3.6 Noise

Introduction

This section describes the affected environment and regulatory setting for noise. It also describes the potential noise impacts that would result from implementation of the Project and provides mitigation measures that would reduce these impacts, where applicable. Cumulative impacts are discussed at the end of this section.

No comments pertaining to noise issues were received in response to the Notice of Preparation (NOP) (Appendix 1).

Existing Conditions

Regulatory Setting

City of Menlo Park General Plan

The California Government Code requires that a noise element be included in the general plan of each county and city in the state. The noise element establishes the local government's goals, objectives, and policies related to noise control. The Noise Element of the City of Menlo Park's (City's) General Plan establishes goals and policies for ensuring that existing and proposed land uses are compatible with their noise environments. Therefore, the City has adopted quantitative exterior noise compatibility criteria for various land uses. The purpose of these criteria is to reduce the potential adverse noise effects of new developments on people, including sleep disturbance, interference with speech communication, and the general sense of dissatisfaction that is often associated with high noise exposure.

Land use compatibility noise standards are included in the City's Noise Element. According to the Noise Element, noise levels up to 60 A-weighted decibels (dBA) day-night level (L_{dn}) are considered normally acceptable for single-family residential land uses, while noise levels are conditionally acceptable up to 70 dBA L_{dn} for these uses as long as noise insulation features are included in the design to reduce interior noise levels. For multi-family residential and hotel uses, noise levels of up to 65 L_{dn} are considered normally acceptable, with noise levels of 70 or L_{dn} considered to be conditionally acceptable. For office buildings, commercial uses, noise levels of up to 70 dBA L_{dn} are also considered to be normally acceptable, with noise levels of up to 77.5 L_{dn} being considered conditionally acceptable. For industrial uses, noise levels up to 75 dBA L_{dn} are considered normally acceptable, and noise levels of up to 80 dBA L_{dn} are conditionally acceptable. For schools and churches, playgrounds, and neighborhood parks, noise levels up to 70 dBA L_{dn} are considered normally acceptable; there are no separate conditionally acceptable noise limits for these uses.

The following goal and policies from the Noise Element of the City General Plan pertain to the Project.

> **Goal NI:** Achieve Acceptable Noise Levels.
>
> *Policy N1.1:* Compliance with Noise Standards. Consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans. Require new projects to comply with the noise standards of local, regional, and building code regulations, including but not limited to the City's Municipal Code, Title 24 of the California Code of Regulations, and subdivision and zoning codes.

Policy N1.2: Land Use Compatibility Noise Standards. Protect people in new development from excessive noise by applying the City's Land Use Compatibility Noise Standards for New Development to the siting and required mitigation for new uses in existing noise environments.

Policy N1.4: Noise Sensitive Uses. Protect existing residential neighborhoods and noise sensitive uses from unacceptable noise levels and vibration impacts. Noise sensitive uses include, but are not limited to, hospitals, schools, religious facilities, convalescent homes and businesses with highly sensitive equipment. Discourage the siting of noise-sensitive uses in areas in excess of 65 dBA CNEL without appropriate mitigation and locate noise sensitive uses away from noise sources unless mitigation measures are included in development plans.

Policy N1.6: Noise Reduction Measures. Encourage the use of construction methods, state-of-the-art noise abating materials and technology and creative site design including, but not limited to, open space, earthen berms, parking, accessory buildings, and landscaping to buffer new and existing development from noise and to reduce potential conflicts between ambient noise levels and noise-sensitive land uses. Use sound walls only when other methods are not practical or when recommended by an acoustical expert.

Policy N1.7: Noise and Vibration from New Non-Residential Development. Design non-residential development to minimize noise impacts on nearby uses. Where vibration impacts may occur, reduce impacts on residences and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration (FTA) near rail lines and industrial uses.

Policy N1.8: Potential Annoying or Harmful Noise. Preclude the generation of annoying or harmful noise on stationary noise sources, such as construction and property maintenance activity and mechanical equipment.

City of Menlo Park Municipal Code

In addition to the City General Plan, the City's Municipal Code also contains noise regulations. Chapter 8.06 of the City's Municipal Code contains noise limitations and exclusions for land uses within the city. The noise ordinance addresses noise limits that would constitute a noise disturbance, primarily as measured at residential land uses. The City's Municipal Code regulations below would be applicable to the Project.

8.06.030 Noise Limitations

Except as otherwise permitted in this chapter, any source of sound in excess of the sound level limits set forth in Section 8.06.030 shall constitute a noise disturbance. For purposes of determining sound levels from any source of sound, sound level measurements shall be made at a point on the receiving property nearest where the sound source at issue generates the highest sound level.

1. For all sources of sound measured from any residential property:
   A. "Nighttime" hours (10:00 p.m. to 7:00 a.m.)—50 dBA
   B. "Daytime" hours (7:00 a.m. to 10:00 p.m.)—60 dBA

8.06.040 Exceptions

a. Construction Activities
   1. Construction activities between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday.
   4. Notwithstanding any other provision set forth above, all powered equipment shall comply with the limits set forth in Section 8.06.040(b).

b. Powered Equipment

1. Powered equipment used on a temporary, occasional or infrequent basis operated between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday. No piece of equipment shall generate noise in excess of 85 dBA at 50 feet.

c. Deliveries

1. Deliveries to food retailers and restaurants.
2. Deliveries to other commercial and industrial businesses between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. Saturdays, Sundays, and holidays.

8.06.050 Exemptions

a. Sound Generated by Motor Vehicles. Sound generated by motor vehicles, trucks and buses operated on streets and highways, aircraft, trains, and other public transport.

1. This exemption shall not apply to the operation of any vehicle including any equipment attached to any vehicle (such as attached refrigeration and/or heating units or any attached auxiliary equipment) for a period in excess of 10 minutes in any hour while the vehicle is stationary, for reasons other than traffic congestion.

Further, the zoning ordinance also contains regulations related to roof-mounted equipment.

16.08.095 Roof-mounted equipment.

Mechanical equipment, such as air-conditioning equipment, ventilation fans, vents, ducting, or similar equipment, may be placed on the roof of a building; provided, that such equipment shall be screened from view as observed at an eye level horizontal to the top of the roof-mounted equipment, except for the SP-ECR/D district, which has unique screening requirements, and all sounds emitted by such equipment shall not exceed fifty (50) decibels at a distance of fifty (50) feet from such equipment. (Ord. 979 § 3 (part), 2012: Ord. 819 § 1 (part), 1991)

Environmental Setting

Fundamentals of Environmental Noise and Vibration

Terminology

A brief description of the noise and vibration concepts and terminology used in this assessment is provided below.

- **Sound**. A vibratory disturbance transmitted by pressure waves through a medium such as air or water and capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear. The dBA scale is the most widely used for environmental noise assessments.
- **Maximum Sound Levels (L_{max}).** The maximum sound level measured during the measurement period.

- **Equivalent Sound Level (L_{eq}).** The equivalent steady-state sound level that, in a stated period of time, would contain the same acoustical energy. The 1-hour A-weighted equivalent sound level (L_{eq} 1h) is the energy average of A-weighted sound levels occurring during a 1-hour period.
- **Day-Night Level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with a 10 dB penalty added to sound levels between 10:00 p.m. and 7:00 a.m.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m. L_{dn} and CNEL are typically within 1 dBA of each other and, for all intents and purposes, are interchangeable.
- **Vibration Velocity Level (or Vibration Decibel Level, VdB).** The root-mean-square velocity amplitude for measured ground motion expressed in dB.
- **Peak Particle Velocity (PPV).** A measurement of ground vibration, defined as the maximum speed at which a particle in the ground is moving and expressed in inches per second (in/sec).

Overview of Noise and Sound

Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process referred to as *A-weighted decibels* (dBA). Table 3.6-1 summarizes typical A-weighted sound levels for different noise sources.

Human sound perception, in general, is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. A doubling of actual sound energy is required to result in a 3 dB (i.e., barely noticeable) increase in noise; in practice, for example, this means that the volume of traffic on a roadway would typically need to double to result in a noticeable increase in noise.

The decibel level of a sound decreases (or attenuates) exponentially as the distance from the source of that sound increases. For a point source such as a stationary compressor or construction equipment, sound attenuates at a rate of 6 dB per doubling of distance. For a line source such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance.[1] Atmospheric conditions,

[1] Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. Office of Planning and Environment. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: October 6, 2015.

Table 3.6-1. Typical A-Weighted Sound Levels

Common Outdoor Activities	Sound Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 mph at 50 feet		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower at 100 feet	70	Vacuum cleaner at 3 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban area, daytime	50	Dishwasher in next room
Quiet urban area, nighttime	40	Theater, large conference room (background)
Quiet suburban area, nighttime		
	30	Library
Quiet rural area, nighttime		Bedroom at night, concert hall (background)
Rustling of leaves	20	
		Broadcast/recording studio
	10	
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: California Department of Transportation. 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September. Available: <http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013A.pdf>. Accessed: October 6, 2015.

including wind, temperature gradients, and humidity, can change how sound propagates over distance and affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers such as buildings and topography that block the line of sight between a source and receiver also increase the attenuation of sound over distance.

Community noise environments are generally perceived as *quiet* when the 24-hour average noise level is below 45 dBA, *moderate* in the 45 to 60 dBA range, and *loud* above 60 dBA. Very noisy urban residential areas are usually around 70 dBA CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA CNEL. Increments of 3 to 5 dB to the existing 1-hour L_{eq}, or to CNEL are commonly used as thresholds for an adverse community reaction to a noise increase. However, there is evidence that incremental thresholds in this range may not be sufficiently protective in areas where noise-sensitive uses are located and CNEL is already high (i.e., above 60 dBA). In these areas, limiting noise increases to 3 dB or less is recommended.[2] Noise intrusions that cause short-term interior levels to rise above 45 dBA at night can disrupt sleep. Exposures to noise levels greater than 85 dBA of 8 hours or longer can cause permanent hearing damage.

Overview of Ground-borne Vibration

Operation of heavy construction equipment, particularly pile-driving equipment and other impact devices (e.g., pavement breakers), creates seismic waves that radiate along the surface of and downward into the ground. These surface waves can be felt as ground vibration. Vibration from the operation of this type of equipment can result in effects that range from annoyance for people to damage for structures. Variations in geology and distance result in different vibration levels, including different frequencies and displacements. In all cases, vibration amplitudes decrease with increased distance.

Perceptible ground-borne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they cause rock and soil particles to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of vibration amplitude, referred to as peak particle velocity (PPV).

Vibration amplitude attenuates over distance. This is a complex function of how energy is imparted into the ground and the soil or rock conditions through which the vibration is traveling.

The following equation is used to estimate the vibration level at a given distance for typical soil conditions.[3] PPV_{ref} is the reference PPV at 25 feet:

$$PPV = PPV_{ref} \times (25/distance)^{1.5}$$

Table 3.6-2 summarizes typical vibration levels generated by construction equipment at the reference distance of 25 feet and other distances, as determined with use of the attenuation equation above.

Tables 3.6-3 and 3.6-4 summarize the guidelines developed by the California Department of Transportation (Caltrans) for damage and annoyance potential from the transient and continuous vibration that is usually associated with construction activity. The activities that are typical of continuous vibration include the use of excavation equipment, static compaction equipment, tracked vehicles, vehicles on a highway, vibratory pile drivers, pile-extraction equipment, and vibratory compaction equipment. The activities that are typical of single-impact (transient) or low-rate, repeated impact vibration include drop balls, blasting, the use of impact pile drivers, “pogo stick” compactors, and crack-and-seat equipment.[4]

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[2] Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. Office of Planning and Environment. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: October 6, 2015.

[3] Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. Office of Planning and Environment. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: October 6, 2015.

[4] California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. < http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf>. Accessed: January 7, 2016.

Table 3.6-2. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 Feet	PPV at 50 Feet	PPV at 75 Feet	PPV at 100 Feet	PPV at 175 Feet
Pile driver (sonic/vibratory)	0.734	0.2595	0.1413	0.0918	0.0396
Hoe ram	0.089	0.0315	0.0171	0.0111	0.0048
Large bulldozer	0.089	0.0315	0.0171	0.0111	0.0048
Loaded trucks	0.076	0.0269	0.0146	0.0095	0.0041
Jackhammer	0.035	0.0124	0.0067	0.0044	0.0019
Small bulldozer	0.003	0.0011	0.0006	0.0004	0.0002

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. Office of Planning and Environment. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: October 6, 2015.

Table 3.6-3. Vibration Damage Potential Threshold Criteria Guidelines

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources[a]	Continuous/Frequent Intermittent Sources[b]
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation. 2013. *Transportation and Construction Vibration Guidance Manual.* September. Available: <http://www.dot.ca.gov/hq/env/noise/pub/TCVGM_Sep13_FINAL.pdf>. Accessed: January 7, 2016.

Notes:

a. Transient sources create a single, isolated vibration event (e.g., blasting or drop balls).

b. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 3.6-4. Vibration Annoyance Potential Criteria Guidelines

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources[a]	Continuous/Frequent Intermittent Sources[b]
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation. 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September. Available: <http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013A.pdf>. Accessed: October 6, 2015

Notes:

a. Transient sources create a single, isolated vibration event (e.g., blasting or drop balls).

b. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Ground-borne vibration can also be quantified by the root-mean-square (RMS) velocity amplitude, which is useful for assessing human annoyance. The RMS amplitude is expressed in terms of the velocity level in decibel units (VdB). The background vibration velocity level in residential areas is usually around 50 VdB or lower. The vibration velocity level threshold of perception for humans is approximately 65 VdB. Most perceptible indoor vibration is caused by sources within buildings, such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are heavy construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is rarely perceptible.

Table 3.6-5 summarizes the typical ground-borne vibration velocity levels and average human response to vibration that may be anticipated when a person is at rest in quiet surroundings. If the person is engaged in any type of physical activity, vibration tolerance increases considerably. The duration of the event has an effect on human response, as does its daily frequency of occurrence. Generally, as the duration and frequency of occurrence increase, the potential for adverse human response increases.

Table 3.6-5. Typical Levels of Ground-borne Vibration

Human or Structural Response	Vibration Velocity Level (VdB)	Typical Sources (50 feet from source)
Threshold for minor cosmetic damage to fragile buildings	100	Blasting from construction project
		Bulldozer or heavy-tracked construction equipment
Difficulty in reading computer screen	90	
		Upper range of commuter rail
Threshold for residential annoyance for occasional events (e.g., commuter rail)	80	Upper range of rapid transit
Threshold for residential annoyance for frequent events (e.g., rapid transit)		Typical commuter rail Bus or truck over bump
	70	Typical rapid transit
Approximate threshold for human perception of vibration; limit for vibration-sensitive equipment		Typical bus or truck on public road
	60	
		Typical background vibration
	50	

Source: Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. Office of Planning and Environment. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: October 6, 2015.

Ground-borne noise is a secondary component of ground-borne vibration. When a building structure vibrates, noise is radiated into the interior of the building. Typically, this is a low-frequency sound that can be perceived as a low rumble. The magnitude of the sound depends on the frequency characteristic of the vibration and the manner in which the room surfaces in the building radiate sound. Ground-borne noise is quantified by the A-weighted sound level inside the building. The sound level accompanying vibration is generally 25 to 40 dBA lower than the vibration velocity level in VdB. Ground-borne vibration levels of 65 VdB can result in ground-borne noise levels of up to 40 dBA, which can disturb sleep. Ground-borne vibration levels of 85 VdB can result in ground-borne noise levels of up to 60 dBA, which can be annoying to daytime noise-sensitive land uses such as schools.[5]

[5] Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06.

Existing Site Conditions and Noise Sources

The TE Connectivity (TE) Campus located at the Project site has multiple sources of stationary noise-generating equipment, which can be observed from surrounding land uses.[6] The equipment at the TE Campus that generates noise includes cooling towers, boilers, baghouses, air compressors, chiller utility pumps, and beam tower vents. TE Connectivity and other tenants are currently in the process of vacating the Project site. As a result, some equipment has been decommissioned, while other equipment is still in operation.

The TE Campus is intended to operate within the confines of the noise conditions specified in the ministerial permit designated for the Campus. The permit was established for the TE Campus to ensure that surrounding land uses that are sensitive to noise would not be subject to adverse effects from the noise-generating equipment present at the Campus. To document compliance with the ministerial permit, noise levels generated at the TE Campus were measured in a noise monitoring and abatement report, submitted to the City in January 2015.[7] Noise was measured at the following three locations south of the TE Campus, along the Dumbarton spur railroad tracks.

- At the chain-link fence, adjacent to Beechwood School
- At the residential property line, 260 feet south of existing Buildings 307 and 308
- At the residential property line, 309 feet south of existing Building 309

At the first two locations, noise from the TE Campus was observed to be louder than the background levels of noise during some periods, while at the third location, TE Campus noise was not observed. At the second and third locations, noise from the TE Campus was found to comply with the conditions of the ministerial permit. Noise measured at the first location was found to comply with the permit during the daytime hours but to comply with the permit only partially during the nighttime hours. Please refer to Appendix 3.6-1 of the noise assessment report, which includes the full dataset of measured noise levels.

Existing Noise Levels

Figure 2-1 in Chapter 2, *Project Description*, depicts the Project site location and adjacent uses. Noise-sensitive land uses[8] in the Project vicinity include multiple neighborhoods of single-family residences, a neighborhood playground (Hamilton Park), Beechwood School, Mt. Olive Apostolic Original Holy Church of God, the Onetta Harris Community Center (including the Belle Haven Pool and Belle Haven Youth Center), and Menlo Park Senior Center. All of these sensitive land uses are south of the Project site. The shortest distance between the Project site and the nearest sensitive land use is approximately 75 feet, which is the distance to the single-family residences located on Sandlewood Street. Beechwood School is located 180 feet from the Project site at its closest distance, and an existing office building is located

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[6] Throughout this EIR, the employee activity at the existing TE Connectivity site is considered to be zero for reasons discussed in Chapter 3.0, *Environmental Impact Analysis*. However, because the Project site was partially occupied at the time measurements were taken, the activity on the site is reflected in the noise measurements. As a result, the analysis presented in this section (unlike other sections) assumes employee activity at the site.

[7] Tyco Electronics. 2015. *TE Connectivity Annual Noise Monitoring and Abatement Report for CY 2014*. January 30. Available in Appendix 3.6-1.

[8] Noise-sensitive land uses are generally defined as locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses typically include single- and multi-family residential areas, health care facilities, lodging facilities, and schools. Recreational areas where quiet is an important part of the environment can also be considered sensitive to noise. Some commercial areas may be considered noise sensitive as well, such as the outdoor restaurant seating areas.

approximately 200 feet west of the Project site at its closest distance. Kelly Park, located southwest of the Project site, is used primarily for active recreation, such as tennis, soccer, and swimming; therefore, it is not considered a noise-sensitive land use for this analysis.

The existing ambient noise environment in the Project area is characteristic of an urban environment (e.g., highway and local traffic, aircraft overflights, commercial noise sources). Noise from vehicle traffic on Bayfront Expressway/State Route 84 (Bayfront Expressway) is the dominant noise source at the Project site. To a lesser extent, the noise environment at the Project site is also influenced by vehicle traffic on local roadways (Constitution Drive and Chilco Street) as well as existing industrial machinery noise and construction activity noise on the Project site.

To quantify existing ambient noise levels in the Project area, long-term (multi-day) and short-term (15-minute) ambient noise measurements were conducted between October 1 and October 5, 2015, for the long-term measurements, and on October 1, 2015, for the short-term measurements. Measurements were conducted at locations in and around the Project site. Long-term measurement locations were selected to capture 24-hour noise levels in areas that are sensitive to noise throughout the day, such as residences and schools. In general, short-term measurements were selected to capture noise levels in areas that are not sensitive to noise throughout the day.

The locations of the noise measurement sites are shown in Figure 3.6-1. Tables 3.6-6 and 3.6-7 summarize the results of the noise measurement survey. For the complete dataset of measured noise levels, please refer to Appendix 3.6-2.

Table 3.6-6. Long-Term Noise Levels Measurements in and around the Project Site

				Measured L_{dn} by date			
Site	Site Description	Date and Time	Primary Noise Sources	Thurs. 10/1[a]	Fri. 10/2	Sat. 10/3	Sun. 10/4
LT-1	Soccer field at Beechwood School	Start: 10/01/2015 10:56 a.m. End: 10/05/2015 12:12 p.m.	Machinery noise from existing equipment on Project site; construction noise at Project site; children playing on soccer field; vehicles traveling on Chilco Street	65.7	70.5	69.8	68.5
LT-2	Eastern terminus of Sandlewood Street	Start: 10/01/2015 11:24 a.m. End: 10/05/2015 12:26 p.m.	Vehicles on Sandlewood Street and Hamilton Avenue; machinery noise from existing land uses on Project site; construction noise at Project site; vehicles entering and exiting Mt. Olive Apostolic Original Holy Church	54.3	60.9	59.0	63.8

Note: See Appendix 3.6-2 for data.

LT = long-term (multi-day) ambient noise measurement.

a. Measurements on this date started in the late morning; thus, a complete,24-hour dataset was not collected. L_{dn} values are based on the partial-day data. Partial-day data were also collected on October 5 but are not reported here because of the limited measurement period. See Appendix 3.6-2 for all available data measured on each day.

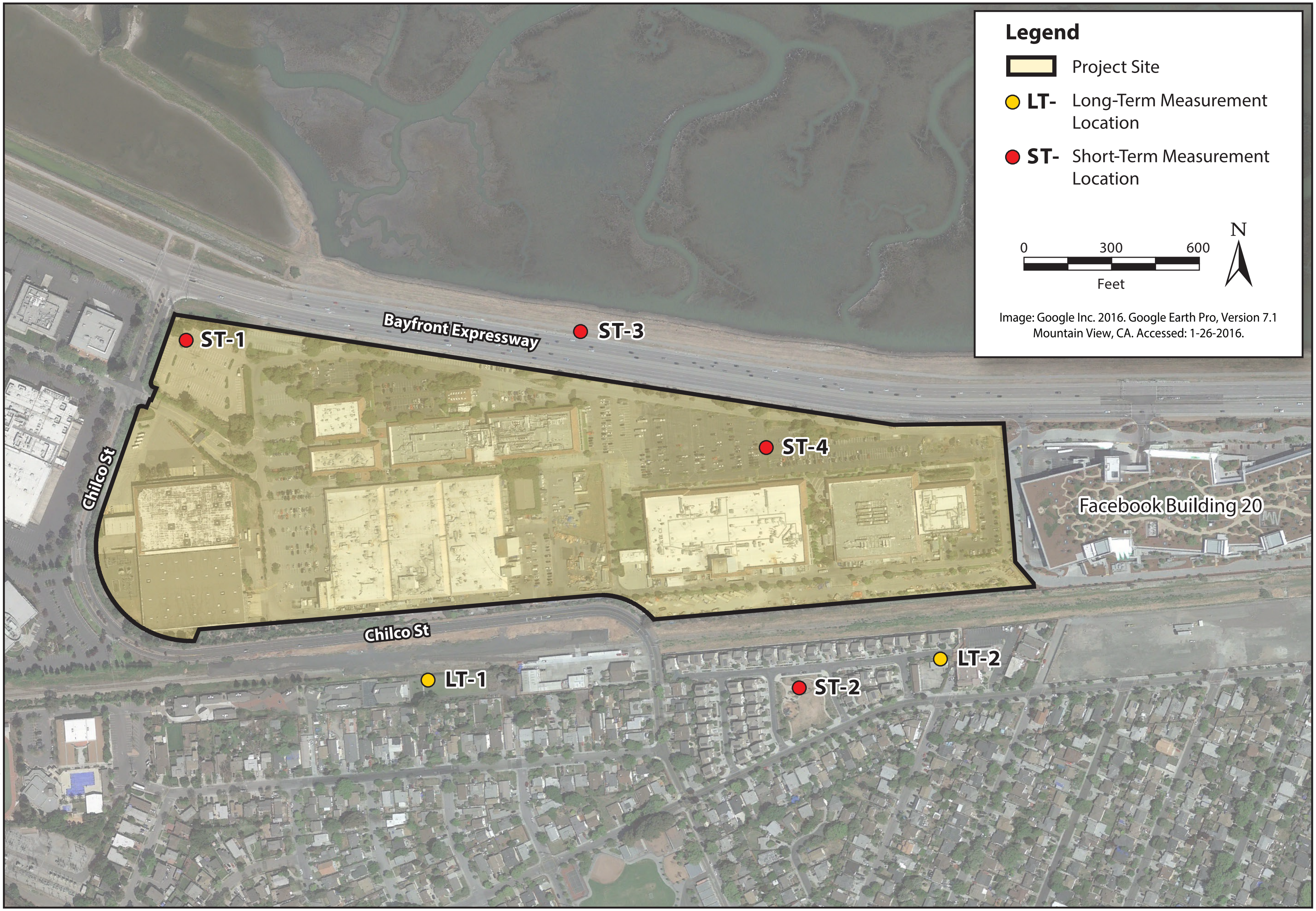

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Figure 3.6-1
Noise Measurement Locations
Facebook Campus Expansion Project Draft EIR

Table 3.6-7. Short-Term Noise Levels Measurements in and around the Project Site

Site	Site Description	Date and Time	Primary Noise Sources	Measured Noise Level (dBA)		
				L_{eq}	L_{max}	L_{min}
ST-1	Parking lot at northwest corner of Project site (location of proposed hotel)	10/01/2015 at 1:11 p.m.	Distant traffic on Middlefield Road; distant aircraft overflight; distant train horn; wind blowing leaves	60.6	69.5	49.2
ST-2	Playground on Hamilton Avenue	10/01/2015 at 12:13 p.m.	Vehicles on Hamilton Avenue and roadways adjacent to the playground; aircraft; construction equipment; backup alarm indicators	56.6	74.9	43.2
ST-3	Bay Trail	10/01/2015 at 2:22 p.m.	Vehicles on SR 84; aircraft	66.5	80.2	44.7
ST-4	Parking lot, approximately 120 feet (in front of existing Building 307)	10/01/2015 at 1:42 p.m.	Vehicles on SR 84, on Constitution Drive, and entering and exiting the parking lot; aircraft	63.2	71.9	46.4

Note: See Appendix 3.6-2 for data files.
ST = short-term (15–20 minute) ambient noise measurement.

As shown in Table 3.6-6, existing noise levels at Beechwood School (Site LT-1) range from 65.7 to 70.5 L_{dn}. Noise sources observed at this location include vehicle traffic on Chilco Street, aircraft overflights, and a constant machinery-type noise, most likely originating from stationary equipment at the TE Campus. Because LT-1 is located at a soccer field, it is probable that the noise environment is also influenced by children playing on the field. Noise from construction activity at the TE Campus was also heard. As discussed above, noise originating at the TE Campus was, in general, found to comply with the conditions of the ministerial permit, except for noise measured near Beechwood School, which was found to be in partial compliance with the permit.

Noise levels on Sandlewood Street, near the single-family residences and Mt. Olive church (Site LT-2), range from 54.3 to 63.8 L_{dn} (Table 3.6-6). Noise sources observed at this location include vehicle traffic, aircraft overflights, and construction equipment at the Project site. The noise assessment report for the TE Campus ministerial permit[9] determined that noise in this area is in compliance with the conditions of the permit, but the noise report assessed stationary-source noise only. Construction equipment noise (primarily backup indicator noises from large equipment), which was heard during the measurement period on October 1, 2015, was not considered in the TE Campus noise assessment report.

Although aircraft overflights are periodically audible at Sites ST-1, ST-3, and ST-4, the noise environment at these sites was determined to be influenced primarily by vehicle traffic on State Route (SR) 84. As shown in Table 3.6-7, noise levels at these locations were 60.6 dBA L_{eq}, 66.5 dBA L_{eq}, and 63.2 dBA L_{eq}, respectively. Noise sources at ST-2, which was located at a neighborhood playground on

[9] Tyco Electronics. 2015. *TE Connectivity Annual Noise Monitoring and Abatement Report for CY 2014*. January 30. Available in Appendix 3.6-1.

Hamilton Avenue, include frequent aircraft overflights, construction noise at the Project site, and vehicles on surrounding roadways. SR 84 has less of an influence on noise levels at this location compared with the other short-term sites because this site is located much farther from this highway than the other sites. The presence of intervening structures, between the measurement location and SR 84, along with the increased distance from SR 84 to the measurement site, contribute to the lower measured noise level at ST-2 compared with the other locations. Average noise during the 15-minute measurement period was determined to be 56.6 dBA L_{eq} at ST-2.

Existing Ground-borne Vibration Levels

The most common sources of ground-borne vibration in the Project area and the city are construction activities and roadway truck traffic. Large delivery trucks typically generate ground-borne vibration velocity levels of around 63 VdB at 50 feet from the source.[10] As described above, the vibration velocity level threshold of perception for humans is approximately 65 VdB. Therefore, existing traffic vibration is neither distinctly nor generally perceptible. Additionally, vibration velocity levels of around 63 VdB would generally not produce ground-borne noise that would disturb sleep.

Environmental Impacts

This section describes the impact analysis related to noise for the Project. It describes the methods used to determine the impacts of the Project and lists the thresholds used to conclude whether an impact would be significant. Impacts are determined to be less than significant (LTS), less than significant with mitigation (LTS/M), or significant and unavoidable (SU); there can also be no impact (NI). Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany each impact discussion, as needed.

Thresholds of Significance

In accordance with Appendix G of the California Environmental Quality Act (CEQA) Guidelines, the Project would be considered to have a significant effect if it would result in any of the conditions listed below.

- Expose persons to or generate noise levels in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies.
- Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels.
- Result in a substantial permanent increase in ambient noise levels in the Project vicinity, above levels existing without the Project.
- Result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity, above levels existing without the Project.
- Be located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport and expose people residing or working in the Project area to excessive noise levels.
- Be located in the vicinity of a private airstrip and expose people residing or working in the Project area to excessive noise levels.

[10] Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. Office of Planning and Environment. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: October 6, 2015.

Methods for Analysis

This noise impact analysis evaluates the temporary noise increase associated with Project construction activities, operational noise generated by sound-generating equipment and onsite activities, traffic noise associated with Project-related changes in traffic patterns, and the exposure of the Project site to traffic and other noise sources.

Noise impacts associated with onsite demolition and construction activities were evaluated using the noise calculation method and construction equipment noise data in the Federal Highway Administration (FHWA) roadway construction noise model (RCNM). The noise data include the A-weighted L_{max}, measured at a distance of 50 feet from the construction equipment, and the utilization factors for the equipment. The utilization factor, which is the percentage of time each piece of construction equipment is typically operated at full power over the specified time period, is used to estimate L_{eq} values from L_{max} values. For example, the L_{eq} value for a piece of equipment that operates at full power over 50 percent of the time is 3 dB less than the L_{max} value.[11]

Direct and cumulative noise impacts associated with increased traffic volumes generated by the Project were evaluated for:

- Existing conditions,
- Existing conditions plus Project condition (existing plus year 2020 Project trips),
- Forecast general plan year 2040 without Project condition (cumulative no Project), and
- Forecast general plan year 2040 with Project condition (cumulative with Project).

Modeling was conducted with use of a spreadsheet that was based on the FHWA Traffic Noise Model (TNM), Version 2.5. This spreadsheet calculates the traffic noise level at a fixed distance from the centerline of a roadway according to the traffic volume, roadway speed, and vehicle mix that is predicted to occur under each condition. Average daily traffic volumes shown in Section 3.3, *Transportation and Traffic*, and received from TJKM (for the forecast general plan no-Project condition)[12] were utilized to determine the traffic noise impact along the major Project traffic access routes. A reasonable default vehicle mix (i.e., the proportion of automobiles, trucks, buses, and other vehicles) was used for future and Project-related traffic. Traffic noise was evaluated in terms of how Project-related traffic noise increases could affect existing noise-sensitive land uses as well as proposed onsite sensitive land uses along the major Project traffic access roadways.

The evaluation of operational noise impacts associated with proposed onsite activities and stationary sources was based on the proposed site plan layout and the types of noise-generating equipment and noise-generating activities provided by the Project Sponsor.

Noise from point sources (e.g., construction equipment and stationary operational equipment) was estimated using point-source attenuation of 6 dB per doubling of distance in addition to ground attenuation of 1.5 dB per doubling of distance, for a total of 7.5 dB of attenuation per doubling of distance. Noise generated by line sources (e.g., vehicles traveling on streets) was estimated using line-source attenuation of 3 dB per doubling of distance from the noise source.

[11] Federal Highway Administration. 2006. FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January.
[12] Burgett, Colin. TJKM. January 28, 2016—email. Refer to Appendix 3.6-3.

Impacts Not Evaluated in Detail

Adjacency to Airports. The closest airport to the Project site is Palo Alto Airport, located approximately 2.4 miles to the southeast. This general aviation airport does not serve commercial aviation and has one runway; the majority of its operations involve small single-engine planes.[13] This airport does not have an adopted Airport Land Use Compatibility Plan, and the Project site is more than 2 miles from the airport. Additionally, the Project site is not located within the noise-sensitive area identified by the airport.[14] Therefore, the Project would not be exposed to excessive noise from this airport. The closest airport with an adopted airport land use plan is San Carlos Airport, located about 4.6 miles to the northwest. This airport is included in the San Mateo County Comprehensive Airport Land Use Plan, adopted in December 1996. The Project site is not located within the 55 dBA noise contour of this airport.[15] There would be ***no impacts*** related to operations at public or private airports; therefore, these impacts are not evaluated further.

Impacts and Mitigation Measures

Impact NOI-1: Exposure to Excessive Noise Levels. The Project could expose persons to or generate noise levels in excess of standards established in the General Plan, noise ordinance or applicable standards of other agencies. (LTS/M)

Construction Noise

Construction is anticipated to occur over a period of approximately 4 years. According to the noise ordinance for the city, construction activities that occur between the hours of 8:00 a.m. and 6:00 p.m. Monday to Friday do not need to comply with the 60 dBA daytime standard outlined in the City Municipal Code. During these hours, however, the ordinance states that no piece of equipment shall generate noise in excess of 85 dBA at 50 feet. Construction occurring outside the hours of 8:00 a.m. to 6:00 p.m. would need to comply with the daytime (7:00 a.m. to 10:00 p.m.) noise standard in the noise ordinance (i.e., 60 dBA L_{eq}).

Standard construction work hours for the Project would be 7:00 a.m. to 7:00 p.m. Monday through Friday; therefore, 1 hour in the morning and 1 hour in the evening would not be covered by the exemption in the noise ordinance. During these 1-hour periods in the morning and evening that are outside the construction noise exemption period, the 60 dBA daytime noise limit in the noise ordinance would apply. Additionally, although standard construction work hours would end at 7:00 p.m. on weekdays, it is possible that construction activities could occur between the hours of 7:00 p.m. and 10:00 p.m. Monday through Friday and 8:00 a.m. and 6:00 p.m. on Saturdays, resulting in additional hours of construction activity that would not be covered by the 8:00 a.m. to 6:00 p.m. weekday exception of the noise ordinance. Construction occurring during these hours on weekdays and on Saturdays would be limited by the 60 dBA daytime noise limit in the noise ordinance. No noise-generating exterior building work or site work would occur on Sundays or holidays. As stated in Chapter 2, *Project Description*, construction activities would comply with the noise requirements in the

[13] AirNav.com. 2013. KPAO—Palo Alto Airport of Santa Clara County. Available: <http://www.airnav.com/airport/KPAO>. Accessed: September 9, 2015.

[14] City of Palo Alto. n.d. *Palo Alto Airport Noise Sensitive Area Map*. Available: <http://www.cityofpaloalto.org/gov/depts/pwd/palo_alto_airport/default.asp>. Accessed: September 9, 2015.

[15] County of San Mateo. 2002. *San Carlos Airport Master Plan Update Airport Modernization Project Draft Environmental Impact Report*.

City of Menlo Park Noise Ordinance (City Municipal Code Section 8.06) at all times. It should be noted that, during the construction exemption hours (8:00 a.m. to 6:00 p.m. on weekdays), the daytime noise limit does not apply; thus, construction noise can exceed the daytime noise limit of 60 dBA so long as no piece of equipment generates noise in excess of 85 dBA at 50 feet (per City Municipal Code Section 8.06.040 b.1).

In general, construction equipment would operate throughout the Project site on a daily basis and would only occasionally operate on the edges of the Project site closest to the adjacent uses. Additionally, to evaluate as a worst-case scenario, the construction schedule assumes that a maximum of two buildings would be under construction at the same time. Construction activities at each building are expected to include building demolition, site grading and utility installation, building foundation construction, construction of the building cores and shells, and paving/architectural coatings. For each phase of construction activity, construction would require the use of heavy-duty, noise-generating equipment. Construction activities would also involve the use of small power tools, generators, mechanical equipment, and other noise sources. During each construction phase, there would be a different mix of equipment operating. Therefore, noise levels would vary, based on the equipment in operation and the location of the construction activity.

Table 3.6-8 presents the typical L_{max} of the construction equipment that would be used for the Project's construction work. The A-weighted L_{max} levels are based on noise levels measured at a distance of 50 feet from the construction equipment. The utilization factors for the equipment are defined as the fraction of time that the equipment typically runs at maximum capacity. The utilization factors are used to estimate L_{eq} values from L_{max} values. The noise reference levels and utilization factors assumed for this analysis are from the FHWA Road Construction Noise Model User's Guide.[16]

It is important to note that the noise levels in Table 3.6-8 are typical values and based on the construction equipment that is likely to be used for Project construction; thus, there could be wide fluctuations in the noise levels, depending on actual site-specific conditions and the type and mix of equipment used at the construction site. As shown in Table 3.6-8, above, the loudest equipment piece, a pile driver, could generate noise levels of up to 94 dBA L_{eq} at a distance of 50 feet. This is the only piece of equipment on the above list that would result in noise levels in excess of the 85 dBA standard for powered equipment, as described in the City Noise Ordinance. In addition, during hours outside of the weekday exemption of 8:00 a.m. to 6:00 p.m., it is possible that noise levels from construction activities could be in excess of the daytime (7:00 a.m. to 10:00 p.m.) noise ordinance noise limit of 60 dBA L_{eq}. Note that the nighttime limit of 50 dBA described in the noise ordinance would not apply because no construction activity is proposed to occur between 10:00 p.m. to 7:00 a.m.

Table 3.6-9 shows the estimated sound levels from the three loudest pieces of equipment as a function of distance, based on calculated point-source attenuation over "soft" (i.e., acoustically absorptive) ground.

[16] Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January.

Table 3.6-8. Typical Noise Levels by Construction Equipment

Equipment	Acoustical Utilization Factor (%)	Typical Noise Level (dBA) at 50 feet from Source	
		L_{max}	L_{eq}
Backhoe	40	78	74
Blade[a]	40	85	81
Bobcat[b]	40	79	75
Concrete crusher[c]	20	90	83
Crane	16	81	73
Dump truck	40	77	72
Excavator	40	81	77
Generator	50	81	78
Gradall	40	83	79
Pickup truck	40	75	82
Pile driver	20	101	94
Scraper	40	84	80
Tire wash[d]	10	82	72

Source: Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide.* FHWA-HEP-05-054. January.

Notes:

a. Based on FHWA noise level for a grader.

b. Based on FHWA noise level for a front-end loader.

c. Based on FHWA noise level for a concrete saw.

d. Based on FHWA noise level for a vacuum street sweeper.

Table 3.6-9. Calculated Reasonable Worst-Case Construction Noise Emission Levels[a]

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated L_{max} Sound Level (dBA)[b]	Calculated L_{eq} Sound Level (dBA)[b]
50	0	0.0	101	95
100	-6	-1.5	94	87
200	-12	-3.0	86	79
300	-16	-3.9	82	75
400	-18	-4.5	79	72
500	-20	-5.0	76	70
600	-22	-5.4	74	68
700	-23	-5.7	73	66
800	-24	-6.0	71	64
900	-25	-6.3	70	63
1,000	-26	-6.5	69	62
1,200	***-28***	***-6.9***	***67***	***60***
1,400	-29	-7.2	65	58
1,600	-30	-7.5	64	57
1,800	-31	-7.8	63	56
2,000	-32	-8.0	61	54
2,200	-33	-8.2	60	53
3,000	-36	-8.9	57	50

Note: ***Bold italic*** text indicates that construction noise (L_{eq}) from the Project would exceed City of Menlo Park Municipal Code noise limitations at approximately 1,200 feet.

a. Noise levels in this table are from the three loudest pieces of equipment only.

b. Noise levels in this table are unmitigated and therefore do not include the mitigation described below under Mitigation Measure NOI-1.1.

As discussed previously, noise from construction activities between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday is exempt from the general City of Menlo Park Noise Ordinance limitations; therefore, construction noise would not need to comply with the 60 dBA L_{eq} daytime noise limitation during these hours. However, construction noise occurring between 7:00 a.m. and 8:00 a.m., between 6:00 p.m. and 10:00 p.m., and on Saturdays would not be included in this exception and would need to comply with the daytime (7:00 a.m. to 10:00 p.m.) noise standard of the noise ordinance of 60 dBA L_{eq}. Comparing the noise levels in Table 3.6-9 to the City of Menlo Park Noise Ordinance limitations for daytime hours shows that construction noise could exceed the 60 dBA L_{eq} limit at residential properties within 1,200 feet. However, it is also important to note that noise levels would most likely attenuate to below 60 dBA at less than 1,200 feet because the calculated noise levels in Table 3.6-9 do not account for local shielding effects. Buildings, fences, trees, and other features would further attenuate the propagation of noise in the Project area; thus, the distances specified in Table 3.6-9 represent a reasonable worst-case scenario of construction noise because they do not assume any intervening structures. In addition, the Project contractor would implement certain Project requirements to reduce potential construction noise impacts. These include ensuring that truck routes would be one way to reduce the need for backup alarms on equipment, performing continuous noise monitoring at the perimeter of the Project site (noise data would be provided to the City on a monthly basis), and installing signage with the disturbance coordinator's contact information for questions, comments, and complaints from the public. Nevertheless, as discussed above, construction activities could result in noise that would exceed the Menlo Park 85 dBA limit for powered equipment at 50 feet during the hours between 8:00 a.m. and 6:00 p.m. and be in excess of 60 dBA L_{eq} during "daytime" (7:00 a.m. to 10:00 p.m.) hours before or after this range (the 50 dBA nighttime noise limit would not apply during these hours). This could result in a ***potentially significant*** impact.

MITIGATION MEASURE. Mitigation Measure NOI-1.1 would reduce construction-related impacts by locating equipment away from sensitive land uses, requiring sound control devices on equipment, utilizing noise-reducing enclosures, and implementing other practices. After implementing these practices, noise from construction activities would be reduced to less than 85 dBA at 50 feet between the hours of 8:00 a.m. and 6:00 p.m. on weekdays, less than 60 dBA at nearby sensitive receptors between the hours of 7:00 a.m. and 8:00 a.m. and 6:00 p.m. and 10:00 p.m. on weekdays, and between 7:00 a.m. and 10:00 p.m. on Saturdays. Thus, this impact would be ***less than significant with mitigation***.

NOI-1.1: Implement Noise Control Measures to Reduce Construction Noise during Project Construction. The Project Sponsor shall submit a Construction Noise Plan for review and approval by the Planning and Building Divisions prior to the issuance of the demolition permit. The Project Sponsor shall comply with construction noise limits specified in Section 8.06 of the City of Menlo Park Municipal Code by implementing measures during demolition and construction of the Project. These measures may include, but are not limited to:

- To the extent feasible, schedule the noisiest construction activities, such as demolition and grading activities, during times that would have the least impact on nearby residential and other receptors. This could include restricting construction activities in the areas of potential impact to the early and late hours of the workday, such as from 8:00 a.m. to 10:00 a.m. or 4:00 p.m. to 6:00 p.m., Monday through Friday.
- Use best available noise control techniques (e.g., improved mufflers, equipment redesign, intake silencers, ducts, engine enclosures, acoustically attenuating shields or shrouds) on equipment and trucks used for Project construction wherever feasible.
- Use hydraulically or electrically powered impact tools (e.g., pile drivers, jack hammers, pavement breakers, rock drills) used for Project construction wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, use an exhaust muffler on the compressed air exhaust; this muffler can lower noise levels from the exhaust by up to about 10 dBA. Use external jackets on the tools themselves where feasible. This could achieve a reduction of 5 dBA. Use quieter equipment, such as drills, rather than impact equipment whenever feasible.
- Use "quiet" gasoline-powered compressors or electric compressors, and use electric rather than gasoline- or diesel-powered forklifts for small lifting to the extent feasible.
- Locate stationary noise sources, such as temporary generators, as far from nearby receptors as possible; such sources shall be muffled and enclosed within temporary enclosures and shielded by barriers or other measures to the extent feasible.

- Install temporary noise barriers (generally approximately 8 feet in height) around construction areas adjacent to sensitive receptors to reduce construction noise from equipment to acceptable levels. Specifically, the noise barriers shall reduce noise levels during the hours of 8:00 a.m. to 6:00 p.m. on weekdays to 85 dBA at a distance of 50 feet from the construction equipment. In addition, the noise barriers shall reduce overall construction noise to less than 60 dBA L_{eq}, as measured at the applicable property lines of adjacent uses, during the hours of 7:00 a.m. to 8:00 a.m. and 6:00 p.m. to 10:00 p.m. weekdays and 7:00 a.m. to 10:00 p.m. on Saturdays. The noise barriers shall be installed unless an acoustical engineer submits documentation that confirms that the barriers are not necessary to achieve these attenuation levels or provides specific locations and heights that would achieve the required attenuation.
- Prohibit trucks from idling along streets serving the construction site.
- Prior to any pile-driving activities, notify all surrounding property owners and occupants within 300 feet of the Project site, informing them of the estimated start date and duration.
- Implement "quiet" pile-driving technology (e.g., vibratory pile driving or pre-drilled pile holes) where feasible, in consideration of geotechnical and structural requirements and conditions.
- Monitor the effectiveness of noise attenuation measures by taking noise measurements during pile-driving activities to ensure compliance with the 85 dBA standard at 50 feet for construction equipment and during general construction occurring during non-exempted daytime hours to ensure compliance with the 60 dBA L_{eq} daytime standard.

Operational Noise

Traffic

Impacts on Offsite Uses. The Project would lead to an increase in traffic in the vicinity of the Project site. Section 3.3, *Transportation and Traffic*, provides average daily traffic (ADT) data for 87 segments in the general vicinity of the Project; however, many of these roadway segments were either located far away from the Project site (where Project traffic would have little effect) or would not experience substantial traffic volume increases as a result of Project implementation. Note that a 10 percent increase in traffic generally results in an approximately 1 dB increase in noise, which is not considered to be a substantial increase in noise. To provide a conservative analysis, all roadway segments where Project-generated traffic would increase the total roadway volumes by 10 percent or more were considered in the analysis. After these segments were selected for analysis, segments that were located within the area bounded by Bay Road to the south, University Avenue to the east, and Marsh Road to the west (as well as a few additional segments located just outside of this area), regardless of the Project-related traffic volume increase, were added to the list of segments to be analyzed to characterize the existing and future noise environment in proximity to the Project for informational purposes.

The Project would result in significant impacts related to traffic noise along a roadway segment if the resulting traffic noise level would exceed the applicable land use compatibility standard for the adjacent land use where existing levels were below the standard or, if the Project-related increase is 3 dB or greater, in areas where the standard is exceeded under existing conditions. As described above, a change in sound level of 3 dB is considered barely noticeable. According to the Noise Element, residential land uses are normally compatible with a noise level of 60 L_{dn}, hotels are normally compatible with noise levels of up to 65 L_{dn}, and commercial uses are normally compatible with noise levels of 70 L_{dn}.

An initial analysis was conducted using a reference distance of 50 feet from each roadway segment centerline. Modeling results demonstrated that Project-generated traffic would have the potential to increase noise levels to above 60 L_{dn} in residential areas where existing traffic volumes do not currently result in an exceedance of the standard. This analysis indicated that significant impacts could occur at residential outdoor use areas along the following roadway segment (additional data presented in Appendix 3.6):

- Chilco Street between Hamilton Avenue and Terminal Avenue

Note that the segment of Chilco Street between Constitution Drive and Bayfront Expressway and the segment of Constitution Drive between Chilco Street and Chrysler Drive also resulted in with-Project noise levels above 60 L_{dn} in areas where existing noise levels were modeled to be less than 60 L_{dn}. However, the only nearby receptors at those segments are commercial land uses (with a standard of 70 L_{dn}); therefore, the 70 L_{dn} standard is not exceeded along these segments.

The analysis along the segment of Chilco Street between Hamilton Avenue and Terminal Avenue was then further refined. Rather than utilizing the typical reference distance, the modeling distance was adjusted to reflect the actual distance to the receivers (specifically, the residential outdoor use areas) along this segment. When accounting for the actual distances to receptors, this segment would still experience a significant impact related to traffic noise. The closest outdoor use area associated with a residence is located approximately 30 feet from the roadway centerline. Modeling for this closer distance results in an existing noise level of 59 L_{dn} and existing plus-Project noise level of 62 L_{dn}. These results indicate an instance in which Project-added traffic increases the noise levels from below the 60 L_{dn} standard to a level above the standard; the Project-added traffic increases noise levels by 3 dB.

Although these results demonstrate that traffic noise along this segment could result in significant impacts, only one receptor along the segment (471 Hamilton Avenue) is close enough to the roadway to actually experience potentially significant noise levels. Furthermore, although there are two other residences and one church along this roadway segment, none of these buildings have outdoor use areas close to the roadway; all other outdoor use areas along this segment (besides the area for 471 Hamilton Avenue) are more than 90 feet away from the roadway centerline and shielded from Chilco Street by buildings.

The outdoor use area for 471 Hamilton Avenue, which is approximately 30 feet from the roadway centerline, currently has a privacy fence that meets the standard for noise attenuation barriers. The wall is solid wood and has no cracks or gaps through or below it. The FHWA Traffic Noise Model was used to estimate the attenuation provided by the existing solid wood fence. Given the height of the fence and site geometry, this wall is expected to reduce traffic noise by approximately 4 dB.

Because the existing plus-Project noise level at the only residential receptor with potential impacts along this segment (30 feet from the roadway centerline) was modeled to result in a noise level of only 2 dB more than the applicable threshold (refer to Table 3.6-10), the 4 dB reduction in noise levels achieved by the existing privacy fence would reduce impacts related to with-Project noise levels at this receptor to ***less than significant***.

Table 3.6-10. Direct Traffic Noise Levels and Potential Impacts at Actual Distances to Offsite Receptors

Roadway	Segment	Approx. Distance to Nearest Receptor (feet)	Receptor Land Use Type	Compatibility Standard (Normally Acceptable) (L_{dn})	Existing L_{dn} at Receptor Distance[a]	Existing plus-Project (2020) L_{dn} at Receptor Distance[a]	Existing plus-Project Noise Exceeds Standard?	Difference (dB)	Potentially Significant Impact?
Chilco Street	Constitution Dr. to Bayfront Expwy.	100	C	70	60	64	No	NA	No
Constitution Drive	Chilco St. to Chrysler Dr.	40	C	70	59	63	No	NA	No
Chilco Street	Hamilton Ave. to Terminal Ave.	30	R	60	59	62	**Yes**	**3.0**	**Yes**[b]

Notes:

Bold = potentially significant impact, R = residential, C = Commercial, NA = not applicable (because standard not exceeded)

a. Modeling results presented in this table do not account for shielding or attenuation offered by buildings and privacy fences located between the roadway and nearby receptors.

b. This impact is identified as potentially significant because Project traffic could increase noise levels to above 60 L_{dn}. However, the impact would be less than significant because, as discussed above, the existing privacy fence at 471 Hamilton Avenue would reduce noise to a less-than-significant level.

Impacts on Onsite Uses. The California Supreme Court held that lead agencies are not required to analyze the impacts of the environment on a project's future users or residents, unless the project exacerbates existing environmental hazards (see *California Building Industry Association v. Bay Area Air Quality Management District* [2015], 62 Cal. 4th 369) or the legislature indicates by specific code (Public Resources Code Sections 21096, 21151.8, 21155.1, 21159.21, 21159.22, 21159.23, and 21159.24). Therefore, this analysis does not assess the potential for noise impacts from existing noise sources on onsite Project uses, unless the Project would increase the noise level from the existing noise sources.

The Project would result in the addition of traffic along some roadway segments in the vicinity of the Project site. Therefore, the Project has the potential to increase the noise level from existing noise sources. In light of the *California Building Industry Association v. Bay Area Air Quality Management District* case, noise impacts on onsite uses (specifically, the proposed hotel or outdoor common areas) should be assessed.

Project-generated traffic would have the potential to increase noise levels along the roadway segment adjacent to the proposed onsite hotel to above the 65 L_{dn} standard for hotel land uses. This roadway segment is:

- Chilco Street between Constitution Drive and Bayfront Expressway

For Chilco Street between Constitution Drive and Bayfront Expressway, the proposed onsite hotel would be located as close as approximately 125 feet away from the centerline of Chilco Street. When considering traffic on Chilco alone, with- and without-Project noise levels at this distance would be below the 65 L_{dn} standard (refer to Table 3.6-11 for the modeling results for this segment).

The proposed hotel would also be located approximately 230 feet away from the centerline of Bayfront Expressway. Existing noise levels at the location of the proposed hotel are currently estimated to be approximately 66 L_{dn}, based on the noise measurements (in L_{eq}) taken in the vicinity. The noise at this location includes traffic noise from both Bayfront Expressway and Chilco Street. Although Chilco Street–only traffic noise would not result in noise levels that would be in excess of the standard for hotels with existing plus-Project conditions, existing plus-Project traffic noise at the hotel site would be approximately 67 L_{dn} when adding traffic noise from Bayfront Expressway. This is in excess of the normally acceptable noise standard for hotel land uses, as described in the City's Noise Element. The City's Noise Element, however, includes a conditionally acceptable noise range for this use of up to 70 L_{dn}. Noise levels in this range are considered conditionally acceptable as long as interior noise is less than 45 dBA. This is generally achieved with conventional construction, because conventional construction (particularly for hotel uses) includes fresh-air supply systems or air-conditioning systems to provide fresh air with windows closed. Noise levels at the future hotel site, including potential noise from Bayfront Expressway, would be conditionally compatible with the proposed onsite hotel, and this impact would be ***less than significant***.

The potential exists for onsite outdoor use areas that face Bayfront Expressway to be exposed to noise levels that would be in excess of the noise compatibility standard. Measurements of existing Bayfront Expressway noise near the proposed outdoor use areas indicated that the noise level is approximately 66 L_{dn}. The current ADT along this roadway segment is approximately 56,000, according to Caltrans roadway data. Because the Project would add traffic to this already busy roadway, it would have the potential to exacerbate potential noise effects from this roadway. As stated in Section 3.3, *Transportation and Traffic*, the Project would increase daily (weekday) vehicle trips by 16,329. Much of this traffic would be entering the Project vicinity via US 101; however, conservatively assuming that all of this traffic would be traveling on Bayfront Expressway, this would result in a maximum noise increase

Table 3.6-11. Existing and Existing plus-Project Noise Levels at Actual Distance to Onsite Receptors along Significant Segments

Roadway	Segment	Approx. Distance to Nearest Receptor (feet)	Receptor Land Use Type	Compatibility Standard (Normally Acceptable)	Existing L_{dn} at Receptor Distance	Existing plus-Project (2020) L_{dn} at Receptor Distance	Existing plus-Project Noise Exceed Standard?	Difference	Significant Impact?
Chilco Street	Constitution Dr. to Bayfront Expwy.	125	H (p)	65	60	64	No	NA	No

Notes:

Bold = significant impact, H (p) = Hotel (proposed), NA = not applicable (because standard not exceeded) of approximately 1 dB at the onsite outdoor use areas. Therefore, even if Project-added traffic were to increase the noise effects, the noise levels would still be below the normally acceptable standards for commercial and office outdoor use areas (i.e., 70 L_{dn}).

The onsite hotel may have outdoor use areas (most likely in the form of pool and deck areas). However, the Project Sponsor has stated that if these uses are included in the design, then they would be facing the south or the east. Having these uses oriented to face the south or the east would result in complete or partial shielding, helping to block the line of sight between Bayfront Expressway and the outdoor use areas. This complete or partial shielding is expected to result in a 2 to 3 dB reduction in noise levels from Bayfront Expressway (or more, if they are south-facing) at these areas, and noise levels from roadway traffic is not expected exceed the normally acceptable 65 L_{dn} level. Noise levels at the future Project outdoor use areas that would face Bayfront Expressway would be compatible with the applicable standards, and this impact would be ***less than significant***.

General Onsite Activity

At the time of the noise measurements, the Project site was occupied. Some noise from general onsite activity already occurs because of the occupied status of these parcels. With the Project, more employee and visitor activity would be possible. Therefore, an increase in the noise level associated with employee and hotel guest activity could occur. The outdoor common areas and amenities provided on the Project site are intended to encourage informal (and, on occasion, formal) gatherings throughout the day. Noise from employee and hotel guest activity is anticipated, such as conversations in outdoor use areas; this would occur mostly during the beginning and end of the workday and during lunch hours.

Sensitive receptors located in proximity to the Project site include multiple neighborhoods of single-family residences, a neighborhood playground (Hamilton Park), Beechwood School, Mt. Olive Apostolic Original Holy Church of God, the Onetta Harris Community Center (including the Belle Haven Pool and Belle Haven Youth Center), and Menlo Park Senior Center. All of these sensitive land uses are south of the Project site. The distance between the outdoor areas of the Project site, areas where people might gather to talk or socialize (non-parking lot outdoor use areas), and the nearest sensitive land use is more than 250 feet. This represents the distance between the southern edge of the publicly accessible open space located between proposed Buildings 21 and 22 and the single-family residences located on Sandlewood Street.

The noise level of a single individual talking at a normal level a distance of 1 meter is approximately 57 dBA.[17] Assuming approximately 100 people are talking in a single area, the noise level at a distance of 1 meter would be approximately 77 dBA. For this type of noise source, the decibel level of a sound decreases (or attenuates) exponentially as the distance from the source of that sound increases. The noise level of the 100 people would attenuate by about 6 dBA for each doubling of distance from the source. At the closest residences to the outdoor areas of the Project site, areas where people might gather to talk or socialize (approximately 250 feet from the green area located south of proposed Building 22), the noise level would attenuate to approximately 40 dBA. Therefore, human activity on the Project site would not exceed 60 dBA at the nearest noise-sensitive land use and would not exceed the noise ordinance limit for residential land uses or the City General Plan compatibility standard. Additionally, Bayfront Expressway (and other busy roadways) is located in the general vicinity of the Project site; these other noise sources have the potential to generate noise far in excess of noise from general human activity, such as people conversing. For noise impacts on the onsite hotel, because

[17] Harris, Cyril M. 1979. *Handbook of Noise Control*. McGraw-Hill. New York.

outdoor meeting or gathering spaces would not be located near the hotel, it is unlikely that noise from human activity would result in a noticeable increase in the existing noise levels. As discussed above for the offsite sensitive land uses, the hotel would be located near Bayfront Expressway, which would have a much greater influence over noise levels than human voices. Therefore, impacts related to human activity and conversations onsite would be ***less than significant.***

Heating, Ventilation, and Air-Conditioning Systems

The new buildings associated with the Project would require heating, ventilation, and air-conditioning (HVAC) systems. Mechanical HVAC equipment located on the ground or rooftops of new buildings would have the potential to generate noise levels that would average approximately 66 dBA at a distance of 50 feet.[18] Although exact locations of future systems are not known at this time, it is possible that HVAC systems for Building 21 could be located along the southern edge of the building. The southern edge of Building 21 is approximately 150 feet from nearby noise-sensitive land uses (residences along Sandlewood Street); therefore, the associated HVAC equipment for this building could be as close as 150 feet from these residential receptors. Noise from the HVAC systems could be reduced to approximately 56 dBA L_{dn} at these distances and, therefore, at the nearest residential receptor, based solely on standard attenuation that occurs over distance (6 dBA per doubling of distance). For equipment located on the ground, this noise level would be below the daytime (7:00 a.m. to 10:00 p.m.) noise standard of 60 dBA from the noise ordinance but in excess of the nighttime noise standard of 50 dBA. For roof-mounted equipment, 66 dBA at a distance of 50 feet would exceed the 50 dBA limit specified in zoning ordinance (Section 16.08.095). Further attenuation of HVAC noise would most likely be achieved by possible shielding from intervening structures; therefore, actual noise levels would be even lower than the estimates discussed here. However, the new HVAC systems may expose persons to noise in excess of the applicable nighttime noise standard and zoning ordinance (Section 16.08.095). Impacts related to HVAC usage would be ***potentially significant***.

MITIGATION MEASURE. Incorporation of Mitigation Measure NOI-1.2 would reduce noise levels at nearby residences to allowable levels (i.e., less than 50 dBA during nighttime hours for equipment located on the ground and less than 50 dBA at a distance of 50 feet for roof-mounted equipment). Therefore, this impact would be ***less than significant with mitigation.***

NOI-1.2: Implement Noise Control Measures to Reduce HVAC Noise during Project Operation. The Project Sponsor shall design the Project HVAC system to limit noise to the applicable standard at the property line of nearby noise-sensitive receptors. Measures that can implemented to achieve this include, but are not limited to:

- Maximize the distance between HVAC systems and nearby sensitive receptors,
- Provide enclosures around the HVAC units,
- Incorporate local barriers around equipment, and
- Utilize mufflers or silencers on HVAC systems.

[18] U.S. Environmental Protection Agency. 1971. *Noise from Construction Equipment and Operations, Building Equipment and Home Appliances.* December 31.

Prior to the issuance of building permits, the Project Sponsor shall prepare a report, identifying measures that will be implemented to ensure that exterior HVAC noise levels will comply with the following noise limits:

- The 60 dBA L_{eq} daytime and 50 dBA L_{eq} nighttime noise standards for equipment located on the ground,
- The zoning ordinance limit of 50 dBA at a distance of 50 feet for roof-mounted equipment.

Parking Lot and Garage

The Project would include new parking areas, allowing future employees to park onsite. Specifically, approximately 3,533 parking spaces would be provided within surface parking lots and in podium parking areas under the proposed buildings (podium parking would be constructed on podiums over surface parking lots). Noise sources from parking structures and lots would include human speech, vehicle doors slamming, cars starting, tires squealing, accidental car alarm incidents, and other automotive noise. Parking area noise is difficult to quantify because of the many variables. Variations in sound levels reflect factors such as parking structure design and the number of vehicles moving through the structure at any given time. However, noise from parking garages is characterized as temporary and periodic noise. At certain times of the day, such as during the midday period, there may be increased activity in parking lots as employees and guests travel for lunch. Even during these periods, however, there most likely would not be substantial overlap in vehicle noise because of the variation in employee schedules and behavior and the short duration of parking lot vehicle activity. Overall, the temporary and periodic noise sources within the parking areas would be different from each other in kind, time, duration, and location; therefore, the overall effects would be separate and, in most cases, would not affect the same receptors at the same time. The type of noise associated with parking structures is considered a nuisance noise effect, and impacts would be ***less than significant***.

Truck Pick-Ups and Deliveries

The Project site would include a total of three loading docks. One dock would be located at the proposed office buildings (i.e., Buildings 21 and 22), and one dock would be located near Chilco Street between Building 23 and the proposed surface parking lot to the east. At Building 21, it is currently anticipated that 10 deliveries of food products would be made per day, while two deliveries of equipment would be made per week. At Building 22, approximately nine deliveries of food products would be made per day, and equipment would be delivered twice per week.

Trucks that would be used to pick up and deliver supplies at the Project site would create intermittent noise (e.g., from idling engines and the beeping from backup warning signals). However, operation of the Project would not involve large-scale commercial services, manufacturing, or similar work that would require frequent truck deliveries and pickups. Simultaneous truck deliveries to the same structure are not anticipated, and simultaneous deliveries to the Project site as a whole would be expected to occur only occasionally because of varying delivery schedules. Trucks are exempted from the City's short-term noise level limit of 60 dBA at residential land uses, provided the trucks do not idle for more than 10 minutes. State law currently prohibits heavy-duty diesel delivery trucks from idling more than

5 minutes.[19] Additionally, given the short duration and relative infrequency of truck trips to the Campus, truck deliveries would not be a source of excessive ambient noise. Therefore, noise impacts related to truck deliveries would be ***less than significant***.

Emergency Generators

Stand-by emergency power generators may be located in several buildings associated with the Project. Emergency generators create temporary and periodic noise from testing. Sound levels from these generators vary, depending on the type of generator and the noise attenuation that has been incorporated into its design and placement. The generators would be tested monthly for approximately 30 minutes to 1 hour. Given the temporary and periodic nature of emergency generator testing, generators would not permanently increase ambient noise levels; however, these generators would be subject to the City's Noise Ordinance standard of 60 dBA for residential land uses. Without accounting for noise attenuation, the emergency generators may generate sound levels of up to 97 dBA at 23 feet from the generator.[20]

The Project is anticipated to include two generators south of Building 21 and two in Building 22. The generators would all be 500-kilowatt, 762-horsepower diesel units. They would run for only 12 hours per year (approximately). The generators proposed to be located close to nearby noise-sensitive receptors are the units that would be located south of the parking area associated with Building 21; these units could be located as close as 100 feet from nearby residences. At this distance, emergency generator testing could result in noise levels in excess of 80 dBA. At this proposed generator location, very limited noise attenuation would be provided by intervening structures, and noise levels would be in excess of thresholds.

The generators are not anticipated to be in use frequently because they are intended to be a backup or emergency power source; however, because they would be tested monthly, noise levels from generator testing could exceed the City's Noise Ordinance if a noise attenuation enclosure were not installed to surround the emergency generators. Accordingly, this impact is considered ***potentially significant***.

MITIGATION MEASURES. Implementation of Mitigation Measures NOI-1.3 and NOI-1.4 would reduce impacts to less-than-significant levels. This impact would be ***less than significant with mitigation***.

NOI-1.3 *Install Sound Enclosures around Emergency Generators.* The Project Sponsor shall reduce the sound level from the operating generators to a maximum sound level of less than the 60 dBA noise standard at nearby noise-sensitive land uses. Measures that could accomplish this standard include, but are not limited to:

- Installing sound enclosures around all emergency generators,
- Utilizing mufflers to reduce generator noise, and
- Utilizing equipment that meets this standard.

[19] California Air Resources Board. 2006. *Final Regulation Order – Requirements to Reduce Idling Emissions from New and In-Use Trucks, Beginning in 2008*. October 16.
[20] City of Menlo Park. 2011. *Menlo Park Facebook Campus Project EIR*. December.

Prior to the issuance of building permits, the Project Sponsor shall prepare a report, identifying measures that shall be implemented to ensure that exterior noise levels from emergency generators comply with the 60 dBA L_{eq} daytime/nighttime noise standards.

NOI-1.4 *Limit Generator Testing to Daytime Hours.* The Project Sponsor shall limit generator testing to between the hours of 8:00 a.m. and 6:00 p.m.

Recycled Water System

A water recycling system may be installed as part of the Project. The system would include constructed wetlands, a mechanical equipment room, primary tanks, and a headworks building. All pumps, the lift station, and other noise-generating equipment associated with the recycled water facility would be housed inside buildings. The headworks building would have blowers. Specific details on the size and type of mechanical equipment to be used has not yet been determined, but it is anticipated that all motors associated with the mechanical equipment would be less than 10 horsepower.

The primary tanks and headworks buildings would be located relatively close to residences south of the Project site. Although it is possible that noise levels would be reduced to less-than-significant levels, based on the design of the building enclosures, the designs for the building enclosures have not been finalized. As such, the potential exists for noise from operation of these facilities to exceed the City's daytime and nighttime noise standards of 60 dBA-L_{eq} and 50 dBA-L_{eq} respectively. Therefore, if the recycled water system is installed as part of the Project, its impact would be considered to be ***potentially significant***.

MITIGATION MEASURE. Implementation of Mitigation Measures NOI-1.5 would reduce this impact to less than significant by ensuring that building structures that would house mechanical equipment would be designed to limit noise from mechanical equipment to levels that would be in compliance with City standards. This impact would be ***less than significant with mitigation***.

NOI-1.5 *Design Enclosures around Mechanical Equipment Associated with the Recycled Water System to Limit Exterior Noise.* The Project Sponsor shall design the recycled water system such that noise generated by mechanical equipment complies with the City noise standards of 60 dBA L_{eq} (daytime) and 50 dBA L_{eq} (nighttime) at nearby residences. Measures that could accomplish this include, but are not limited to:

- Designing equipment room enclosures, access doors, and other equipment room openings to limit noise that could be transmitted to the exterior
- Utilizing mufflers to limit blower noise

Prior to the issuance of building permits, the Project Sponsor shall prepare a report, identifying measures that shall be implemented to ensure that exterior noise levels from the recycled water system comply with the daytime and nighttime noise standards.

Impact NOI-2: Expose Persons to or Generate Excessive Ground-borne Vibration or Ground-borne Noise Levels. The Project would not expose persons to or generate excessive vibration or ground-borne noise. (LTS)

Typical outdoor sources of perceptible ground-borne vibration and noise are construction equipment, steel-wheeled trains, and heavy vehicles crossing over bumps. If a roadway is smooth, then the ground-borne vibration and noise from traffic is rarely perceptible.

Operation of the Project would consist of typical office operations and would not involve vibratory or impact equipment that would generate ground-borne vibration. Therefore, because there would be no ground-borne vibration or noise impacts associated with Project operation, the discussion of vibration impacts focuses on the ground-borne vibration and noise impacts associated with equipment during Project construction.

The operation of heavy-duty construction equipment could generate localized ground-borne vibration and noise at buildings adjacent to the construction site. Ground-borne vibration rarely causes damage to normal buildings, with the occasional exception of blasting and pile-driving during construction. It is anticipated that pile driving would be required during the construction of each building foundation. Table 3.6-2, above, summarizes typical vibration velocity levels for the various types of construction equipment that would be used for the Project.

Existing buildings (and occupants) that could be affected by ground vibration include residences, Beechwood School, and the Mt. Olive Church south of the Project site. Office buildings west of the Project site could also be affected by ground vibration during construction. As discussed in the Environmental Setting section, above, general construction activity could occur as close as 75 feet from existing residences on Sandlewood Street during construction of the green space area of proposed Building 21, directly north of the Dumbarton Rail Corridor. Construction activities associated with developing this area could involve a grader or large bulldozer; however, pile driving would not occur in this portion of the Project site. Given the reference levels shown in Table 3.6-2, PPV levels could be as high as 0.0171 PPV for a large dozer at 75 feet.[21]

Pile driving would be used exclusively to construct building foundations. Given the conceptual site plan for the Project (Figure 2-3), building foundations and the associated pile driving could occur, as a worst-case scenario, at distances of 275 feet from residences south of proposed Building 21 and 200 feet from the existing commercial building west of proposed hotel. At distances of 275 and 200 feet, PPV levels from pile driving would be 0.02 and 0.03, respectively.

Given the information in Tables 3.6-3 and 3.6-4, these worst-case PPV levels from general construction activities and pile driving would be below the damage threshold for the most fragile buildings and below the perceptibility threshold. Therefore, vibration disturbance during construction is not expected to damage buildings or be perceptible to people. This impact is considered to be ***less than significant***.

Impact NOI-3. Substantial Permanent Increase in Ambient Noise Levels. The Project would result in a permanent increase in ambient noise levels in the Project vicinity, above levels existing without the Project. (LTS/M)

Development of the Project could result in a permanent increase in ambient noise levels in the Project vicinity, as described for Impact NOI-1, above. Traffic along some roadway segments in the Project area would increase with Project development, and noise levels along some roadway segments would be expected to increase as well. Further, as discussed in Impact NOI-1, noise from Project HVAC systems, onsite emergency generators, and potentially the recycled water system may also result in a permanent increase in noise levels.

[21] This value is based on the distances specified and the reference levels and formula shown in Table 3.6-2.

As described under Impact NOI-1, implementation of Mitigation Measure NOI-1.2 would reduce impacts related to HVAC noise levels to less than significant at nearby receptors. Additionally, Mitigation Measures NOI-1.3 and NOI-1.4 would reduce impacts related to emergency generator noise to less than significant. Mitigation Measure NOI-1.5 would reduce noise impacts related to the potential recycled water system. With regard to traffic noise impacts on offsite receptors, Project-added traffic would result in a potentially significant traffic noise impact along one roadway segment in the vicinity of the Project site. However, only one receptor along the segment (471 Hamilton Avenue) is located close enough to the roadway to actually experience potentially significant noise levels.

As discussed under Impact NOI-1, the outdoor use area for 471 Hamilton Avenue is located approximately 30 feet from the roadway centerline and currently has a privacy fence that meets the standard for noise attenuation barriers. The privacy fence is solid wood and has no cracks or gaps through or below it. The FHWA Traffic Noise Model was used to estimate the attenuation provided by the existing solid wood fence. Given the height of the fence and site geometry, this wall is expected to reduce traffic noise by approximately 4 dB. Because the existing plus-Project noise level at the only residential receptor with potential impacts along this segment (30 feet from the roadway centerline) was modeled to result in a noise level of only 2 dB more than the applicable threshold (refer to Table 3.6-10), the 4 dB reduction in noise levels achieved by the existing privacy fence would reduce impacts related to with-Project noise levels at this receptor to less than significant.

Because implementation of Mitigation Measures NOI-1.2, NOI-1.3, NOI-1.4, and NOI-1.5 would reduce impacts related to stationary-source noise levels to less than significant, and the Project would not result in direct traffic-noise impacts on nearby receptors, the Project would not result in a substantial permanent increase in ambient noise levels; this impact would be ***less than significant with mitigation***.

Impact NOI-4. Substantial Temporary or Periodic Increase in Ambient Noise Levels. The Project could result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity, above levels existing without the Project. (LTS/M)

Construction

As discussed above for Impact NOI-1, construction activities could result in noise that would exceed the Menlo Park 85 dBA limit for powered equipment at 50 feet, resulting in a ***potentially significant*** impact. Mitigation Measure NOI-1.1, *Implement Noise Control Measures to Reduce Construction Noise during Project Construction,* described above under Impact NOI-1, would reduce construction-related impacts by locating equipment away from sensitive land uses. The mitigation measure would require sound control devices on equipment, noise-reducing enclosures, and other practices. As discussed previously, with implementation of this measure, noise from construction activities would be reduced to less than 85 dBA at 50 feet; thus, this impact would be ***less than significant with mitigation***.

Operational Noise

As discussed under Impact NOI-1, stand-by emergency power generators would be located in several buildings associated with the Project. As discussed above, all of these generators would be located more than 100 feet from the nearest residence and expected to result in noise levels in excess of 80 dBA at the nearest sensitive receptor without incorporation of any attenuation. However, implementation of Mitigation Measures NOI-1.3 and NOI-1.4, described under Impact NOI-1, would reduce impacts to less than significant. This impact would be ***less than significant with mitigation.***

Cumulative Impacts

The geographic context for the cumulative noise analysis from localized construction and stationary-source noise includes areas immediately surrounding the Project site, because noise diminishes rapidly with distance (6 dBA per doubling of distance for point and stationary sources). For cumulative vehicular noise impacts, the cumulative context is based on the cumulative context for the traffic analysis, which includes existing and future developments, including other current projects, probable future projects, and projected future growth within the city through 2040. This analysis is based on the projects listed in Table 3.0-3.

Impact C-NOI-1: Cumulative Exposure to Excessive Noise. The Project, in combination with other development within the city, could result in a substantial increase in exposure of persons to noise in excess of the standards established in the City General Plan or Municipal Code. The Project's contribution would be cumulatively significant. (LTS/M)

Construction Noise

Other projects that would contribute to cumulative noise impacts include the demolition of Buildings 307–309 (6) and the renovation of Building 23 (5), which are both separate projects from the Project.

Besides the demolition of Buildings 307–309 and renovation of Building 23, both of which are on the Project site, the closest planned project in the vicinity of the Project site is the Chilco Street Improvements Project (14). This project, which is located immediately adjacent to the Project site along Chilco Street, would include development of a Class 1 bike route, restriping, new fencing, and storm drain improvements, among other improvements. The proposed Dumbarton Rail Trail Project (15) is also located adjacent to the Project site (immediately south of the southern Project boundary); this 4.5-mile-long bicycling and walking pathway would run adjacent to the current Dumbarton Rail Corridor. The nearest proposed land use project is the Commonwealth Corporate Center, located approximately 550 feet west of the Project site. However, construction on this project is largely complete and is not expected to overlap with Project construction.

Although demolition of Buildings 307–309 and renovation of Building 23 would occur prior to implementation of the Project and the Chilco Street Improvements Project and the proposed Dumbarton Rail Trail Project may occur after Project construction, all of these projects are considered concurrent for the purposes of this analysis. Construction noise effects may result in a cumulative noise impact on nearby sensitive receptors. As discussed under Impact NOI-1, construction activity associated with the Project would generate noise that could affect existing adjacent land uses. However, with implementation of Mitigation Measure NOI-1.1, construction noise impacts are expected to be less than significant. Specific construction noise mitigation measures that could be applied to demolition of Buildings 307–309, renovation of Building 23, the Chilco Street Improvements Project, and the Dumbarton Rail Trail Project are not known at this time. However, it is likely that noise mitigation measures similar to those of the Project would be applied to other projects for compliance with applicable City noise standards. Given this, and the fact that construction noise is highly localized, it is not anticipated that significant cumulative construction noise impacts would occur. Thus, cumulative impacts are considered ***less than significant with mitigation***.

Operational Noise

Stationary Noise

The implementation of other development projects would have the potential to increase ambient noise by creating new operational noise sources (such as HVAC equipment, parking lots, etc.). However, the Chilco Street Improvements Project and the proposed Dumbarton Rail Trail Project, which would be located adjacent to the Project site, would not result in stationary-source operational noise. In addition, the renovation of Building 23 could result in stationary-source noise, generated by HVAC and other equipment, at the Project site. However, this level of noise would most likely not result in a substantial change from the level of noise currently generated at this building because it is reasonable to assume that the existing building currently generates HVAC or other equipment noise. Thus, renovating Building 23 would most likely not drastically increase or decrease noise generated by stationary sources. Such noise would not combine with Project operational noise in a substantial way, given the anticipated distances between stationary equipment at Building 23 and the Project buildings and the nearest sensitive land uses south of the Dumbarton Rail Corridor (i.e., hundreds of feet). No other land use projects with stationary noise sources are located in proximity to the Project (all are more than 550 feet away). Operational noise impacts from stationary sources associated with other development would not be anticipated to combine with Project noise sources to have a significant effect on nearby noise-sensitive land uses (e.g., the school and residences located south of the inactive Dumbarton Rail Corridor). Given the distances between the Project and the closest development projects in the area, and the intervening shielding between the Project and the closest other proposed development project (Commonwealth Corporate Center), the potential cumulative impacts related to stationary noise sources would be ***less than significant.***

Traffic Noise

Cumulative growth in the city could lead to increased noise levels from vehicular traffic. For areas of the city where noise levels already exceed significance thresholds, other development could result in a significant cumulative noise impact.

Modeling for potential cumulative impacts in the Project vicinity was conducted. Segment-specific noise levels under existing conditions were compared with noise levels during 2040 with implementation of the forecast general plan to determine where substantial noise increases may occur. Table 3.6-12 compares noise levels with implementation of the other projects (forecast year 2040 general plan) with existing noise levels.

A significant cumulative traffic noise impact would result if noise levels at existing sensitive land uses were to increase from below the applicable noise threshold under existing conditions to above the applicable threshold under the future scenario, including other development. Alternatively, a cumulative traffic noise impact would also occur if noise levels at existing noise-sensitive land uses were already in excess of thresholds and were to increase substantially under the future scenario (3 dB or more above existing traffic noise levels without the Project). If a cumulative traffic noise impact is anticipated along a given roadway segment, then the Project contribution to this impact must be assessed. The Project would result in a cumulatively considerable contribution to the overall increase in traffic noise levels (3 dB or more) if it were to result in an increase of 1 dB or more that would be attributable solely to the Project.

An initial cumulative impact analysis was conducted using a reference distance of 50 feet from each roadway segment centerline; modeling results demonstrated that other development could result in noise levels in excess of the 60 L_{dn} threshold for residential land uses along segments of Chilco Street and O'Brien drive.

There would be a ***potentially significant*** cumulative impact from vehicular noise from other development along the following two segments:

- Chilco Street between Hamilton Avenue and Terminal Avenue
- O'Brien Drive between University Avenue and Kavanaugh Drive

Modeling for the segment of Adams Drive between University Drive and Adams Court, the segment of Haven Avenue between Bayfront Expressway/Marsh Road and the city limit, the segment of Constitution Drive between Chilco Street and Chrysler Drive, and the segment of O'Brien Drive between Kavanaugh Drive and Willow Road also showed potential cumulative noise impacts when considering the aforementioned 60 L_{dn} standard. However, the only nearby receptors along these segments are commercial, with a standard of 70 L_{dn}; therefore, the 70 L_{dn} standard is not exceeded along these segments.

For some segments determined to have potential cumulative traffic noise impacts, implementation of the Project would be a primary contributor to future vehicular traffic. Of the two previously described roadway segments with significant cumulative impacts, Project-added traffic would result in a cumulatively considerable increase in traffic noise levels at a distance of 50 feet along one roadway segment. This roadway segment is:

- Chilco Street between Hamilton Avenue and Terminal Avenue

The analysis for the two segments determined to have potential cumulative traffic noise impacts was further refined. Rather than utilizing the typical reference distance of 50 feet, the modeling distance was adjusted to reflect the actual distance between the roadway centerline and the noise-sensitive receivers along these segments. The Project-related increase in noise raises the noise levels along this segment to above the 60 L_{dn} threshold when using actual distances to receptors, and the Project-related increase in noise is equal to or greater than 1 dB (refer to Table 3.6-12 for the results of the modeling to determine potential cumulative impacts and Table 3.6-13 for the Project's contribution to a potential cumulative impact).

Because the Project-related increase in noise is equal to or greater than 1 dB along the segment of Chilco Street from Hamilton Avenue to Terminal Avenue, the Project could make a cumulatively considerable contribution to a cumulative traffic noise impact along this segment. However, as discussed under Impact NOI-1, only one receptor along the segment of Chilco Street between Hamilton Avenue and Terminal Avenue (471 Hamilton Avenue) is located close enough to the roadway to actually experience potentially significant noise levels. The outdoor use area for 471 Hamilton Avenue, which is located approximately 30 feet from the roadway centerline, currently has a privacy fence that meets the standard for noise attenuation barriers. The wall is solid wood and has no cracks or gaps through or below it. The FHWA Traffic Noise Model was used to estimate the attenuation provided by the existing solid wood fence. Given the height of the fence and site geometry, this wall is expected to reduce traffic noise by approximately 4 dB.

Table 3.6-12. Cumulative Traffic Noise Levels and Potential Impacts to Offsite Receptors

Roadway	Segment	Approx. Distance to Nearest Receptor (feet)	Receptor Land Use Type	Compatibility Standard (Normally Acceptable) (L_{dn})	Existing L_{dn} at Receptor Distance	Cumulative (Forecast General Plan, including Project) L_{dn}	Cumulative Exceeds Standard with Existing Standard?	Difference between Existing and Forecast General Plan, (if above standard)	Significant Cumulative Impact?
Chilco Street	Hamilton Avenue to Terminal Avenue	30	R	60	59.0	61.0	**Yes**	2	**Yes**
O'Brien Drive	University Avenue to Kavanaugh Drive	30	R	60	59.0	61.0	**Yes**	2	**Yes**
Constitution Drive	Chilco Street to Chrysler Drive	40	C	70	59.0	62.0	No	NA	No
Adams Drive	University Drive to Adams Court	45	C	70	52.0	60.0	No	NA	No
O'Brien Drive	Kavanaugh Drive to Willow Road	45	C	70	60.0	64.0	No	NA	No
Haven Avenue	Bayfront Expressway/ Marsh Road to city limit	50	C	70	61.0	65.0	No	NA	No

Notes:

Bold = significant impact, R = residential, C = Commercial, NA = not applicable (because standard not exceeded)

Table 3.6-13. Project Contribution to Cumulative Traffic Noise Impacts to Offsite Receptors

Roadway	Segment	Significant Cumulative Impact?	Cumulative without-Project L_{dn} at Nearby Receptors	Cumulative plus-Project L_{dn} at Nearby Receptors	Project Contribution to Noise Level	Cumulatively Considerable Contribution?
Chilco Street	Hamilton Avenue to Terminal Avenue	**Yes**	59.0	61.0	**2**	**Yes**
O'Brien Drive	University Avenue to Kavanaugh Drive	**Yes**	61.0	61.0	0	No

Notes:

A "cumulatively considerable contribution" is a greater than a 1 dB increase in noise levels already above 60 L_{dn} without Project-added traffic.

Bold = significant impact

Because the cumulative plus-Project noise level at the only residential receptor with potential impacts along this segment (30 feet from the roadway centerline) was modeled to result in a noise level of only 1 dB more than the applicable threshold (refer to Table 3.6-13), a 4 dB reduction in noise levels achieved by the existing privacy fence would reduce impacts related to with-Project noise levels at this receptor to less than significant. This cumulative impact is ***less than significant.***

Impact C-NOI-2: Cumulative Exposure to Ground-borne Vibration. Construction activities associated with Project-related development and other future development in the city would not expose sensitive receptors to excessive ground-borne vibration. The Project's cumulative impact would be less than significant. (LTS)

Cumulative impacts related to construction vibration would not occur. As described previously, although pile driving may be used for Project construction (to construct building foundations), the worst-case estimated ground vibration levels at nearby sensitive land uses would be below the damage threshold for the most fragile buildings and below the perceptibility threshold at nearby sensitive land uses. Therefore, there would be no direct Project effects on offsite receptors related to construction vibration. The nearest project for the purposes of this analysis is the onsite demolition of Buildings 307–309 and renovation of Building 23, both of which are on the Project site. The closest planned projects in the vicinity of the Project site (and offsite) are the Chilco Street Improvements Project and the proposed Dumbarton Rail Trail Project. The nearest planned land use project is the Commonwealth Corporate Center, located approximately 550 feet west of the Project site. As discussed under Impact C-NOI-1, however, construction on this project is largely complete and not expected to overlap with Project construction.

Nearby offsite projects (Chilco Street Improvements and the proposed Dumbarton Rail Trail Project) located adjacent to the Project site would use equipment during construction activities (including, but not limited to, an excavator and a backhoe) that could generate some vibration; however, it is not anticipated that these construction projects would involve impact equipment or result in meaningful vibration levels. The demolition of Buildings 307–309 and the renovation of Building 23 could result in some construction vibration on the Project site; however, vibration associated with demolition activities is highly localized (generally within 50 to 100 feet of the construction activity).

As discussed under Impact NOI-2, above, building foundations and the associated pile driving for the Project could occur, as a worst-case scenario, at distances of 275 feet from residences south of proposed Building 21 and 200 feet from the existing commercial building west of proposed hotel. At distances of 275 and 200 feet, PPV levels from pile driving would be 0.02 and 0.03, respectively.

Given the information in Tables 3.6-3 and 3.6-4, these worst-case scenario PPV levels from general construction activities and pile driving would below the damage threshold for the most fragile buildings and below the perceptibility threshold. Because construction vibration associated with other projects would be highly localized, the potential for construction vibration from other development projects to combine with vibration generated by the Project would be low. Additionally, because all new development projects are subject to CEQA and/or National Environmental Policy Act (NEPA) review, potential vibration impacts associated with each individual project would be assessed. For these reasons, development in the Project vicinity would not result in the exposure of people to excessive vibration levels during construction; cumulative impacts related to construction vibration would be ***less than significant***.

Impact C-NOI-3: Cumulative Permanent Increase in Noise Levels. Operation of the Project, in combination with other development in the city, would result in a substantial permanent ambient noise level increase in the Project vicinity. However, the Project's contribution would not be cumulatively significant. (LTS)

As described above under Impact C-NO-1, cumulative increases in traffic would result in substantial noise level increases from vehicular traffic along six roadway segments in the vicinity of the Project site. Therefore, cumulative impacts along these segments would be significant. The Project, however, would result only in a cumulatively considerable increase in noise along one of these six segments (Chilco Street from Hamilton Avenue to Terminal Avenue), because the Project-related increase would exceed 1 dB along a segment where a cumulative impact was modeled to occur. The Project's contribution to this impact could be cumulatively considerable if receptors along this segment would be affected. However, as described under Impact C-NOI-1, only one receptor along this segment (471 Hamilton Avenue) is located close enough to the roadway to actually experience potentially significant noise levels. The outdoor use area for 471 Hamilton Avenue, which is located approximately 30 feet from the roadway centerline, currently has a privacy fence that meets the standard for noise attenuation barriers. The wall is solid wood and has no cracks or gaps through or below it. The FHWA Traffic Noise Model was used to estimate the attenuation provided by the existing solid wood fence. Given the height of the fence and site geometry, this wall is expected to reduce traffic noise by approximately 4 dB.

Because the cumulative plus-Project noise level at the only residential receptor with potential impacts along this segment (30 feet from the roadway centerline) was modeled to result in a noise level of only 1 dB more than the applicable threshold (refer to Table 3.6-13), a 4 dB reduction in noise levels achieved by the existing privacy fence would reduce impacts related to with-Project noise levels at this receptor to less-than-significant levels. Therefore, the Project would not make a cumulatively considerable contribution to a cumulative impact at nearby noise-sensitive land uses. This cumulative impact is ***less than significant***.

Impact C-NO-4: Cumulative Temporary Increase in Noise Levels. Construction activities associated with Project-related development and other future development in the city would not expose sensitive receptors to a substantial temporary increase in the ambient noise level. The Project's cumulative impact would be less than significant. (LTS)

With regard to cumulative temporary increases in noise levels, the closest potential construction activity (the main source of Project-related temporary noise) would occur on the future Project site. Specifically, Buildings 307–309 at the Project site (where Building 21 would be constructed) would be demolished, and Building 23 would be renovated as part of separate projects. Besides demolition of Buildings 307–309 and renovation of Building 23, all of which are on the Project site, the closest planned projects in the vicinity of the Project site are the Chilco Street Improvements Project and the proposed Dumbarton Rail Trail Project, located adjacent to the Project site.

The nearest planned land use project is the Commonwealth Corporate Center, located approximately 550 feet west of the Project site. As discussed under Impact C-NOI-1, however, construction on this project is largely complete and is not expected to overlap with Project construction.

Although demolition of Buildings 307–309 and renovation of Building 23 would occur prior to implementation of the Project, and the Chilco Street Improvements Project and the proposed Dumbarton Rail Trail Project may occur after Project construction, all three are considered concurrent for the purposes of this analysis. Construction noise effects may result in a cumulative noise impact on nearby sensitive receptors. As discussed under Impact NOI-1 and Impact C-NOI-1, above, construction activity associated with the Project would generate noise that could affect existing adjacent land uses. However, with implementation of Mitigation Measure NOI-1.1, construction noise impacts are expected to be less than significant. Specific construction noise mitigation measures that could be applied to demolition of Buildings 307–309, renovation of Building 23, the Chilco Street Improvements Project, and to the Dumbarton Rail Trail Project are not known at this time, but it is likely that noise mitigation measures similar to those associated with the Project would be applied to other projects for compliance with applicable City noise standards. Given this, and the fact that construction noise is highly localized, it is not anticipated that significant cumulative construction noise impacts would occur. This cumulative impact is, therefore, considered ***less than significant***.