3.5 Noise

This section describes the existing noise environment in the project area and the potential for the project to result in noise impacts exceeding the City of South Pasadena's applicable noise level criteria. Data used to prepare this section was taken from the traffic impact study (**Appendix I**) and information obtained by measuring and modeling existing and future traffic noise levels at the project site and in the surrounding area (**Appendix E**).

A summary of the impact conclusions related to noise is provided below. As discussed in the project's Initial Study (**Appendix A**) and in Section 3.0, subsection 3.3, Impacts Found to Be Less Than Significant, of this Draft EIR, the project would have no impact related to Impacts 3.5.5 and 3.5.6; therefore, they would not be discussed further in this Draft EIR.

Impact Number	Impact Topic	Impact Significance
3.5.1	Exposure to noise levels in excess of established standards	Less than significant
3.5.2	Exposure to groundborne vibration	Less than significant with mitigation
3.5.3	Substantial permanent increase in ambient noise levels	Less than significant
3.5.4	Substantial temporary or periodic increase in ambient noise levels	Less than significant with mitigation
3.5.5	For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels	No impact
3.5.6	For a project in the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels	No impact
3.5.7	Cumulative noise impacts	Not cumulatively considerable

3.5.1 FUNDAMENTALS OF SOUND AND ENVIRONMENTAL NOISE

Sound is technically described in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). The decibel scale is a logarithmic scale that describes the physical intensity of the pressure vibrations which make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Because the human ear is not equally sensitive to a given sound level at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Noise, on the other hand, is typically defined as unwanted sound because of its potential to disrupt sleep, to interfere with speech communication, and to damage hearing. A typical noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway.

AMPLITUDE

Amplitude is the difference between ambient air pressure and the peak pressure of the sound wave. Amplitude is measured in decibels on a logarithmic scale. Laboratory measurements correlate a 10 dB increase in amplitude with a perceived doubling of loudness and establish a 3 dB change in amplitude as the minimum audible difference perceptible to the average person.

FREQUENCY

Frequency is the number of fluctuations of the pressure wave per second. The unit of frequency is the Hertz. One Hertz equals one cycle per second. The human ear is not equally sensitive to sound of different frequencies. To approximate this sensitivity, environmental sound is usually measured in A-weighted decibels. On this scale, the normal range of human hearing extends from about 10 dBA to about 140 dBA. Common community noise sources and associated noise levels, in dBA, are depicted in **Figure 3.5-1**.

ADDITION OF DECIBELS

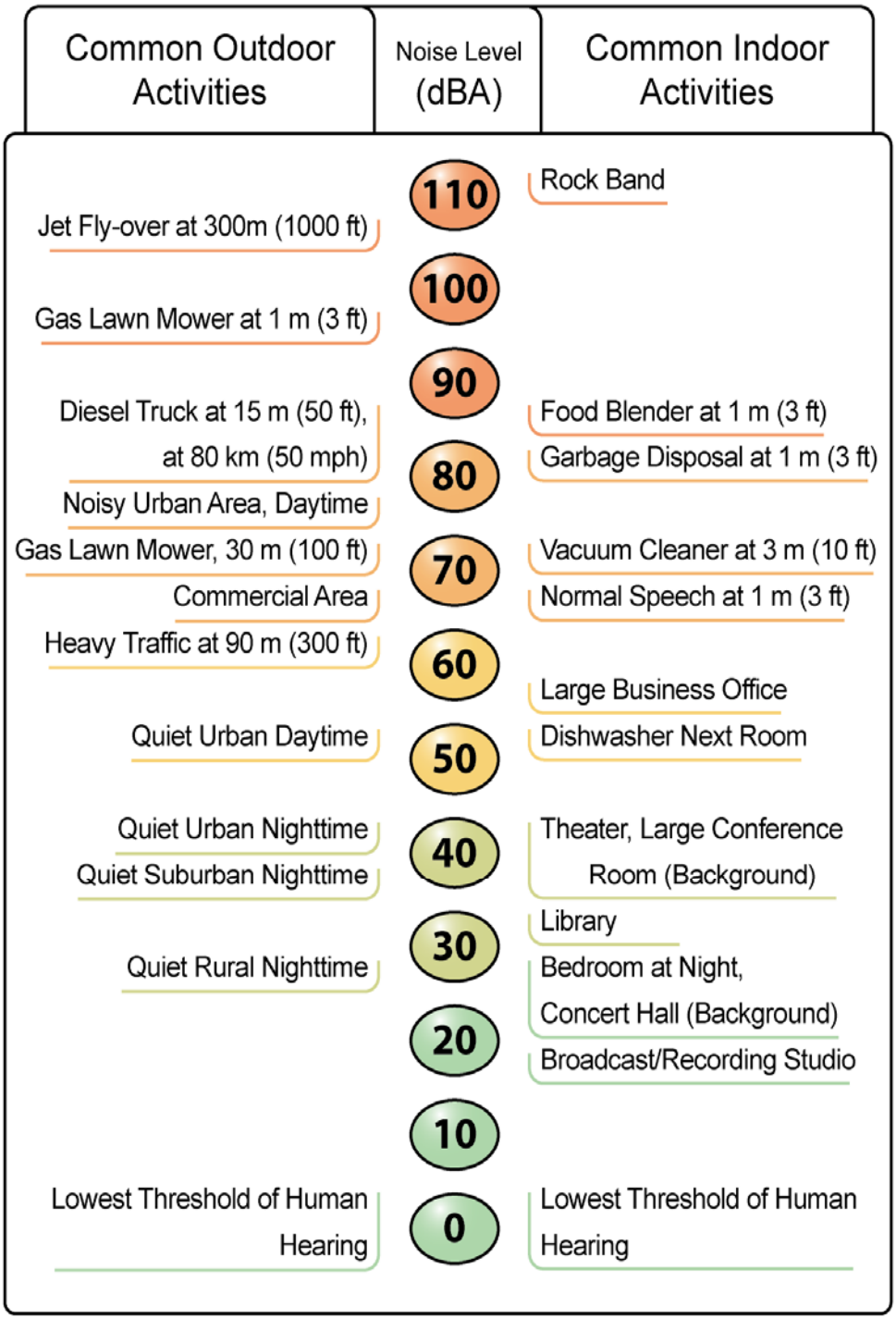
Because decibels are logarithmic units, sound levels cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB.

SOUND PROPAGATION AND ATTENUATION

Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics. No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of 3 dB per doubling of distance is assumed.

Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

FIGURE 3.5-1
TYPICAL COMMUNITY NOISE LEVELS



Source: Caltrans 2012

NOISE DESCRIPTORS

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined below.

- L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

- L_{dn}, the Day-Night Average Level, is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.

- CNEL, the Community Noise Equivalent Level, is a 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.

- L_{min} is the minimum instantaneous noise level experienced during a given period of time.

- L_{max} is the maximum instantaneous noise level experienced during a given period of time.

- Percentile Noise Level (L_n) is the noise level exceeded for a given percentage of the measurement time. For example, L_{10} is the noise level exceeded for 10 percent of the measurement duration, and L_{50} is the noise level exceeded for 50 percent of the measurement duration.

HUMAN RESPONSE TO NOISE

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night, or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings that can provide noise levels as low as 20 dBA and quiet, suburban, residential streets that can

provide noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with more noisy urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted for understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dB cannot be perceived by humans.
- Outside of the laboratory, a 3 dB change is considered a just-perceivable difference.
- A change in level of at least 5 dB is required before any noticeable change in community response would be expected. An increase of 5 dB is typically considered substantial.
- A 10 dB change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

3.5.2 EXISTING SETTING

NOISE-SENSITIVE RECEPTORS

Noise-sensitive land uses are those that may be subject to stress and/or interference from excessive noise. Noise-sensitive land uses include public schools, hospitals, and institutional uses such as churches, museums, and private schools. Typically, residential uses are also considered noise-sensitive receptors. Industrial and commercial land uses are generally not considered sensitive to noise. Existing sensitive receptors adjacent to the project site include multi-family residences to the west and single- and multi-family residences to the southeast, as well as the South Pasadena Library to the south. Residences constructed as part of the project would also be considered a sensitive use. The existing sensitive receptors closest to the project site are multi-family residential units across Diamond Street to the west of the project site.

EXISTING AMBIENT NOISE LEVELS

The project site is located in a highly urbanized environment. The noise environment is a result of historical land use decisions, competing regional and community goals, geographic factors, and limited local controls. Major noise sources in South Pasadena consist of transportation sources and community sources. To document existing ambient noise levels in the vicinity of the project site, short-term ambient noise measurements were conducted on January 25, 2015, by Michael Baker International staff. Existing daytime noise levels were monitored at four locations around the project site, which are depicted in **Figure 3.5-2,** in order to identify representative noise levels in various areas. The measurements were taken with a Larson-Davis SoundExpert LxT precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. Prior to the measurements, the sound level meter was calibrated according to manufacturer specifications with a Larson Davis CAL200 Class I Calibrator. Measured ambient noise levels are summarized in **Table 3.5-1**.

TABLE 3.5-1
SUMMARY OF MEASURED AMBIENT NOISE LEVELS

Location	Noise Source	Monitoring Period		Noise Levels (dBA)		
		Start Date & Time	Duration	Leq	Lmax	Lmin
Mission Street, front of project site	Traffic on Mission Street, Gold Line crossing bell	January 25, 2015 10:26 a.m.	15	64.3	75.4	48.4
Diamond Street, between Mission Street and El Centro Street	Traffic on Mission Street	January 25, 2015 10:44 a.m.	15	54.8	70.2	42.2
El Centro Street, in front of Golden Oaks Apartments	Traffic on El Centro Street, Gold Line crossing bell	January 25, 2015 11:01 a.m.	15	59.8	72.4	46.3
Fairview Avenue, on library property	Traffic on El Centro Street	January 25, 2015 11:20 a.m.	15	52.6	61.6	41.5

*Measurement data sheets are included in **Appendix E.***

Note: Ambient noise measurements were conducted using a Larson-Davis SoundExpert LxT integrating sound level meter placed at a height of approximately 5 feet above ground level.

As shown in **Table 3.5-1**, ambient noise levels ranged between 52.6 dBA and 64.3 dBA L_{eq}. The primary source of noise in the vicinity of the project site was vehicle noise along Mission Street and El Centro Street, with secondary noise produced by the Gold Line crossing bell. Noise levels were typical of a suburban environment.

EXISTING ROADWAY NOISE LEVELS

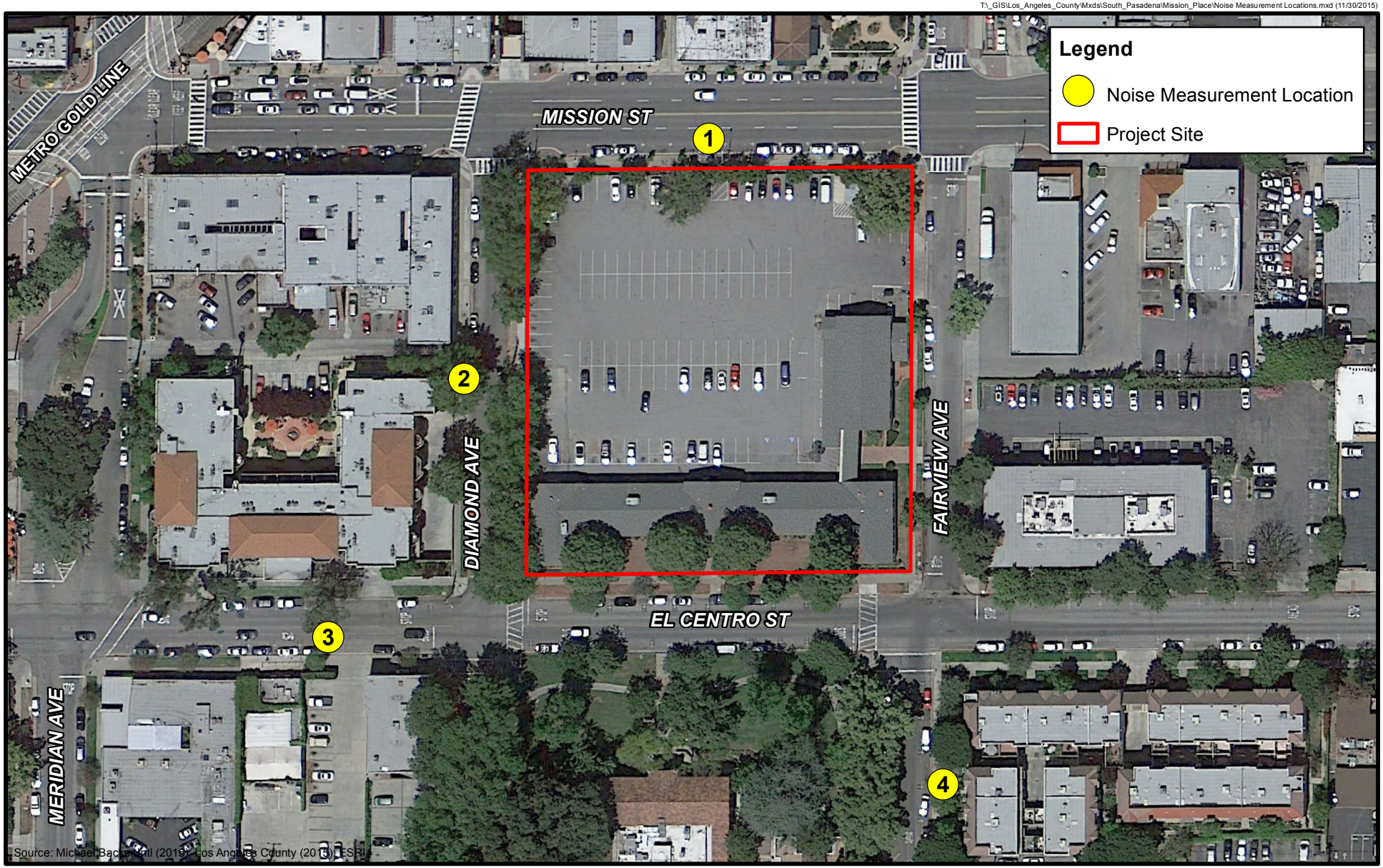
Existing roadway noise levels were calculated for the roadway segments in the project vicinity. This task was accomplished using the Federal Highway Administration (FHWA) Highway Noise Prediction Model (FHWA-RD-77-108) and traffic volumes from the project traffic analysis (see **Appendix G**). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) utilized in the FHWA model have been modified to reflect average vehicle noise rates identified for California by the California Department of Transportation (Caltrans). The average daily noise levels along these roadway segments are presented in **Table 3.5-2**.

TABLE 3.5-2
CURRENT TRAFFIC NOISE LEVELS

Roadway Segment	Existing Uses	CNEL at 50 Feet from Near-Travel-Lane Centerline[1]
Mission Street – Diamond Avenue to Fairview Avenue	Mixed Use Commercial/ Residential	65.0
Diamond Avenue – Mission Street to El Centro	Residential	52.5
Fairview Avenue – Mission Street to El Centro	Commercial/Civic Use	52.1

Notes: Traffic noise levels were calculated using the FHWA roadway noise prediction model based on data obtained from the traffic analysis prepared for this project (Arch Beach Consulting 2015).

T:_GIS\Los_Angeles_County\Mxds\South_Pasadena\Mission_Place\Noise Measurement Locations.mxd (11/30/2015)



N

0 50 100
FEET

Figure 3.5-2
Noise Measurement Locations

Michael Baker
INTERNATIONAL

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FUNDAMENTALS OF ENVIRONMENTAL GROUNDBORNE VIBRATION

Vibration Decibels

Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and in the United States is referenced as vibration decibels (VdB).

The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. Groundborne vibration is almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of a building, the motion does not provoke the same adverse human reaction. In addition, the rumble noise that usually accompanies building vibration is perceptible only inside buildings (FTA 2006). As such, the range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

The general human response to different levels of groundborne vibration velocity levels is described in **Table 3.5-3.**

TABLE 3.5-3
HUMAN RESPONSE TO DIFFERENT LEVELS OF GROUNDBORNE VIBRATION

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: FTA 2006

Peak Particle Velocity

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV) and another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. In this discussion, a PPV descriptor with units of millimeters per second (mm/sec) or inches per second (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints. **Table 3.5-4** displays the reactions of people and the effects on buildings that continuous vibration levels produce. The annoyance levels shown in **Table 3.5-4** should be

interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual.

TABLE 3.5-4
REACTION OF PEOPLE AND DAMAGE TO BUILDINGS FROM CONTINUOUS OR FREQUENT INTERMITTENT VIBRATION LEVELS

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe – vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures.

Source: Caltrans 2013

Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Construction activities can also cause vibration that varies in intensity depending on several factors like type of construction and construction vehicles used. The use of pile driving and vibratory compaction equipment typically generates the highest construction-related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration—the potential to damage a structure and the potential to interfere with the enjoyment of life—are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.008 to 0.012 in/sec PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. People exposed to elevated ambient vibration levels, such as in an urban environment, may tolerate a higher vibration level.

Structural damage from groundborne vibration can be classified as cosmetic only, such as minor cracking of building elements, or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher, and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to a building is very rare and has only been observed in instances where the structure is in a significant state of disrepair and the construction activity occurs immediately adjacent to the structure.

3.5.3 REGULATORY FRAMEWORK

STATE

Governor's Office of Planning and Research

The Governor's Office of Planning and Research (OPR) (2003), published the 2003 General Plan Guidelines, which provide guidance for the acceptability of projects in specific noise environments based on average-daily noise conditions (CNEL/L_{dn}). However, it is important to note that the OPR guidance does not take into account local conditions, including a particular community's sensitivity to noise, noise reduction goals, or assessment of the relative importance of noise pollution. As a result, noise standards developed by local jurisdictions typically differ somewhat from the OPR guidance. In the case of the project, the City has adopted local noise standards, which are most relevant to the noise conditions in South Pasadena. Therefore, this analysis is based on local standards, and the OPR guidance is not considered.

LOCAL

City of South Pasadena General Plan

The City has established noise standards in its adopted General Plan Safety and Noise Element intended to protect community residents from harmful and annoying noise levels. These policies identify permissible maximum average-daily noise standards for determination of land use compatibility. The element's general objectives include limiting the noise levels in residential areas and establishing compatible land uses and marinating ambient noise levels in the city that will not be physically or psychologically detrimental to city residents. The City utilizes standards suggested by the League of California Cities as shown in **Table 3.5-5**.

TABLE 3.5-5
CITY OF SOUTH PASADENA – COMMUNITY AMBIENT NOISE LEVELS

Zone	Time	Quiet	Slightly Noisy
R1 & R2	10:00 p.m.–7:00 a.m.	45dBa	50 dBa
	7:00 a.m.–7:00 p.m.	55 dBA	60dBA
	7:00 p.m.–10:00 p.m.	50 dBa	55dBa
R3	10:00 p.m.–7:00 a.m.	50 dBa	55dBa
	7:00 a.m.–7:00 p.m.	55 dBA	60dBA
Commercial	10:00 p.m.–7:00 a.m.	55 dBA	60dBA
	7:00 a.m.–7:00 p.m.	60dBa	65dBa
Industrial	Anytime	70dBa	75dBa

Source: City of South Pasadena 1998

City of South Pasadena Municipal Code

Municipal Code Chapter 19A.23, Noise Prohibition, addresses the specific noises in the city and their respective regulations, including noise generated by machinery, motor vehicles, construction activity, and animals.

Chapter 19A.13, Construction, presents construction noise regulations. Construction activity is not permitted in a residential zone or within 500 feet of such a zone Monday through Friday before 8 a.m. and after 7 p.m.; Saturday before 9 a.m. and after 7 p.m.; and Sunday before 10 a.m. and after 6 p.m.

3.5.4 IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

According to California Environmental Quality Act (CEQA) Guidelines Appendix G, impacts related to noise are considered significant if the project would result in any of the following conditions:

1) Exposure of persons to or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or of applicable standards of other agencies.

2) Exposure of persons to or generation of an excessive groundborne vibration or groundborne noise level.

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

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

5) For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, exposure of people residing or working in the project area to excessive noise levels.

6) For a project within the vicinity of a private airstrip, exposure of people residing or working in the project area to excessive noise levels.

As discussed in the project's Initial Study (**Appendix A**), the project would have no impact related to standards of significance 5 and 6. Therefore, they will not be discussed further in this Draft EIR.

Criteria for determining the significance of noise impacts were developed based on information contained in CEQA Guidelines Appendix G and from the City of South Pasadena, which identifies acceptable noise levels as follows: "multiple family residential land use is 'normally acceptable' in exterior noise environments up to 65 CNEL and 'conditionally acceptable' up to 70 CNEL. Single family residential areas are 'normally acceptable' up to 60 CNEL and conditionally acceptable' up to 70 CNEL. Schools, libraries and churches are 'normally acceptable' up to 70 CNEL, as are office buildings and business, commercial and profession uses. Recreational uses, such as water recreation, are 'normally acceptable' up to 75 CNEL and 'normally unacceptable' from 70 to 80 CNEL." As such, any noise impacts exceeding these acceptable noise levels would be considered significant impacts.

METHODOLOGY

This analysis of existing and future noise environments is based on noise prediction modeling and empirical observations. The residential and civic uses in the project vicinity are considered noise-sensitive receptors.

Long-Term Operational Stationary Source Noise

Predicted noise levels associated with on-site stationary noise sources were calculated based on representative data obtained from existing literature and noise assessments prepared for similar projects. Operational noise levels were predicted assuming an average noise attenuation rate of 6 dB per doubling of distance from the source. Operational noise levels were calculated at the property lines and nearby land uses for comparison to the City's noise standards.

Long-Term Traffic Noise

The project's potential to permanently increase traffic noise is addressed under the following scenarios: the existing plus project and the cumulative plus project. Traffic noise levels were calculated using the FHWA roadway noise prediction model (FHWA-RD-77-108) based on California vehicle reference noise emission factors and traffic data obtained from the traffic analysis prepared for the project. Additional input data included vehicle speeds, ground attenuation factors, and roadway widths. Predicted noise levels were calculated at a distance of 50 feet from the near-travel-lane centerline. Vehicle distribution was adjusted based on volume data obtained from the traffic analysis (**Appendix G**).

Groundborne Vibration

Groundborne vibration levels associated with construction-related activities as well as operations were evaluated using typical groundborne vibration levels associated with construction equipment and heavy-duty trucks, obtained from the Federal Transit Administration (FTA) guidelines. Potential groundborne vibration impacts were evaluated taking into account the distance from construction activities to nearby land uses and typically applied criteria for structural damage.

Short-Term Construction Noise

Predicted noise levels at nearby noise-sensitive land uses were calculated using typical noise levels and usage rates associated with construction equipment, derived from representative data obtained from similar construction projects. Construction noise levels were predicted assuming an average noise attenuation rate of 6 dB per doubling of distance from the source.

PROJECT IMPACTS AND MITIGATION MEASURES

Exposure to Noise Levels in Excess of Established Standards (Standard of Significance 1)

Impact 3.5.1 Project operation and construction would generate increased local traffic volumes but would not cause a substantial, temporary or permanent increase in ambient noise levels in the project vicinity. This would be a **less than significant** impact.

Construction

The City of South Pasadena regulates noise levels through the General Plan Safety and Noise Element and under Chapter 19A of the City's Municipal Code, as described above. The Safety and Noise Element established a 65 dBA threshold for sensitive land uses, such as residential uses. The proposed project involves the excavation of approximately 48,000 cubic yards of soil for the construction of a mixed-use development including multi-family residential uses, with three levels of subterranean parking.

The project site is located in a highly urbanized environment. Existing sensitive receptors adjacent to the project site include multi-family residences to the west and single- and multi-family residences to the southeast, as well as the South Pasadena Library to the south. Residences constructed as part of the project would also be considered a sensitive use. Existing noise sources in the project area include traffic along Mission Street and surrounding roadways and the crossing bell from the Gold Line, located approximately 0.1 mile to the west of the project site.

Sources of noise associated with the proposed project would include noise generated during construction activities and during operation of the project. Construction noise includes the use of heavy equipment during excavation and grading, as well as construction itself. Because the proposed project would result in an increase in residential and commercial development on the project site, noise on the project site would be expected to incrementally increase during use and operation of the project. New sources of noise include increased human presence and traffic noise generated by vehicle trips to and from the parking area.

As mentioned above, the measured existing ambient noise levels in the project site vicinity range between 52.6 dBA and 64.3 dBA, which are below the City's established threshold of 65 dBA L_{eq}. Construction activities would be restricted to the times set forth in Chapter 19A.13 of the City's Municipal Code and would not occur Monday through Friday before 8 a.m. and after 7 p.m., Saturday before 9 a.m. and after 7 p.m., and Sunday before 10 a.m. and after 6 p.m. Therefore, construction noise would not exceed the applicable standards. Impacts from construction noise would be **less than significant**.

Operation

The noise ordinance in Municipal Code Chapter 19A.12 specifies that noise generated by machinery, equipment, fans, or air conditioning must not increase the ambient noise level by more than 5 dBA at the property line. Large-scale HVAC systems would be installed for the new rental residential and commercial uses located on the project site. Such HVAC systems can result in noise levels that average between 50 and 65 dBA L_{eq} at 50 feet from the equipment. The project's HVAC units would be mounted in HVAC wells on the rooftops of the proposed buildings and would be screened from view by the wells and other building features. Therefore, noise levels would not impact sensitive receptors on or off the project site. Additionally, noise from mechanical equipment associated with project operation would be required to comply with the California Building Code requirements pertaining to noise attenuation.

The project site is located in an urbanized environment. The proposed mixed-use development would not be anticipated to increase the ambient noise levels above existing conditions, particularly along Mission Street, which is a highly active pedestrian-oriented street with a similar mix of uses as those proposed to be developed by the project. Because operational noise levels are not anticipated to increase the existing ambient noise level at the closest sensitive receptors, operational noise associated with the proposed project is not expected to expose people to noise in excess of standards listed above. Impacts would be **less than significant**.

Mitigation Measures

None required.

Exposure to Groundborne Vibration (Standard of Significance 2)

Impact 3.5.2 The proposed project has the potential to generate vibrations during construction and expose persons to vibration levels during operation. This impact is **less than significant with mitigation incorporated.**

To assess construction impacts, the analysis uses Caltrans thresholds for fragile buildings, while for operational impacts it uses FTA thresholds as described above.

Construction Impacts

A portion of the project site is currently occupied by the South Pasadena Unified School District Administration Building. According to Section 3.2, Cultural Resources, of this Draft EIR, the structure is considered a historic building. The structure was constructed between 1928 and 1931 and is a contributor to the South Pasadena Historic Business District. Construction activities would take place approximately 10 feet away from the existing historic structure, and groundborne vibrations could impact the structure's stability. Due to the structure's age and historic importance, it is considered a fragile building for the purpose of this analysis.

Construction activities would require the use of off-road equipment such as bulldozers, jackhammers, and haul trucks. The use of major groundborne vibration–generating construction equipment, such as pile drivers, would not be needed for the project. Groundborne vibration levels associated with representative construction equipment are summarized in **Table 3.5-6**. Based on the vibration levels presented in the table, ground vibration generated by construction equipment would not be anticipated to exceed 0.031 PPV at 50 feet. Nonetheless, vibration levels could reach approximately 0.352 PPV at the SPUSD's existing buildings, which would exceed the threshold established by Caltrans for fragile buildings. As such, the project's construction activities would have a significant impact on existing buildings. Mitigation measure **MM 3.2.1b**, as identified in Section 3.2, Cultural Resources, is required to be implemented. With implementation of mitigation measure **MM 3.2.1b,** the project would have a **less than significant** impact.

TABLE 3.5-6
VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Approximate PPV			
	10 Feet	25 Feet	50 Feet	100 Feet
Large Bulldozer	0.352	0.089	0.031	0.011
Loaded Trucks	0.300	0.076	0.027	0.010
Jackhammer	0.138	0.035	0.012	0.004
Small Bulldozer	0.012	0.003	0.001	0.000

Source: FTA 2006

Operational Impacts

During project operation, background operational vibration levels would be expected to average around 50 VdB, as discussed above. This is substantially less than the FTA's vibration impact threshold of 85 VdB for human annoyance. Groundborne vibration resulting from project operation would primarily be generated by trucks making periodic deliveries to the proposed project site (including but not limited to garbage trucks, delivery trucks, and moving trucks). The project would be a mixed-use residential project, and project operation would not perceptibly increase groundborne vibration or groundborne noise on the project site above existing conditions. Therefore, impacts would be **less than significant**.

Mitigation Measures

Implement mitigation measure **MM 3.2.1b** as identified in Section 3.2, Cultural Resources.

Substantial Permanent Increase in Ambient Noise Levels (Standard of Significance 3)

Impact 3.5.3 Project operation would not result in the exposure of persons to or generation of noise levels in excess of the City of South Pasadena's noise standards. This impact would be **less than significant.**

Project construction would be temporary in nature and would not lead to a substantial permanent increase in ambient noise levels in the project vicinity.

Project operation would generate local traffic as a result of residents, employees, and patrons entering and exiting the site. Based on accepted research, a noise level increase of 3 dBA CNEL is not readily perceptible to most people. Thus, for the purpose of this analysis, a permanent increase of 3 dBA CNEL over ambient noise levels without the project is considered to be a significant impact. The increase in traffic resulting from project implementation could increase ambient noise levels at off-site locations (such as residential uses) in the project vicinity. The noise levels associated with Opening Year (2017) traffic volumes without the project and Opening Year (2017) traffic volumes with the project are identified in **Table 3.5-7**.

TABLE 3.5-7
PREDICTED INCREASES IN TRAFFIC NOISE LEVELS – EXISTING PLUS PROJECT CONDITIONS

Roadway Segment	CNEL at 50 Feet from Near-Travel-Lane Centerline[1]		Increase	Threshold	Impact
	Without Project	With Project			
Mission Street – Diamond Avenue to Fairview Avenue	65.0	65.1	0.1	3.0	No
Diamond Avenue – Mission Street to El Centro	52.5	53.3	0.8	3.0	No
Fairview Avenue – Mission Street to El Centro	52.1	53.3	1.2	3.0	No

Notes: Traffic noise levels were calculated using the FHWA roadway noise prediction model based on data obtained from the traffic analysis prepared for this project (Arch Beach Consulting 2015).

As shown above, the greatest increase in noise levels would be along Fairview Avenue, where roadway noise levels would increase by approximately 1.2 dBA CNEL due to project-related traffic increases. This increase would be imperceptible to most sensitive receptors people and would not exceed the identified threshold of significance. Therefore, this impact would be considered **less than significant**.

Mitigation Measures

None required.

Substantial Temporary or Periodic Increase in Ambient Noise Levels (Standard of Significance 4)

Impact 3.5.4 Project construction would result in the exposure of persons to or generation of noise levels in excess of City of South Pasadena noise standards. This impact would be **less than significant with mitigation incorporated.**

Construction-related activities and equipment used during the project's construction phase could result in temporary and periodic increases in ambient noise levels above existing levels. South Pasadena Municipal Code Chapter 19A, Noise Regulations, limits building construction activities including the operation of any pile driver, steam shovel, pneumatic hammer, derrick, or steam or electric hoist between the hours of 7 p.m. and 8 a.m. on Mondays through Fridays, and on weekends before 10 a.m. and after 7 p.m. in a residential zone or within a radius of 500 feet thereof. **Table 3.5-8** shows typical noise levels at construction sites.

TABLE 3.5-8
TYPICAL NOISE LEVELS AT CONSTRUCTION SITES

Construction Phase	Noise Level at 50 Feet with Mufflers (dBA Leq)	Noise Level at 100 Feet with Mufflers (dBA Leq)
Clearing	82	76
Excavation	86	80
Foundation/Conditioning	77	71
Finishing and Cleanup	86	80

Source: EPA 1971

The sensitive receptors closest to the project site are multi-family residential units adjacent to the western boundary of the project site, approximately 50 feet from the project site. As shown in **Table 3.5-8,** typical noise levels at construction sites can reach 86 dBA at 50 feet from equipment, which is above established noise standards. Therefore, construction-generated noise could periodically exceed noise standards and this would be a **significant** impact. As such, mitigation measure **MM 3.5.4** is required.

Mitigation Measures

MM 3.5.4 **Construction Impact Mitigation.** The project applicant shall implement the following mitigation measures:

a. *Diesel Equipment Mufflers.* All diesel equipment shall be operated with closed engine doors and shall be equipped with factory-recommended mufflers.

b. *Electrically Powered Tools.* Electrically powered tools shall be used to run air compressors and similar power tools.

c. *Restrictions on Excavation and Foundation/Conditioning.* Excavation, foundation-laying, and conditioning activities (the noisiest phases of construction) shall be restricted to between the hours of 8:00 a.m. and 7:00 p.m. Monday through Friday and 10:00 a.m. to 7:00 p.m. on weekends, in accordance with Chapter 19A of the South Pasadena Municipal Code.

d. *Additional Noise Attenuation Techniques***.** For all noise-generating construction activity on the project site, additional noise attenuation techniques shall be employed as necessary to reduce noise levels to the extent feasible. Such techniques may include the use of sound blankets on noise-generating equipment and the construction of temporary sound barriers between construction sites and nearby sensitive receptors.

e. *Construction Sign Posting*. The project applicant shall establish a noise disturbance coordinator, who shall be responsible for responding to any local complaints about construction noise. The coordinator would be responsible for determining the cause of the noise complaint (starting too early, bad muffler, etc.) and would be required to implement reasonable measures such that the complaint is resolved. A sign shall be posted informing all workers and subcontractors of the time restrictions for construction activities. The sign shall also include the name and telephone number of the noise disturbance coordinator and the City telephone numbers where noise violations can be reported.

Implementation of mitigation measure **MM 3.5.4** would ensure that noise impacts generated by construction of the proposed project would not affect nearby residents, resulting in a **less than significant** impact.

3.5.5 CUMULATIVE SETTING, IMPACTS, AND MITIGATION MEASURES

CUMULATIVE SETTING

The geographic extent of the cumulative setting for noise consists of the project site and vicinity. Based on the noise measurement surveys conducted, ambient noise levels at the nearest residential land uses are primarily affected by vehicle traffic on nearby area roadways and by the Gold Line crossing bell. As a result, the primary factor for cumulative noise impact analysis is the consideration of future traffic noise levels along area roadways.

CUMULATIVE IMPACTS AND MITIGATION MEASURES

Cumulative Noise Impacts

Impact 3.5.7 Project operation would result in a contribution to cumulative noise levels. This impact would be considered **less than cumulatively considerable.**

Cumulative noise impacts would occur primarily as a result of increased traffic on local roadways due to the Mission Place project and other projects in the vicinity. Therefore, cumulative traffic-generated noise impacts have been assessed based on the contribution of project components to the future cumulative base traffic volumes in the project vicinity. The noise levels associated with cumulative base traffic volumes without the project and cumulative base traffic volumes with the project are identified in **Table 3.5-9**.

TABLE 3.5-9
PREDICTED INCREASES IN CUMULATIVE TRAFFIC NOISE LEVELS

Roadway Segment	CNEL at 50 Feet from Near-Travel-Lane Centerline[1]		Increase	Threshold	Impact
	Cumulative Without Project	Cumulative With Project			
Mission Street – Diamond Avenue to Fairview Avenue	65.2	65.3	0.1	3.0	No
Diamond Avenue – Mission Street to El Centro	52.6	53.4	0.8	3.0	No
Fairview Avenue – Mission Street to El Centro	52.1	53.3	1.2	3.0	No

Notes: Traffic noise levels were calculated using the FHWA roadway noise prediction model based on data obtained from the traffic analysis prepared for this project (Arch Beach Consulting 2015).

As shown in **Table 3.5-9**, under the cumulative project scenario, the project would not result in roadway noise level increases beyond noise level thresholds at all vicinity roadway segments. This impact would be **less than cumulatively considerable**.

Mitigation Measures

None required.

3.5.6 REFERENCES

Arch Beach Consulting. 2015. *Traffic Impact Analysis – Mission Place Mixed-Use Project.*

Caltrans (California Department of Transportation). 2012. *IS/EA Annotated Outline.* http://www.dot.ca.gov/ser/vol1/sec4/ch31ea/chap31ea.htm.

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FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment*.

OPR (Governor's Office of Planning and Research). 2003. *2003 General Plan Guidelines.*