

4.8 Noise

This section evaluates the potential for impacts relating to noise resulting from implementation of The OC River Walk Project (project).

4.8.1 Environmental Setting

4.8.1.1 Regulatory Setting

This section describes the federal, state, and local regulatory framework adopted to address noise.

Federal

Federal Transit Administration Standards

Although the Federal Transit Administration (FTA) standards are intended for federally funded mass transit projects, the impact assessment procedures and criteria included in the FTA Transit Noise and Vibration Impact Assessment Manual (September 2018) are routinely used for projects proposed by local jurisdictions, including the City of Anaheim and City of Orange. The manual includes criteria for assessing the impacts of groundborne vibration, presented in Table 4.8-1, Federal Transit Administration Groundborne Vibration Impact Criteria. These annoyance criteria are given in vibration decibels (VdB), which provides vibration velocity level on a decibel scale. For building damage, 100 VdB is identified as the threshold of risk for cosmetic damage to fragile buildings.

The FTA also provides criteria for evaluating construction noise impacts. A daytime 8-hour equivalent energy level (Leq) of 80 dBA is the criteria for residential land uses, and 85 dBA Leq (8-hour) is identified for commercial land uses.

Table 4.8-1. Federal Transit Administration Groundborne Vibration Impact Criteria

Land Use Category	Impact Levels (VdB)		
	Frequent Events ¹	Occasional Events ²	Infrequent Events ³
Category 1: Buildings where vibration would interfere with interior operations	65	65	65
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime uses	75	78	83

Source: FTA 2018.

Notes: VdB = vibration decibel

Vibration levels are measured in or near the vibration-sensitive use.

¹ "Frequent Events" are defined as more than 70 vibration events of the same source per day.

² "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day.

³ "Infrequent Events" are defined as fewer than 30 vibration events of the same source per day.

State

California Noise Control Act (California Health and Safety Code, Sections 46000–46080)

California Health and Safety Code, Sections 46000–46080, known as the California Noise Control Act of 1973, find that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The act declares that the State of California has a responsibility to protect the health and welfare of its citizens through the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare. Section 46050.1 mandates development guidelines for the preparation and content of General Plan Noise Elements.

Local

Anaheim Municipal Code

Chapter 6.70 of the Anaheim Municipal Code establishes noise standards regarding maximum noise level limits (City of Anaheim 2024). Chapter 6.70 of the Municipal Code states that no person shall create any sound radiated for extended periods from any premises which produces a sound pressure level at any point on the property line in excess of 60 dBA. This section exempts construction noise from this standard so long as the construction occurs during specified hours (i.e., 7:00 a.m. and 7:00 p.m., unless otherwise extended by City). Additionally, the code establishes the following limitations on amplified noise:

- In all residential zones and within two hundred feet of any boundary thereof, no sound-amplifying equipment shall be operated or used for noncommercial purposes between the hours of 8:00 p.m. and 8:00 a.m. of the following day.
- In all non-residential zones, except such portions thereof as may be included within two hundred feet of the boundary of any residential zone, the operation or use of sound-amplifying equipment for commercial purposes is prohibited between the hours of 9:00 p.m. and 8:00 a.m. of the following day.
- In all non-residential zones, except such portions thereof as may be included within two hundred feet of the boundary of any residential zone, the operation or use of sound-amplifying equipment for noncommercial purposes is prohibited between the hours of 10:00 p.m. and 7:00 a.m. of the following day.
- Sound emanating from sound-amplifying equipment shall not be audible to a person of normal hearing acuity within an enclosed building (other than a building within which the sound emanate) at a distance in excess of two hundred feet from the sound-amplifying equipment.

- In no event shall the sound-amplifying equipment be unreasonably loud, raucous, jarring or disturbing to a person of normal sensitiveness within the area of audibility, or disturb the peace or quiet of any neighborhood.
- It shall be unlawful for any person to operate or use any sound-amplifying equipment within, upon or adjacent to the premises of any hospital, school, or publicly owned or operated arena, stadium, convention center or auditorium, while in use, in a manner which disturbs, disrupts or interferes with the conduct of any event, business or activity of any nature then occurring within such building or premises.

City of Anaheim Noise Element

In the Noise Element of the City of Anaheim's General Plan, the City adopted land use-noise compatibility standards, which are shown in Table 4.8-2, Anaheim Land Use Compatibility for Community Noise Exposure (Exterior) (Figure N-2 of the Anaheim General Plan) (City of Anaheim 2004). The land use compatibility standards are used to identify "normally acceptable," "conditionally acceptable," "normally unacceptable," and "clearly unacceptable" noise levels for the placement of varying land uses. Additionally, the Noise Element includes the following goal and policies that include best management practices for construction activities:

- **Goal 3.1:** Protect residents from the effects of "spill over" or nuisance noise emanating from the City's activity centers.
 - **Policy 3.** Enforce standards to regulate noise from construction activities. Particular emphasis shall be placed on the restriction of the hours in which work other than emergency work may occur. Discourage construction on weekends or holidays except in the case of construction proximate to schools where these operations could disturb the classroom environment.
 - **Policy 4.** Require that construction equipment operate with mufflers and intake silencers no less effective than originally equipped.
 - **Policy 5.** Encourage the use of portable noise barriers for heavy equipment operations performed within 100 feet of existing residences or make applicant provide evidence as to why the use of such barriers is infeasible.

**Table 4.8-2. Anaheim Land Use Compatibility for Community Noise Exposure (Exterior)
(Figure N-2 of the Anaheim General Plan)**

Land Use Category	Exterior Noise Exposure (dBA CNEL)			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential – Low Density Single Family, Duplex, Mobile Homes	<60	55–70	70–75	>75
Residential – Multiple Family	<65	60–70	70–75	>75
Transient Lodging-Motels, Hotels	<65	60–70	70–80	>80
Schools, Libraries, Churches, Hospitals, Nursing Homes	<70	60–70	70–80	>80
Auditoriums, Concert Halls, Amphitheaters	--	<70	>65	--
Sports Arena, Outdoor Spectator Sports	--	<75	>70	--
Playgrounds, Neighborhood Parks	<70	--	67.5–75	>72.5
Golf Courses, Riding Stables, Water Recreation, Cemeteries	<75	--	70–80	>80
Office Buildings, Businesses, Commercial, and Professional	<70	67.5–77.5	--	>75
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	--	>75

Source: City of Anaheim 2004.

Notes: CNEL = community noise equivalent level; dBA = A-weighted decibel

Compatibility Key:

- Normally Acceptable: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
- Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.
- Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.
- Clearly Unacceptable: New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would be usable.

City of Orange Municipal Code

Section 8.24.040 of the City of Orange’s Municipal Code contains the City of Orange’s Noise Ordinance. The Noise Ordinance includes noise levels limits of an hourly average of 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.), or 50 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.). The maximum noise level shall not exceed 70 dBA during the day or 65 dBA during nighttime. These noise standards apply specifically to noise exposure at residential property lines, and activities conducted on public parks, public playgrounds, and public or private school grounds are exempt from these limits, provided that park use is consistent with the expected use, rules, regulations and permit provisions of the location. Outdoor gatherings, public dances, shows, sporting and entertainment events or other public or private events are exempt provided such events are conducted pursuant to any permit or license requirements established by the City. Additionally, construction activities are exempt provided said activities take place between the

hours of 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a federal holiday.

City of Orange Noise Element

The City of Orange Noise Element establishes the maximum allowable noise exposure guideline of 65 A-weighted decibel (dBA) community noise equivalent level (CNEL) for transportation noise. That is, areas with ambient exterior noise levels from transportation noise up to 65 dBA CNEL are considered compatible with sensitive receptors. The Noise Element also defines what is considered a significant increase in ambient noise level under the California Environmental Quality Act (CEQA). Where the existing ambient noise level is less than 65 dBA, a project related permanent increase in ambient noise levels of 5 dBA CNEL or greater would be significant. Where the existing ambient noise level is greater than 65 dBA, a project related permanent increase in ambient noise levels of 3 dBA CNEL or greater would be significant. Additionally, the City of Orange Noise Element outlines policies related to noise exposure from construction activities:

- **Goal 7.0:** Minimize construction, maintenance vehicle, and nuisance noise in residential areas and near noise-sensitive land uses.
 - **Policy 7.1.** Schedule City maintenance and construction projects so that they generate noise during less sensitive hours.
 - **Policy 7.2.** Require developers and contractors to employ noise minimizing techniques during construction and maintenance operations.
 - **Policy 7.3.** Limit the hours of construction and maintenance operations located adjacent to noise-sensitive land uses.
 - **Policy 7.4.** Encourage limitations on the hours of operations and deliveries for commercial, mixed-use, and industrial uses abutting residential zones.

4.8.1.2 Existing Conditions

Fundamentals of Environmental Noise

Quantification of Noise

The California Department of Transportation (Caltrans) defines noise as sound that is loud, unpleasant, unexpected, or undesired. Further, for the purposes of noise analysis, noise only exists if a source, path, and receiver are present. Sound pressure waves must be produced by a source and transmitted through a medium, such as air. The sound must be perceived by, registered by, or affect a receptor, such as an ear or noise monitoring device (Caltrans 2013).

Sound pressure levels are quantified using a logarithmic ratio of actual sound pressures to a reference pressure squared, called bels. A bel is typically divided into tenths, or decibels (dB). Sound pressure alone is not a reliable indicator of loudness because frequency (or pitch) also affects how receptors respond to the sound. To account for the pitch of sounds and the

corresponding sensitivity of human hearing to them, the raw sound pressure level is adjusted with a frequency-dependent A-weighting scale that is stated in units of decibels (dBA) (Caltrans 2013). Typical A-weighted noise levels are listed in Table 4.8-3, Typical A-Weighted Noise Levels.

Table 4.8-3. Typical A-Weighted Noise Levels

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

Source: Caltrans 2013.

Note: dBA = A-weighted decibel

A receptor's response to a given noise may vary depending on the sound level, duration of exposure, character of the noise sources, the time of day during which the noise is experienced, and the activity affected by the noise. Activities most affected by noise include rest, relaxation, recreation, study, and communications, such as quiet conversation or telephone calls. In consideration of these factors, different measures of noise exposure have been developed to quantify the extent of the effects from a variety of noise levels. For example, some measures consider the 24-hour noise environment of a location by using a weighted average that penalizes noise levels during normal relaxation and sleep hours. Other measures consider an average noise

level over a period of time that includes ambient noise and a steady-state noise source for a given period of time within the averaging period (Caltrans 2013). The indices for measuring community noise levels that are used in this report are defined below:

Leq, the equivalent energy level, provides an average acoustic or sound energy content of noise, measured during a prescribed period, such as 1 minute, 15 minutes, 1 hour, or 8 hours. The sound level may not be constant over the measured time period, but the average decibel sound level, given as dBA Leq, contains an equal amount of energy as the fluctuating sound level.

CNEL, the community noise equivalent level, is the average equivalent A-weighted sound level over a 24-hour period. This measurement applies weights to noise levels during evening and nighttime hours to compensate for the increased disturbance response of people at those times. CNEL is the equivalent sound level for a 24-hour period with a +5 dBA weighting applied to all sound occurring between 7:00 p.m. and 10:00 p.m. and a +10 dBA weighting applied to all sound occurring between 10:00 p.m. and 7:00 a.m.

Ldn, the day-night noise level, is a 24-hour Leq, except that the nighttime hours (10:00 p.m. to 7:00 a.m.) are assessed a 10 dBA penalty. This penalty attempts to account for the fact that nighttime noise levels are potentially more disturbing than equal daytime noise levels.

The decibel level of a sound decreases (or attenuates) as the distance from the source of that sound increases. For a single point source, such as a piece of mechanical equipment, the sound level normally decreases by approximately 6 dBA for each doubling of distance from the source. Sound that originates from a linear (or “line”) source, such as vehicular traffic, attenuates by approximately 3 dBA per doubling of distance. Other contributing factors that affect sound reception include ground absorption, topography that provides a natural barrier, meteorological conditions, or the presence of human-made obstacles, such as buildings and sound barriers (Caltrans 2013).

Noise Effects

Reaction to a given sound varies depending on acoustic characteristics of the source and the environment of the receptor. The A-scale deemphasizes low-frequency sounds because humans are more sensitive to high-frequency sounds that are more likely to cause hearing damage. People tend to compare an intruding noise to existing background noise levels. If a new noise is considerably louder or noticeable above existing levels, it is generally considered objectionable. The activity that the receptor is engaged in also affects response. For example, the same noise source, such as constant freeway traffic, may be more objectionable to people sleeping than to workers in a factory. A 3 dBA change is the smallest increment that is perceptible by most receivers, and a 5 dBA change in community noise level is clearly noticeable. Generally, 1 to 2

dBA changes are not detectable, except under controlled laboratory conditions. A sound that is 10 dBA greater than the reference sound is typically perceived as twice as loud (Caltrans 2013).

Fundamentals of Environmental Vibration

Vibration is defined as dynamic excitation of an elastic system, such as the ground or a structure, which results in oscillatory movement of the system (Caltrans 2020). Typical human-made causes of earthborne vibration include trains and construction activities such as blasting, pile driving, and operation of heavy earthmoving equipment. The resulting waves transmitted through solid material are referred to as structureborne or groundborne vibration. Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. The vibration levels inside a building depend on the vibration energy that reaches the foundation and the characteristics of the structure that affect propagation of the vibration through it. A heavier building will typically experience lower vibration levels. The most common impact associated with vibration is annoyance resulting from the effects of vibration, such as building movement, rattling of windows, shaking of items on shelves or walls, and rumbling sounds. In more extreme cases, building damage may occur. Because the effects of vibration elicit a greater response than the vibration itself, vibration is typically only perceptible to people inside buildings (FTA 2018).

Vibration levels are typically expressed in terms of the peak particle velocity (PPV) and root mean square (RMS) amplitude, both in inches per second (in/sec). PPV is most appropriate for evaluating building damage potential. Caltrans estimates that continuous vibration levels of less than 0.08 PPV and single-event vibration levels of less than 0.12 PPV do not result in damage to even the most fragile historical buildings (Caltrans 2020). The FTA has identified a maximum PPV of 0.2 in/sec for fragile buildings and 0.12 in/sec for extremely fragile historical buildings (FTA 2018).

PPV does not account for human response to vibration. The RMS amplitude is used to represent average vibration amplitude, which accounts for the time it takes for the human body to respond to vibration signals. The RMS amplitude is also given in decibel notation, referenced as VdB, which serves to compress the range of numbers required to describe vibration relative to human response. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. Like airborne noise, groundborne noise is measured in dBA. The sound level accompanying vibration is generally 25 to 40 dBA lower than the vibration velocity level in VdB. Due to its low-frequency components, groundborne noise sounds louder than broadband noise with the same noise level. Typical vibration levels from various sources are shown in Table 4.8-4, Typical Levels of Groundborne Vibration. As shown in this table, the background vibration velocity level in residential areas is usually around 50 VdB, which is below the 65 VdB threshold of human perception (FTA 2018). The same human reaction corresponds to a given vibration velocity level and its resulting noise level; therefore, for simplicity, this analysis refers only to a source's VdB to describe potential human response to groundborne vibration and noise.

Table 4.8-4. Typical Levels of Groundborne Vibration

Vibration Level	in/sec RMS	Typical Sources (50 feet from source)	Human/Structural Response
VdB ¹			
100	0.01	Blasting from construction projects	Threshold, minor cosmetic damage to fragile buildings
90–100	0.003–0.01	Bulldozers and other heavy tracked construction equipment	Difficulty with tasks such as reading
80–90	0.001–0.003	Commuter rail and rapid transit, upper range	Residential annoyance, infrequent events (e.g., commuter rail)
70–80	0.0003–0.001	Typical commuter rail, bus or truck over bump, typical rapid transit	Residential annoyance, frequent events (e.g., rapid transit)
60–70	0.0001–0.0003	Bus or truck, typical	Limit for vibration-sensitive equipment, approximate threshold for human perception
50	0.00003	Typical background vibration	Not detectable

Source: FTA 2018.

Notes: in/sec = inches per second; RMS = root mean square; VdB = vibration decibel

¹ RMS vibration velocity level in VdB relative to 10⁻⁶ in/sec.

The general human response to different groundborne vibration velocity levels is described in Table 4.8-5, Human Response to Different Levels of Groundborne Vibration.

Table 4.8-5. Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Noise Level		Human Reaction
	Low Frequency	Mid Frequency	
65 VdB	25 dBA	40 dBA	Approximate threshold of perception for many people. Mid-frequency sound may disturb sleep.
75 VdB	35 dBA	50 dBA	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is annoying. Mid-frequency noise disturbs sleep and is considered annoying in more quiet areas.
85 VdB	45 dBA	60 dBA	Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise disturbs sleep and mid-frequency noise can be annoying to daytime NSLUs, such as schools.

Source: FTA 2018.

Note: dBA = A-weighted decibel; NSLU = noise-sensitive land use; VdB = vibration decibel

Existing Noise Environment

The noise environment on the project site is characterized by transportation noise sources, including railroad and roadway noise. Other existing noise sources include people using the Santa Ana River Trail for active and passive recreation. Recreational noise sources include children at play, people conversing, and people walking/jogging or biking. The nearest sensitive receptors are the Extended Saty America – Orange County hotel, located approximately 60 feet from the project site; Garrison Apartments, approximately 500 feet east of the project site; Ayres Hotel Anaheim, approximately 550 feet west of the project site; and Orangeland RV Park, located approximately

860 feet east of the project site. Several office buildings are located on either side of the project site, such as the Arena Corporate Center, ranging from approximately 50 feet to 420 feet from the nearest project site boundary.

There are two existing railroad lines in the project vicinity. The existing Union Pacific Railroad freight line is located north of Katella Avenue and crosses the project site near the Arena Corporate Center. Additionally, the Metrolink/Los Angeles – San Diego – San Luis Obispo Rail (LOSSAN) Corridor passenger service is located south of Katella Avenue. Railroad noise contours for the passenger service line (Figure N-4 in the City of Anaheim’s Noise Element) show the 60 CNEL contour line extends approximately 520 feet from the centerline of the Metrolink/LOSSAN Corridor tracks. The City’s Noise Element does note, however, that this distance may be extended at grade crossings where a warning horn is sounded (City of Anaheim 2004).

State Route 57 (SR-57) and Katella Avenue are major sources of roadway noise on the project site. The SR-57 extends over the southern area of the project site, and Katella Avenue over the site near the Honda center. Both roadways generate noise levels above 70 dBA CNEL adjacent to the roadways rights-of-way.

4.8.2 Thresholds of Significance

According to Appendix G of the CEQA Guidelines, the project would have a significant impact on noise if it would:

- **Threshold NOI-1:** Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- **Threshold NOI-2:** Generation of excessive groundborne vibration or groundborne noise levels.
- **Threshold NOI-3:** For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

The Initial Study (Appendix A to this Environmental Impact Report [EIR]) determined that the following threshold would have less than significant or no impact, and this environmental topic will not be addressed further in this section of the Draft EIR:

- Threshold N-3

4.8.3 Plans, Programs, and Policies

This section addresses plans, programs, and policies relevant to the project.

- PPP NOI-1** The project is required to comply with goals and policies related to noise as outlined in the City of Anaheim Noise Element and City of Orange Noise Element.
- PPP NOI-2** The project is required to comply with the noise standards and policies listed in City of Anaheim Municipal Code Chapter 6.70 and City of Orange Municipal Code Section 8.24.040.

4.8.4 Environmental Impacts

The following sections address various potential impacts relating to noise that could result from implementation of the project.

4.8.4.1 Threshold NOI-1: Exceedance of Noise Standards

Impact Analysis

The potential for the project to generate noise during construction and operation is addressed below.

Construction

The operation of heavy equipment during project construction would result in temporary increases in noise in the immediate vicinity of the project site. Construction of the project would continue for approximately 24 to 36 months. Construction activities would include excavation of material sources; clearing and grubbing; grading; retaining wall and bridge construction; drainage improvements; paving; and installation of fencing, signs, and other safety-related features. Construction equipment and vehicles could include backhoes; loaders; tractors; excavators; cranes; graders; scrapers; lifts; concrete trucks and pump; paving machines; compactors/rollers; air compressors; generators; and trucks for demolition, grading, and materials delivery. Drilling and pile driving may be required for bridge installation. Table 4.8-6, Typical Construction Noise Levels, provides average noise levels associated with equipment that may be required for project construction.

Table 4.8-6. Typical Construction Noise Levels

Equipment	Typical Noise Level (dBA) 50 Feet from Source	Typical Noise Level (dBA) 60 Feet from Source	Typical Noise Level (dBA) 500 Feet from Source	Typical Noise Level (dBA) 550 Feet from Source	Typical Noise Level (dBA) 860 Feet from Source
Backhoe	77.6	76.0	57.6	56.8	52.9
Loader	80	78.4	60.0	59.2	55.3
Tractor	84	82.4	64.0	63.2	59.3
Crane	80.6	79.0	60.6	59.8	55.9
Excavator	80.7	79.1	60.7	59.9	56.0
Grader	85	83.4	65.0	64.2	60.3
Scraper	83.6	82.0	63.6	62.8	58.9
Lift	74.7	73.1	54.7	53.9	50.0
Dump Truck	76.5	74.9	56.5	55.7	51.8
Concrete Pump Truck	81.4	79.8	61.4	60.6	56.7
Paver	77.2	75.6	57.2	56.4	52.5
Compactor/Roller	83.2	81.6	63.2	62.4	58.5
Air Compressor	77.7	76.1	57.7	56.9	53.0
Generator	80.6	79.0	60.6	59.8	55.9
Rock Drill	81	79.4	61.0	60.2	56.3
Drill Rig	84.4	82.8	64.4	63.6	59.7
Impact Pile Driver	101.3	99.7	81.3	80.5	76.6

Source: FHWA 2006 for noise levels at 50 feet. Noise levels at other distances assume attenuation rate of 6 dBA for every doubling of distance.

Notes: dBA = A-weighted decibel

Noise levels from construction were evaluated based on typical equipment noise levels determined by the Federal Highway Administration Roadway Construction Noise Model (RCNM). The RCNM model uses typical noise level specifications and usage assumptions to calculate average noise level exposure from multiple pieces of construction equipment over a workday. Based on the default equipment fleet assumed for the project in air quality modeling (refer to Appendix C, Air Quality/GHG Data, to the Draft EIR), the largest construction fleet would be required during the excavation and grading phase of construction. The project is linear in nature and limited in width, which would limit the number of equipment that could operate simultaneously in the same location. The five noisiest pieces of construction equipment required for the excavation and grading phase were assumed to operate in the same location on a given day (excavator, tractor, grader, compactor/roller, scraper). Using the RCNM, they have the potential to generate an average noise level up to 86.1 dBA over an 8-hour workday at 50 feet from active construction. Modeling data is included in Appendix H, Noise

Data, of the Draft EIR. Similar equipment would be required throughout the construction duration, and this average noise level is assumed to be representative of typical construction activities. However, noise levels would be higher on days when impact pile driving would be required for bridge construction. Assuming the five noisiest pieces of equipment required for bridge construction (impact pile driver, crane, tractors, and loaders), an average 8-hour noise level of approximately 94.7 dBA at 50 feet would occur. Noise levels from point sources, such as construction sites, typically attenuate at a rate of about 6 dBA per doubling of distance (Caltrans 2013a).

Construction would take place during daytime hours and therefore would be consistent with the applicable portions of the City of Anaheim and City of Orange Noise Ordinances (refer to Section 4.8.1, Environmental Setting). Construction activities are exempt for noise levels limits established in the noise ordinances, and neither ordinance establishes a noise level standard for construction. Therefore, the FTA recommended screening levels of 80 dBA for residential uses and 85 dBA for commercial uses are used to determine if construction noise would result in temporary nuisance impacts to nearby sensitive receptors. Typical construction noise levels would have the potential to exceed the FTA standard of 80 dBA up to approximately 100 feet from the construction area, and exceed 85 dBA up to 60 feet from the construction area. Noise exposure from typical construction is conservatively measured from the limits of the project disturbance area. Days when pile driving would be required would have the potential to exceed the FTA standard of 80 dBA up to approximately 275 feet from the bridge construction area, and exceed 85 dBA up to 160 feet from the construction area. Noise exposure from pile driving activities is measured from the edge of the riverbed where bridge construction would occur.

As previously stated, the nearest sensitive receptors are the Extended Stay America – Orange County, located approximately 60 feet from the project site; Garrison Apartments, approximately 500 feet east of the project site; Ayres Hotel Anaheim, approximately 550 feet west of the project site; and Orangeland RV Park, located approximately 860 feet east of the project site. Several offices are located east of the project site ranging from approximately 50 feet to 420 feet from the nearest project site boundary. As such, most receptors are located outside the potential impact area for construction noise during typical construction and pile driving. However, the Extended Stay America – Orange County hotel may be exposed to construction noise levels above 80 dBA from typical construction. The hotel building would be located approximately 300 feet from the nearest bridge construction area and would not be within the screening distance for significant noise from pile driving activity. Office buildings adjacent to the project site south of the Extended Stay America – Orange County hotel, south of Ball Road, and south of Katella Avenue may be exposed to noise levels in excess of 85 dBA during typical construction activities. The office buildings located closest to any bridge construction would be the office building located directly south of the Extended Stay America – Orange County hotel. The office building would be located approximately 450 feet from the bridge construction area; therefore, it would not be located within the 160 feet screening distance for impact from pile driving. Impacts would be temporary and

would only occur during construction activities adjacent to these receptors. Due to the linear nature of the project, construction would only occur in these areas for short periods throughout the duration of project construction.

However, because construction noise would have the potential to exceed the screening levels established by the FTA during typical construction activities, a potentially significant impact would occur.

Operation

Operation of the project would not generate a net increase in vehicle trips on the project site (refer to Section 4.9, Transportation). Maintenance of the project would be incorporated into existing underlying jurisdiction maintenance schedules for existing facilities, and vehicle trips would be minimal and intermittent. Therefore, operation of the project would not result in a permanent increase in ambient vehicle noise levels.

Additionally, operational noise levels along the project alignment would be influenced by the sound of trail users talking, occasional animal sounds (e.g., dogs on leash), occasional facility maintenance, and small gatherings in new facilities. Noise levels would be similar to existing use of the Santa Ana River Trail, although additional users are anticipated. However, the new noise sources from additional users would be intermittent and typically limited to normal conversation. Normal conversation typically results in a noise level of 65 dBA Leq at 3 feet (Caltrans 2013) and attenuates to below 50 dBA Leq at 15 feet. The Enhanced Recreational Facilities (refer to Figure 2-8c, Proposed Improvements – Group C, for locations) would accommodate small gatherings in terraced seating, nature play areas, parklets, and plazas, or water access and kayak launching, etc. It is anticipated that the trail and the park would generally operate between 5:30 am and 10:30 pm, which aligns with the City of Anaheim's standard operating schedule. The City of Orange's standard park operating hours are from 5 am to 11 pm. Noise from small gatherings would also typically consist of conversational noise, with intermittent nuisance noise from yelling or music. Large-scale events, such as festivals and other activities would require Special Event permitting from the City of Anaheim or City of Orange, as applicable, that would include conditions to limit excessive noise. Gatherings on the west side of the project, where all but one Enhanced Recreational Facility would be located, would be required to comply with amplified noise regulations adopted by the City of Anaheim (refer to Section 4.8.1.1, Regulatory Setting). As previously described, the project site is currently exposed to ambient noise levels from freeway, high traffic roadway, and rail noise. As such, an incremental increase in intermittent noise at conversational levels and from small gatherings generated within the project corridor would not be noticeable compared to existing ambient noise levels from transportation noise sources. Additionally, there are no existing residential properties located adjacent to the project corridor. The closest existing residences are the Garrison Apartments, located approximately 500 feet from the project site and 800 feet from the nearest Enhanced Recreational Facility.

Regular maintenance activities could include but not be limited to occasional repairs and litter removal that would potentially involve the use of power equipment. However, maintenance would be occasional, limited in duration, and similar to existing noise levels generated by maintenance and landscape equipment used to maintain existing land use development, and roadway and rail corridors. Thus, maintenance of the project would not be expected to generate a noticeable increase in ambient noise levels compared to those under existing conditions.

Operational impacts of the project would be less than significant because the project would not generate noise levels that would be substantially different from those under existing conditions.

Level of Significance Before Mitigation: Potentially significant.

Mitigation Measure: Mitigation Measure NOI-1 is required.

4.8.4.2 Threshold NOI-2: Excessive Groundborne Vibration or Noise

Impact Analysis

Groundborne vibration and noise would be limited to the project construction phase. The project does not include any components that would generate vibration after construction. Building damage and annoyance to receptors are the main concerns related to construction vibration. Manufacturing and other industrial uses may involve the use of equipment that is sensitive to vibration. Therefore, surrounding industrial and light industrial land uses are considered vibration-sensitive for this analysis. Potentially vibration-sensitive industrial uses are located adjacent to the proposed alignment on the east side of the project site. For example, the Kinder Morgan Orange Terminal gas facility is located adjacent to the project site near the freight railroad crossing. Land uses on the east side of the project site north and south of the Orange County Transportation Authority rail line include a coating and sandblasting service and an automation company that includes on-site machine manufacturing, both approximately 300 feet from the project site. The nearest land uses to bridge construction areas that would potentially include vibration-sensitive equipment are the Kinder Morgan Orange Terminal, located approximately 375 feet east of the northern proposed pedestrian/bicycle bridge, and the light industrial business park located approximately 550 feet east of the southern proposed pedestrian/bicycle bridge.

Typical vibration levels for available construction equipment required for the project are provided in Table 4.8-7, Vibration Source Levels for Construction Equipment. The FTA estimates that vibration levels less than 100 VdB do not result in building damage (FTA 2018). As shown in Table 4.8-7, all equipment would be below 100 VdB within 35 feet of equipment operation and project construction would not result in building damage at surrounding buildings.

As shown in Table 4.8-7, vibration levels would naturally reduce to below 75 VdB more than 110 feet from typical construction areas, and 235 feet from pile driving, which is the level that may be

annoying to daytime noise-sensitive land uses (refer to Table 4.8-1). A roller would be required for construction throughout the project alignment. It is conservatively assumed for this analysis that a vibratory roller would be used. The Extended Stay America – Orange County hotel, approximately 60 feet from the project site, is the only noise-sensitive receptor that would be within the 110 feet screening distance for typical construction. The hotel would be located approximately 300 feet from the nearest bridge construction area and would not be within the screening distance for significant vibration from pile driving activity. Due to the linear nature of the project, construction activities would only be within 110 feet of the hotel for a short time. Additionally, construction would occur during the day and would not disturb sleep. However, vibration could be a temporary annoyance to hotel guests and staff, and exceed the significance threshold impact criteria as outlined in Table 4.8-1. Therefore, this impact would be potentially significant.

Furthermore, as shown in Table 4.8-7, vibration levels would reduce to below 65 VdB more than 235 feet from typical construction areas, and 500 feet from pile driving areas, which is the level that may interfere with vibration-sensitive uses (refer to Table 4.8-1). As previously described, industrial land uses are conservatively considered vibration-sensitive for this analysis. Most potentially vibration-sensitive industrial areas are located outside the screening distances for potential vibration impacts. However, the Kinder Morgan Orange Terminal is located within the screening distance for impacts from typical construction activity. Therefore, construction of the project would result in potentially significant exposure to groundborne vibration during construction.

Table 4.8-7. Vibration Source Levels for Construction Equipment

Construction Equipment	Approximate VdB at 25 Feet ^a	Approximate VdB at 35 Feet ^a	Approximate VdB at 110 Feet ^a	Approximate VdB at 235 Feet ^a	Approximate VdB at 500 Feet ^a
Large Bulldozer	87	83	68	58	48
Loaded Truck	86	82	67	57	47
Small Bulldozer	58	54	38	29	19
Caisson Drilling	87	83	68	58	48
Vibratory Roller	94	90	75	65	55
Pile Driving	104	100	85	75	65

Source: FTA 2018.

Notes:

^a Based on the formula $VdB = VdB(25 \text{ feet}) - 30\log(d/25)$ provided by the FHWA (2006).

PPV = peak particle velocity; VdB = vibration decibel

Level of Significance Before Mitigation: Potentially significant.

Mitigation Measure: Mitigation Measure NOI-2 is required.

4.8.5 Cumulative Impacts

This section addresses various potential cumulative impacts relating to noise that could result from implementation of the project and reasonably foreseeable nearby future development.

4.8.5.1 Cumulative Threshold NOI-1: Exceedance of Noise Standards

Construction noise impacts are localized in nature because they are limited to the construction site where construction equipment is operating. Construction of cumulative projects would occur in the vicinity of the project, specifically the OCVIBE Master Site Plan Project (OCVIBE Project), a planned mixed-use development west of the project site. However, the cumulative projects and the proposed project would be subject to the Cities' Municipal Codes that limit noise to less sensitive daytime hours. Additionally, construction would be spread out throughout the project alignment and the OCVIBE Project area such that construction noise would be less likely to combine to affect the same receptors at the same time. However, cumulative projects include new residential uses adjacent to the Project site that would potentially be occupied prior to the completion of project construction. The OCVIBE Project includes new residential units north of the Honda Center, approximately 90 feet west of the project site. Construction of the OCVIBE Project residential units is anticipated to start in 2027 and may be completed prior to the end of project construction. Additionally, there's also a planned mixed-use development with residential units on the former Ball Road Basin adjacent to the project site. Although construction of these residential units is not anticipated to be complete before the end of project construction, it is conservatively assumed cumulative analysis that project construction could overlap with occupancy of these residential units. If residential units are occupied prior to project completion, sensitive receptors from both cumulative projects could be located within the 100-foot screening distance of typical project construction activities. Both projects would be outside of the 275-foot screening distance for pile driving at the nearest proposed pedestrian/bike bridge. The nearest proposed pedestrian/bike bridge is located approximately 275 feet southeast of the proposed OCVIBE Project residential buildings. As such, a cumulatively considerable impact to sensitive receptors developed under cumulative projects would occur as result of typical project construction activities.

Once constructed, the proposed project would not result in a noticeable increase in ambient noise levels. A cumulatively considerable impact would not occur during operation.

4.8.5.2 Cumulative Threshold NOI-2: Excessive Groundborne Vibration or Noise

Similar to noise effects, vibration is a localized phenomenon and is progressively reduced as the distance from the source increases. Therefore, cumulative projects that would be considered for the vibration cumulative analysis would be projects close to the project site, such as the OCVIBE Project. The OCVIBE Project would require similar construction equipment as the project, such as grading paving equipment, although the size of the construction fleet is anticipated to be larger for the OCVIBE Project due to its size. Construction from the OCVIBE Project, combined with the

proposed project, would not be expected to generate vibration levels that could exceed standards for building damage beyond active construction areas. Impacts related to annoyance or equipment interference would be site-specific and limited to times where construction would occur adjacent to noise or vibration-sensitive uses. Due to the limited potential impact area for active construction, cumulative construction would not be expected to occur simultaneously within the screening distances for vibration impacts from typical construction or pile driving (refer to Table 4.8-7). Therefore, vibration generated by construction on the project site and other sites would not combine to generate cumulative vibration impacts. However, similar to cumulative construction noise, the adjacent OCVICE Project and the former Ball Road Basin project include new residential units that may be occupied prior to the end of project construction. As shown in Table 4.8-7, vibration levels would naturally reduce to below 75 VdB more than 110 feet from typical construction areas, and 235 feet from pile driving. Future occupied residential units could be located within the 110-foot screening distance for typical project construction activities, but both projects would be outside of the 235-foot screening distance for pile driving at the nearest proposed pedestrian/bike bridge. As such, a cumulatively considerable impact to sensitive receptors could occur under cumulatively as result of typical project construction.

Once constructed, the proposed land use would not generate a significant source of vibration during normal operation. Therefore, a significant cumulative vibration impact would not occur during operation.

4.8.6 Level of Significance Before Mitigation

Without mitigation, the following thresholds would be potentially significant:

- **Threshold NOI-1:** Implementation of the project could generate a substantial temporary increase in ambient noise levels in the vicinity of the project site in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- **Threshold NOI-2:** Implementation of the project could generate excessive groundborne vibration or groundborne noise levels during construction.

4.8.7 Mitigation Measures

4.8.7.1 Threshold NOI-1: Exceedance of Noise Standards

NOI-1: The City of Anaheim shall include the following construction specifications on all project construction plans for sites located within 100 feet of sensitive receptors (i.e., Extended Stay America – Orange County hotel building and occupied residential buildings) or 60 feet of occupied office buildings.

During construction, the construction contractor shall employ the following noise-reducing measures where use of construction equipment occurs within 100 feet of sensitive receptors or 60 feet of occupied office buildings:

- Use acoustical shelters around any air compressors, generators, and any other stationary construction equipment not fitted with baffled enclosures
- Use baffling around stationary construction equipment to reduce noise and vibration levels
- Properly muffle and maintain all construction equipment powered by internal combustion engines
- Prohibit unnecessary idling of internal combustion engines
- Whenever feasible, use electrical power to run air compressors and similar power tools

4.8.7.2 Threshold NOI-2: Excessive Groundborne Vibration or Noise

NOI-2: The City of Anaheim shall ensure that all project construction specifications include the following noticing requirement. The construction contractor shall provide written notification at least 1 week prior to the start of any construction activities within 110 feet of sensitive receptors (i.e., Extended Stay America – Orange County hotel and occupied residential buildings) or 235 feet of the Kinder Morgan Orange Terminal. The notice shall inform hotel, occupied residential buildings, and industrial operators of the estimated start date and duration of daytime vibration-generating construction activities and provide a point of contact for vibration exposure complaints.

4.8.8 Level of Significance After Mitigation

4.8.8.1 Threshold NOI-1: Exceedance of Noise Standards

Implementation of Mitigation Measure NOI-1 would muffle construction equipment to minimize levels at nearby sensitive receptors. This impact would be reduced to a less than significant levels and no significant and unavoidable impacts would remain.

4.8.8.2 Threshold NOI-2: Excessive Groundborne Vibration or Noise

Implementation of Mitigation Measure NOI-2 would reduce impacts by minimizing the potential nuisance of vibration by allowing surrounding uses time to prepare for a potential nuisance. This impact would be reduced to a less than significant levels and no significant and unavoidable impacts would remain.

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