3.8 NOISE

Introduction

This section describes the ambient, or background, noise conditions in the project vicinity and key noise sources that contribute to those ambient conditions. This section also evaluates the potential for noise and ground-borne vibration impacts resulting from construction and operation of the proposed project. More specifically, the evaluation addresses the potential for the proposed project to cause a substantial temporary and/or permanent increase in ambient noise levels in the vicinity of the project area; or cause exposure of off-site residents or nearby businesses to noise levels or ground-borne vibration in excess of standards established in the City of Menlo Park General Plan and Noise Ordinance, or any other applicable standards.

As discussed in the Initial Study (Appendix B), the project would not result in noise impacts associated with being near a public or private airport. Therefore, this potential noise issue is not addressed in this section. Comments received on the Notice of Preparation and during the public scoping meeting (Appendix C) did not raise concerns related to potential noise issues.

Setting

Fundamentals of Sound and Environmental Noise

Sound. Sound is created when objects vibrate, resulting in air pressure variations characterized by their amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude is the decibel (dB). The decibel scale is logarithmic; it describes the physical intensity of air pressure variations. The pitch of the sound is related to the frequency of the pressure variation. The human ear's sensitivity to sound is frequency dependent. The A-weighted decibel scale ("dBA") modifies the dB levels to better approximate the frequencies heard by a human ear.

Environmental Noise. Noise is "unwanted" sound. A typical noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background is the noise from individual distinguishable local sources, such as aircraft overflights or traffic on adjacent roadways. Table 3.8-1 lists representative environmental noise levels.

Several descriptors are commonly used to gauge the noise exposure level of individuals and communities. These descriptors are sensitive to noise intensity over time and, in some cases, to the time of day when the noise occurs. Those that are applicable to this analysis are described below.

- **L_{eq}**, the equivalent energy noise level, is the average acoustic energy content of noise over any chosen exposure time. The L_{eq} is the constant noise level that would deliver the same acoustic energy to the ear as the actual time-varying noise over the same exposure time. L_{eq} does not depend on the time of day during which the noise occurs.

Table 3.8-1 Representative Environmental Noise Levels		
Common Outdoor Activities	**Noise Level (dBA)**	**Common Indoor Activities**
	—110—	Rock Band
Jet Fly-over at 100 feet		
	—100—	
Gas Lawnmower at 3 feet		
	—90—	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	
		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	—30—	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Threshold of Human Hearing	—0—	Threshold of Human Hearing
Source: California Department of Transportation, 1998.		

- **L_{dn}**, the day-night average noise level, is a 24-hour average L_{eq} with a 10 dBA "penalty" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for increased nighttime noise sensitivity. Because of this penalty, the L_{dn} is always higher than its corresponding 24-hour L_{eq} (e.g., a constant 60 dBA noise over 24 hours would have a 60 dBA L_{eq}, but a 66.4 dBA L_{dn}).
- **CNEL**, the community noise equivalent level, is an L_{dn} with an additional 5 dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m.

Community noise exposures are typically represented by 24-hour descriptors, such as a 24-hour L_{eq}, L_{dn}, or CNEL. One-hour and shorter-period descriptors are useful for characterizing noise caused by short-term activities, such as the operation of construction equipment.

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 L_{dn}/CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA L_{dn}/CNEL. Three to five dBA increments to existing one-hour L_{eq}, or to the L_{dn}/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 use are located and L_{dn}/CNEL is already high (i.e., above 60 dBA); in these areas, limiting noise increases to 3 dBA or less is recommended.[1] Noise intrusions that cause short-term interior levels to rise above 45 dBA at night can disrupt sleep. Eight-hour or longer exposures to noise levels greater than 85 dBA can cause permanent hearing damage.

Ground-borne Vibration. Vibrating objects in contact with the ground radiate energy through that medium; if a vibrating object is massive enough and/or close enough to the observer, its vibrations are perceptible. The rumbling sound caused by the vibration of room surfaces is called ground-borne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and in the U.S. is referenced as vibration decibels (VdB).

The background vibration velocity level in residential areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

The general human response to different levels of ground-borne vibration velocity levels is described in Table 3.8-2.

Existing Noise Levels

Office and light industrial uses occupy the block that separates the Independence and Constitution sites. North of the project area is Bayfront Expressway and Bedwell Bayfront Park, which is a public open space with walking trails for hiking. South of the project area is US 101. Further to the west along Marsh Road and between Chilco Street and Willow Road are noise sensitive land uses such as residential, parks, and schools. Vehicular traffic is the primary source of noise in the project vicinity.

[1] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, DOT-T-95-16, April 1995.

Table 3.8-2 Human Response to Different Levels of Ground-borne Vibration	
	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.
Source: Federal Railroad Administration, 1998.	

The closest residential uses east of the project area are screened from Bayfront Expressway traffic noise and from potential noise sources proposed in the project area by the existing office buildings.

Existing daytime noise levels were measured at four locations around and within the project area on June 24, 2005. These locations were selected to represent existing noise levels at the project site and existing sensitive receptors within the project vicinity. These locations are identified in Figure 3.8-1. Each measurement location is described and the average, minimum, and maximum noise levels measured at each of these locations are presented in Table 3.8-3. These short-term noise measurements were used as noise reference levels to calibrate the traffic noise computer model (developed by the Federal Highway Administration [FHWA] and called "Traffic Noise Model" or TNM) that was used to determine existing daily average noise exposure and the future impacts of added traffic from the project and other development.

Table 3.8-3
Daytime Noise Levels Measurements at Selected Locations in/around the Project Area

Noise Measurement Location/Time		Primary Noise Sources	Noise Level Statistics		
			L_{eq}	L_{min}	L_{max}
#1	Constitution site, 260 feet south of Bayfront Expressway and 350 feet from Marsh Road; start time: 12:55 PM.	Vehicular traffic on Bayfront Expressway and Marsh Road.	65.9	52.1	76.8
#2	Residential neighborhood along Pierce Road between Newbridge Street and US 101, east side, 50 feet from Willow Road; start time: 1:35 PM.	Vehicular traffic on Willow Road and local traffic along Pierce Road.	64.4	54.3	75.7
#3	Residential neighborhood along Willow Road between Hamilton Avenue and O'Brien Drive, east side, behind soundwall; start time: 2:20 PM.	Vehicular traffic on Willow Road and local traffic along internal driveway (inside soundwall).	62.4	50.4	78.3
#4	Residential neighborhood along Marsh Road, on sidewalk south of Page Street; start time: 3:10 PM.	Vehicular traffic along Marsh Road.	70.0	56.5	82.5

Source: PBS&J, 2005.

Notes:

1. Measurements were taken on June 24, 2005. Each measurement was 10 minutes in duration.
2. L_{eq} is the average noise level over the measurement period, L_{min} is the minimum instantaneous noise level measured during the 10-minute period, while L_{max} is the maximum instantaneous noise level measured during the 10-minute period.

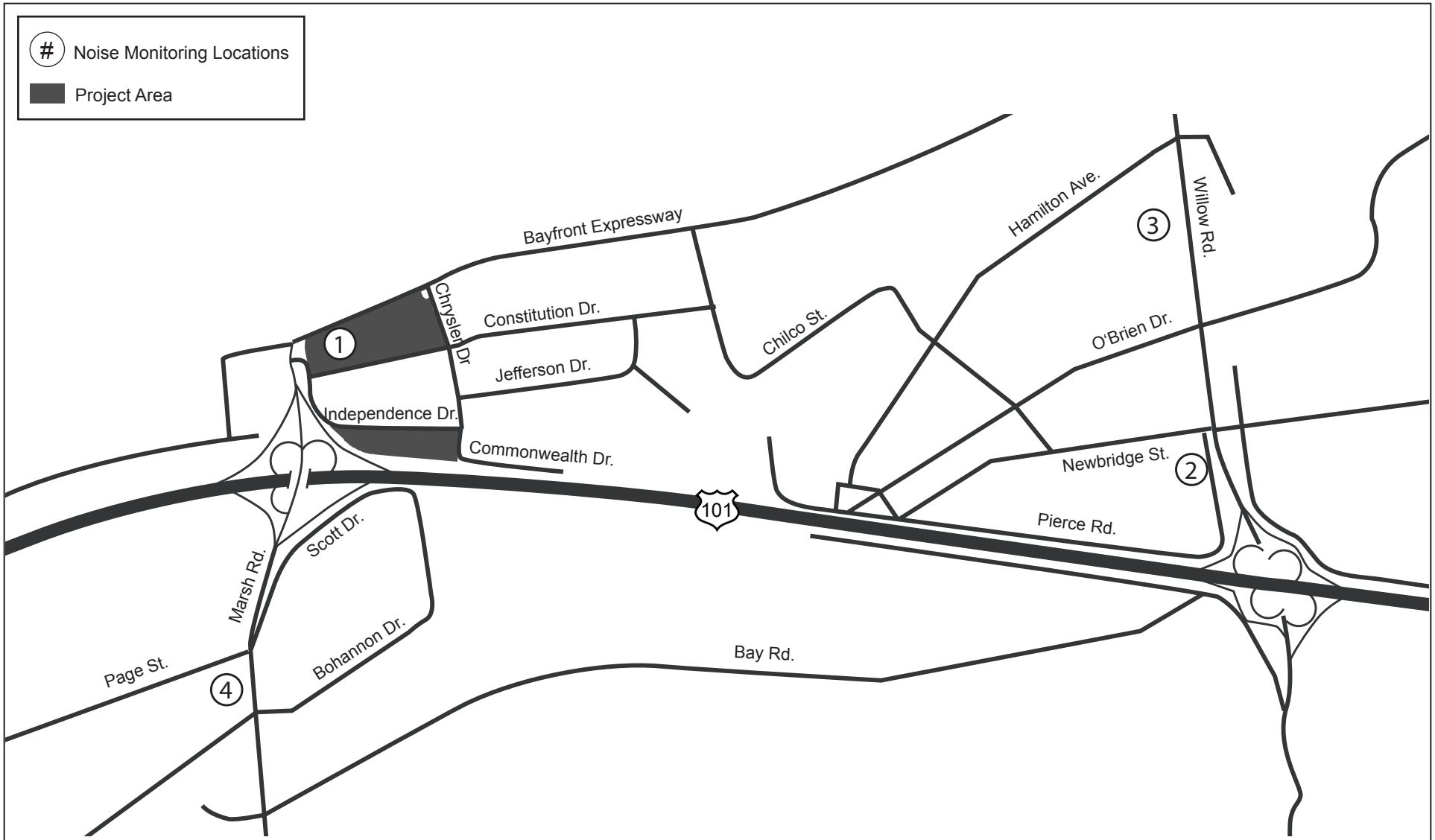

FIGURE 3.8-1
Noise Measurement Locations

***Source*:** Bohannon Development Company

TNM was used to calculate the existing 24-hour traffic noise levels (L_{dn}) at noise-sensitive uses close to where the noise measurements were taken; the modeled L_{dn} at these locations is presented in Table 3.8-4. Note that the existing traffic-induced L_{dn} are above the City's 60 dBA standard at all of the noise-sensitive locations modeled. Noise levels on the Constitution site were below the City's 70 dBA standard for office and industrial land uses.

Table 3.8-4
Existing (Year 2005) Traffic Noise Levels at Selected Locations in the Vicinity of the Project Area (24-Hour Average)

Location	L_{dn} (dBA)
On the Constitution Site:	
At a distance of 260 feet from Bayfront Expressway	67.1
Along Willow Road:	
Residences on Pierce Road facing east toward Willow Road	64.8
Residences on Willow Road near Hamilton Avenue (behind sound barrier)	63.6
Along Marsh Road:	
Residences on Marsh Road near Page Street	68.9

Source: PBS&J, 2008.

Notes:

1. Traffic noise was calculated using field measurement data and the FHWA's TNM computer model.
2. Instances where exterior noise exposures exceed applicable City Noise Element standards for the specific land use are shown in **bold**.

Existing Ground-borne Vibration Levels

Aside from seismic events, the greatest regular sources of ground-borne vibration in the project area and the City of Menlo Park are construction activities and roadway truck traffic. Heavy trucks currently transport goods and materials along the streets surrounding the project area. Large delivery trucks typically generate ground-borne vibration velocity levels around 63 VdB, and these levels could reach 72 VdB where trucks pass over an uneven road surface.[2]

Regulatory Setting

State of California Title 24. Title 24 of the California Code of Regulations codifies Sound Transmission Control requirements, which establish uniform minimum noise insulation performance standards for new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings. Specifically, Title 24 states that interior noise levels attributable to exterior sources shall not exceed 45 dBA L_{dn} in any habitable room of new dwellings. Dwellings are to be

[2] Federal Railroad Administration, 1998, *High Speed Ground Transportation Noise and Vibration Impact Assessment*.

designed so that interior noise levels will meet this standard for at least ten years from the time of building permit application.

City of Menlo Park Noise Element. 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 relating to noise control.

The Noise Element of the Menlo Park General Plan establishes goals and policies for assuring that existing and proposed land uses are compatible with their noise environments. To this end, the City has adopted quantitative exterior noise compatibility criteria for various land uses. The purpose of these criteria is to reduce the potential adverse effects of noise on people, including sleep disturbance, interference with speech communication, and the general sense of dissatisfaction that is often associated with high noise exposure. Under the City's Noise Element, noise levels up to 60 dBA are considered normally acceptable for residential and hotel uses, while noise levels are conditionally acceptable up to 70 dBA, as long as noise insulation features are included in the design to reduce interior noise levels. For recreational uses, noise levels up to 70 dBA are normally acceptable. For office uses, noise levels up to 65 dBA are considered normally acceptable, and 75 dBA are conditionally acceptable. For industrial uses, noise levels up to 70 dBA are normally acceptable, and 75 dBA are conditionally acceptable.

The Noise Element aims *"to prevent the escalation of noise levels in areas where noise-sensitive uses are located," and requires that pre-development environmental studies "analyze in detail the potential noise impacts of any actions that the City may take or act upon which could significantly alter noise levels in the community"* and *"consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans."*

City of Menlo Park Municipal Code. In addition to the City's General Plan, noise regulations are also contained in the City's Municipal Code. Chapter 8.06 of the 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 on residential land uses. The following regulations would be applicable to the proposed project:

8.06.040 Exceptions.

(a) Construction Activities.

(1) Construction activities between the hours of eight (8) a.m. and six (6) p.m. Monday through Friday,

(d) Deliveries.

(1) Deliveries to food retailers and restaurants,

(2) Deliveries to other commercial and industrial businesses between the hours of seven (7) a.m. and six (6) p.m. Monday through Friday and nine (9) a.m. to five (5) p.m. Saturdays, Sundays and holidays;

(e) Occasional Social Gatherings. Occasional social gatherings between eleven (11) a.m. and eleven-thirty (11:30) p.m.; provided, the noise level for the occasional social gathering measured from any adjacent residential property does not exceed sixty-five (65) dBA;

Both the compatibility of the proposed project with the noise environment in the project area and the effects of new noise sources introduced by the project on existing nearby sensitive uses are considered in detail below.

Impacts and Mitigation Measures

Noise Analysis Methodology

Analysis of the existing and future noise environment is based on noise level monitoring, noise prediction computer modeling, and empirical observations of receptor noise exposure characteristics. Existing noise levels were monitored at selected locations on and around the project area (see Table 3.8-3) using a Larson-Davis Model 720 sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. Noise modeling procedures involved the use of TNM to calculate existing and future vehicular noise levels at selected noise-sensitive uses in the project vicinity. The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) used in the TNM reflect the latest measurement of average vehicle noise rates for all vehicle classes. Traffic volumes used as data inputs in the noise prediction model were provided by the traffic analysis prepared for this DEIR.

This analysis uses the City of Menlo Park General Plan's land use compatibility guidelines to assess the noise exposure of land uses in the project vicinity. The General Plan sets the following thresholds for noise impacts: 60 dBA L_{dn} for residential, transient lodging, churches and nursing homes; and 70 dBA L_{dn} for office building, business and commercial areas.

The Federal Railway Administration's vibration impact thresholds for sensitive buildings, residences, and institutional land uses are used to assess vibration. These thresholds are 80 VdB at residences and buildings where people normally sleep (e.g., nearby residences) and 83 VdB at institutional buildings.

The Federal Transit Administration's (FTA) incremental traffic noise impact criteria are used to assess impacts associated with traffic noise. Rather than establishing fixed criteria to define noise impacts, the FTA's impact criteria becomes progressively more stringent as the baseline traffic noise levels increase. Thus, these criteria are more protective of communities with high noise exposure. Specifically, where the baseline L_{dn} is less than 60 dBA, a permanent increase in roadway traffic noise levels of 3 dBA over baseline ambient noise levels is considered to be substantial and, therefore, significant; where the baseline L_{dn} is between 60 dBA and 65 dBA, a permanent increase in roadway traffic noise levels of 2 dBA over baseline ambient noise levels is considered to be substantial and, therefore, significant; where the baseline L_{dn} is between 65 dBA and 70 dBA, a permanent increase in roadway traffic noise levels of 1 dBA over baseline ambient noise levels is considered to be substantial and, therefore, significant.

Standards of Significance

The proposed project would result in a significant impact if it would:

- **Impact Criterion #1:** Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinances, or the applicable standards of other agencies.
- **Impact Criterion #2:** Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- **Impact Criterion #3:** A substantial permanent increase in ambient noise levels in the project vicinity above existing levels.
- **Impact Criterion #4:** A substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing levels.

Project Evaluation

The following analysis discusses the potential impacts of the proposed project that would be allowed under the GPA/ZOA as well as the proposed Menlo Gateway project.

Impact NO-1: *The proposed project would result in a substantial increase in the exposure of people to noise in excess of the standards established in the Menlo Park General Plan or Menlo Park Municipal Code. This would be considered a significant impact. (S)*

Exposure of Off-site Receptors. As noted in the Setting, existing residential uses in the project vicinity, such as along Willow Road and Marsh Road, are currently exposed to noise levels in excess of the City standards of 60 dBA L_{dn} for residential uses. The addition of project-related traffic would further increase traffic noise levels above the City's standards for residential uses. Because the existing noise levels along the major arterials in the City are above the City standards, these noise levels would continue to be above the City standards in the near-term future with the addition of project-related traffic. For the purposes of this analysis, if the existing noise levels are above the City standards, then the significance threshold is based on whether the project's incremental increase would be considered significant. Using FTA guidance, the project's incremental increase to noise levels at the identified sensitive uses would be significant for residents along Marsh Road, resulting in a significant impact. The project's increment is shown in Table 3.8-5 and discussed below under Impact NO-3.

Exposure of On-site Receptors. The proposed development at the Independence site would include a hotel, which would be subject to the City's 60 dBA standard for transient lodging and Title 24 of the California Code of Regulations interior noise standard of 45 dBA. The primary noise source affecting the Independence site would be traffic on US 101, which runs along the site's southern frontage. The freeway, which currently operates at a Level of Service F, generates noise levels in excess of the 60 dBA standard at the Independence site. While this outdoor level would be above the City standard, under State building requirements, the hotel would be required to include noise insulation materials to reduce the interior noise level below the 45 dBA standard. In addition, as described in Chapter 2, Project Description, the project is proposing a 382-foot-long, 12-foot-high sound wall adjacent to

Table 3.8-5
Project Increment to Near-Term Future Noise Levels at Representative Locations in the Project Vicinity (24-hour Average)

Location	L_{dn} (dBA)				
	Near Term Future Traffic without Project	Near Term Future + Project Traffic	City General Plan Standard	Project Traffic Increment	Significance Threshold
On the Constitution Site:					
At a distance of 260 feet from Bayfront Expressway	66.6	67.2	65/70	0.6	NT
Along Willow Road:					
Residences on Pierce Road facing east toward Willow Road	67.2	67.4	60	0.2	1.0
Residences on Willow Road near Hamilton Avenue (behind sound barrier)	63.0	63.1	60	0.1	2.0
Along Marsh Road					
Residences on Marsh Road near Page Street	**69.1**	**70.4**	**60**	**1.3**	**1.0**

Source: PBS&J, 2008.

Notes:

1. Calculated using the FHWA's TNM computer model.
2. Instances where project incremental noise exposures exceed the established incremental standards are shown in **bold**.
3. NT = No threshold. The Constitution Site location would represent new land uses included under the proposed project, and therefore should only be compared to the City's General Plan standard for new land uses.

US 101 to provide a visual as well as a sound barrier for the proposed outdoor pool. On the Constitution site, the project is proposing office uses with an outdoor area that would be used for passive recreational uses. The buildings would be subject to the City standards for office uses of 65 dBA; however, for the outdoor recreational uses, the City standard would allow noise levels up to 70 dBA. Noise levels at the Constitution site would be greater than the City's normally acceptable noise level for office uses of 65 dBA, but below the City's standard for recreational uses. As noted, in areas where exterior noise levels are within the conditionally acceptable range, interior noise levels can be reduced with noise insulation materials to acceptable levels at office uses, as well as residential. Because the proposed project would be required to meet interior noise level standards and outdoor activity noise levels for recreation areas, there would be a less-than-significant impact relating to the exposure of persons on the Constitution and Independence sites to excessive noise levels.

MITIGATION MEASURE. There are no feasible mitigation measures that could reduce or eliminate the impact, other than reducing traffic. As noted in Section 3.11, Traffic and Circulation and in Chapter 2, Project Description, the proposed project includes a Transportation Demand Management (TDM) program that includes a variety of measures

designed to reduce the number of daily trips. Based on a reduction in trips, noise level increases along Marsh Road as a result of the project could be minimized, such that the noise level increase would be less than 1 dBA. However, as noted in the traffic section, because of the uncertainty in the effectiveness of the TDM program, to be conservative, trip reductions from the TDM program were not considered in this EIR. Therefore, this impact is considered to be significant and unavoidable. (SU)

Impact NO-2: *Construction activities associated with the proposed project would have the potential to expose sensitive receptors to excessive ground-borne vibration. This would be a potentially significant impact. (PS)*

Project construction activities would have the potential to generate low levels of ground-borne vibration (other than during pile driving). Construction-related vibration has three potential effects. First, vibration at high enough levels can disturb people trying to sleep. Thresholds for this vibration have been developed by the Federal Transit Administration (FTA), which has determined that any vibration over 80 VdB can be a significant impact at places where people sleep. Second, vibration at relatively low levels can disturb vibration-sensitive research and manufacturing equipment, such as electron microscopes and high resolution lithographic equipment. Even normal optical microscopes will sometimes be difficult to use when vibration is well below the human annoyance level. The FTA has developed a vibration threshold of 65 VdB, based on acceptable vibration for moderately vibration-sensitive equipment, such as optical microscopes and electron microscopes with vibration isolation systems. Third, groundborne vibration can potentially damage the foundations and exteriors of existing, older structures. Groundborne vibration that can cause this kind of damage is typically limited to impact equipment, especially pile-drivers. The FTA damage thresholds indicate that, for buildings not extremely sensitive to vibration, a damage threshold of between 0.2 in/sec to 0.5 in/sec would apply depending on the type of building.

Table 3.8-6 identifies various vibration velocity levels for the types of construction equipment that are expected at the project area during construction. Table 3.8-7 provides the peak particle velocity (PPV) for various pieces of equipment. Structural damage to existing buildings due to construction vibration would only be an issue during pile-driving. Pile-driving can produce PPV values of up to 1.518 at 25 feet. Impact pile drivers produce a high level of vibration for short periods (0.2 second) with sufficient time between impacts to allow a building's resonant effects to decay before the next vibration event. Normally, the integrity of existing structures would be potentially jeopardized within 50 feet of pile-driving activity.

The nearest residential uses located along Marsh Road, south of Scott Drive, are approximately 1,000 feet across US 101 from the Independence site. Residences are also located southeast from the project area in the Belle Haven community, south of the Dumbarton Rail right-of-way. These homes are also approximately 1,000 feet away and are located behind existing commercial buildings. Based on the information presented in Table 3.8-6, vibration levels from construction activities, including pile driving, would not exceed 80 VdB at a distance of 1,000 feet. Therefore, exposure of residential areas to or generation of excessive ground-borne vibration or ground-borne noise levels would be less than significant.

Table 3.8-6 Vibration Source Levels for Construction Equipment					
	Approximate VdB				
	25 Feet	50 Feet	75 Feet	100 Feet	200 Feet
Large Bulldozer	87	81	77	75	60
Loaded Trucks	86	80	76	74	59
Jackhammer	79	73	69	67	52
Small Bulldozer	58	52	48	46	31
Pile Driving (impact, upper range)	112	103	98	94	85
Pile Driver (sonic, upper range)	105	96	91	87	78
Source: Federal Railroad Administration, 1998; PBS&J, 2009.					

Table 3.8-7 Vibration Source Levels for Construction Equipment				
	At 25 feet		At 100 feet	
Construction Equipment	Approximate VdB	Peak Particle Velocity (in/sec)	Approximate VdB	Peak Particle Velocity (in/sec)
Large Bulldozer	87	0.089	69	0.011
Truck	86	0.076	68	0.010
Jackhammer	79	0.035	61	0.004
Small Bulldozer	58	0.003	40	< 0.001
Caisson Drilling	87	0.089	69	0.011
Pile Driver (impact, upper range)	112	1.518	94	0.190
Pile Driver (sonic, upper range)	105	0.734	87	0.092
Source: *Transit Noise and Vibration Impact Assessment*, Chapter 12 Noise and Vibration During Construction, May 2006; PBS&J, 2008.				

Existing occupied office and commercial uses are located in the center portion of the project area between Independence Drive and Constitution Drive, as well as east of Chrysler Drive (see Figure 2-2 in Chapter 2, Project Description). Office and commercial uses are generally not considered sensitive receptors; however, because of the nature of the businesses that are present in the vicinity, it is unknown whether these uses include vibration sensitive equipment, such as could be used for computer chip manufacturing. So, to be conservative, the adjacent buildings are assumed to include vibration-sensitive uses. In addition, if occupants of the hotel are present during construction of the office building on the Independence site, hotel occupants could be up to 300 feet from construction activities and vibration levels could be up to 80 VdB for pile driving. Therefore, buildings both in the immediate project vicinity, as well as on the project site, could be exposed to vibration associated with project

construction. Buildings on adjacent lots are approximately 100 feet from the property boundaries for the Independence and Constitution sites. Based on the information presented in Table 3.8-6, vibration levels from construction activities could reach up to 75 VdB for normal construction activities, and up to 94 VdB during pile driving. These vibration levels would be well above the FTA recommended threshold for vibration-sensitive equipment of 65 VdB, and this would be a potentially significant impact of the project.

The existing buildings located in the center portion of the project area between Independence Drive and Constitution Drive, as well as east of Chrysler Drive would also have the potential to be exposed to vibration peaks during construction if pile driving techniques are used. If pile driving resulted in vibration levels in excess of the FTA damage thresholds of 0.2 in/sec to 0.5 in/sec, the project could result in damage to the adjacent structures. As shown in Table 3.6-7, at a distance of 100 feet, peak vibration levels during pile driving would be below the FTA thresholds. At this time, it is unknown if pile driving would be required for construction of the proposed buildings, but, if required, pile driving would be at least 100 feet or more from any existing structures; therefore, pile driving would not result in excessive vibration to any adjacent structures.

The proposed project would not result in significant impacts related to annoyance to residential uses or damage during pile driving, with the exception of potentially disturbing hotel occupants. However, impacts to adjacent buildings could occur if they include vibration-sensitive equipment, such as optical or electron microscopes. If no such vibration-sensitive equipment exists in the vicinity, there would be no significant vibration impacts from the project. However, until it is determined that no vibration-sensitive equipment is in the vicinity, it is assumed that this equipment may be present, and thus the project's impacts to vibration-sensitive equipment is potentially significant.

MITIGATION MEASURE. Mitigation Measure NO-2.1 would require the notification of nearby businesses of potential impacts to vibration-sensitive equipment, in order to identify any vibration-sensitive equipment in the project vicinity, and implement best management practices, as described in Mitigation Measure NO-2.2, to help reduce impacts to any buildings identified with vibration-sensitive equipment. However, even with implementation of these measures, if vibration-sensitive equipment is identified in the project vicinity, these receptors could be exposed to excessive vibration levels. Therefore, this impact is considered to be significant and unavoidable. (SU)

NO-2.1 *Notify nearby businesses of construction activities that could affect vibration-sensitive equipment*. The project sponsor shall provide notification to adjacent property owners and occupants, prior to the start of construction, informing them of the estimated start date and duration of vibration-generating construction activities, such as would occur during site preparation, grading, and pile driving, if required. This notification shall include information warning about potential for impacts related to vibration-sensitive equipment. The project sponsor shall identify a phone number for the property owners and occupants to call if they have vibration-sensitive equipment on their site.

NO-2.2 Implement construction best management practices to reduce construction vibration. If vibration-sensitive equipment is identified within the project vicinity, the project sponsor shall implement the following measures during construction of all project components:

- To the extent feasible, construction activities that could generate high vibration levels at any identified vibration-sensitive locations, shall be scheduled during times that would have the least impact on nearby land uses. This could include restricting construction activities in the areas of potential impact to the early and late hours of the work day, such as from 8:00 am to 10:00 am or 4:00pm to 6:00 pm Monday to Friday.
- Stationary sources, such as construction staging areas and temporary generators, shall be located as far from nearby vibration-sensitive receptors as possible.
- Trucks shall be prohibited from idling along streets serving the construction site where vibration-sensitive equipment is located.

Impact NO-3: *Operation of the proposed project would result in a substantial permanent ambient noise level increase in the project vicinity. This would be a significant impact. (S)*

Areas along the main access routes to the project area would experience an increase in traffic noise levels associated with buildout of the proposed project. The changes in future noise levels at selected noise-sensitive locations along roadways in the project vicinity are identified in Table 3.8-5. As shown, the proposed project would increase local traffic noise levels by a maximum of 1.3 dBA L_{dn} for the area along Marsh Road. Based on FTA's guidance, land uses that experience higher ambient noise levels are likely to be less tolerant of moderate to small increases in noise levels. The description of FTA standards in the "Regulatory Setting," explains that an increase of 1 dBA could be considered significant where background noise levels are between 65 dBA and 70 dBA. This increase would be exceeded, as noted in Table 3.8-5, for residential uses along Marsh Road. As a result, land uses in this area would experience a significant increase in noise exposure.

MITIGATION MEASURE. There are no feasible mitigation measures that could reduce or eliminate the impact, other than reducing traffic. As noted in Section 3.11, Traffic and Circulation and in Chapter 2, Project Description, the proposed project includes a Transportation Demand Management (TDM) program that includes a variety of measures designed to reduce the number of daily trips. Based on a reduction in trips, noise level increases along Marsh Road as a result of the project could be minimized such that the noise level increase would be less than 1 dBA. However, as noted in the traffic section, because of the uncertainty in the effectiveness of the TDM program, to be conservative, trip reductions from the TDM program were not considered in this EIR. Therefore, this impact is considered to be significant and unavoidable. (SU)

Impact NO-4: *Construction of the proposed project would generate a short-term increase in noise levels that would exceed ambient noise levels in the area. This would be considered a potentially significant impact. (PS)*

Project construction would require the use of heavy equipment for building demolition, site grading and excavation, paving, and building fabrication. Construction activities would also involve the use of smaller power tools, generators, mechanical equipment, and other noise sources. During each construction stage, there would be a different mix of equipment operating and noise levels would vary based on the amount of equipment in operation and the location of the construction activity.

The U.S. Environmental Protection Agency (EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment and typical construction activities; these data are presented in Tables 3.8-8 and 3.8-9, respectively. As shown in the tables, noise levels would diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 84 dBA measured at 50 feet from the noise source to the receptor would reduce to 78 dBA at 100 feet from the noise source to the receptor, and reduce by another 6 dBA to 72 dBA at 200 feet from the noise source to the receptor, etc.

Table 3.8-8
Noise Ranges of Typical Construction Equipment

Construction Equipment	Noise Levels in dBA L_{eq} at 50 feet[a]
Front Loader	73–86
Trucks	82–95
Cranes (moveable)	75–88
Vibrator	68–82
Saws	72–82
Pneumatic Impact Equipment	83–88
Jackhammers	81–98
Pumps	68–72
Generators	71–83
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Back Hoe	73–95
Pile Driving (peaks)	95–107
Tractor	77–98
Scraper/Grader	80–93
Paver	85–88

Source: EPA, 1971 as presented in City of Los Angeles, 1998.

Notes:

1. Machinery equipped with noise-control devices or other noise-reducing design features do not generate the same level of noise emissions as that shown in this table.

Table 3.8-9 Typical Outdoor Construction Noise Levels		
Construction Phase	**Noise Levels at 50 Feet (dBA L_{eq})**	**Noise Levels at 50 Feet with Mufflers (dBA L_{eq})**
Ground Clearing	84	82
Excavation, Grading	89	86
Foundations	78	77
Structural	85	83
Finishing	89	86
Source: EPA, 1971 as presented in City of Los Angeles, 1998.		

The nearest noise sensitive receptor to the project area would be the existing residential area south of US 101 approximately 0.2 miles (approximately 1,000 feet) away along Marsh Road, south of Scott Drive. Residences are also located approximately 1,000 feet away in the Belle Haven community, located south of the Dumbarton Rail right-of-way. At this distance and with the intervening freeway interchange, noise generated by construction activities would not cause a significant increase in existing ambient noise levels. Noise levels generated during construction are more likely to result in annoyance of nearby workers in the project vicinity, especially when high noise producing equipment is in operation, such as jackhammers or pile driving. However, office, commercial, and industrial uses are not typically identified as sensitive noise receptors. Construction activities would generate typical noise levels at an adjacent parcel up to 86 dBA L_{eq} during excavation, grading and finishing. However, while nearby workers would have the potential for a substantial short-term increase in noise, this would not be considered a significant impact, because they are not considered sensitive receptors.

The proposed project would be constructed on existing Bay mud and/or fill material and could extend to a maximum height of 140 feet. Thus, a pile-driven foundation may be required, as discussed under Impact NO-2. The resulting noise levels would be approximately 101 dBA at 50 feet. At an attenuation rate of 6 dBA per doubling of distance to a receiver, the resulting noise level at the closest residential receptor (1,000 feet) would be approximately 75 dBA. However, at this distance, noise levels would be altered by intervening structures, such as the freeway and other buildings. Construction noise could also affect future on-site hotel occupants during later phases of construction. If occupants of the hotel are present during construction of the office building on the Independence site, hotel occupants could be up to 300 feet from construction activities. At an attenuation rate of 6 dBA per doubling of distance to a receiver, the resulting noise level at 300 feet would be approximately 73 dBA for most construction activities, and up to 85 dBA for pile driving. In addition, construction activities would be subject to Title 8 of the City of Menlo Park Municipal Code, which states that construction activities that exceed stated noise limits are permitted only between the hours of 8:00 AM and 6:00 PM, Monday through Friday.

Nevertheless, because the project would generate a substantial increase in construction noise, the impact is considered potentially significant.

> MITIGATION MEASURE. Implementation of the following measure would reduce construction noise associated with the proposed project to a less-than-significant level. (LTS)

NO-4.1 *Implement construction best management practices to reduce construction noise.* The project sponsor shall include in construction contracts requirements to adhere to construction best management practices for construction noise. The construction contracts shall include the following measures, or other similar measures shown to be equally effective:

- To the extent feasible, the noisiest construction activities shall be scheduled during times that would have the least impact on nearby land uses. This would include restricting typical demolition and exterior construction activities to the hours of 8:00 am to 6:00 pm Monday to Friday.
- Equipment and trucks used for project construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds) wherever feasible.
- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.
- If pile driving is required, notification shall be sent to surrounding property owners and occupants within 300 feet of the project site informing them of the estimated start date and duration.
- Construction contractors, to the maximum extent feasible, shall be required to use "quiet" gasoline-powered compressors or other electric-powered compressors, and use electric rather than gasoline or diesel powered forklifts for small lifting.
- Stationary noise sources, such as temporary generators, shall be located as far from nearby receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible.
- If required by the City, temporary plywood noise barriers shall be erected around the construction site, to shield adjacent uses.
- Trucks shall be prohibited from idling along streets serving the construction site.

Cumulative Impacts

The geographic context for the cumulative noise analysis from localized construction and stationary source noise includes areas immediately surrounding the project site. 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 in the next 20 years.

Impact NO-1CM: *The proposed 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 Menlo Park General Plan or Menlo Park Municipal Code; however, the proposed project's contribution would not be cumulatively considerable. Therefore, the project's cumulative impact would be less than significant. (LTS)*

Exposure of Off-site Receptors. The traffic model used to predict future traffic levels assumed approved development and City growth through the year 2027. As noted above, for the purposes of this analysis, in areas where the existing noise level exceeds the City's standards, the significance of the project's impacts are based on the project's incremental increase. The increase of cumulative plus project-related traffic over existing noise levels is shown in Table 3.8-10. The increase from existing noise levels would be significant under cumulative conditions if the increase would exceed the 1 dBA threshold for the selected locations. However, as shown in Table 3.8-10, the project's increase over the cumulative (long-term baseline) would be less than this threshold; therefore, the project's contribution would not be considerable, resulting in a less-than-significant cumulative impact.

Exposure of On-site Receptors. As noted above under Impact NO-1, the noise levels on the Constitution and Independence sites would exceed the City's standard for new hotel and office uses. Noise levels from cumulative development would contribute to this exceedance. However, for uses that fall within the conditionally acceptable exterior noise limits, the interior noise levels for office and residential uses can be reduced to acceptable levels with incorporation of noise insulating materials. For outdoor areas on the Independence site, the proposed construction of a sound wall would reduce exterior noise levels to acceptable levels. On the Constitution site, the noise levels would be under 70 dBA, and, therefore, within the acceptable noise limits for recreational uses. Therefore, the project's contribution would be less than significant.

Impact NO-2CM: *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 development in Menlo Park should not result in the exposure of people to or the generation of excessive ground-borne vibration, due to the localized nature of vibration impacts and the fact that construction throughout the City would not occur at the same time. High ground-borne vibration at each of the construction sites would continue to be isolated and affect receptor within close proximity to the individual pieces of construction equipment. As such, the vibration impact of the proposed project, in conjunction with vibration from other cumulative development, would not result in a significant cumulative impact.

Table 3.8-10
Project Increment to Long-Term Future Noise Levels (Year 2025)
at Representative Locations in the Project Vicinity
(24-hour Average)

Location	L_{dn} (dBA)					
	Existing Traffic	**Long-Term Future Traffic without Project**	**Long Term + Project**	**City's General Plan Standard**	**Project Traffic Increment**	**Significance Threshold**
On the Constitution Site:						
At a distance of 260 feet from Bayfront Expressway	67.1	68.8	67.9	65/70	0.8	NT
Along Willow Road:						
Residences on Pierce Road facing east toward Willow Road	64.8	68.1	68.1	60	0.0	1.0
Residences on Willow Road near Hamilton Avenue (behind sound barrier)	63.6	63.9	64.1	60	0.2	2.0
Along Marsh Road						
Residences on Marsh Road near Page Street	69.0	69.9	70.8	60	0.9	1.0

Source: PBSJ&J, 2008.

Notes:

1. Calculated using the FHWA's TNM computer model.
2. Instances where project incremental noise exposures exceed the established incremental standards are shown in **bold**.
3. NT = No threshold. The Constitution Site location would represent new land uses included under the proposed project, and therefore should only be compared to the City's General Plan standard for new land uses.

Impact NO-3CM: *Operation of the proposed project and other cumulative developments would result in a substantial permanent ambient noise level increase in the project vicinity; however, the proposed project's contribution would be less than cumulatively considerable. Therefore, the project impact would be less than significant. (LTS)*

As described above under Impact NO-1CM, cumulative and project-related traffic would result in substantial noise level increases at two of the selected locations because the increase would exceed the FTA significance thresholds. However, the project's contribution would be less than cumulatively considerable because the project increment would be less than the threshold of 1.0 dBA. Therefore, he cumulative impact of increased ambient noise levels would be less than significant.