Noise Technical Report
Anaheim Regional Transportation Intermodal Center (ARTIC)

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1.0 Executive Summary

This noise impact report has been prepared to assess the potential noise impacts associated with the proposed Anaheim Regional Transportation Intermodal Center (ARTIC) project.

This report uses the data collected during the field noise measurement survey of three long-term measurement sites to document the ambient noise levels of the existing noise environment of the project site. These measurements documented the ambient noise levels from noise sources in the project vicinity including traffic and train noise sources. The current Community Noise Levels (CNEL) at noise sensitive receiving properties in the project area range from 67 to 73 dBA. The major noise sources that contribute to these noise levels are vehicular traffic on local highways and roadways. The current CNEL is 60 dBA at the existing Metrolink station.

Traffic noise levels along roadway segments in the project vicinity were also calculated using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) for existing conditions, without project and with project conditions for the opening year (2013) and without project and with project conditions for the year 2030. Project-related traffic noise levels would result in a less than significant increase in ambient noise levels in the project vicinity compared to noise levels without the project. Similarly cumulative traffic impacts associated with the multiple projects combined with the ARTIC project show a negligible increase in ambient noise levels. The ARTIC project will have a less than significant cumulative traffic noise impact.

The new location will be approximately one quarter (0.25) miles east along the existing OCTA railroad right-of-way (ROW) in a larger facility. The relocation of the Metrolink station will bring noise and vibration impacts slightly closer to the Ayres Hotel. However, the dominate noise source at the Ayers Hotel is SR57. The existing CNEL at the Ayres Hotel is 67 dBA. Train traffic is not expected to increase significantly in 2013, increases are expected over a long period of time. Therefore, it is anticipated that 2013 noise levels will be similar to those currently. The existing CNEL is 60 dBA. Therefore, no perceptible noise increases will occur over existing ambient noise levels. Further, FTA impact criteria require noise sensitive receivers to be within 200 feet of the centerline of the project to be evaluated for vibration effects. The Ayres Hotel is outside of this impact screening distance; therefore no perceptible change in vibration will occur associated with the ARTIC project.

From a cumulative perspective anticipated train increase are expected to increase by 26 percent throughout Orange County. According to FTA, a noticeable increase occurs at 40 percent which would provide a 2 dBA increase at a reference distance of 50 feet. Project increases in train traffic are below this level, therefore no perceptible noise increase will occur resulting in a less than significant cumulative impact.

Temporary increases in noise levels will occur during the construction of the project. However, noise sensitive receivers are beyond the FTA screening distance of 200 feet be influence by temporary increase in vibration from construction equipment. General construction noise will cause temporary increases in ambient noise levels. Construction noise mitigation measures should be followed according to local ordinances were applicable where staging areas are located near noise sensitive land uses.

2.0 Introduction

The City of Anaheim is proposing to relocate the existing Anaheim Metrolink/Amtrak Station from the current location south of Katella Avenue and west of State Route (SR) 57. The new station, the Anaheim Regional Transportation Intermodal Center (ARTIC), will accommodate existing transportation services, as well as anticipated future growth.

Transit projects of this type require an evaluation of noise impacts as required under the Title 23, Code of Federal Regulations, Part 771 (23 CFR 771) "Environmental Impact and Related Procedures." 23 CFR 771 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway and mass transit projects. According to 23 CFR 771, all highway and mass transit projects that are developed in conformance with this regulation are deemed to be in conformance with the National Environmental Policy Act (NEPA). Further, the project is subject to CEQA Threshold requirements which require the evaluation of whether the project poses any significant noise impacts. If noise impacts are found from the implementation and construction of the proposed project appropriate mitigation methods will be considered.

This report is intended to satisfy the City of Anaheim, the City of Orange and the County of Orange local land use compatibility guidelines and ordinances for protecting sensitive land use categories in the project area as well as comply with CEQA Thresholds and guidelines from the Federal Transit Agency (FTA) by examining the noise impacts from the proposed project and evaluating the mitigation measures incorporated as part of the project design. Construction and operation of the proposed transit center has the potential to generate substantial temporary and/or permanent increases in ambient noise levels in the vicinity of the project area, expose people to excessive noise levels, groundborne vibration or groundborne noise levels. The evaluation of these potential noise impacts associated with the proposed project includes documenting existing noise conditions in the vicinity of the project site; describing the criteria for determining the significance of noise impacts; and determining the likely noise impacts that would result from construction activities, vehicular traffic, rail line activity, aircraft, and other noise sources. Where appropriate, mitigation measures are recommended to reduce project-related noise impacts to a less-than-significant level.

Project Background

The City of Anaheim (City) in collaboration with the Orange County Transportation Authority (OCTA) is proposing to relocate the existing Anaheim Metrolink/Amtrak Station that is south of Katella Avenue and adjacent to The Grove of Anaheim. The new location will be approximately one quarter (0.25) mile east along the existing OCTA railroad right-of-way (ROW) in a larger (310,000 square feet) facility (Figure 1). The OCTA railroad ROW is part of the Los Angeles to San Diego (LOSSAN) Corridor. The 310,000 square feet structure includes the gross building floor space, Metrolink/Amtrak concourse, and an under-building bus transit center. The selected design concept of the iconic ARTIC Intermodal Terminal is not an expandable structure, so the Bus Transit Center, the Metrolink/Amtrak Concourse, the Public Hall/Waiting Area, and the Program Space are designed to accommodate current needs and not preclude services that need to be provided in the future. The Metrolink/Amtrak Concourse is being planned to connect to the future transit modes. These future projects include California High Speed Rail, Anaheim Rapid Connector, and the California-Nevada Super Speed Train. Program Spaces are being planned to accommodate the passenger services of ticketing and related activities for the future transit modes. The final build-out of tenant improvements will be completed by other project teams for theses future transit modes in approximately five to ten years or later.

Purpose and Need

ARTIC is necessary because of the anticipated increase in rail passenger demand and the need to provide convenient intermodal connections. The existing Anaheim Metrolink/Amtrak station will not be able to meet the future demand for services because of physical and contractual constraints (Cordoba Corporation, 2009). In addition the existing Anaheim Metrolink/Amtrak station has restricted access and does not facilitate a seamless transfer of travelers from one mode of transit service to another at a regional center. ARTIC intended to provide improved and safe pedestrian access to two major sports and entertainment centers within the City. ARTIC is also intended to provide opportunities for Transit Oriented Development (TOD) as identified within the Platinum Triangle Master Land Use Plan.

Project Description

ARTIC will include the development of an Intermodal Terminal, Public Plaza/Drop-Off Area, the Stadium Pavilion, the Tracks/Platforms, Douglass Road Improvements, Katella Avenue improvements, and Surface Parking/Access. The Intermodal Terminal is proposed to be a three-level building of approximately 310,000 gross square feet that is comprised of approximately 140,000 square feet at-grade or above-grade and approximately 170,000 square feet below the building. There will be two levels at-grade or above-grade and one level below the building. The above grade uses will include terminal operations, passenger-oriented retail/restaurants, and civic space/public plaza. The below the building uses will include bus waiting and service areas. The facility will include an underground concourse with access to Metrolink/Amtrak and a parking lot south of the railroad ROW.

The project will also include a new stub end track that will be constructed south of the existing tracks. Two, 1,200 foot long, platforms (varying in width from 21 feet to 40 feet) will be constructed for ARTIC. A replacement rail bridge will be constructed over Douglass Road to accommodate the three track/two platform alignment. Douglass Road will be widened to an eight lane configuration as it approaches Katella Avenue. These roadway improvements will include pedestrian circulation and relocation of utilities to service the project site. Construction is anticipated to last approximately twenty-six (26) to thirty-six (36) months.

N W E S

Not to Scale

Figure 2-1. Project Vicinity Map

3.0 Noise and Vibration Fundamentals

Noise, otherwise known as unwanted sound, is what humans hear when our ears are exposed to small pressure fluctuations in the air (FTA, 2006). Noise is generated by a source and the magnitude of the noise depends on the type of source and its operating characteristics. In the case of the ARTIC Project, cars, buses, and freight and commuter rail will be the primary sources of noise.

Measurement of Sound

Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep. To the human ear, sound has two significant characteristics: pitch and loudness. A specific pitch can be an annoyance, while loudness can affect our ability to hear. Pitch is the number of complete vibrations or cycles per second of a wave that results in the range of tone from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect.

When excessive noise interrupts ongoing activities, such as sleeping, conversing, and watching TV, it can create annoyance in communities, especially residential areas. In order to quantify and measure this noise annoyance in the environment, beginning in the 1970s, the EPA undertook a number of research and synthesis studies relating to community noise of all types. As a result of this research, the EPA developed descriptors, noise impact criteria, and methods of noise assessment.

Noise is measured using several descriptors:

- Decibel (dB) - The logarithmic unit used to measure sound and indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3.0 dB or less are only perceptible in laboratory environments.
- A-weighting Sound Level (dBA) –The basic noise unit that measures sound audible to humans. Noises contain sound energy at different frequencies whose range depends on the individual noise source. Human hearing does not register the sound levels of all noise frequencies equally, and can reduces the impression of the magnitude of high and low pitched sounds. dBA units are sound levels measured through a process that filters noise levels to predominantly include sounds that are audible to humans. This process reduces the strength of very low and very high pitched sounds, such as low-frequency seismic disturbances and dog whistles, to more accurately measure sounds that affect humans. Normally occurring sounds lie in the range of 40 to 120 dBA. A sample of the dBA of common transit-related and other noise sources is shown on Figure 3-1.

- Equivalent Sound Level (L_{eq}) – A single value of sound level that quantifies the amount of noise in a specific environment for a particular period of time.

- Hourly Equivalent Sound Level (L_{eq} (h)) - A value that accounts for all levels of sound that occur in a particular location for one hour. For example, as a train approaches, passes by, and recedes into the distance, the dBA will rise, reach a maximum level, and eventually fade. The Leq (h) for this event would be a value that measures the cumulative impact of each level of sound that resulted from the train's passing, in addition to any other sounds that occurred during one hour. It is particularly useful when measuring the cumulative noise impact for communities.

- Day-Night Sound Level (L_{dn}) - A value that accounts for all levels of sound that occur in a particular location for 24 hours. This cumulative value also includes a ten dB penalty imposed on any noise that occurs between 10 PM and 7 AM. L_{dn} is used to measure the cumulative noise impact at residential areas primarily because it takes into account the increased sensitivity to noise at night, which is when most people are sleeping. Typical ranges for community noise in various settings are shown in Table 3-1.

- CNEL - Similar to L_{dn}, CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to A-weighted sound levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m., and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m.

Table 3-1. Typical Range of L_{dn} in Populated Areas

Area	L_{dn}, dBA
Downtown City	75–85
"Very Noisy" Urban Residential Areas	65-75
"Quiet" Urban Residential Areas	60-65
Suburban Residential Areas	55-60
Small Town Residential Areas	45-55

Notes:
L_{dn}= cumulative noise exposure
Source: FTA (2006)

A few general relationships may be helpful in understanding the dB scale:

- An increase of one dBA cannot be perceived by the human ear.

- A three dBA increase is normally the smallest change in sound levels that is perceptible to the human ear.

- A ten dBA increase in noise level corresponds to tenfold increase in noise energy, but a listener would only judge a ten dBA increase as being twice as loud.

- A 20 dBA increase would result in a dramatic change in how a listener would perceive the sound.

Noise impacts can be described as inaudible, potentially audible and audible. Inaudible impacts are less than 1.0 dB and are not detectable by the human ear. Potentially audible refers to changes in noise levels ranging between 1.0 and 3.0 dB. This range has only been found to be noticeable in laboratory environments. Lastly, the audible impacts generally refer to a change of 3.0 dB or greater which refers to increases in noise levels noticeable to humans. However a change in 3.0 dB or less has been found to be barely perceptible in exterior environments.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6 dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise sensitive receptor of concern. There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound.

Physiological Effects of Noise

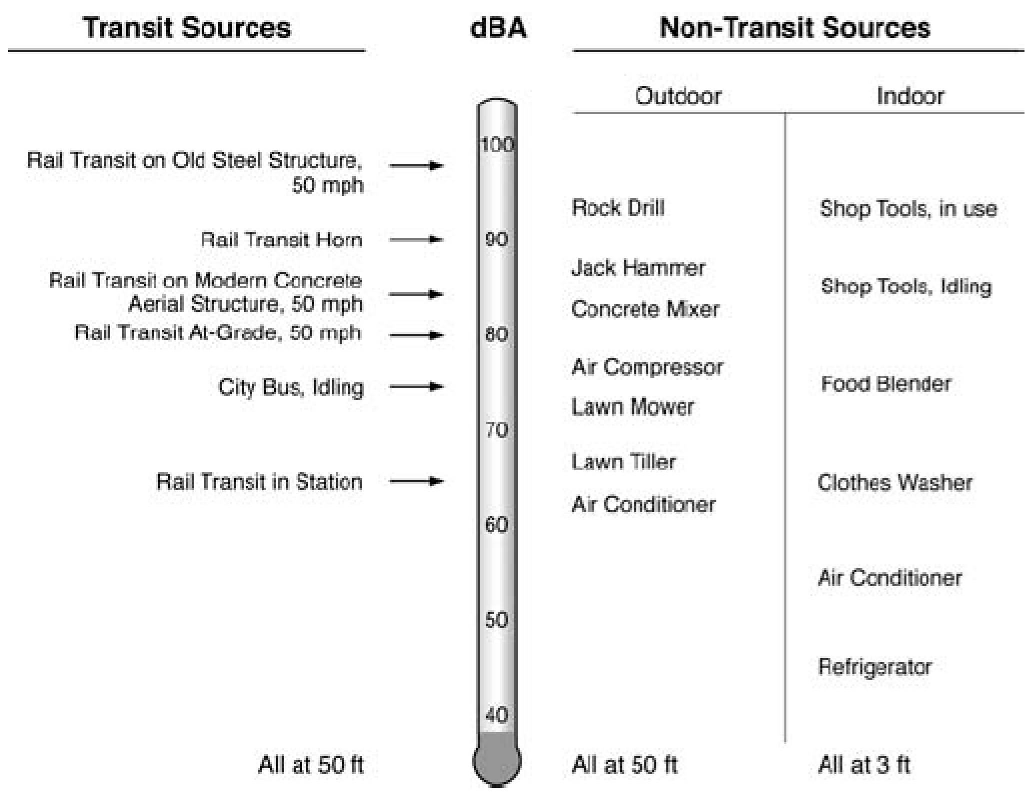
Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tension, and thereby affecting blood pressure, functions of the heart, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced with the feeling of pain in the ear. This is called the threshold of pain. It is not only exposure to extremely high noise levels that can lead to hearing loss. Irreversible hearing damage can occur with long-term cumulative exposure to levels as low as 70 dBA. This 70 dBA threshold is not for singular or peak events; rather it is the average environmental sound level a person is exposed to over weeks and years that is critical in preventing hearing loss. So, if enough “quiet times” are also experienced, this threshold can be surpassed without significant damage occurring. Table 3-2 lists a Summary of Human Effects in Areas Exposed to 55 dBA Ldn. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas.

Table 3-2: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meters. 99 percent sentence intelligibility (average) at 1.0 meters. 95 percent sentence intelligibility (average) at 3.5 meters.
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below “vigorous action.”
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency, “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” March 1974.

Figure 3-1. Typical A-weighted Sound Levels



Source: FTA Transit Noise and Vibration Impact Assessment Manual (May, 2006)

Vibration

Vibration is a trembling or oscillating motion of the earth. Like noise, vibration is transmitted in waves, but in this case through the earth or solid objects. Unlike noise, vibration is typically of a frequency that is felt rather than heard.

Vibration can be either natural, as in the form of earthquakes, volcanic eruptions, sea waves, landslides, etc., or man-made as from explosions, the action of heavy machinery or heavy vehicles such as trains or construction equipment. Both natural and man-made vibration may be continuous such as from operating machinery, or transient as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways including displacement, velocity and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 3-3 presents the human reaction to various levels of peak particle velocity.

Table 3-3. Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006-0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Threshold at which there is a risk to “architectural” damage to normal buildings
0.20	Vibrations annoying people in buildings	Threshold at which there is a risk “architectural” damage to normal dwelling-houses with plastered walls and ceilings
0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause “architectural” damage and possible minor structural damage

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hertz (Hz) range and usually occur around 15 Hz. Traffic vibrations exhibit a similar range of frequencies. However, due to their suspension systems, buses often generate frequencies around 3 Hz at high vehicle speeds. It is more uncommon, but possible, to measure traffic frequencies above 30 Hz.

The way in which vibration is transmitted through the earth is called propagation. Propagation of earthborne vibrations is complicated and difficult to predict because of the endless variations in the soil through which waves travel. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground’s surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a “push-pull” fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse or “side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level striking a given point is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced with distance as a result of material damping in the form of internal friction, soil layering, and void spaces. The amount of attenuation provided by material damping varies with soil type and condition, as well as the frequency of the wave.

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

In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Common sources of groundborne vibration include trains and construction activities such as blasting, pile driving and operating heavy earthmoving equipment.

Typical vibration source levels from construction equipment are shown in Table 3-4. There are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils.

Table 3-4: Typical Vibration Source Levels for Construction Equipment

Equipment	Approximate VdB at 25 feet	
Pile Driver (impact)	Upper range	112
	Typical	104
Pile Driver (sonic)	Upper range	105
	Typical	93
Clam shovel drop (slurry wall)		94
Hydromill (slurry wall)	In soil	66
	In rock	75
Vibratory roller		94
Hoe ram		87
Large bulldozer		87
Caisson drilling		87
Loaded truck		86
Jackhammer		79
Small bulldozer		58

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

4.0 Regulatory Requirements

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located, including noise land use compatibility guidelines. The applicable noise standards governing the project site include federal and state standards as well as the standards found in the City of Anaheim, City of Orange and the County of Orange Municipal Noise Codes which establish exterior noise acceptability thresholds for identifying impacts to future residents of new development in areas with existing ambient noise. This section further describes these established guidelines.

Federal Policies and Regulations

Noise Control Act of 1972 and Quiet Communities Act of 1978

The Noise Control Act of 1972 (42 USC) and the Quiet Communities Act of 1978 (42 USC 4913) were established by the U.S. EPA to set performance standards for noise emissions from major sources, including transit sources. Though these acts are still in effect, the enforcement of the stated noise emission standards shifted to state and local governments in 1981.

Federal Railroad Administration

The FRA adopted the USEPA railroad noise standards as its noise regulations (49 CFR 11, part 210) for the purpose of enforcement. The standards provide specific noise limits for stationary and moving locomotives, moving railroad cars, and associated railroad operations in terms of A-weighted sound level at a specified measurement location. The standards are shown in Table 4-1.

Table 4-1. Summary of EPA/FRA Railroad Noise Standards

Operating Conditions	Measured Distance (Feet)	Standard (dBA)
Non-Switcher Locomotives[1] built on or before 12/31/79		
Stationary[4]	100	73
Idle Stationary[5]	100	93
Non-Idle Moving[6]	100	95
Switcher Locomotives[2] plus Non-Switcher Locomotives built after 12/31/79		
Stationary	100	70
Idle Stationary	100	87
Non-Idle Moving	100	90
Rail Cars[3]		
Speed less than 45 mph	100	88
Speed greater than 45 mph	100	93
Coupling	50	92

Notes:
1) Non-Switcher Locomotives - A road engine that is used in long-haul railcar movement.
2) Switcher Locomotives - A smaller engine that is used in shuttling railcars.
3) Railcar - The car(s) pulled by a train engine.
4) Stationary - Sitting at idle and measured 100 feet from the center line of the track where the train is idling.
5) Idle Stationary - Sitting at idle.
6) Non-Idle Moving - Moving along the rails.
Source: City of Perris General Plan Noise Element, 2005.

Federal Transit Authority

Federal Transit Administration Construction Vibration Criteria. Groundborne vibration has the potential to disturb people as well as to damage buildings. Although it is rare for transit-induced groundborne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitude to damage nearby buildings. The FTA guideline for construction vibration impact criteria are shown in Table 4-2 for various structural categories. Construction vibration Damage Criteria Thresholds are shown in Table 4.3.

Table 4-2: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	Vibration Level Damage Impact Criteria (VdB)
Reinforced-concrete, steel or timber (no plaster)	102
Engineered concrete and masonry (no plaster)	98
Non-engineered timber and masonry buildings	94
Buildings extremely susceptible to vibration damage	90

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

Table 4-3. Construction Vibration Damage Criteria Thresholds

Building Category	Type of Building	Vibration Level (in/sec)	Approximate Lv[1]
Category I	Reinforced-concrete, steel, or timber (no plaster)	0.5	102
Category II	Engineered concrete and masonry buildings	0.3	98
Category III	Non-engineered timber and masonry buildings	0.2	94
Category IV	Buildings extremely susceptible to vibration damage	0.12	90

Notes:
1) RMS velocity in decibels (VdB) re 1 micro-inch/second.
Source: Acoustical Impact Analysis South Perris Industrial, City of Perris. URS Corporation. May 2009 (Appendix I).

Federal Transit Administration Train Related Activity Noise and Vibration Criteria

FTA has established guidelines for evaluating noise exposure levels and vibration impacts from train related activity in their Transit Noise and Vibration Impact Assessment Manual (FTA-VA-90-1003-06, May 2006). The thresholds are displayed in Table 4-4. This policy document outlines different levels of detail for impact analysis for both noise and vibration; a screening procedure, a general impact assessment, and a detailed analysis. Noise impact criteria for construction and operation of passenger rail facilities are based on the change in outdoor noise exposure using a sliding scale with three receptor categories and three degrees of impact. These criteria apply to various surface transportation modes, including heavy rail. The criteria respond to heightened community annoyance caused by late-night or early morning service and they respond to varying sensitivity of communities to noise from projects during different ambient noise conditions.

Table 4-4. FTA Vibration Impact Criteria Thresholds

Vibration Category	Groundborne Vibration (GBV) (VdB re: 1 micro-inch/sec)			Groundborne Noise (GBN) (dB re: 20 micro-Pascal's)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events	Occasional Events	Infrequent Events
Category 1	65 VdB[4]	65 VdB[4]	65 VdB[4]	NA[4]	NA[4]	NA[4]
Category 2	72 VdB	75 VdB	80 VdB	35 VdB	38 VdB	43 VdB
Category 3	75 VdB	78 VdB	83 VdB	40 VdB	43 VdB	48 VdB

Notes: Vibration-sensitive equipment is generally not sensitive to groundborne noise.
1) "Frequent Events" is defined as more than 70 events of the same source per day. Most rapid transit projects fall into this category.
2) "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3) "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.
4) This criterion limit is based upon levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
Source: Acoustical Impact Analysis South Perris Industrial, City of Perris. URS Corporation, May 2009 (Appendix I)

State Policies and Regulations

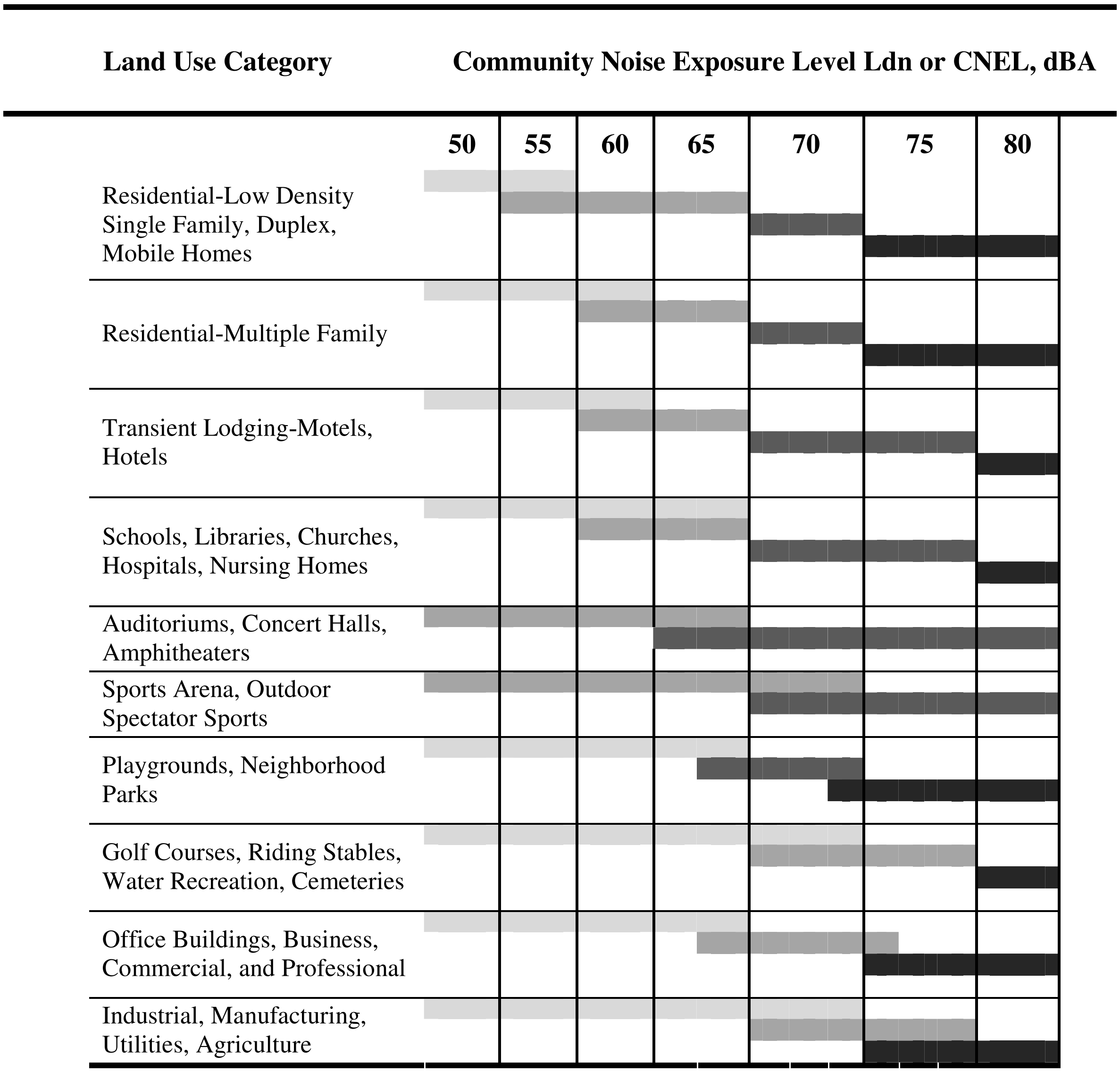
California Noise Control Act of 1973

The California Health and Safety Code established the California Noise Control Act of 1973 (§46000 et seq.) to "establish and maintain a program on noise control." This act mirrors the federal Noise Control Act of 1972 and also defers the enforcement of noise emission standards to local county and city agencies.

California Government Code Section 65302 (f)

California Government Code Section 65302 (f) states that general plans must include a noise element section which identifies and appraises noise problems in the community, and recognizes the guidelines established by the Office of Noise Control. The adopted noise element should serve as a guideline for compliance with the state's noise standards. The Office has prepared a land use compatibility chart for community noise as shown in Table 4-5. It identifies normally acceptable, conditionally acceptable and clearly unacceptable noise levels for various land uses. These standards identify normally acceptable, conditionally acceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

Table 4-5. Land Use Compatibility for Community Noise Environments



Normally Acceptable:
Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment may seem noisy.

Clearly Unacceptable:
New construction or development should generally not be undertake. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

Local Policies and Regulations

Cities and counties in California are preempted by federal law from controlling noise generated from most mobile sources, including noise generated by vehicles and trucks on the roadway, trains on the railroad, and airplanes. Therefore, the states of California's land use compatibility guidelines are adopted as a tool to gauge the compatibility of new development in the noise environment generated by mobile sources.

City of Anaheim General Plan and Noise Ordinance

The Noise Element of the City of Anaheim's General Plan indicates that noise levels are to be attained in habitable exterior areas and need not encompass the entirety of the property, and that special consideration should be given in the case of infill residential development located along the City's arterial corridors or railroad lines in order to achieve an appropriate balance between providing a quality living environment and attractive project design.

The City of Anaheim adopted, as part of the Noise Element, the State of California standards as described previously. Exterior noise levels at residential locations should not exceed a CNEL of 65 dB while interior levels shall not exceed a CNEL of 45 dB in any habitable room as shown in Table 4-6.

City of Anaheim Municipal Code, Chapter 6.70, Sound Pressure Levels. Section 6.70.

Stationary sources of noise are governed under the local Municipal Code, Chapter 6.70, Sound Pressure Levels. Section 6.70.010 simply states that "No person shall, within the City, create any sound, radiated for extended periods from any premises which produces a sound pressure level at any point on the property in excess of 60 dB (Re 0.0002 Microbar) read on the A-scale of a sound level meter. Readings shall be taken in accordance with the instrument manufacturer's instructions, using the slowest meter response." The section goes on to state, "Traffic sounds, sound created by emergency activities and sound created by governmental units shall be exempt from the applications of this chapter. Sound created by construction or building repair of any premises within the City shall be exempt from the applications of this chapter during the hours of 7 a.m. and 7 p.m."

City of Anaheim Municipal Code, Chapter 6.70

To minimize disturbance by construction noise, the City restricts noise intensive construction activities to the hours specified under Chapter 6.70 of the City of Anaheim Municipal Code (i.e., 7 a.m. to 7 p.m.). These hours shall also apply to any servicing of equipment and to the delivery of materials to or from the site. In addition, construction shall be restricted to weekdays and Saturdays between the hours of 7:00 a.m. and 7:00 p.m. Construction shall not be allowed any time on Sundays or Federally recognized holidays.

Table 4-6. State of California Interior and Exterior Noise Standards (CNEL)

Land Use		CNEL (dBA)	
Categories	**Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single- and Multi-family	45[3]	65
	Mobile homes	--	65[4]
Commercial	H0otel, motel, transient housing	45	--
	Commercial retail, bank, restaurant	55	--
	Office building, research and development, professional offices	50	--
	Amphitheater, concert hall, auditorium	45	--
	Gymnasium (multi-purpose)	50	--
	Sports Club	55	--
	Manufacturing, warehousing, wholesale, utilities	65	--
	Movie theaters	45	--
Institution/Public	Hospitals, school classrooms, playgrounds	45	65
	Church, library	45	--
Open Space	Parks	--	65

[1] Indoor environment including kitchens, bathrooms, toilets, closets and corridors.
[2] Outdoor environment limited to: private yard of single-family dwellings; multiple-family patios or balconies accessed from within the dwelling (balconies 6 feet deep of less are exempt); mobile home parks; park picnic areas; school playgrounds; and hospital patios.
[3] Noise level requirements with closed windows, mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code.
[4] Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

City of Orange Municipal Code, Chapter 8.24, Noise Control

Interior and exterior noise levels for residential land uses in the City of Orange are governed by the City's Municipal Code, Chapter 8.24, Noise Control. The code states that, "It is 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 other residential property to exceed" the noise levels displayed in Table 4-7.

Table 4-7. City of Orange Municipal Code Residential Noise Levels

Noise Zone	Noise Level (dBA)	Time Period
Exterior	55	7:00 a.m. - 10:00 p.m.
	50	10:00 p.m. - 7:00 a.m.
Interior	55	7:00 a.m. - 10:00 p.m.
	None Given	10:00 p.m. - 7:00 a.m.

Source: City of Orange, Municipal Code, Section 8.24

City of Orange, General Plan Noise Element

The City of Orange has adopted a mandatory Noise Element required by California's Health and Safety Code Section 46050.01. The goal of the Noise Element is to identify problems and noise sources threatening community safety and comfort and to establish policies and programs that will limit the community's exposure to excessive noise levels. Standards within the Noise Element state that transportation sources not exceed an exterior noise level of 65 dBA CNEL at residential locations while interior levels shall not exceed a CNEL of 45 dBA in any habitable room. Table 4-8 displays standards for other land uses found within the City of Orange.

Table 4-8. Maximum Allowable Noise Exposure – Transportation Sources

Land Use		CNEL (dBA)	
Designations	**Uses**	**Interior[1,3]**	**Exterior[2]**
Estate Low Density Low Density Residential Low Medium Density Residential	Single-family, duplex, and multiple-family	45	65
	Mobile home park	N/A	65
Medium Density Residential Neighborhood Mixed-use Neighborhood Office Professional Old Towne Mixed-use General Commercial Yorba Commercial Overlay Urban Mixed-use Urban Office Professional	Single-family	45	65
	Mobile home park	N/A	65
	Multiple-family, mixed-use	45	65[4,5]
	Transient lodging—motels, hotels	45	65
	Sports arenas, outdoor spectator sports	N/A	N/A
	Auditoriums, concert halls, amphitheaters	45	N/A
	Office buildings, business, commercial and professional	50	N/A
Light Industrial Industrial	Manufacturing, utilities, agriculture	N/A	N/A
Public Facilities and Institutions	Schools, nursing homes, day care facilities, hospitals, convalescent facilities, dormitories	45	65
	Government Facilities—offices, fire stations, community buildings	45	N/A
	Places of Worship, Churches	45	N/A
	Libraries	45	N/A
	Utilities	N/A	N/A
	Cemeteries	N/A	N/A
Recreation Commercial Open Space Open Space—Park Open Space—Ridgeline Resource Area	Playgrounds, neighborhood parks	N/A	70
	Golf courses, riding stables, water recreation, cemeteries	N/A	N/A

Notes:
(1) Interior habitable environment excludes bathrooms, closets and corridors.
(2) Exterior noise level standard to be applied at outdoor activity areas; such as private yards, private patio or balcony of a multi-family residence. Where the location of an outdoor activity area is unknown or not applicable, the noise standard shall be applied inside the property line of the receiving land use.
(3) Interior noise standards shall be satisfied with windows in the closed position. Mechanical ventilation shall be provided per Uniform Building Code (UBC) requirements.
(4) Within the Urban Mixed-Use, Neighborhood Mixed-Use, Old Towne Mixed-use, and Medium Density Residential land use designations, exterior space standards apply only to common outdoor recreational areas.
(5) Within Urban Mixed-Use and Medium Density Residential land use designations, exterior noise levels on private patios or balconies located within 250 feet of freeways (I-5, SR-57, SR-55, SR-22, or SR-241) and Smart Streets and Principal Arterials identified in the Circulation & Mobility Element that exceed 70 dB should provide additional common open space.
N/A=Not Applicable to specified land use category or designation
Source: Alliance Acoustical Consultants, modified by EDAW, 2008

County of Orange Municipal Code, Section 4-6, Noise Control

In order to control unnecessary, excessive and annoying sounds emanating from unincorporated areas in Orange County, the County has developed Section 4-6, Noise Control, of the Municipal Code to prohibit such sounds generated from all sources. This section of the County's Municipal Code has specific standards established for interior and exterior noise levels for residential areas within the County. Table 4-9 displays the County's standards for interior and exterior noise levels for residential land uses.

Table 4-9. County of Orange Municipal Code Residential Noise Levels

Noise Zone	Noise Level (dBA)	Time Period
Exterior	55	7:00 a.m. - 10:00 p.m.
	50	10:00 p.m. - 7:00 a.m.
Interior	55	7:00 a.m. - 10:00 p.m.
	45	10:00 p.m. - 7:00 a.m.

Source: County of Orange, Municipal Code, Section 4-6

5.0 Methodology

A general noise assessment was performed to evaluate impacts from the proposed relocation of the transit center. Evaluation of noise impacts associated with the proposed project involved:

- Identifying applicable regulatory requirements and threshold levels at noise sensitive land use areas;
- Identifying noise sensitive land uses in the project area;
- Obtaining field measurements of sensitive land uses subject to federal, state and local threshold levels;
- Determining the long-term noise impacts, including vehicular traffic and stationary noise sources, on noise sensitive land uses;
- Determining the short-term construction noise impacts on noise sensitive land; and uses
- Determining the required mitigation measures to reduce long-term noise impacts from all sources.

The approach for assessing project noise impacts stem from the FTA Transit Noise and Vibration Assessment Manual (FTA-VA-90-1003-06, May, 2006) as well as other applicable local noise ordinances that apply to the construction and operation of the transit center and community noise levels at sensitive land use categories. A noise monitoring program was conducted to establish a baseline for determining existing noise levels within the proposed project area as well as from the existing Anaheim Metrolink/Amtrak Station. Noise computations were performed utilizing the field measurement data, traffic data, and Federal Highway Administration Traffic Noise Prediction Model Methodology (FHWA-RD-77-108) to assess changes in traffic noise levels in the project area. The predicted future noise levels were then compared to the existing conditions, FTA, and local regulations to determine potential impacts generated from the proposed project. Further discussion of the field procedures and computation methods utilized in the noise assessment are presented below.

Field Survey

A field investigation was conducted to identify land uses that could be subject to traffic, train movement, and construction noise impacts from the proposed project. Land uses in the proposed project area were categorized by land use type, as defined in Table 5-1. Accordingly, this impact analysis focuses on locations with potential impacts from the implementation and construction of the proposed project.

Field measurement locations were selected to represent the existing conditions of the proposed project area.

Field Measurement Procedures

The three long-term measurements taken within the project area were completed in accordance with the FTA guidelines for conducting noise measurements. FTA recommends that full one-hour measurements are the most precise way to determine ambient noise exposure for nonresidential receivers. For residential receivers, full 24-hour measurements are most precise. Such full-duration measurements are preferred over other options, where time and study funds allow. The duration of the study allowed for three long-term measurements to be conducted. The following procedures apply to full-duration measurements:

- Measure a full 24-hours' L_{dn} at the receiver of interest, for a single weekday (generally between noon Monday and noon Friday).

- Use judgment in positioning the measurement microphone. Location of the microphone at the receiver depends upon the proposed location of the transit noise source. If, for example, a new rail line will be in front of the house, do not locate the microphone in the back yard. Figure 5-1 illustrates recommended measurement positions for various locations of the project, with respect to the house and the existing source of ambient noise.

- Undertake all measurements in accordance with good engineering practice following guidelines given in American Society for Testing and Materials (ASTM) and American National Standards Institute (ANSI) standards.

Field Measurement Instruments

The following instruments were used for field noise measurements:

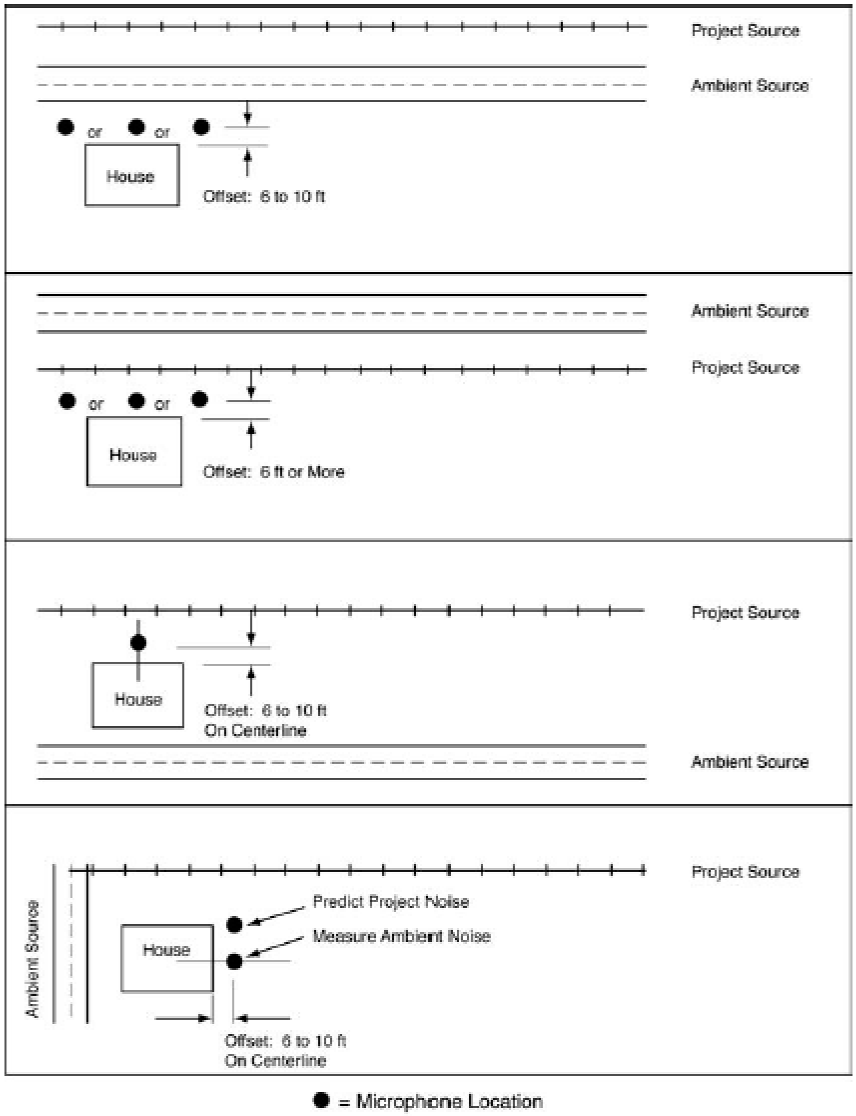
- Sound Level Meter – A Larson Davis (LD) 824 System sound level meter was used to measure existing noise levels. This sound level meter and its microphone conform to the Institute of Electronic and Electric Engineers and the ANSI standards for Type 1 instruments.

- Microphone System – LD Model 2560 1.27-centimeter (0.5-inch) pressure microphone; LD Model 900 microphone preamplifier.

- Acoustic Field Calibrator – LD Model CA250 Precision Acoustic Calibrator.

Sony DSC-W50 Cybershot 6.0 Mega Pixel MPEG camera.

Figure 5-1. Recommended Microphone Locations for Existing Noise Measurements

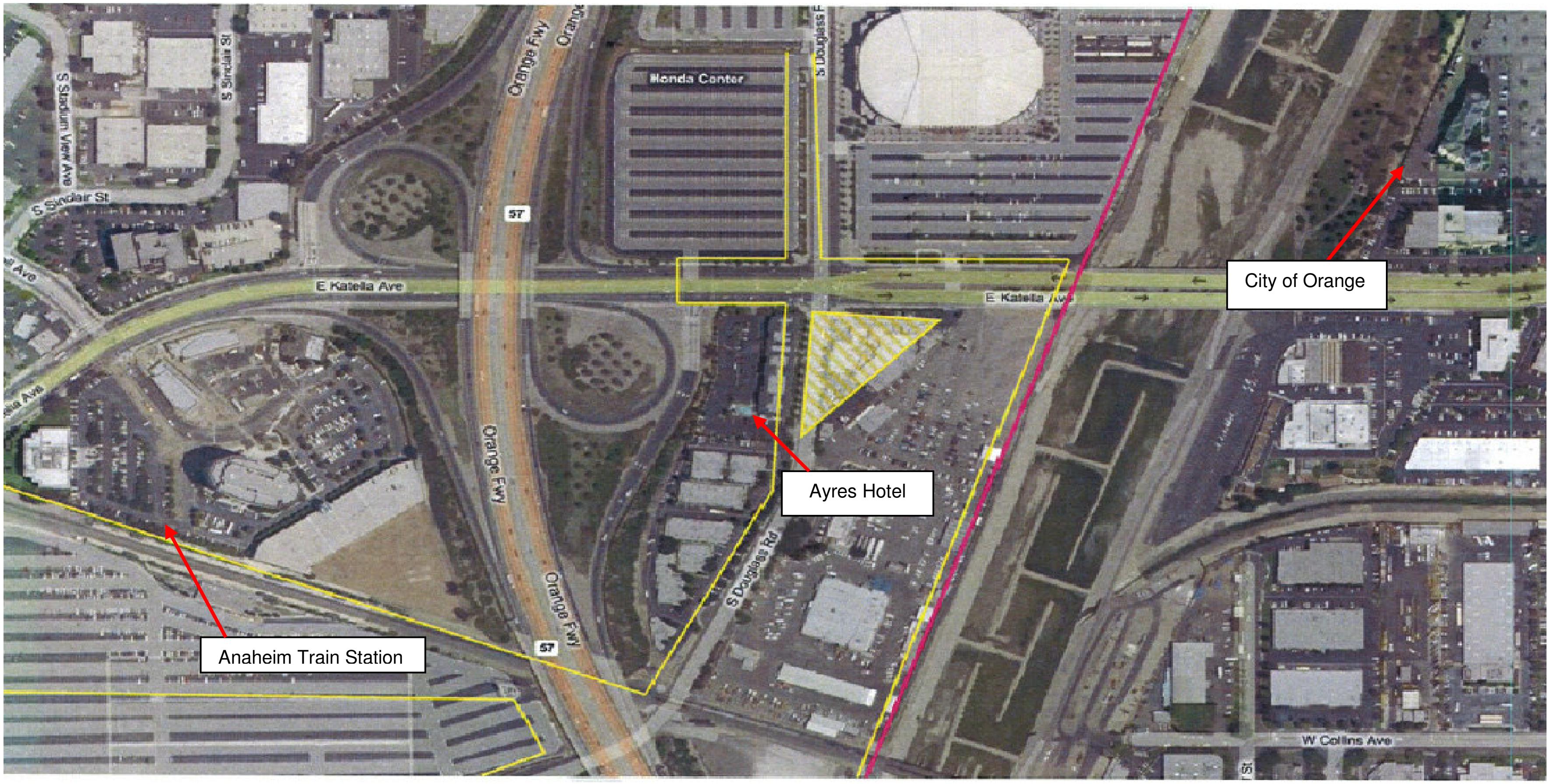


*Source: FTA 2006

Long-Term Measurement

Three long-term measurements were conducted at three locations: the Ayres Hotel of Anaheim, the existing Anaheim Metrolink/Amtrak Station, and the closest location to the border of the City of Anaheim and the City of Orange, as shown in Figure 5-2. No additional long-term measurements were conducted in the project area, as other sensitive land uses were located outside the FTA screening distance.

The purpose of this measurement was to describe variations in sound levels throughout the day and to determine the existing cumulative CNEL and L_{dn} values for each of the three locations within the project area. The long-term measurements were conducted using a Larson-Davis Model 824 Type 1 (Serial No. 824A3609) sound level meter. Long-term sound level data was collected over 24-hour periods. The long-term measurement at the Ayres Hotel of Anaheim was started on April 15, 2010 at 4:20 p.m. and ended on April 16, 2010 at 4:20 p.m. The long-term measurement at the existing Anaheim Metrolink/Amtrak Station was started on April 13, 2010 at 6:20 p.m. and ended on April 14, 2010 at 6:20 p.m. The long-term measurement at the border of the City of Anaheim and the City of Orange was started on April 7, 2010 at 12:30 p.m. and ended on April 8, 2010 at 12:30 p.m.



Legend:

- Project Limits
- Not Part of Project
- City of Anaheim/City of Orange Boundary

N W E S

Not to Scale

Figure 5-2. Field Measurement Locations

Traffic Noise Levels Prediction Methods

The proposed project includes the relocation of a transit center and local roadway improvements that will alter traffic patterns. The noise analysis considered the noise effects of the transit center on existing noise sensitive land uses identified in the project area. Future noise impacts resulting from vehicular traffic on roadways were modeled using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) which includes the California specific vehicle noise curves (CALVENO). The noise computations use a series of regression formulas to calculate an energy average noise level for the different classes of vehicles (automobiles, medium truck, heavy trucks) average daily traffic volumes (ADT), vehicle speed, and the percentage of vehicles on the road during the three time periods of the day. Traffic inputs were obtained for roadway segments evaluated in the Traffic Impact Analysis Report (Linscott, Law, and Greenspan Engineers, 2010). Automobiles were assumed to be traveling at 40 miles per hour (mph) and medium and heavy trucks were assumed to be traveling at 40 mph. Truck percentages of ADT were assumed to be at 5 percent for medium trucks and 3 percent for heavy trucks. The noise computations also calculated the CNEL value which applies an appropriate penalty for evening and nighttime hours. Traffic noise was evaluated under existing conditions, opening year (2013) and design year (2030) without project and with project conditions.

Describe the Process for Evaluating Noise Abatement

The implementation of the proposed project can potentially impact any sensitive receivers identified within the project area. Therefore, procedures outlined in the FTA Transit Noise and Vibration Impact Assessment were utilized as a guideline for determine if the proposed project will cause noise impacts to the surrounding area or exceed federal, state or local standards. It was determined that a General Noise Assessment would be appropriate to utilize for this project. The procedures for this level of assessment provided by the FTA are as follows:

1. Tabulate existing ambient noise exposure at all identified receivers.

2. Tabulate project noise exposure at these receivers from the analytical procedures provided in the FTA guidelines.

3. Determine the level of noise impact (No Impact, Moderate Impact or Severe Impact) following the procedures in Chapter 3 of the FTA guidelines.

4. Document the results in noise-assessment inventory tables.

5. Illustrate the areas of Moderate Impact and Severe Impact on maps or aerial photographs.

6. Discussion of the magnitude of the impacts is an essential part of the assessment. The magnitude of noise impact is defined by the two threshold curves delineating onset of Moderate Impact and Severe Impact.

For operational rail noise, FTA has identified noise sensitive land uses to assess potential impacts of transit projects, as shown in Table 5-1. These criteria were developed based on the research done by the USEPA that identified environments particularly sensitive to annoying noises. These environments are known as “noise sensitive land uses” or “sensitive receptors.”

Table 5-1. Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor L_{eq} (h)*	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor L_{eq} (h)*	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

*L_{eq} for the noisiest hour of transit–related activity during hours of noise sensitivity.

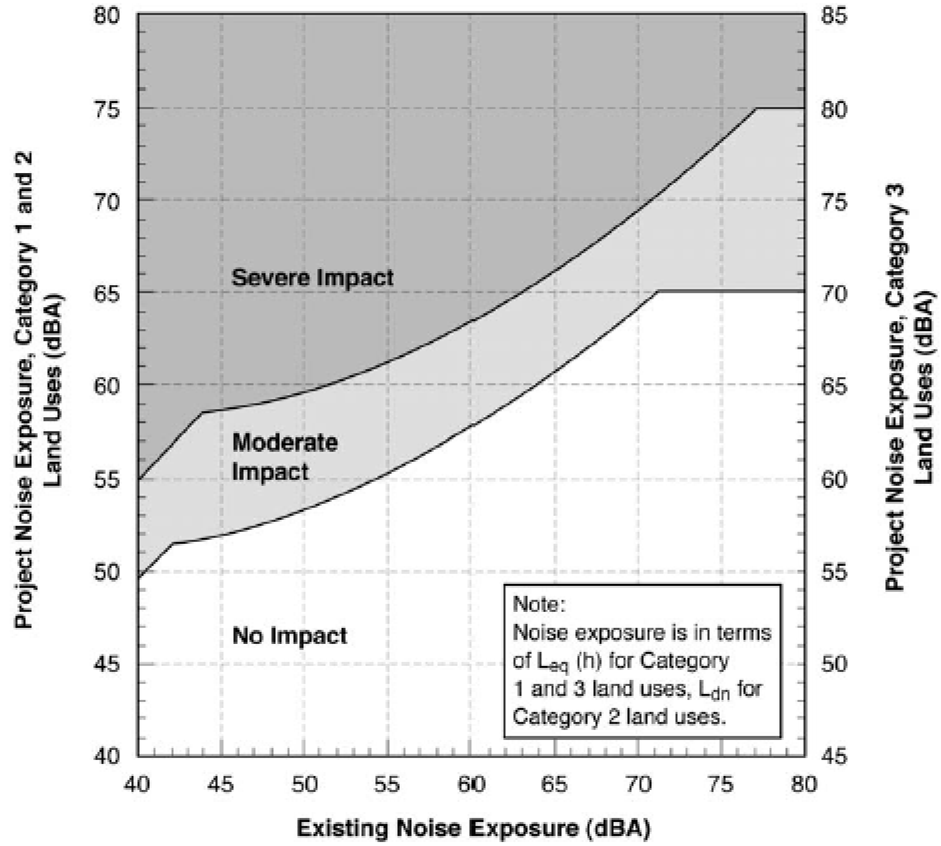
For Categories 1 and 3, the L_{eq} noise descriptor is used, while Category 2 properties are assessed utilizing the L_{dn} descriptor. In most cases, these three categories are the only land uses that would be negatively impacted by high noise levels because industrial or commercial areas are generally compatible with high noise levels.

FTA provides criteria for three degrees of impact: “No Impact,” “Moderate Impact,” and “Severe Impact” which correlate well with CEQA impact terminology (i.e., no impact, less than significant impact and potentially significant impact), as shown in Figure 5-3.

- No Impact - The project, on average, will result in an insignificant increase in the number of instances where people are “highly annoyed” by new noise.
- Moderate Impact - The change in cumulative noise is noticeable to most people, but may not be sufficient to cause strong, adverse community reactions.
- Severe Impact - A significant percentage of people would be highly annoyed by the noise, perhaps resulting in vigorous community reaction.

The Severe Impact criterion complies with the National Environmental Policy Act (NEPA) definition of “significant adverse impact of effect”. All three degree of impact categories also correspond to the CEQA impact terminology.

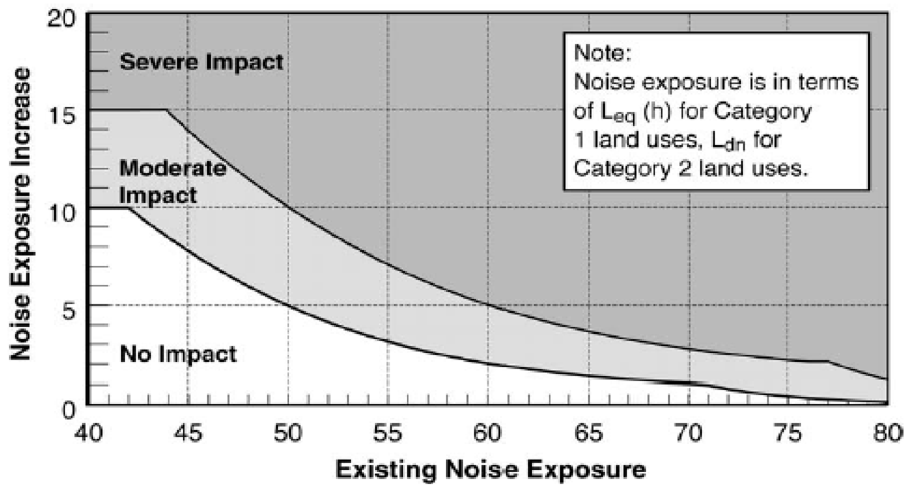
Figure 5-3. Noise Impact Criteria for Transit Projects



The criterion for each degree of impact is on a sliding scale dependent on the existing noise exposure and the increase in noise exposure due to the project. Noise impacts to these three categories as a result of a proposed project are assessed by comparing the existing and future project-related outdoor noise levels.

As the existing level of ambient noise increases, the allowable level of transit noise also increases; however, the total amount by which that community's noise can increase without an impact is reduced. As shown in Figure 5-4, as existing and allowable combined total noise levels increase, the allowable change in noise level decreases.

Figure 5-4. Allowable Transit Noise Level Increases (L_{dn} and L_{eq} in dBA)

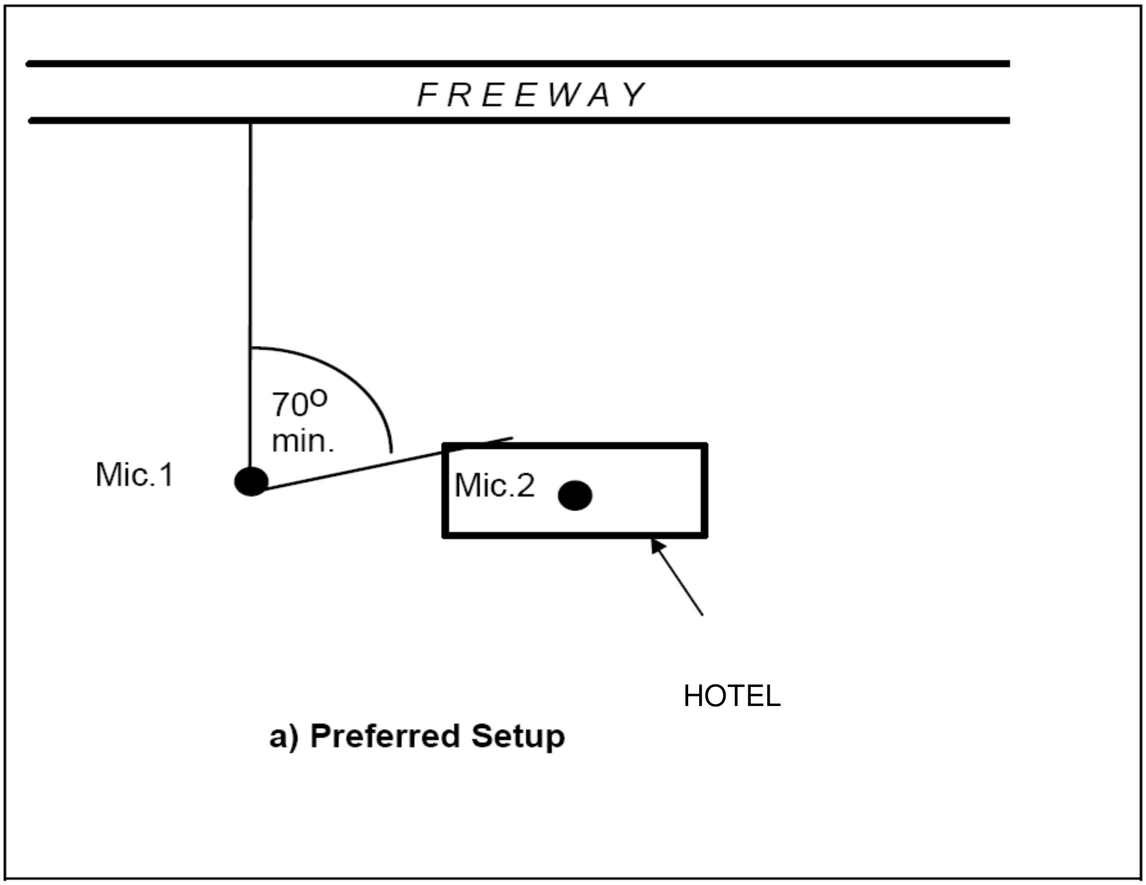


Hotel Room Noise Measurements

Local ordinances in the project vicinity require determining the potential noise impacts of a project on building interiors. The FTA guidance does not provide direction on determining the attenuation of a building, therefore, the method used to determine the attenuation of the Ayres Hotel building was similar to the guidelines outlined in the Caltrans TeNS manual (Caltrans, 2009) for performing simultaneous interior and exterior noise measurement.

For each measurement, a microphone is located outside, approximately the same distance from the highway as the center of each room. The second microphone is located in the center of the room. The microphones should be set up far enough away from the building to avoid shielding by the corners of the building. This can be accomplished by maintaining at least a 70-degree angle between a perpendicular line to the highway and a line to the corner of the building, as shown in Figure 5-5.

Figure 5-5. Simultaneous Interior and Exterior Noise Meter Setup



Source: Caltrans' TeNS Manual

6.0 Existing Environment

Overview of Existing Noise Sources

There are a myriad of noise sources in the City of Anaheim that contribute to the existing noise environment. The major source of noise is vehicular traffic traveling throughout the City on its various roadways and freeways. In addition, several passenger and freight trains run throughout the City of Anaheim.

The City also includes a variety of stationary noise sources. These are primarily associated with industrial land uses, but also include fireworks displays put on at Disneyland on a regular basis and at Angel Stadium of Anaheim for special events. While the noises from these stationary sources are audible, they are of short duration and as such, do not add substantially to the existing CNEL, which is based on a 24-hour, time-weighted average.

Sensitive Land Uses in the Project Vicinity

The project area consists of mainly commercial land uses including office buildings, restaurants, retail businesses, and one hotel. FTA guidance recommends a screening distance of 1,200 feet from the centerline of the noise-generating activity. Sensitive receivers identified within this screen distance are the Ayres Hotel of Anaheim and the Avalon Anaheim Stadium Apartments, identified within Category 2 of the FTA Land Use Categories. An Extended Stay Hotel was also identified in the City of Orange approximately 1000 feet from the border of the City of Anaheim and the City of Orange border. However, it resides beyond the FTA screening distance; therefore it is not expected to experience noise impacts from the proposed project. A property immediately east of the Santa Ana River is designated "Urban Mixed Use" in the City of Orange General Plan Land Use Plan, and therefore allows and could accommodate residential development in the future. However, currently there are no future plans for such development. Although noise sensitive land uses in the City of Orange are outside of the FTA screening, existing 24-hour noise measurement was take at the closet location to the project site near the City of Anaheim and the City of Orange border to characterize the existing environment.

Ambient Noise Levels

A field survey was conducted taking three long-term (24-hour) measurements to determine the current noise environment the Ayres Hotel of Anaheim, the existing Anaheim Metrolink/Amtrak Station and a location near the border of the City of Anaheim and the City of Orange at the cross streets of W. Katella Avenue and Main Street. Field monitoring was performed on April 6 through April 16, 2010 for these three locations.

The purpose of long-term monitoring was to document the existing noise environment and capture the noise levels associated with operations or activities in the project vicinity. The three long-term measurements were also used to determine the existing cumulative CNEL and L_{dn} values for each of the three locations within the project area. To calculate the average CNEL for each area an average hourly Leq was calculated from the 24-hour measurement period. Then a 10 dB penalty was applied to the A-weighted sound levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m., and a 5 dB penalty applied to the A-weighted sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m. These values were then averaged to determine the CNEL value for each location. L_{dn} is determined utilizing the same methods in determining the CNEL values, however, a 5 dBA penalty is not added to the evening hours between 7:00 p.m. and 10 p.m. A summary of the long-term results at each of the locations are presented in Table 6-1. The CNEL and L_{dn} calculations can be found in Appendix B.

Table 6-1. Existing Project Area Cumulative CNEL Values

Location Description	CNEL (dBA)	L_{dn} (dBA)
Anaheim Metrolink/Amtrak Station	60	59
Ayres Hotel	67	67
City of Orange	73	72

Currently, the Ayres Hotel location experiences noise levels that exceed 65 dBA CNEL. According to the California Office of Noise Control's land use compatibility chart for community noise, the Ayres Hotel is within the "conditionally acceptable" category. This is attributed to the hotel being located near the SR57 freeway, the dominate noise source during field monitoring. A "conditionally acceptable" designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design.

Existing Traffic Noise

Noise from motor vehicles is generated by engine vibrations, the interaction between tires and the road, and the exhaust system. Reducing the average motor vehicle speed reduces the noise exposure of receptors adjacent to the road. Each reduction of five miles per hour reduces noise by about 1 dBA.

In order to assess the potential for mobile-source noise impacts, it is necessary to determine the noise currently generated by vehicles traveling through the project area. Average daily traffic (ADT) volumes were based on the existing daily traffic volumes provided Linscott, Law & Greenspan, Engineers (April 2010). The results of this modeling indicate that average noise levels along arterial segments currently range from approximately 75 dBA to 76 dBA CNEL as calculated at a distance of 50 feet from the centerline of the road. Noise levels for existing conditions along analyzed roadways are presented in Table 6-2.

Table 6-2. Existing Traffic Noise Levels

Segment	ADT	CNEL (dBA @ a reference distance of 50 feet)
Katella Avenue between Manchester Avenue and Anaheim Way	35,040	75.0
Katella Avenue between I-5 Freeway and Lewis Street	35,040	75.6
Katella Avenue between Lewis Street and State College Boulevard	30,260	75.0
Katella Avenue between State College Boulevard and Sportstown	32,800	75.3
Katella Avenue between Sportstown and Howell Avenue	34,240	75.5
Katella Avenue between Howell Avenue and SR-57 Freeway	37,990	75.9
Katella Avenue between SR-57 Freeway and Main Street	29,610	74.9
Katella Avenue between Main Street and Batavia Street	30,280	75.0

Rail Noise

Noise from trains is generated by crossing bells, engines, exhaust noise, air turbulence generated by cooling fans, and other gear noise. The interaction of steel wheels with rails generates three types of noise: (1) rolling noise; (2) impact noise when a wheel encounters a discontinuity in the running surfaces, such as a rail joint, turnout, or crossover; and (3) squeals generated by friction on tight curves. Noise generated by the event of a single train passing is dominated primarily by the train horn and secondarily by the train engines and cars. Train horns are required by the Federal Railroad Administration (FRA) to sound at a minimum of 103 dBA as measured from 100 feet from the train.

To determine the existing noise environment with the operation of the current train traffic three long-term measurements were taken in the surrounding proposed project area.

Factors that influence the overall impact of railroad noise on adjacent uses include the distance of Buildings from the tracks, the intermittent nature of train noise (engine, horns, tracks), and the lack of sound walls or other barriers between the tracks and adjacent uses.

Long-term noise measurements at the project site documented the noise levels from the existing Metrolink and Amtrak train operations through the current Metrolink station. The hourly L_{eq} values documented by the long-term noise measurement were weighted and summed to calculate the day-night 24-hour weighted average noise level for all noise sources on the project site. The resulting weekday measured ambient noise level the project site is 59 dBA L_{dn}.

Stationary Noise Sources. Stationary noise mentioned earlier in this section influence the ambient noise levels at the project site. These sources include noise from parking lot activities on the project site from the project site.

As was observed during the time of the noise measurements, noise from vehicular traffic and train operations were the dominant noise sources influencing the ambient noise levels on the project site.

Noise from any existing or future fixed equipment in the project vicinity, or proposed as part of the project, is regulated by the City's Stationary Equipment Noise Ordinance. This ordinance restricts fixed equipment (such as air conditioners, pool filters, compressors, and industrial machinery) from exceeding 55 dBA when measured at any location on a neighboring residential property. Any plans submitted for a building permit must include documentation that proposed equipment meets this standard. Therefore, implementation of the proposed project would not expose persons in the project vicinity to excessive noise levels from stationary noise sources.

7.0 Impacts and Mitigations Measures

This section identifies the noise impacts associated with implementation of the proposed project. Mitigation measures are recommended, as appropriate, for significant impacts to eliminate or reduce them to a less-than-significant level.

Short-Term Impacts and Mitigation

Construction-Related Noise Impacts

Temporary noise impacts are impacts associated with demolition, site preparation, grading and construction of the proposed land uses. Two types of short-term noise impacts are likely to occur during construction. First, the transport of workers and movement of materials to and from the site could incrementally increase noise levels along local roads. The second type of short-term noise impact is noise generated by construction equipment at the job site during demolition, site preparation, grading and/or building construction. Construction is performed on a distinct schedule, each phase of which has its own mix of equipment noise characteristics. However, despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 7-1 lists typical construction equipment noise levels recommended for noise impact assessments as based on a distance of 50 feet, the recommended reference distance provided by FTA guidance, between the equipment and a noise receiver.

Table 7-1. Typical Construction Equipment Noise

Equipment	Maximum Noise Level (dBA L_{eq} at 50 feet)
Scrapers	89
Bulldozers	85
Heavy Trucks	88
Backhoe	80
Pneumatic Tools	85
Concrete Pump	82

Source: Federal Transit Administration, May 2006.
dBA = A-weighted decibels
L_{eq} = equivalent sound level

The Platinum Triangle Subsequent EIR Number 332 cited construction noise characterized by Bolt, Beranek and Newman (City of Anaheim, 2005). In their study, construction noise for commercial and industrial development is shown as 89 dBA L_{eq} when measured at a reference distance of 50 feet from the construction site. It is assumed that this noise level would be representative of construction noise levels associated with ARTIC construction activities. This value takes into account the number of pieces and spacing of heavy equipment used in during construction. In later phases of construction, noise levels are typically reduced from these values and the physical structures that have been assembled further break up line-of-sight from the nearby receivers. Based on the 89 dBA L_{eq} value and assuming that construction were to occur for eight hours a day, the CNEL is calculated at 84 dBA at 50 feet. The location of construction for the relocation of the proposed project would potentially expose noise sensitive receivers such as the Ayres Hotel to significant levels of short-term noise exposure from construction activities. As stated previously, the Extended Stay Hotel in the City of Orange is located over 1,200 feet from the proposed project location and construction activities for ARTIC are not expected to cause impacts are the hotel.

Further, due to the daytime schedule of the Metrolink and Amtrak trains nighttime construction is expected to occur along the railroad tracks. Nighttime construction may generate potential noise impacts on the Ayres Hotel and the Avalon Anaheim Stadium Apartments.

Mitigation Measures

Implementation of the proposed project is expected to result in a temporary and periodic increase in ambient noise levels in the project vicinity above existing noise levels. All other thresholds of significance are not expected to be impacted with the implementation of the proposed project. During construction of the proposed project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Noise from project construction would be regulated through the City of Anaheim Municipal Codes. On-going and during grading, demolition, and construction, the property owner/developer shall be responsible for requiring contractors to implement the following measures to limit construction-related noise:

- N-1: Noise generated by construction shall be limited to 60 dBA along Douglass Road, Katella Avenue, and the tracks before 7 AM and after 7 PM, as governed by Chapter 6.70, Sound Pressure Levels, of the Anaheim Municipal Code. If 60 dBA is exceeded during these hours, noise attenuation features (i.e. temporary noise barriers, sound curtains, etc.) shall be installed to reduce noise levels to below 60 dBA at the exterior of the affected building. These noise attenuation features may be removed if a qualified noise specialist determines that noise levels are not significantly impacted by nighttime construction;

- N-2: When excessive noise during construction is anticipated before 7 AM and after 7 PM the contractor shall request an exception to the requirements of Chapter 6.70 of the Anaheim Municipal Code. The request shall be submitted in accordance with the provisions contained in Chapter 6.70 and shall include a construction schedule and a list of equipment to be used during that time frame. This information shall be provided to the Director of Public Works or Chief Building Official for consideration; and

- N-3: Construction equipment and supplies shall be located in staging areas that shall create the greatest distance possible between construction-related noise sources and noise sensitive receivers nearest the project area. This information shall be specified on all grading, excavation and construction plans."

The mitigation measures identified above will reduce potential impacts associated with noise to a level that is less than significant. Therefore, no significant impacts relating to noise have been identified.

Construction-Related Groundborne Vibration Impacts

Construction activities, especially those associated with excavation or the use of impact equipment such as used in pile driving, are a known source of groundborne noise and vibration. Construction of the proposed project would require the use of heavy excavation equipment. Pile driving can result in typical groundborne vibration levels of 104 VdB at a distance of 25 feet from the operating equipment. The FTA construction vibration damage thresholds are shown in Table 4-3 of this report. The damage threshold for buildings considered particularly fragile structures is approximately 90 VdB; while the damage threshold for structures made of engineered concrete and masonry is 98 VdB.

The nearest sensitive receiver found within the proposed project area is the Ayres Hotel a Category 2 Land Use, the hotel is located approximately 800 feet from the proposed project location. The maximum FTA screening distance for Category 2 Land Uses is 200 feet. Furthermore, the Extended Stay Hotel in the City of Orange is located over 1,200 feet from the proposed project location. Both locations are located outside the FTA recommended screening distance, therefore, no vibration impacts are likely to occur. As a result, no mitigation would be required to reduce noise impacts from pile driving to a less-than-significant level.

Long term Impacts

Opening Year (2013) Traffic Impacts

Due to the relocation of the existing Anaheim Metrolink/Amtrak Station, vehicular will be rerouted to ARTIC. To identify any potential traffic noise impacts as a result of the project, the FHWA-RD-77-108 noise calculations were utilized as discussed earlier to estimate without project and with project conditions for the opening year (2013) of the proposed project. As shown in Table 7-2, on-site traffic noise levels along roadway segments adjacent to the project site at a reference distance of 50 feet have negligible increases in noise levels from without project to with project conditions. Therefore, it was determine that the changes in local traffic patterns and improvements to local roads would not have a perceptible increase in ambient noise levels in the project area. As a result, project related traffic noise impacts associated with vehicular traffic would have a less than significant impact.

Table 7-2. Opening Year (2013) Traffic Noise Levels

Segment	2013 Without Project		2013 With Project	
	ADT	CNEL	ADT	CNEL
Katella Avenue between Manchester Avenue and Anaheim Way	53,229	76.8	53,449	76.8
Katella Avenue between I-5 Freeway and Lewis Street	53,195	77.4	53,565	77.4
Katella Avenue between Lewis Street and State College Boulevard	45,127	76.7	45,497	76.7
Katella Avenue between State College Boulevard and Sportstown	43,779	76.6	44,412	76.6
Katella Avenue between Sportstown and Howell Avenue	47,287	76.9	47,670	76.9
Katella Avenue between Howell Avenue and SR-57 Freeway	52,195	77.3	52,578	77.4
Katella Avenue between SR-57 Freeway and Main Street	38,732	76.0	39,471	76.1
Katella Avenue between Main Street and Batavia Street	36,039	75.7	36,445	75.8

2030 Cumulative Traffic Impacts

Cumulative traffic impacts can occur when multiple projects combine and operate concurrently. Future projects will be completed and operating by the year 2030. Therefore, 2030 traffic impacts will be analyzed for the proposed project in conjunction with other future planned projects operating within the proposed project area during this future date.

To identify cumulative traffic noise impacts as a result of the project in combination with other project sources, the FHWA-RD-77-108 noise calculations were utilized as discussed earlier to estimate 2030 without project and with project conditions. As shown in Table 7-3, on-site traffic noise levels along roadway segments adjacent to the project site at a reference distance of 50 feet have negligible increases in noise levels from without project to with project conditions. Therefore, it was determine that the changes in local traffic patterns and improvements to local roads would not have a perceptible increase in ambient noise levels in the project area. As a result, project related traffic noise impacts associated with vehicular traffic would have a less than significant impact.

Table 7-3. 2030 Cumulative Traffic Noise Levels

Segment	2030 Without Project		2030 With Project	
	ADT	CNEL	ADT	CNEL
Katella Avenue between Manchester Avenue and Anaheim Way	70,870	78.1	71,090	78.1
Katella Avenue between I-5 Freeway and Lewis Street	70,720	78.6	71,090	78.7
Katella Avenue between Lewis Street and State College Boulevard	57,490	77.7	57,860	77.8
Katella Avenue between State College Boulevard and Sportstown	51,287	77.2	51,920	77.3
Katella Avenue between Sportstown and Howell Avenue	61,927	78.1	62,310	78.1
Katella Avenue between Howell Avenue and SR-57 Freeway	70,807	78.6	71,190	78.7
Katella Avenue between SR-57 Freeway and Main Street	62,161	78.1	62,900	78.1
Katella Avenue between Main Street and Batavia Street	51,164	77.2	51,570	77.3

Opening Year (2013) Rail Impacts

The new location will be approximately one quarter (0.25) mile east along the existing OCTA railroad right-of-way (ROW) in a larger facility. The only difference occurs when the trains stop 0.25 mile east of their current location, which brings the noise closer to a sensitive receiver, the Ayres Hotel. Therefore, Metrolink and Amtrak trains arriving and departing from ARTIC are expected to cause a periodic increase in ambient noise levels in the project vicinity above levels existing without ARTIC. There are approximately 22 Amtrak trains and 19 Metrolink trains that arrive and depart from this station. Train trips are projected to increase by 26 percent by the year 2030 for Orange County Transit Centers. At each arrival and departure there will be a periodic increase in ambient noise levels that will be audible. However, this increase is expected to last no longer than one minute and will be short in duration.

Nearby sensitive land uses were identified within the project area such as the Avalon Anaheim Stadium Apartments and the Extended Stay Hotel in the City of Orange that fall outside of the FTA noise impact criteria screen distance of 1,200 feet. Therefore, the future impact analysis will focus on the Ayres Hotel of Anaheim, which is the closest receiver that would experience changes in noise levels. This receiver location is approximately 800 feet away from the centerline of the platform of ARTIC, placing the station closer to the hotel than its current location. The existing CNEL and L_{dn} values at the Ayres Hotel were found to be 67 dBA, with the dominate noise source in project area being the traffic traveling along SR-57 and the SR-57 northbound exit. The CNEL and L_{dn} values for the existing Anaheim Metrolink/Amtrak Station were found to be 60 dBA and 59 dBA, respectively.

Following FTA guidance, a 40 percent change in the number of trains per day or per hour would produce an approximate 2 dBA change in noise experience at a reference distance of 50 feet from the noise source. According to the Final EIR for the OCTA Long-Range Transportation Plan, transit trips in Orange County are expected to increase by 26 percent by the year 2030. However, for the opening year, 2013, transit trips will increase by a negligible amount. Therefore the project train traffic increases from existing conditions to 2013 are not anticipated to create a noticeable increase over existing sound levels.

The opening year, 2013, CNEL and L_{dn} values found at ARTIC are well below the CNEL and L_{dn} values found at the Ayres Hotel. Existing and future L_{dn} values of 67 dBA and 59 dBA respectively, were compared utilizing Figure 5-3. According to the FTA Noise Impact Criteria for Transit Projects if the existing noise levels at the Ayres Hotel are 67 dBA and the future noise levels for the proposed project are 59 dBA than the implementation of the proposed project will have no future impact on the Ayres Hotel or the surrounding area.

When comparing the existing CNEL value at the hotel to the 2013 with project CNEL value at ARTIC, as shown in Table 7-4, it is anticipated that no increase in CNEL would occur. Therefore, future noise levels at ARTIC would be less than the noise levels already experienced at the Ayres Hotel. No noticeable change will occur in the exterior noise environment near the hotel. Furthermore, at the border between the City of Anaheim and the City of Orange the existing CNEL is near 73 dBA. Future noise levels from ARTIC are expected to be far less than the 73 dBA; therefore, noise levels from the relocation of the station will not be noticeable in this area. Therefore, no project impacts are expected in the City of Orange.

Table 7-4. Opening Year (2013) With Project Sound Levels

Location	CNEL (dBA)	L_{dn} (dBA)
Anaheim Metrolink/Amtrak Station	60	59
Ayres Hotel	67	67
City of Orange	73	73

The existing noise level in the project area is within the "conditionally acceptable" noise level ranges for the hotel location. Future noise levels will remain within the same range for this Land Use Compatibility noise level.

Opening Year (2013) Interior Noise Impact

In order to satisfy local and state standards for interior sound levels, a simultaneous interior and exterior measurement was taken at the Ayres Hotel to determine the building attenuation. The interior measurement was taken in Room 135 of the hotel and an exterior measurement was taken at the hotel pool area, results are shown in Table 7-5. The interior measurement was 34 dBA and the exterior measurement was 65 dBA, therefore, the building attenuation for the hotel is 31 dB. The CNEL for the Ayres Hotel was found to be 67 dBA. By applying the building attenuation of 31 dBA to the exterior CNEL of 67 dBA, the interior sound level is expected to be 36 dBA, as shown in Table 7-5. The future noise levels will remain below the state and local standards interior noise standards.

Table 7-5. Ayres Hotel Interior and Exterior Sound Levels for Opening Year (2013) With Project

Location	Interior Sound Level, dBA	Exterior Sound Level, dBA	Building Attenuation, dB
Ayres Hotel	36	67	31

2030 Cumulative Rail Impacts

As stated previously transit trip are expected to increase by 26 percent throughout Orange County. FTA guidance states that with a 40 percent change in trains per day or hour can produce an approximate 2 dBA change in noise exposure at a reference distance of 50 feet from the noise source. The 26 percent increase will occur throughout the County of Orange, not just the City of Anaheim. Therefore, it is assumed that the 2030 noise levels will increase by a maximum of 1 dBA from existing noise levels at the ARTIC station. However, sound level attenuates or drops off at a rate of 6 dBA for each doubling of the distance. (Caltrans, 2009) The Ayres Hotel is located approximately 800 feet from the ARTIC station location and the Extended Stay Hotel is located over 1,200 feet from the station. Therefore, the increase in noise levels from the relocation of the station and the estimated increase in transit trip will have no impact on the Ayres Hotel or the Extended Stay Hotel. Noise levels for the 2030 design year condition are shown in Table 7-6.

Table 7-6. 2030 With Project Noise Levels

Location	CNEL (dBA)	L_{dn} (dBA)
Anaheim Metrolink/Amtrak Station	61	60
Ayres Hotel	67	67
City of Orange	73	72

The existing noise level in the project area is within the “conditionally acceptable” noise level ranges for the hotel location. Future noise levels will remain within the same range for this Land Use Compatibility noise level.

2030 Cumulative Interior Noise Impact

Noise levels for the 2030 conditions are expected to be similar to the 2013 and existing conditions. As stated previously the building attenuation of the Ayres Hotel was found to be 31 dBA. Therefore, because 2030 noise levels are expected to remain the same as 2013 and existing conditions the interior sound levels for the hotel rooms will be 36 dBA, as shown in Table 7-7. The future noise levels will remain below the state and local standards interior noise standards.

Table 7-7. Ayres Hotel Interior and Exterior Sound Levels for 2030 With Project

Location	Interior Sound Level, dBA	Exterior Sound Level, dBA	Building Attenuation, dB
Ayres Hotel	36	67	31

Rail Groundborne Vibration Impacts for Opening Year (2013) and 2030

Future vibration levels and potential vibration impacts are determined according to the FTA Vibration Screening and the General Vibration Assessment procedures, outlined in Chapter 9 and 10, respectively, of the FTA guidance. The Vibration Screening procedure provides reference distances for sensitive receivers identified within the proposed project area. The Ayres Hotel was identified as the nearest sensitive receiver within the proposed project area which is categorized as a Category 2 Land Use. The screening distance for Category 2 Land Uses is 200 feet from the project right-of-way. The Ayres Hotel is approximately 800 feet from the proposed project location. Therefore, according to the FTA guidance no vibration impacts are likely to occur at the Ayres Hotel.

Metrolink and Amtrak Trains currently pass through the project area. For purposes of this analysis, future project activity at the year of opening, 2013, is expected to remain equivalent to existing conditions. Therefore, no changes in vibration noise levels will occur. Therefore, groundborne vibration and groundborne noise impacts would be less than significant.

The project vicinity could include impacts from the proposed California High-Speed Train (HST) project. The California High-Speed Rail Authority has identified the Caltrans right-of-way along the north side of West Evelyn Avenue as a potential corridor for the HST. Impacts from this possible future project could contribute to cumulative noise and vibration impacts to the proposed Downtown Family Development Project. However, while the programmatic EIR/EIS identifies corridor areas with potential noise and vibration impacts, site-specific impacts will be determined and evaluated in the project level environmental analysis that will be required for the HST project. Based on the existing level of detail available for the HST, it is not possible at this time to evaluate site-specific impacts for purposes of this project's environmental review. Mitigation measures, including possible construction of sound-walls and/or grade-separated crossings may be required as part of the HST project to reduce these potential impacts at all sensitive receptors along the project corridor to less than-significant levels.

8.0 References

Caltrans 2009	California Department of Transportation. Technical Noise Supplement-Technical Noise Supplement to the Traffic Noise Analysis Protocol. November 2009.
City of Anaheim	Municipal Code of Ordinances Title 6, Section 7. April 2010.
City of Anaheim	The Platinum Triangle Subsequent EIR Number 332. May 2005.
City of Orange	Noise Element of the General Plan. March 2010.
City of Orange	Municipal Code of Ordinances Title 8, Section 24. July 2010.
County of Orange	Municipal Code of Ordinances Title 4, Section 5. April 2010.
EPA 1971	Bolt, Beranek and Newman, Inc. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. December 1971.
FHWA	Federal Highway Administration Traffic Noise Prediction Model Methodology (FHWA-RD-77-108)
FHWA 2004	United States Department of Transportation, FHWA Traffic Noise Model. TNM 2.5. February 2004.
FTA 2006	Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.
Linscott, Law & Greenspan 2010	City of Anaheim, Traffic Impact Analysis Report. April 2010.
OCTA	Orange County Transit Authority. Final EIR for the Long Range Transportation Plan. July 2006.

Appendix A Noise Monitoring Locations

Noise Monitoring Field Report
ARTIC Project

SITE PHOTOS

Long-Term

01
Meas

Anaheim Metrolink/Amtrak Station
2150 E. Katella Avenue
Anaheim, CA 92806

SITE INFORMATION
Analysis Date: 4/13/2010 6:20 PM
Noise Analyst: J. Burnam

APN:
Take:
Owner: City of Anaheim

Project Distance: 50 ft
Existing Land Use: Commercial
Planned Land Use: Commercial

NOISE RESULTS

Sound Level (Ldn) **58.9** dBA

Sound Level (CNEL) **59.5** dB

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02/ Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS
Long-term measurements take at the Anaheim Metrolink/ Amtrak Train Station. Sound Level Meter was placed 50 feet from the center of the two railroad tracks. The main noise noise source for this area is the trains passing through, arriving, and departing.

Noise Monitoring Field Report
ARTIC Project

SITE PHOTOS

Long-Term

01
Meas

Ayres Hotel of Anaheim
2550 E. Katella Avenue
Anaheim, CA 92806

SITE INFORMATION

Analysis Date: 4/15/2010 4:20 PM
Noise Analyst: J. Burnam

APN:
Take:
Owner: Ayres Hotel

Project Distance: 850 ft
Existing Land Use: Hotel
Planned Land Use: Hotel

NOISE RESULTS

Sound Level (Ldn) **66.8** dBA

Sound Level (CNEL) **67.4** dB

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02/ Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

Long-term measurement was taken at the Ayres Hotel of Anaheim. The sound level meter was placed outside the window of Room 136. This area was directly north of the hotel pool area and the entrance to the hotels' onsite gym. The main noise source for this hotel is the State Route 57 and the State Route 57 northbound exit.

Noise Monitoring Field Report

ARTIC Project

SITE PHOTOS

Long-Term

01
Meas

City of Orange
1635 W. Katella Avenue
Orange, CA 92867

SITE INFORMATION

Analysis Date: 4/07/2010 12:30 PM
Noise Analyst: J. Burnam

APN:
Take:
Owner: Extended Stay Hotel

Project Distance: 2000 ft
Existing Land Use: Hotel
Planned Land Use: Hotel

NOISE RESULTS

Sound Level (Ldn) **72.5** dBA

Sound Level (CNEL) **73.1** dB

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02/ Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

This measurement was placed in the City of Orange near the border of the City of Anaheim. The sound level meter was placed in the southwest corner of the Extended Stay Hotel property. The area near the border of the two cities is primarily commercial. The main source of noise for this area is traffic along Katella Avenue and traffic in the nearby commercial parking lots.

Noise Monitoring Field Report
ARTIC Project

SITE PHOTOS

Exterior

01
Meas

Ayres Hotel
2550 E. Katella Avenue
Anaheim, CA 92806

SITE INFORMATION

Analysis Date: 4/06/2010 11:13 AM
Noise Analyst: J. Burnam

APN:
Take:
Owner: Ayres Hotel

Project Distance: 850 ft
Existing Land Use: Hotel
Planned Land Use: Hotel

NOISE RESULTS

Sound Level **65.2** dBA

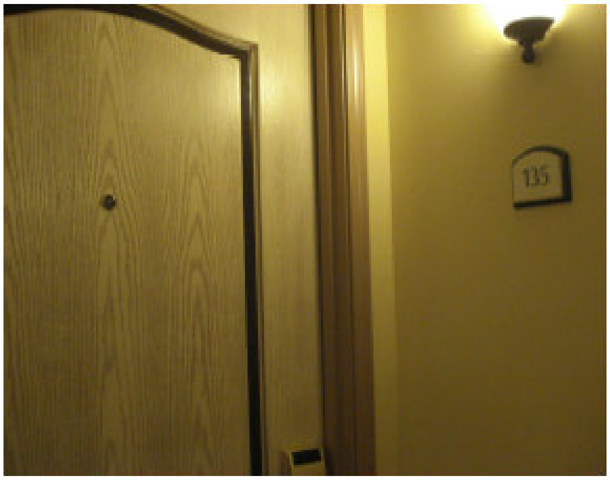
ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02/ Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

Simultaneous interior and exterior measurement to determine building attenuation. This measurement was taken in the pool area of the Ayres Hotel. The main noise source for this are was the traffic on State Route 57 and Katella Avenue.

Noise Monitoring Field Report
ARTIC Project

SITE PHOTOS



Interior

01
Meas

Ayres Hotel
2550 E. Katella Avenue
Anaheim, CA 92806

SITE INFORMATION

Analysis Date: 4/06/2010 11:13 AM
Noise Analyst: J. Burnam

APN:
Take:
Owner: Ayres Hotel

Project Distance: 850 ft
Existing Land Use: Hotel
Planned Land Use: Hotel

NOISE RESULTS

Sound Level **33.8** dBA

ENTECH SLM 1: Larson Davis Model 824 / Serial 824A3517
Microphone: 0.5" PCB Electronics 377B02/ Serial
Preamp: Larson Davis PRM902 0.5" 7 pin/ Serial

FIELD COMMENTS

Simultaneous interior and exterior measurement to determine building attenuation. This measurement was taken in Room 135 of the Ayres Hotel. The sound level meter was placed in the center of the room. The main noise source was traffic on State Route 57 and Katella Avenue and people talking in the hallways of the hotel.

Appendix B Noise Calculations

Table B-1. CNEL and Ldn Calculations for the Anaheim Metrolink/Amtrak Station

Date	Time	Leq	CNEL Applied Penalty, dB	CNEL	Ldn Applied Penalty, dB	Ldn
4/13/10	6:20 PM	56.9	0	56.9	0	56.9
4/13/10	7:00 PM	54	5	59	0	54
4/13/10	8:00 PM	53.9	5	58.9	0	53.9
4/13/10	9:00 PM	54.1	5	59.1	0	54.1
4/13/10	10:00 PM	53.7	10	63.7	10	63.7
4/13/10	11:00 PM	52.9	10	62.9	10	62.9
4/14/10	12:00 AM	52.2	10	62.2	10	62.2
4/14/10	1:00 AM	50.7	10	60.7	10	60.7
4/14/10	2:00 AM	51.1	10	61.1	10	61.1
4/14/10	3:00 AM	51.6	10	61.6	10	61.6
4/14/10	4:00 AM	55.1	10	65.1	10	65.1
4/14/10	5:00 AM	58.2	10	68.2	10	68.2
4/14/10	6:00 AM	59.9	10	69.9	10	69.9
4/14/10	7:00 AM	59.8	0	59.8	0	59.8
4/14/10	8:00 AM	57.5	0	57.5	0	57.5
4/14/10	9:00 AM	55.3	0	55.3	0	55.3
4/14/10	10:00 AM	55.3	0	55.3	0	55.3
4/14/10	11:00 AM	55.4	0	55.4	0	55.4
4/14/10	12:00 PM	55.9	0	55.9	0	55.9
4/14/10	1:00 PM	55.8	0	55.8	0	55.8
4/14/10	2:00 PM	53.9	0	53.9	0	53.9
4/14/10	3:00 PM	55.9	0	55.9	0	55.9
4/14/10	4:00 PM	56.8	0	56.8	0	56.8
4/14/10	5:00 PM	57.4	0	57.4	0	57.4
4/14/10	6:00 PM	58.4	0	58.4	0	58.4
Average		--	--	59.5	--	58.9

Figure B-1: Summary of Long-Term Measurement for the Anaheim Metrolink/Amtrak Station

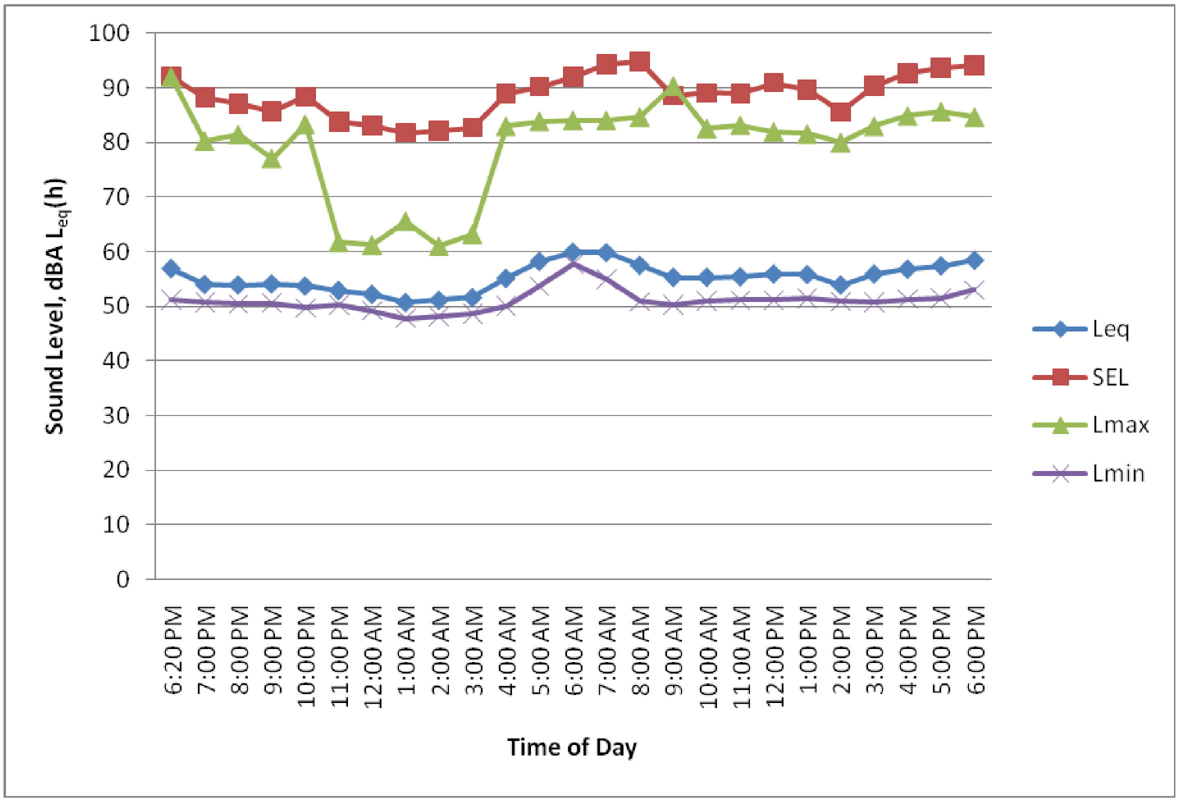


Table B-2. CNEL and Ldn Calculations for the Ayres Hotel

Date	Time	Leq	CNEL Applied Penalty, dB	CNEL	Ldn Applied Penalty, dB	Ldn
4/15/10	4:20 PM	64.3	0	64.3	0	64.3
4/15/10	5:00 PM	61.5	0	61.5	0	61.5
4/15/10	6:00 PM	64.7	0	64.7	0	64.7
4/15/10	7:00 PM	67	5	72	0	67
4/15/10	8:00 PM	63.2	5	68.2	0	63.2
4/15/10	9:00 PM	63.3	5	68.3	0	63.3
4/15/10	10:00 PM	62.4	10	72.4	10	72.4
4/15/10	11:00 PM	61.1	10	71.1	10	71.1
4/16/10	12:00 AM	58.2	10	68.2	10	68.2
4/16/10	1:00 AM	57.5	10	67.5	10	67.5
4/16/10	2:00 AM	56.4	10	66.4	10	66.4
4/16/10	3:00 AM	55.9	10	65.9	10	65.9
4/16/10	4:00 AM	57.8	10	67.8	10	67.8
4/16/10	5:00 AM	63.8	10	73.8	10	73.8
4/16/10	6:00 AM	64.4	10	74.4	10	74.4
4/16/10	7:00 AM	63.1	0	63.1	0	63.1
4/16/10	8:00 AM	64.8	0	64.8	0	64.8
4/16/10	9:00 AM	66.5	0	66.5	0	66.5
4/16/10	10:00 AM	65.7	0	65.7	0	65.7
4/16/10	11:00 AM	66.5	0	66.5	0	66.5
4/16/10	12:00 PM	68.3	0	68.3	0	68.3
4/16/10	1:00 PM	66.8	0	66.8	0	66.8
4/16/10	2:00 PM	67.8	0	67.8	0	67.8
4/16/10	3:00 PM	64.9	0	64.9	0	64.9
4/16/10	4:00 PM	64.5	0	64.5	0	64.5
Average		--	--	67.4	--	66.8

Figure B-2: Summary of Long-Term Measurement for the Ayres Hotel

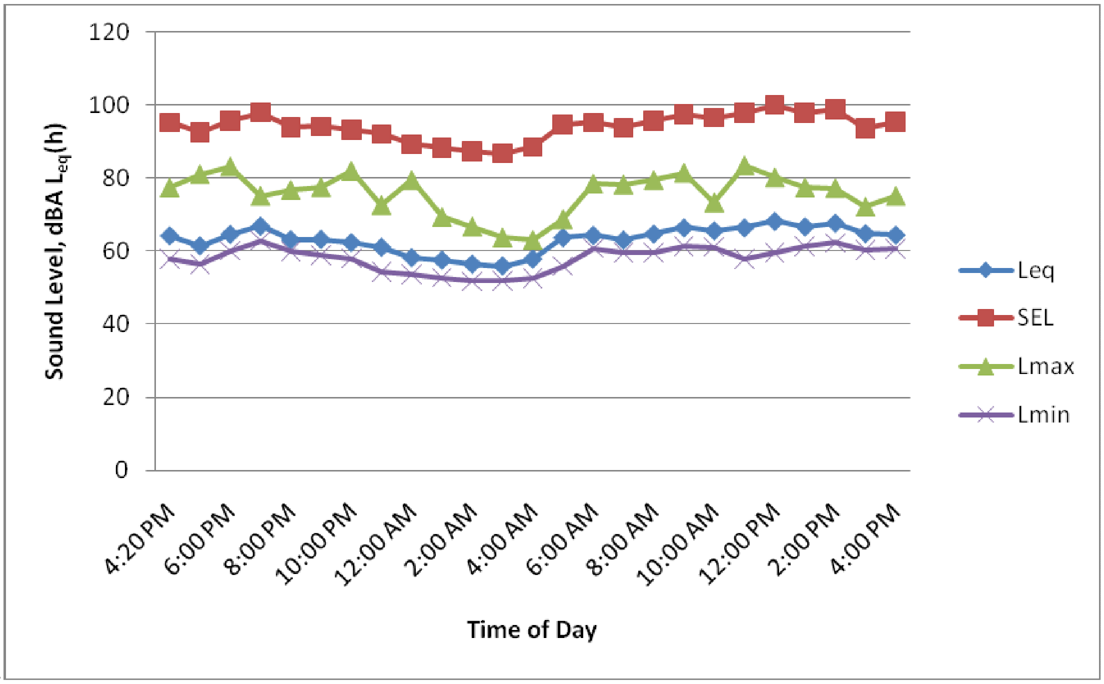


Table B-3. CNEL and Ldn Calculations for the City of Orange

Date	Time	Leq	CNEL Applied Penalty, dB	CNEL	Ldn Applied Penalty, dB	Ldn
4/7/10	12:30 PM	71.9	0	71.9	0	71.9
4/7/10	1:00 PM	68.7	0	68.7	0	68.7
4/7/10	2:00 PM	68	0	68	0	68
4/7/10	3:00 PM	67.1	0	67.1	0	67.1
4/7/10	4:00 PM	68.2	0	68.2	0	68.2
4/7/10	5:00 PM	68.2	0	68.2	0	68.2
4/7/10	6:00 PM	68.6	0	68.6	0	68.6
4/7/10	7:00 PM	70.8	5	75.8	0	70.8
4/7/10	8:00 PM	69.6	5	74.6	0	69.6
4/7/10	9:00 PM	67.2	5	72.2	0	67.2
4/7/10	10:00 PM	65.7	10	75.7	10	75.7
4/7/10	11:00 PM	67.4	10	77.4	10	77.4
4/8/10	12:00 AM	69.2	10	79.2	10	79.2
4/8/10	1:00 AM	68.7	10	78.7	10	78.7
4/8/10	2:00 AM	69.2	10	79.2	10	79.2
4/8/10	3:00 AM	67.7	10	77.7	10	77.7
4/8/10	4:00 AM	68.6	10	78.6	10	78.6
4/8/10	5:00 AM	72	10	82	10	82
4/8/10	6:00 AM	75.7	10	85.7	10	85.7
4/8/10	7:00 AM	71.5	0	71.5	0	71.5
4/8/10	8:00 AM	68.8	0	68.8	0	68.8
4/8/10	9:00 AM	67.8	0	67.8	0	67.8
4/8/10	10:00 AM	67.5	0	67.5	0	67.5
4/8/10	11:00 AM	66.6	0	66.6	0	66.6
4/8/10	12:00 PM	67.2	0	67.2	0	67.2
Average		--	--	73.1	--	72.5

Figure B-2: Summary of Long-Term Measurement for the City of Orange