5.5 NOISE

This section of the Draft Environmental Report (DEIR) discusses the fundamentals of sound; examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; evaluates potential noise impacts associated with the 109th Street Pool and Bathhouse Replacement project; and provides mitigation to reduce noise impacts at sensitive residential locations. This evaluation uses procedures and methodologies as specified by California Department of Transportation (Caltrans) and the Federal Transit Authority (FTA). The noise calculations are included in Appendix G of this DEIR.

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as “noisiness” or “loudness.”

The following are brief definitions of terminology used in this chapter:

- ***Sound.*** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- ***Noise.*** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- ***Decibel (dB).*** A unitless measure of sound on a logarithmic scale.
- ***A-Weighted Decibel (dBA).*** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- ***Equivalent Continuous Noise Level (L_{eq}).*** The mean of the noise level averaged over the measurement period, regarded as an average level.
- ***Day-Night Level (L_{dn}).*** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10 PM to 7 AM.
- ***Community Noise Equivalent Level (CNEL).*** The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the levels occurring from 7 PM to 10 PM and 10 dB added to the sound levels occurring from 10 PM to 7 AM.

L_{dn} and CNEL values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment.

5.5.1 Environmental Setting

Characteristics of Sound

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). The human hearing system is not equally sensitive to sound at all frequencies. Sound waves below 16 Hz are not heard at all and are "felt" more as a vibration. Similarly, while people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off

rapidly above about 10,000 Hz and below about 200 Hz. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency dependent rating scale is usually used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. The normal range of human hearing extends from approximately 0 dBA to 140 dBA.

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. Because of the physical characteristics of noise transmission and noise perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Changes of 1 to 3 dB are detectable under quiet, controlled conditions and changes of less than 1 dBA are usually indiscernible. A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernable to most people in an exterior environment whereas a 10 dBA change is perceived as a doubling (or halving) of the sound. Table 5.5-1, *Change in Sound Pressure Level*, presents the subjective effect of changes in sound pressure levels.

Table 5.5-1
Change in Sound Pressure Level

Change in Apparent Loudness	
± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen 1988

Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases by 4.5 dB for each doubling of distance.

When sound is measured for distinct time intervals, the statistical distribution of the overall sound level during that period can be obtained. The energy-equivalent sound level (L_{eq}) is the most common parameter associated with such measurements. The L_{eq} metric is a single-number noise descriptor that represents the average sound level over a given period of time. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_{02}, L_{08}, and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time, or 1, 5, and 15 minutes per hour. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet-time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}).

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, and thereby affecting blood pressure, functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA could result in permanent hearing damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium. A sound level of 190 dBA will rupture the eardrum and permanently damage the inner ear. Table 5.5-2 shows typical noise levels from various noise sources.

Table 5.5-2
Typical Noise Levels from Noise Sources

Common Outdoor Activities	*Noise Level (dBA)*	*Common Indoor Activities*
	110	Rock Band
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three 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		
	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 Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans Table 9-2136.2 1998.

Vibration Fundamentals

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 is normally associated with activities such as railroads or vibration-intensive stationary sources but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. Vibration displacement is the distance that a

point on a surface moves away from its original static position. The instantaneous speed that a point on a surface moves is described as the velocity and the rate of change of the speed is described as the acceleration. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During project construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of the project, the project occupants may be subject to levels of train-generated vibration that can cause annoyance due to noise generated from vibration of the project structure and items within the structure. Analysis of this type of vibration is best measured in velocity and acceleration.

The three main wave types of concern in the propagation of groundborne vibrations are surface or Rayleigh waves, compression or P-waves, and shear or S-waves.

- Surface or Rayleigh waves travel along the ground surface. They carry most of their energy along an expanding cylindrical wave front, similar to the ripples produced by throwing a rock into a lake. The particle motion is more or less perpendicular to the direction of propagation (known as retrograde elliptical).

- Compression or P-waves are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal, in a push-pull motion. P-waves are analogous to airborne sound waves.

- Shear or S-waves are also body waves, carrying their energy along an expanding spherical wave front. Unlike P-waves, however, the particle motion is transverse, or perpendicular to the direction of propagation.

The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak of the vibration signal and RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response.

The units for PPV and RMS velocity are normally inches per second (in/sec). Often, vibration is presented and discussed in dB units in order to compress the range of numbers required to describe the vibration. All PPV and RMS velocity are in in/sec and all vibration levels in this study are in dB relative to one microinch per second (abbreviated as VdB). The threshold of perception is approximately 65 VdB. Typically, groundborne vibration generated by manmade activities attenuates rapidly with distance from the source of the vibration. Even the more persistent Rayleigh waves decrease relatively quickly as they move away from the source of the vibration. Man-made vibration problems are, therefore, usually confined to short distances (500 feet or less) from the source.

Construction operations generally include a wide range of activities that can generate groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Vibratory compactors or rollers, pile drivers, and pavement breakers can generate perceptible amounts of vibration at distances within 200 feet of the vibration sources. Heavy trucks can also generate groundborne vibrations, which vary depending on vehicle type, weight, and pavement conditions. Potholes, pavement joints, discontinuities, differential settlement of pavement, etc., all increase the vibration levels from vehicles passing over a road surface. Construction vibration is normally of greater concern than vibration of normal traffic on streets and freeways with smooth pavement conditions. Trains generate substantial quantities of vibration due to their engines, steel wheels, and heavy loads.

Regulatory Framework

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise.

The City of Los Angeles

Noise Compatibility

Table 5.5-3 presents a land use compatibility chart for community noise prepared by the California Office of Noise Control and adopted by the City of Los Angeles in the City of Los Angeles General Plan. This table provides urban planners with a tool to gauge the compatibility of land uses relative to existing and future noise levels. It identifies normally acceptable, conditionally acceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements. Under Policy 16 of the City of Los Angeles General Plan Noise Element, the Community Noise and Land Use Compatibility standards as shown in Table 5.5-3 may be used, or other measures that are acceptable to the city, to guide land use and zoning reclassification, subdivision, conditional use, and use variance determinations and environmental assessment considerations.

City of Los Angeles Municipal Code – Stationary Sources

The City's noise ordinance is designed to protect people from objectionable nontransportation noise sources such as music, machinery, pumps, and air conditioners. These standards do not gauge the compatibility of developments in the noise environment, but provide restrictions on the amount and duration of noise generated at a property, as measured at the property line of the noise receptor. According to the City's noise ordinance, stationary noise sources such as radios, television sets, and similar devices (Section 112.01); and air conditioning, refrigeration, heating, pumping, and filtering equipment (Section 112.03) are prohibited from causing the ambient noise level to increase by more than 5 dB.[1]

City of Los Angeles Municipal Code – Construction Noise

The City of Los Angeles prohibits construction, repair, or excavation work with any construction-type device that makes loud noises to the disturbance of persons occupying sleeping quarters in any dwelling hotel or apartment or other place of residence; repair or servicing of construction equipment; and job-site materials delivery between the hours of 9 PM to 7 AM (Chapter XI, Section 112.03, City of Los Angeles Municipal Code). Furthermore, construction or repair work; operation, repair, or servicing of construction equipment; and job-site materials deliveries in any residential zone or within 500 feet of a residential zone are prohibited prior to 8 AM or after 6 PM on Saturday or any time on Sundays.

[1] Where noise is emanating from any electrical transformer or gas metering and pressure control equipment existing and installed prior to the effective date of the ordinance enacting this chapter, any steady tone with audible fundamental frequency or overtones have 200 Hz, 5 dB shall be added to the offending source. Where noise is a repeated impulsive noise, 5 dB shall be added to the offending source. Where noise occurs more than 5 but less than 15 minutes in any period of 60 consecutive minutes between the hours of 7 AM and 10 PM of any day, 5 dB shall be subtracted from the offending source. Where noise occurs 5 minutes or less in any period of 60 consecutive minutes, between the hours of 7 AM and 10 PM of any day, 5 dB shall be subtracted from the offending source.

Table 5.5-3
Community Noise and Land Use Compatibility

Land Uses	CNEL (dBA) 55	60	65	70	75	80
Residential Single Family, Duplex, Mobile Homes						
Residential Multiple Family						
Transient Lodging, Motel, Hotel						
Schools, Libraries, Churches, Hospitals, Nursing Homes						
Auditoriums, Concert Halls, Amphitheaters						
Sports Arena, Outdoor Spectator Sports						
Playground, Neighborhood Parks						
Golf Courses, Riding Stables, Water Recreation, Cemeteries						
Office Buildings, Businesses, Commercial, and Professional						
Industrial, Manufacturing, Utilities, Agricultural						

Explanatory Notes

Normally Acceptable: Specified land use is satisfactory, based upon assumption buildings involved are convention construction, without any special noise insulation..

Normally Unacceptable: New construction or development should generally be discouraged. A detailed analysis of noise reduction requirements must be made and noise insulation features included in the design of a project.

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

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

Source: Los Angeles, City of, 1999, February. Noise Element of the City of Los Angeles General Plan.

Chapter XI, Section 112.05, of the Los Angeles Municipal Code also specifies the maximum noise level for construction equipment. In accordance with the Section 112.05, construction equipment, including augers, loaders, power shovels, cranes, derricks, motor graders, paving machines, off-highway trucks, ditchers, trenchers, compactors, scrapers, wagons, pavement breakers, compressors, and pneumatic or other powered equipment shall not produce a maximum noise level exceeding 75 dBA at a distance of 50 feet. The City allows construction noise exceeding these noise limits if compliance is technically infeasible. However, the burden of proving that compliance is technically infeasible includes showing that noise limitations cannot be complied with despite the use of mufflers, shields, sound barriers, and/or other noise reduction devices or techniques during the operation of the equipment.

City of Los Angeles Municipal Code – Vehicles: Loading and Unloading

Pursuant to Section 114.03 of the City of Los Angeles Municipal Code, it is unlawful for any person to load or unload any vehicle, or operate any wheeled equipment that causes any impulsive sound or raucous or unnecessary noise, within 200 feet of any residential building between the hours of 10:00 PM and 7:00 AM.

Vibration Standards

The City of Los Angeles does not have specific limits or thresholds for vibration. The FTA provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration for both vibration annoyance and structural damage. The human reaction to various levels of vibration is highly subjective and variable. As noted in the FTA manual, "although PPV is appropriate for evaluating the potential of building damage, it is not suitable for evaluating human response" (FTA 2006). This is because it takes time for the human body to respond to vibration signals. Table 5.5-4 lists the FTA criteria for acceptable levels of groundborne vibration based on the relative perception of a vibration event for various types of vibration-sensitive land uses.

Table 5.5-4
Groundborne Vibration and Noise Impact Criteria – Human Annoyance

Land Use Category	*Max L_v (VdB)[1]*	*Description*
Workshop	90	Distinctly felt vibration. Appropriate to workshops and nonsensitive areas
Office	84	Felt vibration. Appropriate to offices and nonsensitive areas.
Residential – Daytime	78	Barely felt vibration. Adequate for computer equipment.
Residential – Nighttime	72	Vibration not felt, but groundborne noise may be audible inside quiet rooms.

Source: FTA 2006
[1] As measured in 1/3-octave bands of frequency over the frequency ranges of 8 to 80 Hz.

The level at which groundborne vibration is strong enough to cause structural damage has not been determined conclusively. The most conservative estimates are reflected in the FTA standards, shown in Table 5.5-5. Wood-frame buildings, such as typical residential structures, are more easily excited by ground vibration than heavier buildings. According to Caltrans' *Transportation Related Earthborne Vibration* (2002), extreme care must be taken when sustained pile driving occurs within 25 feet of any building; however, the threshold at which there is a risk of architectural damage to normal houses with plastered walls and ceilings is 0.2 inch per second.

Table 5.5-5
Groundborne Vibration and Noise Impact Criteria – Structural Damage

Building Category	PPV (in/sec)	VdB
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Nonengineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: FTA 2006
Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

5.5.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if it would result in:

N-1 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.

N-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

N-3 A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

N-4 A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

N-5 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, expose people residing or working in the project area to excessive noise levels.

N-6 For a project within the vicinity of a private airstrip, expose people residing or working the project area to excessive noise levels.

The Initial Study, included as Appendix A, substantiates that impacts associated with the following thresholds would be less than significant:

- Threshold N-5
- Threshold N-6

These thresholds will not be addressed in the following analysis.

City of Los Angeles CEQA Threshold Guidelines

The City of Los Angeles CEQA Threshold Guide (LA CEQA) is a guidance document that was developed by the City to provide citywide guidance for CEQA impact analyses. It includes a screening and significance criteria to evaluate project impacts. The significance thresholds assist in determining whether a project's impacts would be presumed significant under normal circumstances.

Construction Thresholds

Under LA CEQA, the screening criteria for construction noise is whether construction activities would occur within 500 feet of a noise-sensitive use and whether construction would occur between the hours of 9 PM and 7 AM Monday through Friday, before 8 AM or after 6 PM on Saturday, or at any time on Sunday for projects in Los Angeles. For the significance threshold, under LA CEQA 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 3-month period would exceed existing ambient exterior noise levels by 5 dBA or more at a noise-sensitive use; or
- construction activities conducted at night would exceed the ambient noise level by 5 dBA at a noise-sensitive use between the hours of 9 PM and 7 AM Monday through Friday, before 8 AM or after 6 PM on Saturday, or at any time on Sunday.

Presumed Ambient Noise Levels

Ambient noise levels are based on Presumed Ambient Noise Levels, as set forth in the Los Angeles Municipal Code (LAMC), Section 111.03, as shown in Table 5.5-6.

Table 5.5-6
City of Los Angeles Presumed Ambient Noise Levels

Noise Zone	*Time Interval*	*Presumed Ambient Noise Level (dBA)*
A1, A2, RA, RE, RS, RD, RW1, RW2, R1, R2, R3, R4, and R5	7 AM to 10 PM	50
	10 PM to 7 AM	40
P, PB, CR, C1, C1.5, C2, C4, C5, and CM	7 AM to 10 PM	60
	10 PM to 7 AM	55
M1, MR1, and MR2	7 AM to 10 PM	60
	10 PM to 7 AM	55
M2 and M3	7 AM to 10 PM	65
	10 PM to 7 AM	65

Source: City of Los Angeles Municipal Code. Chapter XI, Noise Regulation, Section 111.03, Minimum Ambient Noise Level.
Notes:
Residential: A1 and A2: Agriculture; RA and RS: Suburban; RE Residential Estate; RD: Restricted Density Multiple Dwelling; RW1 and RW2: Residential
Waterways; R1: One-family; R2: Two-family; R3, R4, and R5: Multiple Dwelling
Commercial P: Automobile Parking; PB Parking Building; CR, C1, and C1.5: Limited Commercial; C2, C4, and C5: Commercial Zone; CM: Commercial Manufacturing
Light Industrial: M1: Limited Industrial; MR1: Restricted Industrial; MR2: Restricted Light Industrial, M2: Light Industrial; M3: Heavy Industrial
- Ambient noise is averaged over a period of at least 15 minutes at a location and time of day comparable to that during which the measurement is taken of the particular noise source being measured.
- In the event the ambient noise level is less than the presumed ambient noise level designated in this section, the presumed ambient noise level in this section shall be deemed to be the minimum noise level.
- If the measurement location is on boundary line between two different noise zones, the presumed ambient noise level of the quieter zone shall be used.

5.5.3 Environmental Impacts

The following impact analysis addresses thresholds of significance for which the Initial Study disclosed potentially significant impacts. The applicable thresholds are identified in brackets after the impact statement.

IMPACT 5.5-1 PROJECT IMPLEMENTATION WOULD RESULT IN LONG-TERM OPERATION-RELATED NOISE THAT WOULD NOT EXCEED LOCAL STANDARDS. [THRESHOLDS N-1 AND N-3]

Impact Analysis: Operation of the 109th Street Pool and Bathhouse project would remain similar to the current existing use and facilities on the project site. The proposed project would replace the existing pool and bathhouse facility with a newer and smaller pool and bathhouse facility. While the project would allow for a greater number of users at the facility, the proposed project would replace the existing uses with the same uses, and therefore would not introduce new noise-generating activities or change existing uses on the site.

Additionally, noise impacts from the addition of the 2,500-square-foot off-street parking area on the northern part of the site would be minimal, as its planned capacity is five vehicles only. On-street parking along East 110th Street and East 109th Street would still serve the majority of patrons who travel to the site by vehicle. Therefore, no additional vehicle trips are expected to occur from implementation of the proposed project. Based on the existing use of the site as a pool and bathhouse, no substantial increase in vehicle trips, and the small size of the off-street parking area, the proposed project would not generate long-term operation-related noise levels that would exceed the City's noise standards or substantially elevate existing noise levels in the vicinity of noise-sensitive land uses

IMPACT 5.5-2: CONSTRUCTION OF THE PROJECT WOULD CREATE SHORT-TERM GROUNDBORNE VIBRATION AND GROUNDBORNE NOISE AT NEARBY RESIDENTIAL STRUCTURES. [THRESHOLD N-2]

Impact Analysis: Construction activities can generate varying degrees of ground vibration, depending on the construction procedures and the construction equipment. Because the project site is relatively flat and built out, no pile driving or blasting would be required in the construction effort. However, construction equipment used during project development would produce vibration from vehicle travel as well as demolition and building activities.

Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. Groundborne vibration is almost never annoying to people who are outdoors and therefore evaluated in terms of indoor receivers (FTA 2006). Vibration is typically sensed at nearby structures when objects within the structure generate noise from the vibration, such as rattling windows or picture frames. Vibration is typically not perceptible in outdoor environments. The effect on buildings in the vicinity of the construction site often varies, depending on soil type, ground strata, and receptor building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Ground vibrations from construction activities rarely reach levels that can damage structures, but can achieve the audible and perceptible ranges in buildings close to the construction site.

The project site is in a residential neighborhood and is surrounded by adjacent vibration-sensitive residential uses. The nearest sensitive receptors are 15 feet to the west, 335 feet to the east, 65 feet to the south, and 165 feet to the north of construction activities associated with the pool and bathhouse. The nearest sensitive uses are approximately 60 feet to the north, 290 feet to the south, 120 feet to the east, and 265 feet to the

west of the parking lot. Construction of the proposed project would last approximately 16 months, with the initial 4 months reserved for demolition of the pool and bathhouse and the rest for construction of the new pool and bathhouse and paving of the off-street parking area. The majority of the construction equipment would be used during the demolition and building construction phase. During demolition, operation of heavy construction equipment such as a bulldozer would cause the highest levels of vibration.

Vibration Annoyance Criteria

The highest levels of vibration would be experienced when a heavy piece of construction equipment is operating or passes in proximity to the nearby vibration-sensitive structures. Levels of vibration produced by construction equipment are evaluated against the FTA's significance threshold for vibration annoyance of 78 VdB for residential structures during the daytime. To evaluate human annoyance from daytime construction activities, Table 5.5-7 lists the maximum levels of vibration from heavy construction that would occur at the nearest vibration-sensitive structures in the surrounding residential land uses. As shown in this table, construction of the project would generate levels of vibration that exceed the FTA criterion for nuisance for residential uses within 70 feet. Residential structures outside 70 feet would not experience perceptible levels of vibration from construction activities; therefore, no significant impact would occur to residential areas farther than 70 feet. However, the exceedance of the vibration threshold from maximum vibration levels as a result of the construction activities would result in vibration levels that would be a significant impact to residential uses within 70 feet of construction activities.

Table 5.5-7
Vibration Source Levels for Construction Equipment – Vibration Annoyance

Equipment	*Velocity Level (VdB) at 15 Feet[1]*	*Velocity Level (VdB) at 70 Feet[2]*	*Significance Threshold (VdB)*	*Exceeds Significance Threshold?*
Large bulldozer	91	78	78	Yes
Small bulldozer	62	49	78	No
Jackhammer	83	70	78	Yes
Loaded trucks	90	77	78	Yes

Source: Based on methodology from FTA 1995.
[1] Distance based on maximum impact of construction activities associated with pool and bathhouse replacement. On-site construction activities would occur at a distance of 15 feet from nearest receptor.
[2] 70 feet is the maximum distance that vibration annoyance would still occur and is based on the large bulldozer, which generates the highest vibration velocity of the equipment mix.

Structural Damage Criteria

The FTA has established thresholds for vibration levels that would cause damage to building structures. The FTA criterion for vibration-induced structural damage is 0.20 inch per second PPV for wood-framed structures. Project-related construction vibration was evaluated for its potential to cause structural damage to the closest off-site structures. As shown in Table 5.5-8, project-related construction activities would result in PPV levels that are below the FTA's criterion for vibration-induced structural damage, and no significant impact would occur.

Table 5.5-8
Vibration Source Levels for Construction Equipment – Structural Damage

Equipment	Approximate RMS Velocity (in/sec) from Pool and Bathhouse Construction at 15 Feet[1]	Approximate RMS Velocity (in/sec) from Off-Street Parking Lot Construction at 60 Feet	Significance Threshold (VdB)	Exceeds Significance Threshold?
Large bulldozer	0.1915	0.0239	0.2	No
Small bulldozer	0.0065	0.0008	0.2	No
Jackhammer	0.0753	0.0094	0.2	No
Loaded trucks	0.1635	0.0204	0.2	No

Source: Based on methodology from FTA 1995.
Note: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.
[1] Distance based on maximum impact of construction activities associated with pool and bathhouse replacement. On-site construction activities would occur at a distance of 15 feet.

IMPACT 5.5-3: CONSTRUCTION ACTIVITIES WOULD RESULT IN TEMPORARY NOISE INCREASES IN THE VICINITY OF THE PROPOSED PROJECT. [THRESHOLD N-4]

Impact Analysis: Short-term noise can be associated with site preparation, grading, and construction of the proposed land uses. Two types of short-term noise impacts could occur during construction. First, the transport of workers and movement of materials to and from the site could incrementally increase noise levels along local access roads. The second type of short-term noise impact is related to noise generated at the job site during demolition, site preparation, grading, and/or physical construction. Construction is performed in distinct steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. However, despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

Composite construction noise is best characterized by *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances* (Bolt, Beranek and Newman 1971). As the project site is in a residential neighborhood, it is surrounded by adjacent noise-sensitive uses. To account for the close proximity of the project site to the noise-sensitive receptors, maximum noise levels are measured for each of the construction phases. The property line of the nearest noise-sensitive receptor is 15 feet to the west of the project site. Based on the project site layout, it is assumed that construction equipment would not be operated directly up to the property line shared between the project site and the abutting sensitive receptors to the west. Other nearby residential noise-sensitive receptors to activities associated with the pool and bathhouse construction are approximately 65 feet to the south, 165 feet to the north, and 335 feet to the east of the project site. The closest noise-sensitive receptors to construction activities associated with the off-street parking area are approximately 60 feet to the north of the project site. The other nearby residential noise-sensitive receptors associated with the off-street parking construction area are located 120 feet to the east, 265 feet to the west, and 290 feet to the south.

Construction of the proposed project would last approximately 16 months, with the initial 4 months reserved for demolition of the existing aquatic facility and the rest for construction of the new facility and paving of the off-street parking area. Surrounding noise-sensitive uses would be exposed to prolonged construction activities. Those residential uses to the west and south of the site would be exposed to the most excessive noise levels due to their proximity. The noise-sensitive uses to the north would also be exposed to construction activities during the paving of the off-street parking area in the northern portion of the site. Tables 5.5-9 and 5.5-10 show the maximum noise levels from construction activities for the nearest

residential uses. Noise levels are calculated as if all construction equipment is operating directly adjacent to the proposed project's property line, with the exception of the sensitive uses abutting the western boundary of the project site. These values take into account both the number of pieces and spacing of the heavy equipment used in the construction effort. In later phases, such as during building assembly, noise levels are typically reduced from these values and the physical structures further break up line-of-sight noise propagation.

Table 5.5-9
Noise Levels from Pool/Bathhouse Construction

Construction Phase	All Applicable Equipment in Use (dBA L_{eq})			
	Construction Noise at 15 feet to the West[1]	Construction Noise at 65 feet to the South	Construction Noise at 165 feet to the North	Construction Noise at 335 feet to the East
Ground clearing/Demolition	94	82	74	67
Excavation	99	87	79	72
Foundation construction	88	76	68	61
Building construction	97	85	77	70
Finishing and site cleanup	99	87	79	72
Presumed ambient	50	50	50	50
Exceeds ambient by 5+ dB?	**Yes**	**Yes**	**Yes**	**Yes**

Source: Bolt, et al. 1971. Based on the analysis for office building, hotel, hospital, school, and public works construction.
[1] Includes residential uses west adjacent to the pool and bathhouse construction area. Based on the project site layout, is assumed that construction equipment would not be operated directly up to the property line shared between the project site and the abutting sensitive receptors to the west.

Table 5.5-10
Noise Levels from Parking Area Construction

Construction Phase	All Applicable Equipment in Use (dBA L_{eq})			
	Construction Noise at 60 feet to the North	Construction Noise at 120 feet to the East	Construction Noise at 265 feet to the West	Construction Noise at 290 feet to the South
Ground Clearing/Demolition	82	76	70	69
Excavation	87	81	75	74
Foundation Construction	76	70	64	63
Building Construction	85	79	73	72
Finishing and Site Cleanup	87	81	75	74
Presumed Ambient	50	50	50	50
Exceeds Ambient by 5+ dB?	**Yes**	**Yes**	**Yes**	**Yes**

Source: Bolt, et al. 1971. Based on the analysis for office building, hotel, hospital, school, and public works construction.
[1] Includes residential uses west adjacent to the pool and bathhouse construction area. Based on the project site layout, is assumed that construction equipment would not be operated directly up to the property line shared between the project site and the abutting sensitive receptors to the west.

The nearest sensitive receptors would be exposed to maximum noise levels of up to 94 dBA from demolition activities for 4 months, and would additionally be exposed to 12 months of maximum noise levels of up to 97 dBA from building construction. The noise levels from pool and bathhouse construction activities would result in an increase of the ambient noise environment at the surrounding residential land uses to a range between 61dBA and 99 dBA. Under LA CEQA guidelines, as construction activities associated with the

project would exceed 10 days in a 3-month period, and the range in noise levels would exceed the presumed ambient noise levels set forth in LAMC Section111.03 by more than 5 dBA, it would be a significant impact to the surrounding residential land uses. However, noise levels shown in Table 5.5-9 are based on construction equipment operating in close proximity to the property line. Construction equipment would be dispersed throughout the site and would typically not operate directly at the property line. Consequently, average noise levels from construction activities would be reduced compared to maximum noise levels. Regardless, average and maximum noise levels from construction activities would cause the existing ambient noise environment at the residential areas surrounding the project site to increase by more than 5 dB, and impacts would be significant.

5.5.4 Cumulative Impacts

Operation

The purpose of the project is to modernize the current uses and facilities. Consequently, no significant mobile-source or stationary-source noise impacts from project implementation were identified, and the proposed project would have a less than considerable contribution to cumulative impacts on operational noise impacts.

Construction

Cumulative construction noise and vibration impacts are confined to a localized area of impact. Consequently, cumulative impacts would only occur if other projects are being constructed in the local vicinity of the project at the same time construction activities associated with the project would occur. Because the adjacent land uses are developed and no remaining vacant parcels lie within the immediate vicinity of the project site, no cumulatively considerable construction noise and vibration impacts would occur. Impacts to nearby noise- and vibration-sensitive land uses would be limited to project-related impacts only.

5.5.5 Existing Regulations and Standard Conditions

- City of Los Angeles Municipal Code: Chapter XI, Noise Regulations.
- California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, California Building Code

5.5.6 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, the following impact would be less than significant:

- Impact 5.5-1 Project implementation would result in long-term operation-related noise that would not exceed local standards.

Without mitigation, the following impacts would be **potentially significant**:

- Impact 5.5-2 Construction activities would result in short-term groundborne vibration and groundborne noise at the nearest vibration-sensitive residential uses to the pool and bathhouse construction area.

- Impact 5.5-3 Construction activities would result in temporary noise increases for the surrounding noise-sensitive uses in the vicinity of the proposed project.

5.5.7 Mitigation Measures

Impact 5.5-2

No mitigation measures are available to reduce heavy construction equipment from causing perceptible levels of vibration at nearby residences in the vicinity of the project.

Impact 5.5-3

5.5-1 The Construction Contractor shall locate all stationary noise sources (e.g., generators, compressors, staging areas) as far from noise-sensitive receptors as feasible, such as in the northeast section of the main project site, to minimize the noise impacts of these sources.

5.5-2 The Construction Contractor shall minimize the noise levels from operation of heavy construction equipment by fitting that construction equipment with properly operating mufflers, air intake silencers, and engine shrouds to a level of effectiveness as originally equipped by the manufacturer.

5.5-3 The Construction Contractor shall minimize the noise impacts from operation of heavy construction equipment by installing, under the direction of a certified acoustical engineer, temporary sound blankets a minimum of 8 feet tall with a minimum Sound Transmission Class (STC) rating of 18 or higher at the boundary of the pool and bathhouse construction area and off-street parking construction area.

5.5.8 Level of Significance After Mitigation

Impact 5.5-2

No mitigation measures are available to reduce vibration levels generated by heavy construction equipment. The close proximity of the vibration-sensitive receptors results in no feasible mitigation measures to reduce vibration. Rerouting of truck routes would not be feasible, as the project is fully enclosed by residential uses. Restricting the hours of construction activity is already mandated and regulated by the City's Municipal Code. Certain available mitigation measures may prevent and restrict introduction of additional vibration, but they would not reduce the vibrations identified in this section. Therefore, project construction activities would generate perceptible levels of vibration at residential uses within 70 feet of the project site, and Impact 5.5-2 would remain significant and unavoidable.

Impact 5.5-3

Implementation of Mitigation Measure 5.5-3 would result in a reduction of 5 to 8 dB. However, it would not fully reduce noise to a level below significance. Construction noise impacts to residential uses in the vicinity of the project site would remain significant and unavoidable because, although mitigation measures would reduce construction noise levels, noise generated during construction activities would continue to substantially elevate (+5 dB) over existing ambient noise levels, particularly to the noise-sensitive receptors to the west and south of the pool and bathhouse construction areas and to the north of the off-street parking construction area. Consequently, Impact 5.5-3 would remain significant and unavoidable.

This page intentionally left blank.