RANCHO CIENEGA CELES KING III POOL DEMOLITION

NOISE AND VIBRATION IMPACT STUDY

Prepared for
LOS ANGELES BUREAU OF ENGINEERING

Prepared by
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TECHNICAL APPENDIX

Appendix A  Noise Data and Calculations
1.0 SUMMARY OF FINDINGS

Terry A. Hayes Associates Inc. (TAHA) completed a noise and vibration impact analysis for the Rancho Cienega Celes King III Pool Demolition Project (proposed project). The analysis assessed construction and operational impacts associated with the proposed project. Summary of impact statements are shown in Table 1-1. Mitigation measures are summarized following the table.

<table>
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<th>Proposed Project Level of Significance</th>
<th>Applicable Mitigation Measures</th>
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<td>Would the proposed project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?</td>
<td>Less-than-Significant Impact With Mitigation</td>
<td>N1 through N8</td>
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<tr>
<td>Would the proposed project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?</td>
<td>Less-than-Significant Impact</td>
<td>None</td>
</tr>
<tr>
<td>Would the proposed project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?</td>
<td>Less-than-Significant Impact</td>
<td>None</td>
</tr>
<tr>
<td>Would the proposed project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?</td>
<td>Less-than-Significant Impact With Mitigation</td>
<td>N1 through N8</td>
</tr>
<tr>
<td>For a project located within an airport land use plan or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?</td>
<td>No Impact</td>
<td>None</td>
</tr>
<tr>
<td>For a project located within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise?</td>
<td>No Impact</td>
<td>None</td>
</tr>
</tbody>
</table>


Mitigation Measures

**N1** Construction equipment shall be properly maintained and equipped with mufflers.

**N2** Construction equipment shall have rubber tires instead of tracks.

**N3** Equipment shall be turned off when not in use for an excess of five minutes, except for equipment that requires idling to maintain performance.

**N4** A public liaison shall be appointed for project construction will be responsible for addressing public concerns about construction activities, including excessive noise. As needed, the liaison shall determine the cause of the concern (e.g., starting too early, bad muffler) and implement measures to address the concern.

**N5** The construction manager shall coordinate with the site administrator for Dorsey High School to schedule construction activity such that student exposure to noise is minimized.

**N6** The public shall be notified in advance of the location and dates of construction hours and activities.

**N7** Construction activities shall be prohibited between the hours of 9:00 p.m. and 7:00 a.m. when located within 500 feet of occupied sleeping quarters or other land uses sensitive to increased nighttime noise levels.
If Mitigation Measures N1 through N7 do not reduce noise impacts to a level of insignificance, the project applicant shall develop new and appropriate measures to effectively mitigate construction related noise at the affected school. Provisions shall be made to allow the school and or designated representative(s) to notify the project applicant when such measures are warranted (e.g., Mitigation Measure N4).
2.0 INTRODUCTION

2.1 PURPOSE OF REPORT

The purpose of this report is to evaluate the potential noise and vibration impacts associated with the proposed project.

2.2 PROJECT DESCRIPTION

2.2.1 Project Description

The proposed project consists of demolition of the Celes King III Indoor Pool. The building and pool will be demolished, and the site will be graded and landscaped.

2.2.2 Project Background

The Rancho Cienega Sports Complex (Phase 1) Project was approved on December 2016. The proposed project included the development of an upgraded and expanded sports complex. The proposed project will construct a new 30,000 square-foot sports complex that includes a new indoor gymnasium with office space, a running path, and a lookout deck on the second floor; a new tennis shop with restrooms and tennis overlook; a new stadium overlook with a concession stand, restrooms and a ticket office; installation of new driveways; and upgrades to existing parking areas. For historic reasons, demolition of the Celes King III Indoor Pool was not considered with the Rancho Cienega Sports Complex (Phase 1) Project which was approved by the Board of Recreation and Park Commissioners on December 14, 2016. This demolition project is related to but not necessary for the Ranch Cienega Sports Complex.

2.2.3 Location

The project site is located at 5001 Rodeo Road in the West Adams-Baldwin Hills-Leimert Community of the City of Los Angeles. The project site is bounded by the Rancho Cienega Sports Complex to the north, Susan Miller Dorsey High School to the east, residential land uses to the south, and a shopping center to the west. Figure 2-1 shows the location of the project site.

2.2.4 Setting

The project site currently has an indoor pool. Adjacent to the project site is the existing Rancho Cienega Sports Complex which contains a variety of facilities including a gymnasium, basketball courts, baseball diamond, children’s play area, community room, football field, handball courts, picnic tables, soccer field, skate park, and tennis courts. The project site is accessed via Rodeo Road on the south side and via Exposition Boulevard on the north side. There are two main parking areas: one in the northwest area of the park and another in the southern area adjacent to Rodeo Road.

The land uses located in the vicinity of the project site are highly urbanized. The Project area consists predominantly of single- and multi-family residential housing, industrial uses, commercial uses, and public facilities. Residential housing is located to the east and south of the project site, industrial and commercial uses to the west, and exclusively industrial to the north. Public facilities land uses are located directly adjacent to the north and institutional uses east of the project site.

FIGURE 2-1
PROJECT LOCATION

3.0 NOISE AND VIBRATION

This section describes the characteristics and effects of noise and vibration, discusses the applicable regulatory setting, the existing setting, and evaluates noise and vibration levels associated with the proposed project.

3.1 NOISE AND VIBRATION CHARACTERISTICS AND EFFECTS

3.1.1 Noise

Characteristics of Sound

Sound is technically described in terms of the loudness (amplitude) and frequency (pitch). 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. Figure 3-1 provides examples of A-weighted noise levels from common sounds.

Noise Definitions

This noise analysis discusses average sound levels in terms of Equivalent Noise Level ($L_{eq}$). $L_{eq}$ is the average sound level for any specific time period, on an energy basis. The $L_{eq}$ for one hour is the energy average 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. $L_{eq}$ is expressed in units of dBA.

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, the nature of work or human activity that is exposed to the noise source.

Audible Noise Changes

Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dBA. A change of at least 5 dBA would be noticeable and may evoke a community reaction. A 10-dBA increase is subjectively heard as a doubling in loudness and would likely cause a community response.

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3 California Department of Transportation, Technical Noise Supplement, September 2013.
FIGURE 3-1
A-WEIGHTED DECIBEL SCALE


Near Jet Engine: 130 dBA
Rock-n-Roll Band: 120 dBA
Jet Flyover @1,000ft: 110 dBA
Loud Auto Horn @ 10ft: 100 dBA
Power Mower: 90 dBA
Motorcycle @ 25ft Food Blender: 80 dBA
Garbage Disposal: 70 dBA
Living Room Music: 60 dBA
Human Voice @ 3ft: 50 dBA
Residential Air Conditioner @ 50ft: 40 dBA
Bird Calls: 30 dBA
Quiet Living Room: 20 dBA
Average Whisper: 10 dBA
Rustling Leaves: 0 dBA

Threshold of Pain: 130 dBA
Threshold of Human Audibility: 0 dBA

Very Faint
Faint
Moderate
Loud
Very Loud
Deafening
Threshold of Pain

Exposition Corridor Transit Neighborhood Plan
Noise levels decrease as the distance from the noise source to the receiver increases. Noise levels generated by a stationary noise source, or "point source," will decrease by approximately 6 dBA over hard surfaces (e.g., pavement) and 7.5 dBA over soft surfaces (e.g., grass) 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 would be 83 dBA at a distance of 100 feet over hard surface from the noise source, 77 dBA at a distance of 200 feet, and so on. Noise levels generated by a mobile source will decrease by approximately 3 dBA over hard surfaces and 4.5 dBA over soft surfaces for each doubling of the distance.

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, greatly reducing noise levels from the source since sound can only reach the receiver by bending over the top of the barrier (diffraction). 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 greatly reduced. In situations where the source or the receiver is located 3 meters (approximately 10 feet) above the ground, or whenever the line-of-sight averages more than 3 meters above the ground, sound levels would be reduced by approximately 3 dBA for each doubling of distance.

### 3.1.2 Vibration

#### Characteristics of Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration can be a serious concern, causing buildings to shake and rumbling sounds to be heard. In contrast to noise, vibration is not a common environmental problem. 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 rock blasting, pile driving, and heavy earth-moving equipment.

#### 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. 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

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

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4Line-of-sight is an unobstructed visual path between the noise source and the noise receptor.
Perceptible Vibration Changes

In contrast to noise, vibration is not a phenomenon that most people experience every day. The background vibration velocity level in residential areas is usually 50 VdB RMS or lower, well below the threshold of perception for humans which is around 65 VdB RMS. 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 vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible.

3.2 REGULATORY SETTING

3.2.1 Noise

Federal

United States Environmental Protection Agency (USEPA). 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 USEPA 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 USEPA rulings in prior years remain in place.

State

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation. State regulations governing noise levels generated by individual motor vehicles and occupational noise control are not applicable to planning efforts, nor are these areas typically subject to California Environmental Quality Act (CEQA) analysis.

Local

The City of Los Angeles has established policies and regulations concerning the generation and control of noise that could adversely affect its citizens and noise-sensitive land uses. Regarding construction, Section 41.40 (Noise Due to Construction, Excavation Work – When Prohibited) of the Los Angeles Municipal Code (LAMC) states that no construction or repair work shall be performed between the hours of 9:00 p.m. and 7:00 a.m. on Monday through Friday since such activities would generate loud noises and disturb persons occupying sleeping quarters in any adjacent dwelling, hotel, apartment, or other place of residence. Further, no person, other than an individual home owner engaged in the repair or construction of his/her single-family dwelling, shall perform any construction or repair work of any kind or perform such work within 500 feet of land so occupied before 8:00 a.m. or after 6:00 p.m. on any Saturday, nor at any time on any Sunday or on a federal holiday. Under certain conditions, the City may grant a waiver to allow limited construction activities to occur outside of the limits described above.

LAMC Section 112.04 (Powered Equipment Intended for Repetitive Use in Residential Areas and Other Machinery, Equipment, and Devices) specifies between the hours of 10:00 p.m. and 7:00 a.m. of the following day, no person shall operate any lawn mower, backpack blower, lawn edger,

riding tractor, or any other machinery, equipment, or other mechanical or electrical device, or any hand tool which creates a loud, raucous or impulsive sound, within any residential zone or within 500 feet of a residence. Furthermore, no gas-powered blower shall be used within 500 feet of a residence at any time.

LAMC Section 112.05 (Maximum Noise Level of Powered Equipment or Powered Hand Tools) specifies the maximum noise level of powered equipment or powered hand tools. Any powered equipment or hand tool that produces a maximum noise level exceeding 75 dBA at a distance of 50 feet is prohibited. However, this noise limitation does not apply where compliance is technically infeasible. Technically infeasible means the above noise limitation cannot be met despite the use of mufflers, shields, sound barriers and/or any other noise-reduction device or techniques during the operation of equipment.

The Los Angeles Unified School District (LAUSD) has established noise standards to ensure that excess noise exposure to students and faculty does not occur. LAUSD has adopted an exterior noise standard of 67 dBA L eq and an interior classroom noise standard of 45 dBA L eq.

### 3.2.2 Vibration

**Federal**

The Federal Transit Administration (FTA) has published guidance for assessing building damage impacts from vibration. Table 3-1 shows the FTA building damage criteria for vibration. FTA has also established criteria related to vibration annoyance, which are shown in Table 3-2.

<table>
<thead>
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<th>TABLE 3-1: CONSTRUCTION VIBRATION DAMAGE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Category</td>
</tr>
<tr>
<td>I. Reinforced-concrete, steel or timber (no plaster)</td>
</tr>
<tr>
<td>II. Engineered concrete and masonry (no plaster)</td>
</tr>
<tr>
<td>III. Non-engineered timber and masonry buildings</td>
</tr>
<tr>
<td>IV. Buildings extremely susceptible to vibration damage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 3-2: CONSTRUCTION VIBRATION ANNOYANCE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use Category</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>1. Buildings where vibration would interfere with interior operations.</td>
</tr>
<tr>
<td>2. Residences and buildings where people normally sleep.</td>
</tr>
<tr>
<td>3. Institutional land uses with primarily daytime use.</td>
</tr>
</tbody>
</table>

/a/ Frequent Events are defined as more than 70 vibration events of the same source per day.
/b/ Occasional Events are defined as between 30 and 70 vibration events of the same kind per day.
/c/ Infrequent Events are defined as fewer than 30 vibration events of the same kind per day.
/d/ This criterion limit is based on levels that are acceptable for most moderately-sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.


**State**

There are no adopted State vibration standards.
Local

There are no adopted City of Los Angeles vibration standards.

3.3 EXISTING SETTING

3.3.1 Existing Noise and Vibration Environment

To characterize the existing noise environment around the project site, ambient noise was monitored using a SoundPro DL Sound Level Meter on May 31, 2018, between 10:00 a.m. and 12:00 p.m. The detailed locations are shown in Figure 3-2. Measurements were taken for 15-minute periods at each site. As shown in Table 3-3, the existing ambient sound levels range between 70.4 and 70.8 dBA $L_{eq}$. Traffic was the primary source of noise at each site. Possible sources of vibration at the project site include the Los Angeles County Metropolitan Transportation Authority (Metro) Expo Line and truck traffic. Based on the field visits, neither source generates perceptible vibration on the project site.

<table>
<thead>
<tr>
<th>Figure 3-2 Key</th>
<th>Noise Monitoring Location</th>
<th>Sound Level (dBA, $L_{eq}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residences at 3515 S. La Brea Ave.</td>
<td>70.8</td>
</tr>
<tr>
<td>2</td>
<td>Residences at 5010 Rodeo Rd.</td>
<td>70.4</td>
</tr>
<tr>
<td>3</td>
<td>Susan Miller Dorsey High School</td>
<td>70.4</td>
</tr>
</tbody>
</table>

**TABLE 3-3: EXISTING AMBIENT NOISE LEVELS**

**SOURCE:** TAHA, 2018.

3.3.2 Sensitive Receptors

Sensitive receptors are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. They typically include residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas. The project site is located in an urban environment and many sensitive receptors are located near the construction zone as shown in Figure 3-2. Sensitive receptors within the vicinity of the project site include Dorsey High School adjacent to the east, residences directly to the south and southwest across Rodeo Road.

3.4 METHODOLOGY AND IMPACT CRITERIA

3.4.1 Methodology

The noise and vibration analysis considers construction and operational sources. Construction noise levels were based on information obtained from USEPA. Noise levels associated with typical construction equipment were obtained from the Federal Highway Administration (FHWA) Roadway Construction Noise Model. This model predicts noise from construction operations based on a compilation of empirical data and the application of acoustical propagation formulas. Maximum equipment noise levels were adjusted based on anticipated percent of use. Example equipment noise levels were estimated by making a distance adjustment to the construction source noise level.

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FIGURE 3-2
NOISE MONITORING LOCATIONS AND SENSITIVE RECEPTORS
The methodology used for this analysis can be viewed in Section 2.1.4 (Sound Propagation) of the California Department of Transportation (Caltrans) Technical Noise Supplement. Vibration levels generated by construction equipment were estimated using example vibration levels and propagation formulas provided by FTA found in Section 12.2 (Construction Vibration Assessment).\(^8\)

(1) Noise Distance Attenuation Formula: \(dBA_2 = dBA_1 + 20 \times \log_{10} \left(\frac{D_1}{D_2}\right)\)

Where:

\(dBA_1 = \text{Noise level at the reference distance of 50 feet}\)

\(dBA_2 = \text{Noise level at the receptor}\)

\(D_1 = \text{Reference distance (50 feet)}\)

\(D_2 = \text{Distance from source to receptor (measured distance)}\)

(2) Logarithmic Noise Level Addition Formula: \(Nc = 10 \times \log_{10} ((10^{N1/10}) + (10^{N2/10}))\)

Where:

\(Nc = \text{Combined noise level}\)

\(N1 = \text{Noise level one}\)

\(N2 = \text{Noise level two}\)

Vibration levels were estimated using example vibration levels and propagation formulas provided by FTA.\(^9\) The methodology and formulas obtained from the FTA Transit Noise and Vibration Assessment guidance can be viewed below. Vibration damage is assessed using formula (3) and vibration annoyance is assessed using formula (4).

(3) Vibration Damage Attenuation Formula: \(PPV_{\text{equip}} = PPV_{\text{ref}} \times (25/D)^{1.5}\)

Where:

\(PPV_{\text{equip}} = \text{Peak particles velocity in inches per second of the equipment adjusted for distance}\)

\(PPV_{\text{ref}} = \text{Reference vibration level in inches per second at 25 feet}\)

\(D = \text{Distance from the equipment to the receptor in feet}\)

(4) Vibration Annoyance Attenuation Formula: \(L_{V_{\text{equip}}} = L_{V_{\text{ref}}} - 30 \times \log (D/25)\)

Where:

\(L_{V_{\text{equip}}} = \text{Vibration level in vibration decibels of equipment adjusted for distance}\)

\(L_{V_{\text{ref}}} = \text{Reference vibration level in vibration decibels at 25 feet}\)

\(D = \text{Distance from the equipment to the receptor in feet}\)


\(^9\)Ibid.
3.4.2 CEQA Significance Thresholds

The proposed project would not result in a substantial permanent increase in ambient noise levels or expose persons to excessive noise from public or private airports. Accordingly, this issue is not further analyzed for potential impacts.

In accordance with Appendix G of the CEQA Guidelines, the proposed project would have a significant impact related to noise and vibration if it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; and/or
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

Construction Noise

Based on the LAMC, the proposed project would exceed the local standards and substantially increase temporary construction noise levels if:

- Construction activities would occur within 500 feet of a noise-sensitive use and outside the hours allowed in the LAMC. The allowable hours of construction in the LAMC include 7:00 a.m. to 9:00 p.m. Monday through Friday and 8:00 a.m. to 6:00 p.m. on Saturday. No construction activity is allowed on Sundays or federal holidays; and/or
- Equipment noise levels would exceed 75 dBA L_{eq} at 50 feet unless technically infeasible.

Construction Vibration

The construction-related vibration analysis considers the potential for building damage and annoyance. Maximum vibration levels were assessed based on large bulldozer and hoe ram activity, which would be considered as a frequent event happening between 70 times or more in one day.

- Vibration levels would exceed 0.3 inches per second at engineered concrete and masonry buildings (e.g., typical residential buildings, schools, commercial centers); and/or
- Vibration levels associated with hoe ram activity would exceed 72 VdB at residences or 75 VdB at institutional land uses with primarily daytime use.
ENVIRONMENTAL IMPACTS

3.5.1 Would the proposed project result in exposure persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? (Less-than-Significant Impact With Mitigation)

Impact Analysis

Construction

Equipment. Construction activity is anticipated to begin in December 2020 and take approximately 12 months to complete, concluding in December 2021. The LAMC allows construction activity to occur Monday through Friday between the hours of 7:00 a.m. and 9:00 p.m., although daily construction would not likely occur after 6:00 p.m. If necessary, construction of the proposed project would occur between the hours of 8:00 a.m. and 6:00 p.m. on Saturdays. There would be no construction activities on Sundays or federal holidays, and no construction would occur during prohibited hours.

Demolition and grading activities would require heavy-duty equipment common to urban development, including, but not limited to, hoe rams, graders, loaders, and trucks. Typical noise levels from various types of equipment that may be used during construction are listed in Table 3-4. The table shows noise levels at distances of 50 feet from the construction noise source. Construction activities typically require the use of numerous pieces of noise-generating equipment. A hoe ram would be used for breaking up concrete during the pool demolition. Hoe ramming would generate the highest noise levels of any construction equipment with a noise level of 90.3 dBA at 50 feet. The noise levels shown in Table 3-5 take into account that multiple pieces of construction equipment would be operating simultaneously. When considered as an entire process with multiple pieces of equipment, project-related activity (i.e., ground clearing and site preparation) would generate noise levels between 78 and 89 dBA $L_{eq}$ at 50 feet.

### Table 3-4: Noise Level Ranges of Typical Construction Equipment

<table>
<thead>
<tr>
<th>Construction Equipment</th>
<th>Noise Level at 50 feet ($L_{eq}$, dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backhoe (Skid Loader/Skip Loader)</td>
<td>73.6</td>
</tr>
<tr>
<td>Compactor</td>
<td>76.2</td>
</tr>
<tr>
<td>Dump Truck</td>
<td>72.5</td>
</tr>
<tr>
<td>Excavator</td>
<td>76.7</td>
</tr>
<tr>
<td>Hoe Ram</td>
<td>90.3</td>
</tr>
<tr>
<td>Roller</td>
<td>73.0</td>
</tr>
</tbody>
</table>


### Table 3-5: Typical Outdoor Construction Noise Levels

<table>
<thead>
<tr>
<th>Construction Method</th>
<th>Noise Level at 50 feet (dBA, $L_{eq}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Clearing</td>
<td>84</td>
</tr>
<tr>
<td>Site Preparation</td>
<td>89</td>
</tr>
<tr>
<td>Foundations</td>
<td>78</td>
</tr>
<tr>
<td>Structural</td>
<td>85</td>
</tr>
<tr>
<td>Finishing</td>
<td>89</td>
</tr>
</tbody>
</table>

The impact analysis is based on the construction limits outlined in the LAMC. As discussed above, construction activity would comply with the allowable hours of construction in the LAMC, including 7:00 a.m. to 9:00 p.m. Monday through Friday, 8:00 a.m. to 6:00 p.m. on Saturday, and no construction activity on Sundays or federal holidays. The LAMC limits equipment noise levels to 75 dBA at 50 feet unless technically infeasible. Noise levels from individual pieces of equipment would typically range from 72.5 to 90.3 dBA L_{eq} at 50 feet. Unmitigated noise levels would typically exceed the allowable noise level stated in the LAMC. Therefore, without mitigation, the proposed project would result in a significant impact related to construction noise.

**Trucks.** In addition to on-site construction activities, noise would be generated off-site by construction-related trucks. Demolition and construction activities would require an average of 10 truck roundtrips per day, with a peak of 18 daily truck roundtrips occurring during one month for the infill of the pool pit. A doubling of traffic volume is typically needed to audibly increase noise levels along a roadway segment. An additional 10 truck round trips per day on average or 18 truck round trips per day during the peak period would not double the volume on any roadway segment. It is not anticipated that off-site vehicle activity would audibly change average daily noise levels. Therefore, the proposed project would result in a less-than-significant impact related to off-site noise during construction.

**Operations**

Typical sources of noise for new projects include increased traffic, mechanical equipment, and parking lots. The project site would include a community front lawn with playground facilities and would not introduce new operational sources of noise. The playground would generate noise similar to the existing tennis courts and would not represent a new noise source. Furthermore, playground noise is not anticipated to be audible above existing traffic noise along Rodeo Road due to the high existing noise level of 70.4 dBA L_{eq}. The landscaped areas would require occasional routine maintenance involving typical landscaping equipment, which would comply with the provisions of LAMC Section 112.04. Therefore, the proposed project would result in a less-than-significant impact related to operational noise.

**Mitigation Measures:**

**N1** Construction equipment shall be properly maintained and equipped with mufflers.

**N2** Construction equipment shall have rubber tires instead of tracks.

**N3** Equipment shall be turned off when not in use for an excess of five minutes, except for equipment that requires idling to maintain performance.

**N4** A public liaison shall be appointed for project construction will be responsible for addressing public concerns about construction activities, including excessive noise. As needed, the liaison shall determine the cause of the concern (e.g., starting too early, bad muffler) and implement measures to address the concern.

**N5** The construction manager shall coordinate with the site administrator for Dorsey High School to schedule construction activity such that student exposure to noise is minimized.

**N6** The public shall be notified in advance of the location and dates of construction hours and activities.

**N7** Construction activities shall be prohibited between the hours of 9:00 p.m. and 7:00 a.m. when located within 500 feet of occupied sleeping quarters or other land uses sensitive to increased nighttime noise levels.
N8 If Mitigation Measures N1 through N7 do not reduce noise impacts to a level of insignificance, the project applicant shall develop new and appropriate measures to effectively mitigate construction related noise at the affected school. Provisions shall be made to allow the school and or designated representative(s) to notify the project applicant when such measures are warranted (e.g., Mitigation Measure N4).

Significance After Mitigation

Construction

Mitigation Measures N1 through N7 are designed to reduce construction noise levels. The equipment mufflers associated with Mitigation Measure N1 would reduce construction noise levels by approximately 3 dBA. Mitigation Measures N2 through N7, although difficult to quantify, would also reduce and/or control construction noise levels. Mitigation Measure N8 provides a mechanism for additional noise control if construction activities are disruptive at Dorsey High School. Other measures included the following:

- Electric Equipment - Electric equipment would generate less noise than diesel equipment but is not widely available and the horsepower associated with electric equipment would not meet project requirements.
- Relocation - Removing the affected land uses from the construction zone would eliminate the impact. This measure would not be feasible due to the associated cost of relocation.
- Window Retrofits - Retrofitting windows at affected land uses would reduce noise exposure. This measure would not be feasible due to the number of affected land uses and associated cost of retrofitting considering the temporary nature of the noise from construction.

Mitigation Measures N1 through N8 are feasible measures to control noise levels, including engine mufflers. With implementation of these feasible mitigation measures, and based on compliance with the LAMC, construction equipment noise would be mitigated to the greatest extent feasible. Therefore, the proposed project would result in a less-than-significant impact related to construction noise.

Operations

No significant impacts have been identified related to operational noise. Therefore, no mitigation measures are required.

3.5.2 Would the proposed project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels? (Less-than-Significant Impact)

Impact Analysis

Construction

Construction activity can generate varying degrees of vibration, depending on the procedure and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of a construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, and to slight damage at the highest levels. In most cases, the primary concern regarding construction vibration relates to damage.
On-Site Equipment. The FTA provides vibration levels for various types of construction equipment with an average source level reported in terms of velocity.\textsuperscript{10} Table 3-6 provides estimates of vibration levels for a wide range of soil conditions.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>PPV at 25 feet (Inches/Second)</th>
<th>Approximate L, at 25 feet /a/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Bulldozer</td>
<td>0.089</td>
<td>87</td>
</tr>
<tr>
<td>Loaded Trucks</td>
<td>0.076</td>
<td>86</td>
</tr>
<tr>
<td>Hoe Ram</td>
<td>0.089</td>
<td>87</td>
</tr>
<tr>
<td>Small Bulldozer</td>
<td>0.003</td>
<td>58</td>
</tr>
</tbody>
</table>

/\textsuperscript{a/} RMS velocity in decibels (VdB) related to 1 micro-inch/second.


The reference levels were used to estimate vibration levels at the sensitive receptors most likely to be impacted by equipment at each location of construction activity. Vibration levels are shown in Table 3-7 and discussed in detail for each construction phase.

<table>
<thead>
<tr>
<th>Sensitive Receptor</th>
<th>Distance from Bulldozing Activity (Feet)</th>
<th>Vibration Level (Inches Per Second)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Family Residences to the south</td>
<td>160</td>
<td>0.0055</td>
</tr>
<tr>
<td>Multi-Family Residences to the southwest</td>
<td>450</td>
<td>0.0012</td>
</tr>
<tr>
<td>Dorsey High School Track</td>
<td>300</td>
<td>0.0021</td>
</tr>
<tr>
<td>Dorsey High School nearest Classroom</td>
<td>550</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

/\textsuperscript{a/} Engineered concrete and masonry (no plaster) building damage impact criterion is 0.3 inches per second.

/\textsuperscript{b/} The applicable annoyance impact criterion for residences experiencing frequent events (i.e., over 70 vibration events from the same source per day) is 72 VdB.

/\textsuperscript{c/} The applicable annoyance impact criterion for institutional land uses experiencing frequent events (i.e., over 70 vibration events from the same source per day) is 75 VdB.

\textsc{Source:} TAHA, 2018.

The maximum vibration levels would be generated during large bulldozer and hoe ram activity. Vibration levels would be approximately 0.089 inches per second and 87 VdB at 25 feet. The nearest off-site sensitive land use would be approximately 160 feet to the south across Rodeo Road. Large bulldozer and hoe ram vibration levels would be approximately 0.006 inches per second and 63 VdB. These levels would be below the significance thresholds of 0.3 inches per second and 72 VdB. Additionally, as shown in Table 3-7, vibration levels would not exceed the significance thresholds at any other off-site sensitive land use, including Dorsey High School.

Off-Site Trucks. In addition to on-site construction activities, construction trucks on the roadway network have the potential to expose vibration-sensitive land uses located near the proposed project access route. As shown in Table 3-6, loaded trucks generate vibration levels of 0.076 inches per second at a distance of 25 feet. Rubber-tired vehicles, including trucks, do not generate significant roadway vibrations that can cause building damage. It is possible that trucks would generate perceptible vibration at sensitive receptors adjacent to the roadway. However, these would be transient and instantaneous events typical to the roadway network. This level of activity is not considered substantial enough to generate a vibration annoyance. Therefore, construction truck activity would result in a less-than-significant vibration impact.

Operations

The proposed project would not introduce any significant stationary sources of vibration, including mechanical equipment that would be perceptible at sensitive receptors. Therefore, operational activity would result in a less-than-significant impact related to vibration.

Mitigation Measures

No impacts have been identified related to groundborne vibration levels, and no mitigation measures are required.

3.5.3 Would the proposed project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project? (Less-than-Significant Impact)

Impact Analysis

As discussed in Section 3.5.1, above, the proposed project would not generate new traffic or include a significant source of mechanical equipment noise. Maintenance (i.e., landscaping) activities would comply with the provisions of LAMC Section 112.04. Therefore, the proposed project would result in a less-than-significant impact related to operational noise.

Mitigation Measures

No impacts have been identified related to permanent noise levels, and no mitigation measures are required.

3.5.4 Would the proposed project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project? (Less-than-Significant Impact with Mitigation)

Impact Analysis

As discussed in Section 3.5.1, sensitive receptors around the construction zone would experience increased noise levels associated with construction. Construction noise impacts would be temporary in nature, but equipment noise levels would exceed the 75 dBA at 50 feet. Therefore, without mitigation, the proposed project would result in a significant noise impact related to temporary and periodic construction activity.

Mitigation Measures

Refer to Mitigation Measures N1 through N8, above.

Significance After Mitigation

Based on compliance with the LAMC, construction equipment noise would be mitigated to the greatest extent feasible. The implementation of Mitigation Measures N1 through N8 would reduce noise impacts to less-than-significant.
3.5.5 Would the proposed project result in for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels? *(No Impact)*

**Impact Analysis**

The project site is not located within an airport land use plan. The nearest airports to the project site are the Santa Monica Municipal Airport and the Los Angeles International Airport, located approximately five miles to the west and south, respectively. Due to the distance from the nearest airport, the proposed project would not expose people working or residing in the project area to excessive noise. Therefore, no impact would occur.

**Mitigation Measures**

No impacts have been identified related to public airport noise levels, and no mitigation measures are required.

3.5.6 Would the proposed project result in for a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels? *(No Impact)*

**Impact Analysis**

The project site is not located within the vicinity of a private airstrip. Therefore, no noise impacts to people working or residing in the project area would occur.

**Mitigation Measures**

No impacts have been identified related to private airport noise levels, and no mitigation measures are required.

3.6 **CUMULATIVE IMPACTS**

The Rancho Cienega Sports Complex (Phase 1) Project would be completed prior to the proposed project and construction associated with that project would not occur concurrently with the proposed project. All other related projects would be over 1,000 feet from the project site. Noise generated by the proposed project would not be audible at related project sites. Similarly, vibration generated by the proposed project would not be perceptible at related project sites. There is no potential for the proposed project and related projects to combine to increase noise or vibration levels. The proposed project would not generate new vehicle trips to and from the site following construction, or a significant change in permanent noise or vibration levels in the project area. Therefore, the proposed project would not contribute to a cumulative noise or vibration impact.
4.0 REFERENCES


Los Angeles Municipal Code, *Section 112.04 (Powered Equipment Intended for Repetitive Use in Residential Areas and Other Machinery, Equipment, and Devices)*.

Los Angeles Municipal Code, *Section 112.05 (Maximum Noise Level of Powered Equipment or Powered Hand Tools)*.

Los Angeles Municipal Code, *Section 41.40 (Noise Due to Construction, Excavation Work – When Prohibited)*.

Appendix A Noise and Vibration Calculations
### Vibration Annoyance Analysis

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Distance (feet)</th>
<th>Vibration Level (VdB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Family Residences to the South</td>
<td>160</td>
<td>63</td>
</tr>
<tr>
<td>Multi-Family Residences to the Southwest</td>
<td>450</td>
<td>49</td>
</tr>
<tr>
<td>Dorsey High School Track</td>
<td>300</td>
<td>55</td>
</tr>
<tr>
<td>Dorsey High School Nearest Classroom</td>
<td>550</td>
<td>47</td>
</tr>
</tbody>
</table>

**Equation:** \( \text{Lv}(D) = \text{Lv}(25 \text{ ft}) - 30 \log(D/25) \)

**D** = Distance (feet)

**Lv(D)** = Vibration Level


### Vibration Damage Analysis

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Distance (feet)</th>
<th>Vibration Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Family Residences to the South</td>
<td>160</td>
<td>0.0055</td>
</tr>
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</tr>
<tr>
<td>Dorsey High School Nearest Classroom</td>
<td>550</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

**Equation:** \( \text{PPV}_{\text{equip}} = \text{PPV}_{\text{ref}} \times (25/D)^{1.5} \)

**PPV** (equip) is the peak particle velocity in in/sec of the equipment adjusted for distance

**PPV** (ref) is the reference vibration level in in/sec at 25 feet (Table 12-2)

**D** is the distance from the equipment to the receiver.

**Source:** Federal Transit Administration, *Noise and Vibration Model*, 2006

### Summation of Noise Levels

**Equation:** \( \text{Ns} = 10 \times \log_{10}(10^{\text{N1}/10}) + (10^{\text{N2}/10}) + (10^{\text{N3}/10}) + (10^{\text{N4}/10}) \)

**Ns** = Noise Level Sum

**N1** = Noise Level 1

**N2** = Noise Level 2

**N3** = Noise Level 3

**N4** = Noise Level 4

**Source:** California Department of Transportation, *Technical Noise Supplement*, 2013

### Noise Distance Attenuation

**Equation:** \( \text{Ni} = \text{No} - 20 \log(D_i/Do) \)

**Ni** = attenuated noise level of interest

**Di** = distance to receptor (Di>Do)

**No** = reference noise level

**Do** = reference distance

**Source:** (Bolt, Beranek, and Newman, 1971)