DRAFT NOISE TECHNICAL REPORT

UNIVERSITY OF CALIFORNIA, IRVINE

LONG RANGE DEVELOPMENT PLAN

Irvine, CA

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SECTION 1 INTRODUCTION

This report assesses potential noise and vibration impacts associated with implementation of the University of California, Irvine (UCI) 2007 Long Range Development Plan (LRDP). It describes the existing noise environment, regulatory requirements, results of sound-level measurements, and provides an assessment of the potential noise and vibration impacts of the proposed project. The changes in estimated noise levels due to the project are compared to applicable guidelines contained in local and state planning documents to determine significance. Potential project-related noise sources from vehicular traffic, stationary noise sources, and construction activity are discussed. This report also provides a general discussion of the potential impacts from groundborne vibration.

1.1 PROJECT DESCRIPTION

The proposed project involves updating the LRDP for the UCI campus to reflect student enrollment projections through the horizon year 2025-26, and identifies institutional and development objectives, delineates campus land uses, and estimates the new building space needed to support program expansion.

The primary intent of the 2007 LRDP is to provide a general land use plan to enable UCI to achieve its academic, research, and public service goals, to realize the best possible balance between aesthetic and functionality, to guide stewardship over the development of the campus, and to attain appropriate integration with the surrounding off-campus community. The overall goal of the UCI LRDP Student Enrollment Update is to provide for an increase in student enrollment to 37,000 students through the year 2025-26 commensurate with UCI's strategy for academic development and in order to accommodate the projected demand for higher education within the State of California.

The UCI campus is located in the southern portion of the City of Irvine (City), in Orange County, California. The campus is adjacent to the City of Newport Beach (Figure 1). As shown in Figure 2, the campus is generally bounded by Campus Drive and Jamboree Road to the north, Culver Drive to the east, Bonita Canyon Drive to the south, and State Route 73 (SR-73) and MacArthur Boulevard to the west. Regional access is provided to UCI via Interstate 405 (I-405), SR-55, and SR-73. The toll road extension of SR-73 provides access from areas in southern Orange County.

The UCI campus currently consists of approximately 1,475 acres. Academic and support facilities consist of 207 acres and housing for student, faculty, and staff consists of 312 acres. There are approximately 309 acres of open space areas to be developed. The remaining area consists of campus support services, income-producing inclusion area, mixed-use, support retail, recreational, roadways, and parking.

Approximately 770 acres (52 percent) of the campus is currently developed, with most development focused in the central academic core. The primary areas of undeveloped property remain in the outer campus areas. These outer, undeveloped areas mainly consist of rolling topography covered with exotic and native grasses. Pockets of native habitat exist throughout the outer campus area, mainly in designated open space areas.

The LRDP land use plan includes ten land use categories: academic and support uses, campus support services student housing, faculty/staff housing, housing reserve, mixed use, for-profit inclusion area, parking and roadways, open space–athletics and recreation, and open space–general. The LRDP is not an

implementation plan and therefore does not include a development phasing plan or a schedule for population and space projections.

- Academic and Support Uses accommodate the core teaching and research facilities and support uses. Permitted uses include classrooms, laboratories and other research facilities; clinical facilities; academic and administrative office space; libraries; performance and cultural facilities; service facilities; parking; research institutes; food service; infrastructure; and other support uses.

- Campus Support Services include service functions that support the operation, maintenance, and safety of the campus. Permitted uses include administrative office space; service space; corporation yards; maintenance facilities; material storage and handling; shops; warehousing; shipping and receiving; central plant and utility systems; police and safety uses; and other support space.

- Student Housing accommodates a variety of housing types to meet the varying needs of single graduate and undergraduate students, student groups (including academic theme houses and fraternity and sorority housing), and family student housing.

- Faculty/Staff Housing includes attached or detached housing for University faculty and staff; child care, preschool, or elementary school facilities; recreation facilities; community meeting space; and other residential support uses.

- Housing Reserve accommodates future University housing needs, including housing for students, faculty, staff, medical residents and interns, post-doctoral researchers, and other University affiliates.

- Mixed Use includes two types of mixed use functions: Commercial and Neighborhood. Commercial Mixed Use accommodates housing, commercial, or academic-related uses within a common site to support UCI's mission and to provide a live-work environment. Neighborhood Mixed Use accommodates mixed use at the neighborhood level to support the local campus community.

- For-Profit Inclusion Area accommodates third-party real estate transactions on campus Inclusion Area land. Permitted uses include office space; research and development uses; commercial and retail space; research facilities; clinical uses; and other commercial or non-profit facilities that support the academic mission of the campus through direct collaboration and/or support of campus programs through development revenue.

- Parking and Roadways accommodate facilities to support parking, transportation, and transit facilities, including surface parking; multi-level parking structures; streets and associated rights-of-way; traffic-control facilities; and parkway landscaping.

- Open Space–Athletics and Recreation includes intercollegiate athletics and campus recreation uses. Permitted uses include indoor and outdoor intercollegiate athletic facilities; indoor and outdoor recreation facilities; playfields; courts; jogging trails; and support uses including food service, child care, office and meeting space, and parking.

- Open Space–General includes the campus open space network of parks, greenbelts, riparian corridors, habitat areas, buffers, and trail systems. Permitted uses include landscaping; pedestrian and bike trail systems; water quality and drainage structures; small facilities such as food service, interpretive centers, seating and viewing areas, and other facilities compatible with open space; habitat restoration and management; and support facilities including maintenance roads, support structures, field research facilities, and other facilities that support campus open space needs.

The campus consists of approximately 1,475 acres in a setting that is increasingly characterized as urban. The surrounding land uses include established commercial and residential communities, commercial and residential areas currently undergoing development or redevelopment, and dedicated open space uses. University Center, which contains residential, restaurant, retail, office, and theater uses, is also located north of the main campus. The Turtle Rock residential community is located along the eastern boundary of the campus. The Bonita Village residential community and the Turtle Ridge residential community are located south of the campus, and the Bonita Ridge residential community is located west of campus. Existing institutional facilities within the Turtle Ridge community include Mariners Church and the Tarbut V'Torah School. The Irvine Business Complex (IBC), consisting of office and commercial development and redevelopment, and the Brinderson Tower Complex are located north of UCI's North Campus.

Immediately north of the campus lies the University Town Center (UTC), a 250-acre area that connects to the gateway quad of the central campus. The UTC was developed and owned by The Irvine Company and provides a wide variety of shopping and entertainment venues, as well as other facilities needed to support the University. The UTC was designed to be the center of the social and recreational focus that linked the University to the outside community. In addition, privately-owned apartment communities border the central campus, along Campus Drive, and provide for additional housing for students whom wish to live off-campus.

The Turtle Rock Residential Community is located immediately adjacent to the East Campus bordering Culver Drive. It consists of low to medium density housing intermingled with open space and park areas, schools, and small businesses; an apartment community lies to the north of the East Campus on the corner of Campus Drive and Culver Drive. Bonita Ridge is a residential community that lies adjacent to the West Campus, but is separated from the West Campus by SR-73 and the Bonita Creek Wetlands Corridor. The City of Newport Beach is also adjacent to the West Campus, but is located approximately 3 miles to the west and is also separated by SR-73.

A few of the land uses adjacent to the North Campus are the Brinderson Tower Complex, which is located across Fairchild Road and includes a 15-story and a 13-story multi-tenant office buildings and parking structures; The Irvine Business Complex, which is located to the northeast of the North Campus, and is comprised of business and industrial land uses; and The Knoll Center, which located directly across the street from the North Campus on Jamboree Boulevard in New port Beach, and is comprised of mix-uses that include offices, hotels, ancillary retail, and several restaurants.

The following details the methodology and findings of the analysis.

1.2 NOISE BACKGROUND

Noise is generally defined as loud, unpleasant, unwanted, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, and sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound's pitch and is measured in hertz (Hz), whereas intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. Some simple rules are useful, however, in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The frequency of a sound is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a certain number of times per second. A particular tone that makes the drum skin vibrate 100 times per second generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the best human ear.

Sound from a tuning fork (a pure tone) contains a single frequency, but most sounds one hears in the environment do not consist of a single frequency but a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all of a sound's frequencies according to a weighting system that reflects the fact that human hearing is less sensitive at low frequencies and extremely high frequencies than at mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the L_{eq} (equivalent sound level) is used. L_{eq}

is the energy-mean A-weighted sound level during a measured time interval and is the "equivalent" constant sound level that would have to be produced by a given source to equal the fluctuating level measured. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the L_{max} and L_{min} indicators, which represent the root-mean-square maximum and minimum obtainable noise levels during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L_{10}, L_{50}, and L_{90} are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L_{10} typically describe transient or short-term events, whereas levels associated with L_{90} describe the steady-state (or most prevalent) noise conditions.

Finally, another sound measure known as the Community Noise Equivalence Level (CNEL) is defined as the "A" weighted average sound level for a 24-hour day. It is calculated by adding a 5 dB "penalty" to sound levels in the evening (7:00 p.m. to 10:00 p.m.) and a 10 dB penalty to sound levels in the night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The Day-Night Average Sound Level (L_{dn} or DNL) is a 24-hour-average L_{eq} with a 10 dBA penalty added to noise occurring during the hours of 10:00 p.m. to 7:00 a.m. The CNEL is used by the State of California and City of Irvine to define acceptable land-use compatibility regarding noise. Sound levels of typical noise sources and environments are provided in Table 1 as a frame of reference.

1.3 VIBRATION BACKGROUND

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of input excitation. Vibration consists of waves transmitted through solid material (Beranek and Ver, 1992). There are several types of wave motion in solids, unlike in air, including compressional, shear, torsional, and bending. The solid medium can be excited by forces, moments, or pressure fields. This leads to the terminology of "structure-borne/groundborne" vibration.

Groundborne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be comprised 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 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 groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz.

Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. 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. The vibration of building surfaces can also be radiated as sound and heard as a low-frequency rumbling noise, known as groundborne noise.

Ambient and source vibration information for this study are expressed in terms of the peak particle velocity (PPV) in inches per second (in/sec) that correlates best with human perception. The particle velocity is the velocity of the soil particles resulting from a disturbance. Agencies such as Caltrans use the PPV descriptor because it correlates well with damage or complaints. Caltrans estimates that the threshold of perception is approximately 0.006 in/sec and the level at which continuous vibrations begins to annoy people is approximately 0.010 in/sec.

SECTION 2 APPLICABLE NOISE STANDARDS

Local noise compatibility guidelines are often based on the broader guidelines of state and federal agencies. Local noise regulations and enforceable noise ordinances are implemented in areas surrounding the campus as planning guidelines, and are presented in this section as background information. UCI is a State agency and is not subject to these regulations, with the exception of Title 24, Section 1208, "Sound Transmission Control" of the State of California (State) Code of Regulations discussed below.

2.1 FEDERAL

Among other guidance, the Noise Control Act of 1972 directed the Environmental Protection Agency (EPA) to develop noise level guidelines that would protect the population from the adverse effects of environmental noise. The EPA published a guideline (EPA Levels Document 1974) containing recommendations of 55 dBA L_{dn} outdoors and 45 dBA L_{dn} indoors as a goal for residential land uses. 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 levels below 65 dBA L_{dn} outdoors as acceptable for residential use. Outdoor levels up to 75 dBA L_{dn} may be made acceptable through the use of insulation in buildings. The Federal Highway Administration (FHWA), the Federal Interagency Committee on Urban Noise (FICUN), and the Federal Aviation Administration (FAA) have also developed standards and guidance, which are not directly applicable to the UCI campus.

2.2 STATE OF CALIFORNIA

The pertinent regulations are contained in the State of California Code of Regulations (CCR), Title 24, Section 1208, "Sound Transmission Control," which establish the acceptable interior environmental noise level (45 dBA CNEL) for multi-family dwellings. Title 24 applies to applicable facilities (dormitories, lodging and hospitals) on the UCI campus. Section 65302(f) of the CCR requires that local land use planning jurisdictions prepare a General Plan; however, it is not required for University of California campuses. The State Department of Health Services has developed guidelines for community noise acceptability for use by local agencies. Selected relevant levels are listed below:

- below 60 dBA CNEL: normally acceptable for low-density residential use,
- 50 to 70 dBA: conditionally acceptable for low-density residential use,
- below 65 dBA CNEL: normally acceptable for high-density residential use,
- 60 to 70 dBA CNEL: conditionally acceptable for high-density residential, transient lodging, churches, educational and medical facilities, and
- below 70 dBA CNEL: normally acceptable for playgrounds, neighborhood parks.

"Normally acceptable" is defined as satisfactory for the specified land use, if normal conventional construction is used in buildings. "Conditionally acceptable" may require some additional noise attenuation or special study. 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. Figure 3 depicts the State compatibility requirements.

2.3 CITY OF IRVINE

Although UCI is constitutionally autonomous and is therefore exempt from municipal regulation, local standards (City of Irvine) may be relevant for evaluating impacts because UCI property abuts City property. UCI typically pursues consistency with local general plans, ordinances, and policies where feasible. Furthermore, City regulations are relevant for addressing UCI development projects that would affect adjacent City noise-sensitive land uses.

The Noise Element of the City of Irvine General Plan has identified sound levels compatible with various land uses. Sound levels up to 65 dBA CNEL are normally compatible for single family residential, transient lodging, and park uses. Sound levels up to 60 dBA CNEL are normally compatible for institutional uses, such as hospitals, churches, libraries, and schools (City of Irvine, General Plan).

The City of Irvine Noise Ordinance regulates noise from construction. Section 6-8-205(A) indicates that construction activities may occur between 7:00 a.m. and 7:00 p.m. Mondays through Fridays, and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction activities shall be permitted outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the Chief Building Official or his or her authorized representative. Trucks, vehicles, and equipment that are making or are involved with material deliveries, loading, or transfer of materials, equipment service, maintenance of any devices or appurtenances for or within any construction project in the City shall not be operated or driven on City streets outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the City. Any waiver granted shall take impact upon the community into consideration. No construction activity will be permitted outside of these hours except in emergencies including maintenance work on the City rights-of-way that might be required. Table 2 presents noise standards published in Section 6-8-204 of the Noise Ordinance.

2.4 CITY OF NEWPORT BEACH

The Noise Element of the City of Newport Beach General Plan has identified sound levels compatible with various land uses. Sound levels up to 65 dBA CNEL are identified as normally compatible for single-family, two-family, and multi-family residential, and mobile home, hospital, church, library, and school classroom uses (City of Newport Beach 2006).

Construction noise is governed by Section 10.28.040 of the City of Newport Beach Noise Ordinance:

A. Weekends and Saturdays. No person shall, while engaged in construction, remodeling, digging, grading, demolition, painting, plastering or any other related building activity, operate any tool, equipment or machine in a manner which produces loud noise that disturbs, or could disturb, a person of normal sensitivity who works or resides in the vicinity, on any weekday except between the hours of seven a.m. and six-thirty p.m., nor on any Saturday except between the hours of eight a.m. and six p.m.

B. Sundays and Holidays. No person shall, while engaged in construction, remodeling, digging, grading, demolition, painting, plastering or any other related building activity, operate any tool, equipment or machine in a manner which produces loud noise that disturbs, or could disturb, a person of normal sensitivity who works or resides in the vicinity, on any Sunday or any federal holiday.

C. No landowner, construction company owner, contractor, subcontractor, or employer shall permit or allow any person or persons working under their direction and control to operate any tool, equipment or machine in violation of the provisions of this section.

D. Exceptions.

1. The provisions of this section shall not apply to emergency construction work performed by a private party when authorized by the Building Director or designee.

2. The maintenance, repair or improvement of any public work or facility by public employees, by any person or persons acting pursuant to a public works contract, or by any person or persons performing such work or pursuant at the direction of, or on behalf of, any public agency; provided, however, this exception shall not apply to the City of Newport Beach, or its employees, contractors or agents, unless:

   a. The City Manager or department director determines that the maintenance, repair or improvement is immediately necessary to maintain public services;

   b. The maintenance, repair or improvement is of a nature that cannot feasibly be conducted during normal business hours;

   c. The City Council has approved project specifications, contact provisions, or an environmental document that specifically authorizes construction during hours of the day which would otherwise be prohibited pursuant to this section.

2.5 VIBRATION

A considerable amount of research has been conducted to correlate vibrations with architectural and structural damage. The Federal Office of Surface Mining (OSM), formally known as U.S. Bureau of Mines, recommends a safety groundborne vibration level of 2.0 in/sec for residential structures. Caltrans technical advisory circular (TAV-96-01-R9201) agrees with the OSM safety level for impact pile driving; however, the architectural damage risk level for continuous (or steady-state) vibrations is 0.2 in/sec.

The Federal Transit Administration (FTA) and Federal Railroad Administration (FRA) have published guidelines for assessing the impacts of groundborne vibration associated with rail projects, which have been applied by other jurisdictions to other types of projects (FTA 1995). The FTA measure of the threshold of architectural damage for conventional sensitive structures is a peak particle velocity (PPV) of 0.2 in/sec.

SECTION 3 EXISTING NOISE ENVIRONMENT

Many land uses are considered sensitive to noise. Noise-sensitive receptors are land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise. They often include residential dwellings, transient lodging, dormitories, hospitals, educational facilities, and libraries. Industrial and commercial land uses are generally not considered sensitive to noise.

Sensitive receptors at UCI include student residential buildings, libraries, and classrooms found throughout the campus. The main existing student residential units on the campus are east of E. Peltason Drive and north of Anteater Drive. There are three other existing student residential units on the campus: Mesa Court Housing located north of Mesa Road and west of W. Peltason Drive, Campus Village Housing located west of Bison Avenue and east of W. Peltason Drive, and Middle Earth Housing located west of E. Peltason Drive and south of Pereira Drive. The existing faculty/staff residential housings on the campus are located south of Anteater Drive surrounded by California Avenue and Los Trancos Drive. In addition, there are many off-campus apartment complexes located north of Campus Drive. The majority of the academic and support facilities are located within the Peltason Drive circle (refer to Figure 4 for the existing development configuration).

The existing noise environment in the project area is a result of stationary sources, periodic aircraft overflights, construction, mechanical equipment and vehicular traffic in addition to the associated campus activities.

3.1 TRANSPORTATION NOISE SOURCES

3.1.1 Vehicular Traffic

Vehicular traffic noise is the predominant noise source within the campus area and along the surrounding access roads. Major roadways on campus include Peltason Drive, Campus Drive, Bison Avenue, and California Avenue. Major access roadways in the campus vicinity that are adjacent to sensitive residential receptors include University Drive, Harvard Avenue, Culver Drive, and Bonita Canyon Road. SR-73, which is located to the south of campus, has a negligible noise contribution on the campus because of a large distance and intervening structures between the roadway and the campus. On-campus parking lots are also a source of traffic noise.

The FHWA Traffic Noise Model (TNM) Version 2.5 was used to estimate existing traffic noise levels for on-campus and off-campus roadway segments. The modeling effort considered the posted vehicle speed, average daily traffic (ADT) volume, and the estimated vehicle mix. The speed limits on the roadway segments were obtained from the City's Transportation Design Procedures and the existing traffic counts were obtained from the UCI LRDP Traffic Study (Austin-Foust Associates 2007). The model assumed a default ground type of "pavement." Calculations using the current traffic volumes were performed at a distance of 50 feet from the centerline of each roadway segment, and were used to determine the distances to the 60, 65, 70, and 75 dBA CNEL noise contours. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography. Table 3 shows existing traffic noise levels within and around the University. A

review of the Table shows that sound levels along most roadways in the project vicinity currently exceed 65 dBA CNEL.

3.1.2 Aviation

The UCI campus is located approximately 1.5 miles southeast of John Wayne Airport (SNA). General aircraft and helicopter overflights originating from John Wayne Airport were observed during the noise measurements; however, its 60 CNEL contour does not extend to the campus (John Wayne Airport 2005). According to the FAA guideline, land uses of residential and public use are considered compatible if the noise level is less than 65 dBA CNEL (FAA 2004). Therefore, the existing aircraft noise level within the campus is considered not significant.

El Toro Marine Corps Air Station (MCAS) is located approximately 5 miles east of UCI, and Tustin MCAS is located approximately 3 miles north of the University. However, both facilities were closed in 1999.

3.2 STATIONARY NOISE SOURCES

Stationary noise sources on campus include the central utilities plant (under construction), electrical substation, major heating/ventilation/air conditioning (HVAC) systems, institutional operations, emergency generators and parking lots**.** These noise sources become a concern when they are in proximity to potential noise-sensitive land uses.

3.3 CONSTRUCTION NOISE SOURCES

Construction activity is currently occurring throughout the campus and generates noise that is audible at nearby land uses. Construction noise levels vary depending on the distance between the activity and receptors, and the type of equipment used, how it is operated, and how well the equipment is maintained. Figure 5 illustrates sound levels from typical construction equipment. Sound levels from typical construction activity typically range from 60 to 90 dBA at 50 feet from the source (EPA, 1971).

3.4 EXISTING SOUND LEVELS

An ambient sound level survey was conducted from September 25-27, 2006 to quantify the noise environment on and off campus. The measurement locations were selected to be representative of the noise-sensitive land uses in the study area, and included residential and educational land uses.

Seventeen attended one-hour noise measurements were conducted at noise sensitive areas throughout the University, Aldrich Park, and at the proposed Satellite Plant. The measurements were taken during the daytime (7:00 a.m. to 7:00 p.m.) period. Four unattended 24-hour noise measurements were also conducted at existing residential areas. One Larson Davis Model 820 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter (Serial #1583) and two Larson-Davis Model 720 ANSI Type 2 Integrating Sound Level Meters (Serial #0487 and 0493) were used as the data collection device for 1-hour and 24-hour noise measurements. The meters were set to "slow" response and used A-weighting for all measurements. To ensure accuracy, the laboratory calibration of the instruments was field-checked before and after each measurement period with a Larson Davis Model CAL200 (Serial

#3046) acoustical calibrator. The accuracy of the calibrator is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology. The meters meet the requirements of American National Standard S1.4-1983 and the International Electrotechnical Commission Publications 804 and 651. In all cases, the microphone was equipped with a windscreen and was five feet above the ground to simulate the average height of the human ear. Weather conditions during the measurements were calm, with clear skies and low humidity.

The results of these measurements are summarized in Tables 4 and 5 and correspond to the locations depicted on Figure 6. The measured sound levels were influenced by vehicular traffic, periodic aircraft overflights, distant construction, pedestrian passbys, etc. The hourly Leq ranged from approximately 48 dBA to 70 dBA. The CNEL at the long-term measurement locations ranged from approximately 56 dBA to 63 dBA.

SECTION 4 IMPACTS AND MITIGATION

4.1 SIGNIFICANCE CRITERIA

The following significance criteria are based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. For the purposes of this report, the project would have a significant impact with regard to noise if it would result in any of the following:

- Exposure of persons to or generation of noise levels in excess of levels set forth in Table 2 or Figure 3 (State of California noise standards are applied on campus and City of Irvine noise standards are applied off campus),
- A permanent increase of 3 dBA or more in ambient noise levels at noise sensitive receptors above levels existing without the project, or
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

4.2 TRANSPORATION NOISE SOURCES

4.2.1 Impacts

4.2.1.1 Vehicular Traffic

Implementation of the LRDP would result in increased vehicular traffic on the regional road network, which would incrementally increase ambient noise levels. As discussed previously, major roadways on campus include Peltason Drive, Campus Drive, Bison Avenue, and California Avenue. Major access roadways in the campus vicinity adjacent to existing sensitive residential receptors include University Drive, Harvard Avenue, Culver Drive, and Bonita Canyon Drive.

Acoustical calculations were performed using future traffic volumes with LRDP implementation using TNM, as described above. All roadway segments presented in the Traffic Study were analyzed. Calculations were performed at a distance of 50 feet from the centerline of each roadway segment, and were used to determine the distances to the 60, 65, 70, and 75 dBA CNEL noise contours. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography. Table 6 shows the future traffic noise levels within and around the campus with LRDP implementation.

A comparison of existing traffic noise levels and future traffic noise levels with LRDP implementation is shown in Table 7. The difference between the existing and future traffic noise level (delta) ranges from a decrease of approximately 3 dBA to an increase of approximately 8 dBA. A change of less than 3 dBA is not perceptible by the average human ear. All roadways segments, with four exceptions, were shown to have an expected change of less than 3 dBA.

The following segments would experience an increase of 3 dBA or greater:

- Segment 1: Academy Way between California Avenue and Medical Plaza Drive

- Segment 2: California Avenue between Theory and Bison Avenue
- Segment3: Michelson Drive between Carlson Avenue and Harvard Avenue
- Segment4: Carlson Avenue between Michelson Drive and Palatine

Segment 1 would experience an increase of approximately 3 dBA. However, the noise level with the implementation of the LRDP is less than 60 dBA CNEL. As shown in Figure 3, the noise level less than 60 dBA CNEL is considered compatible to any land uses. Therefore, the noise level generated by this segment is considered to be not significant.

Land uses around segment 2 are categorized as Academic and Support Uses or Income Producing Inclusion Area; these areas would experience an increase of approximately 3 dBA. However, as shown in Figure 3, the State of California considers school land uses exposed to noise levels up to 70 dBA CNEL to be "normally acceptable." The noise level near segment 2 would be approximately 66 dBA with the implementation of the LRDP. No outdoor areas of frequent use would be affected by the roadway noise levels. Therefore, the noise level generated by this segment is considered to be not significant.

Segment 3 would experience an increase of approximately 3 dBA. However, the existing ADT of 17,000 vehicles would increase to 33,000 vehicles, due to non-project changes in background conditions (the land uses near Carlson Avenue). There would be no traffic volume increase attributable to the LRDP alone (Austin-Foust, UCI LRDP Traffic Study, 2007). Therefore, the noise level generated by this segment is considered to be not significant.

Segment 4 would experience an increase of approximately 8 dBA. However, the existing ADT of 4,000 vehicles would increase to 25,000 vehicles, due to non-project changes in background conditions (the land uses near Carlson Avenue). The ADT increase attributable to the LRDP alone would be 1,000 vehicles (Austin-Foust, UCI LRDP Traffic Study, 2007), which corresponds to a noise level increase of less than 1 dBA. Therefore, the noise level generated by this segment is considered to be not significant.

The segment of W. Peltason Drive between Academy Way and Mesa Road would experience a future noise level that exceeds 60 dBA with the implementation of the LRDP. However, as shown on Figure 7, the land west of W. Peltason Drive would be categorized as Open Space–Athletics and Recreation or Parking and Roadways, and the land east of W. Peltason Drive would be categorized as Academic and Support or Campus Support Services. A noise level of 60 dBA is considered compatible with these land uses (Figure 3); therefore, the noise level generated by this segment is considered to be not significant.

4.2.1.1.1 New Noise Sensitive Land Uses

New faculty housing is proposed south of California Avenue and west of the intersection of California Avenue and Gabrielino Drive (Figure 7: FS-16 and FS-17). Student Housing is proposed south of E. Peltason Drive and east of Bison Avenue (SH-12), east of Anteater Drive and north of Culver Drive (SH-40) and east of California Avenue and south of Arroyo Drive (SH-36). Housing Reserve (HR-10) is bordered by California Avenue, Anteater Drive, and Bonita Canyon Road, adjacent to Faculty/Staff Housing area. Noise from vehicular traffic may exceed 60 dBA in these areas; the impact is considered to be significant.

4.2.1.2 Aviation

There are no future noise contour projections available from John Wayne Airport (SNA). Therefore, it was assumed that the existing condition would remain constant in the future. Under this assumption, the noise level from John Wayne Airport is considered to be not significant.

4.2.2 Mitigation Measures

4.2.2.1 Exterior Noise Environment

New noise sensitive receptors should be constructed in an area where the exterior sound level is less than 65 dBA CNEL to ensure that outdoor sensitive land uses are not subjected to inappropriate noise levels resulting from roadways. If this is not feasible, proper site planning to avoid noise impacts should be considered for all noise sensitive projects. Site planning techniques includes the following:

- Increase the distance from the noise source to sensitive receptors by creation of setbacks;
- Place non-noise sensitive uses such as parking structures and utility areas between the noise source and receiver;
- Orient usable outdoor living space such as balconies, patios, and common areas away from roadways; and
- Construct landscaped earthen berms or noise walls as appropriate.

4.2.2.2 Interior Noise Environment

A site-specific acoustical analysis should be prepared for all new structures as required by CCR Title 24 (transient lodging, dormitories, long-term health facilities, and multifamily dwellings) when the exterior noise level exceeds 60 dBA CNEL. The report should demonstrate that the sound level in all habitable rooms would be less than 45 dBA CNEL. Noise reduction measures may include specific window treatments, such as dual glazing, and mechanical ventilation when the 45 dBA CNEL limit can only be achieved with a closed window condition. It is recommended that the interior noise level from transportation noise sources within classrooms not exceed 50 dBA CNEL.

4.3 STATIONARY NOISE SOURCES

4.3.1 Impacts

Stationary noise sources include existing and proposed utilities plants, emergency generators, parking structures, mechanical ventilation systems, and similar uses. These sources may generate significant noise levels and be of concern if they are located within close proximity to noise sensitive receptors such as residences, dormitories, classrooms and libraries. In addition, noise from fixed sources may disrupt communication and normal routine if constructed near less sensitive receptors such as offices if not appropriately mitigated.

New major mechanical HVAC equipment located on the ground or on rooftops of new buildings have the potential to generate average noise levels of 65 to 75 dBA CNEL at 50 feet when equipment is operating constantly for 24 hours.

Noise from parking structures typically consists of vehicles arriving and departing, vehicle movement within the parking structure, wheel squeal, car alarms, opening and closing of car doors, and peoples' voices. Noise would also be generated by the parking structure ventilation system. Quantification of parking structure noise is difficult to predict due to many variables. Variation in sound levels will depend on such factors as parking structure design and the number of vehicles moving through the structure at any given time.

Based on previous staff sound level measurements at a similar plant, the proposed satellite utilities plant is expected to generate unmitigated sound levels ranging from 85 to 105 dBA at 3 feet. Assuming similar equipment and design, the plant expansion and satellite would result in a substantial increase in the overall ambient noise environment in the project vicinity

Noise from fixed sources may result in a potentially significant noise impact.

4.3.2 Mitigation Measures

Noise from fixed noise sources has the potential to significantly impact noise sensitive receptors. The following measures would reduce the impact to below the level of significance:

Parking Garages

- Construct new parking garages at least 250 feet from existing or planned noise sensitive receptors.
- Construct new noise sensitive receptors at least 250 feet from existing or planned parking structures.

HVAC Equipment

- Prior to construction, conduct a site-specific noise analysis to ensure that noise levels from HVAC equipment do not exceed 65 dBA at the nearest on-campus sensitive receptors. Noise impacts can be mitigated through the installation of acoustical shielding (parapet wall or near-field noise barrier) around all new equipment or the placement of equipment below grade in basement space.

Satellite Utilities Plant

Noise control measures should be incorporated into the design of the Satellite Utilities Plant. The following measures can be implemented to reduce noise impacts:

- Use low-speed fans, baffles, mufflers, etc. to reduce emitted noise;
- Increase the distance from the noise source to sensitive receptors with setbacks;
- Place equipment inside buildings;

- Construct screening, landscaped earthen berms, noise walls, or other noise attenuation;
- Eliminate glass, louvers, openings, or vents in the exterior walls of the plant, particularly those facing adjacent planned buildings. If openings are necessary, install acoustical louvers or baffles on project components at all exterior openings;
- Install hospital-grade silencers on the intake and exhaust system;
- Place cooling towers as close to plant buildings as possible to utilize the buildings as noise barriers; and
- Install integrated noise barriers on the sides of cooling towers.

4.4 CONSTRUCTION NOISE SOURCES

Construction of campus buildings and facilities would generate noise that could expose nearby receptors to elevated noise levels. Elevated noise levels would be primarily experienced close to the noise source. The magnitude of the impact would depend on the type of construction activity, noise level generated by various pieces of construction equipment, duration of the construction phase, distance between the noise source and receiver, and intervening structures.

Development occurring under the LRDP would implement conventional construction techniques and equipment. Standard equipment, such as scrapers, graders, backhoes, loaders, tractors, cranes, and miscellaneous trucks, would be used for construction of most project facilities. Specialized construction activities such as pile driving are not anticipated to be frequent during implementation of LRDP.

Figure 5 shows average noise levels generated by individual pieces of construction equipment. Sound levels of typical construction equipment range from 60 dBA to 90 dBA at 50 feet from the source. Noise from construction equipment has point source acoustical characteristics. Strictly speaking, a point source sound decays at a rate of 6 dB per doubling of distance from the source. The rule applies to the propagation of sound waves with no ground interaction.

4.4.1 Mitigation Measures

Construction of campus facilities pursuant to the LRDP could expose nearby receptors to significant sound levels. To minimize the potential for significant impacts, the construction contractor would be required to take measures to reduce construction/demolition noise to the maximum extent practicable. Prior to initiation of construction, the campus should approve a construction noise mitigation program including but not limited to the following:

- Require the construction contractor to work in such a manner so as not to exceed an average sound level of 75 dBA at any noise sensitive receptor between 7:00 a.m. and 7:00 p.m.;
- Outfit and maintain construction equipment with manufacturer-recommended noise-reduction devices;
- Locate stationary construction noise sources such as generators or pumps at least 100 feet away from noise-sensitive land uses where feasible;

- Locate laydown and construction vehicle staging areas at least 100 feet away from noise-sensitive land uses where feasible.
- Inform academic, administrative, and residential areas potentially subject to construction noise two weeks prior to the start of each project when possible.
- Schedule loud construction activity (i.e., jackhammering, concrete sawing, asphalt removal, and large-scale grading operations) within 100 feet of a residential or academic building outside of finals week of classes.
- Schedule loud construction activity, as described above, within 100 feet of a residential or academic building during holidays or class breaks when possible.
- Restrict loud construction activity within 100 feet of a residential or academic building to the time between 7:00 a.m. and 7:00 p.m.
- Use a noise barrier when conducting loud construction activity in close proximity to noise sensitive receptors. The barrier must have sufficient mass to attenuate the low frequency component of the construction equipment, and must be high enough to block the line-of-sight between the noise source and the receptor.

4.5 VIBRATION SOURCES

The main concerns related to vibration are annoyance and damage. However, vibration sensitive instruments and operations often used at engineering and physics laboratories can be disrupted at much lower levels. The follow provides a general discussion on potential impacts from groundborne vibration.

The primary source of vibration within the project vicinity would be from construction activities. Vibration levels from vehicular traffic and stationary noise sources are typically considered insignificant. For example, safe levels of vibration for sensitive structures such as historical buildings and ancient ruins have been measured at 0.08 in/sec at approximately 16 feet from the nearest lane of a freeway.

An increased level of vibration would be expected during construction. The level of vibration depends on the type of soil and the energy generating capability of the construction equipment. Typical intensities of vibration from operation of construction equipment are presented in Figure 8 (Wiss, 1981). The intensities are based on data recorded on the surface of the earth or in residential or relatively small commercial buildings. It should be noted that actual levels would depend on the source type and specific equipment needed to perform the work. Generally, the way a building is constructed and the condition it is in determines how much vibration it can withstand before damage appears.

According to Caltrans, the highest measured vibration level during highway construction was 2.88 in/sec at 10 feet from a pavement breaker. Other construction activities and equipment, such as D-8 and D-9 Caterpillars, earthmovers, and trucks have not exceeded 0.10 in/sec at 10 feet. According to Caltrans, damage is possible when pile driving occurs at 25 feet or less from any structure. Damage may also occur within 50 feet of a building in poor condition or a building previously damaged by an earthquake (Caltrans, 1992). Pile driving is not anticipated to be necessary to implement the 2007 LRDP; however, potential impacts from pile driving should be considered if it becomes necessary.

Vibration sensitive instruments and operations may require special consideration during construction, specifically blasting during quarry operations. Vibration criteria for sensitive equipment and operations are not defined and are often case specific. In general, the criteria must be determined based on manufacturer specifications and recommendations by the equipment user. As a guide, major construction activity within 200 feet and pile driving within 600 feet may be potentially disruptive to sensitive operations (Caltrans, 1996).

4.5.1 Mitigation Measures

For major construction activity involving heavy earthmoving equipment within 200 feet of vibration sensitive land uses (e.g., vibration sensitive laboratory equipment), prior to the initiation of construction activities, the UCI Planning, Design, and Construction department should approve a construction vibration mitigation program developed by a qualified person experienced in the fields of environmental noise and vibration assessment to be implemented by the construction contractor. The construction vibration mitigation program should include measures to reduce vibration resulting from construction activities to the maximum extent practicable. Notification and monitoring of construction activities should include, but not be limited to, the following:

- Perform vibration monitoring during construction to establish the level of vibration produced by high impact activities. Conduct monitoring when any construction would occur within 50 feet of a vibration sensitive land use. Conduct monitoring using a portable vibration-monitoring instrument that provides a calibrated record of local ground movement/acceleration. Use alternative work methods and equipment if construction vibration exceeds 2.0 in/sec. Establish baseline vibration levels at specified locations prior to construction.
- Notify building occupants at least two weeks prior to the start of construction that would occur within 50 feet of any vibration sensitive land use.

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Table 1
Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	
Civil Defense Siren (100 ft)		130	
Commercial Jet Take-off (200 ft)		120	32 times as loud **Threshold of Pain**
Pile Driver (50 ft)	Rock Music Concert	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Power Lawn Mower (3 ft)		100	8 times as loud **Very Loud**
Motorcycle (25 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck, 40 mph (50 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Higher Limit of Urban Ambient Sound	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (3 ft) Electronic Typewriter (10 ft)		70	Reference Loudness **Moderately Loud**
Normal Conversation (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Private Business Office	50	1/4 as loud
Bird Calls (distant)	Lower Limit of Urban Ambient Sound	40	1/8 as loud **Quiet**
Soft Whisper (5 ft)	Quiet Bedroom	30	
	Recording Studio	20	**Just Audible**
			Threshold of Hearing

Source: Compiled by Kimley-Horn and Associates, Inc.

Table 2
City of Irvine Noise Ordinance: Noise Standards dB(A)
Noise Levels for a Period Not Exceeding (minutes/hour)

Noise Zone		Time Period	30	15	5	1	0 (anytime)
1	Exterior	7:00 a.m. – 10:00 p.m.	55	60	65[1]	70	75
		10:00 p.m. – 7:00 a.m.	50	55	60	65[1]	70
	Interior	7:00 a.m. – 10:00 p.m.	--	--	55	60	65
		10:00 p.m. – 7:00 a.m.	--	--	45	50	55
2	Exterior	Any time	55	60	65	70	75
	Interior	Any time	--	--	55	60	65
3	Exterior	Any time	60	65	70	75	80
	Interior	Any time	--	--	55	60	65
4	Exterior	Any time	70	75	80	85	90
	Interior	Any time	--	--	55	60	65

Notes:
Noise zone 1: All hospitals, libraries, churches, schools, and residential properties.
Noise zone 2: All professional office and public institutional properties.
Noise zone 3: All commercial properties excluding professional office properties.
Noise zone 4: All industrial properties.

1. This standard does not apply to multi-family residence private balconies. Multi-family developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notice to all future tenants regarding potential noise impacts.

2. It shall be unlawful for any person at any location within the City to create any noise or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person which causes the noise level when measured on any property within designated noise zones either within or without the City to exceed the applicable noise standard.

3. Each of the noise standards specified above shall be reduced by five dB(A) for impact, or predominant tone noise or for noises consisting of speech or music.

4. In the event that the noise source and the affected property are within different noise zones, the noise standards of the affected property shall apply.

Source: City of Irvine Municipal Code, Title 6, Division 8, Chapter 2, Section 6-8-204.

Table 3
Existing Traffic Noise Levels

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
Academy Way	between California Ave. and Medical Plaza	4,000	0.5%	0.0%	25	55	--	--	--	--
	between Medical Plaza and W. Peltason Dr.	4,000	0.5%	0.0%	25	55	--	--	--	--
Bison Ave.	between California Ave. and E. Peltason Dr.	15,000	0.5%	0.5%	35	66	120	55	--	--
	south of California Ave.	21,000	0.5%	0.5%	35	67	135	75	25	--
California Ave.	between University Dr. and Academy Way	12,000	0.5%	0.5%	35	65	110	45	--	--
	between Academy Way and Theory	7,000	0.5%	0.5%	35	62	80	30	--	--
	between Theory and Bison Ave.	8,000	0.5%	0.5%	35	63	90	30	--	--
	east of Bison Ave.	3,000	0.5%	0.0%	25	54	--	--	--	--
	between Campus Dr. and Adobe Circle Rd. N	13,000	0.5%	0.5%	35	65	115	50	--	--
	between Adobe Circle Rd. N and Arroyo Dr. N	14,000	0.5%	0.5%	35	65	115	50	--	--
E. Peltason Dr.	between Bison Ave. and S. Circle View	13,000	0.5%	0.5%	35	65	115	50	--	--
	between S. Circle View and Los Trancos Dr.	14,000	0.5%	0.5%	35	65	115	50	--	--
	between Los Trancos Dr. and Gabrielino Dr.	13,000	0.5%	0.5%	35	65	115	50	--	--
	between Gabrielino Dr. and Anteater Dr..	15,000	0.5%	0.5%	35	66	120	55	--	--
	between Anteater Dr. and Palo Verde Rd.	15,000	0.5%	0.5%	35	66	120	55	--	--
	between Palo Verde Rd. and Pereira Dr.	16,000	0.5%	0.5%	35	66	125	60	--	--
	between Pereira Dr. and Campus Dr.	15,000	0.5%	0.5%	35	66	120	55	--	--
Gabrielino Dr.	between E. Peltason Dr. and Russell Pl.	4,000	0.5%	0.0%	25	55	--	--	--	--
Los Trancos Dr.	between E. Peltason Dr. and Vista Bonita Dr.	2,000	0.5%	0.0%	25	52	--	--	--	--
Mesa Rd.	between University Dr. and Pereira Dr.	8,000	0.5%	0.0%	25	58	35	--	--	--
	between Pereira Dr. and W. Peltason Dr.	6,000	0.5%	0.0%	25	57	25	--	--	--
Palo Verde Rd.	between E. Peltason Dr. and California Ave.	2,000	0.5%	0.0%	25	52	--	--	--	--
Pereira Dr.	between W. Peltason Dr. and Pereira Dr.	9,000	0.5%	0.0%	25	59	40	--	--	--
	between Pereira Dr. and E. Peltason Dr.	9,000	0.5%	0.5%	35	63	100	35	--	--
	between E. Peltason Dr. and Adobe Circle Rd.	9,000	0.5%	0.5%	35	63	100	35	--	--
W. Peltason Dr.	between Bison Ave. and Academy Way	11,000	0.5%	0.0%	25	60	45	--	--	--
	between Academy Way and Mesa Rd.	10,000	0.5%	0.0%	25	59	45	--	--	--

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
	between Mesa Rd. and Pereira Dr.	13,000	0.5%	0.0%	25	61	55	--	--	--
	between Pereira Dr. and Campus Dr.	14,000	0.5%	0.5%	35	65	115	50	--	--
Campus Dr.	between Bristol N. and MacArthur Blvd.	26,000	0.5%	0.5%	50	72	175	105	60	30
	between MacArthur Blvd. and Von Karman Ave.	19,000	0.5%	0.5%	50	71	195	125	65	--
	between Von Karman Ave. and Teller Ave.	15,000	0.5%	0.5%	50	70	180	115	50	--
	between Jamboree Rd. and Carlson Ave.	20,000	0.5%	0.5%	45	70	180	115	50	--
	between Carlson Ave. and University Dr.	20,000	0.5%	0.5%	45	70	180	115	50	--
	between University Dr. and W. Peltason Dr.	25,000	0.5%	0.5%	50	72	220	140	80	30
	between W. Peltason Dr. and E. Peltason Dr.	22,000	0.5%	0.5%	50	72	205	135	75	25
	between E. Peltason Dr. and California Ave.	24,000	0.5%	0.5%	50	72	215	140	80	25
	between California Ave. and Culver Dr.	21,000	0.5%	0.5%	50	72	205	130	70	25
	between Culver Dr. and Turtle Rock Dr.	13,000	0.5%	0.5%	50	70	170	110	45	--
University Dr.	between Jamboree Rd. and MacArthur Blvd. SB	11,000	1.0%	1.0%	55	70	180	120	55	--
	between MacArthur Blvd. NB and California Ave.	27,000	1.0%	1.0%	55	74	255	165	105	40
	between Mesa Rd. and Campus Dr.	33,000	1.0%	1.0%	55	75	275	180	115	50
	between Campus Dr. and Harvard Ave.	24,000	1.0%	1.0%	55	74	245	160	100	40
	between Harvard Ave. and Culver Dr.	20,000	1.0%	1.0%	55	73	230	145	90	30
	between Culver Dr. and Ridgeline Dr.	28,000	0.5%	0.5%	50	73	225	145	90	30
Harvard Ave.	between Michelson Dr. and University Dr.	17,000	0.5%	0.5%	50	71	190	120	55	--
	between University Dr. and Bridge Rd.	13,000	0.5%	0.5%	50	70	170	110	45	--
	between Bridge Rd. and Berkeley	13,000	0.5%	0.5%	50	70	170	110	45	--
	between Berkeley and California Ave.	13,000	0.5%	0.5%	50	70	170	110	45	--
	between California Ave. and Culver Dr.	14,000	0.5%	0.5%	50	70	175	115	50	--
Culver Dr.	between I-405 SB and Michelson Dr.	46,000	1.0%	1.0%	55	77	315	200	130	70
	between Michelson Dr. and University Dr.	42,000	1.0%	1.0%	55	76	305	195	125	65
	between University Dr. and Harvard Ave.	44,000	1.0%	1.0%	55	76	310	200	130	65
	between Harvard Ave. and Campus Dr.	33,000	1.0%	1.0%	55	75	275	180	115	50
	between Campus Dr. and Anteater Dr.	32,000	0.5%	0.5%	50	73	240	155	100	35
Ford Rd.	between Jamboree Rd. and MacArthur Blvd.	9,000	0.5%	0.5%	50	68	150	90	30	--
Bonita Canyon Dr.	between MacArthur Blvd. and San Miguel Dr.	26,000	0.5%	0.5%	50	73	220	140	85	30

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
	between San Miguel Dr. and SR-73 SB	17,000	0.5%	0.5%	50	71	190	120	55	--
	between Newport Coast Dr. and SR-73 NB	22,000	0.5%	0.5%	50	72	205	135	75	25
	between Anteater Dr. and Newport Coast Dr.	24,000	0.5%	0.5%	50	72	215	140	80	25
Michelson Dr.	between Jamboree Rd. and Carlson Ave.	31,000	1.0%	1.0%	55	75	270	175	115	50
	between Carlson Ave. and Harvard Ave.	17,000	1.0%	1.0%	55	72	215	140	80	25
	between Harvard Ave. and Culver Dr.	20,000	1.0%	1.0%	55	73	230	145	90	30
	between Culver Dr. and Yale Ave.	15,000	1.0%	1.0%	55	72	205	130	70	25
Carlson Ave.	between Michelson Dr. and Palatine	4,000	0.5%	0.5%	45	63	90	35	--	--
Shady Canyon Dr.	east of Bonita Canyon Dr.	19,000	0.5%	0.5%	45	70	175	115	45	--
Jamboree Rd.	between I-405 SB and Michelson Dr.	75,000	1.0%	1.0%	55	79	385	245	155	100
	between Michelson Dr. and Dupont Dr.	54,000	1.0%	1.0%	55	77	335	215	140	80
	between Dupont Dr. and Campus Dr.	46,000	1.0%	1.0%	55	77	315	200	130	70
	between Campus Dr. and Birch St.	37,000	1.0%	1.0%	55	76	290	185	120	55
	between Birch St. and Fairchild Rd.	38,000	1.0%	1.0%	55	76	290	185	120	55
	between Fairchild Rd. and MacArthur Blvd.	33,000	1.0%	1.0%	55	75	275	180	115	50
	between Bristol SB and University Dr.	47,000	1.0%	1.0%	55	77	315	205	130	70
	between University Dr. and Bison Ave.	37,000	1.0%	1.0%	55	76	290	185	120	55
	between Bison Ave. and Ford Rd.	39,000	1.0%	1.0%	55	76	295	190	125	60
Von Karman Ave.	between Campus Dr. and Birch St.	14,000	0.5%	0.5%	50	70	175	115	50	--
	between Birch St. and MacArthur Blvd.	12,000	0.5%	0.5%	50	69	165	105	40	--
Birch St.	west of MacArthur Blvd.	23,000	0.5%	0.5%	45	70	145	85	50	--
	between MacArthur Blvd. and Von Karman Ave.	15,000	0.5%	0.5%	45	69	160	105	40	--
	between Von Karman Ave. and Jamboree Rd.	12,000	0.5%	0.5%	45	68	145	90	30	--
MacArthur Blvd.	between Campus Dr. and Birch St.	27,000	1.0%	1.0%	55	74	255	165	105	40
	between Birch St. and Von Karman Ave.	22,000	1.0%	1.0%	55	73	235	155	100	35
	between Von Karman Ave. and Jamboree Rd.	26,000	1.0%	1.0%	55	74	250	165	105	40
	between Jamboree Rd. and Fairchild Rd.	34,000	1.0%	1.0%	55	75	280	180	115	50
	between Fairchild Rd. and University Dr.	34,000	1.0%	1.0%	55	75	280	180	115	50
	between University Dr. and SR-73	35,000	1.0%	1.0%	55	75	280	185	120	55
	between SR-73 and Bison Ave.	61,000	1.0%	1.0%	55	78	350	225	145	90

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
Bison Ave.	between Bison Ave. and Ford Rd.	63,000	1.0%	1.0%	55	78	355	230	145	90
	between Jamboree Rd. and MacArthur Blvd.	13,000	1.0%	1.0%	55	71	150	90	--	--
	Between MacArthur Blvd. and SR-73	7,000	1.0%	1.0%	55	68	115	70	35	--

*Source: Austin-Foust Associates, Inc.. 2007
**Source: City of Irvine Transportation Design Procedures, 2006

Table 4
Short-Term Ambient Sound Level Measurements

ID	Location	Date / Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
S1	California Ave. (West of Twain St.)	15:35-16:35	54.8	39.2	77.5	58.8	44.9	41.8
S2	Los Trancos Dr. (at Vista Bonita Dr.)	16:50-17:50	55.8	40.0	78.9	59.0	46.2	41.8
S3	University Dr. (West of Culver Dr.)	07:20-08:20	70.5	47.2	80.3	75.0	68.0	55.5
S4	Harvard Ave. (East of Berkeley)	08:30-09:30	63.5	47.2	78.8	66.9	59.8	50.2
S5	Campus Dr. (East of E. Peltason Dr.)	09:40-10:40	66.4	46.6	80.8	70.5	62.2	52.0
S6	E. Peltason Dr. (South of Pereira Dr.)	10:50-11:50	65.1	45.2	84.1	68.9	60.5	50.3
S7	Mesa Rd. (East of University Dr.)	12:00-13:00	61.9	48.4	75.3	65.9	58.3	51.3
S8	Bridge Rd. (North of Stanford Ave.)	13:30-14:30	57.5	43.2	71.5	60.3	52.8	45.7
S9	Anteater Dr. (North of California Ave.)	14:50-15:50	56.6	42.0	70.8	61.9	48.5	43.9
S10	Aldrich Park	17:00-18:00	48.5	44.7	63.6	49.9	46.8	45.5
S11	Bonita Canyon Rd. (West of Newport Coast Dr.)	07:30-08:30	64.5	47	77.8	68.8	60.9	54.9
S12	Anteater Dr. (South of California Ave.)	08:40-09:40	55.5	41.3	73.2	60.2	46.3	43
S13	West of Culver Dr. (South of Campus Dr.)	09:50-10:10	69.0	46.4	81.1	73.0	66.8	49.4
S14	East of Culver Dr. (South of Campus Dr.)	10:15-10:35	59.7	44.8	72.7	62.8	56.9	47.5
S15	East of Irvine Hall (Proposed Satellite Plant Location)	11:00-12:00	53.6	47.4	68.2	55.4	51.5	49.9
S16	W. Peltason Dr. (West of Bison Ave.)	12:15-13:15	62.9	50.5	78.7	66.3	60.9	53.9
S17	Gabrielino Dr. (at Vista Bonita Dr.)	13:30-14:30	60.5	40.1	81.4	58.2	48.0	43.9

Notes:

S1 – S2 conducted on 9-25-06.
S3 – S10 conducted on 9-26-06.
S11 – S17 conducted on 9-27-06.

Noise Sources During Measurements:

S1: Traffic on California Avenue
S2: Traffic on Los Trancos Drive and Vista Bonita Drive, pedestrian passbys, distant aircraft
S3: Traffic on University Drive

S4: Traffic on Harvard Avenue, nearby maintenance facility
S5: Traffic on Campus Drive
S6: Traffic on E. Peltason Drive, pedestrian passbys
S7: Traffic on Mesa Road, nearby maintenance building
S8: Traffic on Bridge Road
S9: Traffic on Anteater Drive, distant construction, pedestrian passbys.
S10: Pedestrian passbys, skateboarders
S11: Traffic on Bonita Canyon Road, maintenance worker passbys.
S12: Traffic on Anteater Drive, pedestrian/bicycle passbys.
S13: Traffic on Culver Drive, nearby construction
S14: Aircraft, pedestrian passbys
S15: Traffic on W. Peltason Drive, nearby construction
S16: Traffic on Gabrielino Drive, construction vehicle passbys, nearby construction

Table 5
Summary of Long-Term Ambient Sound Level Measurements (dBA)

Location	Average Leq	CNEL
L1	59.5	62.2
L2	58.3	62.3
L3	53.2	56.1
L4	58.1	63.1

Note: See Appendix A for further detail.

Table 6
Future (With Project) Traffic Noise Levels

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
Academy Way	between California Ave. and Medical Plaza	8,000	0.5%	0.0%	25	58	35	--	--	--
	between Medical Plaza and W. Peltason Dr.	6,000	0.5%	0.0%	25	57	25	--	--	--
Adobe Circle Rd.	South	1,000	0.5%	0.0%	25	49				
	North	2,000	0.5%	0.0%	25	52	--	--	--	--
Anteater Dr.	between E. Peltason Dr. and Russell Pl.	14,000	0.5%	0.0%	25	61	50	--	--	--
	between Russell Pl. and California Ave.	9,000	0.5%	0.0%	25	59	40	--	--	--
	between California Ave. and Proposed Rd	9,000	0.5%	0.0%	25	59	40	--	--	--
	between Proposed Rd and Culver Dr.	11,000	0.5%	0.0%	25	60	45	--	--	--
Proposed Rd	between Anteater Dr. and Bonita Canyon Dr.	1,000	0.5%	0.0%	25	50	--	--	--	--
Arroyo Dr. N	east of California Ave.	7,000	0.5%	0.0%	25	58	30	--	--	--
Access Rd.	between Arroyo Dr. N and Campus Dr.	2,000	0.5%	0.0%	25	52	--	--	--	--
	between Arroyo Dr. N and Culver Dr.	6,000	0.5%	0.0%	25	57	25	--	--	--
Arroyo Dr. S	east of California Ave.	3,000	0.5%	0.0%	25	54	--	--	--	--
Bison Ave.	between California Ave. and E. Peltason Dr.	22,000	0.5%	0.5%	35	67	140	80	25	--
	south of California Ave.	33,000	0.5%	0.5%	35	69	125	70	40	--
California Ave.	between University Dr. and Academy Way	22,000	0.5%	0.5%	35	67	105	60	25	--
	between Academy Way and Theory	12,000	0.5%	0.5%	35	64	80	45	--	--
	between Theory and Bison Ave.	17,000	0.5%	0.5%	35	66	125	65	--	--
	east of Bison Ave.	3,000	0.5%	0.0%	25	54	--	--	--	--
	between Campus Dr. and Adobe Circle Rd. N	23,000	0.5%	0.5%	35	67	105	60	30	--
	between Adobe Circle Rd. N and Arroyo Dr. N	20,000	0.5%	0.5%	35	67	100	60	25	--
	between Arroyo Dr. N and Adobe Circle Rd. S	14,000	0.5%	0.5%	35	65	85	50	--	--
	between Adobe Circle Rd. S and Palo Verde Rd.	9,000	0.5%	0.5%	35	63	70	35	--	--
	between Palo Verde Rd. and Arroyo Dr. S	9,000	0.5%	0.5%	35	63	100	35	--	--
	between Arroyo Dr. S and Anteater Dr.	11,000	0.5%	0.5%	35	64	75	40	--	--
	between Anteater Dr. and Gabrielino Dr.	5,000	0.5%	0.0%	25	56	--	--	--	--
	between Gabrielino Dr. and Owens Dr.	2,000	0.5%	0.0%	25	52	--	--	--	--
E. Peltason Dr.	between Bison Ave. and S. Circle View	21,000	0.5%	0.5%	35	67	100	60	25	--

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
	between S. Circle View and Los Trancos Dr.	22,000	0.5%	0.5%	35	67	105	60	25	--
	between Los Trancos Dr. and Gabrielino Dr.	21,000	0.5%	0.5%	35	67	135	75	25	--
	between Gabrielino Dr. and Anteater Dr.	15,000	0.5%	0.5%	35	65	85	50	--	--
	between Anteater Dr. and Palo Verde Rd.	23,000	0.5%	0.5%	35	67	105	60	30	--
	between Palo Verde Rd. and Pereira Dr.	20,000	0.5%	0.5%	35	67	100	60	25	--
	between Pereira Dr. and Campus Dr.	22,000	0.5%	0.5%	35	67	105	60	25	--
Gabrielino Dr.	between E. Peltason Dr. and Russell Pl.	4,000	0.5%	0.0%	25	55	--	--	--	--
	between Russell Pl. and California Ave.	1,000	0.5%	0.0%	25	50	--	--	--	--
Los Trancos Dr.	between E. Peltason Dr. and Vista Bonita Dr.	2,000	0.5%	0.0%	25	52	--	--	--	--
	between Vista Bonita Dr. and Owens Dr.	1,000	0.5%	0.0%	25	50	--	--	--	--
Mesa Rd.	between University Dr. and Pereira Dr.	10,000	0.5%	0.0%	25	59	45	--	--	--
	between Pereira Dr. and W. Peltason Dr.	7,000	0.5%	0.0%	25	58	30	--	--	--
Palo Verde Rd.	between E. Peltason Dr. and California Ave.	2,000	0.5%	0.0%	25	52	--	--	--	--
Pereira Dr.	between W. Peltason Dr. and Pereira Dr.	6,000	0.5%	0.0%	25	57	25	--	--	--
	between Pereira Dr. and E. Peltason Dr.	9,000	0.5%	0.5%	35	63	100	35	--	--
	between E. Peltason Dr. and Adobe Circle Rd.	6,000	0.5%	0.5%	35	61	55	--	--	--
Russell Pl.	between Gabrielino Dr. and Anteater Dr.	8,000	0.5%	0.0%	25	58	35	--	--	--
W. Peltason Dr.	between Bison Ave. and Academy Way	7,000	0.5%	0.0%	25	58	30	--	--	--
	between Academy Way and Mesa Rd.	13,000	0.5%	0.0%	25	61	55	--	--	--
	between Mesa Rd. and Pereira Dr.	18,000	0.5%	0.0%	25	62	75	25	--	--
	between Pereira Dr. and Campus Dr.	17,000	0.5%	0.5%	35	66	125	65	--	--
Campus Dr.	between Bristol N. and MacArthur Blvd.	39,800	0.5%	0.5%	50	74	210	125	75	45
	between MacArthur Blvd. and Von Karman Ave.	27,000	0.5%	0.5%	50	73	225	145	85	30
	between Von Karman Ave. and Teller Ave.	20,000	0.5%	0.5%	50	71	200	130	65	--
	between Teller Ave. and Jamboree Rd.	22,000	0.5%	0.5%	50	72	205	135	75	25
	between Jamboree Rd. and Carlson Ave.	35,000	0.5%	0.5%	45	72	220	140	80	30
	between Carlson Ave. and University Dr.	28,000	0.5%	0.5%	45	71	200	130	65	--
	between University Dr. and W. Peltason Dr.	24,000	0.5%	0.5%	50	72	215	140	80	25
	between W. Peltason Dr. and E. Peltason Dr.	37,000	0.5%	0.5%	50	74	250	165	105	40
	between E. Peltason Dr. and California Ave.	32,000	0.5%	0.5%	50	73	240	155	100	35
	between California Ave. and Culver Dr.	18,000	0.5%	0.5%	50	71	145	90	55	--

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
	between Culver Dr. and Turtle Rock Dr.	17,000	0.5%	0.5%	50	71	190	120	55	--
University Dr.	between Jamboree Rd. and MacArthur Blvd. SB	13,200	1.0%	1.0%	55	71	150	90	55	--
	between MacArthur Blvd. NB and California Ave.	45,000	1.0%	1.0%	55	76	260	200	155	55
	between California Ave. and Mesa Rd.	46,000	1.0%	1.0%	55	77	315	200	130	70
	between Mesa Rd. and Campus Dr.	39,000	1.0%	1.0%	55	76	240	145	90	55
	between Campus Dr. and Harvard Ave.	32,000	1.0%	1.0%	55	75	270	175	115	50
	between Harvard Ave. and Culver Dr.	17,000	1.0%	1.0%	55	72	170	100	60	30
	between Culver Dr. and Ridgeline Dr.	44,000	0.5%	0.5%	50	75	270	175	115	50
Harvard Ave.	between I-405 and Michelson Dr.	17,000	0.5%	0.5%	50	71	190	120	55	--
	between Michelson Dr. and University Dr.	24,000	0.5%	0.5%	50	72	165	100	60	25
	between University Dr. and Bridge Rd.	23,000	0.5%	0.5%	50	72	210	135	75	25
	between Bridge Rd. and Berkeley	13,000	0.5%	0.5%	50	69	135	75	45	--
	between Berkeley and California Ave.	20,000	0.5%	0.5%	50	71	155	95	55	--
	between California Ave. and Culver Dr.	22,000	0.5%	0.5%	50	72	160	95	60	25
Culver Dr.	between I-405 SB and Michelson Dr.	56,000	1.0%	1.0%	55	77	285	170	105	65
	between Michelson Dr. and University Dr.	50,000	1.0%	1.0%	55	77	270	165	100	60
	between University Dr. and Harvard Ave.	70,000	1.0%	1.0%	55	78	375	235	155	100
	between Harvard Ave. and Campus Dr.	39,000	1.0%	1.0%	55	76	240	145	90	55
	between Campus Dr. and Anteater Dr.	22,000	0.5%	0.5%	50	72	160	95	60	25
Ford Rd.	between Jamboree Rd. and MacArthur Blvd.	13,100	0.5%	0.5%	50	69	130	75	45	--
Bonita Canyon Dr.	between MacArthur Blvd. and San Miguel Dr.	31,200	0.5%	0.5%	50	73	190	115	70	35
	between San Miguel Dr. and SR-73 SB	26,400	0.5%	0.5%	50	72	175	105	65	30
	between Newport Coast Dr. and SR-73 NB	27,000	0.5%	0.5%	50	73	175	105	65	30
	between Anteater Dr. and Newport Coast Dr.	39,000	0.5%	0.5%	50	74	205	125	75	45
Michelson Dr.	between Jamboree Rd. and Carlson Ave.	52,000	1.0%	1.0%	55	77	330	210	135	75
	between Carlson Ave. and Harvard Ave.	33,000	1.0%	1.0%	55	75	275	180	115	50
	between Harvard Ave. and Culver Dr.	22,000	1.0%	1.0%	55	73	235	155	100	35
	between Culver Dr. and Yale Ave.	18,000	1.0%	1.0%	55	73	220	140	85	30
Carlson Ave.	between Michelson Dr. and Palatine	25,000	0.5%	0.5%	45	71	195	125	60	--
	between Palatine and Campus Dr.	16,000	0.5%	0.5%	45	69	120	75	40	--
Shady Canyon Dr.	east of Bonita Canyon Dr.	9,000	0.5%	0.5%	45	67	130	70	--	--

Roadway	Segment	ADT*	Percent Medium Trucks	Percent Heavy Trucks	Speed Limit (mph)**	CNEL at 50 ft from Centerline (dBA)	Approximate Distance (ft) to CNEL Noise Contour			
							60	65	70	75
Jamboree Rd.	between I-405 SB and Michelson Dr.	95,000	1.0%	1.0%	55	80	425	265	170	110
	between Michelson Dr. and Dupont Dr.	54,000	1.0%	1.0%	55	77	335	215	140	80
	between Dupont Dr. and Campus Dr.	53,000	1.0%	1.0%	55	77	335	215	140	80
	between Campus Dr. and Birch St.	51,000	1.0%	1.0%	55	77	330	210	135	75
	between Birch St. and Fairchild Rd.	57,000	1.0%	1.0%	55	78	345	220	140	85
	between MacArthur Blvd. and Bristol NB	47,800	1.0%	1.0%	55	77	265	160	95	60
	between Bristol SB and University Dr.	53,200	1.0%	1.0%	55	77	280	165	100	60
	between University Dr. and Bison Ave.	41,800	1.0%	1.0%	55	76	250	150	90	55
	between Bison Ave. and Ford Rd.	47,000	1.0%	1.0%	55	77	315	205	130	70
Von Karman Ave.	between Campus Dr. and Birch St.	19,000	0.5%	0.5%	50	71	195	125	65	--
	between Birch St. and MacArthur Blvd.	17,000	0.5%	0.5%	50	71	190	120	55	--
Birch St.	west of MacArthur Blvd.	30,000	0.5%	0.5%	45	72	205	135	70	25
	between MacArthur Blvd. and Von Karman Ave.	22,100	0.5%	0.5%	45	70	140	85	50	--
	between Von Karman Ave. and Jamboree Rd.	20,100	0.5%	0.5%	45	70	135	80	50	--
MacArthur Blvd.	between Campus Dr. and Birch St.	37,300	1.0%	1.0%	55	75	235	145	85	50
	between Birch St. and Von Karman Ave.	28,300	1.0%	1.0%	55	74	210	125	75	45
	between Von Karman Ave. and Jamboree Rd.	34,500	1.0%	1.0%	55	75	230	140	85	50
	between Jamboree Rd. and Fairchild Rd.	40,000	1.0%	1.0%	55	76	295	190	125	60
	between Fairchild Rd. and University Dr.	49,000	1.0%	1.0%	55	77	320	205	135	75
	between University Dr. and SR-73	37,000	1.0%	1.0%	55	76	290	185	120	55
	between SR-73 and Bison Ave.	73,000	1.0%	1.0%	55	79	380	240	155	100
	between Bison Ave. and Ford Rd.	70,400	1.0%	1.0%	55	78	320	190	115	70
Bison Ave.	between Jamboree Rd. and MacArthur Blvd.	17,300	1.0%	1.0%	55	72	170	100	60	30
	between MacArthur Blvd. and SR-73	10,600	1.0%	1.0%	55	70	135	80	--	--

*Source: Austin-Foust Associates, Inc. 2007

**Source: City of Irvine Transportation Design Procedures 2006

Table 7
Comparison of Existing and Future Traffic Noise Levels

Roadway	Segment	CNEL at 50 ft from Centerline (dBA)		
		Existing	Future With Project	Delta
Academy Way	between California Ave. and Medical Plaza	55	58	3
	between Medical Plaza and W. Peltason Dr.	55	57	2
	between California Ave. and W. Peltason Dr.	55	--	N/A
Adobe Circle Rd.	South	--	49	N/A
	North	--	52	N/A
Anteater Dr.	between E. Peltason Dr. and Russell Pl.	--	61	N/A
	between Russell Pl. and California Ave.	--	59	N/A
	between California Ave. and Proposed Rd	--	59	N/A
	between Proposed Rd and Culver Dr.	--	60	N/A
Proposed Rd	between Anteater Dr. and Bonita Canyon Dr.	--	50	N/A
Arroyo Dr. N	east of California Ave.	--	58	N/A
Access Rd.	between Arroyo Dr. N and Campus Dr.	--	52	N/A
	between Arroyo Dr. N and Culver Dr.	--	57	N/A
Arroyo Dr. S	east of California Ave.	--	54	N/A
Bison Ave.	between California Ave. and E. Peltason Dr.	66	67	1
	south of California Ave.	67	69	2
California Ave.	between University Dr. and Academy Way	65	67	2
	between Academy Way and Theory	62	64	2
	between Theory and Bison Ave.	63	66	3
	east of Bison Ave.	54	54	0
	between Campus Dr. and Adobe Circle Rd. N	65	67	2
	between Adobe Circle Rd. N and Arroyo Dr. N	65	67	2
	between Arroyo Dr. N and Adobe Circle Rd. S	--	65	N/A
	between Adobe Circle Rd. S and Palo Verde Rd.	--	63	N/A
	between Palo Verde Rd. and Arroyo Dr. S	--	63	N/A
	between Arroyo Dr. S and Anteater Dr.	--	64	N/A
	between Anteater Dr. and Gabrielino Dr.	--	56	N/A
	between Gabrielino Dr. and Owens Dr.	--	52	N/A
E. Peltason Dr.	between Bison Ave. and S. Circle View	65	67	2
	between S. Circle View and Los Trancos Dr.	65	67	2
	between Los Trancos Dr. and Gabrielino Dr.	65	67	2
	between Gabrielino Dr. and Anteater Dr.	66	65	-1
	between Anteater Dr. and Palo Verde Rd.	66	67	1
	between Palo Verde Rd. and Pereira Dr.	66	67	1
	between Pereira Dr. and Campus Dr.	66	67	1
Gabrielino Dr.	between E. Peltason Dr. and Russell Pl.	55	55	0
	between Russell Pl. and California Ave.	--	50	N/A
Los Trancos Dr.	between E. Peltason Dr. and Vista Bonita Dr.	52	52	0
	between Vista Bonita Dr. and Owens Dr.	--	50	N/A
Mesa Rd.	between University Dr. and Pereira Dr.	58	59	1
	between Pereira Dr. and W. Peltason Dr.	57	58	1

Roadway	Segment	CNEL at 50 ft from Centerline (dBA)		
		Existing	Future With Project	Delta
Palo Verde Rd.	between E. Peltason Dr. and California Ave.	52	52	0
Pereira Dr.	between W. Peltason Dr. and Pereira Dr.	59	57	-2
	between Pereira Dr. and E. Peltason Dr.	63	63	0
	between E. Peltason Dr. and Adobe Circle Rd.	63	61	-2
Russell Pl.	between Gabrielino Dr. and Anteater Dr.	--	58	N/A
W. Peltason Dr.	between Bison Ave. and Academy Way	60	58	-2
	between Academy Way and Mesa Rd.	59	61	2
	between Mesa Rd. and Pereira Dr.	61	62	1
	between Pereira Dr. and Campus Dr.	65	66	1
Campus Dr.	between Bristol N. and MacArthur Blvd.	72	74	2
	between MacArthur Blvd. and Von Karman Ave.	71	73	2
	between Von Karman Ave. and Teller Ave.	70	71	1
	between Teller Ave. and Jamboree Rd.	--	72	N/A
	between Jamboree Rd. and Carlson Ave.	70	72	2
	between Carlson Ave. and University Dr.	70	71	1
	between University Dr. and W. Peltason Dr.	72	72	0
	between W. Peltason Dr. and E. Peltason Dr.	72	74	2
	between E. Peltason Dr. and California Ave.	72	73	1
	between California Ave. and Culver Dr.	72	71	-1
	between Culver Dr. and Turtle Rock Dr.	70	71	1
University Dr.	between Jamboree Rd. and MacArthur Blvd. SB	70	71	1
	between MacArthur Blvd. NB and California Ave.	74	76	2
	between California Ave. and Mesa Rd.	--	77	N/A
	between Mesa Rd. and Campus Dr.	75	76	1
	between Campus Dr. and Harvard Ave.	74	75	1
	between Harvard Ave. and Culver Dr.	73	72	-1
	between Culver Dr. and Ridgeline Dr.	73	75	2
Harvard Ave.	between I-405 and Michelson Dr.	--	71	N/A
	between Michelson Dr. and University Dr.	71	72	1
	between University Dr. and Bridge Rd.	70	72	2
	between Bridge Rd. and Berkeley	70	69	N/A
	between Berkeley and California Ave.	70	71	1
	between California Ave. and Culver Dr.	70	72	2
Culver Dr.	between I-405 SB and Michelson Dr.	77	77	0
	between Michelson Dr. and University Dr.	76	77	1
	between University Dr. and Harvard Ave.	76	78	2
	between Harvard Ave. and Campus Dr.	75	76	1
	between Campus Dr. and Anteater Dr.	73	72	-1
Ford Rd.	between Jamboree Rd. and MacArthur Blvd.	68	69	1
Bonita Canyon Dr.	between MacArthur Blvd. and San Miguel Dr.	73	73	0
	between San Miguel Dr. and SR-73 SB	71	72	1
	between Newport Coast Dr. and SR-73 NB	72	73	1
	between Anteater Dr. and Newport Coast Dr.	72	74	2
Michelson Dr.	between Jamboree Rd. and Carlson Ave.	75	77	2

Roadway	Segment	CNEL at 50 ft from Centerline (dBA)		
		Existing	Future With Project	Delta
	between Carlson Ave. and Harvard Ave.	72	75	3
	between Harvard Ave. and Culver Dr.	73	73	0
	between Culver Dr. and Yale Ave.	72	73	1
Carlson Ave.	between Michelson Dr. and Palatine	63	71	8
	between Palatine and Campus Dr.	--	69	N/A
Shady Canyon Dr.	east of Bonita Canyon Dr.	70	67	-3
Jamboree Rd.	between I-405 SB and Michelson Dr.	79	80	1
	between Michelson Dr. and Dupont Dr.	77	77	0
	between Dupont Dr. and Campus Dr.	77	77	0
	between Campus Dr. and Birch St.	76	77	1
	between Birch St. and Fairchild Rd.	76	78	2
	between Fairchild Rd. and MacArthur Blvd.	75	--	N/A
	between MacArthur Blvd. and Bristol NB	--	77	N/A
	between Bristol SB and University Dr.	77	77	0
	between University Dr. and Bison Ave.	76	76	0
	between Bison Ave. and Ford Rd.	76	77	1
Von Karman Ave.	between Campus Dr. and Birch St.	70	71	1
	between Birch St. and MacArthur Blvd.	69	71	2
Birch St.	west of MacArthur Blvd.	70	72	2
	between MacArthur Blvd. and Von Karman Ave.	69	70	1
	between Von Karman Ave. and Jamboree Rd.	68	70	2
MacArthur Blvd.	between Campus Dr. and Birch St.	74	75	1
	between Birch St. and Von Karman Ave.	73	74	1
	between Von Karman Ave. and Jamboree Rd.	74	75	1
	between Jamboree Rd. and Fairchild Rd.	75	76	1
	between Fairchild Rd. and University Dr.	75	77	2
	between University Dr. and SR-73	75	76	1
	between SR-73 and Bison Ave.	78	79	1
	between Bison Ave. and Ford Rd.	78	78	0
Bison Ave.	between Jamboree Rd. and MacArthur Blvd.	71	72	1
	between MacArthur Blvd. and SR-73	68	70	2

Delta is difference between existing and future with project.
N/A indicates that roadway segments do not exist in the existing year or existing segments are further divided in the future.

APPENDIX A
LONG-TERM SOUND LEVEL MEASUREMENTS

Table A-1
Long-Term Sound Level Measurements at
L1: University Drive at Campus Drive (Mesa Court Housing)

Date	Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
09-25-06	14:00-15:00	56.9	48.2	69.9	60.0	54.8	51.6
	15:00-16:00	58.1	49.7	77.1	60.5	55.9	52.9
	16:00-17:00	57.5	49.1	69.6	60.2	56.0	53.1
	17:00-18:00	60.2	51.3	81.3	61.7	57.5	54.7
	18:00-19:00	59.2	49.7	78.4	61.3	56.9	54.1
	19:00-20:00	55.8	47.4	68.5	58.3	54.5	51.3
	20:00-21:00	55.5	45.3	72.4	58.1	53.5	50.0
	21:00-22:00	55.8	44.8	78.7	58.3	53.3	49.5
	22:00-23:00	54.9	44.1	68.7	57.8	52.8	48.6
	23:00-00:00	53.6	43.7	69.8	55.5	50.9	47.3
09-26-06	00:00-01:00	51.7	41.7	66.8	54.6	49.5	45.6
	01:00-02:00	50.2	41.6	69.4	52.7	46.9	43.2
	02:00-03:00	45.1	39.9	60.4	47.7	42.9	40.9
	03:00-04:00	52.1	39.7	69.5	51.2	43.1	40.4
	04:00-05:00	45.3	39.7	61.9	47.8	41.8	40.2
	05:00-06:00	50.7	39.7	68.3	53.6	46.3	41.4
	06:00-07:00	55.4	42.2	69.4	58.7	52.9	48.1
	07:00-08:00	57.7	47.7	69.7	60.2	56.5	53.2
	08:00-09:00	57.7	48.3	70.4	60.3	56.5	53.4
	09:00-10:00	63.9	48.1	81.8	62.7	58.2	54.1
	10:00-11:00	70.1	53.9	92.6	72.2	63.0	58.4
	11:00-12:00	56.8	47.2	69.3	59.8	55.3	51.8
	12:00-13:00	56.8	47.9	70.7	59.5	55.3	52.0
	13:00-14:00	57.4	47.1	69.6	60.7	55.0	51.2

Table A-2
Long-Term Sound Level Measurements at
L2: California Avenue at Adobe Circle Road

Date	Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
09-25-06	15:00-16:00	61.9	47.2	91.6	62.6	58.2	52.1
	16:00-17:00	60.1	45.6	73.6	62.9	58.3	51.8
	17:00-18:00	60.2	47.0	74.0	62.9	59.0	54.3
	18:00-19:00	60.6	48.6	74.6	63.3	59.3	54.4
	19:00-20:00	59.9	45.0	78.8	62.3	57.8	51.2
	20:00-21:00	58.8	44.7	74.4	61.8	57.0	49.7
	21:00-22:00	59.2	43.1	73.2	61.9	57.5	50.2
	22:00-23:00	58.5	41.4	76.1	61.1	55.1	45.9
	23:00-00:00	56.6	41.2	80.1	58.9	51.1	44.1
09-26-06	00:00-01:00	53.6	40.2	75.2	57.6	46.7	41.4
	01:00-02:00	48.2	39.4	66.7	51.1	41.8	40.1
	02:00-03:00	47.1	37.1	72.7	44.1	39.8	37.7
	03:00-04:00	43.8	37.1	70.4	40.7	38.2	37.2
	04:00-05:00	51.9	36.8	79.9	43.8	38.7	37.3
	05:00-06:00	51.3	36.8	73.3	51.2	38.9	37.3
	06:00-07:00	52.9	38.0	79.4	56.4	43.6	39.4
	07:00-08:00	59.1	39.6	79.4	62.0	56.3	47.3
	08:00-09:00	58.4	42.3	75.3	61.7	55.9	47.6
	09:00-10:00	58.3	41.3	76.7	61.5	55.1	46.7
	10:00-11:00	58.0	41.7	78.2	60.9	53.2	45.3
	11:00-12:00	62.9	44.1	89.5	61.5	55.2	47.3
	12:00-13:00	57.8	44.3	71.7	61.3	55.2	47.5
	13:00-14:00	57.8	44.5	72.2	61.2	55.1	48.6
	14:00-15:00	59.9	45.7	76.3	62.7	57.5	53.1

Table A-3
Long-Term Sound Level Measurements at
L3: California Avenue; 53 Urey Court Residence

Date	Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
09-26-06	15:00-16:00	59.2	42.7	77.9	63.4	54.8	47.1
	16:00-17:00	55.1	43.4	74.1	58.2	49.4	46.2
	17:00-18:00	54.0	45.8	72.0	57.6	50.8	48.2
	18:00-19:00	54.0	46.3	71.2	57.2	50.9	48.3
	19:00-20:00	52.6	43.7	71.3	55.7	48.9	46.3
	20:00-21:00	51.0	42.0	74.8	50.7	46.3	44.1
	21:00-22:00	49.2	40.9	66.3	50.5	46.6	44.4
	22:00-23:00	47.3	38.0	65.9	48.3	44.7	41.7
	23:00-00:00	43.6	36.9	64.6	45.0	41.0	38.2
09-27-06	00:00-01:00	43.7	36.6	54.4	47.6	41.6	37.7
	01:00-02:00	43.8	36.5	68.6	43.6	38.6	37.0
	02:00-03:00	40.1	36.3	60.2	41.6	37.6	36.3
	03:00-04:00	38.0	36.1	48.1	39.5	37.2	36.2
	04:00-05:00	40.2	36.0	63.2	41.6	37.3	36.2
	05:00-06:00	39.7	36.2	61.0	41.2	37.6	36.3
	06:00-07:00	47.0	37.2	67.3	47.3	42.0	38.5
	07:00-08:00	54.9	40.4	79.4	56.9	46.4	43.1
	08:00-09:00	54.7	38.7	76.2	57.5	44.5	40.7
	09:00-10:00	52.2	39.5	74.9	54.6	44.0	41.5
	10:00-11:00	49.3	39.8	69.1	50.1	43.0	41.1
	11:00-12:00	55.8	39.8	79.4	58.9	47.3	42.0
	12:00-13:00	53.9	41.2	73.8	56.5	48.3	43.8
	13:00-14:00	55.5	41.8	73.8	58.5	50.4	44.8
	14:00-15:00	59.5	42.6	77.7	63.5	55.1	46.2

Table A-4
Long-Term Sound Level Measurements at
L4: E. Peltason Drive; 95 Schubert Court Residence

Date	Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
09-26-06	16:00-17:00	58.4	46.9	72.9	60.8	57.0	51.3
	17:00-18:00	57.8	46.3	68.3	60.6	57.1	51.3
	18:00-19:00	57.9	45.2	71.0	60.8	57.0	51.5
	19:00-20:00	56.4	44.0	68.7	59.7	55.2	48.4
	20:00-21:00	55.7	43.9	69.7	59.1	54.1	46.7
	21:00-22:00	56.4	44.6	72.5	59.8	55.1	47.7
	22:00-23:00	55.3	44.4	72.9	59.1	52.2	45.6
	23:00-00:00	52.5	44.0	63.5	56.9	48.6	45.0
09-27-06	00:00-01:00	50.7	43.4	64.6	54.8	45.7	44.0
	01:00-02:00	52.9	42.7	73.1	57.3	44.4	43.2
	02:00-03:00	49.8	42.3	63.3	52.7	43.8	42.5
	03:00-04:00	47.9	42.2	66.9	48.7	43.5	42.6
	04:00-05:00	46.6	42.7	62.4	46.5	43.9	43.2
	05:00-06:00	49.8	42.2	63.3	53.8	43.9	42.8
	06:00-07:00	54.7	42.1	72.1	58.7	49.3	43.4
	07:00-08:00	63.7	44.2	73.9	68.5	59.7	49.9
	08:00-09:00	65.2	48.1	90.1	63.4	58.8	53.2
	09:00-10:00	59.0	46.5	79.4	61.5	56.9	51.0
	10:00-11:00	59.1	48.0	73.2	61.7	57.4	52.9
	11:00-12:00	58.2	45.6	74.9	61.3	56.6	50.2
	12:00-13:00	58.6	45.6	72.9	61.5	57.5	51.4
	13:00-14:00	59.1	45.8	81.4	61.5	57.4	51.5
	14:00-15:00	58.9	46.5	72.7	61.5	57.1	51.1
	15:00-16:00	58.5	46.2	77.7	61.0	57.1	51.7