

4.4 NOISE

This section describes the current noise setting at the project site, analyzes the project for its potential noise impacts, and recommends mitigation measures to reduce significant impacts.

4.4.1 ENVIRONMENTAL SETTING

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, unexpected, or unwanted. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave by a disturbance or vibration that causes pressure variation in air that the human ear can detect.

SOUND PROPERTIES

A sound wave is introduced into a medium (air) by a vibrating object. The vibrating object (e.g., vocal chords, the string of a guitar or the diaphragm of a radio speaker) is the source of the disturbance that moves through the medium. Regardless of the type of source creating the sound wave, the particles of the medium through which the sound moves are vibrating in a back and forth motion at a given rate (frequency). The frequency of a wave refers to how often the particles vibrate when a wave passes through the medium. The frequency of a wave is measured as the number of complete back-and-forth vibrations of a particle per unit of time. One complete back-and-forth vibration is called a cycle. If a particle of air undergoes 1,000 cycles in 2 seconds, then the frequency of the wave would be 500 cycles per second. The common unit used for frequency is in cycles per second, called Hertz (Hz).

Each particle vibrates as a result of the motion of its nearest neighbor. For example, the first particle of the medium begins vibrating at 500 Hz and sets the second particle of the medium into motion at the same frequency (500 Hz). The second particle begins vibrating at 500 Hz and thus sets the third particle into motion at 500 Hz. The process continues throughout the medium; hence each particle vibrates at the same frequency, which is the frequency of the original source. Subsequently, a guitar string vibrating at 500 Hz will set the air particles in the room vibrating at the same frequency (500 Hz), which carries a sound signal to the ear of a listener that is detected as a 500 Hz sound wave.

The back-and-forth vibration motion of the particles of the medium would not be the only observable phenomenon occurring at a given frequency. Because a sound wave is a pressure wave, a detector could be used to detect oscillations in pressure from high to low and back to high pressure. As the compression (high-pressure) and rarefaction (low-pressure) disturbances move through the medium, they would reach the detector at a given frequency. For example, a compression would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Similarly, a rarefaction would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Thus, the frequency of a sound wave refers not only to the number of back-and-forth vibrations of the particles per unit of time but also to the number of compression or rarefaction disturbances that pass a given point per unit of time. A detector could be used to detect the frequency of these pressure oscillations over a given period of time. The period of the sound wave can be found by measuring the time between successive high-pressure points (corresponding to the compressions) or the time between successive low-pressure points (corresponding to the rarefactions). The frequency is simply the reciprocal of the period; thus an inverse relationship exists so that as frequency increases, the period decreases, and vice versa.

A wave is an energy transport phenomenon that transports energy along a medium. The amount of energy carried by a wave is related to the amplitude (loudness) of the wave. A high-energy wave is characterized by large amplitude; a low-energy wave is characterized by small amplitude. The amplitude of a wave refers to the maximum amount of displacement of a particle from its rest position. The energy transported by a wave is directly proportional to the square of the amplitude of the wave. This means that a doubling of the amplitude of a wave is indicative of a quadrupling of the energy transported by the wave.

Sound and the Human Ear

Because of the ability of the human ear to detect a wide range of sound-pressure fluctuations, sound-pressure levels are expressed in logarithmic units called decibels (dB) to avoid a very large and awkward range in numbers. The sound-pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure and then multiplied by 20. The reference sound pressure is considered the absolute hearing threshold (Caltrans 1998). Use of this logarithmic scale reveals that the total sound from two individual 65-dB sources is 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB).

Because the human ear is not equally sensitive to all audible frequencies, a frequency-dependent rating scale was devised to relate noise to human sensitivity. An A-weighted dB (dBA) scale performs this compensation by discriminating against frequencies that are more sensitive to humans. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale has been chosen by most authorities for the purpose of regulating environmental noise. Typical indoor and outdoor noise levels are presented in Exhibit 4.4-1.

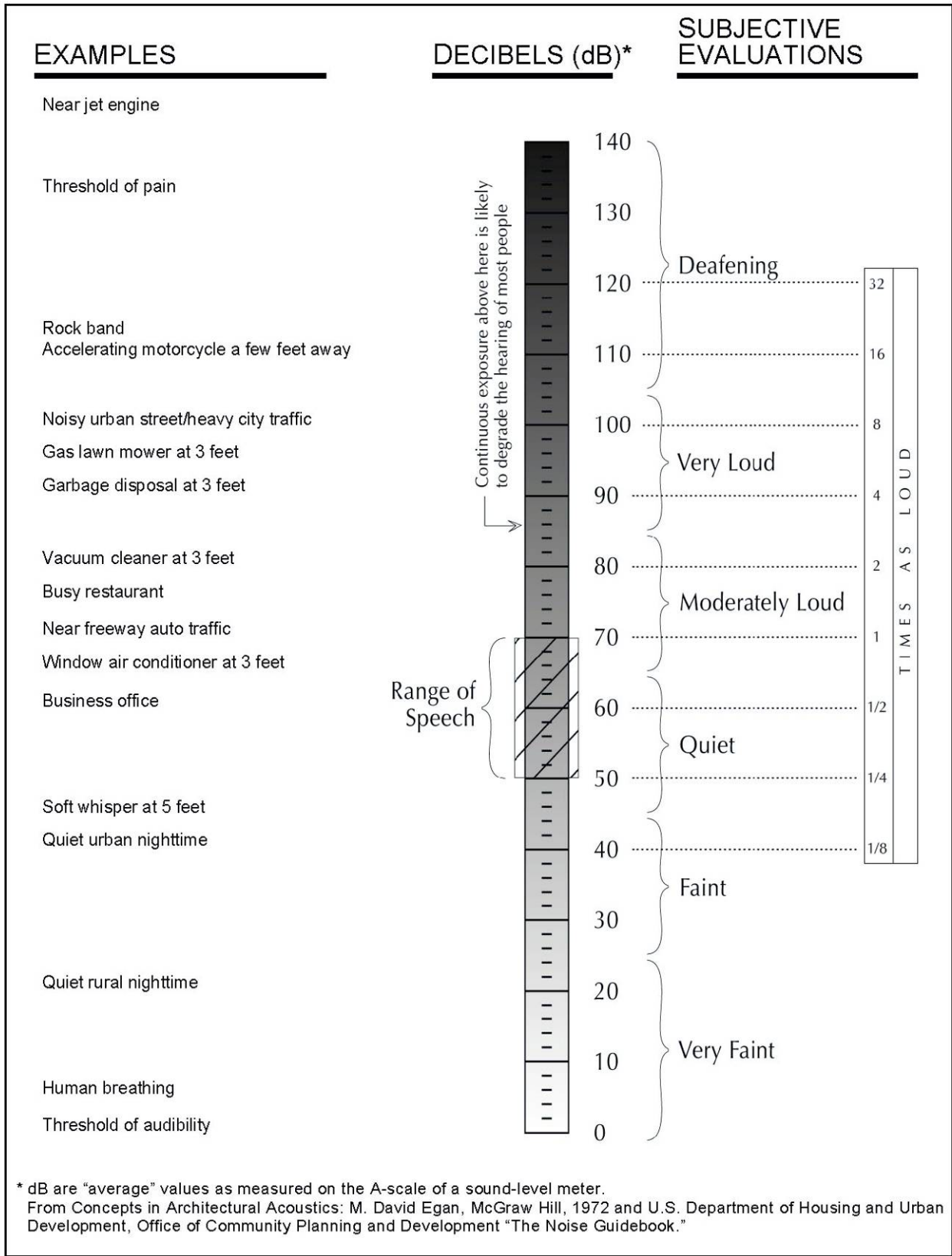
With respect to how humans perceive and react to changes in noise levels, a 1 dBA increase is imperceptible, a 3 dBA increase is barely perceptible, a 6 dBA increase is clearly noticeable, and a 10 dBA increase is subjectively perceived as approximately twice as loud (Egan 1988), as presented in Table 4.4-1. Table 4.4-1 was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dBA or more is typically considered significant and/or substantial in terms of the degradation of the existing noise environment.

Table 4.4-1 Subjective Reaction to Changes in Noise Levels of Similar Sources		
Change in Level, dBA	Subjective Reaction	Factor Change in Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0

Source: Egan 1988

Sound Propagation

As sound (noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, is dependent on surface characteristics, atmospheric conditions, and the presence of physical barriers. The inverse-square law describes the attenuation caused by the pattern in which sound travels from the source to receptor. Sound travels uniformly outward from a point source in a spherical pattern with an attenuation rate of 6 dBA per doubling of distance (dBA/DD). However, from a line source (e.g., a road), sound travels uniformly outward in a cylindrical pattern with an attenuation rate of 3 dBA/DD. The surface characteristics between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity may affect noise levels. Furthermore, the presence of a barrier between the source and the receptor may also attenuate noise levels. The actual amount of attenuation is dependent upon the size of the barrier and the frequency of the noise. A noise barrier may be any natural or human-made feature such as a hill, tree, building, wall, or berm (Caltrans 1998).



Source: EDAW 2007

Typical Noise Levels

Exhibit 4.4-1

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dBA with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30–40 dBA with its windows closed (Paul S. Veneklasen & Associates 1973, cited in Caltrans 2002).

Noise Descriptors

The selection of a proper noise descriptor for a specific source is dependent upon the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (Caltrans 1998, Lipscomb and Taylor 1978).

- ▶ L_{\max} (Maximum Noise Level): The maximum instantaneous noise level during a specific period of time. The L_{\max} may also be referred to as the “peak (noise) level.”
- ▶ L_{\min} (Minimum Noise Level): The minimum instantaneous noise level during a specific period of time.
- ▶ L_X (Statistical Descriptor): The noise level exceeded X% of a specific period of time.
- ▶ L_{eq} (Equivalent Noise Level): The energy mean (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq} . In noise environments determined by major noise events, such as aircraft overflights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high work levels.
- ▶ L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dBA “penalty” for noise events that occur during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. In other words, 10 dBA is “added” to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- ▶ CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA “penalty” added to noise events that occur during the noise-sensitive hours between 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn} .
- ▶ SENL (Single Event [Impulsive] Noise Level): The SENL describes a receiver’s cumulative noise exposure from a single impulsive noise event, which is defined as an acoustical event of short duration and involves a change in sound pressure above some reference value. SENLs typically represent the noise events used to calculate the L_{eq} , L_{dn} , and CNEL.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level L_{eq} , which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

Negative Effects of Noise on Humans

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 1998).

Vibration

Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of groundborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, groundborne vibrations may be described by amplitude and frequency.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS), as in RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (FTA 2006, Caltrans 2002).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006). This is based on a reference value of 1 micro (μ) in/sec.

The background vibration-velocity level in residential areas is usually approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

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 is rarely perceptible. 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. Construction activities can generate groundborne vibrations, which can pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2006).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, horizontal directional drilling, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 4.4-2 describes the general human response to different levels of groundborne vibration-velocity levels.

Table 4.4-2 Human Response to Different Levels of Groundborne Noise and Vibration	
Vibration-Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception.
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.
VdB = vibration decibels referenced to 1 micro-inch/second and based on the root mean square (RMS) velocity amplitude. Source: FTA 2006	

EXISTING NOISE ENVIRONMENT

Existing Land Uses in the Project Vicinity

As shown in Exhibit 3-2 (see Chapter 3, “Project Description”), the project site is currently vacant and undeveloped. Adjacent residential areas border the northeast and southeast sides of the project site. One-story single family homes to the southeast of the project site are shielded from the project site by an existing 6-foot to 9-foot high sound wall, with approximately 5 feet between the houses and the sound wall. Two-story single family homes to the northeast of the project site face the project site (i.e., front yards are closest to project site). Commercial developments are currently under construction west of the project site across Airport Way. Residential uses adjacent to the project site may be affected by increased project-related traffic noise on local area roadways and on-site project-related noise sources, as well as temporary noise due to construction of the project.

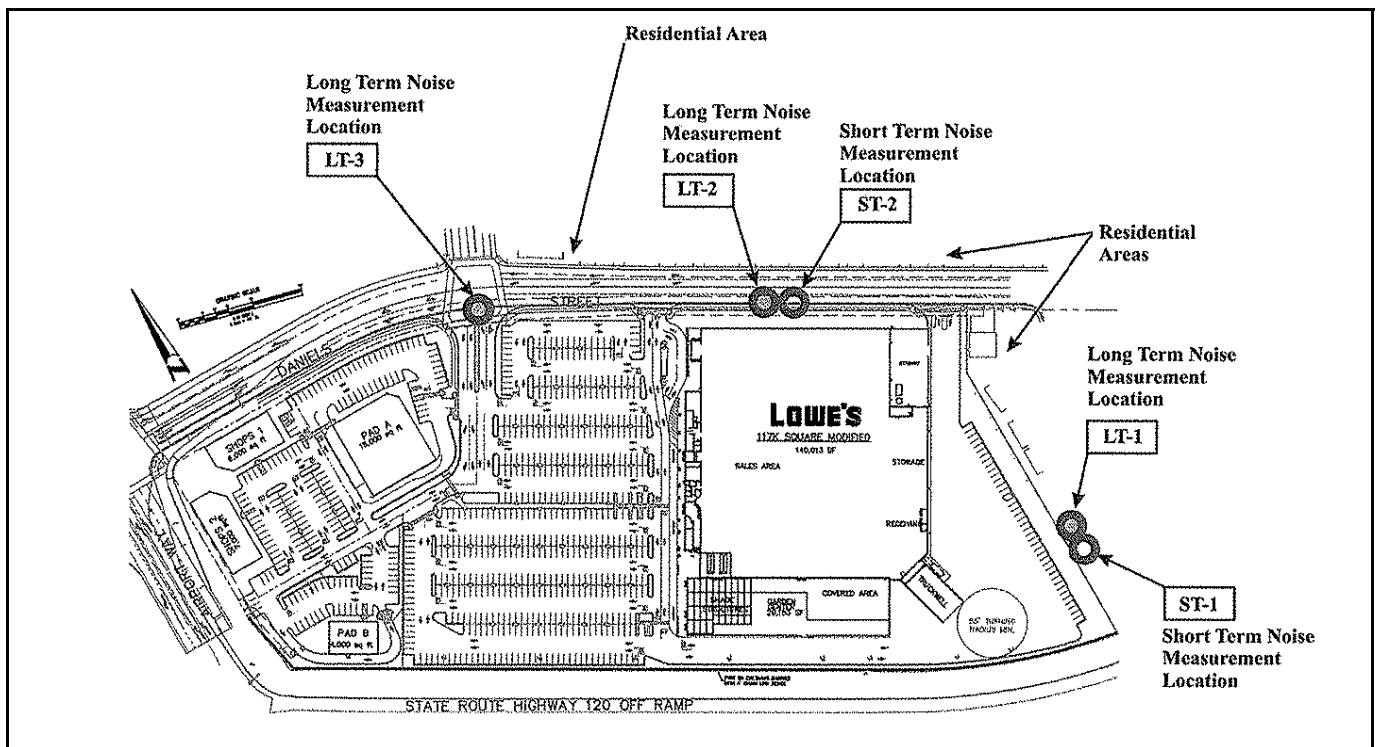
Existing Ambient Noise Environment in the Project Vicinity

The existing sound environment is primarily affected by vehicular traffic on State Route (SR) 120. To quantify the existing ambient noise environment in the project vicinity, ambient noise level measurement surveys were conducted at three locations in the project area January 18 through the 23, 2006. The noise survey measurement locations are shown in Exhibit 4.4-2 below.

Long-term (LT) noise levels at measurement locations, LT-1, 2 and 3 are summarized in Table 4.4-3, which includes the calculated L_{dn} sound levels from multi-day sound level measurements at each measurement location, and Table 4.4-4, which shows existing 24-hour L_{eq} sound levels. The L_{dn} values presented in Table 4.4-3 are based on the 24-hour L_{eq} data presented in Table 4.4-4, incorporating a 10 dBA “penalty” for noise levels measured during the noise-sensitive hours between 10:00 p.m. and 7:00 a.m. This weighting attempts to account for the fact that noise during this specific period of time has a higher potential to result in human disturbance with respect to normal sleeping hours.

As shown in Table 4.4-3, the 24-hour noise levels ranged from 62 to 71 L_{dn} at representative locations along the property line of the closest adjacent residences.

As shown in Exhibit 3-2 (see Chapter 3, “Project Description”), the proposed Lowe’s store would be located at the southeast corner of the intersection of Daniels Street and South Airport Way, which runs perpendicular to State Route 120, in Manteca, California. The proposed site is approximately 100 feet from the SR 120 off-ramp. The site borders the off ramp to South Airport Way. Access to customer parking would be from Daniels Street, which runs along the northeast side of the site. The proposed Lowe’s store would be located on the east side of the site. A recessed truck well would be located at the south corner of the building and a separate delivery drive lane would run along the southeast side of the building. Three smaller retail commercial buildings would be located northwest of the anchor store.



Source: Wilson, Ihrig & Associates, Inc. 2006 (as included in Appendix D)

Environmental Noise Survey Measurement Locations

Exhibit 4.4-2

**Table 4.4-3
Summary of Long-Term Sound Level Measurements (L_{dn} , dBA)**

Date/Day of Week	Location LT-1	Location LT-2	Location LT-3
Wednesday January 18	70	70	70
Thursday January 19	67	71	69
Friday January 20	68	70	71
Saturday January 21	65	67	68
Sunday January 22	62	65	67
Monday January 23*	--	69	68
Existing Typical L_{dn}	68	69	70

Note: *Monday, 23 January 2006 included a non-typical, local noise event in the 12:00 am – 1:00 pm period
 Source: Wilson, Ihrig & Associates, Inc. 2006 (as included in Appendix D)

Table 4.4-4 Existing Ambient Noise Levels (24-Hour L_{eq}, dBA)					
Date/Day of Week (12 a.m. – 12 p.m.)	Location LT-1	Location LT-2	Location LT-3	Location ST-1	Location ST-2
Wednesday January 18	64	67	66	--	--
Thursday January 19	61	64	64	--	--
Friday January 20	61	64	65	--	--
Saturday January 21	59	61	62	--	--
Wednesday January 18	58	62	64	--	--
Monday January 23*	--	63	64	--	--
Tuesday January 24	--	--	--	--	59
Tuesday January 24	--	--	--	59	--
Existing Typical L_{dn}	61	64	64	59	59
Typical L_{max}	--	--	--	67	77

Note: *Monday, 23 January 2006 included a non-typical, local noise event in the 12:00 am – 1:00 pm period
Source: Wilson, Ihrig & Associates, Inc. 2006 (as included in Appendix D)

4.4.2 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

The Federal Highway Administration (FHWA), Federal Aviation Administration (FAA), Federal Transit Administration (FTA), and the Department of Housing and Urban Development (HUD) provide standards for noise levels in relation to highway projects, aircraft standards, transit projects, and federally funded housing, respectively. None of these standards directly pertain to the proposed project.

However, FTA has set forth guidelines for maximum-acceptable vibration criteria for different types of land uses to address the human response to groundborne vibration (FTA 1995):

- ▶ 65 VdB (referenced to 1 $\mu\text{in}/\text{sec}$ and based on the RMS velocity amplitude) for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities);
- ▶ 80 VdB for residential uses and buildings where people normally sleep; and
- ▶ 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices).

Standards have also been established to address the potential for groundborne vibration to cause structural damage to buildings. These standards were developed by the Committee of Hearing, Bio Acoustics, and Bio Mechanics (CHABA) at the request of the U.S. Environmental Protection Agency (EPA) (FTA 2006). For fragile structures, CHABA recommends a maximum limit of 0.25 in/sec PPV (FTA 2006).

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. These regulate noise levels of motor vehicles and freeway noise affecting classrooms, set standards for sound transmission control and occupational noise control, and identify noise insulation standards. In addition, the Governor's Office of Planning and Research has developed the *State of California General Plan Guidelines*,

which includes land use compatibility guidelines for community noise environments to assist local agencies in their preparation of general plan noise elements (State of California 2003). None of these standards are directly relevant to this project.

With respect to vibration, the California Department of Transportation (Caltrans) recommends a threshold of 0.2 in/sec PPV for the protection of normal residential buildings and 0.08 in/sec PPV for the protection of old or historically significant structures (Caltrans 2002). These standards are more stringent than the federal standard established by CHABA, presented above.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

City of Manteca General Plan

The noise element of the City of Manteca (City) general plan (City of Manteca 2003) identifies goals, standards, and policies designed to ensure that City residents are not subjected to noise beyond acceptable levels. A general objective of the noise element is to protect existing noise-sensitive development (e.g., hospitals, schools, churches, and residences) from new uses that would generate noise levels incompatible with those uses and, conversely, discourage noise-sensitive uses from locating near sources of high noise levels. The noise element establishes noise criteria for determining land use compatibility for new land uses affected by transportation noise sources. The noise element also establishes maximum allowable noise performance standards for stationary noise sources. The City's general plan noise exposure and performance standards are summarized in Table 4.4-5.

Several goals, policies, and implementation measures contained in the City general plan noise element specifically address noise issues associated with proposed development projects and may be applicable to the proposed project.

- ▶ **Policy N-P-2:** New development or residential or other noise-sensitive land uses will not be permitted in noise-impacted areas unless effective mitigation measures are incorporated into the project design to satisfy the performance standards in Table 4.4-5 of this Draft EIR.
- ▶ **Policy N-P-3:** The City may permit the development of new noise-sensitive uses only where the noise level due to fixed (non-transportation) noise sources satisfies the noise level standards of Table 4.4-5 of this Draft EIR. Noise mitigation may be required to meet Table 4.4-5 performance standards.
- ▶ **Policy N-P-4:** The City shall require stationary noise sources proposed adjacent to noise sensitive uses to be mitigated so as to not exceed the noise level performance standards in Table 4.4-5 of this Draft EIR.
- ▶ **Policy N-P-5:** In accordance with Table 4.4-5 standards, the City shall regulate construction-related noise impacts on adjacent uses.
- ▶ **Policy N-P-6:** Where the development of residential or other noise-sensitive land use is proposed for a noise-impacted area, an acoustical analysis is required as part of the environmental review process so that noise mitigation may be considered in the project design. The acoustical analysis shall:
 - (a) Be the responsibility of the applicant.
 - (b) Be prepared by a qualified acoustical consultant experienced in the fields of environmental noise assessment and architectural acoustics.
 - (c) Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and the predominant noise sources.

- (d) Estimate existing and projected (20 years) noise levels in terms of the standards of Table 4.4-5, and compare those levels to the adopted policies of the noise element.
- (e) Recommend appropriate mitigation measures to achieve compliance with the adopted policies and standards of the noise element.
- (f) Estimate noise exposure after the prescribed mitigation measures have been implemented.
- (g) Describe a post project assessment program that could be used to monitor the effectiveness of the proposed mitigation measures.

Table 4.4-5 City of Manteca General Plan Maximum Allowable Noise Exposure and Performance Standards			
Mobile Noise Sources			
Land Use ⁴	Outdoor Activity Areas ^{1,2} (dBA L_{dn}/CNEL)	Interior Spaces (dBA)	
		L_{dn}/CNEL	L_{eq} ³
Residential	60 ²	45	--
Transient Lodging	60 ²	45	--
Hospitals, Nursing Homes	60 ²	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Music Halls	60 ²	--	40
Office Buildings	65	--	45
Schools, Libraries, Museums	--	--	45
Playgrounds, Neighborhood Parks	70	--	--
Stationary Noise Sources ^{5,6}			
Outdoor Activity Areas			
Noise Level Descriptor (dBA)	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)	
Hourly Equivalent Sound Level (L _{eq})	50	45	
Maximum Sound Level (L _{max})	70	65	
¹ Outdoor activity areas for residential development are considered to be backyard patios or decks of single family dwellings, and the patios, balconies or common areas where people generally congregate for multi-family developments. Outdoor activity areas for non-congregate, including pedestrian plazas, seating areas, and outside lunch facilities. Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.			
² In areas where it is not possible to reduce exterior noise levels to 60 dBA L _{dn} or below using a practical application of the best noise-reduction technology, an exterior noise level of up to 65 L _{dn} will be allowed.			
³ Determined for a typical worst-case hour during periods of use.			
⁴ Where a proposed use is not specifically listed on the table, the use shall comply with the noise exposure standards for the nearest similar use as determined by the City.			
⁵ Each of the noise level standards specified above shall be reduced by 5 dBA for simple noise tones, noises consisting primarily of speech or music, or recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints.			
⁶ No standards have been included for interior noise levels. Standard construction practices should, with the exterior noise levels identified, result in acceptable interior noise levels.			
Source: City of Manteca 2003			

- ▶ **Policy N-P-7:** Noise level criteria applied to land uses other than residential or other noise-sensitive uses shall be consistent with noise performance levels of Table 4.4-5 of this Draft EIR.
- ▶ **Policy N-P-12:** The City shall require new roadways to be mitigated so as to not exceed the noise levels specified in Table 4.4-5 of this Draft EIR. Widening or other improvement projects of existing roadways shall be mitigated to the most practical extent.
- ▶ **Implementation Measure N-I-1:** New development in residential areas with an actual or projected exterior noise level greater than 60 dB L_{dn} will be conditioned to use mitigation measures to reduce exterior noise levels to less than or equal to 60 dB L_{dn} .
- ▶ **Implementation Measure N-I-3:** In making a determination of impact under the California Environmental Quality Act (CEQA), a substantial increase will occur if ambient noise levels are increased by 10 dB or more. An increase from 5–10 dB may be substantial. Factors to be considered in determining the significance of increases from 5–10 dB include:
 - the resulting noise levels;
 - the duration and frequency of the noise;
 - the number of people affected;
 - the land use designation of the affected receptor sites;
 - public reactions or controversy as demonstrated at workshops or hearings, or by correspondence; and
 - prior CEQA determinations by other agencies specific to the project.
- ▶ **Implementation Measure N-I-4:** Control noise at the source through use of insulation, berms, building design and orientation, buffer space, staggered operating hours and other techniques. Use noise barriers to attenuate noise to acceptable levels.
- ▶ **Implementation Measure N-I-6:** Require an acoustical analysis where:
 - Noise sensitive land uses are proposed in areas exposed to existing or projected noise levels exceeding the levels specified in Table 4.4-5 of this Draft EIR.

City of Manteca Zoning Ordinance

The City's zoning ordinance (City of Manteca 2005) specifies that the sound pressure levels radiated by any use or facility shall not exceed the noise level values in Table 4.4-6. Normal household appliances and construction equipment operated between the hours of 7:00 a.m. to 7:00 p.m. are exempt from these standards. For the purposes of this analysis it is understood that these standards apply to noise generated by stationary or area sources of noise and do not apply to mobile noise sources.

The City's zoning ordinance also specifies vibration standards, which state that no vibration shall be produced which is transmitted through the ground and is discernible without the aid of instruments, nor shall any vibration produced exceed 0.002g peak at up to 50 cycles per second (CPS) frequency (117.75 VdB, based on a reference value of 1 μ in/sec) (City of Manteca 2005). Vibrations occurring at higher than 50 CPS frequency of a periodic vibration shall not induce accelerations exceeding 0.001g (111.74 VdB, based on a reference value of 1 μ in/sec). In addition, single impulse periodic vibrations occurring at an average interval greater than five minutes shall not induce accelerations exceeding 0.01g (131.74 VdB, based on a reference value of 1 μ in/sec).

**Table 4.4-6
City of Manteca Zoning Ordinance Noise Performance Standards**

Receiving Land Use Category	Time Period	Maximum Exterior Noise Level (hourly L_{eq} , dBA)
Single and Limited Multiple Family	10 p.m. to 7 a.m.	50
	7 a.m. to 10 p.m.	60
Multifamily residential, Public Institutional and Neighborhood Commercial	10 p.m. to 7 a.m.	55
	7 a.m. to 10 p.m.	60
Medium and Heavy Commercial	10 p.m. to 7 a.m.	60
	7 a.m. to 10 p.m.	65
Light industrial	Anytime	70
Heavy industrial	Anytime	75
Notes: The following corrections are applicable (apply only one correction): Daytime Operation Only (7 a.m. – 7 p.m.): +5 decibels Noise Source Operates Less Than: 20% of any one-hour period: +5 decibels 5% of any one-hour period: +10 decibels 1% of any one-hour period: +15 decibels Noise of Impulsive Character (e.g., hammering): -5 decibels Noise Rising or Falling in Pitch or Volume (e.g., hum, screech): -5 decibels Source: City of Manteca 2005		

4.4.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

To assess potential construction, stationary, and area source noise impacts, noise-sensitive receptors and their relative exposure were identified. Noise levels of specific equipment anticipated to be used in project construction or operation were determined and resultant noise levels at sensitive receptors were modeled assuming a noise attenuation rate of 6 dBA/DD. This analysis is based on a preliminary analysis conducted by Wilson, Ihrig and Associates (Wilson, Ihrig and Associates, Inc. 2006).

The FHWA Traffic Noise Model (FHWA 1988) was used to model traffic noise levels along affected roadways, based on the trip distribution estimates obtained from the traffic analysis prepared for this project (Fehr & Peers, 2007). The project's contribution to the baseline traffic noise levels along area roadways was determined by comparing the predicted noise levels at 50 feet from the centerline of the near travel lane with and without project-generated traffic. Predicted traffic noise levels at particular sensitive receptors were calculated assuming a noise reduction of 4.5 dBA/DD from the roadway (i.e., the centerline of the near traffic lane). The thresholds of significance applied in this analysis primarily address the exterior noise standards established by the City of Manteca. Unless otherwise stated, an exceedance of interior noise level standards would not occur if exterior noise standards are achieved because of sufficient exterior-to-interior noise reduction of common buildings. When analyzing project-generated noise with respect to the City of Manteca Zoning Ordinance Noise Performance Standards (Table 4.4-6), these standards are applied at the property line of the noise-receiving land use.

Groundborne vibration impacts were quantitatively assessed based on existing documentation (e.g., vibration levels produced by specific construction equipment) and the distance of sensitive receptors from the given vibration source. Attenuation of groundborne vibration levels at receptors were calculated according to formulas and methodologies established by the Federal Transit Administration (FTA 2006).

For the analysis of truck delivery noise in the loading dock area, the +10 dBA correction is applied to the City of Manteca Zoning Ordinance Noise Performance Standards (Table 4.4-6) pursuant to guidance from the City of Manteca Community Development Department staff (Gore, pers. comm., 2006) based on the assumption that on-site truck activity would occur no more than 5% of any one-hour period. For the analysis of on-site stationary and area noise sources it is estimated that the 6-foot high masonry wall located across from the southeast side of the project site would provide 5 dBA noise reduction at the back yards of the residences located on Laurel Park Circle. This reduction amount is the minimum reduction expected for instances when the top of the barrier is just high enough to “graze” the direct noise path between the noise source and affected receptor (Caltrans 2002).

Noise levels generated by the turnover of vehicles in the store parking lots were estimated according to methodologies established by the FTA (FTA 2006), which is based on the hourly turnover of vehicles during daytime and nighttime hours and assumes a reference SENL of 92 dBA at 50 feet.

THRESHOLDS OF SIGNIFICANCE

The following thresholds of significance, as identified in Appendix G of the State CEQA Guidelines were used to determine whether implementation of the proposed project would result in significant noise impacts. The project would result in a significant noise impact if it would:

- ▶ Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies,
 - **Land Use Compatibility Impacts.** Because the proposed land use is not considered a noise-sensitive receptor and the City has no noise exposure standards for commercial or retail land uses (Table 4.4-5), noise exposure on the site is not analyzed further in this Draft EIR.
- ▶ Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project,
 - **Short-Term Construction Noise Impacts.** Short-term construction noise impacts would be significant if construction-generated noise levels exceed the City of Manteca General Plan Maximum Allowable Noise Exposure and Performance Standards for exposure from stationary sources in outdoor activity areas (Table 4.4-5) pursuant to general plan Policy N-P-5, and/or exceed the City of Manteca Zoning Ordinance Noise Performance Standards, and/or result in a substantial increase in ambient noise levels at nearby noise-sensitive land uses pursuant to general plan Implementation Measure N-I-3 (i.e., 5 dBA or greater) during the more noise-sensitive early morning, evening and nighttime periods of the day (i.e., outside the hours considered exempt by the City [i.e., 7:00 a.m. to 7:00 p.m., daily]).
- ▶ Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project,
 - **Traffic Noise Impacts.** Long-term traffic noise impacts would be significant if traffic generated by implementation of the proposed project would increase the average daily noise levels by more than 5 dBA (City of Manteca General plan Implementation Measure N-I-3) and/or cause the overall exterior noise level to exceed the applicable $L_{dn}/CNEL$ noise exposure standard established by the City of Manteca general plan (Table 4.4-5) at noise-sensitive receptors (e.g., 60 dBA $L_{dn}/CNEL$ for the back yards of residential land uses). Where existing traffic noise levels are higher than the applicable $L_{dn}/CNEL$ noise exposure standard established by the City of Manteca general plan (Table 4.4-5), any noticeable (i.e., 3 dBA $L_{dn}/CNEL$ or greater [Egan 1988]) increase in noise levels is considered significant. If, and only if, a practical application of the best available noise-reduction technology cannot achieve the 60 dBA $L_{dn}/CNEL$ standard, then an exterior noise level of 65 dBA $L_{dn}/CNEL$ may be allowed in outdoor activity areas (Table 4.4-5, note 2). For all affected residential land uses, long-term traffic noise impacts would be

significant if traffic noise generated by implementation of the proposed project would exceed 45 dBA L_{dn} /CNEL in any habitable rooms (pursuant to Title 24 of the CCR).

- **Stationary and Area Noise Impacts.** Long-term stationary- and area-noise impacts would be significant if noise generated by on-site stationary- and area-sources associated with project operations exceeds the City of Manteca general plan Maximum Allowable Noise Exposure and Performance Standards, (Table 4.4-5) as applied at nearby sensitive receptors; or if on-site stationary- and area-source noise exceeds the City of Manteca Zoning Ordinance Noise Performance Standards (Table 4.4-6). These include a daytime hourly L_{eq} of 50 dBA and 70 dBA L_{max} , and a nighttime hourly L_{eq} of 45 dBA and 65 dBA L_{max} . For all affected residential land uses, noise generated by on-site stationary- and area-sources would be significant if it exceeds 45 dBA L_{dn} /CNEL in any habitable rooms (pursuant to Title 24 of the CCR).
- ▶ Expose persons to or generation of excessive groundborne vibration or groundborne noise levels.
- **Vibration Impacts.** Vibration impacts would be significant if levels exceed Caltrans recommended standard of 0.2 in/sec ppv with respect to the prevention of structural damage for normal buildings, and/or the FTA maximum acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance) at nearby vibration-sensitive land uses, and/or the City's zoning ordinance standards of 111.74 VdB for periodic vibrations or 131.74 VdB for single impulse periodic vibrations occurring at an average interval greater than five minutes.

The project area is not located within the 60 dBA CNEL noise contour zones of any nearby airports or railways (City of Manteca General Plan 2003). Consequently, the impacts of aircraft or railroad noise are not addressed further in this Draft EIR.

IMPACT ANALYSIS

IMPACT 4.4-1 **Noise — Short-Term Construction Noise.** *Short-term construction-generated noise levels could exceed the City of Manteca General Plan Maximum Allowable Noise Exposure and Performance Standards for stationary sources (Table 4.4-5), the City of Manteca Zoning Ordinance Noise Performance Standards (Table 4.4-6), or result in a noticeable increase (i.e., increase of 3 dBA or more) in ambient noise levels at existing nearby off-site sensitive land uses. This would be a significant impact.*

Construction activities at the project site would include site preparation (e.g., clearing, grading, and excavation), trenching, laying of concrete foundations, paving, frame erection, equipment installation, finishing, cleanup, and other miscellaneous activities. No demolition, pile driving, or rock blasting would occur as part of project construction.

The on-site equipment required is not known at this time but, based on similar projects, would be anticipated to include excavators, graders, loaders, haul trucks, and cranes. According to the EPA, the noise levels of primary concern are typically associated with the site preparation phase because of the on-site equipment associated with clearing, grading, and excavation. Depending on the operations conducted, individual equipment noise levels can range from 79 to 91 dBA at 50 feet, as indicated in Table 4.4-7.

The simultaneous operation of the on-site heavy-duty equipment associated with the project, as identified above, could result in combined intermittent noise levels of approximately 94 dBA at 50 feet from the project site. This value is conservative because it assumes the concurrent operation of all the equipment in close proximity to each other. Based on these equipment noise levels and assuming a noise attenuation rate of 6 dBA/DD from the source and no intervening barriers, exterior noise levels at sensitive receptors located within approximately 2,500 feet of the project site could exceed 60 dBA without feasible noise controls or intervening barriers. At the back yards of homes located on Laurel Park Circle, which are approximately 50 feet from the southeast side of the project site,

it is assumed that approximately 5 dBA noise reduction would be provided by the 6-foot high masonry wall. Thus, these receptors would be exposed to construction noise levels of approximately 89 dBA, without mitigation. Because of the protection provided by this existing wall, the 60 dBA construction noise contour would extend approximately 1,400 feet in this direction assuming no other intervening buildings or barriers.

**Table 4.4-7
Typical Construction Equipment Noise Levels**

Type of Equipment	Noise Level in dBA at 50 feet	
	Without Feasible Noise Control	With Feasible Noise Control ¹
Dozer or Tractor	80	75
Excavator	88	80
Compactor	82	75
Front-end Loader	79	75
Backhoe	85	75
Grader	85	75
Crane	83	75
Generator	78	75
Truck	91	75

¹ Feasible noise control includes the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturer's specifications.
Sources: U.S. Environmental Protection Agency 1971; Federal Transit Administration 2006

Noise from construction activities between the hours of 7 a.m. to 7 p.m. is exempt from the provisions of the Manteca Noise Ordinance. However, if construction operations were to occur during the noise-sensitive hours outside of these hours, the applicable noise standards could be exceeded at residential land uses near the proposed project. Thus, if construction activities are not limited to the hours exempt by the Manteca Noise Ordinance, the temporary construction noise generated by on-site could expose off-site sensitive receptors to, or generate noise levels in excess of, the applicable noise standards and/or result in a noticeable increase in ambient noise levels at noise-sensitive receptors. This would be a **significant** impact.

IMPACT 4.4-2 Noise — Long-Term Operational Traffic Noise Impacts. *Project implementation would not generate traffic noise levels at nearby noise-sensitive receptors that exceed the City's standards. This impact is considered less than significant.*

Operation of the proposed project is expected to result in approximately 8,164 trips per day (Fehr & Peers 2007). These trips would be distributed over the local street network and would affect roadside noise levels.

The FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) was used to calculate traffic noise levels along affected roadways for baseline traffic conditions on the opening day of the project in 2008, with and without operation of the project, based on the trip distribution estimates used in Section 4.11, "Transportation and Circulation," of this Draft EIR. The proposed project's contribution to the existing traffic noise levels along area roadways was determined by comparing predicted baseline roadside noise levels with and without additional traffic that would result directly from operation of the proposed project. Input data used in the model included average daily traffic levels for nearby area roadways, fleet mixes (percentages of automobiles, medium-duty trucks, and heavy-duty trucks during daytime, evening, and nighttime hours), vehicle speeds, ground attenuation factors, and roadway widths. Table 4.4-8 summarizes the modeled noise levels and resultant increases in traffic noise levels attributable to the project for roadway segments located in the vicinity of the project site. The noise levels shown in Table 4.4-8 indicate conditions at 50 feet from the centerline of the near travel lane of affected

roadway segments. Modeled traffic noise levels were calculated assuming a noise reduction of approximately 4.5 dBA per doubling of distance from the roadway segment.

Table 4.4-8 Summary of Modeled Traffic Noise Levels			
Roadway Segment	Noise Level [L_{dn} /CNEL (dBA)] at 50 Feet From Centerline of Near Travel Lane		
	Existing	Existing Plus Project	Net Change
Airport Way – SR 120 to Daniels Street	69.8	70.1	+0.3
Airport Way – Daniels Street to Wawona Street	69.0	69.2	+0.2
Airport Way – SR 120 EB to SR 120 WB	68.6	69.5	+0.9
Daniels Street – Airport Way to Fishback Road	62.3	67.3	+5.1
Daniels Street – Fishback Road to Junction Drive	60.3	63.8	+3.5
Daniels Street – Junction Drive to Winters Drive	59.6	62.8	+3.2
Daniels Street – Winters Drive to Union Drive	60.2	62.9	+2.7

Note: Traffic noise levels were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) based on traffic information (e.g., average daily traffic, vehicle speeds, roadway width) obtained from the data prepared for this project. Modeling assumes no natural or human-made shielding (e.g., vegetation, berms, walls, buildings).
See Appendix D, "Noise Modeling Analysis," for traffic noise modeling input and output.
Source: Data modeled by EDAW 2007

As shown in Table 4.4-8, residences along Daniels Street would experience the largest increase in traffic-generated noise levels from implementation of the proposed project. The largest increase, 5.1 dBA, would occur along the segment of Daniels Street between Airport Way and Fishback Road; however, there are no residences or other sensitive receptors located along this roadway segment. Residents are located along the other modeled segments of Daniels Street. The segment between Fishback Road and Junction Drive would increase from 60.3 to 63.8 dBA CNEL and the segment between Junction Drive and Winters Drive would increase from 59.6 to 62.8 dBA CNEL at a distance of 50 feet from the centerline of the near travel lane. Both the existing and resultant traffic noise levels would be lower in the back yards of these single family homes along these segments of Daniels Street due to attenuation provided by the row of houses themselves. Typically, a row of buildings that are packed "tightly" (i.e., covering about 65-90% of the area), such as the row of homes along Daniels Street, provides a minimum of approximately 5 dBA of attenuation (Caltrans 1998). Thus, the traffic noise level in the backyards of homes along Daniels Street between Fishback Road and Junction Drive would increase from 55.3 to 58.8 dBA CNEL due to project-generated traffic. Similarly, the traffic noise level in the backyards of homes along Daniels Street between Junction Drive and Winters Drive would increase from 54.6 to 57.8 dBA CNEL due to project-generated traffic. Less protection is provided by the homes located along the segment of Daniels Street between Winters Drive and Union Drive because they are spaced out more and, therefore, can only be reasonably assumed to provide 3 dBA noise reduction (Caltrans 1998). Thus, the noise level at the back yards of homes along this road segment would increase from 57.2 to 59.9 dBA CNEL due to project-generated traffic. Pursuant to Implementation Measure N-I-3 of the City's general plan, these increases are not considered significant impacts because they do not exceed 5 dBA at the backyards of the single family homes. Therefore, project-generated traffic would not result in an exceedance of the City's 60 dBA L_{dn} /CNEL threshold for the backyard areas of single family homes. The traffic noise increase along all other modeled roadway segments would not be noticeable (i.e., less than 3 dBA).

Because the noise reduction from common residential building construction typically provides an exterior-to-interior reduction of 25–30 dBA (Veneklasen 1973, cited in Caltrans 2002), interior noise levels are not expected to result in the exceedance of the interior noise standard of 45 dBA L_{dn} /CNEL at any nearby homes. Thus, the interior noise standard could be exceeded only if exterior noise levels exceeded 70 dBA L_{dn} /CNEL. According to

the modeling results shown in Table 4.4-8, the project would not cause noise to exceed 70 dBA $L_{dn}/CNEL$. As a result, traffic noise generated by the project would be **less than significant**.

IMPACT 4.4-3 **Noise — Stationary- and Area-Source Noise Levels.** *Long-term operational noise levels associated with proposed facility operations would vary throughout the day. Lowe's operations and equipment such as delivery truck operations, forklifts, roof-mounted mechanical building equipment, and an emergency generator would potentially exceed noise ordinance standards at nearby residences. Consequently, the project's long-term operational noise impact would be considered a **significant** impact.*

With respect to stationary-source and area-source noises, the proposed project would include on-site truck activity, forklifts, a trash compactor, rooftop mechanical units, parking lot activity, and a backup emergency power generator. Noise levels typically attributable to these sources and resultant noise exposure levels at nearby existing noise-sensitive land uses are discussed separately below:

Delivery Truck Operations: Noise sources associated with on-site operational truck activity would include tractor trailers driving to and from the truckwell, back-up alarms, the revving of engines during acceleration, and compression brakes. Short-term sound level measurements of these activities were collected at a distribution center in southern California in August 2006, and are summarized in Table 4.4-9. These short-term noise level measurements were collected in accordance with the American National Standards Institute (ANSI) acoustic standards at multiple locations using a Larson Davis model 824 sound level meter.

Activity/Noise Source	L_{max} (dBA) at 50 feet (range) ¹
Voices of workers or truck drivers	57.2 – 59.2
Idling semi-truck	63.9 – 64.6
Truck with trailer passing at approx. 5 mph	64.6
Truck with trailer passing at approx. 10 mph	66.4 – 68.4
Compression brakes of truck in fuel shed	78.2
Truck coupling with trailer	79.5
Truck revving engine, pulling away from stop	69.0 – 80.4
Acceleration of truck without trailer passing at approx. 10 mph	84.6
Truck compression brakes	74.4 – 86.1
Back-up alarm and engine acceleration of truck	76.3 – 86.2

Notes: The durations of all measurements was less than 10 seconds. Because sound level measurements were collected at varying distances from the measured noise source, all measurements have been adjusted to a distance of 50 feet. A range of sound levels is shown when the sound level of a particular activity type was measured more than once.

Sources: Data collected by EDAW on August 7 and 8, 2006.

The type of on-site truck activity that would occur closest to off-site receptors would be the passing of trucks along the southeast side of the proposed Lowe's store between the entrance near the east corner of the site and the truckwell. These truck passes would occur approximately 50 feet from the back yards of homes located on Laurel Park Circle. As shown in Table 4.4-9, trucks passing at slow speeds generate noise levels as high as 68.4 dBA L_{max} at 50 feet. Assuming the 6-foot high masonry wall located along the property line of these homes would provide an additional 5 dBA of attenuation because it would be high enough to block the direct path of most truck noise, the resulting maximum noise level would be approximately 63.4 dBA L_{max} . This would not exceed the L_{max} standards of the City's general plan or City's Zoning Ordinance L_1 standards.

The two loudest truck-related noise sources presented in Table 4.4-9 are the truck compression brakes, as loud as 86.1 dBA L_{max} , and the simultaneous sounds of a back-up alarm and engine acceleration when a truck accelerates in reverse, which reaches 86.2 dBA L_{max} (from a distance of 50 feet). Back-up alarms automatically deploy when the trucks operate in reverse gear. Most truck activity would occur in the truckwell and nearby turning area and the closest off-site sensitive receptors to this area would also be the homes on Laurel Park Circle which would be as close as 150 feet. Through distance alone these maximum noise levels would attenuate to approximately 76.7 dBA L_{max} at the closest backyard. Some additional attenuation would be provided by the approximately 6-foot high masonry wall located along the property line of these homes. Assuming this wall would provide an additional 5 dBA of attenuation, the resulting maximum noise level would be approximately 71.7 dBA L_{max} . This would exceed the L_{max} standards of the City's general plan of 70 dBA L_{max} (daytime) and 65 dBA L_{max} (nighttime), as well as the City's Zoning Ordinance standards of 65 dBA L_1 during nighttime hours. As a result, this would be a **significant** impact.

Trucks en route to the loading dock are estimated to produce a SENL of approximately 80 dBA at a distance of 50 feet. At the nearest residential properties to the southeast (approximately 200 feet away), unmitigated SENL and L_{max} values associated with truck events on the project site were predicted to be approximately 68 dBA assuming a noise attenuation rate of 6 dBA/DD and no intervening barriers. The homes located southeast of the project site would have an additional 5 dBA of protection from the existing 6-foot high masonry wall and, therefore, would be exposed to sound level of 63 dBA. This impact is **significant**.

Forklifts: Forklift activity would consist of the loading and unloading of trucks at the truckwell near the south corner of the proposed Lowe's store. Forklifts generate a noise level of 93 dBA L_{eq} at the operator's ear (Dranitsaris 1982, as cited in Berger, Neitzel, and Kladden 2006), which is conservatively assumed to be a distance of 3 feet. Through distance alone, this noise level would attenuate to 56.5 dBA L_{eq} at the backyards of the nearest home located approximately 200 feet away. Some additional attenuation would be provided by the walls of the truck well and the approximate 6-foot high masonry wall located along the property line of these homes. Assuming both barriers would each provide an additional 5 dBA of attenuation because they break the line of site from the forklift area to the receptors, the resulting noise level would be approximately 46.5 dBA L_{eq} . This would not exceed the City's general plan standard of 50 dBA L_{eq} during daytime hours for exposure of outdoor activity areas by stationary-source noise; however, the comparable nighttime standard of 45 dBA L_{eq} could be exceeded between the hours of 10 p.m. and 7 a.m. This would be considered a **significant** impact. However, for safety reasons forklifts typically don't operate in close proximity to moving trucks so an even higher additive sound level generated by the simultaneous operation of trucks and forklifts is not anticipated.

Trash Compactor: The project would include a trash compactor located near the truck loading area. The hydraulic drive mechanisms on typical trash compactors generate a noise level of 70 dBA SENL at a distance of 10 feet (Peterson 1980). Assuming a noise attenuation rate of 6 dBA/DD, trash compactor noise would attenuate to 44 dBA SENL at the nearest residential receptors located 200 feet away on the southeast side of the project site (through distance alone). An additional 5 dBA of attenuation would also be provided for receptors located behind the existing 6-foot high masonry wall located along the southeast side of the project site. The resultant noise levels, with or without the intervening wall, would be below the daytime standard of 70 dBA L_{max} and nighttime standard of 65 dBA L_{max} of the City's general plan (Table 4.4-5) as well as the City's Zoning Ordinance Noise Performance Standards of 75 dBA L_1 (daytime) and 65 dBA L_1 (nighttime) (Table 4.4-6). As a result, trash compactor noise would be a **less-than significant** impact.

Mechanical Building Equipment: Mechanical building equipment (e.g., heating, ventilation, and air conditioning systems) would be mounted on the roofs of the proposed store buildings and therefore have a direct line of site over the existing masonry wall to some existing off-site receptors. Mechanical building equipment could generate noise levels of 90 dBA at 3 feet from the source (EPA 1971). Assuming a noise attenuation rate of 6 dBA/DD and no intervening barriers, mechanical building equipment noise would attenuate to the City's more stringent nighttime hourly L_{eq} standard of 45 dBA at distance of 550 feet. Thus, if mechanical building were

mounted on portions of the roof (i.e., the northeast and southeast sides), without any shielding or enclosures and that are closer than 550 feet to off-site residences, it could expose nearby off-site receptors to noise levels that exceed the City's 60 dBA L_{dn} /CNEL standard for stationary sources (Table 4.4-5). This would be considered a **significant** impact.

Parking Lot Activity: The project would include approximately 580 parking spaces to serve the Lowe's store and other commercial uses. Noise levels generated by the turnover of vehicles in the store parking lots were estimated according to methodologies established by the FTA (FTA 2006), which is based on the hourly turnover of vehicles during daytime and nighttime hours and assumes a reference SENL of 92 dBA at 50 feet. Assuming a maximum hourly daytime (7 a.m. to 10 p.m.) turnover volume of approximately 580 vehicles per hour either entering or exiting the parking lot and an hourly nighttime (10 p.m. to 7 a.m.) turnover volume of approximately 290 vehicles per hour, and no intervening noise barriers, predicted peak-hour average noise levels attributable to parking lot activities would be approximately 54.0 dBA L_{eq} during daytime hours, 51.0 dBA L_{eq} during nighttime hours and daily L_{dn} /CNEL levels of 58.0 dBA at distance of 50 feet (see Appendix D of this Draft EIR for modeling results). Most of this activity would occur near the entrance by the intersection of Fishback Road and Daniels Street, and by the front doors of the store. These locations are more than 100 feet from the nearest off-site receptors, the homes along the northeast side of Daniels Street. At this distance parking lot noise levels would be 48.0 dBA L_{eq} during daytime hours, 45.0 dBA L_{eq} during nighttime hours, and 52.0 dBA L_{dn} /CNEL. These resultant noise levels do not exceed the general plan thresholds of 50 dBA L_{eq} during daytime hours, 45 dBA L_{eq} during nighttime hours, or 60 dBA L_{dn} /CNEL for residential land uses, respectively. As a result, this impact is considered **less than significant**.

Emergency Generator: A 350 kilo Watt (kW) emergency generator would be located at the east corner of the project site. In addition to providing a backup source of power during power shortages, the generator would be tested approximately once per week, for a duration of up to 60 minutes during each test. The noise level of an existing emergency generator at another Lowe's store was measured at 84 dBA L_{eq} at 40 feet (Wilson, Ihrig & Associates, Inc., 2006). This noise level would attenuate through distance alone to 76 dBA L_{eq} at the closest off-site residence located 100 feet away. Though some additional attenuation would be provided by the existing 6-foot-high masonry wall located along the property line of the homes along Laurel Park Circle, the resultant noise level at these residential receptors would exceed the daytime hourly L_{eq} standard of 50 dBA and the nighttime hourly L_{eq} standard of 45 dBA established by the City of Manteca general plan (Table 4.4-5). This would be a **significant** impact.

Summary: Noise levels generated by on-site truck activity, forklift activity, mechanical building equipment, and testing of the backup emergency generator could expose nearby sensitive receptors to noise levels that exceed the City's applicable standards. In addition, these activities result in increased levels of disturbance and sleep disruption to occupants of nearby residential dwellings, particularly during the more noise-sensitive evening and nighttime hours. Furthermore, there may be times when these various on-site stationary sources generate noise simultaneously and generate even greater noise levels at off-site receptors. Thus, stationary-source noise levels associated with the operation of the proposed project would be considered a **significant** impact.

IMPACT 4.4-4 **Noise — Ground Vibration Levels.** *Short-term -construction-generated ground vibration levels would not exceed Caltrans' recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or the FTA's maximum acceptable vibration standard or 80 VdB with respect to human response for residential uses (i.e., annoyance) at vibration-sensitive land uses. This impact would be less than significant.*

The long-term operation of the proposed project would not include any major sources of vibration. However, construction activities have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and operations involved. Vibration generated by

construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Table 4.4-10 displays vibration levels for typical construction equipment.

Table 4.4-10 Typical Construction Equipment Vibration Levels			
Equipment		PPV at 25 feet (in/sec) ¹	Approximate Lv (VdB) at 25 feet ²
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Trucks		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58
¹ Where PPV is the peak particle velocity ² Where Lv is the velocity level in decibels (VdB) and based on the root mean square (RMS) velocity amplitude. Source: Federal Transit Administration 2006			

As mentioned above, on-site construction equipment could include an excavator, front-end loader, rubber tired backhoe, grader, compactor, paving equipment, generator, and trucks, based on similar projects. No demolition, pile driving, or rock blasting is planned as part of project construction. As shown in Table 4.4-10, vibration levels associated with project construction could be as high as 87 VdB (0.089 in/sec PPV) at a distance of 25 feet (from large bulldozers). Applying attenuation rates estimated according FTA-recommended methodology, construction-generated ground vibration would attenuate to 78.0 VdB (0.031 in/sec PPV) at a distance of 50 feet. These levels are less than the Caltrans-recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings, the FTA maximum acceptable vibration standard of 80 VdB with respect to human response for residential uses (i.e., annoyance), and the City’s zoning ordinance standards of 111.74 VdB for periodic vibrations. Because there are no off-site residential receptors located within 50 feet of the project site, this impact is considered **less than significant**.

4.4.4 MITIGATION MEASURES

No mitigation measures are required for the following less-than-significant impacts:

Impact 4.4-2: Long-Term Operational Traffic Noise Impacts.

Impact 4.4-4: Ground Vibration Levels.

The following mitigation measures are provided for significant impacts:

Mitigation Measure 4.4-1: Short-Term Construction Noise

- a. All outdoor operation of construction equipment shall be limited to the hours from 7:00 a.m. to 7:00 p.m. daily.
- b. Construction equipment staging areas shall be set back from nearby off-site sensitive receptors, including the housing northeast and southeast of the project site.

- c. All construction equipment shall be properly maintained and equipped with noise control, such as mufflers, in accordance with manufacturers' specifications.

Mitigation Measure 4.4-3: Stationary- and Area-Source Noise Levels

- a. The applicant shall incorporate operational measures that prevent noise generated by on-site truck and forklift activity from exceeding the maximum allowable noise exposure standards of the City's general plan of 70 dBA L_{max} during daytime hours, and 65 dBA L_{max} during nighttime hours in the outdoor activity areas of nearby residents (Table 4.4-5). The following operational measures shall be implemented:
 - 1. Limit on-site truck activity and/or fork lift activity, including the ingress, egress, idling, and waiting of trucks at the site to the daytime hours of 7 a.m. to 10 p.m., or, outside of the hours between 7 a.m. and 10 p.m., require trucks to enter, exit, idle, and wait at on-site locations where no off-site receptors would be exposed to noise exceeding City standards, as calculated by an acoustical engineer. This may involve requiring trucks to enter and exit at the two entrances west of the proposed Lowe's store building and wait in or near the customer parking area west of the proposed Lowe's building
 - 2. Only operate forklifts that generate noise levels less than 66 dBA at a distance of 50 feet. This can be achieved by selecting a fork lift model based on the noise level data included in the manufacturer's specifications, choosing a low-noise electric-powered forklift, and/or with the installation of additional shrouds or mufflers.
- b. In addition, the applicant shall incorporate design measures to reduce exposure of off-site residences to noise generated by on-site truck and forklift activity to levels that are below City standards, as calculated by an acoustical engineer. These design measures may include, but are not limited to, the following:
 - 1. Construction of a wall, berm, or combination thereof along the southeast side of the site to provide additional attenuation to off-site noise-sensitive receptors. The barrier shall be constructed of solid material (e.g., brick, block, adobe, earth) and be of sufficient height to, at a minimum, block the line of site from the loading dock area to the ground floor of the residences located to the southeast. The barrier shall blend into the overall landscape and have an aesthetically pleasing appearance that agrees with the color and character of the area and not become the dominant visual element of the community.
 - 2. Construction of a taller sound wall, up to 8 feet in height, at the location of the existing 6-foot-high masonry wall located along the property line of the affected homes on Laurel Park Circle. This wall shall be constructed of solid material (e.g., brick, block, adobe) and be of sufficient height to, at a minimum, block the line of site from the loading dock area to the ground floor of the residences located to the southeast. This barrier shall blend into the overall landscape and have an aesthetically pleasing appearance that agrees with the color and character of the nearby homes and not become the dominant visual element of the community.
 - 3. Relocation of the truckwell and truck turning area to a location located further from the closest off-site noise-sensitive receptors. One such location would be the area between the west corner of the proposed Lowe's store and the SR 120 off ramp.
 - 4. In combination with the existing 6-foot-high masonry wall located along the property line of the homes on Laurel Park Circle, the selected measures shall provide a total of at least 6.7 dBA reduction in truck and forklift noise at the backyards of the affected homes. This would be enough attenuation to reduce noise generated by on-site loading activity to less than the 70 dBA L_{max} standard established in the City's general plan for daytime hours. In addition, prohibiting on-site truck activity and operations at the loading dock during the more noise-sensitive hours of the day would prevent the generation of noise levels that exceed the 65 dBA L_{max} standard established in the City's general plan for nighttime hours. Funding for the implementation of the selected mitigation measures shall be wholly provided by the project applicant.

Where there is a question regarding the noise levels before and after mitigation is implemented in a particular area, site-specific noise studies/modeling shall be conducted to determine compliance or noncompliance with standards.

- c. Mechanical equipment (e.g., heating, ventilation, and air conditioning equipment) shall be located at the farthest distance from and/or be enclosed or shielded from nearby existing noise-sensitive receptors to the extent that their sound levels are below City standards, as calculated by an acoustical engineer.
- d. The applicant shall incorporate design features to ensure that noise levels generated by the emergency power generator do not exceed the City's general plan daytime noise standard of 50 dBA L_{eq} or the nighttime standard of 45 dBA L_{eq} at off-site noise-sensitive receptors, as determined by an acoustical engineer. These features may include but are not limited to the following:
 1. The emergency power generator shall be located at the farthest distance from and/or be enclosed or shielded from nearby existing noise-sensitive receptors.
 2. The noise level posted in the manufacturer's noise specifications shall be considered when selecting a model and a low-noise model shall be selected.
 3. The generator shall be properly maintained and equipped with noise control, such as mufflers, in accordance with manufacturers' specifications.
 4. All regular testing of the generator shall occur between the hours from 7:00 a.m. to 7:00 p.m.

Where there is a question regarding the noise levels before and after mitigation is implemented in a particular area, site-specific noise studies/modeling shall be conducted to determine compliance or noncompliance with standards, and the design shall be adjusted so that standards are met. Funding for the installation of this mitigation measure shall be provided by the project applicant.

4.4.5 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Implementation of Mitigation Measure 4.4-1 would reduce construction noise levels at sensitive receptors near the project site and eliminate potential construction noise during more noise-sensitive evening and nighttime hours. As a result, impact associated with construction noise would be reduced to a **less-than-significant** level.

By shielding or relocating on-site stationary-noise sources, or selecting quieter equipment models, implementation of Mitigation Measure 4.4-3 would reduce stationary-source noise levels at sensitive receptors near the project site to comply with Maximum Allowable Noise Exposure and Performance Standards of the City's general plan (Table 4.4-5) and the noise performance standards of the City's zoning ordinance (Table 4.4-6). As a result, impacts associated with on-site operational activity would be reduced to a **less-than-significant** level. Implementation of these mitigation measures would also make the project consistent with the City's general plan policies related to noise (including policies N-P-2, N-P-3, N-P-4, N-P-5, N-P-6, and N-P-7).