G. NOISE

This section describes the general characteristics of sound and the categories of audible noise. It then summarizes the regulatory framework related to noise issues at the City, State, and federal levels. Existing sources of noise near the project site are described. Impacts that may result from the proposed project are identified and mitigation measures to reduce potential impacts are recommended where appropriate.

1. Setting

This setting section begins with an introduction to several key concepts and terms that are used in evaluating noise and vibration. It then explains the various agencies that regulate the noise environment in the City of Menlo Park and summarizes key standards that are applied to proposed development. This setting section concludes with a description of current noise sources that affect the project site and the noise conditions that are experienced in the project site vicinity.

a. Characteristics of Sound. To the human ear, sound has two key characteristics: pitch and loudness. A specific pitch can be an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations or cycles per second of a wave that results in the range of tone from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments.

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, or sleep.

Several noise measurement scales exist that are used to describe noise in a particular location. A decibel (dB) is a unit of measurement which indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3.0 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3.0 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense and 30 dB is 1,000 times more intense. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness. Sound intensity is normally measured through the A-weighted sound level (dBA). This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Table IV.G-1 lists definitions of acoustical terms. Table IV.G-2 shows representative outdoor and indoor noise levels in units of dBA.

Noise impacts can be described in three categories. The first category comprises changes in noise levels of less than 1.0 dB, which are inaudible to the human ear. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is audible impacts, which refer to increases in noise levels noticeable to humans.

Table IV.G-1: Definitions of Acoustical Terms

Term	Definition
Decibel, dB	A unit that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{02}, L_{08}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level at 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 decibels to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Vibration Isolator	A resilient support (on which equipment is mounted or from which it is hung) designed to reduce the vibration transmitted to the supporting structure.

Source: Handbook of Acoustical Measurement and Noise Control, 1998.

Table IV.G-2: Typical A-Weighted Sound Levels

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a few feet away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	Reference Level
Average Office	60	Moderate	1/2 as loud
Suburban Street	55	Moderate	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	1/4 as loud
Large Transformer	45	Quiet	
Average Residence Without Stereo Playing	40	Faint	1/8 as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	Threshold of Hearing

Source: Compiled by LSA Associates, Inc., 2002.

Audible increases in noise levels generally refer to a change of 3.0 dB or greater, since this level has been found to be barely perceptible in exterior environments. Only audible changes in existing ambient or background noise levels are considered significant.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level. Geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6 dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise-sensitive receptor of concern.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. The predominant rating scales for human communities in the State of California are the L_{eq} and community noise equivalent level (CNEL) or the day-night average level (L_{dn}) based on A-weighted decibels (dBA). CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours. The City of Menlo Park uses the CNEL noise scale for long-term noise impact assessments.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

Another noise scale often used together with the L_{max} in noise ordinances for enforcement purposes is percentile noise levels. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

b. Fundamentals of Groundborne Vibration. Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernable, but without the effects associated with the shaking of a building there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as motion of building surfaces, rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Building damage is typically not a result of vibration unless blasting and pile driving occur. Annoyance from vibration often occurs

when the vibration exceeds the threshold of perception by up to 10 decibels. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of groundborne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with groundborne vibration and noise from these sources are usually localized to within about 100 feet of the vibration source, although there are examples of groundborne vibration causing interference out to distances greater than 200 feet, as described in the Federal Transit Administration Transit Noise and Vibration Impact Assessment.[1] When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for this project that the roadway surfaces around the project site would be smooth enough that groundborne vibration from street traffic would not exceed the impact criteria; however, construction activities associated with the proposed project could result in groundborne vibration that would be perceptible and annoying. Groundborne noise is not likely to be a problem because noise arriving via the normal airborne path usually will be greater than groundborne noise.

Groundborne vibration has the potential to disturb people as well as to damage buildings. Although it is rare for traffic-induced groundborne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitude to damage nearby buildings.[2] Groundborne vibration is usually measured in terms of vibration velocity, either the root-mean-square (rms) velocity or peak particle velocity (PPV). The rms velocity is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage.

Factors that influence groundborne vibration and noise include the following:

- Vibration Source: Vehicle suspension, wheel types and condition, track/roadway surface, track support system, speed, transit structure, and depth of vibration source;
- Vibration Path: Soil type, rock layers, soil layering, depth to water table, and frost depth; and
- Vibration Receiver: Foundation type, building construction, and acoustical absorption.

Among these factors that influence groundborne vibration and noise, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and shallow rock seems to concentrate the vibration energy close to the surface and can result in groundborne vibration problems at large distance from the track. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

[1] Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.* May.

[2] Ibid.

c. Noise and Vibration Regulatory Framework. The following section summarizes the regulatory framework related to noise and vibration, including federal, State, and City of Menlo Park plans, policies, and standards.

(1) U.S. Environmental Protection Agency (U.S. EPA). In 1972 Congress enacted the Noise Control Act. This act authorized the U.S. EPA to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table IV.G-3. The U.S. EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels. For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an L_{eq} (24) of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The U.S. EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels do not exceed 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor L_{dn} of 55 dBA are summarized in Table IV.G-4. At 55 dBA L_{dn}, typically there is no adverse community reaction and 95 percent sentence clarity (intelligibility) may be expected at 3.5 meters. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

For the purposes of this EIR, the U.S. EPA findings provide a more complete understanding of the issue of noise as well as a context in which to evaluate the proposed project.

(2) Federal Transit Administration (FTA). The FTA has compiled goundborne vibration and noise criteria used for predicting community annoyance for transit operations from available national and international standards. These levels are based on the maximum levels for a single event. The criteria are primarily for passenger train operations, but they can be applied to freight trains. However, the differences between a passenger train and a freight train must be considered. A typical passenger train event will last approximately 10 seconds, whereas a 5,000-foot-long freight train traveling at 30 mph can take approximately 2 minutes to pass. Table IV.G-5 shows the FTA's groundborne vibration and noise impact criteria.[3] Table IV.G-5 also shows that the frequent and infrequent event criteria are based on a community response equivalent. Typically a frequent event at lower levels would evoke the same response as an infrequent event at higher levels.

As the City of Menlo Park does not have vibration standards for residential and commercial land uses, the vibration criteria established by the Federal Transit Administration were used to evaluate potential vibration impacts on adjacent land uses.

[3] Ibid.

Table IV.G-3: Summary of U.S. EPA Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, 1974. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." March.

Table IV.G-4: Summary of Human Effects in Areas Exposed to 55 dB CNEL

Type of Effects	Magnitude of Effect
Speech—Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety
Speech—Outdoors	100 percent sentence intelligibility (average) at 0.35 meters 99 percent sentence intelligibility (average) at 1.0 meters 95 percent sentence intelligibility (average) at 3.5 meters
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below "vigorous action"
Complaints	1 percent dependent on attitude and other non-level related factors
Annoyance	17 percent dependent on attitude and other non-level related factors
Attitude Toward Area	Noise essentially the least important of various factors

Source: U.S. Environmental Protection Agency, 1974. "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." March.

Table IV.G-5: Groundborne Vibration and Noise Impact Criteria

Land Use Category	Groundborne Vibration Impact Levels (VdB in reference to a base level using 1 micro inch/sec)		Groundborne Noise Impact Levels (dB in reference to a base level using 20 micro Pascals)	
	Frequent[a] vents	Infrequent[b] Events	Frequent Events	Infrequent Events
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB[c]	65 VdB[c]	N/A[c]	N/A[c]
Category 2: Residences and buildings where people normally sleep	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	83 VdB	40 dBA	48 dBA

[a] "Frequent Events" is defined as more than 70 events per day.
[b] "Infrequent Events" is defined as fewer than 70 events per day.
[c] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

Source: Federal Transit Administration, 2006.

(3) State of California. The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the "State Noise Insulation Standard," it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations

include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor-ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA L_{dn} in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard where such units are proposed in an area with exterior noise levels greater than 60 dBA L_{dn}.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City has adopted and modified the State's land use compatibility guidelines, as discussed below.

(4) City of Menlo Park. The City of Menlo Park addresses noise in the Noise Element of the General Plan and in the Noise Ordinance. The Noise Element of the General Plan adopts the Land Use Compatibility Standards for Community Noise Environments developed by the Office of Noise Control in the California Department of Health. These standards for exterior noise are summarized in Table IV.G-6. The Land Use Compatibility Standards for multi-family dwellings require the preparation of an acoustical report for dwellings proposed in areas where exterior noise levels exceed 60 dBA L_{dn}. The purpose of the acoustical report is to demonstrate the manner by which the development will meet the standards for interior noise levels (45 dBA CNEL (of L_{dn}) with windows and doors closed.

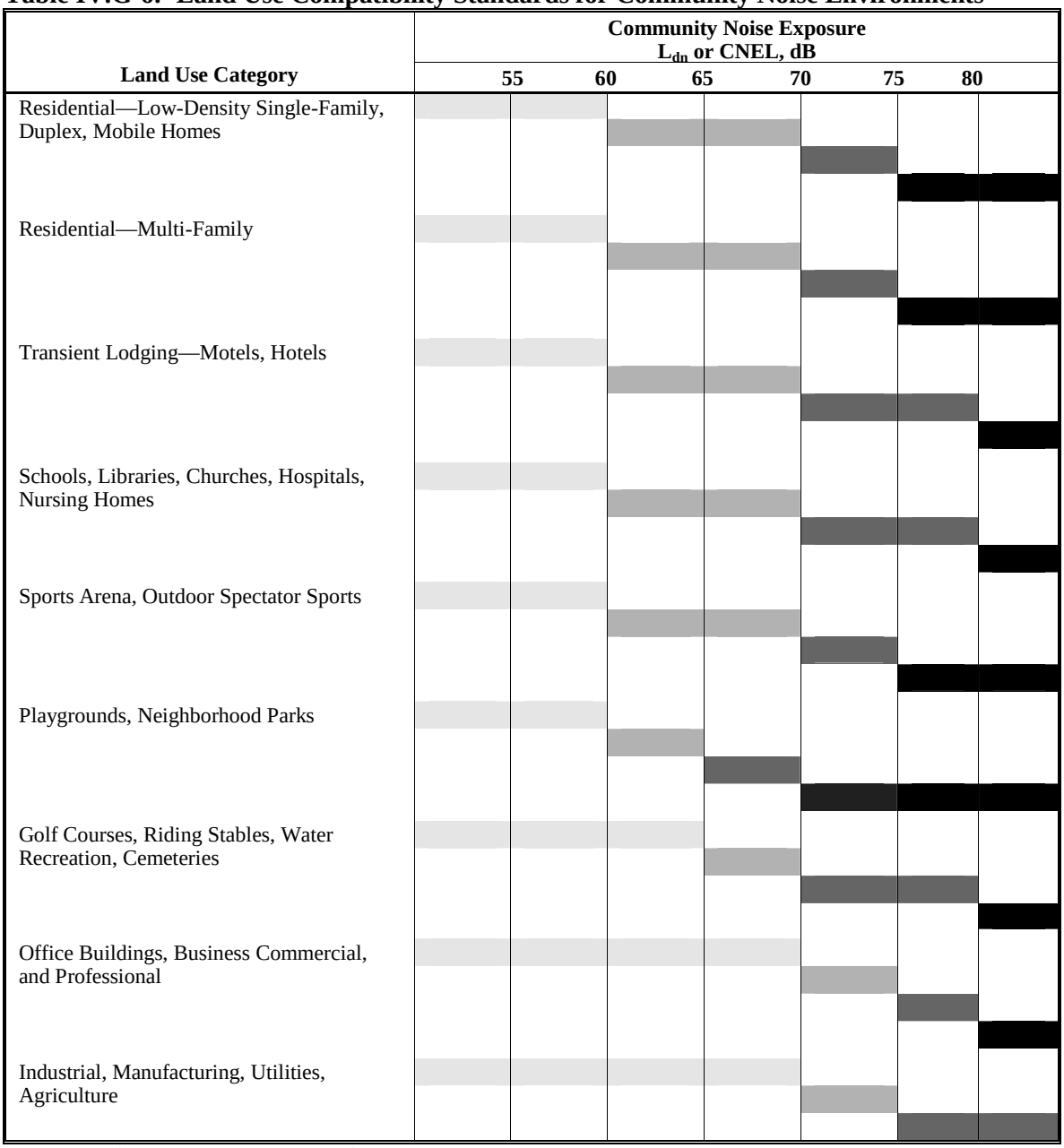
The City of Menlo Park Noise Ordinance[4] addresses noise limits that would constitute a noise disturbance and establishes construction hour limits. These noise limits are summarized in Table IV.G-7. However, noise sources listed in Section 08.06.040 and 08.06.050 of the Noise Ordinance are exceptions and exemptions to the noise limitations set forth by Section 08.06.030. These noise sources include construction, motor vehicles operated on streets and highways, aircraft, trains, and other public transportation. Construction activities that exceed stated noise limits are permitted only between the hours of 8:00 a.m. and 6:00 p.m. on Monday through Friday. Construction by contractors is not permitted on weekends or holidays.

d. Existing Noise. Existing noise levels in and around the project site are affected by the three key noise sources, which are described below.

(1) Existing Ambient Noise. On-site noise sources are primarily associated with railroad operations on the Caltrain tracks and traffic on El Camino Real. Edward L. Pack Associates, Inc. monitored the existing noise environment and documented the results in "Noise and Vibration Assessment Study for the Planned 1300 El Camino Real Mixed-Use Development," published on March 24, 2006. Results of the monitoring indicate that existing ambient noise levels on the project site range from 51.4 to 64.6 dBA L_{eq}.

[4] City of Menlo Park Noise Ordinance 8.06.030.

Table IV.G-6: Land Use Compatibility Standards for Community Noise Environments



Source: City of Menlo Park Noise Element of the Comprehensive Plan, 1978. November.

NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

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

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

CLEARLY UNACCEPTABLE
New construction or development clearly should not be undertaken.

(2) Auto Dealership Stationary Sources. The buildings within the project site are vacant and produce no noise. However, when an auto dealership occupied the site, the area contained numerous stationary noise sources, including loading and unloading activities, heating ventilation/air-conditioning (HVAC) equipment, parking lot activity, and emergency generators. Operation of the dealership (e.g., car washing, the movement of vehicles) also produced noise.

Table IV.G-7: City of Menlo Park Acceptable Noise Levels, dBA

Land Use	Time of Day	Exterior (Leq)	Interior[a] (Leq)
Residential (Single and Multi-Family)	Daytime (7 a.m. to 10 p.m.)	60	45
	Nighttime (10 p.m. to 7 a.m.)	50	35

[a] Interior noise limits apply only to sources of sound that are emitted from one multi-family unit into another.

Note: Correction for character of sound: In the event the alleged offensive noise contains a steady, audible tone, such as a whine screech, beating, pulsating, throbbing, or hum, the standards set forth in Section 8.06.030 shall be reduced by 5 dB.

Source: Menlo Park Noise Ordinance, 2004.

(3) Existing Vehicular Traffic. Vehicular traffic is an existing noise source associated with vehicles traveling on roads and driveways near the project site. The existing traffic noise levels in the study area are listed in Table IV.G-8. As shown in Table IV.G-8, the highlighted rows represent roadway segments adjacent to the project site. The Federal Highway Administration (FHWA) highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions along El Camino Real, Garwood Way, Merrill Street, Alma Street, Laurel Street, Oak Grove Avenue, and Glenwood Avenue. This model requires various data inputs, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. Traffic volumes were obtained from the traffic study prepared for the project by Hexagon Transportation Consultants, Inc. The resultant noise levels were weighted and summed over 24-hour periods to determine the CNEL values. As shown in Table IV.G-8, traffic noise along these roadway segments is generally low to moderate. The 70 dBA CNEL and 65 dBA CNEL traffic noise contours are confined within the right-of-way for all roadway segments analyzed, except for the roadway segments along El Camino Real. The traffic noise model printouts are included in Appendix C. Baseline traffic-related noise levels are based on 2005 data; however, traffic volumes on roads around the project site (and associated noise levels) have not changed substantially since then.

Existing groundborne vibration is mostly associated with passenger vehicles and heavy-duty trucks in the project area. Vibration associated with rail operations is discussed below. Because the rubber tires and suspension systems of passenger vehicles and heavy-duty vehicles provide vibration isolation, it is unusual for passenger vehicles or heavy-duty trucks to cause groundborne noise or vibration problems. Passenger vehicles and heavy-duty trucks cause effects such as rattling of windows; however, the source is almost always airborne noise and not vibration. Most causes of passenger vehicle and heavy-duty truck-related vibration can be directly related to a pothole, bump, expansion joint, or other discontinuity in the road surface. Smoothing the bump or filling the pothole will usually solve the problem.

Table IV.G-8: Existing 2005 Baseline Traffic Noise Levels

Roadway Segment	Average Daily Trips (ADT)	Center-line to 70 CNEL (Feet)	Center-line to 65 CNEL (Feet)	Center-line to 60 CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane
El Camino Real					
North of Glenwood Avenue	29,700	61	127	272	69.3
Between Glenwood Avenue and Oak Grove Avenue[a]	27,100	58	120	256	68.9
South of Oak Grove Avenue	27,800	59	122	261	69.0
Garwood Way					
North of Glenwood Avenue	300	< 50	< 50	< 50	47.1
South of Glenwood Avenue	200	< 50	< 50	< 50	45.3
Merrill Street					
South of Oak Grove Avenue	2,300	< 50	< 50	< 50	54.0
Alma Street					
South of Oak Grove Avenue	2,100	< 50	< 50	< 50	53.6
Laurel Street					
North of Glenwood Avenue	1,900	< 50	< 50	< 50	56.7
Between Glenwood Avenue and Oak Grove Avenue	3,100	< 50	< 50	< 50	58.8
South of Oak Grove Avenue	3,900	< 50	< 50	57	59.8
Oak Grove Avenue					
West of El Camino Real	4,700	< 50	< 50	51	59.0
Between El Camino Real and Alma Street	7,800	< 50	< 50	71	61.2
Between Alma Street and Laurel Street	9,500	< 50	< 50	80	62.1
East of Laurel Street	7,200	< 50	< 50	67	60.9
Glenwood Avenue					
West of El Camino Real	10,900	< 50	53	113	64.3
Between El Camino Real and Garwood Way	5,200	< 50	< 50	69	61.1
Between Garwood Way and Laurel Street	4,300	< 50	< 50	61	60.2
East of Laurel Street	3,800	< 50	< 50	56	59.7

[a] Highlighted rows represent roadway segments adjacent to the proposed project site.
[b] Traffic noise within 50 feet of roadway centerline requires site-specific analysis.

Source: LSA Associates, Inc., 2007.

(4) Existing Rail Operations. The project site is adjacent to a functioning rail line that produces noise and groundborne vibration. The existing rail line is located immediately adjacent to the north side of the project site. Activity on the Caltrain rail lines and freight operations represents a significant source of noise and groundborne vibration for the project area. The aforementioned Noise and Vibration Assessment Study[5] assessed potential noise and vibration impacts on the project site associated with the existing rail operations. The assessment accounts for trains passing by and train whistles. Based on the Caltrain schedule in place as of February 2009, the railroad tracks currently carry 97 Caltrain passenger trains (49 northbound and 48 southbound, of which 11 trains in each direction are "baby bullet" trains with limited stops along the railroad corridor) and one to four unscheduled freight trains per day. The current Caltrain train schedule indicates that the baby bullet train has six stops per day in Menlo Park. According the FTA's groundborne vibration and noise impact criteria, the existing rail road operation is considered frequent because there are more than 70 train events per day (see Table IV.G-5). The groundborne vibration standard for commercial uses subject to frequent train events is 75 VdB. The Noise and Vibration Assessment Study documented

[5] Edward L. Pack Associates, Inc., 2006. Noise and Vibration Assessment Study. March.

four freight trains during the day of the site survey. As noted in the study, freight train operations are unscheduled and can vary from day-to-day. Because of the proximity to the project site of the railroad tracks and rail operations, noise and vibration impacts could be significant.

2. Impacts and Mitigation Measures

This section evaluates potential noise impacts associated with the proposed project and identifies mitigation measures to address these impacts, as appropriate.

a. Significance Criteria. The following criteria are adapted from the City of Menlo Park Noise Ordinance (No. 892), the City of Menlo Park General Plan, *CEQA Guidelines*, and the FTA Vibration impact guidelines. The project site is not within 2 miles of an airport, and is not under the jurisdiction of an airport land use plan. Therefore, airport-related noise criteria have not been included. The project would have a significant impact on the environment if it would:

- Result in exterior L_{dn} or CNEL greater than 70 dBA for commercial uses (*Noise Criterion A*).
- Violate the City of Menlo Park Noise Ordinance (Noise Ordinance Section 08.06.030), affecting parcels zoned or used for residential purposes as summarized in Table IV.G-7 (*Noise Criterion B*).
- Expose persons to or generate groundborne vibration exceeding 72 VdB that would result in community annoyance established by the FTA's groundborne noise and vibration impact criteria (*Noise Criterion C*).
- Expose off-site sensitive land uses to a long-term averaged noise level increase of 3 dBA or more over the corresponding existing noise levels when the existing noise levels already exceed the City's noise standards *(Noise Criterion D)*.

b. Less-Than-Significant Impacts. The following discussion describes the less-than-significant noise-related impacts of the project.

To determine vibration levels in project structures, FTA methods take into account how the building is tied to the ground. Large masonry structures have natural frequencies in the range of 20 to 30 Hz. Spread footings, including spread footings on widely-spaced columns (which would be used in the construction of the proposed parking garage) reduce vibration from the ground to the upper level of the building podium by 13 dB. However, depending on construction materials/methods, vibration may increase by 6 dB due to floor resonances. Therefore, vibration levels on the first floor of the proposed structures would be 7 dB lower than levels measured on the ground surface of the vacant site. Vibration is also reduced as it travels from the ground up through the building. In large buildings, vibration decreases by approximately 2 dB per floor. Therefore, vibration levels on the second floor of the proposed structures would be 9 dB lower than levels measures on the ground surface of the vacant site.

The average vibration level *(Criterion C)* generated by passenger trains during the measurement period at the project site was 61 VdB. Vibration generated by freight trains was not captured during the measurement period. Vibration generated by freight trains was obtained from a similar rail line in Sunnyvale, CA. Typical freight train vibration at the Sunnyvale site ranged from 55 VdB to 70 VdB at 72 feet from the nearest track and 57 VdB to 64 VdB at 118 feet from the farthest track. The highest vibration level was measured at 70 VdB at 72 feet. At the planned minimum building setback

of approximately 80 feet from the nearest track, the vibration levels on the project site would be up to 70 VdB at the ground floor. As described above, vibration would be reduced due to the use of widely-spaced columns in the sub-grade parking structure. Uses located on the second floor would experience a further reduction of 2 VdB. Inside the most adversely affected spaces, the highest vibration levels are expected to be up to 63 and 61 VdB for the ground floor and second floors, respectively. Therefore, the vibration levels would be well within the 75 VdB limits of the FTA guidelines for commercial uses exposed to frequent groundborne vibration events, and no significant impact would result.

Pile driving and the operation of heavy construction equipment can also be potential sources of groundborne vibration. However, pile driving is not expected to be used in construction of the proposed project. Typical groundborne vibration levels measured at a distance of 50 feet from heavy construction equipment in full operation, such as vibratory rollers or heavy tracked equipment, can range up to approximately 94 VdB.[6] However, due to the distance of off-site sensitive structures from the construction areas where these vibration levels would occur, and due to the structural materials of these existing buildings, expected vibration levels would be below the FTA's construction vibration impact criteria of 98 VdB and would be considered a less-than-significant impact.

c. Significant Noise Impacts. The proposed project would result in the significant impacts discussed below.

(1) Construction-Period Impacts. Construction of the proposed project would result in one significant short-term noise impact.

<u>Impact NOISE-1</u>: During construction of the project, noise levels from construction activities may range up to 91 dBA L_{max} at the nearest land uses to the project site for a limited time period. (S)

Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. The character of the noise generated on each construction site and, therefore, the noise levels surrounding the site, changes as construction progresses through its sequential phases. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase.

The transport of workers, construction equipment, and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from passing trucks (87 dBA L_{max} at 50 feet) would be similar to existing truck-generated noise. For this reason, short-term intermittent noise from trucks would be minor when averaged over a longer time period. In addition, noise associated with on-road vehicles is regulated by federal and State governments and is exempted from local government regulations. Therefore, short-term construction-related impacts associated with worker and equipment transport to the project site would result in a less-than-significant impact on sensitive receptors along the access routes leading to the project site.

[6] Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.* May.

The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earth-moving equipment includes excavating machinery such as backhoes, bulldozers, draglines and front loaders, and earthmoving and compacting equipment, which includes compactors, scrapers, and graders. Typical operating cycles for such construction equipment may involve 1 or 2 minutes of full power operation followed by 3 to 4 minutes at lower power settings. Existing tenants in the project site vicinity may be subject to short-term noise generated by construction equipment and activities on the site when construction occurs near the project site boundary (*Criterion B*).

Table IV.G-9 lists typical construction equipment noise levels recommended for use in noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor. Typical construction noise levels vary up to a maximum of 93 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. This would affect a variety of neighboring uses including residential uses at the senior residential center to the west of the project site.

Table IV.G-9: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	68 to 80	77
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Electric Saws	66 to 72	70
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	85 to 90	88
Tractors	77 to 82	80
Front-End Loaders	86 to 90	88
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	85
Air Compressors	76 to 89	85
Trucks	81 to 87	85

Source: Bolt, Beranek & Newman, 1987. *Noise Control for Buildings and Manufacturing Plants.*

Construction of the proposed project is expected to require the use of earthmovers such as bulldozers and scrapers, loaders and graders, water trucks, and pickup trucks. As shown in Table IV.G-9, the typical maximum noise level generated by each earthmover on the project site is assumed to be 88 dBA L_{max} at 50 feet from the operating earthmover. The maximum noise level generated by water and pickup trucks is approximately 85 dBA L_{max} at 50 feet from these vehicles. Each doubling of the sound sources with equal strength would increase the noise level by 3 dBA. Assuming each piece of construction equipment operates at some distance apart from the other equipment, the worst-case combined noise level at the nearest residences during this phase of construction would be 91 dBA L_{max}.

While pile driving can be another major source of construction noise, it is not expected to be used in the construction of the proposed project.

Implementation of the following mitigation measure would reduce the project's short-term construction-period noise impacts to a less-than-significant level:

> Mitigation Measure NOISE-1: The following measures shall be implemen-ted during construction of the project:

(a) To minimize construction noise impacts on nearby residents and businesses, and to be consistent with Chapter 8.06 of the City of Menlo Park Municipal Code, standard construction activities that exceed stated noise limits shall be permitted only between the hours of 8:00 a.m. and 6:00 p.m. from Monday to Friday.

(b) To reduce daytime construction-related noise impacts to the maximum feasible extent, the project sponsor shall develop a site-specific noise reduction program subject to City review and approval, which includes the following measures:

- Signs shall be posted at the construction site that include permitted construction days and hours, a day and evening contact number for the job site, and a day and evening contact number for the City in the event of problems.
- Contact information for an on-site complaint and enforcement manager shall be posted to allow for responses to and tracking of complaints.
- A pre-construction meeting shall be held with the job inspectors and the general contractor/on-site project manager to confirm that noise mitigation and practices are completed prior to the issuance of a building permit (including construction hours, neighborhood notification, posted signs, etc.).
- Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds, wherever feasible).
- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed-air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed-air exhaust shall be used; this muffler can lower noise levels, which could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.
- Stationary noise sources shall be located as far from sensitive receptors as possible and they shall be muffled and enclosed within temporary sheds; or insulation barriers or other measures shall be incorporated to the extent feasible.
- Prior to construction, a temporary 8-foot high plywood noise barrier (with a rating of 4 pounds/square foot) shall be constructed along the common 1300 El Camino Real/Glenwood Inn property line. (LTS)

(2) Traffic and Rail Related Noise. Traffic generated by the proposed project would not be significant enough to result in any perceptible changes in noise in places where the existing noise levels already exceed the City's noise standards *(Criterion D)*. However, projected future traffic would result in noise levels that could significantly adversely affect occupants of the proposed project, as discussed below. In addition, the proposed project would be located immediately adjacent to the Caltrain rail line, which would expose persons on the site to high noise levels. (*Criterion A*). Each of these potential impacts is discussed below.

<u>Impact NOISE-2</u>: Local traffic and rail operations would generate long-term noise levels exceeding 60 dBA CNEL. (S)

Traffic. Local traffic would generate long-term noise levels on the project site exceeding the Normally Acceptable[7] noise level established in the City's Land Use Compatibility Standards for Community Noise Environments.

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the project site. The traffic volumes were taken from the traffic study prepared for the project by Hexagon Transportation Consultants, Inc. The resultant noise levels were weighted and summed over a 24-hour period in order to determine the CNEL values associated with vehicular traffic (i.e., excluding train noise). CNEL contours are derived through a series of computerized iterations to isolate the 60, 65, and 70 dBA CNEL contours for traffic noise levels in the project area. The Near-Term traffic noise levels that would occur with and without the project are shown in Table IV.G-10. The Long-Term 2016 traffic noise levels that would occur with and without the project are shown in Table IV.G-11. As shown in Tables IV.G-10 and IV.G-11, the highlighted rows represent roadway segments adjacent to the project site.

In order to analyze the worst case scenario and highest traffic volumes for each of the modeled years, the PM traffic volumes were used. In addition, the Near-Term without the project analysis assumed operation of the auto dealership; and the Near-Term and Long-Term with the project analyses assumed that the Garwood Way extension would not be built since these scenarios yielded overall higher traffic volumes on the roadway segments that were analyzed (ensuring that roadway noise levels would not be under-estimated).

Tables IV.G-10 and IV.G-11 show that implementation of the proposed project would result in relatively minor changes in traffic noise levels. The largest increase in traffic-related noise would occur on Garwood Way south of Glenwood Avenue, which would experience a 7.5 dBA increase over the no-project scenario. This range of noise level increase would be considered significant. The traffic noise level with the project for this roadway segment would be 54.6 dBA CNEL at 50 feet from the centerline of the outermost travel lane. This roadway segment is adjacent to the railroad tracks and therefore, noise from railroad activity would be significantly higher than noise generated by vehicle traffic. In addition, the resultant noise level would be within the normally acceptable range and no mitigation would be required for off-site areas.

Table IV.G-11 shows that portions of the project site would be exposed to exterior traffic noise levels that exceed 60 dBA CNEL. Under the Long Term with-project traffic conditions scenario, the commercial land uses on the project site would experience the following traffic noise levels:

- **El Camino Real.** The 70 dBA CNEL contour line for traffic noise is approximately 67 feet from the roadway centerline; the 65 dBA CNEL contour line is approximately 140 feet from the roadway centerline.

[7] Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Table IV.G-10: Near-Term Traffic Noise Levels

Roadway Segment	Average Daily Trips (ADT)	Near Term Without Project				Average Daily Trips (ADT)	Near Term With Project				Increase From Without Project Conditions (dBA)
		Center-line to 70 CNEL (Feet)	Center-line to 65 CNEL (Feet)	Center-line to 60 CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane		Center-line to 70 CNEL (Feet)	Center-line to 65 CNEL (Feet)	Center-line to 60 CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane	
El Camino Real											
North of Glenwood Ave.	33,300	66	137	294	69.8	33,500	66	138	295	69.8	0.0
Btwn Glenwood Ave. and Oak Grove Ave.[a]	30,500	62	130	277	69.4	32,000	64	134	286	69.6	0.2
South of Oak Grove Avenue	32,000	64	134	286	69.6	33,600	66	138	296	69.8	0.2
Garwood Way											
North of Glenwood Avenue	300	< 50	< 50	< 50	47.1	300	< 50	< 50	< 50	47.1	0.0
South of Glenwood Avenue	400	< 50	< 50	< 50	48.3	1,700	< 50	< 50	< 50	54.6	6.3
Merrill Street											
South of Oak Grove Avenue	2,200	< 50	< 50	< 50	53.8	2,200	< 50	< 50	< 50	53.8	0.0
Alma Street											
South of Oak Grove Avenue	7,200	< 50	< 50	< 50	59.0	7,800	< 50	< 50	53	59.3	0.3
Laurel Street											
North of Glenwood Avenue	2,000	< 50	< 50	< 50	56.9	2,200	< 50	< 50	< 50	57.3	0.4
Btwn Glenwood Ave. and Oak Grove Ave.	3,200	< 50	< 50	< 50	58.9	3,900	< 50	< 50	57	59.8	0.9
South of Oak Grove Avenue	4,200	< 50	< 50	60	60.1	4,400	< 50	< 50	62	60.3	0.2
Oak Grove Avenue											
West of El Camino Real	5,100	< 50	< 50	54	59.4	5,200	< 50	< 50	54	59.4	0.0
Between El Camino Real and Alma Street	8,300	< 50	< 50	74	61.5	9,000	< 50	< 50	78	61.8	0.3
Between Alma Street and Laurel Street	10,600	< 50	< 50	86	62.5	11,600	< 50	< 50	92	62.9	0.4
East of Laurel Street	8,100	< 50	< 50	72	61.4	8,900	< 50	< 50	77	61.8	0.4
Glenwood Avenue											
West of El Camino Real	11,900	< 50	56	119	64.6	12,100	< 50	57	121	64.7	0.1
Between El Camino Real and Garwood Way	5,900	< 50	< 50	75	61.6	6,100	< 50	< 50	77	61.7	0.1
Between Garwood Way and Laurel Street	4,800	< 50	< 50	66	60.7	5,900	< 50	< 50	75	61.6	0.9
East of Laurel Street	4,300	< 50	< 50	61	60.2	4,500	< 50	< 50	63	60.4	0.2

[a] Highlighted rows represent roadway segments adjacent to the project site.
[b] Traffic noise within 50 feet of roadway centerline requires site-specific analysis.
Source: LSA Associates, Inc., 2007.

Table IV.G-11: Long-Term Traffic Noise Levels

Roadway Segment	Average Daily Trips (ADT)	Long Term Without Project				Average Daily Trips (ADT)	Long Term With Project				Increase from Without Project Conditions (dBA)
		Center-line to 70 CNEL (Feet)	Center-line to 65 CNEL (Feet)	Center-line to 60 CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane		Center-line to 70 CNEL (Feet)	Center-line to 65 CNEL (Feet)	Center-line to 60 CNEL (Feet)	CNEL (dBA) 50 Feet from Centerline of Outermost Lane	
El Camino Real											
North of Glenwood Ave.	35,600	69	144	307	70.1	35,800	69	144	308	70.1	0.0
Btwn Glenwood Ave. and Oak Grove Ave.[a]	32,700	65	136	290	69.7	34,100	67	140	299	69.9	0.2
South of Oak Grove Avenue	33,800	66	139	297	69.8	35,800	69	144	308	70.1	0.3
Garwood Way											
North of Glenwood Avenue	400	< 50	< 50	< 50	48.3	400	< 50	< 50	< 50	48.3	0.0
South of Glenwood Avenue	300	< 50	< 50	< 50	47.1	1,700	< 50	< 50	< 50	54.6	7.5
Merrill Street											
South of Oak Grove Avenue	2,300	< 50	< 50	< 50	54.0	2,300	< 50	< 50	< 50	54.0	0.0
Alma Street											
South of Oak Grove Avenue	7,500	< 50	< 50	52	59.2	8,300	< 50	< 50	56	59.6	0.4
Laurel Street											
North of Glenwood Avenue	2,100	< 50	< 50	< 50	57.1	2,300	< 50	< 50	< 50	57.5	0.4
Btwn Glenwood Ave. and Oak Grove Ave.	3,400	< 50	< 50	52	59.2	4,100	< 50	< 50	59	60.0	0.8
South of Oak Grove Avenue	4,400	< 50	< 50	62	60.3	4,600	< 50	< 50	64	60.5	0.2
Oak Grove Avenue											
West of El Camino Real	5,400	< 50	< 50	56	59.6	5,500	< 50	< 50	56	59.7	0.1
Between El Camino Real and Alma Street	8,500	< 50	< 50	75	61.6	9,500	< 50	< 50	80	62.1	0.5
Between Alma Street and Laurel Street	11,100	< 50	< 50	89	62.7	12,200	< 50	< 50	95	63.1	0.4
East of Laurel Street	8,500	< 50	< 50	75	61.6	9,400	< 50	< 50	80	62.0	0.4
Glenwood Avenue											
West of El Camino Real	12,600	< 50	58	124	64.9	12,900	< 50	59	126	65.0	0.1
Between El Camino Real and Garwood Way	6,200	< 50	< 50	78	61.8	6,400	< 50	< 50	79	62.0	0.2
Between Garwood Way and Laurel Street	5,100	< 50	< 50	68	61.0	6,200	< 50	< 50	78	61.8	0.8
East of Laurel Street	4,500	< 50	< 50	63	60.4	4,800	< 50	< 50	66	60.7	0.3

[a] Highlighted rows represent roadway segments adjacent to the project site.
[b] Traffic noise within 50 feet of roadway centerline requires site-specific analysis.
Source: LSA Associates, Inc., 2007.

The 60 dBA CNEL contour line for traffic noise is approximately 299 feet from the roadway centerline; and the 57 dBA CNEL contour line is approximately 445 feet from the roadway centerline.

Commercial uses are located approximately 40 feet from the centerline of El Camino Real and would be exposed to a traffic noise level of 74 dBA CNEL. Commercial uses located within the 70 dBA CNEL to 75 dBA CNEL contour are considered Conditionally Acceptable and would require mitigation measures to meet the interior noise standard.

- **Garwood Way.** The 70, 65, and 60 dBA CNEL contour lines for traffic noise are less than 50 feet from the roadway centerline. These traffic noise levels are confined to the roadway right-of-way. Commercial uses proposed along Garwood Way would be considered Normally Acceptable; thus no further mitigation is needed.

Rail. Noise and vibration measurements were collected at various locations as part of the Noise and Vibration Assessment study.[8] The following discussion summarizes the findings of the study.

Future rail operations were assumed to be the same as current rail operations. A higher number of train pass-bys was not assumed for future rail operations because future rail operations will depend on the demand for rail service and the potential implementation of State-wide high-speed train service. Assuming a substantial increase in train traffic would be speculative.

Noise levels in the noise and vibration assessment study are expressed in terms of L_{dn}. Because noise levels in L_{dn} are similar to the CNEL, they are interchangeable. Noise levels in the discussion below are expressed in CNEL to be consistent with the following impact discussion.

Noise generated by the rail lines north of the project site would be approximately 72 dBA CNEL at 80 feet from the centerline of the tracks. This noise includes sound generated by single event noises, such as train whistles. The CNEL measurement is a value that takes into account average noise levels over a 24-hour period. Single-event train noise, such as a train whistle, is considered a nuisance but would not be considered significant if CNEL standards are not exceeded.

Railroad noise levels would be 72 dBA CNEL at the minimum building setback, which is up to 12 dB in excess of the City of Menlo Park Noise Element standards and the Title 24 criterion. However, the General Plan standards pertain specifically to interior noise. Exterior noise levels between 70 to 75 dBA around commercial buildings are considered conditionally acceptable as long as appropriate noise insulation features are included in the design. The City's land use compatibility standards state that for commercial land uses exposed to noise levels in the conditionally acceptable range, conventional construction, with windows closed and a fresh air supply system would normally suffice to reduce interior noise to an acceptable level. Based on the U.S. EPA's Protective Noise Levels,[9] with a combination of walls, doors, and windows, standard construction for northern California buildings built to residential standards provide more than 25 dBA in exterior-to-interior noise reduction with windows closed. Therefore, with windows closed, railroad and vehicular noise levels would be reduced to 47 dBA CNEL in the interior of the commercial units in the project site (i.e., 72

[8] Edward L. Pack Associates, op.cit.

[9] EPA 550/9-79-100, November 1978.

dBA - 25 dBA = 47 dBA). However, provisions would need to be made to allow for windows to be closed for prolonged periods of time. Implementation of the following mitigation measure would reduce both traffic and train related noise impacts on the proposed project to a less-than-significant level:

> Mitigation Measure NOISE-2: To ensure that windows can remain closed for a prolonged period of time, an alternative ventilation system, such as an air conditioning system or mechanical ventilation, shall be required in all buildings. (LTS)

(3) Stationary and Operational Noise Impacts. The proposed project could result in significant noise impacts associated with stationary sources (*Criterion B*).

Impact NOISE-3: Long-term stationary noise sources on the project site could generate noise levels in excess of the thresholds set in Section 8.06.030 of the City's Noise Ordinance. (S)

As noise spreads from a source, it loses energy. The farther away the noise receiver is from the noise source, the lower the perceived noise level. Geometric spreading causes the sound level to attenuate, resulting in a 6 dBA reduction in the noise level for each doubling of distance from a single point source of noise to the noise receptor.

Truck deliveries for the proposed grocery store/market/major retail tenant space would occur within a recessed loading area on the ground floor of the retail structure. The loading zone could expose nearby office uses to high noise levels, but these noise levels would not likely exceed those associated with the train tracks to the north of the project site. However, mechanical equipment and other on-site sources (e.g., air-conditioning or other mechanical ventilation equipment, emergency generators, etc.) from the proposed commercial uses could generate noise that would exceed the City's noise limits.

To prevent noise impacts on adjacent land uses, noise-generating equipment associated with the proposed uses should be located as far as practical from all existing and planned residential properties. Screening and limiting certain types of noise-generating equipment would also prevent noise impacts on adjacent land uses.

> Mitigation Measure NOISE-3a: All on-site stationary noise sources shall comply with the standards listed in Section 08.06.030 of the City's Noise Ordinance.
>
> Mitigation Measure NOISE-3b: Implement Mitigation Measure NOISE-2. (LTS)