4.9.1 INTRODUCTION

This section describes the existing ambient noise environment of the Hayward campus, including the sources of existing noise in the area of the proposed project and the current locations of noise-sensitive land uses that potentially would be affected by campus development under the proposed Master Plan. The relevant noise standards and guidelines are described. Potential project-related noise sources, including construction activity, are discussed. The changes in estimated noise levels due to the proposed project are compared to thresholds of significance to determine the significance of the changes in the ambient noise environment that are anticipated to result from implementation of the proposed Master Plan.

No public comments related to noise were received in response to the first Notice of Preparation (NOP) issued for this EIR. Comments were received in response to the revised NOP issued in September 2008 for the project-level analysis for the Pioneer Heights Phase IV project which requested that noise impacts from that project be addressed in the EIR. Noise levels associated with that project are evaluated in detail in **Volume 2** of this EIR and are summarized below in the discussion of noise impacts from the development of the entire campus.

4.9.2 ENVIRONMENTAL SETTING

4.9.2.1 Study Area

For purposes of evaluating the noise impacts of the proposed project, the study area is defined to include all of the campus, residences or schools within 1,000 feet of the campus boundary, and major city streets leading to the campus, including Carlos Bee Boulevard, Harder Road, Hayward Boulevard, and Campus Drive.[1]

4.9.2.2 Fundamentals of Environmental Noise and Vibration

Noise

Noise is usually defined as unwanted sound. It is an undesirable by-product of society's normal day-to-day activities. Sound becomes unwanted when it interferes with normal activities, when it causes actual

1 Although other streets would also experience an increase in traffic related to campus development under the proposed Master Plan, noise levels would not increase substantially along those streets, as discussed later in this section.

physical harm, and/or when it has adverse effects on health. The definition of noise as unwanted sound implies that it has an adverse effect on people and their environment.

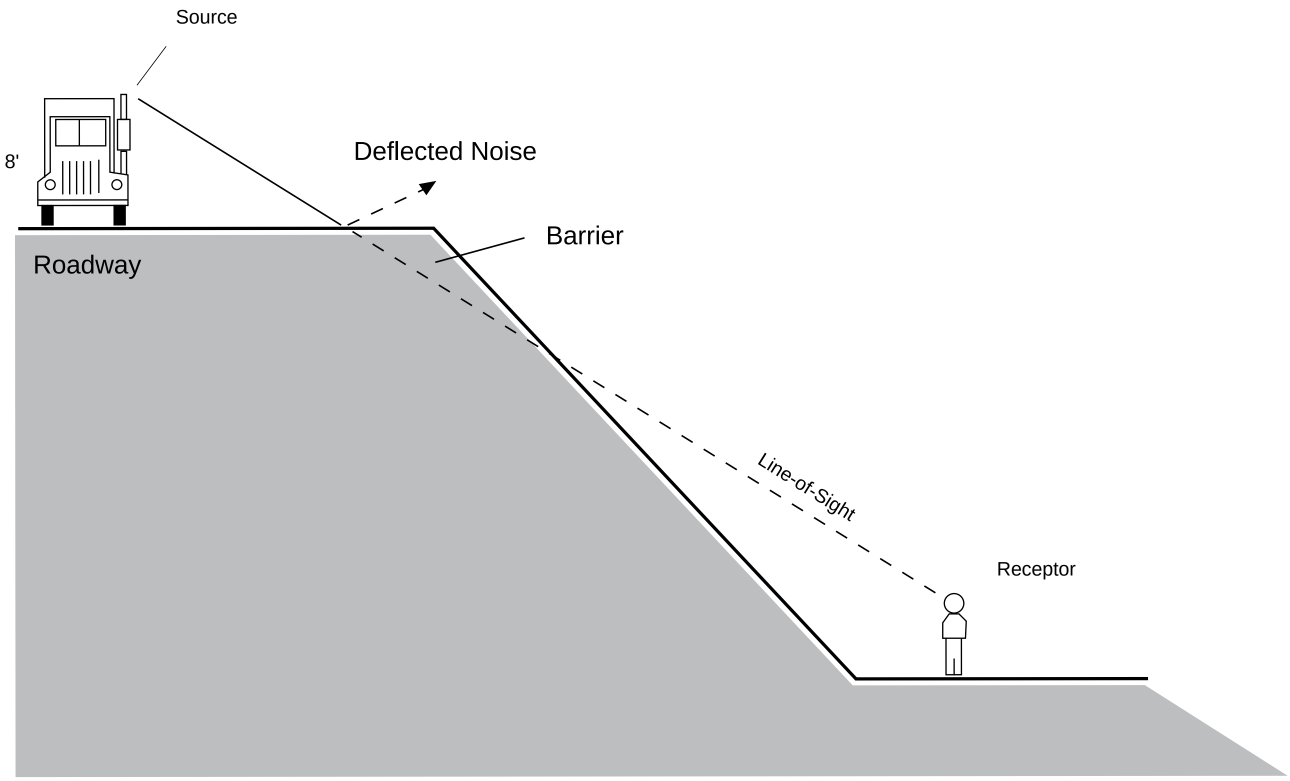
Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). The human ear does not respond uniformly to sounds at all frequencies; for example, it is less sensitive to low and high frequencies than it is to the medium frequencies that more closely correspond to human speech. In response to the sensitivity of the human ear to different frequencies, the A-weighted noise level (or scale), which corresponds more closely with people's subjective judgment of sound levels, has been developed. This A-weighted sound level, referenced in units of dB(A), is measured on a logarithmic scale such that a doubling of sound energy results in a 3.0 dB(A) increase in noise level. In general, changes in a noise level of less than 3.0 dB(A) are not typically noticed by the human ear (US Department of Transportation 1980a). Changes in noise ranging from 3.0 to 5.0 dB(A) may be noticed by some individuals who are extremely sensitive to changes in noise. A greater than 5.0 dB(A) increase is readily noticeable, while the human ear perceives a 10.0 dB(A) increase in sound level to be a doubling of sound.

Noise sources occur in two forms: (1) point sources, such as stationary equipment or individual motor vehicles; and (2) line sources, such as a roadway with a large number of point sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dB(A) for each doubling of distance from the source to the receptor at acoustically "hard" sites and 7.5 dB at acoustically "soft" sites (US Department of Transportation 1980a).[2] For example, a 60 dB(A) noise level measured at 50 feet from a point source at an acoustically hard site would be 54 dB(A) at 100 feet from the source and 48 dB(A) at 200 feet from the source. Sound generated by a line source typically attenuates at a rate of 3.0 dB(A) and 4.5 dB(A) per doubling of distance from the source to the receptor for hard and soft sites, respectively (US Department of Transportation 1980a). Sound levels can also be attenuated by man-made or natural barriers (e.g., sound walls, berms, ridges), as well as elevation differences, as illustrated in **Figure 4.9-1, Noise Attenuation by Barriers and Elevation Differences**.

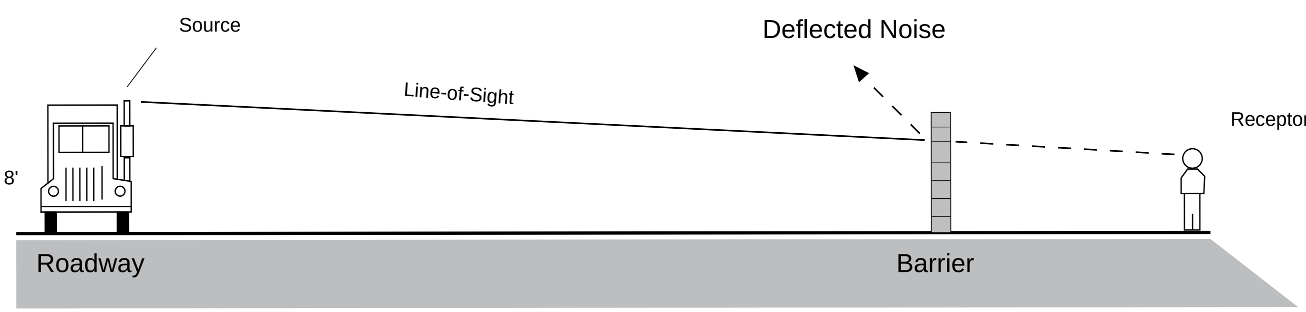
Wall/berm combinations may reduce noise levels by as much as 10.0 dB(A) depending on their height and distance relative to the noise source and the noise receptor (US Department of Transportation 1980b). Sound levels may also be attenuated 3.0 to 5.0 dB(A) by a first row of houses and 1.5 dB(A) for each additional row of houses (Barry and Reagan 1978). The minimum noise attenuation provided by typical building construction in California is provided in **Table 4.9-1, Outside to Inside Noise Attenuation**.

---

[2] Examples of "hard" or reflective sites include asphalt, concrete, and hard and sparsely vegetated soils. Examples of acoustically "soft" or absorptive sites include soft, sand, plowed farmland, grass, crops, heavy ground cover, etc.



"Barrier Effect" Resulting from Differences in Elevation.



"Barrier Effect" Resulting from Typical Soundwall.

SOURCE: Impact Sciences, Inc. – October 2004

FIGURE **4.9-1**

Noise Attenuation by Barriers and Elevation Differences

Table 4.9-1
Outside to Inside Noise Attenuation (dB(A))

Building Type	Open Windows	Closed Windows
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Convalescent Homes	17	25
Offices	17	25
Theaters	20	30
Hotels/Motels	17	25

Source: Transportation Research Board, National Research Council, Highway Noise: A Design Guide for Highway Engineers, National Cooperative Highway Research Program Report 117.

When assessing community reaction to noise, there is an obvious need for a scale that averages varying noise exposures over time and that quantifies the result in terms of a single number descriptor. Several scales have been developed that address community noise level. Those that are applicable to this analysis are the Equivalent Noise Level (L_{eq}), the Day-Night Noise Level (L_{dn}), and the Community Noise Equivalent Level (CNEL).

- L_{eq} is the average A-weighted sound level measured over a given time interval. L_{eq} can be measured over any period, but is typically measured for 1-minute, 15-minute, 1-hour, or 24-hour periods.
- L_{dn} is a 24-hour L_{eq} with a "penalty" of 10 dB added during the nighttime hours (10:00 PM to 7:00 AM), which is normally sleeping time.
- CNEL is another average A-weighted sound level measured over a 24-hour period. However, the CNEL noise scale is adjusted to account for some individuals' increased sensitivity to noise levels during the evening as well as the nighttime hours. A CNEL noise measurement is obtained after adding a "penalty" of 5 dB to sound levels occurring during the evening from 7 PM to 10 PM, and 10 dB to sound levels occurring during the nighttime from 10 PM to 7 AM.[3]

Vibration

Vibration of the air is called sound when it is within the frequency audible to the human ear, while vibration of materials other than air is called simply "vibration." Vibration that travels through the earth

3 The logarithmic effect of adding these penalties to the peak-hour L_{eq} measurement results in a CNEL measurement that is within approximately 3 dB(A) (plus or minus) of the peak-hour L_{eq}. California Department of Transportation, *Technical Noise Supplement; A Technical Supplement to the Traffic Noise Analysis Protocol*, October 1998, pp. N51-N54.

is referred to as groundborne vibration. Airborne vibration is caused by low-frequency sound (less audible to the human ear) that can excite building components and create a feeling of vibration.

Vibration may be composed of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in hertz (Hz). Most environmental vibrations consist of a composite, or "spectrum" of many frequencies, and are generally classified as broadband or random vibrations. The normal frequency range of most perceptible vibration generally ranges from a low frequency of less than 1 Hz to a high of about 200 Hz. Vibration is often measured in terms of the peak particle velocity (PPV)[4] in inches per second (in/sec) that correlates best with human perception. The threshold of perception for annoyance to humans is about 65 dB (referenced to 1 microinch per second). There is a high probability of annoyance if vibration velocities reach 85 dB (referenced to 1 microinch/sec) (US Department of Transportation 2006a).

Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease (attenuate) with distance from the source. High-frequency vibrations reduce much more rapidly than low frequencies, so that in the far-field from a source the low frequencies tend to dominate. An example of high frequency vibration would be ultrasound used in medicine, while sources of low frequency vibration would include pumps, boilers, electrical installations, fans, and road and rail traffic. Soil properties also affect the propagation of vibration. When groundborne vibration interacts with a building, there is usually a ground-to-foundation coupling loss, but the vibration can also be amplified by the structural resonances of the walls and floors. Vibration in buildings is typically perceived as rattling of windows or items on shelves, or the motion of building surfaces.

Groundborne vibration can be perceived without instrumentation within a few hundred feet of certain types of construction activities, especially pile driving. Road vehicles rarely create enough groundborne vibration to be perceptible to humans unless the road surface is poorly maintained and there are potholes or bumps. If traffic (typically heavy trucks) induces perceptible vibration in buildings, such as window rattling or shaking of small loose items, then it is most likely an effect of low-frequency airborne noise or ground characteristics.

Human annoyance by vibration is related to the number and duration of events. The more events or the greater the duration, the more annoying it will be to humans.

---

4 Particle velocity is the velocity of a particle (real or imagined) in a medium as it transmits a wave.

4.9.2.3 Noise-Sensitive Land Uses Within and Adjacent to the Campus

For purposes of this analysis, noise-sensitive receptors include residences and academic buildings. Noise-sensitive receptors located close to heavily traveled roadways or other stationary noise sources on the campus include existing student housing off of Harder Road and the academic buildings on West Loop and East Loop Roads.

Off-campus sensitive receptors include single and multi-family residences and schools located along Carlos Bee Boulevard, Harder Road, Grandview Avenue, Campus Drive, and Hayward Boulevard. These uses are mostly to the northwest, north, and east of the campus. Some residences are located off of Harder Road near Mission Boulevard.

Noise Sources

The primary existing noise source throughout the project area (both on campus and off campus) is motor vehicle traffic. Localized intermittent sources of noise include sounds from parking lots and curbside parking activities, mechanical equipment, car sirens, pedestrian traffic, and delivery trucks.

Roadways

The most pervasive noise sources in developed areas are typically related to transportation. Vehicle noise along heavily traveled roadways commonly causes sustained elevated noise levels. In densely developed communities, traffic noise often occurs in close proximity to land uses where people are sensitive to noise.

Most of the vehicles traveling to and from the campus take Carlos Bee Boulevard and Harder Road, both of which connect to Mission Boulevard. A third campus access is located from the north from Foothill Boulevard to 2nd Street to Campus Drive, which terminates on the northeast side of the campus at Hayward Boulevard. Inside the campus, the main traffic circulation goes through the campus on West Loop and East Loop Roads. Campus shuttles and buses also provide access to the campus site along the West and East Loop Roads.

These roadways tend to be heavily traveled during the daytime, at moderate vehicle speeds, and handle buses and medium-duty trucks but generally few heavy-duty trucks. Motor vehicle traffic is the predominant noise source across the project area.

Stationary Sources

Stationary noise sources include mechanical equipment, such as air conditioners, ventilation systems, pool pumps, and institutional operations, including landscape maintenance. These noise sources may result in environmental effects when they are in proximity of land uses where people are likely to be sensitive to noise. No major industrial or manufacturing facilities are presently located in the project area.

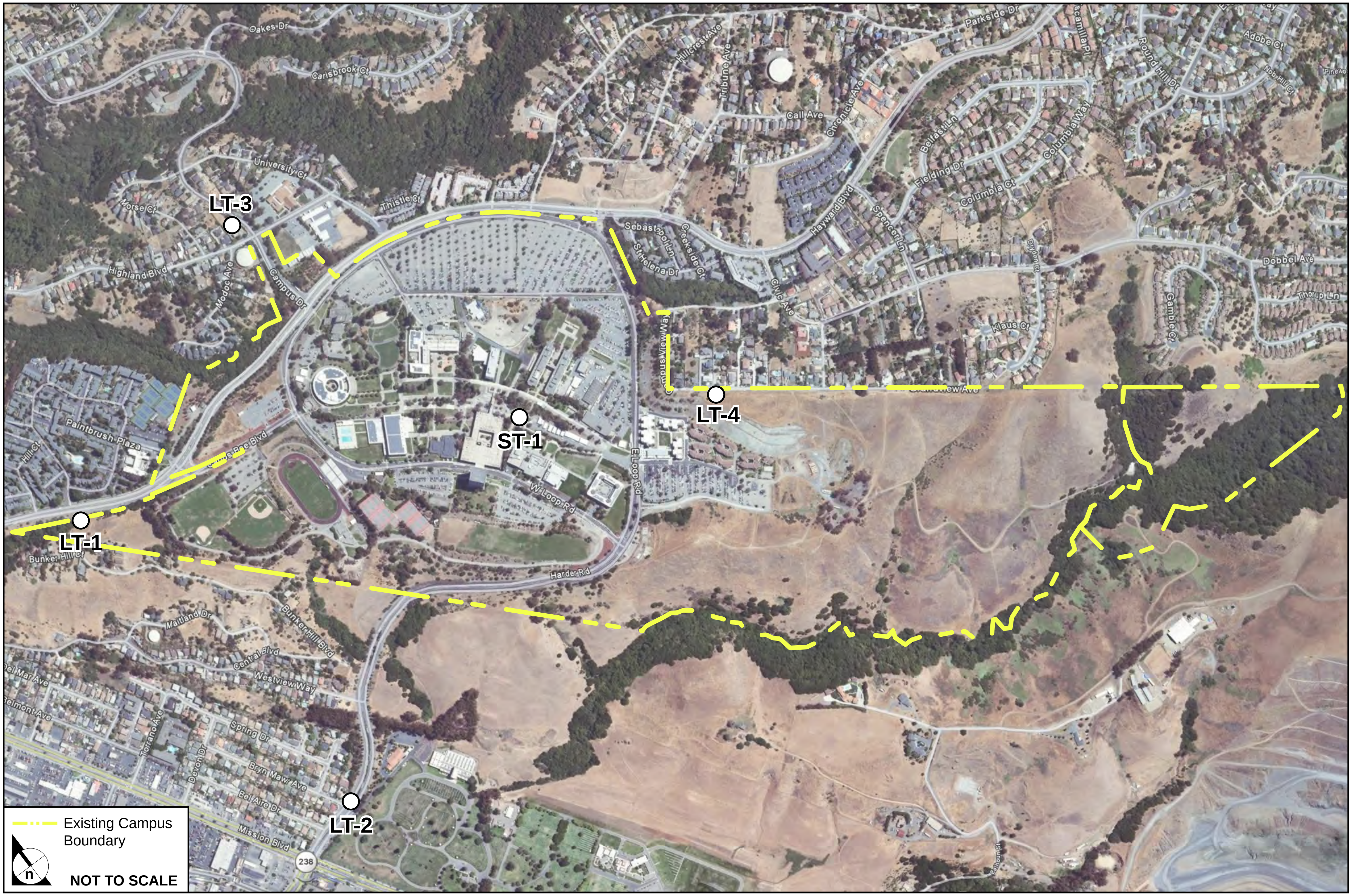
Construction Activity

Construction traffic and equipment operation at construction sites temporarily elevates noise levels at the project site and in the vicinity of construction activities. Construction noise is typically most noticeable in quieter residential areas that are in proximity to project construction locations. Noise levels vary depending on the distance between construction activity and the receptors, the type of equipment used, how the equipment is operated, and how well it is maintained.

4.9.2.4 Ambient Noise Levels in the Project Area

In order to quantify noise levels in the project area and to calibrate the noise model to be used in the assessment of potential project noise impacts, an ambient noise level survey was conducted on May 28, through May 29, 2008 and on October 30, through October 31, 2008. The noise survey was conducted at selected sites in the project area, as shown in **Figure 4.9-2, Noise Measurement Locations**. The measurement locations were selected to be representative of the noise-sensitive receptors in the study area and included existing residential land uses that could potentially be affected by the implementation of the proposed Campus Master Plan. Noise-sensitive receptors off site include single-family and multi-family residences. On campus, academic buildings and existing student residences are considered noise sensitive.

Noise measurement locations were selected at/near existing homes along major roadways that are used to access the main campus, including Carlos Bee Boulevard, Harder Road, and Campus Drive, as these roadways are expected to experience the highest increases in traffic due to campus growth under the Campus Master Plan. Note that noise-sensitive receptors are present along all of the roadways listed above. Noise measurements were also taken near Grandview Avenue because the residences along this roadway are adjacent to the campus property, and could experience increases in noise levels as a result of increased activity on the campus and due to increased traffic because, in the event that faculty and staff housing is built on the land between Pioneer Heights and Grandview Avenue and that housing is accessed via Civic Drive, Cotati Road, and Grandview Avenue, the project would add some daily trips to Grandview Avenue.



SOURCE: CSU East Bay Hayward Campus Master Plan Study - April 2008

FIGURE **4.9-2**

Noise Measurement Locations

961-002•10/08

Long-term (24 hours in duration) and short-term (15 minutes in duration) noise measurements were taken to calibrate the model. Three long-term noise measurements were made on May 28 through May 29, one long-term measurement was made on October 30 through October 31, and one short-term noise measurement was conducted on May 29. The measurements were taken using Larson Model 720 sound level meters, which satisfy American National Standards Institute (ANSI) requirements for general environmental noise measurement instrumentation. The sound meters were equipped with an omnidirectional microphone, calibrated before the day's measurements, and set at 5 feet above ground. The weather conditions were clear, with winds ranging from 5 to 15 miles per hour, on the day the noise measurements were taken. The measurement locations are shown in **Figure 4.9-2**.

Long-term noise measurement LT-1 was made at a distance of 75 feet from the center of Carlos Bee Boulevard, west of the intersection of Carlos Bee Boulevard and Hayward Boulevard. The nearest single-family and multi-family residences are located at a distance of about 70 feet from the center of Carlos Bee Boulevard near this location. Average noise levels at LT-1 were about 62 dB(A) L_{eq} during daytime hours and 58 dB(A) L_{eq} at night. The calculated noise level at this location was 65 dB(A) L_{dn} or 66 dB(A) CNEL. At the location of the nearest residences, the day-night average noise level was calculated to be about 64 dB(A) L_{dn}.

Long-term noise measurement LT-2 was conducted in the median of Harder Road, east of Mission Boulevard. The nearest single-family and multi-family residences are located at a distance of about 60 feet from the center of Harder Road near this location. As such, the noise levels at sensitive receptors would be lower than those recorded in the median of Harder Road. Average noise levels at LT-2 were about 80 dB(A) L_{eq} during daytime hours and 71 dB(A) L_{eq} at night. The calculated L_{dn} noise level at this location was 81 dB(A) L_{dn} or 81 dB(A) CNEL. At the setback of residences, the day-night average noise level was calculated to be 66 dB(A) L_{dn}.

Long-term noise measurement LT-3 was conducted at a distance of 30 feet from the center of Campus Drive, north of Highland Boulevard. Nearby single-family residences are located at a distance of about 45 feet from the center of Campus Drive. Average noise levels at LT-3 were about 64 dB(A) L_{eq} during daytime hours and 54 dB(A) L_{eq} at night. The calculated noise level at this location was 65 dB(A) L_{dn} or 65 dB(A) CNEL. At the setback of residences, the day-night average noise level was calculated to be 62 dB(A) L_{dn}.

Long-term noise measurement LT-4 was conducted at a distance of 50 feet from Pioneer Heights I student housing. Nearby single-family residences along Grandview Avenue are located at a distance of about 275 feet from the student housing. Average noise levels at LT-4 were about 48 dB(A) L_{eq} during daytime hours and 51 dB(A) L_{eq} at night. The calculated noise level at this location was 57 dB(A) L_{dn} or 57 dB(A) CNEL. At the setback of residences, the day-night average noise level was calculated to be 45 dB(A) L_{dn}.

Short-term noise measurement ST-1 was located on the campus adjacent to the Student Union building. Ambient noise level at this location was about 65 dB(A) L_{eq}.

4.9.3 REGULATORY SETTING

Federal and state laws have led to the establishment of noise guidelines for the protection of the population from adverse effects of environmental noise. Local noise compatibility guidelines are often based on the broader guidelines of state and federal agencies. Many local noise goals are implemented as planning guidelines and by enforceable noise ordinances.

4.9.3.1 Federal

Among other guidance, the Noise Control Act of 1972 directed the US Environmental Protection Agency (US EPA) to develop noise level guidelines that would protect the population from the adverse effects of environmental noise. The US EPA published a guideline containing recommendations of 55 dB(A) L_{dn} outdoors and 45 dB(A) L_{dn} indoors as a goal for residential land uses (US EPA 1974). The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues, and therefore should not be construed as standards or regulations.

The Department of Housing and Urban Development (HUD) standards define L_{dn} levels below 65 dB(A) outdoors as acceptable for residential use. Outdoor levels up to 75 dB(A) L_{dn} may be made acceptable through the use of insulation in buildings.

4.9.3.2 State

The pertinent State of California regulations are contained in the California Code of Regulations (CCR). Title 24 "Noise Insulation Standards" establish the acceptable interior environmental noise level (45 dB(A) L_{dn}) for multi-family dwellings (that may be extended by local legislative action to include single-family dwellings). Section 65302(f) of the CCR establishes the requirement that local land use planning jurisdictions prepare a General Plan. The Noise Element is a mandatory component of the General Plan. It may include general community noise guidelines developed by the California Department of Health Services and specific planning guidelines for noise/land use compatibility developed by the local jurisdiction. The state guidelines also recommend that the local jurisdiction consider adopting a local nuisance noise control ordinance. The California Department of Health Services has developed guidelines (1987) for community noise acceptability with which given uses are compatible for planning use by local agencies. For these purposes, selected relevant noise level guidelines include:

- CNEL below 60 dB(A)—normally acceptable for low-density residential use
- CNEL of 55 to 70 dB(A)—conditionally acceptable for low-density residential use
- CNEL below 65 dB(A)—normally acceptable for high-density residential use
- CNEL of 60 to 70 dB(A)—conditionally acceptable for high-density residential, transient lodging, churches, and educational and medical facilities
- CNEL below 70 dB(A)—normally acceptable for playgrounds and neighborhood parks

"Normally acceptable" noise levels are defined as levels satisfactory for the specified land use, assuming that conventional construction is used in buildings. "Conditionally acceptable" noise levels may require some additional noise attenuation or special study. Note that, under most of these land use categories, overlapping ranges of acceptability and unacceptability are presented, leaving some ambiguity in areas where noise levels fall within the overlapping range.

The State of California additionally regulates the noise emission levels of licensed motor vehicles traveling on public thoroughfares, sets noise emission limits for certain off-road vehicles and watercraft, and sets required sound levels for light-rail transit vehicle warning signals. The extensive state regulations pertaining to worker noise exposure are for the most part applicable only to the construction phase of any project (for example California Occupational Safety and Health Administration Occupational Noise Exposure Regulations [8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Section 5095, et seq.]) or for workers in a "central plant" or a maintenance facility, or involved in the use of landscape maintenance equipment or heavy machinery.

4.9.3.3 Local

The Hayward Public Nuisance Ordinance (Article 1 of the Hayward Municipal Code) regulates persistent noise and construction noise sources, while the City's general plan provides land use compatibility guidelines for a wide range of land uses. While local regulations do not apply to CSUEB Hayward campus, they are summarized below and used in part as the basis for determining the significance of noise-related impacts.

Noise from mobile sources such as motor vehicles is regulated by California State Law and the California Vehicle Code. Section 4-1.03 of the Hayward Municipal Code states that "No person shall produce, suffer or allow to be produced by any machine, animal or device, or any combination of same, on or abutting areas zoned or used for residential purposes a construction noise level of more than 6 dB above the local ambient level at any point outside the property plane before the hour of 7:00 AM and after the hour of 7:00 PM daily except on Sundays and holidays. On Sundays and holidays these restrictions apply before 10:00 AM and after 6:00 PM." A special permit for nighttime construction can been applied for and granted by the City Manager.

The City of Hayward General Plan includes Land Use Compatibility Guidelines that shows a maximum exterior L_{dn} noise level of 60 dB(A) to be "normally acceptable" for areas with mainly low-density residential land uses and 65 dB(A) for high density residential.

Table 4.9-2, Land Use/Noise Level Compatibility Standards, is a Land Use Compatibility Chart for Community Noise as presented in the Hayward General Plan. The City of Hayward has adopted noise and land use compatibility guidelines recommended by the State of California Office of Noise Control, as shown in **Table 4.9-2**. The City also has established design objectives for maximum interior noise levels for a wide range of land uses.

4.9.4 IMPACTS AND MITIGATION MEASURES

4.9.4.1 Standards of Significance

In accordance with Appendix G of the *2008 California Environmental Quality Act (CEQA) Statutes and Guidelines* and the CSU CEQA Handbook, the impact of the proposed project on noise would be considered significant if it would exceed the following significance criteria:

- Expose people to or generate noise levels in excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies;
- Expose people to or generate excessive groundborne vibration or groundborne 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;
- A substantial temporary increase in ambient noise levels (associated mainly with construction activities) was evaluated based on the following criterion:
- Result in exposure of people residing or working in the project area to excessive noise levels if the project is located within an area covered by an airport land use plan, or where such a plan has not been adopted, within 2 miles of a public airport or public use airport; or
- Result in exposure of people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip.

Table 4.9-2
Land Use/Noise Level Compatibility Standards

Land Use Category	Community Noise Level L_{dn} or CNEL (dB) Clearly Unacceptable	Normally Unacceptable	Conditionally Acceptable	Normally Acceptable
Residential (Low Density Single-Family, Duplex, Mobile Homes)	75 +	70–75	55–70	under 60
Residential (Multi-Family)	75 +	70–75	60–70	under 65
Transient Lodging (Motels, Hotels)	80 +	70–80	60–70	under 65
Schools, Libraries, Churches, Hospitals, Nursing Homes	80 +	70–80	60–70	under 70
Auditoriums, Concert Halls, Amphitheaters	65 +	--	under 70	--
Sports Arenas, Outdoor Spectator Sports	70 +	--	under 75	--
Playgrounds, Neighborhood Parks	72.5 +	67.5–75	--	under 70
Golf Courses, Riding Stables, Water Recreation, Cemeteries	80 +	70–80	--	under 75
Office Buildings, Business, Commercial and Professional	--	75–85	67.5–77.5	under 70
Industrial, Manufacturing, Utilities, Agriculture	--	75–85	70–80	under 75

Source: City of Hayward 2006
Notes:
Clearly Unacceptable – New construction or development should generally not be undertaken
Normally Unacceptable – New construction or development should generally be discouraged. If construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
Conditionally Acceptable – New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.
Normally Acceptable – Specified land use is satisfactory, based upon the assumption that nay buildings involved are of normal construction, without any special noise insulation requirements

For purposes of evaluating the significance of the noise impacts, the following numeric thresholds are used in this Draft EIR:

- An increase in noise which causes the significance thresholds (60 dB(A) L_{dn} for single-family residential; 65 dB(A) L_{dn} for multi-family residential, 70 dB(A) L_{dn} for schools, and 70 dB(A) L_{dn} for parks) to be exceeded and the project results in an increase in noise of 3 dB(A) or more;
- An increase of 3 dB(A) where the outdoor noise levels without the project are above the significance thresholds;
- An increase of 5 dB(A), where the noise levels without the project are 50 to 60 dB(A) L_{dn} for single-family residential uses and the increase in noise from the project does not cause the significance thresholds to be exceeded; or
- An increase of 10 dB(A), where noise levels without the project are less than 50 dB(A) L_{dn} for single-family residential uses and the increase in noise from the project does not cause the significance thresholds to be exceeded.

The increase in noise is based on comparing the proposed project and no project conditions within the same time frame (2030). A noise increase of 3 dB is considered to be a perceptible increase and has been used as a standard in this Draft EIR to evaluate impacts in areas where the ambient or background noise levels without the proposed project are over the noise thresholds for affected land uses. Increases of 5 and 10 dB are used to evaluate noise impacts in areas where the ambient or background noise levels without the project are low or moderate. The use of this "sliding scale" is appropriate because where ambient/background levels are low an increase of 3 dB(A) may be perceptible but would not typically be enough to create an annoyance or nuisance. On the other hand, where the ambient/background noise levels are already moderately high, an increase of 3 dB(A) would exacerbate an existing noise problem and would increase the level of annoyance perceived by sensitive receptors.

For evaluating construction noise, the following numeric threshold adapted from the City of Hayward's noise ordinance is used in this Draft EIR.

- Construction noise level is in excess of the ambient noise level by 6 dB(A) at the nearest sensitive receptor during nighttime hours between 7:00 PM to 7:00 AM on weekdays and Saturdays, and between 10:00 PM to 6:00 AM on Sundays and holidays.

Issues Not Discussed Further

The campus is not located within an airport land use plan or within 2 miles of a public airport or public use airport. In addition, the campus is not located within 2 miles of a private airstrip. Therefore, no impact would occur and no additional analysis is needed.

Pile driving would not be needed on the campus site because the bedrock is shallow. Therefore, there would be no vibration impact related to pile driving activities and no additional analysis is needed.

4.9.4.2 Methodology

The primary noise issues associated with campus development under the proposed Master Plan are the exposure of existing and proposed noise-sensitive land uses to noise from (1) short-term construction activities; (2) noise from project-related traffic and changes in traffic patterns (long-term); and (3) noise associated with daily activities on the campus, such as noise from landscaping, mechanical equipment, recreational activities, and parking lot activities, and from special events on the campus.

Existing noise conditions are described based on information provided from traffic noise modeling conducted using traffic data developed for this Draft EIR. Federal Highway Administration (FHWA) *Highway Traffic Noise Prediction Model* (FHWA-RD-77-108) was used to estimate traffic noise (US Department of Transportation 2006b). This model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, distances between the noise source and the receptor, and other noise-attenuating conditions. The average vehicle noise rates (energy rates) for California were also used in this modeling. Noise modeling assumed soft ground type and did not take any shielding from barriers, structures, or terrain into account. Traffic noise was evaluated for the following scenarios: 2008 Existing, 2030 No Project, 2030 Proposed Project with Third Entrance, and 2030 Proposed Project without Third Entrance. Note that 2030 is used in this Draft EIR as the horizon year for the evaluation of impacts from the buildout of the campus under the proposed Master Plan. Average daily trip traffic volumes, traffic speeds and percentages of automobiles, medium trucks, and heavy trucks were provided by Fehr & Peers Transportation Consultants for input into the traffic noise model. All impacts were estimated and evaluated not at the source of noise but at the site where the nearest noise-sensitive receptor is located relative to the noise source.

The adopted noise thresholds from the Hayward General Plan were used to evaluate the significance of on-site and off-site ambient noise impacts. As described above, for purposes of evaluating whether an increase in noise levels as a result of the project would be significant, an increase of 3 dB(A) or greater in L_{dn} was considered a substantial permanent increase.

As discussed in **Section 3.0, Project Description**, the proposed Master Plan includes a potential new entrance from the east on Hayward Boulevard, which would serve to better distribute vehicle trips internally and provide a major new gateway to the campus. The connection would be designed to discourage excessive through-travel and speeds because East Loop Road runs between the central academic campus and the primary student residential area that would be sensitive to increases in noise volumes. Since building the new connection depends in part on the City of Hayward's participation and approval of the design of the new intersection, the noise analysis in this Draft EIR was conducted for two alternate scenarios – with the new entrance (2030 Proposed Project with Third Entrance), and without the new entrance (2030 Proposed Project without Third Entrance). The results for both scenarios are reported in the impacts below.

4.9.4.3 Project Impacts and Mitigation Measures

MP Impact NOI-1: **Campus development under the proposed Campus Master Plan would result in increased vehicular traffic on the regional road network, which would increase ambient traffic noise levels at existing on- and off-site noise sensitive uses.**

Level of Significance: Less than significant

Development of the proposed project would increase traffic volumes on the local roadway network, which would result in increased traffic noise levels at noise-sensitive receptors located along these roadways. Project-generated noise increases were calculated based on traffic conditions with the project as compared to no project traffic conditions in the year 2030. **Table 4.9-3, Traffic Noise Levels at On- and Off-Campus Locations in dB(A) CNEL/L_{dn},** summarizes the calculated L_{dn} noise levels at adjacent noise-sensitive uses under the following conditions: 2008 Existing, 2030 No Project, 2030 Proposed Project with Third Entrance, and 2030 Proposed Project without Third Entrance traffic conditions. The calculated traffic-generated noise increases are also summarized. Calculations based on the traffic noise model were generally consistent with ambient background noise survey measurements.

As discussed earlier in the section, the selected roadway segments are expected to be areas that would experience the greatest project-related traffic increases as a result of the proposed project. Although other streets in the vicinity of the campus would also experience traffic increases as a result of the proposed project, the traffic increases on those streets are anticipated to be smaller than at the modeled locations based on the results of the traffic study completed for the project. Therefore the increase in noise levels due to the traffic at these locations would also be expected to be smaller than at the modeled roadway segments. The modeled locations represent the "worst-case scenario" for this analysis. Noise impacts from project-related traffic with and without the third entrance are presented in **Table 4.9-3**, and are discussed below by comparing the with project noise levels to 2030 without project conditions.

Impacts of 2030 Proposed Project with Third Entrance

The existing noise levels along all roadway segments already exceed the 60 dB(A) L_{dn} threshold for single-family residences. As stated under the Standards of Significance, a significant noise impact would occur if the project traffic would result in an increase of 3 dB(A) where the ambient noise levels without the project are above the significance thresholds. As shown in **Table 4.9-3**, compared to 2030 conditions without the project, the addition of project traffic would result in a traffic noise increase of less than 3 dB(A) on all study segments. The highest increase (2.9 dB(A)) would occur along Harder Road, with 2.7 dB(A) as a result of campus growth. However this increase is below the numeric threshold and therefore there would not be a significant noise impact. Similarly, if there were no growth in traffic from other sources and project traffic were the only traffic added to the roadway segments, the resultant noise increases would also be less than 3 dB(A) on all study segments. Since noise levels along the study segments would increase by less than 3 dB(A), the increase in roadway noise as a result of the proposed project would not be considered significant.

Impacts of 2030 Proposed Project without Third Entrance

Implementation of the proposed project without the third entrance would distribute traffic similar to existing traffic patterns because the third entrance would not be available to drivers to access the campus. Similar to the 2030 Proposed Project with Third Entrance scenario, compared to 2030 conditions without the project, and compared to existing conditions assuming no growth in traffic from other sources, the addition of project traffic would result in a traffic noise increase of less than 3 dB(A) on all study segments. Once again, the noise increase would be the greatest along Harder Road—about 2.2 dB(A). However, it would not exceed the significance threshold. Therefore, noise impacts under the "without Third Entrance scenario" would be considered less than significant.

It should be noted that these project-related traffic noise increases are predicted based on traffic volumes associated with full development under the proposed Master Plan (that is, projected campus traffic in 2030). In the interim years (before 2030), because the traffic volumes would be lower than at full development under the Campus Master Plan, the noise increases would be even lower. Furthermore, to address the proposed project's significant traffic impacts, in compliance with **MP Mitigation Measure TRANS-1**, the Campus would develop and implement a Transportation Demand Management (TDM) program to reduce project-generated traffic. This mitigation measure would further reduce any project-related traffic noise increases along roadway segments.

In summary, although the proposed project would result in additional traffic that would increase noise levels along affected roadways, the traffic added by campus development under the proposed Master Plan with and without the third entrance would not significantly increase noise levels along any of the roadway segments. The impact would be less than significant.

Table 4.9-3
Traffic Noise Levels at On- and Off-Campus Locations in dB(A) L_{dn}

Road	Segment	Distance from Center to Nearest Receptor (feet)	Modeled L_{dn} Noise Level, dB(A)[1]				Increase over 2030 No Project, dB(A)[2]		Potential Significant Impact
			2008 Existing	2030 No Project	2030 Proposed Project (Future plus Project)				
					With Third Entrance	Without Third Entrance	With Third Entrance	Without Third Entrance	
Carlos Bee Boulevard	Mission Blvd to Hayward Blvd.	60	65.6	67.4	68.3	68.4	0.9	1.0	No
Carlos Bee Boulevard	Hayward Blvd to West Loop Road	100	60.6	61.9	62.7	63.4	0.8	1.5	No
West Loop Road	Carlos Bee Boulevard to Harder Road	70	61.8	63.6	63.9	64.0	1.8	1.9	No
East Loop Road	Carlos Bee Boulevard to Harder Road	70	60.5	63.6	65.7	65.8	2.1	2.3	No
Harder Road	West Loop Road to Mission Boulevard	60	67.0	68.8	71.5	71.0	2.7	2.2	No
Hayward Boulevard	Carlos Bee Boulevard to Campus Drive	60	68.5	71.6	71.9	72.2	0.3	0.6	No
Hayward Boulevard	East of Campus Drive	60	63.1	64.9	65.2	65.2	0.3	0.3	No

Road	Segment	Distance from Center to Nearest Receptor (feet)	Modeled L_{dn} Noise Level, dB(A)[1]				Increase over 2030 No Project, dB(A)[2]		Potential Significant Impact
			2008 Existing	2030 No Project	2030 Proposed Project (Future plus Project)		With Third Entrance	Without Third Entrance	
					With Third Entrance	Without Third Entrance			
Campus Drive	Hayward Boulevard to 2nd Street	45	62.2	64.0	64.8	64.8	0.8	0.8	No
2nd Street	West of Campus Drive	45	62.5	66.6	67.6	67.6	1.0	1.0	No

[1]*Noise levels are indicated at the setback of adjacent noise sensitive uses.*
[2] *Calculations assume an ambient background noise level of about 50 dB(A) L_{dn}.*

Mitigation Measure: No mitigation is required.

MP Impact NOI-2: **Daily operations within the Campus could expose existing off-site and future on-site noise sensitive receptors to elevated noise levels.**

Level of Significance: Less than significant

Daily noise generating activities on the campus would include student gatherings and conversations, athletic and recreational activities, social events, landscaping and maintenance activities, on-site traffic, and mechanical equipment noise. Noise generated by daily campus activities is not expected to exceed the noise standard of 60 dB(A) L_{dn} exterior and 45 dB(A) L_{dn} interior at off-site residential locations or 70 dB(A) L_{dn} at churches or schools because the noise levels generated by these activities are generally low at the source and would be further attenuated by the distance between the campus facilities and the nearest off-site receptors, including the residences on Grandview Avenue. Even though additional student housing would be constructed on the campus in the vicinity of Grandview Avenue and noise in the vicinity of the new housing from heating, ventilation, and air conditioning (HVAC) equipment could increase, similar to existing conditions, noise levels associated with HVAC systems would be reduced to below the noise standard for residences at a distance of less than 50 feet from the source with the use of standard attenuation barriers.

On-site noise-sensitive receptors, including student housing and academic buildings on the campus, could however be exposed to excessive noise from other land uses that are developed within the campus. For instance, noise levels could be elevated in the vicinity of new buildings from the operation of commercial grade HVAC systems for large office and research facilities. However, the land use plans for the Campus Master Plan have been designed to avoid the location of sensitive land uses near potential loud noise sources. All of the student housing has been planned to be located in the southern and western portions of the campus at some distance from academic buildings. Similarly, locations for future faculty and staff housing are also located along the edges of the developed campus and would be at a distance from on-site noise sources. Furthermore, noise levels associated with typical commercial grade HVAC systems can be reduced to below the noise standard for residences at a distance of less than 50 feet from the source with the use of standard attenuation barriers. Therefore, on-site receptors are not expected to be exposed to noise levels in excess of the standards for noise sensitive uses, and the impact is considered less than significant.

Mitigation Measure: No mitigation is required.

MP Impact NOI-3: Construction on the campus pursuant to the proposed Campus Master Plan could expose existing and future noise-sensitive receptors to elevated construction noise levels.

Level of Significance: Potentially significant

Construction of new facilities on the campus would occur as a result of the implementation of the proposed Master Plan and would include demolition, ground clearing, earthmoving, foundations, erection of structures and finishing. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance and shielding between construction noise sources and noise sensitive areas. **Table 4.9-4, Construction Equipment Noise Emission Levels,** summarizes noise levels produced by commonly used construction equipment. Individual types of construction equipment are expected to generate noise levels ranging from 74 to 89 dB(A) at a distance of 50 feet.

Table 4.9-4
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dB(A)) 50 feet from Source
Grader	85
Bulldozers	85
Truck	88
Loader	85
Roller	74
Air Compressor	81
Backhoe	80
Pneumatic Tool	85
Paver	89
Concrete Pump	82

Source: Federal Transit Administration 2006.

Noise generated by construction is anticipated to be the greatest during site grading activities and excavation for underground utilities. Noise generated during foundation and building construction would be lower. Maximum noise levels would typically range from 70 to 90 dB(A) during excavation and grading activities and from 65 to 85 dB(A) during building construction at a distance of 50 feet from the source. Hourly average construction noise levels are typically 75 dB(A) to 85 dB(A) measured at a distance of 50 feet from the center of the site during busy construction periods. Construction noise levels decrease at a rate of about 6 dB(A) per doubling of distance between the source and receptor. Shielding by buildings or terrain often result in much lower construction noise levels at distant receptors.

The closest off-campus noise-sensitive receptors to the project site include residences along Grandview Avenue and Campus Drive. On-campus noise sensitive receptors include the Pioneer Heights I, II, and III student housing complexes. Residences along Grandview Avenue are located about 50 feet east of the campus site's eastern property line and approximately 275 feet east of Pioneer Heights I student housing. The residences along Campus Drive are located more than 100 feet west and north of the campus's northern property line on Hayward Boulevard and Campus Drive. During the noise monitoring survey, ambient daytime noise levels at these receptors were measured to be about 45 dB(A) L_{eq} near the residences along Grandview Avenue and about 65 dB(A) L_{eq} on Campus Drive.

As discussed earlier in this section, a significant impact would occur if construction activity is predicted to result in a sound level that is more than 6 dB above the ambient sound level at the nearest sensitive receptor between the hours of 7:00 PM and 7:00 AM on weekdays and Saturdays or between the hours of 10 AM and 6 PM on Sundays and holidays. Sensitive receptors include residences, classrooms, libraries, and other places on campus used for learning and research. At places where construction takes place within a distance of about 500 feet from the nearest sensitive receptor, construction noise is likely to increase sound levels at residences by 6 dB or more. Some of the off-site residences along Campus Drive would be located within 500 feet of the proposed faculty and staff housing on Hayward Boulevard, and the residences along Grandview Avenue would be located within 500 feet of subsequent phases of Pioneer Heights student housing (Phases V and VI) and less than 100 feet of the potential faculty and staff housing site along Grandview Avenue. In addition, as student residences are constructed on the campus, occupants of these residences would be exposed to high noise levels from construction of later phases of the campus. Similarly, classroom buildings may be within 500 feet of construction sites on the campus. This impact would be considered significant for construction activities occurring between the hours of 7:00 PM and 7:00 AM on weekdays and Saturdays or between 10 AM and 6 PM on Sundays and holidays. There is no policy in the proposed Campus Master Plan that would limit the hours of construction on the campus. Therefore, construction activities if conducted within 500 feet of a sensitive receptor during the hours of 7:00 PM and 7:00 AM would result in a significant noise impact on those receptors. **MP Mitigation Measure NOI-3a** is proposed to avoid significant noise impacts from construction activities on the campus. **MP Mitigation Measure NOI-3b** is proposed to further reduce significant noise impacts from construction activities related to the proposed project.

MP MM NOI-3a: Construction activities on campus shall be restricted to between the hours of 7:00 AM and 7:00 PM on weekdays and Saturdays and 10:00 AM to 6:00 PM on Sundays and holidays.

MP MM NOI-3b: Prior to initiation of campus construction within 500 feet of a noise sensitive receptor, the Campus shall approve a construction noise mitigation program including but not limited to the following.

- All noise-producing project equipment and vehicles using internal combustion engines shall be equipped with exhaust mufflers and air-inlet silencers where appropriate, in good operating condition that meet or exceed original factory specification.
- Mobile or fixed "package" equipment (e.g., arc-welders, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.
- All mobile or fixed noise producing equipment used on the project, which is regulated for noise output by local, state or federal agency, shall comply with such regulation while engaged in project-related activities.
- Electrically powered equipment shall be used instead of pneumatic or internal combustion powered equipment, where practicable.
- Material stockpiles and mobile equipment staging, construction vehicle parking and maintenance areas shall be located as far as practicable from noise-sensitive land uses.
- Stationary noise sources such as generators or pumps shall be located away from noise-sensitive land uses as feasible.
- The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning purposes only. No project-related public address loudspeaker, two-way radio, or music system shall be audible at any adjacent noise-sensitive receptor except for emergency use.
- The erection of temporary noise barriers shall be considered where project activity is unavoidably close to noise-sensitive receptors.
- The noisiest construction operations shall be scheduled to occur together to avoid continuing periods of the greatest annoyance, wherever possible.
- Construction vehicle trips be routed as far as practical from existing residential uses.

- The loudest campus construction activities, such as demolition, blasting, and pile driving, shall be scheduled during summer, Thanksgiving, winter, and spring breaks when fewer people would be disturbed by construction noise.
- Whenever possible, academic, administrative, and residential areas that will be subject to construction noise shall be informed a week before the start of each construction project.

Significance after Mitigation: Less than significant

4.9.4.4 Cumulative Impacts and Mitigation Measures

MP Impact NOI-1 evaluates the increase in noise in 2030 under three scenarios: a No Project scenario that estimates the increase in noise levels along city streets as a result of 2030 background traffic volumes, and two Project scenarios that add project-related traffic volumes to 2030 background traffic volumes and then estimate the increased noise levels. Note that the 2030 background traffic volumes reflect the increased traffic that would result from population and employment growth projected in the study area through 2030. The analysis presented under **MP Impact NOI-1**, therefore, presents the cumulative noise impacts in the study area. Further evaluation is not required.

4.9.5 REFERENCES

Barry, T. M. and J. A. Reagan. 1978. *FHWA Highway Traffic Noise Prediction Model*. US Department of Transportation, Federal Highway Administration, Office of Research, Office of Environmental Policy. (NTIS, FHWA-RD-77-108). Washington, D.C.

City of Hayward. 2006. *City of Hayward General Plan.*

City of Hayward. *Hayward Municipal Code*

Fehr & Peers. 2008. *Transportation Impact Analysis for the Proposed CSU East Bay Hayward Campus Master Plan, Hayward California.*

US Department of Transportation, Federal Highway Administration. 1980a. *Highway Noise Fundamentals*, Springfield, Virginia.

US Department of Transportation, Federal Highway Administration. 1980b. *Highway Noise Mitigation.* Springfield, Virginia.

US Department of Transportation, Federal Highway Administration, Office of Planning and Environment. 2006a. *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06.

US Department of Transportation, Federal Highway Administration. 2006b. *FHWA Highway Construction Noise Handbook.* Washington, DC.