Appendix F

Noise Impact Analysis Memorandum

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BOYLE HEIGHTS SPORTS CENTER GYM PROJECT: ENVIRONMENTAL NOISE REPORT

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Contents

Tables and Figures

Acronyms and Abbreviations

µPa	micropascals
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 decibels
FHWA	Federal Highway Administration
HVAC	heating, ventilation, and air-conditioning
Hz	Hertz
in/s	inches per second
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
L_{xx}	percentile-exceeded sound level
PPV	peak particle velocity
proposed project	Boyle Heights Sports Center Gym Project
RCNM	Roadway Construction Noise Model

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Chapter 1
Introduction

This technical report has been prepared to support the City of Los Angeles (City) environmental review process and provide information regarding the potential effects of noise and ground-borne vibration associated with the proposed Boyle Heights Sports Center Gym Project (proposed project), located at 2500 Whittier Boulevard. This study, described herein, evaluates the potential short- and long-term noise and ground-borne vibration impacts associated with project development. The report describes the environmental setting for the project, including the existing noise environment, as well as applicable laws and regulations and documents the assumptions, methodologies, and findings used to evaluate the impacts.

1.1 Project Description

The proposed project includes construction of a new 10,000-square-foot gymnasium, consisting of a full-sized basketball court, staff offices, equipment storage rooms, restrooms, showers, a community room, a plaza for special gatherings, green space, pedestrian paths, and parking.

The proposed project would be located at 2500 Whittier Boulevard, in the Boyle Heights Community Plan area of the city of Los Angeles. Specifically, the project site is bounded by Whittier Boulevard on the north, South Mathews Street on the west, and the existing Boyle Heights Sports Center facilities on the east and south. Two vacant single-story buildings currently occupy the site; these are approximately 2,500 and 1,100 square feet in area. The site comprises two relatively flat areas in the northwest (higher area) and southeast (lower area) portions of the site; the two areas are separated by a slope.

Existing land uses in the project area include multi- and single-family residences in the neighborhoods surrounding the project site and commercial uses along Whittier Boulevard. A number of public facilities are in the vicinity of the project site, including Soto Street Elementary School, along 7th Street; SEA Charter School/Soto Education Center, at the southwest corner of South Soto Street and Rogers Avenue; Soto Street Children's Center, at the southeast corner of South Fickett Street and 7th Street; and Park Place Head Start, on the south side of 7th Street, across from the Boyle Heights Sports Center. Bishop Mora Salesian High School and School of Santa Isabel are immediately west of the project site and the existing Boyle Heights Sports Center. The confluence of Interstate 5, State Route 60, and Interstate 10 is approximately 600 feet south of the site. The project site, ambient noise measurement locations, and construction noise receptors are shown in Figure 1-1. The proposed project site plan is shown in Figure 1-2.

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Figure 1-1. Project Site, Noise Measurement Locations, and Construction Receptors

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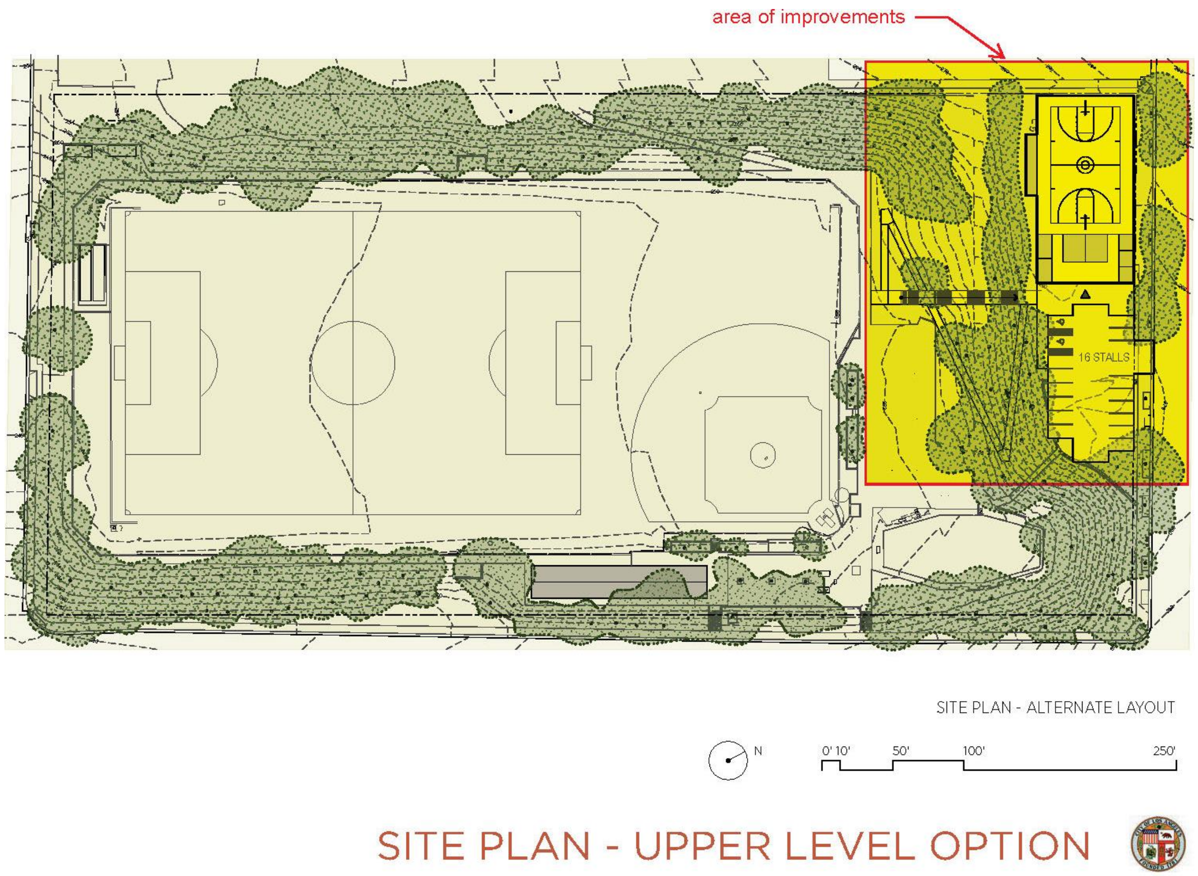
Figure 1-2. Project Site Plan



1.2 Organization of Report

This report is divided into six chapters, including the Introduction. Chapter 2 describes the environmental setting, starting with background information about environmental noise and vibration and then the existing (baseline) noise conditions in the project vicinity. Chapter 3 describes the applicable laws and regulations that apply to the project as well as some additional guidelines regarding ground-borne vibration, which is not specifically addressed by City regulations. Chapter 4 provides a brief description of the methodologies used in the impact analyses, the results of the analyses, and the noise and vibration control methods included for compliance with applicable standards and guidelines. Chapter 5 provides the summary and conclusions. Chapter 6 lists the sources referenced in preparation of this report.

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Chapter 2
Environmental Setting

2.1 Noise Fundamentals

Noise is commonly defined as unwanted sound. 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 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.

2.1.1 Frequency, Amplitude, and Decibels

Continuous sound can be described by *frequency* (pitch) and *amplitude* (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, 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 determines the loudness of that source. The amplitude of a sound is typically described in terms of the *sound pressure level*, which refers to the root-mean-square pressure of a sound wave, and measured in units called micropascals (µPa). One µPa is approximately one hundred-billionth (0.00000000001) of normal atmospheric pressure. Sound pressure levels for different kinds of noise environments can range from less than 100 to more than 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 sound pressure level (also referred to as simply the sound level) in terms of decibels, abbreviated dB. Specifically, the decibel describes the ratio of the actual sound pressure to a reference pressure and 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 standard reference pressure level for acoustical measurements in air. The threshold of hearing for young people is about 0 dB, which corresponds to 20 µPa.

Decibel Addition

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted 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 excavator produces a sound pressure level of 80 dB, two excavators would not produce 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, as described below.

2.1.2 Perception of Noise and 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 sound pressure level 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 in higher or lower frequencies. To approximate the response of the human ear, sound levels in various frequency bands are adjusted (or "weighted"), depending on human sensitivity to those frequencies. The resulting sound pressure level is expressed in A-weighted decibels, abbreviated dBA. 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.

Human Response to Noise

Noise-sensitive receptors (also called "receivers") are locations where people reside or where the presence of unwanted sound may adversely affect the use of the land. The effects of noise on people can be listed in three general categories.

- Subjective effects of annoyance, nuisance, or dissatisfaction
- Interference with activities such as speech, sleep, learning, or working
- Physiological effects such as startling and hearing loss

In most cases, effects from sounds typically found in the natural environment (compared with an industrial or occupational setting) would be limited to the first two categories: creating an annoyance or interfering with activities. (Further discussion of health-related effects is provided below.) No completely satisfactory method exists to measure the subjective effects of sound or the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard arises primarily from the wide variation in individual thresholds of annoyance and habituation to sound. Therefore, an important way of determining a person's subjective reaction 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 exceeds the previously existing ambient sound level or tonal quality, the less acceptable the new sound will be, as judged by the exposed individual.

Table 2-1. Typical Noise Levels in the Environment

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: California Department of Transportation 2013a.

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 the normal environment, is considered just noticeable 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.

Equipment and vehicle operation during nighttime hours can result in noise events that disturb the sleep of people living in nearby residential areas. Interior noise levels between 50 and 55 dBA, maximum sound level, during nighttime hours (10 p.m. to 7 a.m.) were found to result in sleep disturbance and annoyance (Nelson 1987).

2.1.3 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. The primary 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 root-mean-square sound levels that correspond to the loudest and quietest 1-second intervals that occur during the measurement.

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

Community Noise Equivalent Level (CNEL) is a measure of the cumulative 24-hour noise level that considers not only the variation of the A-weighted noise level but also the duration and the time of day of the disturbance. The CNEL is derived from the 24 A-weighted 1-hour L_{eq} that occurs in a day, with "penalties" applied to the L_{eq} occurring during the evening hours (7 p.m. to 10 p.m.) and nighttime hours (10 p.m. to 7 a.m.) to account for increased noise sensitivity during these hours. Specifically, the CNEL is calculated by adding 5 dBA to the evening L_{eq}, adding 10 dBA to the nighttime L_{eq}, and then taking the average value for all 24 hours.

2.1.4 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 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) from a line source is 3 dBA per 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 because of acoustic energy losses on sound wave reflection. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done

for simplification only; for distances of less 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 (Caltrans 2013a). 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, also have major effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations 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, where the sound source tends to be; warmer air above that acts as a cap, causing a reflection of ground level–generated sound).
- **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.

2.2 Environmental Vibration Fundamentals

Ground-borne vibration is an oscillatory motion of the soil with respect to the equilibrium position. It can be quantified in terms of *velocity* or *acceleration*. 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*.

In contrast to airborne sound, ground-borne vibration is not a phenomenon that most people experience every day. The background vibration velocity 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 ground-borne vibration are heavy construction activities (such as blasting and pile driving), railroad operations, and heavy trucks on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is rarely perceptible.

Ground-borne vibration, which can be a serious concern for neighbors of nearby sources, can cause buildings to shake and rumbling sounds to be heard. Vibration can result in effects that range from annoyance to structural damage. Variations in geology and distance result in different vibration levels, with different frequencies and amplitudes.

Ground-borne vibration can be described in terms of peak particle velocity (PPV). PPV is defined as the maximum instantaneous positive or negative peak amplitude of the vibration velocity. The unit of measurement for PPV is inches per second (in/s). 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; to 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; to severe, at a PPV of 0.4 in/s (Caltrans 2013b). If a person is engaged in any type of physical activity, vibration tolerance increases considerably (Caltrans 2013b).

2.3 Existing Conditions

The existing noise-sensitive receivers in the immediate vicinity of the proposed project include multi- and single-family residences, primarily to the north and southeast; Soto Street Elementary School, along 7th Street; Soto Street Children's Center, at the southeast corner of South Fickett Street and 7th Street; Park Place Head Start Day Care Center, adjacent to the Soto Street Children's Center; and Bishop Mora Salesian High School and School of Santa Isabel, immediately west of the project site. Other land uses in the vicinity include commercial businesses and retail stores; the closest commercial uses to the project site are on the north side of Whittier Boulevard, directly across the street from the project site. The primary existing noise sources in the project area are traffic on local streets and nearby freeways, aircraft overflights, and exterior activities at nearby schools, fields, recreational areas, parking lots, and businesses.

To document the existing noise environment, short-term noise measurements (15 minutes in duration) were obtained at four locations in the vicinity of the project site on Wednesday, May 30, 2018. The locations are identified in Figure 1-1; additional details and a summary of the measurement results are provided in Table 2-2.

Measured noise levels were lowest in areas located away from, or shielded from, the more highly traveled roadways in the project area, such as Whittier Boulevard (ST-1, ST-3, and ST-4), with average noise levels (L_{eq}) being approximately 56 to 58 dBA. Noise levels were slightly higher for measurement location ST-2, which was subjected to higher levels of traffic noise from Whittier Boulevard, with an L_{eq} of approximately 61 dBA.

Table 2-2. Summary of Short-Term Noise Measurements

Location #, Description	Measured Noise Levels, dBA	
	Date, Time	L_{eq}
ST-1, sidewalk in front of the Park Place Head Start Day Care Center at 2630 E. 7th Street	5/30/18, 9:57 a.m.–10:12 a.m.	57.9
ST-2, sidewalk along S. Mathews Street, behind the School of Santa Isabel at 2424 Whittier Boulevard	5/30/18, 10:23 a.m.–10:38 a.m.	60.8
ST-3, sidewalk in front of the single-family residence at 926 S. Mott Street	5/30/18, 11:17 a.m.–11:32 a.m.	57.3
ST-4, in alley adjacent to the single-family residence at 734 S. Mathews Street	5/30/18, 11:41 a.m.–11:56 a.m.	56.3

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Chapter 3
Applicable Laws and Regulations

3.1 State Regulations

California 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. The state provides guidelines for evaluating the compatibility of various land uses as a function of community noise exposure.

3.1.1 California Department of Transportation

None of the local laws and regulations discussed below provide any quantitative criteria regarding ground-borne noise and vibration. Therefore, although the proposed project would not be subject to Caltrans oversight, guidance published by the agency nonetheless provides ground-borne vibration criteria that are useful in establishing thresholds of impact. Caltrans' widely referenced *Transportation and Construction Vibration Guidance Manual* (Caltrans 2013b) provides guidance for two types of potential impact, (1) damage to structures and (2) annoyance to people. Guideline criteria for each are provided in Tables 3-1 and 3-2.

Table 3-1. Caltrans Guideline: Vibration Damage Criteria

	Maximum PPV (in/s)	
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 structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans 2013b.

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

Table 3-2. 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.

Note: 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.

Based on these guidelines, a project would have a significant vibration impact, relative to potential building damage, if:

- PPV vibration levels from construction equipment are 0.3 in/s or greater at any existing residential structure or 0.5 in/s at nearby schools or commercial structures.

A project would have a significant vibration impact, relative to potential annoyance, if:

- PPV vibration levels from construction equipment are 0.04 in/s or greater at any existing residence.

3.2 Local

3.2.1 L.A. CEQA Thresholds Guide

The *L.A. CEQA Thresholds Guide* (City of Los Angeles 2006) defines noise-sensitive land uses as residences, transient lodging, schools, day-care facilities, libraries, churches, hospitals, nursing homes, auditoriums, concert halls, amphitheaters, playgrounds, and parks and provides noise/land use compatibility guidelines, as summarized in Table 3-3.

Table 3-3. Land Use Noise Compatibility Guidelines

	Community Noise Exposure CNEL, dB			
Land Use	**Normally Acceptable**	**Conditionally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Single-family, duplex, mobile homes	50–60	55–70	70–75	above 70
Multi-family homes	50–65	60–70	70–75	above 70
Schools, libraries, churches, hospitals, nursing homes	50–70	60–70	70–80	above 80
Transient lodging – motels, hotels	50–65	60–70	70–80	above 80
Auditoriums, concert halls, amphitheaters	—	50–70	—	above 65
Sports arena, outdoor spectator sports	—	50–75	—	above 70
Playgrounds, neighborhoods parks	50–70	—	67–75	above 72
Golf courses, riding stables, water, recreation, cemeteries	50–75	—	70–80	above 80

Normally Acceptable: Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction and without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air-conditioning, will normally suffice.

Normally Unacceptable: New construction or development generally should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development generally should not be undertaken.

Source: City of Los Angeles 2006.

The *L.A. CEQA Thresholds Guide* also establishes significance criteria for four different types of noise sources, (1) construction, (2) operations, (3) railroads, and (4) airports. These criteria are summarized below.

Construction Noise

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.

Operational Noise (including project-generated traffic)

A project would normally have a significant impact related to noise levels from operations if it causes the ambient noise level, measured at the property line of affected uses, to increase by 3 dBA CNEL, to or within the "normally unacceptable" or "clearly unacceptable" category (refer to Table 3-3, above), or 5 dBA or greater. For example, for residences, this means a significant impact would occur if a project causes the ambient noise level to increase by 3 dBA or greater to 70 dBA CNEL or greater or increase by 5 dBA or greater.

The *L.A. CEQA Thresholds Guide* also addresses potential noise impacts associated with railroads and airports. However, the proposed project does not propose to alter any existing railroad or airport operations or expose any new noise-sensitive receptors to excessive noise or vibration from railroad or airport operations. Therefore, these noise sources are not addressed any further in this report.

3.2.2 City of Los Angeles Municipal Code

Construction Noise

Section 41.40 (a) of the City Municipal Code 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" (City of Los Angeles 2017). Construction noise emanating from property zoned for manufacturing or industrial uses is exempted from the Section 41.40 (a) standards. 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 City Municipal Code places limits on the maximum noise levels may be produced by powered equipment or tools in or within 500 feet of any residential zone between the hours of 7:00 a.m. and 10:00 p.m.[1] The proscribed limits shall not apply where compliance is technically infeasible and the burden of proving that compliance is technically infeasible is on the person or persons charged with violation of the standard. Technical infeasibility shall mean that the noise limit cannot be complied with despite the use of mufflers, shields, sound barriers, and/or other noise reduction devices or techniques during operation of the equipment.

Operational Noise

Chapter XI, Noise Regulation, of the City's Municipal Code regulates noise from non-transportation noise sources, such as commercial or industrial operations, mechanical equipment, or residential activities. It is noted that although these regulations do not apply to vehicles operating on public rights-of-way, they do apply to noise generated by vehicles on private property, such as truck operations at commercial or industrial facilities. The exact noise standards vary, depending on the type of noise source, but 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 111.03 provides

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[1] The noise limit is 75 dBA at a distance of 50 feet for typical construction equipment.

minimum ambient noise levels for various land uses, as shown in Table 3-4, below. In the event that the actual measured ambient noise level at the subject location is lower than that provided in the table, the level in the table shall be assumed.

Table 3-4. City of Los Angeles Assumed Minimum Ambient Noise Levels

	Assumed Minimum Ambient Noise (L_{eq}), dBA	
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: City of Los Angeles 2013.

At the boundary line between two zones, the allowable noise level of the quieter zone shall be used. The allowable noise levels are then adjusted if certain conditions apply to the alleged offensive noise, as follows:

- For steady-tone noise 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), reduce allowable noise level by 5 dBA.
- For repeated impulsive noise, reduce allowable noise level by 5 dBA.
- For noise occurring less than 15 minutes in any period of 60 consecutive minutes between the hours of 7:00 a.m. and 10:00 p.m., increase allowable noise level by 5 dBA.

The City's Noise Ordinance is not explicit in defining the length of time over which an average noise level should be assessed. However, based on the noted reference to "60 consecutive minutes," above, it is concluded that the 1-hour L_{eq} metric should be used.

3.2.3 City of Los Angeles General Plan Noise Element

The noise element of the City's General Plan (1999) defines the following land uses to be noise sensitive: single- and multi-family dwellings; long-term care facilities, including convalescent and retirement facilities; dormitories; motels; hotels; transient lodging and other residential uses; houses of worship; hospitals; libraries; schools; auditoriums; concert halls; outdoor theaters; nature and wildlife preserves; and parks.

The noise element contains the following polices that are relevant to the proposed project:

Program 5 – Continue to enforce, as applicable, City, state, and federal regulations intended to abate or eliminate disturbances of the peace and other intrusive noise.

Program 9 – Continue to operate City equipment, vehicles, and facilities in accordance with any applicable City, state, or federal regulations.

Program 11 – 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 (CEQA) and City procedures.

Program 13 – Continue to plan, design, and construct or oversee construction of public projects, as well as projects on City-owned properties, so as to minimize potential noise impacts on noise-sensitive uses and maintain or reduce existing ambient noise levels.

Chapter 4
Project Impact Analysis and Mitigation Methods

4.1 Methodology

4.1.1 Construction Noise and Vibration

The evaluation of potential noise and vibration impacts associated with construction activities was based on the proposed project's construction equipment schedule and phasing information.

Noise

Construction-related noise was analyzed using data and modeling methodologies from the Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) (FHWA 2008), which predicts noise levels at nearby receptors by analyzing the type of equipment, the distance from source to receptor, usage factors, and the presence or absence of intervening shielding between source and receptor. This methodology calculates the composite average noise levels for the multiple pieces of equipment scheduled to be used during each construction phase. The source-to-receptor distances used in the analysis of the maximum noise levels from construction equipment (see Tables 4-3 and 4-4) were the distance from the receptor to the nearest location within the project site. The source-to-receptor distances used in the analysis of average hourly noise levels from construction equipment (see Tables 4-5 and 4-6) were the acoustical average distances between the relevant construction area and each receptor. The acoustical average distance is used to represent noise sources that are mobile or distributed over an area (such as the project site); it is calculated by multiplying the shortest distance between the receiver and the noise source area by the farthest distance and then taking the square root of the product. Noise levels for each phase of construction were analyzed at four receptors in the vicinity of the project site. These receptors, illustrated in Figure 1-1, represent the closest noise-sensitive receptors in each direction from the project site. For all analyses at receptor R4, a 4 dB reduction was applied to anticipated noise levels to account for shielding provided by building structures located between R4 and the project site. The construction schedule and equipment inventory for the project is provided in Table 4-1, and the associated noise levels are provided in Table 4-2. The noise levels are provided for a reference distance of 50 feet. 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.

Table 4-1. Anticipated Construction Phasing, Dates, and Equipment

Construction Phase	Anticipated Start Date	Anticipated End Date	Equipment (Number of Pieces)
Phase 1 – Demolition	09/02/19	10/04/19	Rubber-tired dozer (1) Concrete/industrial saw (1) Scraper (1) Front-end loader (1)
Phase 2 – Site Preparation	10/07/19	10/18/19	Front-end loader (2)

Construction Phase	Anticipated Start Date	Anticipated End Date	Equipment (Number of Pieces)
Phase 3 – Grading	10/21/19	11/22/19	Bulldozer (1) Hydraulic excavator (1) Dump truck (1) Compactor (1) Front-end loader (1)
Phase 4 – Building Construction	11/25/19	04/09/21	Crane (1) Forklift (1) Concrete truck (1) Vibrator (1) Generator (1) Electric power tools (1) Boom lift (1) Scissor lift (1)
Phase 5 – Architectural Coating	04/12/21	06/30/21	Electric power tools (1) Boom lift (1) Forklift (1) Scissor lift (1)

Table 4-2. Construction Equipment Reference Noise Levels

Equipment Item	Maximum Noise Level (L_{max}) at 50 feet, dBA[1]	Average Noise Level (L_{eq}) at 50 feet, dBA[1]
Bulldozer	81.7	77.7
Compactor	83.2	76.2
Concrete truck	81.4	74.4
Concrete saw	89.6	82.6
Crane	80.6	72.6
Dump truck	76.5	72.5
Excavator	80.7	76.7
Forklift	77.6	73.6
Front-end loader	79.1	75.1
Generator	80.6	77.6
Electric power tools	85.2	82.2
Scraper	83.6	79.6
Scissor lift (boom lift)	74.7	67.7
Vibratory concrete mixer	80.0	73.0

[1] Obtained or estimated from FHWA 2008 (RCNM).

Noise level reductions from the temporary construction barriers proposed under Mitigation Measure NOI-1 were determined using a proprietary spreadsheet model[2] that calculates barrier insertion loss at each receptor based on the height of the barrier, the height of each noise source, the height of each receptor, the distance from the receptor to the barrier, the distance from the noise source to the barrier, and the average frequency of the noise.

Vibration

Construction-related vibration 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 ground-borne vibration over distance. The project would not require high-impact construction methods, such as pile driving or blasting. Therefore, the highest ground-borne vibration levels would be associated with conventional heavy construction equipment, such as bulldozers and loaders. According to Caltrans data, these sources generate a PPV of 0.089 in/s at a reference distance of 25 feet.

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 (0.089 in/s); D is the distance from the equipment to the receiver, in feet; and n is a value related to the vibration attenuation rate through ground (the default recommended value for n is 1.1).

4.1.2 Operational Noise

The analysis of traffic noise in the study area was performed qualitatively and based on data from the trip generation assessment memorandum for the proposed project (Fehr and Peers 2018). Noise from on-site operations (including parking lot and heating, ventilation, and air-conditioning [HVAC] noise) was analyzed qualitatively, based on a comparison to existing land uses and the noise environment.

4.2 Impact Analysis

4.2.1 Construction

The analysis below describes the temporary impacts related to noise and vibration as a result of the proposed project during construction.

Noise

Two types of short-term noise impacts could occur during project construction. Construction workers' vehicles and haul trucks, which would transport equipment and materials, would incrementally increase noise levels on access roads. Although there would be a relatively high

[2] Spreadsheet calculations based on Fresnel number calculations for diffraction over a single barrier.

single-event noise level, which could cause an intermittent noise nuisance (e.g., passing trucks at 50 feet would generate up to 77 dBA), the effect on longer-term ambient noise levels (e.g., the daily average noise levels considered in the *L.A. CEQA Thresholds Guide*) would be low because of the infrequent traffic volumes. Therefore, short-term construction-related impacts associated with commuting workers and the transport of equipment to the project site would be less than significant.

The second type of short-term noise impact would be related to noise generated during physical project construction. Construction of the proposed project is anticipated to begin in September 2019 and last approximately 22 months. Day-to-day construction activities would vary throughout the construction process and cease once construction of the project is completed. In accordance with the City Municipal Code, construction would not take place outside the hours of 7 a.m. to 9 p.m. Monday through Friday or 8 a.m. to 6 p.m. on Saturdays or national holidays or at any time on Sunday. Project construction would be broken down into phases. The phases of construction and anticipated construction equipment for each are summarized in Table 4-1.

Based on City Municipal Code standards, construction noise would present a significant impact if maximum noise levels from on-site activity were to exceed 75 dBA at any residence. Table 4-3 summarizes the maximum noise levels (L_{max}) that would be experienced at the closest sensitive receptors during each phase of construction. Maximum noise levels during the demolition, building construction, and architectural coating phases would exceed 75 dBA at receptors R2 and R3, which would be a significant impact. Therefore, the construction contractor would implement Mitigation Measure NOI-1 (see Section 4.3 and Figure 4-1) to ensure that noise levels at nearby homes would be reduced as necessary to comply with the City's standard.

Table 4-3. Maximum Noise Levels from Construction Equipment

	Maximum Noise Level (L_{max}) at Closest Sensitive Receptors, dBA			
Phase	**R1: Soto Street Children's Center**	**R2: School of Santa Isabel**	**R3: Single-family Residence at 924 S. Mott St**	**R4: Single-family Residence at 741 S. Mathews St**
Demolition	67	79	81	75
Site Preparation	56	68	69	64
Grading	61	73	74	69
Building Construction	63	75	76	71
Architectural Coating	63	75	76	71
Significant Impact (Exceeds 75 dBA)?				
Demolition	No	Yes	Yes	No
Site Preparation	No	No	No	No
Grading	No	No	No	No
Building Construction	No	No	Yes	No
Architectural Coating	No	No	Yes	No

According to the *L.A. CEQA Thresholds Guide*, because construction would last for more than 10 days in a 3-month period, a significant impact would occur if construction noise levels were to exceed the existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive land use. Based on the construction equipment information provided in Table 4-1, average hourly noise levels (i.e., 1-hour

L_{eq}) were estimated for each phase of construction at each of the four construction receptors considered in the analysis (refer to Figure 1-1). The results of the analyses are summarized in Table 4-4, below. The table also indicates the average weekday daytime ambient noise levels at each receptor, based on the noise measurements summarized in Table 2-2. Referring to Table 4-4, impacts at receptor R1 would be less than significant during all of the construction phases. However significant impacts would occur under all other analyzed scenarios, except for site preparation noise levels at R2 and R4. Therefore, the construction contractor would implement Mitigation Measure NOI-1 (see Section 4.3 and Figure 4-1) to ensure that construction noise levels at nearby homes would be reduced to within less than 5 dBA of ambient levels as required by the *L.A. CEQA Thresholds Guide* threshold.

Table 4-4. Estimated Construction Noise Levels

Phase	1-Hour L_{eq} at Closest Sensitive Receptors, dBA			
	R1: Soto Street Children's Center	**R2: School of Santa Isabel**	**R3: Single-family Residence at 924 S. Mott St**	**R4: Single-family Residence at 741 S. Mathews St**
Construction Noise Levels				
Demolition	62	71	71	67
Site Preparation	55	63	64	60
Grading	59	68	69	64
Building Construction	62	70	71	66
Architectural Coating	59	68	69	64
Ambient Noise Levels				
Average ambient noise level	58	61	57	56
Construction Noise Increase Over Ambient				
Demolition	4	10	14	11
Site Preparation	0	2	7	4
Grading	1	7	12	8
Building Construction	4	9	14	10
Architectural Coating	1	7	12	8
Significant Impact (Exceeds Ambient by 5 dBA or more)?				
Demolition	No	Yes	Yes	Yes
Site Preparation	No	No	Yes	No
Grading	No	Yes	Yes	Yes
Building Construction	No	Yes	Yes	Yes
Architectural Coating	No	Yes	Yes	Yes

Vibration

Referring to the equipment schedule provided in Table 4-1, various pieces of heavy equipment, such as bulldozers and excavators, would be used at the project site. Vibration levels (PPV, in/s) were estimated at each of the four receptors considered in the construction analysis (refer to Figure 1-1), using the methodology described in Section 4.1.1. The results of the analyses are summarized in Table 4-5, below. The results are presented as a range of vibration levels, based on the estimated range of distances from each receptor that would occur as construction activity shifts around the project site and impacts are assessed relative to the highest predicted PPV. Referring to the table, ground-borne vibration from construction would not exceed the thresholds developed either for potential annoyance at nearby homes or for potential vibration damage at nearby structures. Therefore, the impact associated with construction vibration would be less than significant.

Table 4-5. Estimated Construction Vibration Levels

	R1: Soto Street Children's Center	R2: School of Santa Isabel	R3: Single-family Residence at 924 S. Mott St	R4: Single-family Residence at 741 S. Mathews St
Estimated range of PPV at closest sensitive receptors, in/s	0.002–0.003	0.004–0.011	0.004–0.013	0.004–0.011
Significant impact relative to potential annoyance threshold (0.04 in/s at homes)?	No	No	No	No
Significant impact relative to potential damage threshold (0.3 in/s at homes, 0.5 in/s at schools)?	No	No	No	No

4.2.2 Project Operation

Traffic

The project would generate new vehicle trips that would add incrementally to traffic on surrounding streets and could change the associated traffic noise. According to the trip generation assessment memorandum for the proposed project (Fehr and Peers 2018), the project is anticipated to generate a total of 288 daily trips, including 18 trips in the weekday AM peak hour and 23 trips in the weekday PM peak hour. Relative to existing traffic on nearby roadways, such small increases in traffic noise would generally be considered imperceptible. Therefore, the impact would be less than significant.

On-Site Activity

The proposed project would introduce new noise sources in the study area once the project is operational. These would include the parking lot and HVAC mechanical equipment. Each of these is discussed further below.

Parking Lot Noise

The proposed parking lot would occupy the northeastern portion of the project site (see Figure 1-2). Activities at this location would generate sporadic noise from vehicles starting, car doors slamming, people talking, etc. Although short-term noise would most likely be audible at nearby receptors, it would not generate substantial long-term noise levels (such as those measured by the 1-hour L_{eq} considered in the City Municipal Code). In addition, there is an existing parking lot associated with the School of Santa Isabel directly west of the project site, and street parking is currently available on South Mott Street and Whittier Boulevard. Therefore, the proposed parking lot would be consistent with the existing uses and outdoor activity in the vicinity of the project site. As a result, noise impacts from the proposed parking area would not be significant.

HVAC Noise

The project would require typical mechanical equipment for HVAC functions that would generate noise, but the associated noise levels would be consistent with those generated by similar equipment at the surrounding residences, schools, and commercial buildings. Given the heavily developed nature of the area, the project would not generate significant noise levels above those already experienced in the project vicinity, and it is not anticipated to cause increases in existing ambient noise levels beyond those permitted by the City Municipal Code. As a result, noise impacts from on-site mechanical equipment would not be significant.

Vibration

Mechanical equipment installed at the project site would produce some vibration that may be perceptible within the building. However, there would be no major operational vibration sources that would generate perceptible ground-borne vibration at any nearby lands uses. As a result, there would be no off-site vibration impacts.

4.3 Mitigation Measures

As noted in Section 4.2, the only significant impacts from the project would occur due to noise during project construction. The following mitigation measure is provided to reduce this impact to a less-than-significant level.

NOI-1: Implement Construction Site Noise Control Measures

The following methods shall be included as part of the project to ensure compliance with the City's noise standards and CEQA thresholds for construction:

1. The construction contractor shall conduct all activities in compliance with the applicable restrictions contained in the *L.A. CEQA Thresholds Guide,* including limiting construction noise levels to less than 5 dBA over the existing ambient exterior noise levels at noise-sensitive land uses. The construction contractor shall also comply with the City of Los Angeles Municipal Code, including limiting maximum noise levels at adjacent homes to 75 dBA or less. Such compliance will be achieved using methods that may include, but are not limited to:

   a. Prohibiting construction activity (including deliveries, equipment maintenance, or operation of any construction equipment) at the project site before 7 a.m. or after 9 p.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on any Saturday or national holiday, or at any time on Sunday;

   b. Temporary construction noise barriers shall be installed as described below:

      1) A barrier with a minimum height of 15 feet above ground level shall be installed along the eastern property line of the project site during all phases of construction. The barrier shall wrap around the southern corner of the project site and extend an additional 100 feet to the east. The location of this barrier is identified in Figure 4-1.

2) A barrier with a minimum height of 12 feet above ground level shall be installed along the northern and western property lines of the project site and a portion of the southern property line of the project site. This barrier will connect with the 15-foot barrier described above. The location of this barrier is identified in Figure 4-1.

3) The barriers shall be constructed from acoustical blankets hung over or from a supporting frame. The blankets shall provide a minimum sound transmission class rating of 28 and a minimum noise reduction coefficient (NRC) of 0.80 and be firmly secured to the framework, with the sound-absorptive side of the blankets oriented toward the construction equipment. The blankets shall 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 to minimize the number of seams. The blankets shall be draped to the ground to eliminate any gaps at the base of the barrier.

c. Using low-noise-generating construction equipment;

d. Maintaining all construction equipment, including mufflers and ancillary noise abatement equipment;

e. Ensuring that all mobile and stationary noise-producing construction equipment used on the project site that is regulated for noise output by a local, state, or federal agency complies with such regulation while in the course of project activity;

f. Scheduling high noise-producing activities during periods that are least sensitive;

g. Switching off construction equipment when not in use;

h. Positioning stationary construction equipment, such as generators and compressors, as far away as practical from noise-sensitive receptors;

i. Restricting the use of noise-producing signals, including horns, whistles, alarms, and bells, to safety warning purposes only;

j. Routing construction-related truck traffic away from noise-sensitive areas; and

k. Reducing construction vehicle speeds.

Figure 4-1. Location of Temporary Construction Noise Barriers

4.4 Impacts After Mitigation

Table 4-6 summarizes the maximum noise levels (L_{max}) that would be experienced with implementation of Mitigation Measure NOI-1. Table 4-7 summarizes the average hourly noise levels that would be experienced with implementation of Mitigation Measure NOI-1, along with the corresponding noise increases relative to ambient noise. As shown in Table 4-6 and Table 4-7, with implementation of Mitigation Measure NOI-1, all maximum noise levels would be reduced to 75 dBA or less and all average hourly noise levels would be reduced to less than 5 dBA above ambient levels. Therefore, with the implementations of Mitigation Measure NOI-1, construction noise would comply with both the City's Municipal Codes Standards and the *L.A. CEQA Thresholds* and the impacts would be less than significant.

Table 4-6. Maximum Noise Levels from Construction Equipment with Mitigation Measure NOI-1 Incorporated

Phase	Maximum Noise Level (L_{max}) at Closest Sensitive Receptors with Mitigation Measure NOI-1 Incorporated, dBA			
	R1: Soto Street Children's Center	R2: School of Santa Isabel	R3: Single-family Residence at 924 S. Mott St	R4: Single-family Residence at 741 S. Mathews St
Demolition	60	71	69	67
Site Preparation	54	63	60	59
Grading	56	66	63	62
Building Construction	56	67	65	62
Architectural Coating	56	67	65	62
Significant Impact (Exceeds 75 dBA)?				
Demolition	No	No	No	No
Site Preparation	No	No	No	No
Grading	No	No	No	No
Building Construction	No	No	No	No
Architectural Coating	No	No	No	No

Table 4-7. Estimated Construction Noise Levels with Implementation of Mitigation Measure NOI-1

Phase	1-Hour L_{eq} at Closest Sensitive Receptors after Implementation of Mitigation Measure NOI-1, dBA			
	R1: Soto Street Children's Center	R2: School of Santa Isabel	R3: Single-family Residence at 924 S. Mott St	R4: Single-family Residence at 741 S. Mathews St
Construction Noise Levels				
Demolition	58	64	61	60
Site Preparation	52	58	54	54
Grading	56	62	59	58
Building Construction	56	63	60	59
Architectural Coating	53	61	58	57
Ambient Noise Levels				
Average ambient noise level	58	61	57	56
Construction Noise Increase Over Ambient				
Demolition	0	3	4	4
Site Preparation	0	0	0	0
Grading	0	1	2	2
Building Construction	0	2	3	3
Architectural Coating	0	0	1	1
Significant Impact (Exceeds Ambient by 5 dBA or more)?				
Demolition	No	No	No	No
Site Preparation	No	No	No	No
Grading	No	No	No	No
Building Construction	No	No	No	No
Architectural Coating	No	No	No	No

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Chapter 5
Summary and Conclusions

This technical report has been prepared to evaluate the potential short- and long-term noise and ground-borne vibration impacts associated with project development. The following summarizes the results of this analysis:

- The proposed project includes construction of a new 10,000-square-foot gymnasium, consisting of a full-sized basketball court, staff offices, equipment storage rooms, restrooms, showers, a community room, a plaza for special gatherings, green space, pedestrian paths, and parking.
- Project construction has the potential to generate noise levels in excess of the *L.A. CEQA Thresholds Guide* noise standards and the City Municipal Code noise standards. However, with Mitigation Measure NOI-1 incorporated into the construction process, significant impacts would be less than significant.
- Project operation would not generate noise levels in excess of the *L.A. CEQA Thresholds Guide* noise standards or the City Municipal Code noise standards. Therefore impacts associated with project operation would be less than significant.
- Once operational, the project would not include substantial sources of vibration and, therefore, would not generate any ground-borne vibration impacts.

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Chapter 6
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Appendix A
Construction Noise Analysis

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/7/2018
Case Description: Phase 1 - Demolition

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	58	58	58

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	755	0
Concrete Saw	No	20		89.6	755	0
Scraper	No	40		83.6	755	0
Front End Loader	No	40		79.1	755	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		58.1	54.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw		66	59	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper		60	56	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		55.5	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	66	62	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	61	61	61

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	279	0
Concrete Saw	No	20		89.6	279	0
Scraper	No	40		83.6	279	0
Front End Loader	No	40		79.1	279	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		66.7	62.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw		74.6	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper		68.6	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	74.6	70.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R3	Residential	57	57	57

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	259	0
Concrete Saw	No	20		89.6	259	0
Scraper	No	40		83.6	259	0
Front End Loader	No	40		79.1	259	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	67.4	63.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	75.3	68.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	69.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	75.3	71.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R4	Residential	56	56	56

			Equipment			
Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	271	0
Concrete Saw	No	20		89.6	271	0
Scraper	No	40		83.6	271	0
Front End Loader	No	40		79.1	271	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer		67	63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw		74.9	67.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper		68.9	64.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.4	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	74.9	70.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date:	6/7/2018
Case Description:	Phase 2 - Site Preparation

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R1	Commercial	58	58	58

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Front End Loader	No	40		79.1	755	0
Front End Loader	No	40		79.1	755	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader		55.5	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		55.5	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	55.5	54.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	61	61	61

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	279	0
Front End Loader	No	40		79.1	279	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader		64.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	64.2	63.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R3	Residential	57	57	57

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	259	0
Front End Loader	No	40		79.1	259	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader		64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	64.8	63.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R4	Residential	56	56	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	271	0
Front End Loader	No	40		79.1	271	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader		64.4	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader		64.4	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	64.4	63.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/7/2018
Case Description: Phase 3 - Grading

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	58	58	58

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
			Equipment			
Dozer	No	40		81.7	755	0
Excavator	No	40		80.7	755	0
Dump Truck	No	40		76.5	755	0
Compactor (ground)	No	20		83.2	755	0
Front End Loader	No	40		79.1	755	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	58.1	54.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	57.1	53.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	52.9	48.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	59.7	52.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	55.5	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.7	59.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	61	61	61

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	279	0
Excavator	No	40		80.7	279	0
Dump Truck	No	40		76.5	279	0
Compactor (ground)	No	20		83.2	279	0
Front End Loader	No	40		79.1	279	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	66.7	62.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	65.8	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	61.5	57.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	68.3	61.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	64.2	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.3	68	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R3	Residential	57	57	57

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	259	0
Excavator	No	40		80.7	259	0
Dump Truck	No	40		76.5	259	0
Compactor (ground)	No	20		83.2	259	0
Front End Loader	No	40		79.1	259	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	67.4	63.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	66.4	62.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	62.2	58.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	68.9	62	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.9	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R4	Residential	56	56	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	271	0
Excavator	No	40		80.7	271	0
Dump Truck	No	40		76.5	271	0
Compactor (ground)	No	20		83.2	271	0
Front End Loader	No	40		79.1	271	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Dozer	67	63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	66	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	61.8	57.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	68.6	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	64.4	60.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.6	68.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/7/2018
Case Description: Phase 4 - Building Construction

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	58	58	58

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	755	0
Backhoe	No	40		77.6	755	0
Concrete Pump Truck	No	20		81.4	755	0
Vibratory Concrete Mixer	No	20		80	755	0
Generator	No	50		80.6	755	0
Pneumatic Tools	No	50		85.2	755	0
Man Lift	No	20		74.7	755	0
Man Lift	No	20		74.7	755	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	57	49	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	54	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Pump Truck	57.8	50.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vibratory Concrete Mixer	56.4	49.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	57.1	54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	61.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	51.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	51.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	61.6	61.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	61	61	61

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	279	0
Backhoe	No	40		77.6	279	0
Concrete Pump Truck	No	20		81.4	279	0
Vibratory Concrete Mixer	No	20		80	279	0
Generator	No	50		80.6	279	0
Pneumatic Tools	No	50		85.2	279	0
Man Lift	No	20		74.7	279	0
Man Lift	No	20		74.7	279	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	65.6	57.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	62.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Pump Truck	66.5	59.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vibratory Concrete Mixer	65.1	58.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	65.7	62.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	70.2	67.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	59.8	52.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	59.8	52.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.2	70.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R3	Residential	57	57	57

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	259	0
Backhoe	No	40		77.6	259	0
Concrete Pump Truck	No	20		81.4	259	0
Vibratory Concrete Mixer	No	20		80	259	0
Generator	No	50		80.6	259	0
Pneumatic Tools	No	50		85.2	259	0
Man Lift	No	20		74.7	259	0
Man Lift	No	20		74.7	259	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	66.3	58.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	63.3	59.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Pump Truck	67.1	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vibratory Concrete Mixer	65.7	58.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	66.3	63.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	70.9	67.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60.4	53.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60.4	53.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.9	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R4	Residential	56	56	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	271	0
Backhoe	No	40		77.6	271	0
Concrete Pump Truck	No	20		81.4	271	0
Vibratory Concrete Mixer	No	20		80	271	0
Generator	No	50		80.6	271	0
Pneumatic Tools	No	50		85.2	271	0
Man Lift	No	20		74.7	271	0
Man Lift	No	20		74.7	271	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	65.9	57.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	62.9	58.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Pump Truck	66.7	59.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vibratory Concrete Mixer	65.3	58.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	66	62.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pneumatic Tools	70.5	67.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.5	70.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 6/7/2018
Case Description: Phase 5 - Architectural Coating

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	58	58	58

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
			Equipment			
Pneumatic Tools	No	50		85.2	755	0
Man Lift	No	20		74.7	755	0
Man Lift	No	20		74.7	755	0
Backhoe	No	40		77.6	755	0

Results

Equipment		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Pneumatic Tools		61.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		51.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		51.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		54	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	61.6	59.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	61	61	61

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pneumatic Tools	No	50		85.2	279	0
Man Lift	No	20		74.7	279	0
Man Lift	No	20		74.7	279	0
Backhoe	No	40		77.6	279	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Pneumatic Tools		70.2	67.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		59.8	52.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		59.8	52.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe		62.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	70.2	68.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R3	Residential	57	57	57

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pneumatic Tools	No	50		85.2	259	0
Man Lift	No	20		74.7	259	0
Man Lift	No	20		74.7	259	0
Backhoe	No	40		77.6	259	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Pneumatic Tools	70.9	67.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60.4	53.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60.4	53.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	63.3	59.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.9	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R4	Residential	56	56	56

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Pneumatic Tools	No	50		85.2	271	0
Man Lift	No	20		74.7	271	0
Man Lift	No	20		74.7	271	0
Backhoe	No	40		77.6	271	0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Pneumatic Tools	70.5	67.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift	60	53	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	62.9	58.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.5	68.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.