feet)**

| Phase | Equipment | $L_{eq}$ (8 hr) at 50 ft., dBA | Sound Level at 20 ft., dBA | Sound Level at 10 ft., dBA | *Presumed Interior Sound Level, dBA | Interior Thresh-old of 85 dBA | Above Thresh-old? |
|---|---|---|---|---|---|---|---|
| **Mobilization** | Compressor, Air | 68 | | | | | |
| | Generator (<25KVA, VMS signs) | 70 | | | | | |
| | ***Combined Equipment*** | ***72*** | ***80*** | **86** | **66** | **85** | **NO** |
| **Street Tree Removal** | Truck, Flat Bed | 64 | | | | | |
| | Saw | 63 | | | | | |
| | Wood Chipper (based on chain saw) | 68 | | | | | |
| | Stump Grinder (based on chain saw) | 74 | | | | | |
| | Skid Steer Loader (based on backhoe) | 68 | | | | | |
| | ***Combined Equipment*** | ***76*** | **84** | **90** | **70** | **85** | **NO** |
| **Traffic Control, Demolition, and Concrete Removal** | Hammer, Jack | 82 | | | | | |
| | Saw, Concrete | 77 | | | | | |
| | Skid Steer Loader (based on backhoe) | 71 | | | | | |
| | Truck, Dump | 70 | | | | | |
| | Tractor | 74 | | | | | |
| | ***Combined Equipment*** | ***84*** | **92** | **98** | **78** | **85** | **NO** |
| **Utility Adjustment** | Manhole Cutter (based on rock drill) | 68 | | | | | |
| | Saw, Concrete | 77 | | | | | |
| | Mixer, Concrete (or concrete mixer truck) | 69 | | | | | |
| | ***Combined Equipment*** | ***78*** | **86** | **92** | **72** | **85** | **NO** |
| **Grading/ Formwork** | Roller | 66 | | | | | |
| | Truck, Flat Bed | 64 | | | | | |
| | ***Combined Equipment*** | ***68*** | **76** | **82** | **62** | **85** | **NO** |

| Phase | Equipment | $L_{eq}$ (8 hr) at 50 ft., dBA | Sound Level at 20 ft., dBA | Sound Level at 10 ft., dBA | *Presumed Interior Sound Level, dBA | Interior Thresh-old of 85 dBA | Above Thresh-old? |
|---|---|---|---|---|---|---|---|
| **Concrete Pouring** | Mixer, Concrete (or concrete mixer truck) | 74 | | | | | |
| | Mixer, Concrete Vibratory | 70 | | | | | |
| | ***Combined Equipment*** | ***75*** | **83** | **89** | **69** | **85** | **NO** |
| **Street Tree Planting** | Truck, Flat Bed | 66 | | | | | |
| | Mini Excavator (based on backhoe) | 68 | | | | | |
| | ***Combined Equipment*** | ***70*** | **78** | **84** | **64** | **85** | **NO** |
| **Cleanup** | Truck, Pickup | 68 | | | | | |
| | ***Combined Equipment*** | ***68*** | **76** | **82** | **62** | **85** | **NO** |

*Assumptions: Calculated (or Presumed) Interior Sound Level assumes a 20 dBA attenuation due to structure/building wall using the exterior sound level calculated at 10 ft. The building reduction factor of 20 dBA is referenced from the FHWA Traffic Noise Analysis and Abatement Guidance (Table 3.10-2) and is consistent with Southern California residential construction standards (Light Frame/Ordinary Sash).

Source: Federal Highway Administration. 2011. Highway Traffic Noise: Analysis and Abatement Guidance. FHWA-HEP-10-025. December 2011.

### Table 3.10-8. Scenario 2 Noise Modeling Results (10 and 20 Feet)

| Phase | Equipment | $L_{eq}$(h), dBA at 50 ft. | Sound Level at 20 ft., dBA | Sound Level at 10 ft., dBA | *Presumed Interior Sound Level, dBA | Interior Thresh-old of 85 dBA | Above Thresh -old? |
|---|---|---|---|---|---|---|---|
| **Mobilization** | Compressor, Air | 68 | | | | | |
| | Generator (<25KVA, VMS signs) | 70 | | | | | |
| | ***Combined Equipment*** | ***72*** | ***80*** | ***86*** | **66** | **85** | **NO** |
| **Street Tree Removal** | Truck, Flat Bed | 64 | | | | | |
| | Saw | 63 | | | | | |
| | Wood Chipper (based on chain saw) | 68 | | | | | |
| | Stump Grinder (based on chain saw) | 74 | | | | | |
| | Skid Steer Loader (based on backhoe) | 68 | | | | | |
| | ***Combined Equipment*** | ***76*** | **84** | **90** | **70** | **85** | **NO** |
| **Traffic Control, Demolition, and Concrete Removal** | Hammer, Jack | 82 | | | | | |
| | Saw, Concrete | 77 | | | | | |
| | Skid Steer Loader (based on backhoe) | 71 | | | | | |
| | Truck, Dump | 70 | | | | | |
| | Tractor | 74 | | | | | |
| | ***Combined Equipment*** | ***84*** | **92** | **98** | **78** | **85** | **NO** |
| **Utility Relocation** | Excavator | 75 | | | | | |
| | Saw, Concrete | 77 | | | | | |
| | Compactor | 70 | | | | | |
| | Paver | 68 | | | | | |
| | ***Combined Equipment*** | ***82*** | **90** | **96** | **76** | **85** | **NO** |
| **Grading/ Formwork** | Roller | 66 | | | | | |
| | Truck, Flat Bed | 64 | | | | | |
| | ***Combined Equipment*** | ***68*** | **82** | **76** | **56** | **85** | **NO** |

| Phase | Equipment | $L_{eq}$(h), dBA at 50 ft. | Sound Level at 20 ft., dBA | Sound Level at 10 ft., dBA | *Presumed Interior Sound Level, dBA | Interior Thresh-old of 85 dBA | Above Thresh-old? |
|---|---|---|---|---|---|---|---|
| **Concrete Pouring** | Mixer, Concrete (or concrete mixer truck) | 74 | | | | | |
| | Mixer, Concrete Vibratory | 70 | | | | | |
| | ***Combined Equipment*** | ***75*** | **89** | **83** | **63** | **85** | **NO** |
| **Street Tree Planting** | Truck, Flat Bed | 66 | | | | | |
| | Mini Excavator (based on backhoe) | 68 | | | | | |
| | ***Combined Equipment*** | ***70*** | **78** | **84** | **64** | **85** | **NO** |
| **Crosswalk Repaving** | *Saw, Concrete* | *80* | | | | | |
| | *Skid Steer Loader (based on backhoe)* | *68* | | | | | |
| | *Truck, Dump* | *67* | | | | | |
| | *Paver* | *68* | | | | | |
| | *Line Striper (based on generator (<25KVA,)* | *64* | | | | | |
| | ***Combined Equipment*** | ***80*** | **88** | **94** | **74** | **85** | **NO** |
| **Cleanup** | Truck, Pickup | 68 | | | | | |
| | ***Combined Equipment*** | ***68*** | **76** | **82** | **62** | **85** | **NO** |

*Assumptions: Calculated (or Presumed) Interior Sound Level assumes a 20 dBA attenuation due to structure/building wall using the exterior sound level calculated at 10 ft. The building reduction factor of 20 dBA is referenced from the FHWA Traffic Noise Analysis and Abatement Guidance (Table 3.10-2) and is consistent with Southern California residential construction standards (Light Frame/Ordinary Sash).

Source: Federal Highway Administration. 2011. Highway Traffic Noise: Analysis and Abatement Guidance. FHWA-HEP-10-025. December 2011.

The occupied space of the sensitive receptor should be representative of a frequently occupied, noise-sensitive area such as a living room, sleeping area, dining area, classroom, or waiting room. Even though impacts under Scenarios 1 and 2 would not exceed the Project significance thresholds, as provided in PDF-NOI-2, construction noise BMPs would be implemented as feasible with the Project including prohibiting unnecessary engine idling, keeping all equipment in good condition, locating noise-generating equipment as far as possible away from neighboring homes, completing construction activities during daytime hours, notifying property owners and occupants of upcoming construction activities, and making available contact information for land users to communicate Sidewalk Repair concerns. Because the interior noise thresholds would not be exceeded, the impact would be **less than significant** for Scenarios 1 and 2.

There is a certain subgroup of individual sidewalk projects under Scenarios 1 and 2 that consists of sidewalk and curb ramp repairs which would occur under unusual circumstances or environments. In instances where the 10-foot distance for commercial sensitive uses and 20-foot distance for residential sensitive uses cannot be maintained from the construction noise source, there may be a potentially significant construction noise impact. All local, state and federal standards would be applicable, where appropriate, yet there may be construction sites over the next 30 years where structures are located that were built prior to the uniform building codes being mandated that do not have a large building frontage or setback; or have thin uninsulated walls. Such cases would be very few and unpredicted under the current scope of the Project. Therefore, the Project may result in a potentially significant impact where an interior noise level of 85 dBA $L_{eq}$ (8-hr) and an exterior noise level increase of 10 dBA above the loudest ambient sound level (hourly A-weighted $L_{eq}$) could be exceeded during construction hours as measured or predicted at the closest occupied space façade of the closest sensitive receptor. Exceedances of the applicable construction noise thresholds would still occur even after imposition of the construction noise BMPs in PDF-NOI-1. The impact is therefore significant for individual sidewalk projects where the 10-foot distance for commercial sensitive uses and the 20-foot distance for residential sensitive uses cannot be maintained.

## Mitigation Measures

Pursuant to PDF-NOI-2, the Project is already requiring best management practices for construction noise impacts where feasible. However, despite those measures, construction noise impacts may still exceed the significance threshold where the 10-foot distance for commercial sensitive uses and the 20-foot distance for residential sensitive uses cannot be maintained. In addition, further noise reduction measures were considered, including as set forth in Appendix J2 typical mitigation and options as provided in the FHWA Construction Noise Handbook (FHWA, FHWA-HEP-06-015, August 2006). The analysis provided in Appendix J2 shows that most of the measures are already being implemented, or are otherwise infeasible or inapplicable. Therefore, no other feasible mitigation is available, and construction noise impacts would remain significant and unavoidable where the 10-foot distance for commercial sensitive uses and the 20-foot distance for residential sensitive uses cannot be maintained.

**NOI-2: In terms of potential building damage, would the proposed Project result in ground-borne vibration caused by construction exceeding a velocity of 0.3 ips PPV at the building foundations of the nearest structure?**

**The impact would be less than significant for a vast majority of Project sites. However, the impact would be significant where the distance from the construction vibration source to the building foundation of the nearest structure is less than 8 feet.**

Construction activity can result in varying degrees of vibration, depending on the equipment and methods employed. Operation of construction equipment causes vibrations that spread through the ground and diminish in strength with distance. As discussed in Chapter 2, *Project Description*, Scenario 1 includes sidewalk repair, street tree removal and replacement, and minor utility work expected to last approximately 5 days at a minimum. Scenario 2 includes sidewalk repair, street tree removal and replacement, major utility work and crosswalk repaving expected to occur from 5 to 30 nonconsecutive construction days per construction site. Equipment used during construction of Scenario 1 and Scenario 2 would include vibratory equipment, including a skid steer, backhoe, mini excavator, excavator, truck, dump truck, and aggregate delivery truck. As shown in Table 3.10-6, vibration impact distances for building damage have been determined for the various types of vibratory construction equipment. These impact distances were calculated using a PPV building damage limit of 0.3 ips as discussed in Section 3.10.5.1 above. These are the distances at which vibratory equipment near a structure could potentially cause damage to that structure. The vibration impact distances for building damage range from 0.4 feet at the closest for a skid steer, backhoe, and mini excavator, to 8 feet at the greatest distance for an excavator. This means that if vibratory equipment is located closer to the building foundation of the nearest structure than the distances provided, then there is potential for damage.

As discussed in Chapter 2, *Project Description*, the Project would affect most areas of the City for 30 years. Implementation of the Project would include the continuation of several construction activities, including street tree root pruning, street tree canopy pruning, street tree removal, street tree planting, sidewalk repair, relocation of street signs and adjusting utility boxes. All construction activities would occur on and adjacent to public sidewalks, which are generally greater than 8 feet from the nearest structure façade. For most Project sites for Scenario 1 and Scenario 2, the vibratory equipment would be located 8 feet or more from the foundation of the nearest building, and no building damage would be expected. There could be rare instances where building setbacks are fewer than 8 feet from the vibratory equipment at the sidewalk.

There is a certain subgroup of individual sidewalk projects under Scenarios 1 and 2 that consists of sidewalk and curb ramp repairs which would occur under unusual circumstances or environments. In instances where the 8-foot distance cannot be maintained, there may be potentially significant vibration impacts to the nearest structure. All local, state and federal standards would be applicable, where appropriate, yet there still may be Project sites over the next 30 year that are located near older structures that were built prior to the uniform building codes being mandated. Such cases would be few and unpredicted under the current scope of the Project. Exceedances of the applicable construction noise thresholds would still occur even after imposition of the construction vibration BMPs in PDF-NOI-3. Therefore, the Project may result in a temporary potentially significant vibration impact to building foundations where an 8-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor.

## Mitigation Measures

Pursuant to PDF-NOI-3, the Project is already requiring best management practices for construction vibration impacts where feasible. However, despite those measures, construction vibration impacts may still exceed the significance threshold for construction vibration where an 8-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor. In addition, further noise and vibration reduction measures were considered, including as set forth in Appendix J2 typical mitigation and options as provided in the FHWA Construction Noise Handbook (FHWA, FHWA-HEP-06-015, August 2006.) The analysis provided in Appendix J2 shows that most of the measures are already being implemented or are otherwise infeasible or inapplicable. Therefore, no other feasible mitigation is available, and construction vibration impacts would remain significant and unavoidable where an 8-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor.

**NOI-3: In terms of potential human annoyance, would the proposed Project result in ground-borne vibration caused by construction exceeding 0.1 ips PPV at the nearest occupied space of a sensitive use?**

**The impact would be less than significant for a vast majority of Project sites. However, the impact would be significant where the distance from the construction vibration source to the nearest occupied space of a sensitive use is less than 23 feet.**

As discussed previously, construction activities associated with the Project would include various types of vibratory equipment. In addition to vibration impact distances for building damage, distances for human annoyance, including from noise, have also been determined. As shown in Table 3.10-6, vibration impact distances for human annoyance range from 1 foot at the closest for skid steer, backhoe, and mini excavator, to 23 feet at the greatest distance for an excavator. This means that if vibratory equipment is located closer to the nearest occupied space of a sensitive receptor than the distances provided, then there is a potential for annoyance. These impact distances were calculated using a PPV human annoyance limit of 0.1 ips as discussed in Section 3.10.5.1 above. The occupied space of the sensitive receptor should be representative of a frequently occupied, vibration-sensitive area such as a living room, sleeping area, dining area, waiting room, or office space. This does not include a garage, bathroom, loading area or storage area. For most Project sites, the nearest occupied space of a sensitive receptor would be located further than 23 feet from the vibratory equipment, and significant human annoyance would not be expected. There could be rare instances where the occupied space of a sensitive use is closer than 23 feet.

There is a certain subgroup of individual sidewalk projects under Scenarios 1 and 2 that consists of sidewalk and curb ramp repairs which would occur under unusual circumstances or environments. In instances where the 23-foot distance cannot be maintained, there may be potentially significant vibration impacts related to human annoyance. All local, state, and federal standards would be applicable, where appropriate, yet there still may be construction sites over the next 30 years that are located near structures that were built prior to the uniform building codes being mandated. Such cases would be very few and unpredicted under the current scope of the Project. Exceedances of the applicable construction noise thresholds would still occur even after imposition of the construction vibration BMPs in PDF-NOI-3. Therefore, the Project may result in a temporary potentially significant vibration impact to human annoyance where a 23-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor.

## Mitigation Measures

As discussed in NOI-3, the Project is already requiring best management practice for construction vibration impacts where feasible pursuant to PDF-NOI-3, and the analysis in Appendix J2 of the FHWA Construction Noise Handbook measures shows that most measures to reduce vibration are already being implemented or are otherwise infeasible or inapplicable. Despite these measures, construction vibration impacts may still exceed the significance threshold for construction vibration where a 23-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor. Therefore, no other feasible mitigation is available for the Project, and construction vibration impacts would remain significant and unavoidable where a 23-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor.

**NOI-4: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed Project expose people residing or working in the project area to excessive noise levels?**

**The impact would be less than significant.**

There are three public use airports in the City of Los Angeles, including Los Angeles International Airport (LAX), Van Nuys Airport, and Whiteman Airport. LAX is located southwest of downtown Los Angeles and is the second busiest airport in the United States. Van Nuys Airport and Whiteman Airport are located in the San Fernando Valley in the northern portion of the City. In addition to the public use airports, there are several private use airports and airstrips located in the City.[5] Also, several municipal airports, private use airports, and airstrips are located in other jurisdictions located adjacent to the City of Los Angeles. The Bob Hope Airport (Burbank), Compton/Woodley Airport, Hawthorne Municipal Airport, and Santa Monica Municipal Airport are all located approximately two miles or less from the City of Los Angeles city limit. As such, portions of the construction activities that would be continued by the Project would be constructed within the vicinity of an airport land use plan and/or within two miles of a public or private use airport. As previously discussed under NOI-1 above, the calculated interior sound levels for the construction of Scenario 1 and Scenario 2 would not exceed the project-specific interior threshold of 85 dBA $L_{eq}$ (8-hr). It is recognized that speech may be temporarily interrupted; however, construction would be short-term in duration and no hearing damage would occur. In addition, the Project would not result in any permanent change to noise levels. As such, the Project would not expose people residing or working in the Project area to, or otherwise generate, excessive noise levels and the impact would be less than significant.

## Mitigation Measures

No mitigation is required.

5 Airnav, search by Location, available at: https://www.airnav.com/airports/, accessed February 19, 2019.

### 3.10.6 Significant Unavoidable Adverse Impacts

There are significant and unavoidable adverse impacts related to construction noise and construction vibration in the limited instances where: a 10-foot distance for commercial sensitive receptors and a 20-foot distance for residential sensitive uses cannot be maintained from the construction noise source; an 8-foot distance cannot be maintained from the closest occupied space façade of the closest sensitive receptor; or a 23-foot distance cannot be maintained from the vibratory equipment to the nearest occupied space of a sensitive receptor.