5.6 NOISE

This section of the Draft Environmental Impact Report (DEIR) evaluates the potential for implementation of the Mercury Lane Residential Project to result in noise impacts in the City. This section examines federal, state, and local noise guidelines, policies, and standards; reviews noise levels at existing receptor locations; and evaluates potential noise and vibration impacts associated with the Mercury Lane Residential project. This evaluation uses procedures and methodologies as specified by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA). The analysis in this section is based in part on the noise modeling data included in Appendix I of this DEIR.

5.6.1 Environmental Setting

Noise Descriptors

The following are brief definitions of terminology used in this chapter. Appendix I includes a summary of noise and vibration fundamentals.

- **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}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.
- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Day-Night Sound Level (L_{dn} or DNL).** 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 10:00 PM to 7:00 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 from 7:00 pm to 10:00 pm and 10 dB from 10:00 pm to 7:00 am. For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive, that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.

- **Peak Particle Velocity (PPV).** The peak signal value of an oscillating vibration velocity waveform, usually expressed in inches per second (in/sec).

- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

5.6.1.1 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.

Federal Regulations

US Department of Housing and Urban Development

The US Department of Housing and Urban Development (HUD) has set a goal of 65 dBA L_{dn} as a desirable maximum exterior standard for residential units developed under HUD funding. (This level is also generally accepted within the State of California.) While HUD does not specify acceptable interior noise levels, standard construction of residential dwellings constructed under Title 24 standards typically provides in excess of 20 dBA of attenuation with the windows closed. Based on this premise, the interior L_{dn} should not exceed 45 dBA.

State Regulations

California Code of Regulations, Title 24, Part 2

Current law states that every local agency enforcing building regulations, such as cities and counties, must adopt the provisions of the California Building Code (CBC) within 180 days of its publication. The publication date of the CBC is established by the California Building Standards Commission. The most recent building standard adopted by the legislature and used throughout the state is the 2016 version, often with local, more restrictive amendments that are based on local geographic, topographic, or climatic conditions. The State of California's noise insulation standards are codified in the CBC. These noise

standards are for new construction in California for the purposes of interior compatibility with exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential, schools, or hospitals, are near major transportation noises, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

City of Brea Noise Standards

City of Brea Municipal Code

Chapter 8.20, Noise Control, provides measurement criteria for noise levels as well as noise standards for residential property within a designated noise zone. The Municipal Code establishes all residential property in the City as Noise Zone 1. Table 5.6-1, *Exterior Noise Standards*, summarizes the City's exterior noise standards.

Table 5.6-1 Exterior Noise Standards

Time Period	Noise Level (dBA)				
	L_{50}	L_{25}	L_8	L_2	L_{max}
7:00 a.m.–10:00 p.m.	55	60	65	70	75
10:00 p.m.–7:00 a.m.	50	55	60	65	70

Source: City of Brea Municipal Code.
Note: A 5 dBA penalty shall be applied in the event of an alleged offensive noise such as impact noise, simple tones, speech, music, or any combination of thereof.

Under Special Provisions, Section 8.20.070, noise associated with construction, repair, remodeling, or grading of any real property is exempted from the City's noise standards, provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays and Saturday, or any time on Sunday or a federal holiday.

City of Brea General Plan

The Public Safety Chapter of the City of Brea General Plan includes noise goals and policies that aim to minimize the impact of point source noise and ambient noise levels, transportation-related noise, and noise impacts from sources other than transportation. The following goals and policies are directly relevant to the proposed project:

- **Goal PS-9.** Minimize the impact of point source noise and ambient noise levels throughout the community.
  - **Policy PS-9.2.** Ensure that noise standards set forth in the Municipal Code reflect standards most appropriate for Brea.

- **Policy PS-9.3.** Ensure that acceptable noise levels are maintained near schools, hospitals, convalescent homes, and other noise sensitive areas in accordance with the City's Municipal Code and noise standards contained in the General Plan.

- **Goal PS-2.** Minimize the impacts of transportation-related noise.

- **Goal PS-3.** Minimize noise impacts from sources other than transportation.

  - **Policy PS-3.3.** Minimize stationary noise sources and noise emanating from construction activities and special events.

The General Plan's Noise and Land Use compatibility Table is summarized below in Table 5.6-2, *Community Noise and Land Use Compatibility, City of Brea.*

Table 5.6-2 Community Noise and Land Use Compatibility, City of Brea

Land Uses	CNEL (dBA) 55	60	65	70	75	80
Residential-Low Density Single Family, Duplex, Mobile Homes						
Residential- Multiple Family						
Transient Lodging: Hotels and Motels						
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						

Table 5.6-2 Community Noise and Land Use Compatibility, City of Brea

Land Uses	CNEL (dBA) 55	60	65	70	75	80
Industrial, Manufacturing, Utilities, Agricultural						

Explanatory Notes

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

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

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

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

Source: Brea 2003.

To accomplish these goals and policies, the General Plan Implementation Guide calls for the City to ensure that new developments are exposed to acceptable noise levels by requiring:

- Acoustical analysis for all proposed development within the 60 CNEL contour
- Acoustical analyses for all proposed residential projects in the vicinity of existing and proposed commercial and industrial areas.
- Noise control measures to be incorporated into the proposed development to reduce noise to acceptable levels.

Vibration Standards

The City of Brea does not have specific limits or thresholds for construction vibration. The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of ground-borne vibration for various types of buildings. The FTA criteria are used for this analysis. Structures amplify groundborne vibration and wood-frame buildings, such as typical residential structures, are more affected by ground vibration than heavier buildings. The level at which groundborne vibration is strong enough to cause architectural damage has not been determined conclusively. The most conservative estimates are reflected in the FTA standards shown in Table 5.6-3.

Table 5.6-3 Groundborne Vibration Criteria: Architectural Damage

Building Category		PPV (in/sec)
I.	Reinforced concrete, steel, or timber (no plaster)	0.5
II.	Engineered concrete and masonry (no plaster)	0.3
III.	Non-engineered timber and masonry buildings	0.2
IV.	Buildings extremely susceptible to vibration damage	0.12

Source: FTA 2018.

5.6.1.2 EXISTING NOISE ENVIRONMENT

The project is in an industrial and commercial area west of Brea Downtown with surrounding industrial, commercial, and residential uses. The existing noise environment surrounding the proposed project site is influenced primarily by roadway sources, including Berry Street and Mercury Lane.

Noise from nearby industrial and commercial uses (e.g., industrial machinery, forklifts, truck loading and unloading, industrial and office rooftop mechanical equipment, property maintenance, and parking lot noise) also contributes intermittently to the total noise environment in the project vicinity. Directly east, west, and north of the project site are warehouses/distribution centers, which add to the existing noise environment primarily through truck loading and unloading. Truck loading/unloading and machine noise at the adjacent and nearby industrial uses could occur in the early morning hours when sensitive receptors are more sensitive to changes in the ambient noise environment.

Directly south of the project site is an office building, which adds to the existing noise environment through intermittent property maintenance and parking lot noise. In addition, a shopping center is southeast of the project site across the Brea Canyon Channel.

The general plan public safety element includes a noise section that discusses noise and land use compatibility guidelines and contains existing and projected noise contours (Brea 2003). Projected noise contours considered existing and projected land use development and projected traffic activity. Based on these noise contours, estimated ambient noise levels at the project site range from 60 to 65 dBA CNEL.

Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration. These uses include residences, schools, hospital facilities, houses of worship, and open space/recreation areas where quiet environments are necessary for the enjoyment, public health, and safety of the community. Commercial and industrial uses are not considered noise- or vibration-sensitive uses.

The closest sensitive receptors to the project site are multifamily residences to the south of the project site on West Imperial Highway. Additional residences are further to the southwest. Ambient noise levels at the nearest sensitive receptors are estimated to be 65 to 70 dBA CNEL based on the City noise contour maps (Brea 2003).

5.6.2 Thresholds of Significance

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

N-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.

N-2 Generation of excessive groundborne vibration or groundborne noise levels.

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

Construction Noise Thresholds

The City has not established noise limits for temporary construction activities. The FTA recommends a noise level limit of 90 dBA L_{eq} for residential receptors, which is used in this analysis to assess construction noise impacts that occur in the daytime hours when people are less sensitive to noise.

Transportation Noise Thresholds

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas. Most people can detect changes in sound levels of approximately 3 dBA under normal, quiet conditions, and changes of 1 to 3 dBA are detectable under quiet, controlled conditions. Changes of less than 1 dBA are usually indiscernible. A change of 5 dBA is readily discernible to most people in an exterior environment. Based on this, traffic noise impacts are considered significant if sensitive receptor locations experience 3 dBA or more noise increases with implementation of the project.

Stationary Noise Thresholds

As discussed above in Section 5.6.1.1, *Regulatory Background*, the City's noise ordinance (Section 8.20, Noise Control, of the municipal code) establishes noise level standards at receiving residential land uses (see Table 5.6-1). Noise levels in excess of these standards at residential areas are considered a noise nuisance. The exterior noise level standards would not apply to industrial land uses.

Vibration Thresholds

Per the FTA criteria, the threshold for architectural damage to buildings with reinforced concrete, steel, or timber (i.e., concrete industrial buildings) is 0.5 in/sec PPV, and to buildings with nonengineered timber and masonry (i.e., residential buildings) is 0.2 in/sec PPV.

5.6.3 Plans, Programs, and Policies

5.6.3.1 REGULATORY REQUIREMENTS

RR NOI-1 The project will be constructed in accordance with Section 8.20, Noise Control, of Brea's Municipal Code, which generally prohibits construction, repair, remodeling, or grading of any real property between the hours of 7:00 p.m. and 7:00 a.m. on weekdays and Saturday, or at any time on Sunday or a federal holiday.

RR NOI-2 The project will be constructed in accordance with stationary noise ordinance, Section 8.20.100, Air Conditioning; Refrigeration; Pool Filters and Fans, from Brea's Municipal Code.

5.6.4 Environmental Impacts

5.6.4.1 METHODOLOGY

This noise evaluation was prepared in accordance with the requirements of CEQA to determine if the proposed project would result in significant construction and operational impacts at nearby sensitive receptors. Per *California Building Industry Association v. Bay Area Air Quality Management District*, 62 Cal. 4th 369 (No. S 213478) (*CBIA v. BAAQMD*), noise compatibility for onsite sensitive receptors is no longer the purview of the CEQA. However, the City requires that projects be designed to achieve the interior noise standards of Title 24, which requires exterior-interior noise insulation sufficient to achieve interior noise levels of 45 dBA CNEL/Ldn (see also Section 5.5, *Land Use and Planning*). Construction noise modeling was conducted using the FHWA Roadway Construction Noise Model. Traffic noise increases were estimated using the peak-hour segment volumes provided by LLG Engineers and the following formula from Appendix I—10*LOG(Existing + Project/Existing).

5.6.4.2 IMPACT ANALYSIS

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 5.6-1: Construction activities would not result in temporary noise increases in the vicinity of the proposed project in excess of standards. [Threshold N-1]

The total duration for project construction would be approximately 18 months. In terms of the proposed construction activities, the site preparation and rough grading are expected to generate the highest noise levels since they involve the largest and most powerful equipment. Construction equipment for the proposed project would include equipment such as graders, excavators, tractors, loaders, backhoes, forklifts, air compressors, boom pumps, and trucks.

Two types of short-term noise impacts could occur during construction: (1) mobile-source noise from transport of workers, material deliveries, and debris and soil haul and (2) stationary-source noise from use of construction equipment.

Construction Vehicles

The transport of workers and materials to and from the construction site would incrementally increase noise levels along site access roadways. Individual construction vehicle pass-bys may create momentary noise levels of up to approximately 85 dBA (L_{max}) at 50 feet from the vehicle, but these occurrences would generally be infrequent and short lived. Therefore, noise impacts from construction vehicles would be less than significant.

Construction Equipment

Noise generated by onsite construction equipment is based on the type of equipment used, its location relative to sensitive receptors, and the timing and duration of noise-generating activities. Each stage of construction involves different kinds of equipment and has distinct noise characteristics. Noise levels from construction activities are typically dominated by the loudest several pieces of equipment. The dominant equipment noise source is typically the engine, although work-piece noise (such as dropping of materials) can also be noticeable.

The noise produced at each construction stage is determined by combining the L_{eq} contributions from each piece of equipment used at a given time, while accounting for the ongoing time-variations of noise emissions (commonly referred to as the usage factor). Heavy equipment, such as a dozer or a loader, can have maximum, short-duration noise levels in excess of 80 to 85 dBA at 50 feet. However, overall noise emissions vary considerably, depending on what specific activity is being performed at any given moment. Noise attenuation due to distance, the number and type of equipment, and the load and power requirements to accomplish tasks at each construction phase would result in different noise levels from construction activities at a given receptor. Since noise from construction equipment is intermittent and diminishes at a rate of at least 6 dB per doubling of distance (conservatively ignoring other attenuation effects from air absorption, ground effects, and shielding effects), the average noise levels at noise-sensitive receptors could vary considerably, because mobile construction equipment would move around the site with different loads and power requirements. Noise levels from project-related construction activities were calculated from the simultaneous use of all applicable construction equipment at spatially averaged distances (i.e., from the acoustical center of the general construction site) to the property line of the nearest receptors. Although construction may occur across the entire phase area, the area around the center of construction activities best represents the potential average construction-related noise levels at the various sensitive receptors.

Using information provided by the applicant, the expected construction equipment mix was estimated and categorized by construction activity using the FHWA Roadway Construction Noise Model. The associated, aggregate sound levels—grouped by construction activity—are summarized in Table 5.6-4, *Project Related Construction Noise at the Closest Sensitive Receptor*.

Table 5.6-4 Project-Related Construction Noise at the Closest Sensitive Receptor

Construction Activity Phase	Sound Level at Various Distances from Construction Activities, dBA L_{eq} Residential Uses to South[1]
Grading/Excavation	56
Vertical Build	44
Interior/Exterior	50
Utility	53
Foundation	55

Source: FHWA 2006; based on the construction equipment mix for the Mercury Lane Residential project.
[1] As measured from the acoustical center of the construction site to the nearest sensitive receptor property line, which is measured at 815 feet

Construction activities would be temporary, approximately 18 months, and would not increase noise levels at and near the proposed area of improvements. The highest average construction-related noise levels—up to approximately 56 dBA L_{eq}—would occur at the residential receptors to the south during the excavation phase. This would be less than the existing ambient daytime noise levels indicated by the City noise contour map, and would not be expected to be noticeably audible above existing traffic noise on West Imperial Highway. In addition, this would be well below the FTA criterion of 90 dBA L_{eq}. As discussed above, noise sources associated with construction, repair, remodeling, or grading of any real property are exempt from the provisions of the Municipal Code provided they do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays and Saturday, or at any time on Sunday or a federal holiday. Due to the distance to the nearest sensitive receptors and with adherence to the provisions of the Municipal Code, this impact would be less than significant.

Level of Significance before Mitigation: Impact 5.6-1, construction noise, would be less than significant.

Impact 5.6-2 Project implementation would not result in long-term operation-related noise that would exceed local standards. [Threshold N-1]

The proposed project would introduce new stationary sources of noise on the 1.01-acre project site and would result in an increase in traffic noise on roadways in the vicinity of the project site. The project proposes recreational amenities, such as barbeques and a bocce ball court, which would be on the third-floor podium in an outdoor courtyard. Recreational noise sources would typically include raised voices. No amplified music or public address systems are proposed. Therefore, noise associated with project recreational activities would be localized and is not anticipated to be audible at the nearest sensitive receptors over existing traffic noise levels on Imperial Highway and other local roadways; this impact would be less than significant.

Stationary (Operational) Noise

The proposed residential structure could introduce new stationary noise sources to the community, including mechanical equipment and property maintenance. The exterior mechanical and HVAC equipment associated with the proposed use are expected to be similar to the equipment at surrounding commercial and industrial uses. Typical HVAC units range from approximately 70 to 75 dBA Leq at a distance of 3 feet. Future mechanical equipment associated with the proposed apartment homes would be at least 715 feet from the

boundary of the site to the nearest residential receptors to the south. At this distance, the sound pressure level associated with a common central air conditioning unit would be reduced to approximately 27 dBA or less. Thus, the noise level associated with future central air conditioning units would be below the threshold in municipal code section 8.20.050, which limits noise to 45 dBA at nearby residential uses during the nighttime.[1] In addition, noise from mechanical equipment associated with the project is not expected to be audible above the existing background noise at the nearest sensitive receptors to the south along Imperial Highway.

Noise from sources such as property maintenance may also contribute to the total noise environment in the direct vicinity of the proposed project site. Municipal code section 8.20.07 indicates that noise sources associated with the maintenance of real property are exempted from the provisions of the municipal code, provided said activities take place between the hours of 7:00 a.m. to 7:00 p.m. on any day. Therefore, impacts from stationary noise sources and occasional property maintenance activities associated with the proposed project would be less than significant.

Traffic Noise

The peak hour traffic volumes along roadways in the project area were provided for the proposed project. To determine the permanent traffic noise level increase, the "Existing Plus Project" peak hour traffic volumes were compared to the existing traffic volumes (see Table 5.6-5, *Project-Related Increase in Traffic Noise*). The permanent noise level increase was estimated to be less than 1 dBA. Therefore, the proposed project would not cause a substantial permanent noise level increase at the surrounding noise-sensitive receptors. This is a less-than-significant impact.

Table 5.6-5 Project-Related Increase in Traffic Noise

Roadway Segment	ADT Traffic Volumes			Project Increase (dB)	Cumulative Increase (dB)	Cumulative Increase due to Project (dB)
	Existing	Existing + Project	Cumulative + Project			
Lambert Road, west of Berry Street	31,643	31,708	36,211	<0.1	0.6	0
Lambert Road, east of Berry Street	34,197	34,360	39,288	<0.1	0.6	0
Lambert Road, east of Brea Boulevard	36,788	36,951	41,472	<0.1	0.5	0
Lambert Road, east of State College Boulevard	58,979	59,142	65,362	<0.1	0.4	0
Berry Street, north of Mercury Lane	10,898	11,127	11,454	0.1	0.1	0.1
Brea Boulevard, north of Birch Street	26,822	26,822	30,385	<0.1	0.5	0
Birch Street, east of Brea Boulevard	17,612	17,645	19,766	<0.1	0.5	0
Berry Street, south of Mercury Lane	10,819	11,243	11,568	0.2	0.1	0.2
Brea Boulevard, south of Birch Street	26,800	26,833	31,305	<0.1	0.7	0
Imperial Highway, west of Berry Street	50,663	50,761	55,013	<0.1	0.3	0

[1] Adjusted by 5 dBA for simple tone noise such as mechanical equipment.

Table 5.6-5 Project-Related Increase in Traffic Noise

Roadway Segment	ADT Traffic Volumes			Project Increase (dB)	Cumulative Increase (dB)	Cumulative Increase due to Project (dB)
	Existing	Existing + Project	Cumulative + Project			
Imperial Highway, east of Berry Street	55,508	55,835	60,232	<0.1	0.3	0
Imperial Highway, east of Brea Boulevard	52,625	52,854	56,824	<0.1	0.3	0
Imperial Highway, east of State College Boulevard	71,271	71,467	77,763	<0.1	0.4	0

Source: Traffic data provided by LLG (2019). Traffic modeling is based on a previous site plan with 120 residential units. The updated site plan has 114 units and would generate less average daily vehicle trips than identified in the traffic report.

Level of Significance before Mitigation: Impact 5.6-2, long-term noise from project-related traffic and onsite stationary noise sources, would be less than significant.

Impact 5.6-3: The project would not generate excessive groundborne vibration or groundborne noise. [Threshold N-2]

The following analysis is based on the vibration guidelines provided by the FTA. Vibration impacts are quantified in terms of architectural damage due to vibration expressed in PPV (in/sec) (FTA 2018).

Vibration During Operations

Operation of the proposed project would not generate substantial levels of vibration because there are no notable sources of vibrational energy associated with the project. Thus, operation of the proposed project would not result in significant ground borne vibration impacts.

Vibration During Construction

Construction activities generate varying degrees of ground vibration, depending on the construction procedures, construction equipment used, and proximity to vibration-sensitive uses. The generation of vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight damage at the highest levels. Table 5.6-6, *Vibration Source Levels for Common Construction Equipment*, lists reference vibration levels for different types of commonly used construction equipment.

Table 5.6-6 Vibration Source Levels for Common Construction Equipment

Equipment	Peak Particle Velocity (in/sec) at 25 feet
Vibratory Roller	0.210
Small Bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large Bulldozer	0.089

Source: FTA 2018.

Proposed construction would include grading, which would include equipment such as loaders. Some of these equipment types may generate substantial levels of vibration at close distances. Using the vibration source level of construction equipment provided in the table and the construction vibration assessment guidelines published by the FTA, the vibration impacts associated with the proposed project were assessed in terms of potential architectural damage due to vibration.

Vibration-Induced Structural Architectural Damage

The term "architectural damage" is defined as minor surface cracks (in plaster, drywall, tile, or stucco) or the sticking of doors and windows. This is below the severity of "structural damage," which entails the compromising of structural soundness or the threatening the basic integrity of the building shell. Building damage is typically not a concern for most projects, with the occasional exception of blasting and pile driving during construction (FTA 2018). No blasting, pile driving, or hard rock ripping/crushing activities will be required during project construction. Since vibration-induced architectural damage could result from an instantaneous vibration event, distances are measured from the receptor façade to the nearest location of potential construction activities. For reference, a PPV of 0.20 in/sec is used as the limit for "non-engineered timber and masonry buildings" (i.e., residential buildings) and 0.5 in/sec PPV for "reinforced concrete, steel, or timber" (FTA 2018). Small construction equipment generates vibration levels less than 0.1 in/sec PPV at 25 feet away. At the nearest residences to the south[2], vibration levels from construction activity would attenuate to less than 0.01 in/sec PPV. The nearest nonresidential structures are the concrete parking garage to the southeast and the concrete warehouse to the east, both approximately 75 feet away. As shown in Table 5.6-6, vibration levels from typical construction equipment would be well below the 0.5 in/sec PPV criterion even at a distance of 25 feet.

Construction-generated vibration levels at the nearest receptors would be much less than the vibration damage criterion for "non-engineered timber and masonry buildings" at the nearest residential buildings and below the vibration criterion for non-residential concrete structures, per FTA guidelines (FTA 2018). Impacts related to architectural damage due to construction vibration would not be significant and mitigation is not necessary.

[2] The distance for vibration damage analysis is measured from the edge of construction to the nearest structures, which is 715 feet.

Level of Significance before Mitigation: Impact 5.6-3, short-term construction and long-term vibration levels, would be less than significant.

Impact 5.6-4: The proximity of the project site to an airport would not result in exposure of future residents to airport-related noise. [Threshold N-3]

The project site is not located within an airport land use plan, and project development would not expose people onsite to excessive airport-related noise levels. Further, the project site is not located within the vicinity of a private airstrip. Development of the proposed project would not expose people onsite to excessive noise levels from aircraft at private airstrips. Therefore, no impacts would occur.

Level of Significance before Mitigation: No impact would occur under Impact 5.6-4.

5.6.5 Cumulative Impacts

Operational Noise

Project-related cumulative noise impacts would occur if the project's contribution to cumulative noise increases results in a substantial noise increase in comparison to existing conditions. Project-induced traffic-noise increases on local roadways in the vicinity of the project site were previously discussed under Impact 5.6-2. The project's traffic analyses analyzed several scenarios, including:

- Existing
- Existing Plus Project
- Cumulative Plus Project

The cumulative increase due to the proposed project would be less than 1 dB on affected roadway segments. A significant cumulative traffic noise increase would be identified if project traffic would contribute 1 dBA or more to a potentially significant cumulative impact. Therefore, project-related traffic noise increases would not contribute to a potentially significant cumulative impact.

Construction Noise and Vibration

Cumulative impacts would only occur if other projects are being constructed in the vicinity of the proposed project at the same time as the proposed project. The general area around the project site is built out. Project construction noise would not combine with other planned and approved construction projects to create cumulatively considerable impacts. Therefore, cumulative construction and vibration impacts would be less than significant.

5.6.6 Level of Significance Before Mitigation

Upon implementation of regulatory requirements and standard conditions of approval, all impacts would be less than significant.

5.6.7 Mitigation Measures

No mitigation measures would be required.

5.6.8 Level of Significance After Mitigation

No mitigation required, impacts would be less than significant before mitigation.

5.6.9 References

Brea, City of. 2003. *City of Brea General Plan.*

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