D. NOISE

This section describes the general characteristics of sound and the categories of audible noise. It then summarizes the regulatory framework related to noise 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 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, which is the strength of a sound that describes a noisy or quiet environment, 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 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 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.D-1 lists definitions of acoustical terms. Table IV.D-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 dB, which are inaudible to the human ear. The second category, potentially audible, refers to a change in the noise level between 1 and 3 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.D-1: Definitions of Acoustical Terms

Term	Definitions
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 1 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_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 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.
Sound Exposure Level, SEL	The cumulative sound exposure from a single noise event. Over a stated time period or event, the logarithm of the ratio of a given time integral of squared frequency-weighted sound pressure to the product of the reference sound pressure of 20 micropascals and the reference duration of 1 second.
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.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control*, Harris, C.M., 1998.

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

Noise Level	Extremes	Home Appliances at 10 feet	Speech at 3 feet	Motor Vehicles at 50 feet	Railroad Operations at 100 feet	General Type of Community Environment
120	Commercial Jet Aircraft at 500 ft					
110					Horns	
				Sirens		
100				Diesel Truck (Not Muffled)		
90		Shop Tools	Shout	Diesel Truck (Muffled)	Locomotive at 50 mph	
80		Vacuum Cleaner	Loud Voice	Automobile at 70 mph	Rail Cars at 50 mph Locomotive Idling	Major Metropolis (Daytime)
70		Dishwasher	Normal Voice	Automobile at 40 mph		Urban (Daytime)
60		Air Conditioner	Normal Voice (Back to Listener)	Automobile at 20 mph		Suburban (Daytime)
50		Refrigerator				Rural (Daytime)
40						
30						
20						
10						
0	Threshold of Hearing					

ft = feet
mph = miles per hour
Source: Compiled by LSA Associates, Inc., 2009.

Audible increases in noise levels generally refer to a change of 3 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 receptor.

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. The 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 interchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours. The City 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. Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. As the vibration propagates from the foundation throughout the remainder of the building, the vibration of floors and walls may cause the rattling of windows or a rumbling noise. The rumbling sound caused by the vibration of room surfaces is called groundborne noise.

When assessing annoyance from groundborne noise, vibration is typically expressed as root mean square (rms) velocity in units of decibels of 1 micro-inch per second. To distinguish rms velocity vibration levels from noise levels, the unit is written as “VdB.” Human perception of vibration starts at levels that are sometimes below 67 VdB. Annoyance due to vibration in residential settings starts at approximately 70 VdB. Groundborne vibration is almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of a building, the motion does not provoke the same adverse human reaction.

In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Common sources of groundborne vibration include trains and construction activities such as blasting, pile driving, and the operation of heavy earthmoving equipment. Construction vibration impacts on building structures are generally assessed in terms of peak particle velocity (PPV). Typical vibration source levels from construction equipment are shown in Table IV.D-3.

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.

Table IV.D-3: Typical Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft (in/sec)	Approximate VdB at 25 feet
Pile driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory roller		0.210	94
Hoe ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.* May.

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 source. 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.

c. Regulatory Framework. The following section summarizes the regulatory framework related to noise and vibration, including federal, State, and City 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.D-4. The U.S. EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of maintaining the levels. Ninety-six percent of the population would be protected against hearing loss if sound levels are less than or equal to a 24-hour L_{eq} of 70 dBA. 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 CNEL of 55 dBA are summarized in Table IV.D-5. At 55 dBA CNEL, there is typically no adverse community reaction and 95 percent sentence clarity (intelligibility) may be expected at 3.5 meters (11.5 feet). 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). As the City does not have vibration standards for residential and commercial land uses, the vibration criteria established by the Federal Transit Administration (FTA) were used in this analysis to evaluate potential vibration impacts on adjacent land uses. The FTA's vibration impact criteria and impact assessment guidelines are published in the *Transit Noise and Vibration Impact Assessment* document.[1] The FTA guideline thresholds for construction vibration impacts for various structural categories are shown in Table IV.D-6.

Table IV.D-4: 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.D-5: 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.D-6: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	PPV (in/sec)	Approximate VdB
I. Reinforced – Concrete, Steel or Timber (no plaster)	0.5	102
II. Engineered Concrete and Masonry (no plaster)	0.3	98
III. Non Engineer Timber and Masonry Buildings	0.2	94
IV. Buildings Extremely Susceptible to Vibration Damage	0.12	90

Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment.* May

(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

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

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 CNEL 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 CNEL.

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.

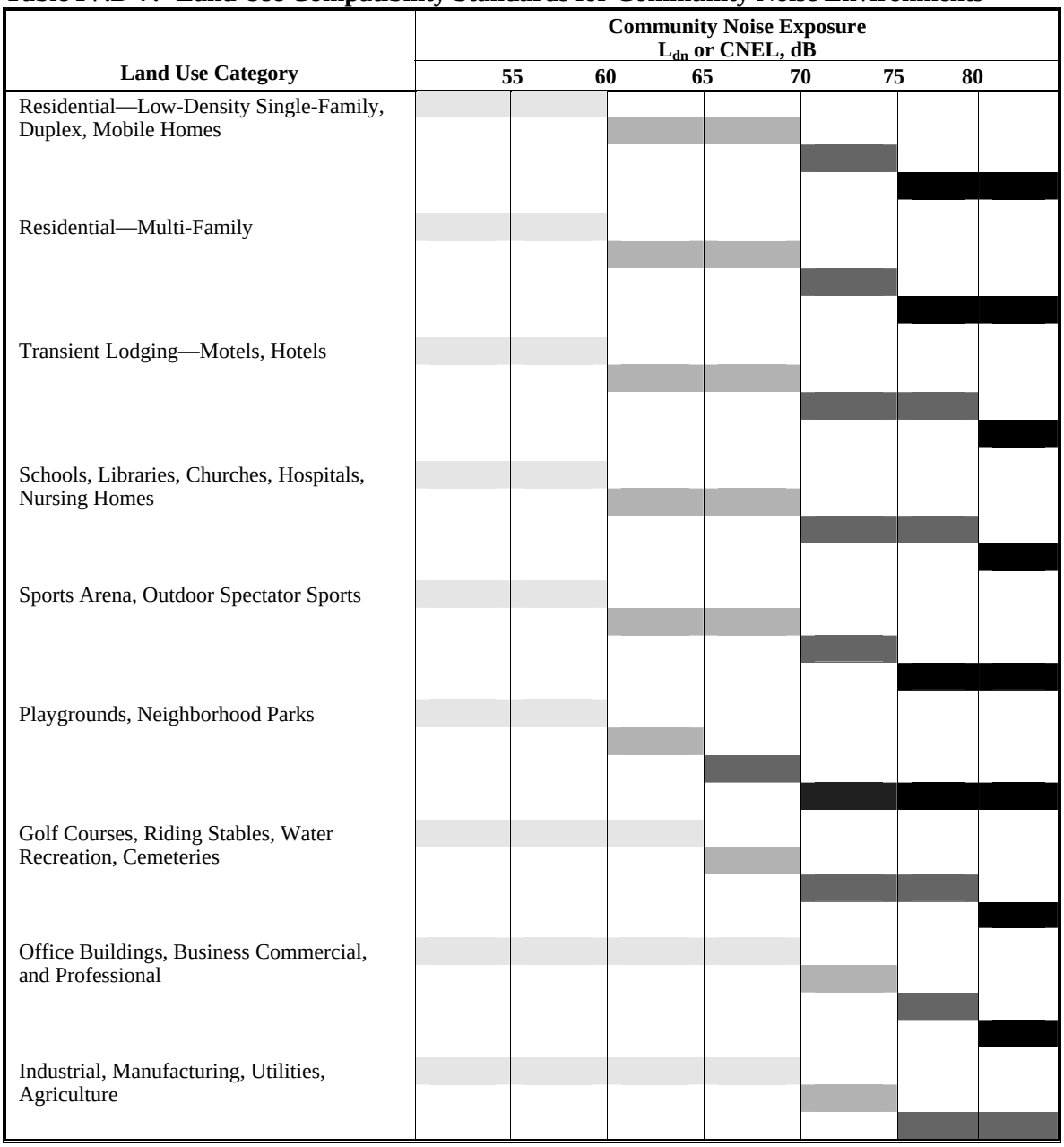
(4) City of Menlo Park. The City addresses noise in the Noise Element of the General Plan[2] and in the Noise Ordinance. The Noise Element of the General Plan adopts the Land Use Compatibility Standards for Community Noise Environments developed by the Office of Noise Control in the California Department of Health. These standards for exterior noise are summarized in Table IV.D-7. 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 CNEL. The purpose of such an acoustical report is to demonstrate how the development will meet the standards for interior noise levels (45 dBA CNEL) with windows and doors closed.

The City's Noise Ordinance[3] addresses noise limits that would constitute a noise disturbance and establishes construction hour limits. These noise limits are summarized in Table IV.D-8. 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.

[2] Menlo Park, City of, 1978. *Menlo Park Noise Element of the Comprehensive Plan*. November 14.

[3] Menlo Park, City of, 2010. *Menlo Park Municipal Code, Chapter 8.06 Noise*. December 14.

Table IV.D-7: Land Use Compatibility Standards for Community Noise Environments



Source: City of Menlo Park General Plan Noise Element, 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.

d. Existing Noise Environment. Existing noise levels in and around the project site are primarily associated with traffic on El Camino Real.

(1) Existing Ambient Noise Levels. An LSA noise technician conducted short term ambient noise monitoring at three locations on the project site on June 9, 2011, between the hours of 9:00 a.m. and 10:30 a.m. The noise monitoring locations are shown in Figure IV.D-1. The purpose of this noise monitoring was to document the existing noise environment and capture the noise levels associated with current operations and activities in the project site vicinity, such as traffic noise on adjacent roadways and parking lot and loading and unloading activities at nearby commercial land uses. Table IV.D-9 lists the noise levels measured during the short term 15-minute noise measurements. Maximum and minimum noise levels were recorded as well as the equivalent continuous noise level measure L_{eq}. The meteorological conditions at the time of each noise measurement are shown in Table IV.D-10. The noise monitoring results indicate that existing daytime ambient noise levels in the vicinity of the project site range from 58.6 dBA to 68.8 dBA L_{eq}.

Table IV.D-8: 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.

Traffic on El Camino Real is the primary noise source affecting existing ambient noise levels in the project site vicinity. Other noise in the project site vicinity includes traffic on College Avenue and Partridge Avenue, and stationary noise from activities at the auto repair shop located adjacent to the southern boundary of the site.

Table IV.D-9: Short Term Ambient Noise Monitoring Results, dBA, June 9, 2011

Location Number	Location Description	Start Time	L_{eq}[a]	L_{max}[b]	L_{min}[c]	Primary Noise Sources
ST1	Southeast corner of project site, near Planet Auto Repair	9:20 a.m.	68.8	79.7	47.5	Traffic on El Camino Real, auto repair shop activities
ST2	Eastern property line of 624 Partridge Avenue	10:10 a.m.	65.8	81.2	49.5	Traffic on El Camino Real, yard maintenance activities
ST3	Eastern property line of 611 College Avenue	9:50 a.m.	58.6	80.0	43.6	Traffic on El Camino Real and College Avenue

[a] L_{eq} represents the average of the sound energy occurring over the 15-minute time period.
[b] L_{max} represents the highest instantaneous sound level measured during the 15-minute time period.
[c] L_{min} represents the lowest instantaneous sound level measured during the 15-minute time period.

Source: LSA Associates, Inc., June 2011.

Table IV.D-10: Meteorological Conditions During Ambient Noise Monitoring

Location Number	Maximum Wind Speed (mph)	Average Wind Speed (mph)	Temperature (°F)	Relative Humidity (%)
ST1	2	1	65	49
ST2	3	2	67	54
ST3	3	2	64	63

Source: LSA Associates, Inc., June 2011.

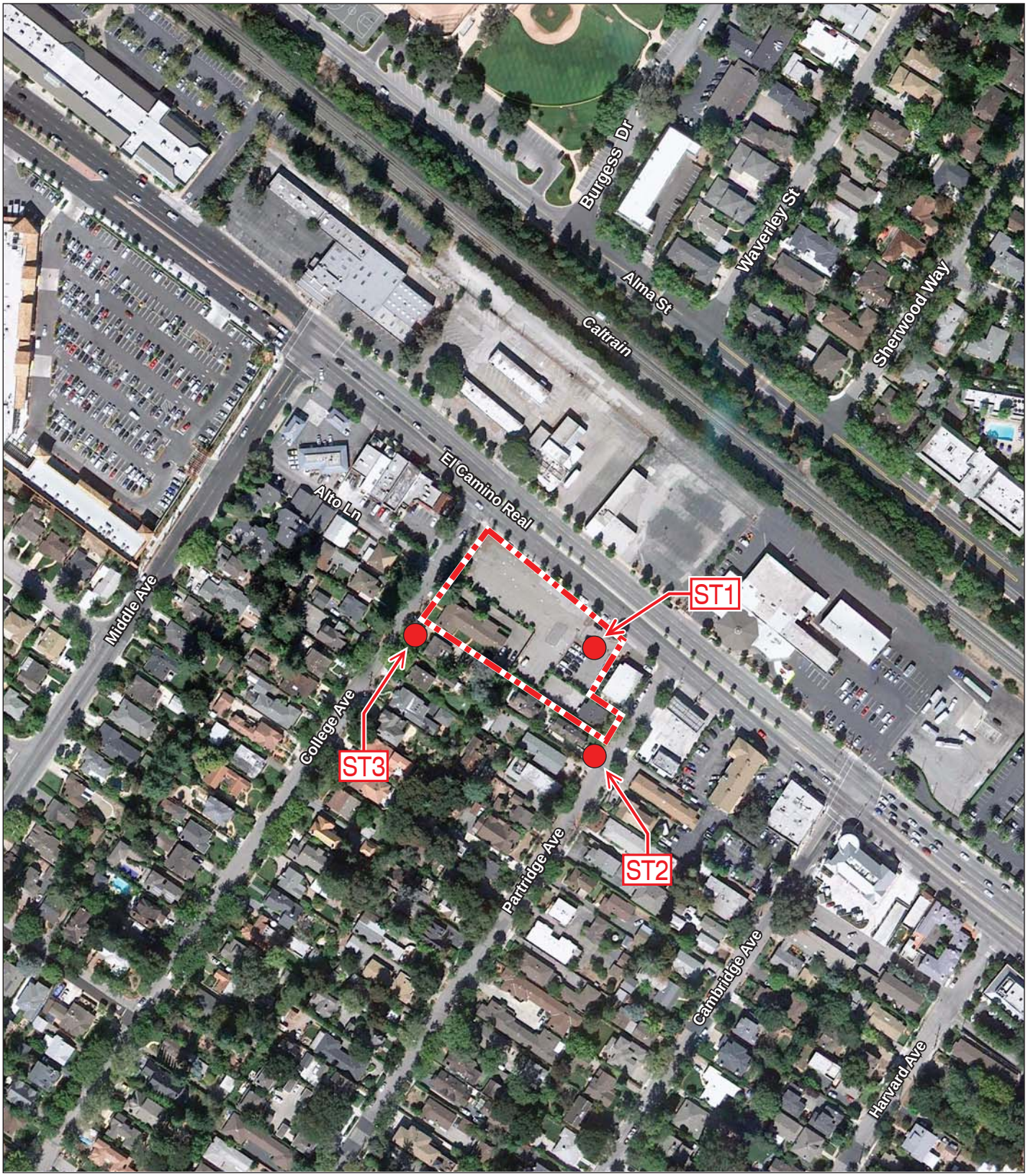
(2) Existing Stationary and Activity Noise Sources in the Project Site Vicinity. Existing stationary noise sources in the project site vicinity include noise generated by idling trucks during deliveries, fans, and compressor noise sources associated with heating, ventilation, and air conditioning (HVAC) systems. The auto repair shop, located adjacent to the southern boundary of the project site, is the primary stationary noise source in the project site vicinity. Activities associated with operation of the auto repair shop including the movement of vehicles in and out of the shop, and mechanical noise, such as the removal of mufflers (using metal saws), were documented through the short term noise monitoring as producing noise levels up to 80 dBA L_{max} at 30 feet from the open garage doors.

(3) Existing Vehicular Traffic. Vehicular traffic is the primary noise source in the project site vicinity. The existing traffic noise levels along select roadway segments in the study area are listed in Table IV.D-11. The highlighted rows in Table IV.D-11 indicate 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, Middle Avenue, College Avenue, Partridge Avenue, Cambridge Avenue, and University Drive. 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 DKS Associates.[4] The resultant noise levels were weighted and summed over 24-hour periods to determine the CNEL values. The traffic noise model printouts are included in Appendix C.

Traffic on El Camino Real results in noise levels of 68.3 dBA CNEL at 50 feet from the centerline of the outermost travel lane. Noise levels from traffic on the other streets in the project site vicinity are all less than 54 dBA CNEL at 50 feet from the centerline of the outermost travel lane. The current site plans show a minimum setback from El Camino Real of approximately 25 feet from the centerline of the outermost travel lane. At this distance, the nearest façade of the proposed residential units would be exposed to traffic noise levels of approximately 72 dBA CNEL.

(4) Existing Rail Operations. The site is bordered by El Camino Real to the east. Beyond El Camino Real are commercial uses and associated surface parking lots. To the east of these commercial uses are the Caltrain railroad tracks. Based on the Caltrain schedule in place as of January 2011, this portion of the rail line currently carries 56 Caltrain passenger trains (31 northbound and 25 southbound trains) and one to four unscheduled freight trains per day. The closest at-grade crossing of the railroad tracks where warning horns must be sounded is located on Ravenswood Avenue, approximately 2,500 feet from the project site's northeastern boundary. Based on the FTA's transit noise calculation guidelines, these train activities would result in noise levels (taking into account train horn noise) of approximately 53 dBA CNEL, as measured at the eastern project site boundary. The model results are provided in Appendix C.

[4] DKS Associates, 2011. *389 El Camino Real Project Traffic Impact Analysis.* December 15.



LSA

FIGURE IV.D-1

Project Site

Noise Monitoring Locations

N

0 115 230

FEET

SOURCE: GOOGLE EARTH, 10/2009; LSA ASSOCIATES, INC., 2011.

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389 El Camino Real Project EIR

Noise Monitoring Locations

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Table IV.D-11: Existing 2011 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 – Menlo Ave. to Roble Ave.	36,300	62	120	251	67.9
El Camino Real – Roble Ave. to Middle Ave.	35,700	61	118	249	67.8
El Camino Real – Middle Ave. to Cambridge Ave. [a]	39,500	64	126	266	68.3
El Camino Real – Cambridge Ave. to Creek Dr.	41,200	66	130	273	68.5
Middle Ave. – University Dr. to El Camino Real	8,700	< 50 [b]	< 50	76	62.0
College Ave. – University Dr. to El Camino Real [a]	700	< 50	< 50	< 50	49.2
Partridge Ave. – University Dr. to El Camino Real [a]	600	< 50	< 50	< 50	48.5
Cambridge Ave. – University Dr. to El Camino Real	1,400	< 50	< 50	< 50	52.2
University Dr. – Middle Ave. to Cambridge Ave.	2,000	< 50	< 50	< 50	53.7

[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., 2011.

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 *CEQA Guidelines*. The project would have a significant impact on the environment if it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels; and
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

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

(1) Construction Vibration Impacts. Construction activities, especially those associated with the use of impact equipment such as that used in pile driving, are a known source of ground-borne noise and vibration. However, pile driving is not expected to be used in construction of the

proposed project. Typical groundborne vibration levels from heavy construction equipment in full operation, such as vibratory rollers, range up to approximately 0.21 PPV as measured at a distance of 25 feet.[5] The FTA construction vibration damage thresholds are shown in Table IV.D-6. The damage threshold for structures made of non-engineered timber and masonry buildings is 0.2 PPV.

The closest sensitive receptors to the proposed construction areas are the single-family residential units located adjacent to the western boundary of the project site, whose closest facades are approximately 15 feet from the proposed residential units. At this distance, vibration levels from project building construction activities, including the use of large bulldozers, compactors, and front-end loaders, would be approximately 0.19 PPV. Large vibratory rollers could be used in the construction of the proposed internal driveway. The nearest off-site residential buildings are located approximately 60 feet from the proposed internal roadway areas. At this distance, vibration levels from a vibratory roller operating at the edge of the proposed parking lot would be expected to range up to approximately 0.06 PPV. Therefore, due to the distance of off-site sensitive structures from the proposed construction areas, and considering the structural engineering of these existing buildings, expected vibration levels would be below the FTA's construction vibration impact threshold of 0.2 PPV for adjacent off-site land uses and would be considered less than significant.

(2) Railroad Noise and Vibration Impacts. The Caltrain rail line is located approximately 455 feet from the project site's eastern boundary. The closest at-grade crossing where warning horns must be sounded is on Ravenswood Avenue, approximately 2,500 feet from the project site's northeastern boundary. Although warning horns may be audible on the project site, at this distance noise from train activity would not expose persons on the project site to noise levels in excess of established standards. Thus, noise impacts from train activities would be less than significant for the proposed residential land use.

Train activities can also be a source of groundborne vibration. However, as the railroad tracks are located approximately 455 feet from the nearest project property line, vibration impacts from railroad activity would be less than significant.

(3) Off-Site Traffic Noise Impacts. 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 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 modeling effort that isolates the 60, 65, and 70 dBA CNEL contours for traffic noise levels in the vicinity of the project site. The modeled existing traffic noise levels are shown in Table IV.D-11. The traffic noise levels that would occur with and without the project under near term traffic conditions (i.e., assuming full occupancy of planned/approved developments near the project site that would be completed in the near term) are shown in Table IV.D-12. The traffic noise levels that would occur with and without the project under long term (year 2030) traffic conditions (i.e., assuming traffic conditions that would exist in the near term condition with an assumed growth rate of 1 percent per year to account for future development over a 20-year growth horizon) are shown in Table IV.D-13. The grey highlighted rows shown in Tables IV.D-12 and IV.D-13 represent roadway segments adjacent to the project site.

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

In order to analyze the worst case scenario and highest traffic volumes for each of the modeled scenarios, PM traffic volumes were used to calculate the Average Daily Traffic (ADT) volumes, as PM volumes were higher overall than the AM traffic volumes.

Tables IV.D-12 and IV.D-13 show that implementation of the proposed project would result in relatively minor changes in traffic noise levels (i.e., less than the normally perceptible change of 3 dBA in an outdoor noise environment). The largest noise increases that would be experienced with project-related traffic in the near term would occur on Partridge Avenue from University Drive to El Camino Real and on College Avenue from University Drive to El Camino Real. With implementation of the project, these segments would experience increases in noise levels over existing conditions of 0.7 dBA and 0.6 dBA, respectively.

The largest noise increases that would be experienced with project-related traffic in the long term would be on Partridge Avenue from University Drive to El Camino Real and on El Camino Real from Roble Avenue to Middle Avenue. With implementation of the proposed project, these segments would each experience increases in noise levels of 1.3 dBA over existing conditions.

As indicated above, the smallest perceptible increase in noise levels in an outdoor environment is 3 dBA. Therefore, noise level increases resulting from project-related traffic noise would not be perceptible and would be considered less-than-significant for off-site receptors (e.g., residents adjacent to the project site).

In addition, it should be noted that implementation of the proposed project would be expected to reduce traffic noise levels at the existing residential uses that are located immediately to the west of the project site. This noise reduction would be expected to occur as a result of the development of project buildings between these residential properties and El Camino Real. The development of the proposed structures would be expected to provide a minimum 5 dBA to 10 dBA reduction in traffic noise levels at the outdoor use areas of these residential properties compared to existing conditions (for properties to the west of the site that have a direct line of sight to El Camino Real).

(4) Aircraft Noise Impacts. The Palo Alto Airport, which is the closest airport to the project site, is located approximately 4.2 miles east of the site. The San Carlos airport is located approximately 7.1 miles northwest of the site. At these distances and due to the flight approach patterns for these airports, the project site is located outside the 55 dBA CNEL noise contour resulting from air traffic at these airports. The project site is not located in an airport land use plan or within 2 miles of a public or public use airport. Therefore, implementation of the proposed project would not expose persons within the project site to excessive aircraft-related noise levels. In addition, the project site is not located within the vicinity of a private airstrip. Therefore, the proposed project would not expose persons on the project site to excessive noise levels associated with a private airstrip.

c. Significant Impacts. The proposed project would result in potentially significant impacts, as 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>: Noise levels from project construction activities could result in a substantial temporary or periodic increase in ambient noise levels in the project site vicinity above levels existing without the project. (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 the 14-month construction period. In addition, noise associated with on-road vehicles is regulated by federal and State governments and is exempt 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.

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. Earthmoving equipment includes excavating machinery such as backhoes, bulldozers, front loaders and compacting equipment, which includes compactors, scrapers, and graders. Typical operating cycles for such construction equipment involve 1 or 2 minutes of full power operation followed by 3 to 4 minutes at lower power settings.

Table IV.D-12: Near Term Traffic Noise Levels

	Near Term Without Project		Near Term With Project			
Roadway Segment	**Average Daily Trips (ADT)**	**CNEL (dBA) 50 Feet from Centerline of Outermost Lane**	**Average Daily Trips (ADT)**	**CNEL (dBA) 50 Feet from Centerline of Outermost Lane**	**Increase From Existing Conditions (dBA)**	**Increase From Without Project Conditions (dBA)**
El Camino Real – Menlo Ave. to Roble Ave.	38,700	68.2	38,800	68.2	0.3	0.0
El Camino Real – Roble Ave. to Middle Ave.	38,100	68.1	38,200	68.1	0.3	0.0
El Camino Real – Middle Ave. to Cambridge Ave. [a]	41,900	68.5	41,900	68.5	0.2	0.0
El Camino Real – Cambridge Ave. to Creek Dr.	43,700	68.7	43,700	68.7	0.2	0.0
Middle Ave. – University Dr. to El Camino Real	8,800	62.0	8,900	62.1	0.1	0.1
College Ave. – University Dr. to El Camino Real [a]	700	49.2	800	49.8	0.6	0.6
Partridge Ave. – University Dr. to El Camino Real [a]	600	48.5	700	49.2	0.7	0.7
Cambridge Ave. – University Dr to El Camino Real	1,500	52.5	1,500	52.5	0.3	0.0
University Dr. – Middle Ave. to Cambridge Ave.	2,000	53.7	2,100	53.9	0.2	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., 2011.

Table IV.D-13: Long Term Traffic Noise Levels

	Long Term Without Project		Long Term With Project			
Roadway Segment	**Average Daily Trips (ADT)**	**CNEL (dBA) 50 Feet from Centerline of Outermost Lane**	**Average Daily Trips (ADT)**	**CNEL (dBA) 50 Feet from Centerline of Outermost Lane**	**Increase From Existing Conditions (dBA)**	**Increase From Without Project Conditions (dBA)**
El Camino Real – Menlo Ave. to Roble Ave.	48,000	69.1	48,000	69.1	1.2	0.0
El Camino Real – Roble Ave. to Middle Ave.	47,200	69.0	47,300	69.1	1.3	0.1
El Camino Real – Middle Ave. to Cambridge Ave.	51,800	69.5	51,800	69.5	1.2	0.0
El Camino Real – Cambridge Ave. to Creek Dr.	53,900	69.6	53,900	69.6	1.1	0.0
Middle Ave. – University Dr. to El Camino Real	10,500	62.8	10,500	62.8	0.8	0.0
College Ave. – University Dr. to El Camino Real	900	50.3	900	50.3	1.1	0.0
Partridge Ave. – University Dr. to El Camino Real	700	49.2	800	49.8	1.3	0.6
Cambridge Ave. – University Dr. to El Camino Real	1,700	53.0	1,700	53.0	0.8	0.0
University Dr. – Middle Ave. to Cambridge Ave.	2,100	53.9	2,400	54.5	0.8	0.6

Source: LSA Associates, Inc., 2011.

Table IV.D-14 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 91 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase would affect neighboring uses, including residential uses to the west of the project site.

Table IV.D-14: 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	74 to 84	80
Scrapers	83 to 91	87
Haul trucks	83 to 94	88
Cranes	79 to 86	82
Portable generators	71 to 87	80
Rollers	75 to 82	80
Dozers	77 to 90	85
Tractors	77 to 82	80
Front-end loaders	77 to 90	86
Hydraulic backhoe	81 to 90	86
Hydraulic excavators	81 to 90	86
Graders	79 to 89	86
Air compressors	76 to 89	86
Trucks	81 to 87	86

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

Demolition of existing structures on the project site and construction of the proposed project is expected to require the use of earthmovers such as bulldozers and scrapers, loaders and graders, water trucks, dump trucks, and pickup trucks. As shown in Table IV.D-14, the typical maximum noise level generated by backhoes on the project site is assumed to be 86 dBA L_{max} at 50 feet from the operating equipment. The maximum noise level generated by bulldozers is approximately 85 dBA L_{max} at 50 feet. The maximum noise level generated by water trucks and other similar trucks is approximately 86 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 during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from an active construction area.

Pile driving can be another major source of construction noise, but would not be used as part of the project.

The closest noise sensitive land uses to the project construction areas are the single-family residential land uses located adjacent to the project site's western boundary. The nearest façade of these properties is located approximately 15 feet from the proposed project buildings. If multiple pieces of earth-moving equipment were to operate simultaneously in close proximity to one another adjacent to the project boundary, these existing single-family uses could be exposed to equipment noise levels in excess of 100 dBA L_{max} during full-power operation cycles. Operation of construction equipment would result in a substantial temporary or periodic increase in ambient noise levels in the project site vicinity above levels existing without the project. Therefore, mitigation would be required to reduce this impact.

In accordance with the City's Noise Ordinance, the project applicant would be required to ensure compliance with the City's regulations regarding permitted hours of construction and maximum permitted equipment operational noise levels. In addition, the construction of a temporary sound barrier along the western project property line would further reduce impacts from temporary construction noise at the adjacent residential land uses. This sound barrier would be expected to reduce temporary construction activity noise levels at sensitive land uses adjacent to the project site by a

minimum of 8 dBA. The location of this temporary sound barrier is shown in Figure IV.D-2. It is included below in Mitigation Measure NOISE-1 as the final element.

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 implemented 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's 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. The signs shall be posted at all entrances to the construction site upon the commencement of construction for the purpose of informing contractors and subcontractors and all other persons at the construction site of the basic requirements of the Noise Ordinance of the Municipal Code. The sign shall be at least 5 feet above ground level and shall consist of a white background with black letters.
- A pre-construction meeting shall be held with the job inspectors and the general contractor/on-site project manager to confirm that noise mitigation protocols are in place prior to the issuance of a building permit (including the establishment of 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).
- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project demolition or construction activities 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 equipment with compressed-air exhaust systems 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.
- No piece of powered equipment shall generate noise in excess of 85 dBA at 50 feet. Powered equipment is defined by the City to be a motorized device powered by electricity or fuel used for construction, demolition, and property or landscape maintenance or repairs. Powered equipment includes but is not limited to: parking lot sweepers, saws, sanders, motors, pumps, generators, blowers, wood chippers, vacuums, drills and nail guns (but specifically excluding internal fuel combustion engine leaf blowers).

- Prior to construction, a temporary sound barrier shall be constructed along the project's western property line adjacent to the existing residential properties that border the project site. The temporary sound barrier shall extend from the project property line at College Avenue to the project property line at Partridge Avenue. This temporary sound barrier shall be constructed at the minimum height of 6 feet above the proposed finished pad elevation with a minimum surface weight of 4 pounds per square foot (or with any commercially available sound barrier material that has an equivalent noise reduction coefficient as a material with a minimum surface weight of 4 pounds per square foot) and shall be constructed so that vertical or horizontal gaps are eliminated. This temporary barrier shall remain in place through the construction phase in which heavy construction equipment, such as excavators, bulldozers, scrapers, loaders, rollers, pavers, and dump trucks are operating within 100 feet of the western project site boundary. (LTS)

(2) Operational Noise Impacts. Operational noise from stationary and traffic noise sources in the project site vicinity would result in noise levels in excess of the City's "normally acceptable" standards, as discussed below.

<u>Impact NOISE-2</u>: Implementation of the proposed project would expose future residents of the proposed project to noise levels that exceed the "normally acceptable" standard for new residential development established in the City's Land Use Compatibility Standards for Community Noise Environments. (S)

Traffic Noise Impacts. The results of the traffic noise modeling are shown in Tables IV.D-11 through IV.D-13. The modeled existing traffic noise levels are shown in Table IV.D-11. The near term traffic noise levels that would occur with and without the project are shown in Table IV.D-12. The long term (year 2030) traffic noise levels that would occur with and without the project are shown in Table IV.D-13.

The traffic noise modeling results show that portions of the project site would be exposed to exterior traffic noise levels that exceed the City's "normally acceptable" land use compatibility criteria of 60 dBA CNEL for new residential development. Existing traffic noise levels on the project site range up to 68.3 dBA CNEL at 50 feet from the centerline of the outermost travel lane of El Camino Real.

Noise generated by traffic along roadway segments adjacent to the project site would range up to 69.5 dBA CNEL at 50 feet from the centerline of the outermost travel lane of El Camino Real under long term traffic conditions both with and without the project.

The nearest façade of the proposed project would be located approximately 25 feet from the centerline of the outermost travel lane of El Camino Real. At this minimum building setback, long term traffic noise levels would range up to approximately 73 dBA CNEL. The City considers outdoor environments with ambient noise levels between 70 dBA and 75 dBA CNEL to be "normally unacceptable" for new residential development. The land use compatibility standards for new residential development require that an acoustical analysis demonstrate the manner by which the development will meet the standards for interior noise levels (45 dBA CNEL) with windows and doors closed. Therefore, in order to maintain acceptable interior noise levels, noise insulation features must be included in the project design.

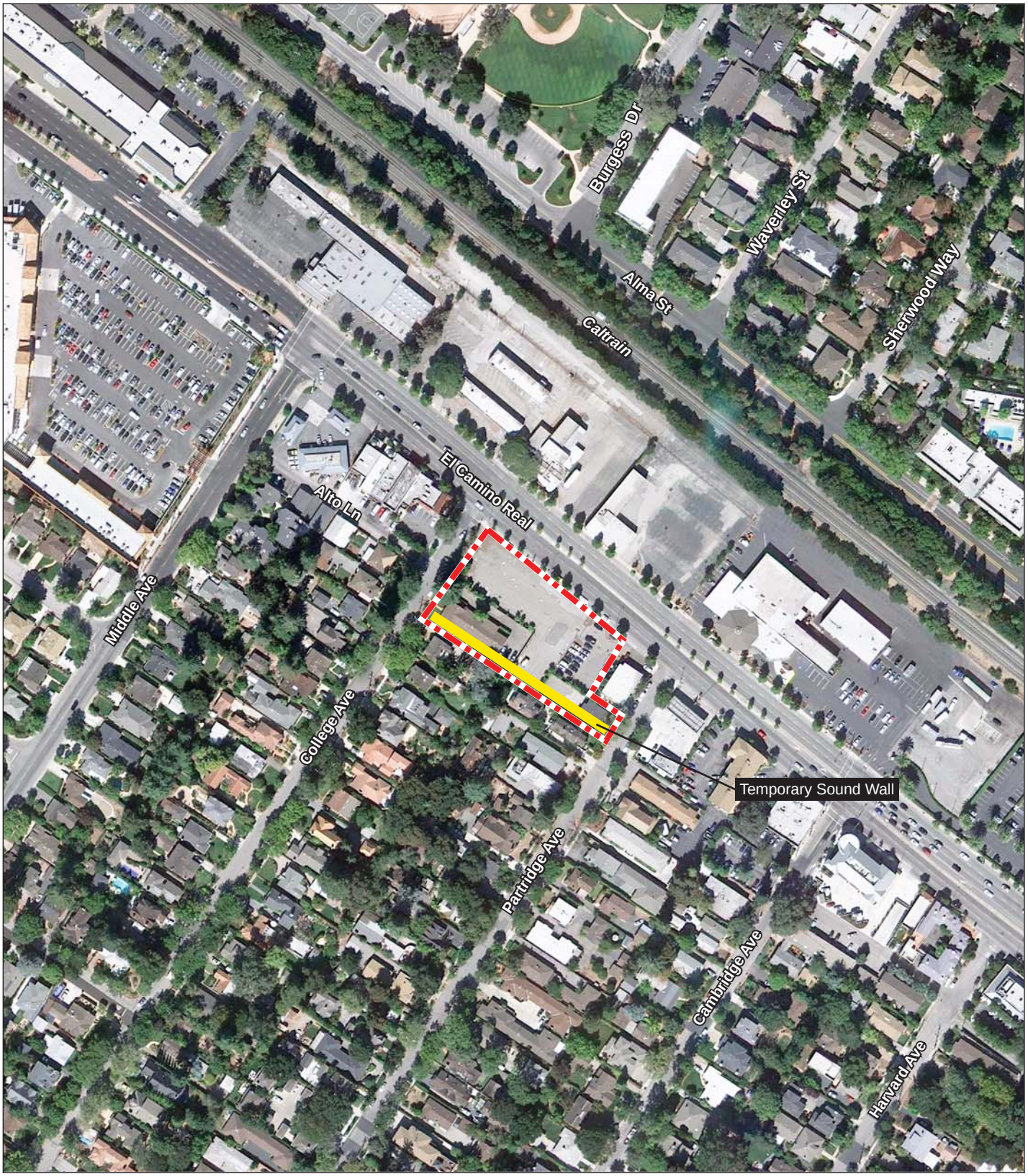

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FIGURE IV.D-2

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Project Site

Temporary Sound Wall Location

389 El Camino Real Project EIR

Temporary Sound Wall Location

SOURCE: GOOGLE EARTH, 10/2009; LSA ASSOCIATES, INC., 2011.

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Based on the U.S. EPA's Protective Noise Levels,[6] with a combination of walls, doors, and windows, standard construction for northern California residences would provide 25 dBA in exterior-to-interior noise reduction with windows closed and 15 dBA or more with windows open. With windows open, interior noise levels of the nearest proposed residential units to El Camino Real would not meet the interior noise standard of 45 dBA CNEL (i.e., 73 dBA - 15 dBA = 58 dBA). Future traffic noise levels on all areas of the site would range from 60 dBA to over 72 dBA, thus requiring implementation of an alternative form of ventilation, such as air conditioning, that would allow windows to remain closed for prolonged periods of time. However, even with implementation of an alternative form of ventilation, the nearest residential units to El Camino Real would not meet the interior noise level standard of 45 dBA CNEL (i.e., 73 dBA – 25 dBA = 48 dBA). At a distance of 45 feet from the centerline of the outermost travel lane of this segment of El Camino Real, long term traffic noise levels would attenuate to below 70 dBA CNEL. Therefore, in addition to the inclusion of an alternative form of ventilation such as air conditioning systems, the facades of all units within 45 feet of the centerline of the outermost travel lane of El Camino Real must be constructed to have an overall laboratory sound transmission class (STC)[7] rating of at least STC-35, and all exterior doors and windows must have a minimum rating of STC-33. Quality control must be exercised in construction to ensure all air gaps and penetrations of the building shell are controlled and sealed.

Therefore, implementation of the following multi-part mitigation measure requiring such design features would be required in order to reduce traffic noise levels at the proposed residential uses to a less-than-significant level:

> Mitigation Measure NOISE-2a: In order to ensure that windows can remain closed for prolonged periods of time to meet the interior noise standard of 45 dBA CNEL established by the City, an alternative form of ventilation, such as air conditioning or noise-attenuated passive ventilation systems, shall be included in all proposed dwelling units.
>
> Mitigation Measure NOISE-2b: In order to meet the interior noise standard of 45 dBA CNEL established by the City, all proposed dwelling units that would be located within 45 feet of the centerline of the outermost travel lane of El Camino Real shall be constructed to have an overall minimum STC rating of STC-35, and all exterior doors and windows shall have a minimum rating of STC-33. Quality control shall be exercised in construction to ensure all air-gaps and penetrations of the building shell are controlled and sealed. (LTS)

Stationary Noise Impacts. Existing stationary noise sources in the project site vicinity contribute to the ambient noise environment such that portions of the project site would be exposed to exterior noise levels that exceed the City's "normally acceptable" noise standard of 60 dBA CNEL for new residential development.

Short term noise measurement ST1 was taken on the project site adjacent to the auto repair shop. The documented ambient noise levels at this location averaged 68.8 dBA L_{eq}. The documented noise sources included both traffic and stationary sources such as mechanical noise from activities at the auto repair shop. Activities associated with operation of the auto repair shop included the movement

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

[7] Sound Transmission Class rates a partition's resistance to airborne sound transfer at the speech frequencies (125-4000 Hz). The higher the number, the better the resistance.

of vehicles in and out of the shop and mechanical noise such as that generated by the removal of mufflers (using metal saws), pneumatic drills, and compressors. Documented noise levels from these activities ranged up to nearly 80 dBA L_{max} at 30 feet from the open garage doors. When averaged over 24 hours, such intermittent noise levels would be expected to be less than the existing 24-hour weighted average traffic noise levels of 68.3 dBA CNEL.

With implementation of the design requirements outlined in multi-part Mitigation Measure NOISE-2, documented existing noise levels from combined traffic and stationary sources would be reduced to below the City's interior noise standard for new residential uses of 45 dBA CNEL (i.e., 68.8 dBA - 25 dBA = 43.8 dBA). Therefore, implementation of Mitigation Measure NOISE-2 would reduce potential impacts on the proposed sensitive land uses from existing stationary noise sources to a less-than-significant level.

Impact NOISE-3: Implementation of the proposed project could expose nearby existing land uses to unacceptable noise levels in violation of the City's Noise Ordinance (Chapter 8.06). (S)

Implementation of the proposed project could result in noise impacts to off-site sensitive land uses from project-related stationary noise sources. Noise generated by residential activities (e.g., gardening, children playing, barbecues) would not be expected to increase ambient noise levels, when averaged over time. Noise generated by project-related mechanical equipment such as air conditioners would be similar to noise levels existing in the vicinity of the project site and would not create a significant increase in noise levels. However, these stationary noise sources could result in exceedances of the standards contained in the City's Noise Ordinance. The Noise Ordinance (Chapter 8.06 of the City's Municipal Code) outlines noise limitations for noise sources that would affect or originate from residential land uses. This ordinance restricts all sources of noise (including fixed equipment such as air conditioners, pool filters, compressors, and industrial machinery) from exceeding 60 dBA L_{eq} during daytime hours and 50 dBA L_{eq} during nighttime hours, as measured at any point on a neighboring residential property nearest where the noise source at issue generates the highest noise level. Any plans submitted for a building permit must include documentation that proposed equipment meets this standard. Implementation of Mitigation Measure NOISE-3 would ensure that the project would comply with this Municipal Code requirement and would reduce project-related stationary noise impacts on off-site noise-sensitive land uses in the project site vicinity to a less-than-significant level.

> Mitigation Measure NOISE-3: The project sponsor shall ensure that project plans submitted for a building permit include documentation that proposed stationary equipment shall not generate noise that exceeds 60 dBA L_{eq} during daytime hours and 50 dBA L_{eq} during nighttime hours, as measured at any point on a neighboring residential property nearest where the noise source at issue generates the highest noise level. (LTS)