APPENDIX K

NOISE TECHNICAL REPORT

NOISE TECHNICAL REPORT

STADIUM RECONSTRUCTION PROJECT
SAN DIEGO, CALIFORNIA

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GLOSSARY OF TERMS AND ACRONYMS

AADT	annual average daily traffic
ADT	average daily traffic
AED	Advanced Explosives Demolition
ALUCP	Airport Land Use Compatibility Plan
AMA	American Motorcycle Association
AMSL	above mean sea level
Caltrans	California Department of Transportation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
City	City of San Diego
CV	concert venue
cy	cubic yard(s)
dB	decibel
dBA	a-weighted decibel
DSI	Demolition Services, Inc.
EIR	Environmental Impact Report
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-8	Interstate 8
I-15	Interstate 15
in/sec	inches per second
ISO	International Organization for Standardization
KMEP MVT	Kinder Morgan Energy Partners Mission Valley Terminal
KVA	kilovolt amps
L_{dn}	day/night average sound level
L_{max}	maximum noise level
in/sec	inches per second
LD	Larson-Davis, Inc.
L_{eq}	equivalent noise level over a period of time
LOS	level of service
LT	long-term
MHPA	Multiple Habitat Planning Area
mph	miles per hour
MTS	Metropolitan Transit System

NFL	National Football League
ppv	peak particle velocity
SANDAG	San Diego Association of Governments
SDIA	San Diego International Airport
SDCRRA	San Diego County Regional Airport Authority
SDSU	San Diego State University
SLM	sound level meter
ST	short-term
SX	Supercross

1.0 INTRODUCTION

1.1 PURPOSE OF STUDY

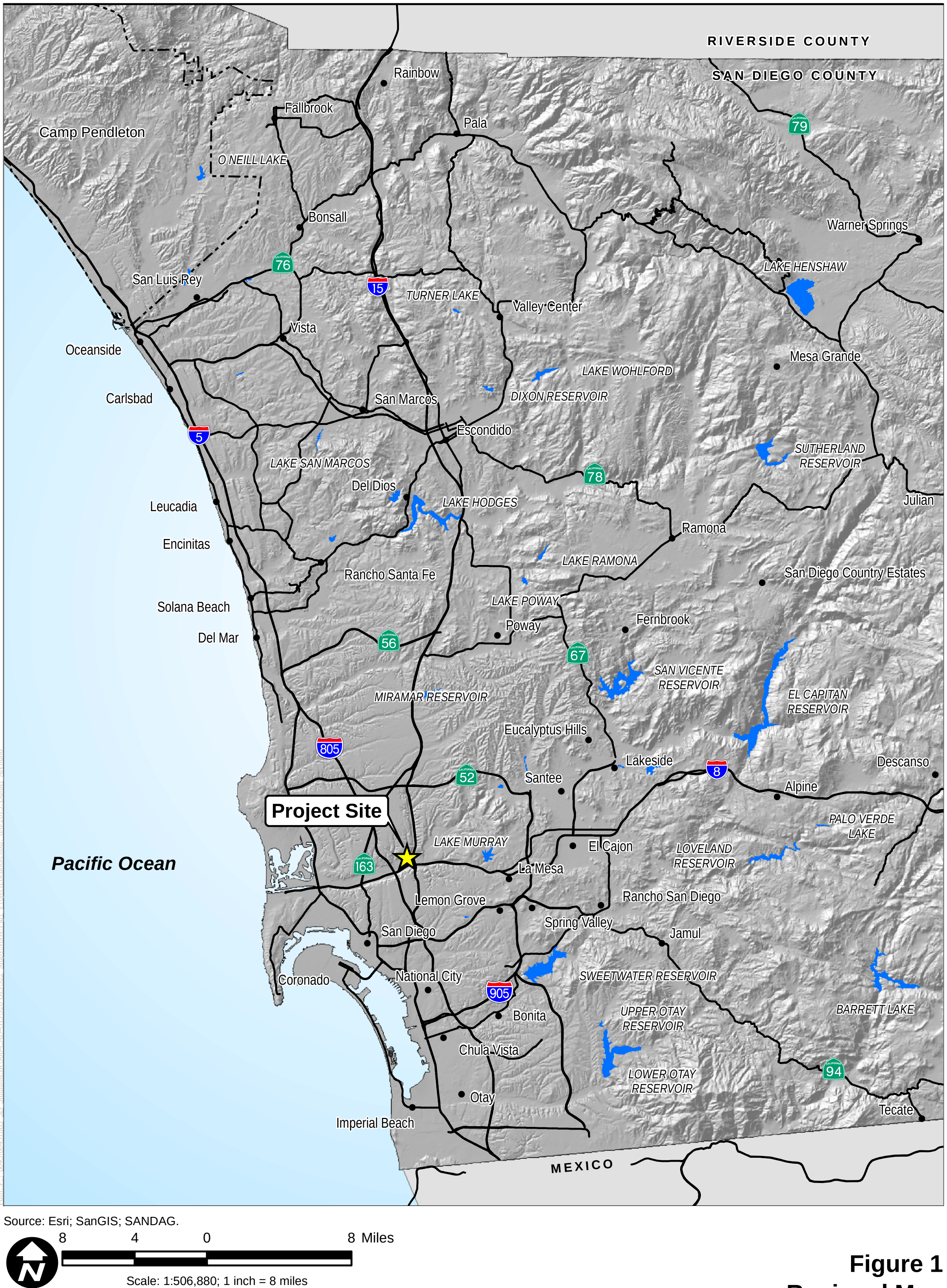
This Noise Technical Report summarizes the ambient noise surveys completed for the Stadium Reconstruction Project (Project). This report analyzes potential impacts to noise-sensitive receptors resulting from the Project and identifies avoidance, minimization, and mitigation measures to reduce potential significant noise impacts to noise-sensitive receptors. The results of this analysis will be incorporated into an Environmental Impact Report (EIR) in-line with the requirements of the California Environmental Quality Act (CEQA).

1.2 PROJECT DESCRIPTION

The City of San Diego is proposing to construct a new stadium replacing the existing Qualcomm Stadium on the 166-acre site located in the Mission Valley community in San Diego County, California. The Project site is owned and under local land use jurisdiction of the City. The new stadium would have a maximum normal capacity of up to 68,000 seats. However, it would be designed to allow for expansion within the stadium footprint to approximately 72,000 seats for special events such as a National Football League (NFL) Super Bowl. The new stadium would consist of approximately 1.75 million square feet, with a structure footprint of approximately 750,000 square feet. The new stadium would have a maximum height of approximately 250 feet above ground level, which includes stadium lights and architectural features on the top of the structure.

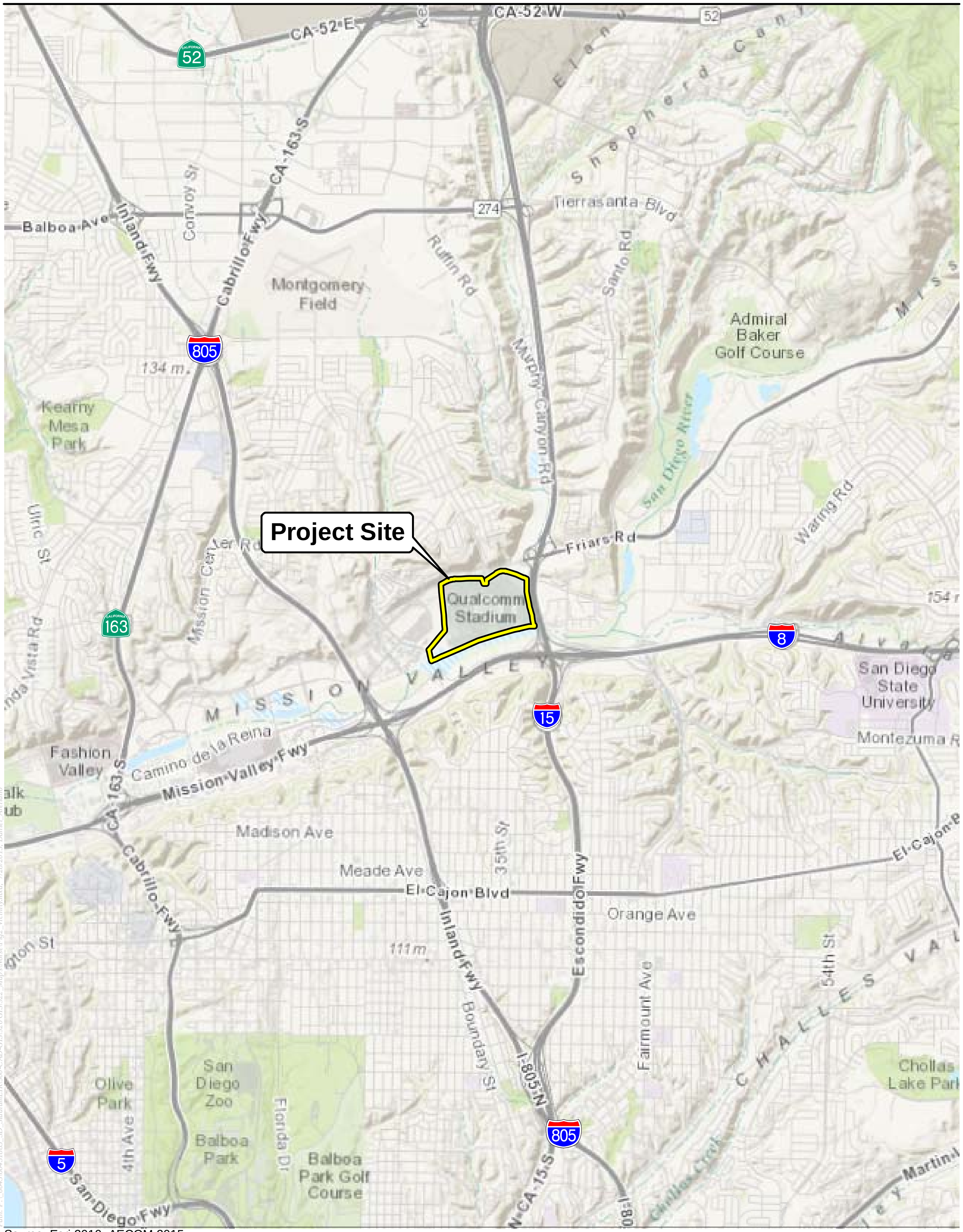
1.3 PROJECT LOCATION

The Project site is located in the City of San Diego, within Mission Valley, just west of Interstate 15 (I-15) and north of Interstate 8 (I-8) (Figure 1). The 17-acre stadium footprint is located on a portion of the 166-acre Project site, which is bounded by Friars Road to the north, I-15 to the east, the San Diego River to the south, and large commercial development to the west (Figure 2). Land use within the immediate vicinity includes both residential and commercial development, as well as open space (e.g., San Diego River).



Source: Esri; SanGIS; SANDAG.

Figure 1
Regional Map



Source: Esri 2010; AECOM 2015.

1 0.5 0 1 Miles

Scale: 1 = 63,360; 1 inch = 1 mile

Figure 2
Project Vicinity

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2.0 PROJECT DESCRIPTION

The Project would replace the existing Qualcomm Stadium with the construction of a new stadium on an approximately 17-acre portion in the northeast corner of the 166-acre Project site. Once the new stadium is operational, the existing Qualcomm Stadium would be demolished, which is located on an approximately 15-acre portion in the center of the Project site surrounded by stadium parking.

The new stadium is anticipated to be leased to the NFL for playing home games during the NFL pre-season, regular season, and post-season. The new stadium would also be used for events similar to what currently occurs at Qualcomm Stadium. Construction preparation would begin along with some equipment mobilization toward the latter part of the 2016 NFL season. Once the season ends, full construction would begin. Construction would continue through the 2017 and 2018 NFL seasons. Construction activities would not occur on game days.

The initial Project construction stages would include designating a construction area and beginning removal of the existing parking lot northeast of Qualcomm Stadium. The new stadium site is below the elevation of Qualcomm Stadium. To avoid drainage and terrain issues, approximately 490,000 cubic yards (cy) of fill material would be imported to elevate the new stadium site so that field level would be approximately 65 to 70 feet above sea level. A retaining wall up to 20 feet tall would be required along the northeast Project site boundary to hold the imported fill. Utility conduits and duct banks would be installed prior to the soil import. Once the fill has been installed and compacted, installation of the new stadium foundation would begin supported on deep foundations, which would include piles. To support Qualcomm Stadium, both driven steel piles (original construction in the 1960s) and drilled shafts (1997 expansion) were used, and both foundation types are feasible for support of the new stadium structure. Other pile types, such as auger cast piles and displacement auger cast piles, would also be considered for the new stadium during the final design phase. The installation of the new stadium foundation would last approximately 5 months; after which, construction of the new stadium structure would begin including the seating areas, roof, fixtures, and exterior.

Construction/demolition truck haul routes would be established, and a construction/demolition traffic management plan would be implemented. The anticipated truck haul routes would be immediate access to and from I-15 and the Project site main entrance via Friars Road. . Project construction/demolition hours of operation would be from 7:00 am to 7:00 pm on weekdays and Saturdays, in accordance with the City Noise Ordinance. Construction/demolition traffic would avoid peak hours in the mornings (7:00 a.m.to 8:30 a.m.) and afternoons (4:00 p.m. to 6:00 p.m.).

Project construction noise would be generated during the following Project construction phases:

(1) demolition of parking pavement for new stadium footprint;

(2) new stadium site preparation including export of excavated material, and import and placement of fill;

(3) pile driving for new stadium foundation;

(4) construction of the new stadium;

(5) demolition of the existing Qualcomm Stadium; and

(6) reconstruction of the Project site parking lot.

3.0 NOISE AND VIBRATION TERMINOLOGY

3.1 NOISE DESCRIPTORS

Noise is generally defined as unwanted or objectionable sound. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance and, in the extreme, hearing impairment. The unit of measurement used to describe a noise level is the decibel (dB); decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3-dB decrease.

Human Perception of Noise

The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, a method called “A-weighting” is used to filter noise frequencies that are not audible to the human ear. The A-scale approximates the frequency response of the average young ear when listening to most ordinary everyday sounds. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale levels of those sounds. Therefore, the “A-weighted” noise scale is used for measurements and standards involving the human perception of noise. In this report, all noise levels are A-weighted and “dBA” is understood to identify the A-weighted dB. Table 1 provides typical noise levels associated with common activities.

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dBA or in terms of acoustical energy. Two noise sources do not sound twice as loud as one source. It is widely accepted that the average healthy ear can barely perceive changes of 3 dBA (increase or decrease); that a change of 5 dBA is readily perceptible; and that an increase (or decrease) of 10 dBA sounds twice (or half) as loud (Caltrans 2011).

Averaging Noise Levels

In addition to noise levels at any given moment, the duration and averaging of noise over time is also important for the assessment of potential noise disturbance. Noise levels varying over time are averaged over a period of time, usually hour(s), expressed as dBA L_{eq}. For example, $L_{eq(3)}$ would be a 3-hour average noise level. When no period is specified, a 1-hour average is assumed ($L_{eq(1)}$ or L_{eq}).

Table 1
Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
-	110	Rock Band
Jet Fly-over at 300 m (1,000 ft)	100	-
Gas Lawn Mower at 1 m (3 ft)	90	-
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	80	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	70	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	60	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	50	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	30	Library
Quiet Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
-	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2011
Notes: m=meters ft=feet
km/hr=kilometers per hour
mph=miles per hour

The time of day of noise is also an important factor to consider when assessing potential community noise impacts, as noise levels that may be acceptable during the daytime hours may create disturbance during evening or nighttime hours, when people are typically at home and sleeping. The Community Noise Equivalent Level (CNEL) is a descriptor used to characterize average noise levels over a 24-hour period, calculated from hourly L_{eq} values, with 5 dBA added to the hourly L_{eq} levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dBA added to the hourly L_{eq} levels occurring between 10:00 p.m. and 7:00 a.m., to reflect the greater disturbance potential from evening and nighttime noise, respectively. The day/night average sound level (L_{dn}) is the same as the CNEL, except the evening period is included in the daytime period.

Noise Attenuation

From the source to the receiver, noise changes both in level and frequency spectrum. The most obvious change is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on the following important factors: ground absorption, atmospheric effects and refraction, shielding by natural and man-made features, noise barriers, diffraction, and reflection. For a point or stationary noise source, such as construction equipment, the attenuation or drop-off in noise level would be at least -6 dBA for each doubling of unobstructed distance between source and the receiver and could attenuate to -7.5 dBA depending on the acoustic characteristics of the intervening ground. For a linear noise source, such as vehicles traveling on a roadway, the attenuation or drop-off in noise level would be approximately -3 dBA for each doubling of unobstructed distance between source and the receiver and could attenuate to -4.5 dBA depending on the acoustic characteristics of the intervening ground.

A large object in the path between a noise source and a receiver can significantly attenuate noise levels at that receiver. The amount of attenuation provided by this "shielding" depends on the size of the object and the frequencies of the noise levels. Natural terrain features, such as hills and dense woods, as well as man-made features, such as buildings and walls, can significantly alter noise levels. Walls or berms are often specifically used to reduce, or attenuate, noise.

Noise-Sensitive Receptors

Some land uses are considered more sensitive to noise than others due to the types of persons or activities involved, such as sleeping, reading, talking, or convalescing. Noise-sensitive receptors are generally considered humans engaged in activities, or occupying land uses, that may be subject to the stress of significant interference from noise including, but not limited to, talking, reading, and sleeping. Typically, land uses associated with noise-sensitive human receptors include residential dwellings, hotels/motels, hospitals, nursing homes, educational facilities, and libraries.

In addition to human receptors, protected animal species and their habitats, e.g., special-status bird species protected under federal and California regulations, may be considered noise-sensitive receptors during their breeding season. Special-status species have been afforded protection or special recognition by federal, state, or local resource agencies or organizations, and typically have relatively limited distribution and may require specialized habitat conditions.

3.2 VIBRATION

In addition to noise, construction activities generate vibration, which can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source, due to spreading of the energy and frictional losses. The energy transmitted through the ground as vibration, if great enough and in proximity to structures, can result in structural damage.

Typical outdoor sources of perceptible groundborne vibration are construction equipment and traffic on rough (i.e., unpaved or uneven) roads. Construction activity can also result in varying degrees of groundborne vibration, depending on the type of equipment, methods employed, distance between source and receptor, duration, number of perceived vibration events, and local geology.

Groundborne vibrations from typical construction activities do not often reach levels that can damage structures in proximity to construction, but their effects may manifest and be noticeable in buildings that are within 25 feet of construction activities. One major concern with regard to construction vibration is potential building damage, which is assessed in terms of peak particle velocity (ppv), typically in units of inches per second (in/sec). In addition to structural damage, the vibration of room surfaces affects people as human annoyance. Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Typically, a vibration level of 0.1 in/sec ppv is the threshold of human annoyance, and 0.2 ppv is the threshold of risk of structural damage.

Construction operations generally include a wide range of activities that can generate various levels of groundborne vibration. In general, blasting and demolition of structures generate the highest vibrations. Heavy truck transport can also generate groundborne vibrations, which vary depending on vehicle type, weight, and pavement conditions. At 25 feet, some construction equipment generates vibration at levels exceeding the threshold of human annoyance (0.1 in/sec ppv), and at levels exceeding the threshold of risk of structural damage (0.2 in/sec ppv). However, at 50 feet, this same equipment is below the thresholds of human annoyance and structural damage (FTA 2006).

4.0 REGULATORY FRAMEWORK

This section provides a summary of the applicable federal, state, and local noise regulations.

4.1 FEDERAL REGULATIONS

The federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that "noise-sensitive" uses are prohibited from being sited adjacent to a highway or, alternately, that the developments are planned and constructed in such a manner that potential noise impacts are minimized. Federal noise policies and programs are developed by federal agencies of the U.S. Department of Transportation through its various operating agencies, i.e., the Federal Aviation Administration, the Federal Transit Administration (FTA), and the Federal Highway Administration (FHWA).

4.2 STATE REGULATIONS

California Administrative Code, Title 24, Interior Noise

Title 24 of the California Administrative Code requires that residential structures, other than detached single-family dwellings, be designed to prevent the intrusion of exterior noise so that the interior CNEL with windows closed and attributable to exterior sources does not exceed 45 dBA CNEL in any habitable room. This requirement is applicable to new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings. This standard is implemented by the California State Building Code Section 1208A.8.2 by stating that "interior noise levels attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room."

California Government Code, General Plan Noise Elements

California does not promulgate statewide standards for environmental noise, but the California State Government Code Section 65302 (f) requires each local jurisdiction to draft a Noise Element for their General Plan to establish acceptable noise limits for various land uses.

California Environmental Quality Act of 1970

CEQA, Public Resources Code 21100 et seq., requires lead agencies to evaluate the environmental impact associated with a proposed project. CEQA requires that a local agency prepare an environmental impact report on any project it proposes to approve that may have a significant effect on the environment. Technical reports such as this noise report are used to develop noise sections of EIRs. CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15064.7) provides thresholds of significance for noise.

California Department of Transportation

The California Department of Transportation (Caltrans) provides vibration level thresholds for architectural and structural damage and human perception thresholds. The Project is not subject to Caltrans requirements; however, Caltrans provides vibration thresholds for reference. To assess the potential for structural damage associated with vibration from construction activities, the vibratory ground motion in the vicinity of an affected structure is measured in terms of ppv, typically in units of in/sec. Table 2 presents the vibration level thresholds for architectural and structural damage and human perception and annoyance.

Table 2
Human and Structural Response to Vibration

Effects on Structures and People	Peak Vibration Threshold (ppv) (in/sec)
Structural damage to commercial structures	6
Structural damage to residential buildings	2
Architectural damage	1.0
General threshold of human annoyance	0.1
General threshold of human perception	0.01

Source: Caltrans 2002

As shown in Table 2, structural damage occurs to various structures when vibration levels reach 2 to 6 in/sec ppv at the respective structures. One-half of the minimum of this threshold range (i.e., 1 in/sec ppv), is considered a safe criterion that would protect against structural damage. For its construction projects, Caltrans uses a vibration criterion of 0.2 in/sec ppv, except for pile driving and blasting activities.

4.3 LOCAL REGULATIONS

City policies, ordinances, and significance thresholds with respect to noise are included in the Noise Element of the City's General Plan (City of San Diego 2008), the City's Municipal Code Noise Ordinance (City of San Diego 2010), and the City's CEQA Significance Determination Thresholds (City of San Diego 2011).

City of San Diego

General Plan, Noise Element

The Noise Element of the City's General Plan (City of San Diego 2008) provides goals and policies to guide compatible land uses and incorporate of noise attenuation measures for new uses. The City's goal is controlling noise to acceptable levels at its source. However, when this is not feasible, the City applies additional measures to limit the effect of noise on future land uses, which include spatial separation, site planning, and building design techniques that address noise exposure and the insulation of buildings to reduce interior noise levels.

The Noise Element provides land use and noise compatibility guidelines (City of San Diego 2008), which are provided in Table 3. As shown in Table 3, the City's exterior unconditional noise level standard for noise-sensitive areas is 60 dBA CNEL. The City assumes that current standard construction techniques provide a 15 dB reduction of exterior noise levels to achieve the interior noise standard of 45 dBA CNEL (City of San Diego 2008). When exterior noise levels are greater than 60 dBA CNEL, consideration of specific construction techniques is required. Multiple dwelling units are "compatible" with exterior noise levels lower than 60 dBA CNEL and, in areas with exterior noise levels of up to 70 dBA CNEL, are "conditionally compatible" provided that the building structure attenuates interior noise levels to 45 dBA CNEL. Commercial uses (such as Qualcomm Stadium) are "conditionally compatible" with noise levels up to 75 dBA CNEL and "compatible" with noise levels up to 65 dBA CNEL.

In addition, the Noise Element provides goals and policies that address mixed-use developments, sensitive receptors, site planning, operations, circulation, and noise attenuating measures. The goals and policies applicable to the Project site include:

Goal A: Noise and Land Use Compatibility

- Consider existing and future noise levels when making land use planning decisions to minimize people's exposure to excessive noise.

  Policy NE-A.1. Separate excessive noise-generating uses from residential and other noise-sensitive land uses with a sufficient spatial buffer of less sensitive uses.

Goal B: Motor Vehicle Traffic Noise

- Minimal excessive motor vehicle traffic noise on residential and other noise-sensitive land uses.

Policy NE-B.1. Encourage noise-compatible land uses and site planning adjoining existing and future highways and freeways.

Table 3
Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
		60	65	70	75
Open Space and Parks and Recreational					
Community & Neighborhood Parks; Passive Recreation					
Regional Parks; Outdoor Spectator Sports, Golf Courses; Athletic Fields; Outdoor Spectator Sports, Water Recreational Facilities; Horse Stables; Park Maint. Facilities					
Agricultural					
Crop Raising & Farming; Aquaculture, Dairies; Horticulture Nurseries & Greenhouses; Animal Raising, Maintain & Keeping; Commercial Stables					
Residential					
Single Units; Mobile Homes; Senior Housing		45			
Multiple Units; Mixed-Use Commercial/Residential; Live Work; Group Living Accommodations **For uses affected by aircraft noise, refer to Policies NE-D.2. & NE-D.3.*		45	45*		
Institutional					
Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12 Educational Facilities; Libraries; Museums; Places of Worship; Child Care Facilities		45			
Vocational or Professional Educational Facilities; Higher Education Institution Facilities (Community or Junior Colleges, Colleges, or Universities)		45	45		
Cemeteries					
Sales					
Building Supplies/Equipment; Food, Beverages & Groceries; Pets & Pet Supplies; Sundries, Pharmaceutical, & Convenience Sales; Wearing Apparel & Accessories			50	50	
Commercial Services					
Building Services; Business Support; Eating & Drinking; Financial Institutions; Assembly & Entertainment; Radio & Television Studios; Golf Course Support			50	50	
Visitor Accommodations		45	45	45	
Offices					
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			50	50	

Source: City of San Diego 2008

Table 3 (Continued)
Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
		60	65	70	75
Vehicle and Vehicular Equipment Sales and Services Use					
Commercial or Personal Vehicle Repair & Maintenance; Commercial or Personal Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution					
Industrial					
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries					
Research & Development				50	

	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.
		Outdoor Uses	Activities associated with the land use may be carried out.
	Conditionally Compatible	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level indicated by the number for occupied areas. Refer to Section I.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated make the outdoor activities acceptable. Refer to Section I.
	Incompatible	Indoor Uses	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

Source: City of San Diego 2008

Policy NE-B.4. Require new development to provide facilities which support the use of alternative transportation modes such as walking, bicycling, carpooling and, where applicable, transit to reduce peak-hour traffic.

Policy NE-B.5. Designate local truck routes to reduce truck traffic in noise-sensitive land uses areas.

Policy NE-B.7. Promote the use of berms, landscaping, setbacks, and architectural design where appropriate and effective, rather than conventional wall barriers to enhance aesthetics.

Goal E: Commercial and Mixed-Use Activity Noise:

- Minimal exposure of residential and other noise-sensitive land uses to excessive commercial and mixed-use related noise.

Policy NE-E.1. Encourage the design and construction of commercial and mixed-use structures with noise attenuation methods to minimize excessive noise to residential and other noise-sensitive land uses.

Goal G: Construction, Refuse Vehicles, Parking Lot Sweepers, and Public Activity Noise:

- Minimal exposure of residential and other noise-sensitive land uses to excessive construction, refuse vehicles, parking lot sweeper-related noise and public noise.

Goal H: Event Noise:

- Balance the effects of noise associated with events with the benefits of the events.

  Policy NE-H.2. Ensure that the future residential and other noise-sensitive land uses adjacent to the ballpark and stadium are compatible with event noise levels.

Noise Ordinance

The City regulates noise through the City's Municipal Code, Chapter 5, Article 9.5, Noise Abatement and Control. The following sections of the Ordinance provide sound level limits between adjacent properties, noise insulation standards, and construction noise limits.

Section 59.5.0401 Sound Level Limits regulates noise generated by on-site sources associated with project operation, such as heating, ventilation, and air conditioning (HVAC) units. The property line noise level limits for various land uses by time of day are shown in Table 4.

Section 59.50404 Construction Noise of the noise ordinance regulates noise produced by construction activities. Construction activities are prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays and certain legal holidays, unless a permit has been granted beforehand by the Noise Abatement and Control Administrator or conjunction with emergency work. Section 59.5.0404 limits construction noise to an average sound level of 75 dBA during the 12-hour period from 7 a.m. to 7 p.m. at or beyond the property lines of any property zoned residential.

Table 4
Sound Level Limits

Land Use Zone	Time of Day	One-Hour Average Sound Level (dB)
1. Single-Family Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45 40
2. Multi-Family Residential (Up to a maximum density of 1/2,000)	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50 45
3. All Other Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55 50
4. Commercial	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	65 60 60
5. Industrial or Agricultural	Any time	75

Source: City of San Diego 2010

Significance Determination Thresholds

The City of San Diego's CEQA Significance Determination Thresholds outline the criteria and thresholds used to determine whether project impacts are significant (City of San Diego 2011). The following applicable thresholds have been used in this analysis for identifying significant noise impacts applicable to the Project:

Interior and Exterior Noise Impacts from Traffic-Generated Noise

The City's CEQA significance determination thresholds provide guidance on implementing the City's noise policies and ordinances, including the general thresholds of significance for uses affected by traffic noise included in Table 5.

As shown in Table 5, the noise level at exterior usable open space for single- and multifamily residences should not exceed 65 dBA.

Operational noise is typically considered permanent, in the sense of the duration of the operation of the constructed facility, while not continuous in nature and occurring only when the stadium is hosting an event (in progress). A significant permanent increase is defined as a direct Project-related permanent ambient increase of 3 dBA or greater, where exterior noise levels would already exceed the City's significance thresholds (City of San Diego 2011) (e.g., 65 dBA daytime for single-family residential land uses). An increase of 3 dBA is perceived by the human ear as a barely perceptible increase.

Table 5
Traffic Noise Significance Thresholds

Structure of Proposed Use That Would Be Impacted by Traffic Noise	Interior Space	Exterior Useable Space[1]	General Indication of Potential Significance
Single-family detached	45 dB	65 dB	Structure or outdoor useable area[2] is <50 feet from the center of the closest (outside) lane on a street with existing or future ADTs >7,500
Multi-family, school, library, hospital, day care center, hotel, motel, park, convalescent home	Development Services Department (DSD) ensures 45 dB pursuant to Title 24	65 dB	
Office, church, business, professional uses	n/a	70 dB	Structure or outdoor useable area is <50 feet from the center of the closest lane on a street with existing or future ADTs >20,000
Commercial, retail, industrial, outdoor sports uses	n/a	75 dB	Structure or outdoor useable area is <50 feet from the center of the closest lane on a street with existing or future ADTs >40,000

Source: City of San Diego 2011

[1] If a project is currently at or exceeds the significance thresholds for traffic noise described above and noise levels would result in less than a 3-dB increase, then the impact is not considered significant.

[2] Exterior useable areas do not include residential front yards or balconies unless the areas such as balconies are part of the required useable open space calculation for multi-family units.

Noise from Adjacent Stationary Uses (Noise Generators)

The Ordinance also limits property line noise levels for various land uses by time of day for noise generated by on-site sources associated with project operation (Table 4), (e.g., for multifamily residential, 55 dBA L_{eq} from 7 a.m. to 7 p.m., 50 dBA L_{eq} from 7 p.m. to 10 p.m., and 50 dBA L_{eq} from 10 p.m. to 7 a.m.). A project that would generate noise levels at the property line that exceed the City‘s Noise Ordinance Standards is considered potentially significant (such as potentially a carwash or projects operating generators or noisy equipment). If a nonresidential use, such as a commercial, industrial, or school use, is proposed to abut an existing residential use, the decibel level at the property line should be the arithmetic mean of the decibel levels allowed for each use as set forth in Section 59.5.0401 of the Municipal Code (Table 4). Although the noise level above could be consistent with the City‘s Noise Ordinance Standards, a noise level above 65 dB (A) CNEL at the residential property line could be considered a significant environmental impact.

Impacts to Sensitive Wildlife

Noise mitigation may be required for significant noise impacts to certain avian species during their breeding season, depending upon the location of the project such as in or adjacent to an Multiple Habitat Planning Area (MHPA), whether or not the project is occupied by California gnatcatcher, least Bell's vireo, southern willow flycatcher, least tern, cactus wren, tricolored blackbird, or western snowy plover, and whether or not noise levels from the project, including construction during the breeding season of these species, would exceed 60 dBA or existing ambient noise level if above 60 dBA. In addition, significant noise impacts to the California gnatcatcher are only analyzed if the project is within an MHPA; there are no restrictions for the gnatcatcher outside the MHPA any time of year.

Temporary Construction Noise and Sound Level Limits

Temporary construction noise that exceeds 75 dB (A) L_{eq} at a sensitive receptor would be considered significant. Construction noise levels measured at or beyond the property lines of any property zoned residential shall not exceed an average sound level greater than 75 dB during the 12-hour period from 7:00 a.m. to 7:00 p.m. In addition, construction activity is prohibited between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with the exception of Columbus Day and Washington's Birthday, or on Sundays, that would create disturbing, excessive, or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator, in conformance with San Diego Municipal Code Section 59.5.0404. Additionally, where temporary construction noise would substantially interfere with normal business communication, or affect sensitive receptors, such as day care facilities, a significant noise impact may be identified.

Noise/Land Use Compatibility

The City's General Plan Noise Element, Table 3, indicates the City's exterior unconditional "compatible" noise level standard for noise-sensitive areas is 60 dBA CNEL. The City assumes that standard construction design techniques would provide a 15-dB reduction of exterior noise levels to interior noise levels of 45 dBA CNEL or less when exterior sources are 60 dBA CNEL or less. When exterior noise levels are greater than 60 dBA CNEL and the interior threshold is 45 dBA CNEL, consideration of specific construction techniques is required. Areas with exterior noise levels of up to 70 dBA CNEL are "conditionally compatible" provided that the building structure attenuates interior noise levels to 45 dBA CNEL.

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5.0 EXISTING CONDITIONS

5.1 LAND USES

Existing land uses within the Project site include the existing Qualcomm Stadium with associated parking lot, a soccer field and recycling center in the southwest corner of the site, and the MTS Trolley Green Line station and trolley line that traverses the southern portion of the site. An MTS Trolley Electric Substation is located at the southeast corner of the site. The Project site is surrounded by major roadways, interstates, existing development, and two surface-water features (San Diego River to the south and Murphy Canyon Creek to the east). Office buildings and large commercial/retail uses are located to the west; and higher density, multifamily residential land uses are located to the northwest and southwest of the Project site and east of I-15. The Kinder Morgan Energy Partners Mission Valley Terminal (KMEP MVT) is located to the northeast of the Project site at 9950 San Diego Mission Road, west of I-15. Friars Road bisects KMEP MVT.

The Project would cover an area of approximately 17 acres northeast of the existing Qualcomm Stadium within the 166-acre Stadium parking lot. The ground surface in the Project vicinity generally slopes gradually down toward the south and southwest toward the San Diego River. At the Project location, the existing ground surface ranges from about 55 to 75 feet above mean sea level (AMSL). The Project site is relatively flat, with no topographic features that could serve as a noise barrier. The Project site is bounded by Friars Road to the north, I-15 to the east, the San Diego River Floodway to the south, and developed area to the west consisting of office buildings, large commercial/retail uses, and a public library. Further north and south, the Project site is in proximity to mesas of the north and south rim of Mission Valley with single-family residential development; further the east and west is the relatively flat developed area of Mission Valley.

5.2 NOISE ENVIRONMENT

Noise Sources (No Qualcomm Stadium Event)

The primary noise source on and surrounding the Project site is traffic noise. Secondary noise sources are activities at the surrounding industrial, commercial, office, and residential areas, trolley service, and aircraft flyovers.

The existing noise environment surrounding the Project site (non-event) is primarily influenced by noise from vehicle traffic on the roadways adjacent to and in proximity to the Project site including Friars Road to the north, San Diego Mission Road to the northeast, I-15 to the east, and Qualcomm Way to the south and west. Camino Del Rio North and I-8 are located south of the San Diego River, approximately 675 and 750 feet, respectively, from the Project site's southern boundary. The predominant traffic noise at the Project site and surrounding areas is from I-15, I-8, and Friars Road, which are described as:

- I-15 – a north-south eight-lane highway facility with four general purpose lanes in each direction, and provides north/south on/off ramps at Friars Road to access the Project site.
- I-8 – an east-west ten-lane highway facility with five general purpose lanes in each direction, and does not provide on/off ramps to directly access the Project site.
- Friars Road – a six-lane divided roadway with a posted speed limit of 50 mph, and provides direct access to the Project site.

Traffic noise level on roadways is dependent upon traffic volume, speed, flow, vehicle mix, pavement type and condition. At higher speeds, typically on freeways, highways and primary arterials, the noise from tire/pavement interaction can be greater than from vehicle exhaust and engine noise (City of San Diego 2008). Generally, traffic noise is increased by heavier traffic volumes, higher speeds, and large trucks. Free-flowing traffic just before or just after peak traffic periods is often the noisiest. Peak traffic periods generally result in lower noise levels due to traffic congestion, which lowers traffic speeds (Caltrans 2011).

Trolley service is provided at the Project site by the San Diego Metropolitan Transit System (MTS) trolley (the Green Line) at 15-minute intervals during the weekday commute and 15- to 20-minute intervals on the weekend mid-day hours. The Green Line provides service from Downtown San Diego to the City of Santee, with service to the Project site every day from approximately 5:00 am to midnight. The Green Line runs east-west north of I-8 and traverses the southern portion of the Project site, with a trolley stop at Qualcomm Stadium (Qualcomm Station) within the Project site. Stadium patrons utilize the trolley for stadium events including approximately 21-26 percent of the attendance at NFL football games and approximately 12-15 percent of the attendance at San Diego State University Aztecs football games (AECOM 2015b).

Random aircraft flyovers occur in the vicinity of the Project site from high altitude commercial and military jets; low elevation traffic and news helicopters, and low elevation single-engine fixed wing aircraft. The closest airports to the Project site include San Diego International

Airport (SDIA) (approximately 5 miles to the southwest) and Montgomery Field (approximately 2 miles to the north). The Project site is not within SDIA's Airport Influence Area and is located approximately 2 miles north of the SDIA approach flight path (east-west) (SDCRAA 2014). The Project site is within Montgomery Field's Airport Influence Area, however, only for overflight notification and airspace protection (SDCRAA 2010).

Noise Sources (Qualcomm Stadium Event)

The existing noise environment of the Project site and the surrounding area during a Qualcomm Stadium event is primarily influenced by traffic noise from vehicle traffic on the roadways adjacent to and in proximity to the Project site, and secondarily, from the noise generated by the stadium event. As discussed in Chapter 3, major events occurring at existing Qualcomm Stadium include:

- NFL football games (including pre-season, regular season, post-season games)
- College football games (including regular season, post-season bowl games)
- Music concert events
- Motor sports events (including monster truck rally, American Motorcycle Association [AMA] Supercross or SX)

NFL games typically occur on Sundays, generally starting at 1:00 to 1:30 p.m. and lasting approximately 3 hours. The existing Qualcomm Stadium parking lot opens 4 hours prior to official game start-time and closes approximately 2 hours after game conclusion. Occasionally, NFL games are played on Sunday (5:30 p.m.), Monday (5:30 p.m.), Thursday (7:00 p.m.), or Saturday (at 5:00 p.m.) (San Diego Chargers 2015). College football games (primarily San Diego State University [SDSU] Aztecs) typically occur on Saturdays starting at 7:30 p.m. and last approximately 3 hours. The stadium parking lot is open 3 hours prior to start time and approximately 2 hours after game conclusion. In December, two college bowl games are played at a time and date determined each year. Music concerts occur infrequently based on other available music venues in San Diego, and typically occur in the evening of any given day. The existing Qualcomm Stadium parking lot is open several hours prior to concert start and conclusion. The motor sports events typically occur on Saturday evenings.

5.3 NOISE-SENSITIVE RECEPTORS

Noise-sensitive receptors are land uses associated with indoor and/or outdoor activities (sleeping, studying, or convalescing) that may be subject to stress and/or significant interference from noise. Noise-sensitive receptors typically include residential dwellings, dormitories, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities (i.e., classrooms), passive recreation areas, daycare facilities, and libraries. The Noise Element of the City's General Plan defines noise-sensitive land uses to include, but not necessarily limited to, residential uses, hospitals, nursing facilities, intermediate care facilities, child educational facilities, libraries, museums, places of worship, child care facilities, and certain types of passive recreational parks and open space (City of San Diego 2008).

There are no noise-sensitive human receptors on the Project site. The nearest human noise-sensitive receptors in proximity to the Project site boundary are off-site residences, as shown in Figure 3. Multifamily housing is approximately 175 feet to the northwest across Friars Road at an elevation of approximately 150 feet AMSL with a direct line-of-sight of the existing Qualcomm Stadium, which has an elevation of approximately 85 feet AMSL at its base. Additional multifamily housing is approximately 400 feet to the east across I-15 at an elevation of approximately 70 feet AMSL with I-15 obstructing line-of-sight of the existing Qualcomm Stadium. Additional multifamily housing is approximately 500 feet to the east across I-15 and San Diego Mission Road at an elevation of approximately 100 feet AMSL with an obstructed line-of-sight of the existing Qualcomm Stadium. The nearest single-family housing is approximately 700 feet to the north of the existing Qualcomm Stadium boundary across Friars Road at an elevation of approximately 275 feet AMSL on the north rim of Mission Valley with a direct line-of-sight of the existing Qualcomm Stadium. Additional single-family housing is approximately 1,800 feet to the south across I-8 at an elevation of approximately 400 feet AMSL on the south rim of Mission Valley with a direct line-of-sight of the existing Qualcomm Stadium. One single-family residence is located approximately 2,000 feet southwest of the Project site boundary along Camino Del Rio South, south of and adjacent to I-8.

In addition to human receptors, special-status bird species may be considered noise-sensitive receptors; especially during their breeding season. Special-status species have been afforded protection or special recognition by federal, state, or local resource agencies or organizations, and typically have relatively limited distribution and may require specialized habitat conditions.

There are no noise-sensitive special-status bird species on the Project site, except within 235 feet of the San Diego River floodway along the southern boundary of the Project site (i.e., no special-status species on the developed area of the Project site). Special-status bird species have the potential to occur within the floodplain of the San Diego River channel corridor and Murphy Canyon Creek based on presence of suitable habitat (AECOM 2015a). Project impacts are analyzed in the Project Biological Technical Report (AECOM 2015a).

Noise Measurements and Observations

To characterize the existing ambient noise environment, noise measurements and observations were performed on the Project site and at nearby noise-sensitive receptors in proximity to the Project site. Ambient noise levels were measured at the nearest residences, to the north, northwest, east, and south of the stadium site; a public library west of the stadium site; and at noise-sensitive bird habitat of the floodplain of the San Diego River at the southern boundary of the stadium site near the MTS Trolley Station – Qualcomm Stadium. A combination of short-term ("ST", 15-minute duration) and long-term ("LT", 24-hour day-night) noise measurements were performed during stadium event and non-event days. Noise measurement locations and observations are summarized in Table 6, and located in Figure 3.

As shown in Table 6, the LT measurements were performed at the single-family and multifamily residences nearest to the existing Qualcomm Stadium and the new stadium site. Three additional measurements were performed at the existing Qualcomm Stadium during the One Direction concert on Thursday, July 9, 2015. These concert venue (CV) measurements (CV-1, CV-2, and CV-3) were conducted for the purpose of collecting data to support a prediction model of typical stadium concert event noise.

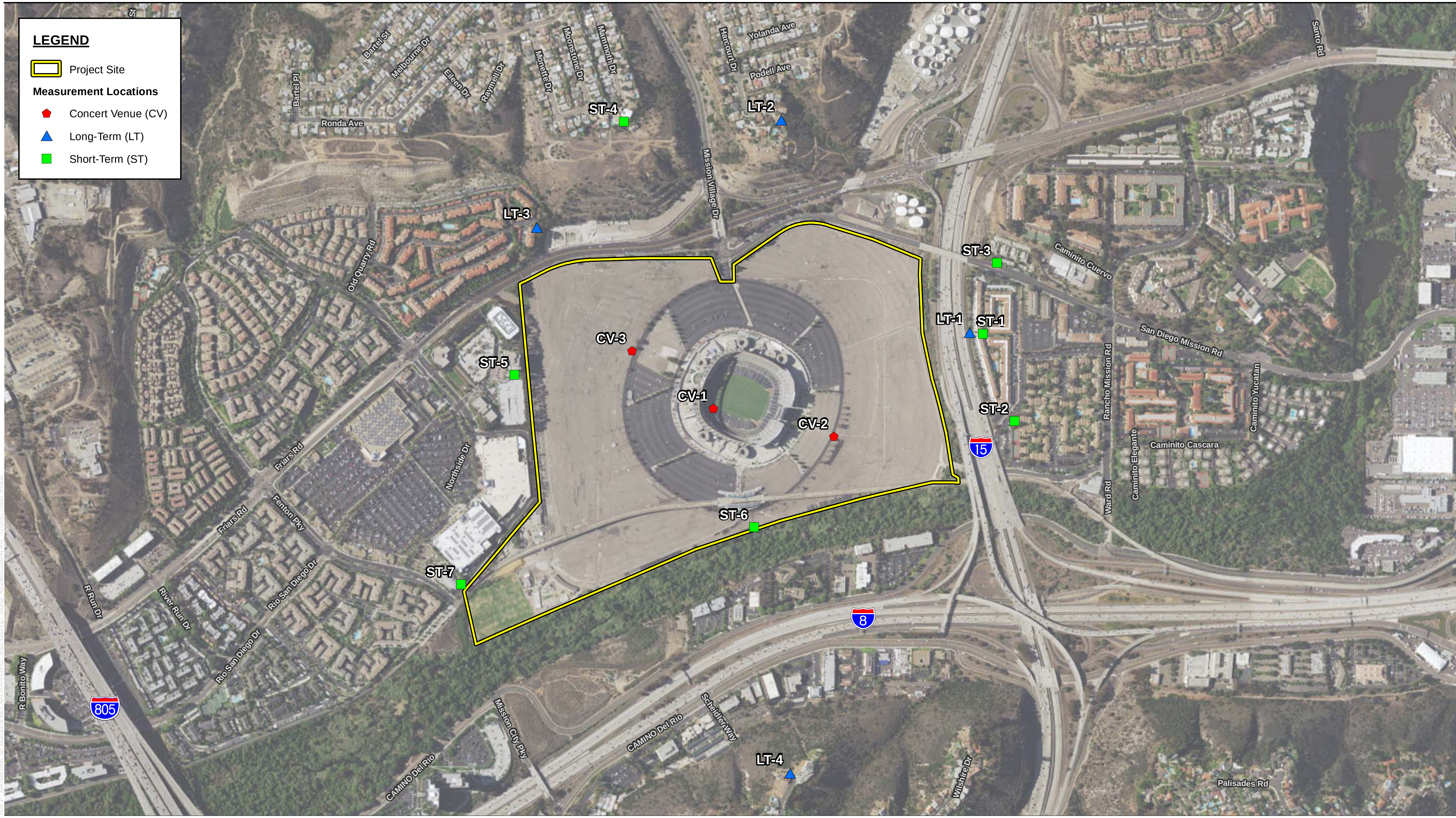
On Wednesday, July 8, 2015, LT ambient noise measurements (LT-1 through LT-4) were initiated at the residences nearest the Project site. From July 8–13, 2015, ST noise measurements were regularly taken near these residences (ST-1 through ST-4), the southern boundary of the Project site (ST-6), an office/commercial area (ST-5), and a public library (ST-7). On Monday, July 13, the LT measurements were concluded. Measured noise levels are summarized in Table 7, and detailed in Appendix A.

Noise measurements were taken by AECOM noise specialists using sound level meters (SLMs) manufactured by Larson-Davis, Inc. (LD). ST noise measurements were made with LD Model 820 SLM, and LT measurements with LD Models 820, 720, and LxT SLM. The SLMs were programmed in "slow" response mode, and to record noise levels with A-weighting. All noise measurements were taken approximately 5 feet above ground level using stationary tripods. SLM calibration was field-checked before and after each measurement using LD Model CAL 200 and CAL 150 calibrators. During the measurements, the weather was generally clear and dry, with winds 0 to 9 mph, and temperatures ranging between 65 to 89 degrees Fahrenheit.

Table 6
Noise Measurement Locations

Site ID*	Location	Distance and Direction from Qualcomm Stadium	Representative Land Use	Dominant Noise Source
LT-1	I-15 along fence line behind backside of Bella Posta Apartments	1,450 feet east	Location used to measure I-15 traffic noise only, not adjacent housing area.	Vehicle traffic on I-15
LT-2	9477 Goodwick Court, east of Mission Village Drive	1,800 feet north	Single-family housing north of stadium site, exterior use area	Vehicle traffic on Friars Road and I-15
LT-3	Monte Vista Apartments Unit 3302 Northwest of Friars Road and Qualcomm Stadium	1,500 feet northwest	Multifamily housing	Vehicle traffic on Friars Road
LT-4	5262 Cromwell Court south of I-8 and Qualcomm Stadium, at end of Cromwell Court	2,400 feet south	Single-family housing	Vehicle traffic on I-8
ST-1	Bella Posta Apartments east of I-15 and north of San Diego Mission Road	1,550 feet northeast	Multifamily housing within interior courtyard	Vehicle traffic on I-15
ST-2	Rancho Mission Villas Unit 209, east of I-15 and Qualcomm Stadium	1,750 feet east	Multifamily housing next to porch deck	Vehicle traffic on I-15
ST-3	Mission Terrace Apartments Unit 7 east of I-15, north of San Diego Mission Road	1,850 feet northeast	Multifamily housing at top of stairs next to residence	Vehicle traffic on I-15 and San Diego Mission Road
ST-4	9391 Broadview, north of Friars Road, west of Mission Village Road	1,900 feet northwest	Single-family home on back deck	Vehicle traffic on Friars Road, Stadium concert event
ST-5	2365 Northside Drive west of Qualcomm Stadium south of Friars Road	1,375 feet west	Commercial Space, Office building at outdoor use area	Vehicle traffic on Friars Road, Saturday car racing
ST-6	Qualcomm Stadium south parking lot boundary	600 feet south	Parking lot, river habitat Trolley station	Vehicle traffic on I-8 and trolley noise
ST-7	Mission Valley Public Library north of Fenton Parkway and Trolley line	2,200 feet southwest	Library outdoor use area	Vehicle traffic on I-8 and trolley noise, soccer announcer

* The Site ID corresponds to noise measurement locations shown in Figure 3.



Source: NAIP 2014.

750 375 0 750 Feet

Scale: 1 = 9,000; 1 inch = 750 feet

Figure 3
Noise Measurement Locations

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Table 7
Ambient Noise Measurement Data

Site ID*	Type	Weekday			Saturday			Sunday		
		Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
LT-1	MFH	76	74	71	75	74	72	74	74	70
LT-2	SFH	63	62	58	62	61	60	61	60	58
LT-3	MFH	59	60	52	64	56	54	57	56	53
LT-4	SFH	67	66	61	67	66	63	67	66	62
ST-1	MFH	61	59	56	59	58	56	59	59	55
ST-2	MFH	71	70	66	70	69	67	69	69	65
ST-3	MFH	69	69	65	69	68	66	68	68	64
ST-4	SFH	57	58	48	54	46	44	54	53	50
ST-5	Office	57	58	50	62	54	52	53	52	49
ST-6	River	62	60	55	58	57	54	59	58	54
ST-7	Library	51	51	46	62	61	58	n/a	n/a	n/a

* The Site ID corresponds to locations shown in Figure 3.
MFH = Multifamily Housing; SFH = Single-family Housing; n/a = not applicable
All noise levels are expressed as dBA L_{eq}

As shown in Table 7, ambient average noise level measurements ranged from 44 to 76 dBA L_{eq}. Noise sources were primarily from vehicle traffic on adjacent roadways of Friars Road, I-15, or I-8. Weekday measurement does not include concert event on Thursday, July 9, 2015, when the existing Qualcomm Stadium hosted a music concert by the group One Direction, which was recorded to be utilized for the modeling of stadium concert event noise.

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6.0 IMPACT ANALYSIS

This section addresses Project-related noise and vibration impacts that would occur during Project construction and operation.

6.1 CONSTRUCTION

Methodology

Construction noise is considered temporary and short term. Construction noise at its source varies depending on construction activities and duration, and the type and usage of equipment involved. Noise impacts from construction are dependent on the construction noise levels generated, the timing and duration of the construction activities, proximity to sensitive receptors, and noise regulations and standards. Construction equipment can be stationary or mobile. Stationary equipment operates in one location for various periods of time with fixed-power operation, such as pumps, generators, and compressors, or a variable noise operation, such as pile drivers, rock drills, and pavement breakers. Mobile equipment moves around the construction site such as bulldozers, graders, and loaders (FTA 2006).

Heavy construction equipment typically operates for short periods at full power followed by extended periods of operation at lower power, idling, or powered-off conditions. Typically, site preparation involves demolition, grading, compacting, and excavating, which would include the use of backhoes, bulldozers, loaders, excavation equipment (e.g., graders and scrapers), pile drivers, and compaction equipment. Finishing activities may include the use of pneumatic hand tools, scrapers, concrete trucks, vibrators, and haul trucks. Typical maximum noise levels generated by various pieces of construction equipment are listed in Table 8.

As shown in Table8, maximum noise levels range from 70 to 95 dBA L_{max}, depending upon the piece of equipment operating (FTA 2006). In typical construction projects, grading and impact activities typically generate the highest noise levels. Grading involves the largest heaviest equipment and typically includes bulldozers, excavators, dump trucks, front-end loaders, and graders with maximum noise levels range from 80 to 85 dBA L_{max}. Impact equipment includes pile drivers, rock drills, pavement breakers, concrete crushers, and industrial/concrete saws with maximum noise levels range from 90 to 95 dBA L_{max}. Each phase of construction has a specific equipment mix, depending on the work to be accomplished during that phase. Each phase also has its own noise characteristics; some phases would have higher continuous noise levels than others, and some have high-impact noise levels.

Table 8
Construction Equipment Noise Levels

Equipment	Noise Level (dBA L_{max}) at 50 Feet
Auger Drill Rig	85
Backhoe	80
Blasting	94
Chain Saw	85
Clam Shovel	93
Compactor (ground)	80
Compressor (air)	80
Concrete Batch Plant *	80
Concrete Crushing Plant **	86
Concrete Mixer Truck	85
Concrete Pump	82
Concrete Saw	90
Crane (mobile or stationary)	85
Dozer	85
Dump Truck	84
Excavator	85
Front End Loader	80
Generator (25 KVA or less)	70
Generator (more than 25 KVA)	82
Grader	85
Hydra Break Ram	90
Impact Pile Driver (diesel or drop)	95
Insitu Soil Sampling Rig	84
Jackhammer	85
Mounted Impact Hammer (hoe ram)	90
Paver	85
Pneumatic Tools	85
Pumps	77
Rock Drill	85
Scraper	85
Tractor	84
Vacuum Excavator (vac-truck)	85
Vibratory Concrete Mixer	80
Vibratory Pile Driver	95

Source: Thalheimer 2000, *FTA 2006, **Ldn Consulting, Inc. 2011
KVA = kilovolt amps

Typical construction projects, with equipment moving from one point to another, work breaks, and idle time, have hourly average noise levels (L_{eq}) that are lower than loud short-term, or instantaneous, peak noise events shown in Table 8. The L_{eq} of each phase is determined by combining the L_{eq} contributions from each piece of equipment used in that phase (FTA 2006). Therefore, typically, hourly average noise levels would be approximately 75 to 80 dBA L_{eq} at 50 feet from the center of the non-impact construction activities area is assumed to occur, with 90 dBA L_{eq} at 50 feet for impact equipment. Noise levels of other activities would be less. Noise levels from construction activities would attenuate with distance at a rate of 6 dBA per doubling of distance over acoustically hard sites, such as streets and parking lots. Intervening structures and/or topography would further attenuate noise levels. These factors generally limit the distance construction noise travels and ensure noise impacts from construction are localized.

Modeling

Construction noise from each of six distinct categories of activity was predicted at the representative nearby noise-sensitive receivers with a technique based on the "general assessment" methodology as appearing in Chapter 12 of the FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006) guidance report. In summary, this technique presumes the two loudest pieces of equipment associated with an activity are operating at full power and located at the geographic center of a construction area or zone. The following details the expected major noise producer(s) based on available anticipated roster of Project construction equipment and schedule, and their location for each studied construction activity phase.

- *Demolition of the Parking Lot (new stadium site)* –Vibrator plates (88 dBA L_{eq} at 50 feet) located up to 550 feet away from the centerpoint of the existing Qualcomm Stadium and 450 feet away from the centerpoint of the new stadium site; concrete/asphalt-crushing plant (86 dBA L_{eq} at 50 feet) centered approximately 1,000 feet east of the existing Qualcomm Stadium footprint.
- *Project Site Preparation* (new stadium site)– Scrapers (92 dBA L_{eq} at 50 feet) located up to 550 feet away from the centerpoint of the existing Qualcomm Stadium and 450 feet away from the centerpoint of the new stadium site.
- *Pile-driving (*new stadium site) – One impact or vibratory-type pile driver (88 dBA L_{eq} at 50 feet) as close as the perimeter of the new stadium site.
- *Facility Construction (new stadium)* – Pettibones and other lifts (95 dBA L_{eq} at 50 feet) at the center of the new stadium site; concrete batch plant (80 dBA L_{eq} at 50 feet) centered approximately 1,000 feet east of the existing Qualcomm Stadium footprint.
- *Demolition of the existing Qualcomm Stadium* – Fans and track hoes (86 dBA L_{eq} at 50 feet) at the center of the existing Qualcomm Stadium footprint; concrete-crushing plant (86 dBA L_{eq} at 50 feet) centered approximately 1,000 feet east of the existing Qualcomm Stadium footprint.

- *Reconstruction of Parking Lot* –Saw cutters and scrapers (92 dBA L_{eq} at 50 feet) located as close as the Project boundary to the northern, eastern, and western sides, and no closer than 235 feet from the southern Project boundary, and not in the far southwest corner of the Project site.

Reference data from the FHWA's *Roadway Construction Noise Model User's Guide* (FHWA 2006) was used to define the sound source levels and acoustical usage factors (i.e., what percentage of time would equipment operate at full power) of construction equipment or activities indicated in the above bullets. The six construction phases listed above were assumed to occur sequentially—not concurrently. Sound propagation between these construction noise sources and the representative receivers was estimated with an Excel spreadsheet model that incorporates algorithms and data based on International Organization for Standardization (ISO) 9613-2 standards, accounting for geometric divergence and acoustical absorption from air and ground effects.

Impact Analysis

Project construction and demolition activities would occur on the Project site. Construction activities of the new stadium would occur in the northeast area of the Project site, with construction staging areas east of Qualcomm Stadium. The demolition of Qualcomm Stadium would occur in the center area of the Project site. Project construction noise would be generated during the following Project construction phases of:

(1) demolition of parking pavement for new stadium footprint,
(2) site preparation including import and placement of fill,
(3) pile driving for new stadium foundation,
(4) construction of the new stadium,
(5) demolition of the existing Qualcomm Stadium, and
(6) reconstruction of the parking lot.

Project noise analysis is based on Project construction/demolition phases occurring separately, i.e., without overlapping. Construction and demolition noise would be localized at the specific areas of construction activity and anticipated to occur from 7 a.m. to 7 p.m. Monday through Saturday, during the allowable construction hours (i.e., within 7 a.m. to 7 p.m.) of the City's noise ordinance.

Project construction activities relating to parking lot pavement removal and/or replacement near the northern and eastern boundaries of the Project site would be closest to residences that are approximately 500 feet to the east (ST-1 and ST-2), approximately 600 feet to the northeast (ST-3), approximately 300 feet to the northwest (LT-3), and approximately 700 feet to the north (LT-2).

Pile driving activities would be farther within the new Stadium footprint, and somewhat farther away from the nearest residences, resulting in distances from pile-driving as follows: approximately 1,050 feet to the east (ST-1); approximately 1,050 feet to the northeast (ST-3); and approximately 800 feet to the north (LT-2).

Qualcomm Stadium Demolition

Demolition of the existing Qualcomm Stadium would be initiated by implosion using explosives in one coordinated event. Implosion methods are very effective for bringing down tall structures that would be difficult to demolish with typical construction equipment, or are too expensive to demolish from the top downward. An implosion also reduces the length of time sensitive receptors are subject to the noise from a long duration of conventional demolition. Implosion methods use highly specialized explosives to undermine the supports of a structure so it collapses either within its own footprint or in a predetermined path. The implosion process is especially suited for high-rise buildings and special structures (e.g., stadiums, cooling towers, smokestacks, boilers, steel mill furnaces) (CEC 2014). Project-specific demolition methods and explosives for the demolition of the existing Qualcomm Stadium would be determined in a demolition plan prior to demolition. The purpose of a demolition plan is to establish methods and procedures to follow for a safe and resourceful demolition (DSI 2012). A demolition plan includes, but is not limited to:

- Structure description: dimensions, materials, and foundation.
- Demolition guidelines: permits required, utility companies notification; temporary perimeter fencing; structural survey; environmental survey (i.e., asbestos and lead-based paint); universal waste stream removal; pre-demolition meeting on-site; site security; blasting plan; dust suppression methods; and debris handing, sorting, reuse, stockpiling, transport, hauling, and disposal location at an appropriate landfill.
- Safety procedures: public protection, fire protection and prevention.
- Daily housekeeping procedures.
- Worker personal protective equipment.
- Waste streams collection: debris, masonry, metals, universal waste.

- Emergency procedures and contacts.
- Public notifications and complaint process.
- Applicable federal, state, and local laws and regulations.

The noise level of the implosion event would be specific to the methods used and parameters such as charge weight, delay, and position that are not known at this time. However, implosion of concrete structures has resulted in maximum noise levels in the range of 120 to 135 dB at the source, which last only a brief period of time (typically less than 8 seconds), with human safety standoff distance of approximately 1,000 feet during the implosion (AED 2011). Since the implosion event would be under 1 minute; the 1-hour average daytime noise level (L_{eq}) would not increase substantially due to the implosion event itself. Demolition noise levels would be predominantly from the continuous sorting, collecting, crushing, and hauling of demolished materials using heavy equipment, as previously calculated and discussed.

Construction Vehicle Traffic

Construction noise would be generated off-site by Project construction-related vehicle traffic trips to and from the job site on local roadways including daily worker commute vehicle trips and by heavy truck trips from construction equipment and materials deliveries, import of fill material (approximately 490,000 cy (24,500 truck trips)), export of excavated material from the new stadium footprint (approximately 920,000 cy [48,091 trips]), and export of demolished concrete from the Qualcomm Stadium and demolished asphalt from the parking lot (totaling approximately 54,000 cy [5,400 trips]). These hauling phases would not overlap; therefore, the export of excavated material (approximately 920,000 cy [48,091 trips]) would be the worst-case hauling scenario based on number of truck trips required within the required schedule and would equate to:

- Assuming a 16-week schedule to haul the import fill, 6 construction days per week, over an 8-hour day, equates to 125 truck roundtrips per hour.
- Adjusting 125 truck trips to equivalent passenger vehicles, results in approximately 375 equivalent passenger vehicles.

The proposed truck haul route would leave the Project site through the main gate of the Project site and travel east along Friars Road to its interchange with I-15. Vehicle traffic on Friars Road is approximately 41,800 annual average daily traffic (AADT) (SANDAG 2015) or 1,742 average hourly traffic volume, which would increase by 375 for a total increased volume of 2,117, or a

22 percent increase. Doubling of traffic volumes (i.e., a 100 percent increase) results in a 3 dB increase, which is barely perceptible to the human ear. The worse-case Project construction truck traffic increase of 22 percent during the hauling of excavated material would result in a 0.9 dBA L_{eq} increase in noise levels along, i.e., Friars Road, which is not a perceivable change in noise level.

Construction Impact Summary

Ambient Noise Levels

Estimated construction noise levels for each phase were calculated at each receptor and logarithmically added to the measured existing ambient noise levels (from Table 7). These log-summed ambient-plus-construction noise levels were then compared to the measured existing ambient noise levels to determine the net increase ambient noise levels at each receptor due to construction noise. The net increase was then compared to the threshold for a substantial temporary increase in ambient noise levels of 10 dBA L_{eq} or greater. The temporary net increase in ambient noise levels at each receptor for a weekday is shown in Table 9.

Table 9
Temporary Net Increase in Ambient Noise Levels, Weekday

Receptor Location ID	**Increase over Existing Ambient, per Phase, on weekdayy Daytime**					
	Phase 1 Demolish Parking Area for New Stadium	**Phase 2 Site Prep for New Stadium**	**Phase 3 Pile Driving for New Stadium**	**Phase 4 Construct New Stadium**	**Phase 5 Demolish Qualcomm Stadium (excludes blasting)**	**Phase 6 Construct New Stadium Parking**
LT-2	2	4	2	3	1	3
LT-3	1	2	1	1	2	**15**
LT-4	0	0	0	0	0	0
ST-1	3	3	1	4	3	8
ST-2	0	0	0	0	0	1
ST-3	0	1	0	1	0	2
ST-4	2	3	1	3	2	5
ST-5	2	4	1	2	4	**22**
ST-7	3	5	1	3	5	**13**

All increase values expressed as dBA L_{eq}
Exceedance is shown in **bold**.

As shown in Table 9, daytime construction noise levels resulted in substantial predicted increases in ambient noise levels during the daytime on a weekday at locations LT-3, ST-5 and ST-7.

As shown in Table 10, daytime construction noise levels resulted in substantial predicted increases in ambient noise levels during the daytime on Saturday at locations LT-3, ST-1 and ST-5. Detailed spreadsheet calculations are provided in Appendix A.

Table 10
Temporary Net Increase in Ambient Noise Levels, Saturdays

Receptor Location ID	dBA Increase over Existing Ambient, per Phase, on Saturday Daytime					
	Phase 1 Demolish Parking Area for New Stadium	Phase 2 Site Prep for New Stadium	Phase 3 Pile Driving for New Stadium	Phase 4 Construct New Stadium	Phase 5 Demolish Qualcomm Stadium (excludes blasting)	Phase 6 Construct New Stadium Parking
LT-2	2	4	2	3	1	4
LT-3	0	1	0	1	1	**10**
LT-4	0	0	0	0	0	0
ST-1	4	4	2	5	4	**10**
ST-2	0	0	0	0	0	2
ST-3	0	1	0	1	0	2
ST-4	3	5	2	5	4	8
ST-5	1	2	0	1	2	**17**
ST-7	0	1	0	0	1	4

All increase values expressed as dBA L_{eq}
Exceedance is shown in **bold**.

In summary, project construction noise levels would result in a substantial temporary net increase in ambient noise levels during Project construction activities at some noise-sensitive receptors in proximity to construction activities as shown in Tables 9 and 10. This is a significant impact.

The increase in traffic volume due to Project construction-related traffic would result in a less than 1 dBA L_{eq} increase in noise levels along adjacent roadways, which is not considered a perceivable change in noise level. This is a less than significant impact.

Noise Standards

Project construction noise impacts would also be significant if the Project would exceed the City’s noise ordinance limits for construction noise levels of 75 dBA L_{eg} at the affected residential property line during the allowable construction hours of 7 a.m. to 7 p.m. Monday through Saturday. Project construction activities at the northeastern boundary of the new stadium site would be closest to the residences located approximately 500 feet to the east (ST-1 and

ST-2); approximately 600 feet to the northeast (ST-3); approximately 300 feet to the northwest (LT-3); and approximately 700 feet to the north (LT-2).

Daytime construction noise levels for each construction phase were calculated at each receptor, as shown in Table 11, and compared to the City's construction noise level limit of 75 dBA L_{eg} at affected residential property lines during the allowable construction hours of 7 a.m. to 7 p.m. Monday through Saturday.

Table 11
Construction Noise Levels at Receptors

Receptor Location ID	Construction Noise (dBA L_{eg}) at Receptor, per Phase					
	Phase 1 Demolish Parking Area for New Stadium	Phase 2 Site Prep for New Stadium	Phase 3 Pile Driving for New Stadium	Phase 4 Construct New Stadium	Phase 5 Demolish Qualcomm Stadium (excludes blasting)	Phase 6 Construct New Stadium Parking
LT-2	61	64	59	62	57	64
LT-3	53	57	50	55	57	74
LT-4	49	52	44	51	53	53
ST-1	60	61	56	63	60	68
ST-2	57	57	53	61	59	67
ST-3	59	61	57	61	58	67
ST-4	53	57	52	57	55	61
ST-5	55	59	49	55	58	**79**
ST-7	50	54	45	51	54	64

All noise levels expressed as dBA L_{eg}
Exceedance is shown in **bold**.

As shown in Table 11 daytime construction noise levels would not exceed City's construction noise level limit of 75 dBA L_{eg} at all receptors during all construction phases. The only exception is ST-5 during Phase 6. This would be a significant impact. Detailed calculations are provided in as Appendix A.

6.2 VIBRATION

Potential vibration impacts may occur from Project construction activities including pavement demolition, site excavation and surface grading, new stadium construction, and demolition of the existing Qualcomm Stadium. Although it is possible for vibrations from construction projects to cause building damage, the vibrations from construction activities are almost never of sufficient amplitude to cause more than minor cosmetic damage to buildings (FTA 2006). Groundborne vibration generated by construction projects is usually highest during pile driving, soil compacting, jackhammering, and demolition-related activities. Table 12 shows typical vibration levels for various pieces of construction equipment that generate high vibration levels (FTA 2006).

Table 12
Construction Equipment Vibration Levels

Equipment		PPV at 25 Feet (in/sec)
Pile Driver (impact)	Upper range	1.518
	Typical	0.644
Pile Driver (sonic)	Upper range	0.734
	Typical	0.170
Hydromill (slurry wall)	Soil	0.008
	Rock	0.017
Clam Shovel Drop (slurry wall)		0.202
Vibratory Roller		0.210
Hoe Ram		0.089
Large Bulldozer		0.089
Caisson Drilling		0.089
Loaded Trucks		0.076
Jackhammer		0.035
Small Bulldozer		0.003

Source: FTA 2006

As shown in Table 12, vibration levels at 25 feet from construction equipment, with the exception of pile drivers, are at or below the threshold of risk of structural damage (0.2 ppv in/sec). At distances beyond 65 feet, vibration levels would be below the threshold of risk of structural damage and below the threshold for human perception (0.1 ppv in/sec) beyond 80 feet.

Structures in proximity to the Project are located approximately 400 feet or greater from where major construction activities would occur. The KMEP MVT on the north side of San Diego Mission Road is located 400 feet from where the nearest pile driving would occur. At this distance, vibration from pile driving (approximately 1.5 in/sec ppv at 25 feet) would attenuate to 0.02 in/sec ppv, which is substantially below the vibration threshold of 0.12 in/sec ppv for structural damage (FTA 2006). Therefore, groundborne vibration generated by construction of the Project would not be perceptible at nearby people or houses and would not result in cosmetic or structural damage to nearby structures. Vibration from Project construction would not expose people or structures to excessive vibration levels that would result in structural damage or human annoyance. This is a less than significant impact.

Transport of materials by heavy trucks to and from construction sites has the potential to generate higher levels of groundborne vibration than mechanical equipment. However, heavy trucks generally operate at very low speeds on-site. Therefore, the groundborne vibration induced by heavy truck traffic is not anticipated to be perceptible at distances greater than 25 feet, and would be a less than significant impact.

6.3 TRAFFIC NOISE

Project construction would generate construction traffic from daily construction worker trips, construction equipment and materials delivery truck trips, and demolition materials truck hauling. However, construction vehicles would access the Project site using I-8 and I-15, where Project construction trips would be a minor contribution to the ADT volumes of I-8 and I-15, which include a high percentage of truck volumes. Exterior ambient noise levels at noise-sensitive receptors located adjacent to I-15 and I-8 are currently likely to exceed standards established in the Noise Element of the General Plan. Project construction traffic would not expose people to current or future transportation noise levels that exceed standards established in the Noise Element of the General Plan. This is a less than significant impact.

The Project would be the replacement of Qualcomm Stadium with the Project of slightly less seating capacity and parking area. Therefore, the Project would generate similar or slightly less traffic volumes on event days. Event traffic added to congested roadways adjacent to the Project site slows traffic, which reduces noise from traffic; and therefore would not increase traffic noise on roadways adjacent to the stadium and nearby noise-sensitive receptors.

Project operational traffic would not expose people to current or future transportation noise levels that exceed standards established in the Noise Element of the General Plan. This is a less than significant impact.

6.4 OPERATIONAL NOISE

Methodology and Modeling

Stadium event noise was modeled at the existing Qualcomm Stadium and for the new stadium to identify event-related noise levels at nearby noise-sensitive receptors. The Cadna/A® Noise Prediction Model (Version 4.5.147) was used to estimate the noise levels from nominal Project operations at the studied noise-sensitive receptors appearing in Figure 3. Cadna/A® is a Windows® based software program that uses algorithms compatible with ISO 9613-2 standards for outdoor sound propagation calculation. The model accepts sound power levels as user-defined input parameters for sources of sound emission. The software's calculations account for classical sound wave geometric divergence, plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. To account for terrain effects, available topographical data was incorporated into Cadna/A® as part of the three-dimensional (3D) model space.

In the case of this operational noise analysis, the existing Qualcomm Stadium and the new stadium were both rendered as a tall, round barrier with three stacked decks of horizontal area sources within, each pitched to resemble the existing seating area architecture and arrangement. For four typical events studied, as listed below, each seating area was populated with shouting attendees at a density reflecting actual or average attendance (from publicly available online sources) including:

- NFL – San Diego Chargers home football game (average 2014 season attendance = 65,432) (ESPN 2015)
- College – SDSU Aztecs football game (average 2014 season attendance = 32,294) (SDSU 2015)
- AMA SX event (2014 attendance = 56,828) (San Diego Supercross 2015)
- Concert (using recent July 9, 2015 One Direction event attendance = 52,831) (San Diego Union Tribune 2015)

For an NFL game, a college football game, and an SX event, Cadna/A-modeled crowd noise was calibrated with "crow's nest" location measurement data from an NFL game at Candlestick Park as appearing in Appendix K of the 49ers Santa Clara Stadium Project Draft EIR (City of Santa Clara 2009). This information was used because it provides a representative noise venue. This measurement data from the Candlestick Park noise study includes acoustical contribution from fireworks, cheering (with notable rises in sound level during touchdowns), and nominal stadium audio/visual system operation. Such calibrated crowd noise was also applied to the prediction model of noise emission from an SX event, to which the noise from motorcycles on a closed-circuit track within the Stadium was added.

Sound measurements taken within the stadium during the One Direction concert (CV-1, CV-2, and CV-3) provided data to help calibrate the Cadna/A model of crowd noise and amplified music for such an event. The concert model also accounted for the partial seating deck usage and the addition of a floor-level attendee area. Cadna/A-modeled predictions of noise, without contribution of nearby roadway traffic, were then logarithmically added to representative time periods of measured traffic noise levels, so that Project-plus-traffic ambient sound levels can be compared between two categories of cases: (1) events at the existing Qualcomm stadium, and (2) potential future events at the new stadium.

Impact Analysis

Ambient Noise Levels

Project operation would generate operational noise levels similar to those from the exiting Qualcomm Stadium. However, the new stadium would be located in the northeast corner of the existing Qualcomm Stadium parking lot, closer to noise-sensitive receptors located to the east (ST-1), northeast (ST-3), and north (LT-2). For all of the event scenarios modeled at the existing Qualcomm Stadium and the new stadium, the net increase in ambient noise levels at all of the ambient monitoring locations (i.e., residences) was less than the significance threshold of a 3 dBA L_{eq} or greater increase for a significance permanent increase in ambient noise levels, except at LT-2 from a concert event at the new stadium, which results in a 4 dBA L_{eq} increase. Based on this operations noise analysis, this 4 dBA L_{eq} increase at the noise-sensitive receiver represented by LT-2 is a significant and unavoidable noise impact.

In addition to evaluating Project impacts based on the 1-hour average (L_{eq}), an analysis was performed based on day-night average (CNEL) and a significant permanent increase is defined as a direct Project-related permanent ambient increase of 3 dBA or greater, where exterior noise levels would already exceed the City's significant threshold (i.e., 65 dBA CNEL daytime for single-family residential land uses) (City of San Diego 2011). In this case, the predicted operations noise from the existing Qualcomm Stadium and the Project were considered with respect to an entire diurnal cycle and not merely the anticipated duration of a typical event in progress. At all nine nearby representative locations (LT-2, LT-3, LT-4, ST-1, ST-2, ST-3, ST-4, ST-5, ST-7), the net increase in CNEL is expected to be less than 3 dBA and would be considered less than significant for all four types of studied events (NFL game, SDSU Aztecs game, SX, concert).

While both operation noise impact assessment methods predictively evaluate the net outdoor ambient increment due to the Project, this noise analysis recommends adoption of L_{eq} metric usage as a more conservative approach to determining potential impacts and potential noise mitigation need. Hence, the net ambient noise increment involving Project operation predicted at LT-2 is a significant impact and unavoidable impact.
Noise Standards

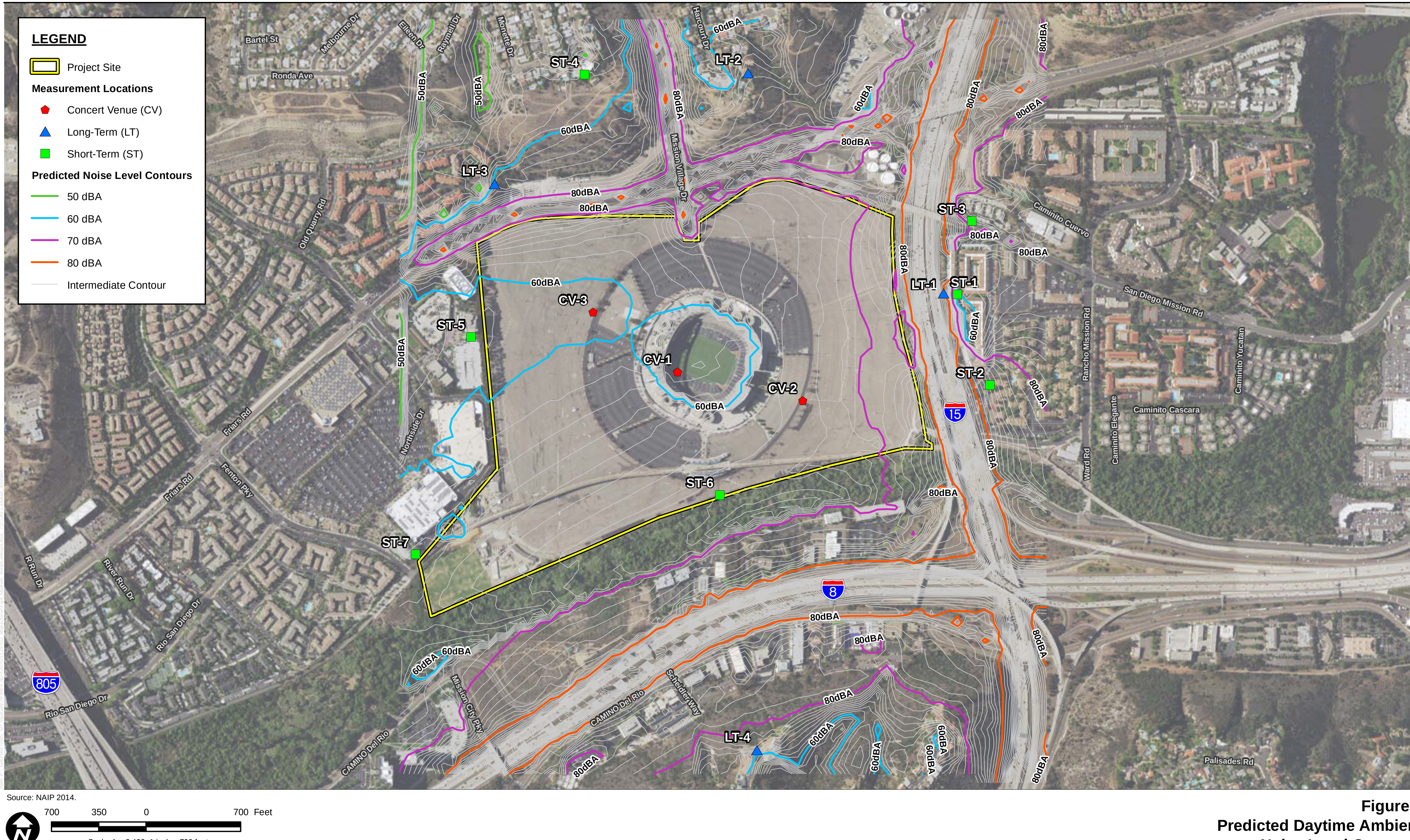
The City's noise ordinance limits operational noise levels at and beyond property lines for various land uses by time of day for noise generated by on-site sources associated with Project operation (Table 4) (e.g., 50 dBA L_{eg} for single-family residential from 7 a.m. to 7 p.m., and 45 dBA L_{eg} from 7 p.m. to 10 p.m.). Based on ambient noise levels measured for the Project (Table 7), ambient noise levels at noise-sensitive receptors to the east (ST-1 and ST-2), northeast (ST-3), and north (LT-2) currently exceed the sound level limits of the City's Noise Ordinance (Table 4).

In addition, as discussed above in the Ambient Noise Levels section, under all of the event scenarios modeled at the existing Qualcomm Stadium and at the new stadium, the net increase in ambient noise levels at all of the ambient monitoring locations (i.e., residences) resulted in a less than significant increase in ambient noise levels (i.e., less than a 3 dBA L_{eq} increase), except at LT-2 where a 4 dBA L_{eq} increase was predicted to occur from a concert event at the Project site.

Therefore, Project operational noise levels (i.e., during stadium events) would exceed the operational noise levels of the City's noise ordinance at a residential property line by time of day for noise generated by on-site sources associated with Project operation. This is a significant impact.

Noise Level Contours

To help illustrate the anticipate potential changes in the outdoor ambient sound environment in the vicinity of the Project, Figures 4 and 5 provide modeled noise level contours at the existing Qualcomm Stadium and at the nearest residences in the surrounding area for non-event and event days, respectively. The depiction of noise contours in Figure 4 represents only the predicted acoustical contribution of nearby road traffic noise and does not account for other sources in the outdoor ambient environment. However, based on available AADT volumes (Caltrans 2015; SANDAG 2015) this traffic noise was modeled to yield L_{eq} values that are within ±3 dBA of the measured values at the long-term locations from the field survey of existing ambient noise. Figure 5 depicts the added acoustical contribution of the typical NFL game to the traffic-only noise of Figure 4. The noise contours of Figure 6 present the predicted acoustical combination of modeled road traffic and noise during a typical NFL game from the new stadium position.



Source: NAIP 2014.

700 350 0 700 Feet

Scale: 1 = 8,400; 1 inch = 700 feet

Figure 4
Predicted Daytime Ambient Noise Level Contours

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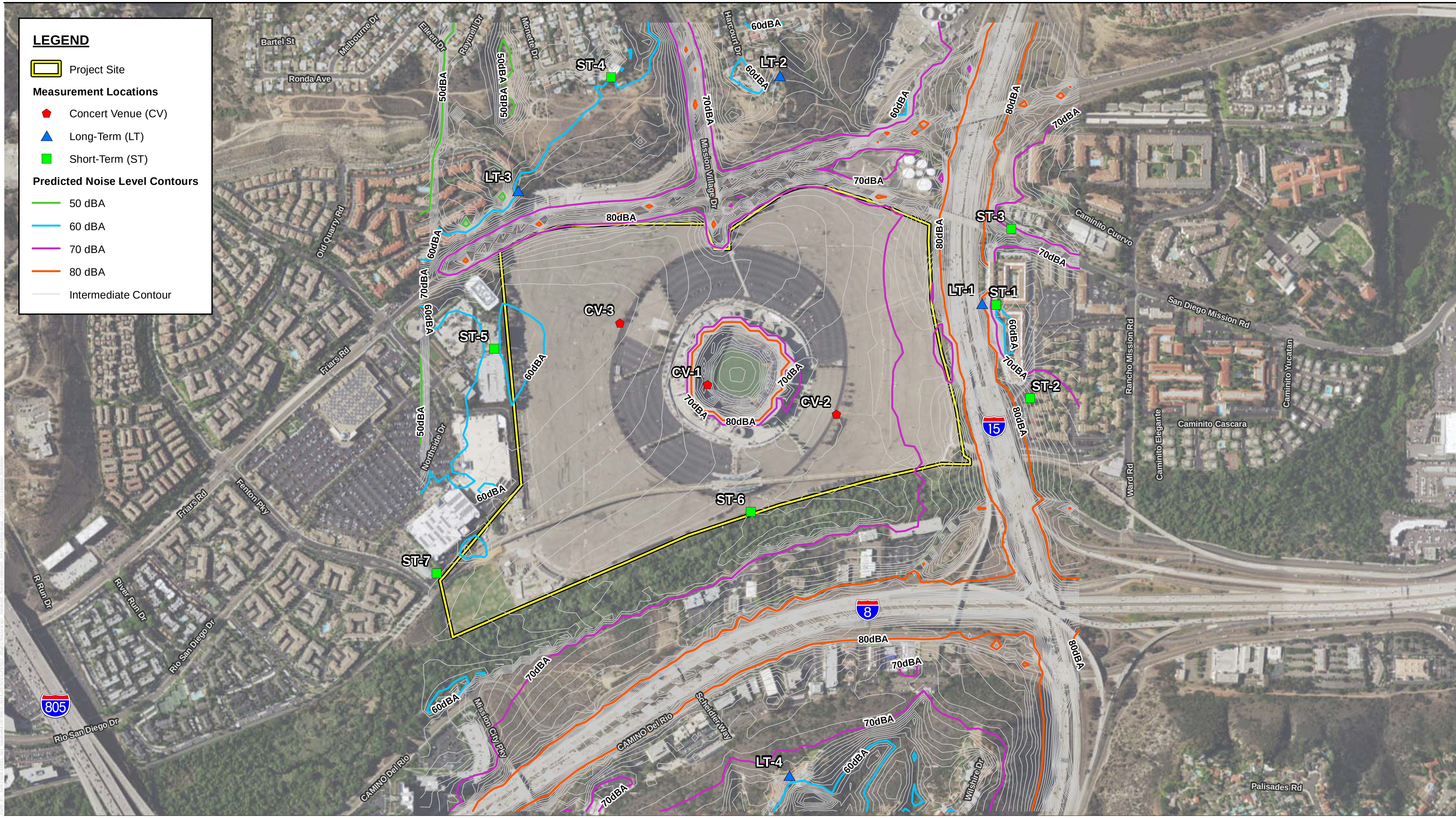

Source: NAIP 2014.

700 350 0 700 Feet

Scale: 1 = 8,400; 1 inch = 700 feet

Figure 5
Predicted Daytime Ambient plus Typical NFL Game Event Existing Location Noise Level Contours

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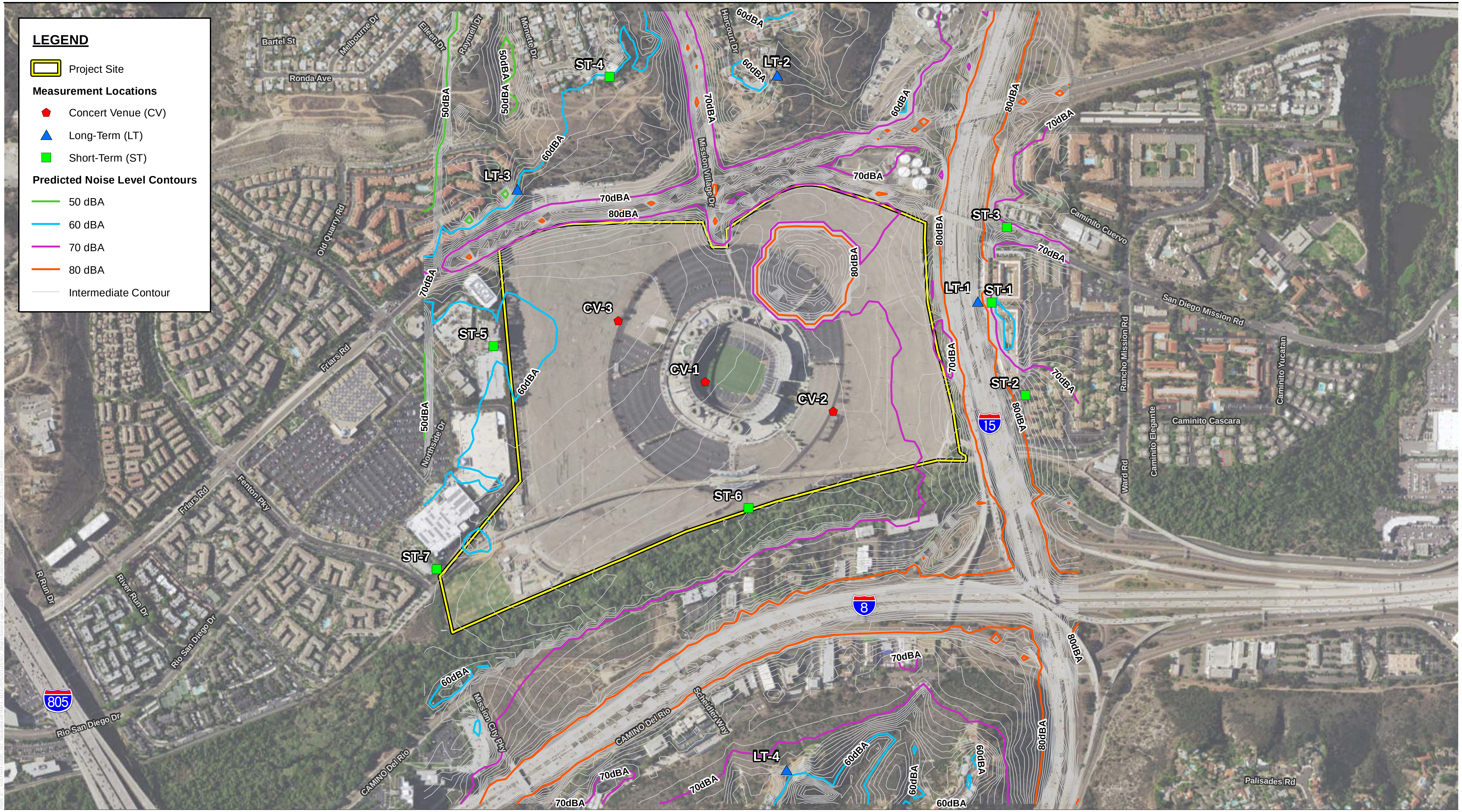

Source: NAIP 2014.

700 350 0 700 Feet

Scale: 1 = 8,400; 1 inch = 700 feet

Figure 6
Predicted Daytime Ambient plus Typical NFL Game Event Proposed Location Noise Level Contours

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7.0 MITIGATION MEASURES

7.1 MITIGATION MEASURES

The noise reduction measures provided below are for the purpose of reducing and minimizing Project operation and construction noise.

7.1.1 Operation

The following operation noise reduction measure is required to reduce and minimize noise levels during Project operation associated with an event in progress.

- NOI-1 (Implement Sound Amplification Controls) – Incorporate electronic controls or limits into the final design of the new stadium's audio/visual sound system, as well as tie-ins from hosted performers to control amplified speech and music noise at the source, and thus offer some degree of expected sound-level reduction at the potentially affected receiver position.

7.1.2 Construction Noise Reduction Measures

The following typical construction noise reduction measures are required to reduce and minimize noise levels during construction, including, but not limited to:

- NOI-2 (Implement Noise Complaint Reporting) – The Project (via construction contractor) would establish a telephone hot-line for use by the public to report any significant adverse noise conditions associated with the construction and operation of the Project. If the telephone is not staffed 24 hours per day, the contractor shall be required to include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This hot-line telephone number shall be posted at the Project site during construction in a manner visible to passersby. This telephone number shall be maintained until the Project has been considered commissioned and ready for operation.

- NOI-3 (Implement Noise Complaint Investigation) – Throughout the construction of the Project, the contractor shall be required to document, investigate, evaluate, and attempt to resolve all Project-related noise complaints. The contractor or its authorized agent shall be required to:

- Use a Noise Complaint Resolution Form to document and respond to each noise complaint;
    - Contact the person(s) making the noise complaint within 24 hours;
    - Conduct an investigation to attempt to determine the source of noise related to the complaint; and
    - Take all reasonable measures to reduce the noise at its source.

- NOI-4 (Implement Construction Practices) – The following are typical field techniques for reducing noise from construction activities, with the purpose of reducing aggregate construction noise levels at nearby noise-sensitive receivers:
    - To the extent practical and unless safety provisions require otherwise, adjust all audible back-up alarms downward in sound level, reflecting locations that have expected lower background level, while still maintaining adequate signal-to-noise ratio for alarm effectiveness. Consider signal persons and strobe lights, or alternative safety equipment and/or processes as allowed, for reducing reliance on high-amplitude sonic alarms.
    - Place stationary noise sources, such as generators and air compressors, on the Project site away from affected noise-sensitive receivers. Place non-noise-producing mobile equipment such as trailers in the direct sound pathways between suspected major noise-producing sources and sensitive receivers.

- NOI-5 (Implement Equipment Noise Reduction) – The following are typical practices for construction equipment selection (or preferences) and expected function that can help reduce noise.
    - Use concrete crushers or pavement saws rather than impact devices such as jackhammers, pavement breakers, and hoe rams for tasks such as concrete or asphalt demolition and removal.
    - Pneumatic impact tools and equipment used at the construction site shall have intake and exhaust mufflers recommended by the manufacturers thereof, to meet relevant noise limitations.
    - Provide impact noise producing equipment (i.e., jackhammers and pavement breaker[s]) with noise attenuating shields, shrouds or portable barriers or enclosures, to reduce operating noise.

- Line or cover hoppers, storage bins, and chutes with sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).
- Provide upgraded mufflers, acoustical lining, or acoustical paneling for other noisy equipment, including internal combustion engines.
- Use alternative procedures of construction and select a combination of techniques that generate the least overall noise and vibration.
- Use construction equipment manufactured or modified to reduce noise and vibration emissions, such as:
  - Electric instead of diesel-powered equipment.
  - Hydraulic tools instead of pneumatic tools.
  - Electric saws instead of air- or gasoline-driven saws.

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8.0 REFERENCES

AECOM, Inc. 2015a. *Biological Technical Report, City of San Diego Stadium Reconstruction Project*, City of San Diego, California. July.

AECOM, Inc. 2015b. *Draft Traffic Impact Analysis Report, Stadium Replacement EIR*, City of San Diego, California. July.

Advanced Explosives Demolition (AED). 2011. Community Notice: Implosion of Keystone Towers, Indianapolis, Indiana. August 28. Available at http://www.indy.gov/eGov/City/DMD/Documents/CD/Community%20Notice-Keystone%20Towers.pdf.

California Department of Transportation (Caltrans). 2002. Transportation Related Earthborne Vibrations (Caltrans Experiences). February 20.

California Department of Transportation (Caltrans). 2011. *Traffic Noise Analysis Protocol for New Highway and Reconstruction Projects, including Technical Noise Supplement*. May. Available at http://www.dot.ca.gov/hq/env/noise/pub/ca_tnap_may2011.pdf.

California Department of Transportation (Caltrans). 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. Table 2-5 Typical Noise Levels, page 2-20. September. Available at http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf.

California Department of Transportation (Caltrans). 2015. Annual Daily Traffic Volumes. July. Available at http://traffic-counts.dot.ca.gov/.

California Energy Commission (CEC). 2014. ACE Project Decommissioning Plan. November 25. Available at http://www.energy.ca.gov/business_meetings/2015_packets/2015-06-10/Item_04_Argus_Cogeneration_Expansion/ACE_Decommissioning_Plan.pdf

City of San Diego. 2008. *City of San Diego General Plan, Noise Element*. March. Available at http://www.sandiego.gov/planning/genplan/pdf/generalplan/adoptednoiseelem.pdf.

City of San Diego. 2010. San Diego Municipal Code, Chapter 5, Article 9.5, Division 4, Noise Ordinance. July. Available at http://docs.sandiego.gov/municode/MuniCodeChapter05/Ch05Art9.5Division04.pdf.

City of San Diego. 2011. *California Environmental Quality Act (CEQA) Significance Determination Thresholds*, Development Services Department. January. Available at http://www.sandiego.gov/development-services/pdf/news/sdtceqa.pdf.

City of Santa Clara. 2009. *Draft Environmental Impact Report, 49ers Santa Clara Stadium Project*. *Appendix K: 49ers Stadium Project Environmental Noise Assessment.* July. Available at http://santaclaraca.gov/modules/showdocument.aspx?documentid=12782.

Demolition Services, Inc. (DSI). 2012. Demolition and Disposal Plan, 4825 Glenbrook Road, NW, Washington, D.C. February 17. Available at http://www.nab.usace.army.mil/Portals/63/docs/SpringValley/Glenbrook_Rd._Demolition_and_Disposal_Plan.pdf.

ESPN. 2015. Available at http://espn.go.com/nfl/attendance. Last accessed July 17, 2015.

Federal Highway Administration (FHWA). 2006. *Roadway Construction Noise Model User's Guide*, FHWA-HEP-05-054. Available at http://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf. Last accessed July 17, 2015.

Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment*. Washington, D.C. May. Available at http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf.

International Organization for Standardization (ISO). 1996. *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.* ISO 9613-2:1996(E).

Ldn Consulting, Inc. 2011. Noise Assessment University District Rock Crusher, Conditional Use Permit, City of San Marcos. August 2011. Available at http://www.ci.san-marcos.ca.us/Modules/ShowDocument.aspx?documentid=4516.

San Diego Association of Governments (SANDAG). 2015. Average Daily Traffic Volumes. Available at http://www.sandag.org/resources/demographics_and_other_data/transportation/adtv/index.asp. Last accessed July 17, 2015.

San Diego Chargers. 2015. San Diego Chargers website, gameday information. Available at http://www.chargers.com/gameday/attending-a-home-game.

San Diego County Regional Airport Authority (SDCRAA). 2010. Montgomery Field Airport, Airport Land Use Compatibility Plan. December 20. Available at http://www.san.org/DesktopModules/Bring2mind/DMX/Download.aspx?EntryId=2985&Command=Core_Download&language=en-US&PortalId=0&TabId=307.

San Diego County Regional Airport Authority (SDCRAA). 2014. San Diego International Airport, Airport Land Use Compatibility Plan. May 1. Available at http://www.san.org/DesktopModules/Bring2mind/DMX/Download. aspx?EntryId=2990&Command=Core_Download&language=en-US&PortalId=0&TabId=180.

San Diego State University (SDSU). 2015. Available at http://www.goaztecs.com/sports/m-footbl/spec-rel/sdsu-m-footbl-CumulativeStats.
html.

San Diego Supercross. 2015. Available at http://www.race-dezert.com/forum/threads/san-diego-supercross-2015.118771/. Last accessed July 17, 2015.

San Diego Union Tribune. 2015. Available at http://www.sandiegouniontribune.com/news/2015/jul/10/one-direction-tour-debut-concert-review/. Last accessed July 17, 2015.

Thalheimer, Erich. 2000. Construction Noise Control Program and Mitigation Strategy as the Central Artery/Tunnel Project. *Noise Control Engineering Journal* 48(5) September/October.

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APPENDIX A

NOISE DATA

Weekday Daytime Predicted Hourly Construction Noise Levels (dBA)

Receiver Location ID	Existing Ambient Noise w/out Project	Per Phase, Construction Noise Plus Existing Ambient						Per Phase, Increase over Existing Ambient					
		Phase 1 Demolish Parking Area for Stadium Reconstruction	Phase 2 Site Preparation for Stadium Reconstruction	Phase 3 Pile Driving for Stadium Reconstruction	Phase 4 Stadium Reconstruction	Phase 5 Demolish Qualcomm Stadium (excludes blasting)	Phase 6 Construct Parking for Stadium Reconstruction	Phase 1 Demolish Parking Area for Stadium Reconstruction	Phase 2 Site Preparation for Stadium Reconstruction	Phase 3 Pile Driving for Stadium Reconstruction	Phase 4 Stadium Reconstruction	Phase 5 Demolish Qualcomm Stadium (excludes blasting)	Phase 6 Construct Parking for Stadium Reconstruction
LT-2	63	65	67	65	66	64	66	2	4	2	3	1	3
LT-3	59	60	61	60	60	61	74	1	2	1	1	2	15
LT-4	67	67	67	67	67	67	67	0	0	0	0	0	0
ST-1	61	64	64	62	65	64	69	3	3	1	4	3	8
ST-2	71	71	71	71	71	71	72	0	0	0	0	0	1
ST-3	69	69	70	69	70	69	71	0	1	0	1	0	2
ST-4	57	59	60	58	60	59	62	2	3	1	3	2	5
ST-5	57	59	61	58	59	61	79	2	4	1	2	4	22
ST-7	51	54	56	52	54	56	64	3	5	1	3	5	13

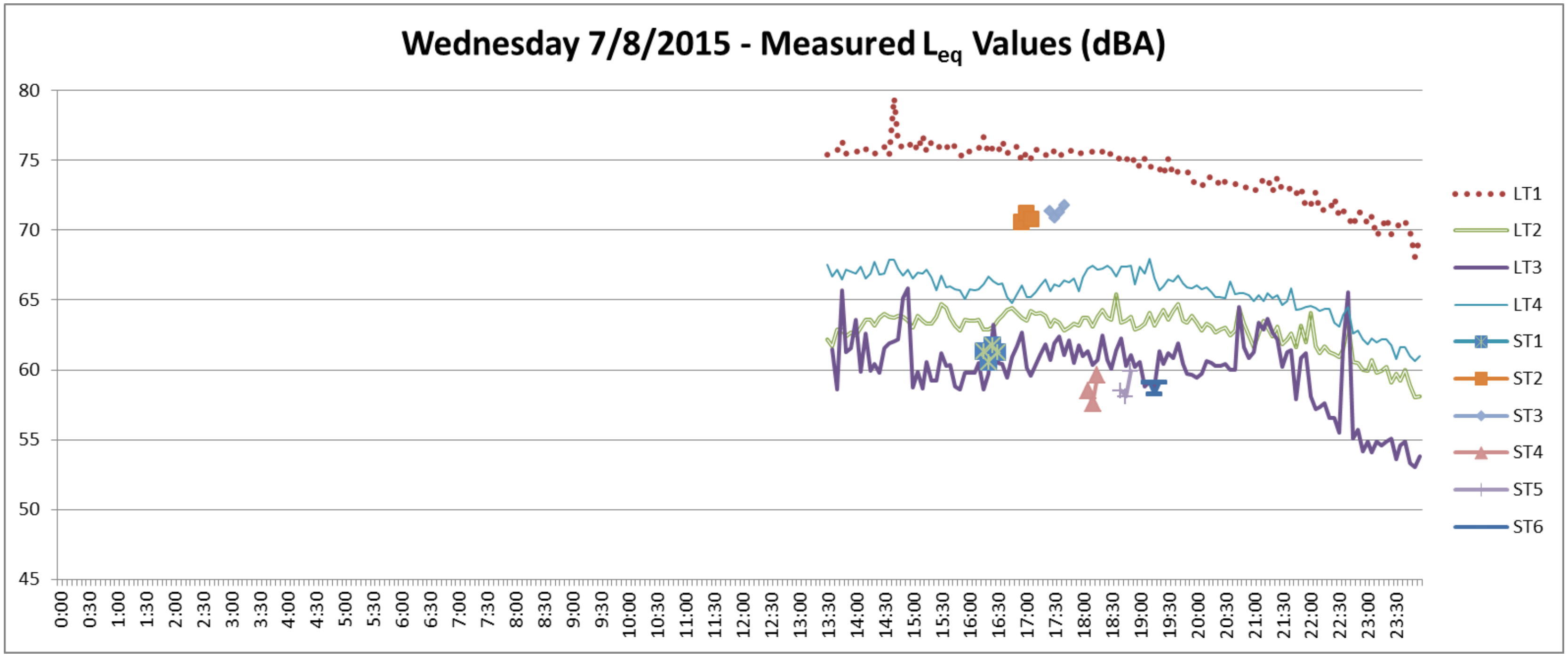
Saturday Daytime Predicted Hourly Construction Noise Levels (dBA)

Receiver Location ID	Existing Ambient Noise w/out Project	Per Phase, Construction Noise Plus Existing Ambient						Per Phase, Increase over Existing Ambient					
		Phase 1 Demolish Parking Area for Stadium Reconstruction	Phase 2 Site Preparation for Stadium Reconstruction	Phase 3 Pile Driving for Stadium Reconstruction	Phase 4 Stadium Reconstruction	Phase 5 Demolish Qualcomm Stadium (excludes blasting)	Phase 6 Construct Parking for Stadium Reconstruction	Phase 1 Demolish Parking Area for Stadium Reconstruction	Phase 2 Site Preparation for Stadium Reconstruction	Phase 3 Pile Driving for Stadium Reconstruction	Phase 4 Stadium Reconstruction	Phase 5 Demolish Qualcomm Stadium (excludes blasting)	Phase 6 Construct Parking for Stadium Reconstruction
LT-2	62	64	66	64	65	63	66	2	4	2	3	1	4
LT-3	64	64	65	64	65	65	74	0	1	0	1	1	10
LT-4	67	67	67	67	67	67	67	0	0	0	0	0	0
ST-1	59	63	63	61	64	63	69	4	4	2	5	4	10
ST-2	70	70	70	70	70	70	72	0	0	0	0	0	2
ST-3	69	69	70	69	70	69	71	0	1	0	1	0	2
ST-4	54	57	59	56	59	58	62	3	5	2	5	4	8
ST-5	62	63	64	62	63	64	79	1	2	0	1	2	17
ST-7	62	62	63	62	62	63	66	0	1	0	0	1	4

Stadium Event Noise Level Comparison
Measured Existing Ambient + Predicted Event Noise

Receiver Location ID	NFL Football Game Sunday Daytime			Collegiate Football Game Saturday Daytime			Motorsports (Supercross) Event Saturday Evening			Live Music / Concert Event Weekday Night		
	Qualcomm Stadium	Stadium Reconstruction Project	Project Increase	Qualcomm Stadium	Stadium Reconstruction Project	Project Increase	Qualcomm Stadium	Stadium Reconstruction Project	Project Increase	Qualcomm Stadium	Stadium Reconstruction Project	Project Increase
LT-2	62	64	1	63	63	1	62	64	2	66	69	4
LT-3	58	58	0	64	64	0	58	58	0	61	60	-1
LT-4	67	67	0	67	67	0	66	66	0	65	63	-2
ST-1	59	60	1	59	59	0	58	59	1	59	60	1
ST-2	69	69	0	70	70	0	69	69	0	67	66	-1
ST-3	68	68	0	69	69	0	68	68	0	66	67	1
ST-4	58	59	1	56	57	1	56	58	2	65	66	1
ST-5	56	55	-1	62	62	0	57	56	-1	61	59	-2
ST-7	N/A[1]	N/A[1]	N/A[1]	62	62	0	61	61	0	58	56	-2

1. ST-7 represents Mission Valley Library, which is closed on Sundays and thusly considered nonsensitve on this day.


Wednesday 7/8/2015 - Measured L_{eq} Values (dBA)
80
75
70
65
60
55
50
45
0:00
0:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
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5:00
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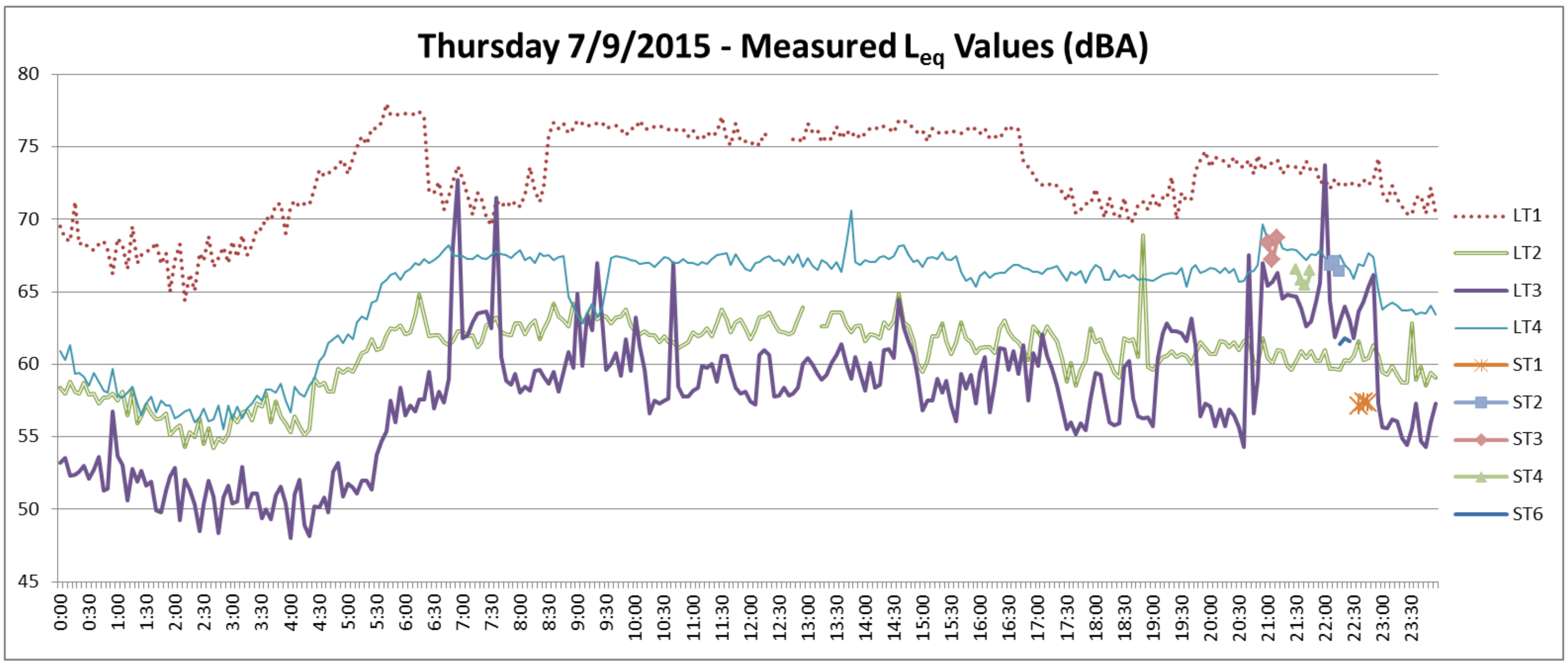
19:00
19:30
20:00
20:30
21:00
21:30
22:00
22:30
23:00
23:30
LT1
LT2
LT3
LT4
ST1
ST2
ST3
ST4
ST5
ST6


Thursday 7/9/2015 - Measured L_{eq} Values (dBA)
80
75
70
65
60
55
50
45
0:00
0:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
5:00
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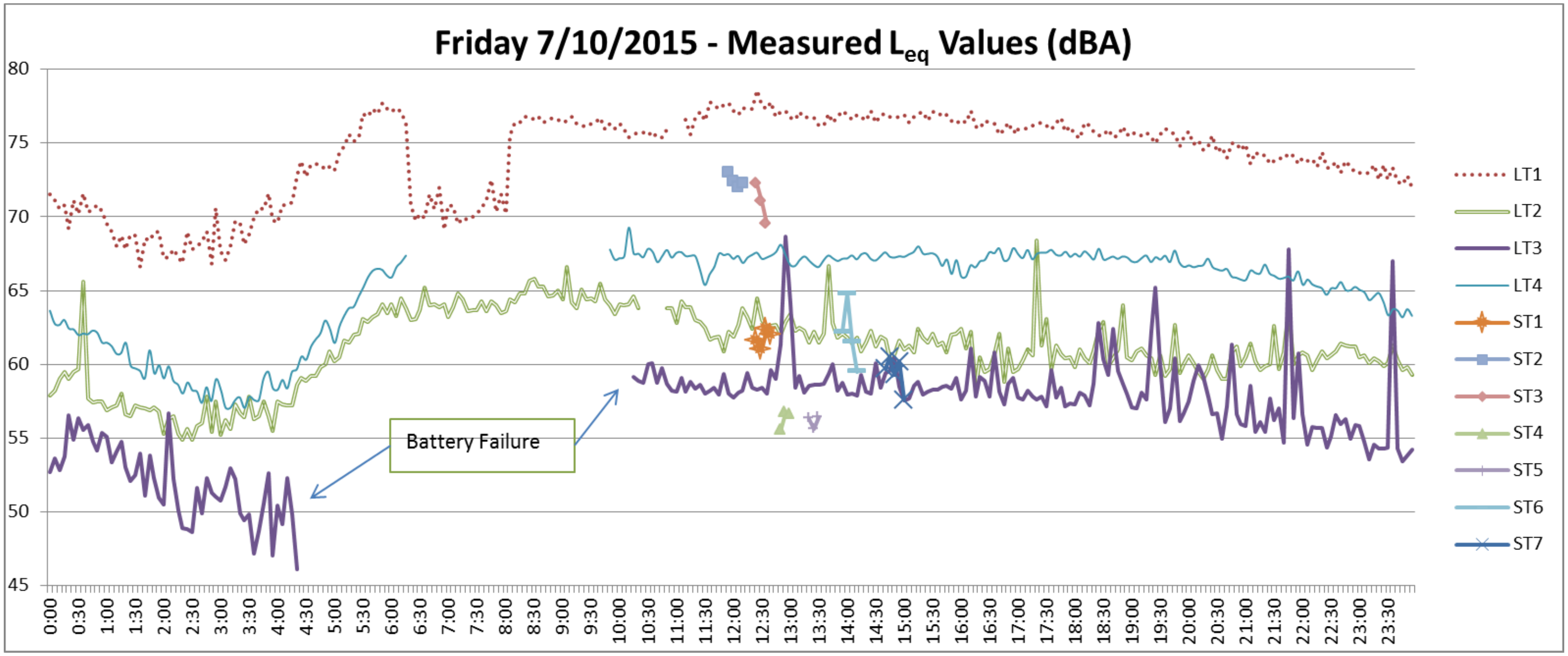
23:00
23:30
LT1
LT2
LT3
LT4
ST1
ST2
ST3
ST4
ST6


Friday 7/10/2015 - Measured L_{eq} Values (dBA)
80
75
70
65
60
55
50
45
Battery Failure
0:00
0:30
1:00
1:30
2:00
2:30
3:00
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4:00
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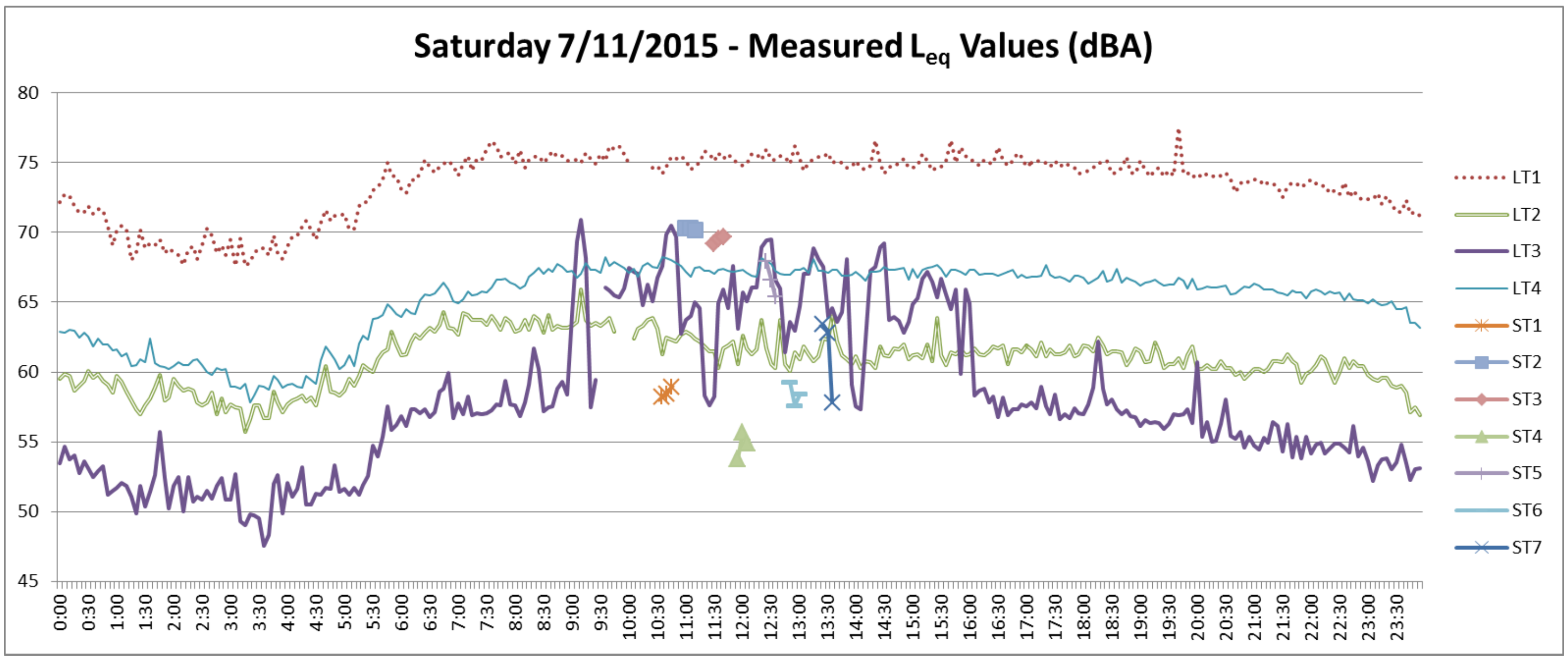
20:30
21:00
21:30
22:00
22:30
23:00
23:30
LT1
LT2
LT3
LT4
ST1
ST2
ST3
ST4
ST5
ST6
ST7


Saturday 7/11/2015 - Measured L_{eq} Values (dBA)
80
75
70
65
60
55
50
45
0:00
0:30
1:00
1:30
2:00
2:30
3:00
3:30
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5:00
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LT4
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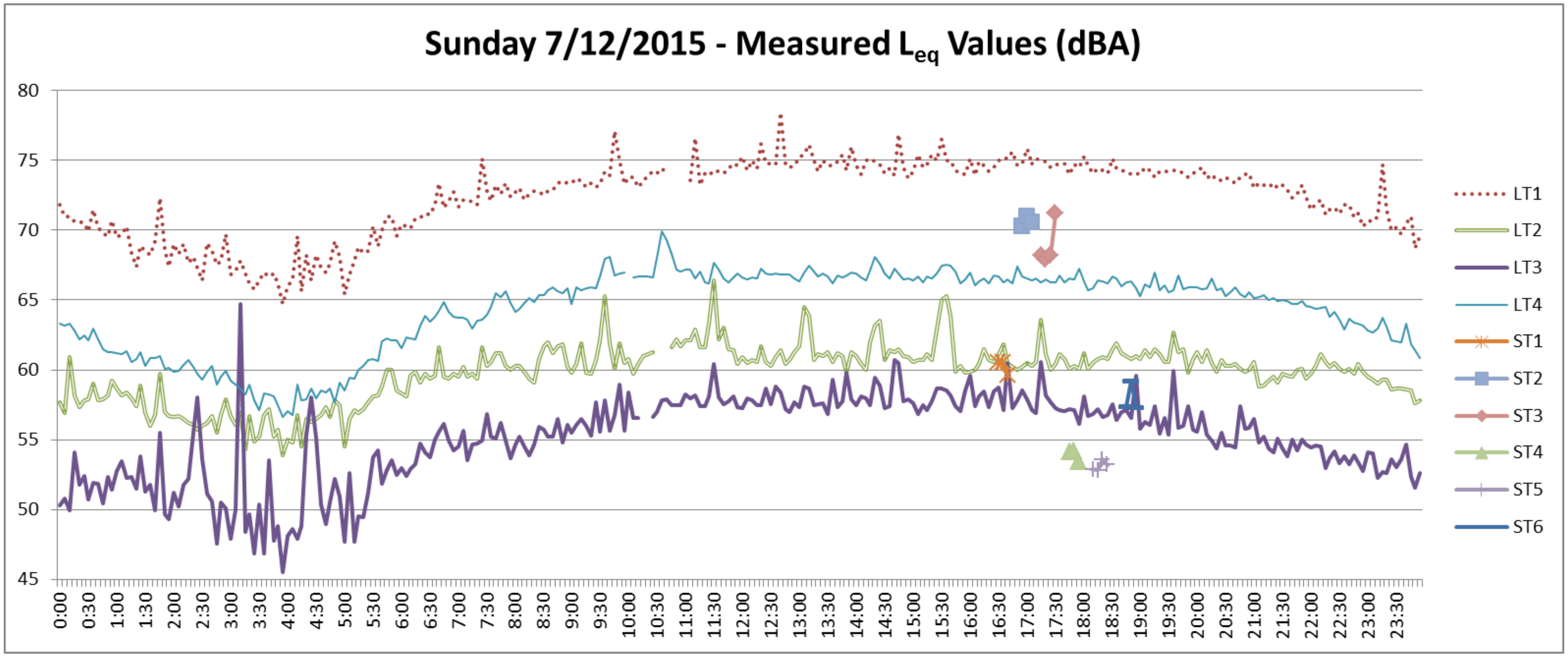
ST4
ST5
ST6
ST7



Sunday 7/12/2015 - Measured L_{eq} Values (dBA)
80
75
70
65
60
55
50
45
0:00
0:30
1:00
1:30
2:00
2:30
3:00
3:30
4:00
4:30
5:00
5:30
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22:00
22:30
23:00
23:30
LT1
LT2
LT3
LT4
ST1
ST2
ST3
ST4
ST5
ST6

Date: 7/8/15

Photograph 1

Site: LT-1

Measurement:
I-15 fence line behind Bella Posta Apartments

(View W)

Date: 7/8/15

Photograph 2

Site: LT-1

Measurement:
I-15 fence line behind Bella Posta Apartments

(View N)

Date: 7/8/15

Photograph 3

Site: LT-2

Measurement:

9477 Goodwick Court
San Diego, CA 92123

(View SW)

Date: 7/8/15

Photograph 4

Site: LT-2

Measurement:

9477 Goodwick Court
San Diego, CA 92123

(View E)

			**Date: 7/8/15** Photograph 5 **Site: LT-3** **Measurement:** 9225 Questor Pl Apt 3302 San Diego, CA 92108 (View SE)
			**Date: 7/8/15** Photograph 6 **Site: LT-3** **Measurement:** 9225 Questor Pl Apt 3302 San Diego, CA 92108 (View E)

			**Date: 7/8/15** Photograph 7 **Site: LT-4** **Measurement:** 5262 Cromwell Ct San Diego CA 92116 (View N)
			**Date: 7/8/15** Photograph 8 **Site: LT-4** **Measurement:** 5262 Cromwell Ct San Diego CA 92116 (View E)

			**Date: 7/8/15** Photograph 9 **Site: ST-1** **Measurement:** Bella Posta Apartments (View WNW)
			**Date: 7/8/15** Photograph 10 **Site: ST-1** **Measurement:** Bella Posta Apartments (View N)

			**Date: 7/8/15** Photograph 12 **Site: ST-2** **Measurement:** 209 Rancho Mission Villas (View NE)
			**Date: 7/8/15** Photograph 11 **Site: ST-2** **Measurement:** 209 Rancho Mission Villas (View S)

Date: 7/8/15

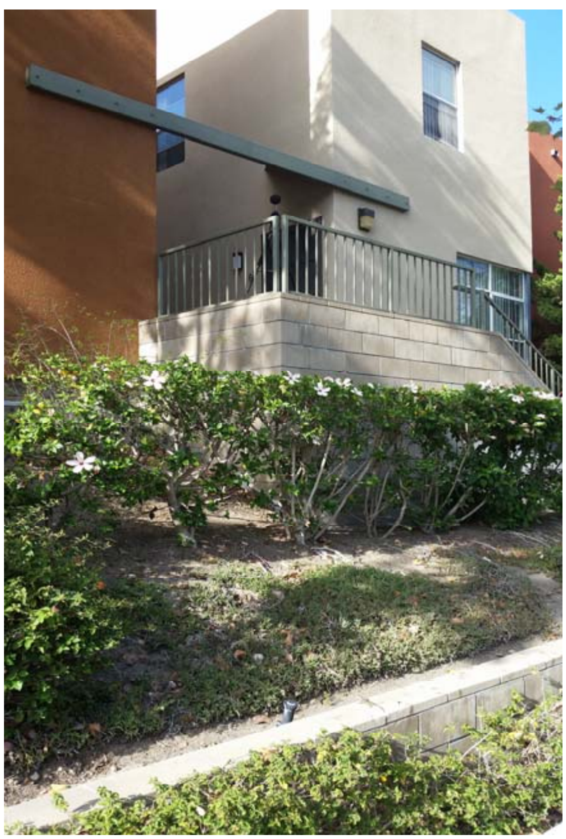
Photograph 12

Site: ST-3

Measurement:

Mission Terrace Apt #7

(View WSW)



Date: 7/8/15

Photograph 13

Site: ST-3

Measurement:

Mission Terrace Apt #7

(View NE)

			**Date: 7/8/15** Photograph 15 **Site: ST-4** **Measurement:** 9391 Broadview Ave San Diego, CA 92123 (View SSE)
			**Date: 7/8/15** Photograph 16 **Site: ST-4** **Measurement:** 9391 Broadview Ave San Diego, CA 92123 (View N)

Date: 7/8/15

Photograph 17

Site: ST-5

Measurement:

2365 Northside Dr
San Diego, CA 92108

(View ESE)

Date: 7/8/15

Photograph 18

Site: ST-5

Measurement:

2365 Northside Dr
San Diego, CA 92108

(View NNE)

Date: 7/8/15

Photograph 19

Site: ST-6

Measurement:

Southern Manhole Cover at stadium parking lot at treeline

(View N)

Date: 7/8/15

Photograph 20

Site: ST-6

Measurement:

Southern Manhole Cover at stadium parking lot at treeline

(View S)

Date: 7/10/15

Photograph 21

Site: ST-7

Measurement:

Mission Valley Library
2123 Fenton Pkwy
San Diego, CA 92108

(View NE)

Date: 7/10/15

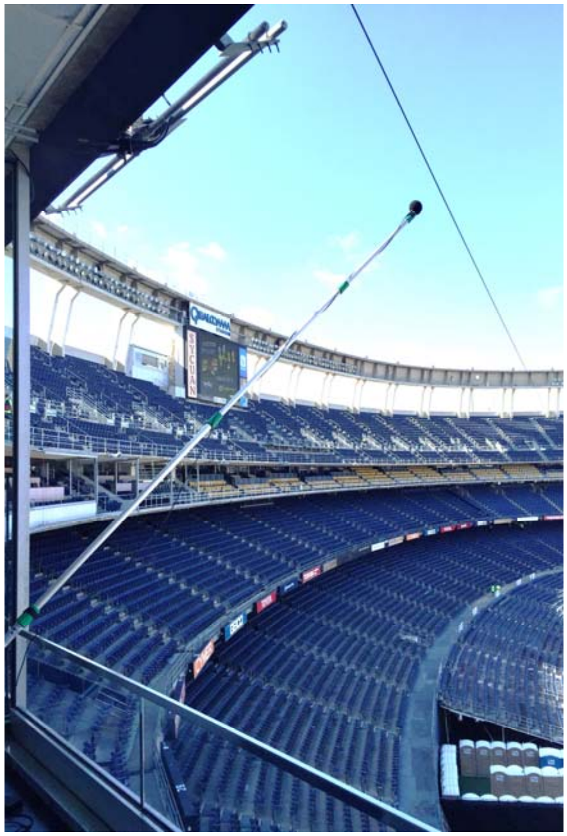
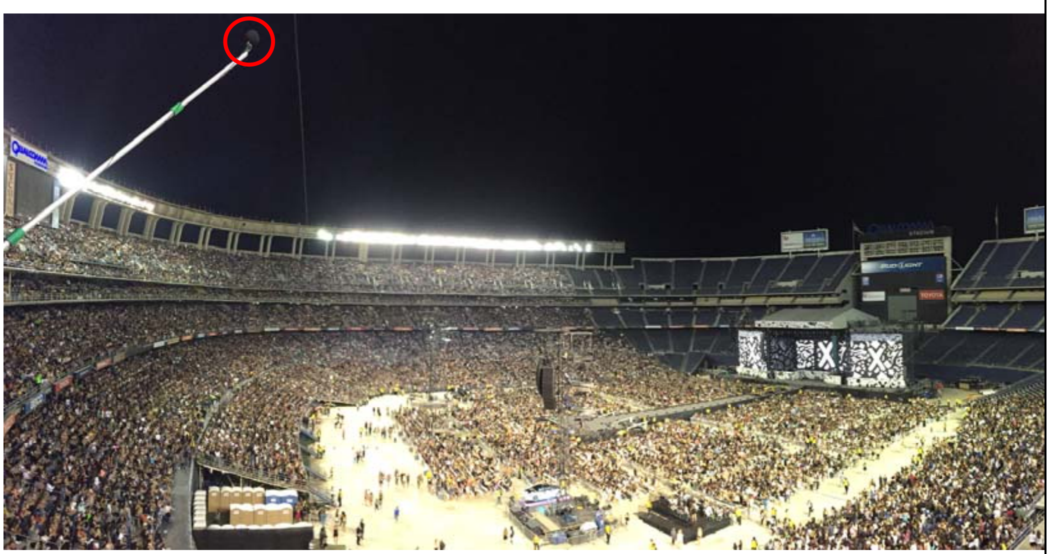
Photograph 22

Site: ST-7

Measurement:

Mission Valley Library
2123 Fenton Pkwy
San Diego, CA 92108

(View SE)

			**Date: 7/16/15** Photograph 23 **Site: CV-1** **Measurement:** Qualcomm Stadium Interior One Direction Concert (View NE)
			**Date: 7/16/15** Photograph 24 **Site: CV-1** **Measurement:** Qualcomm Stadium Interior One Direction Concert (View NE-SE)

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: Date: 7/8/15 Page 1 of 1
Monitoring Location: LT1 Analyst: JR

Sound Level Meter
Model #: 720
Serial #: 0395
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen: Yes / No (explain)

Field Calibration
Model #: 150
Serial #: 4234
Calibration Level (dBA): 94 / 114
Pre-Test 114.0 dBA
Post-Test dBA

Weather Data
Model #: 3500
Serial #: 2058303
Wind: Steady/Gusty/Calm
Precipitation: Yes (explain) / No
Avg Wind Speed/Direction: 1-3
Temp (°F): 77.1 RH (%): 56.6
Bar Psr (Hg): 1010.9 Cloud Cover (%): 40

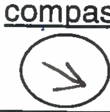
Topo: Flat / Hilly
Terrain: Hard/Soft/Mixed/Snow

GPS Coordinates (at SLM location)#

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
7/8	1155	1230 7/9							114.0 114.0
7/9	1245								114.1

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass



Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: LT 2 Project #: ______ Date: 7/8 Page 1 of 1

Monitoring Location: LT 2 Analyst: JR

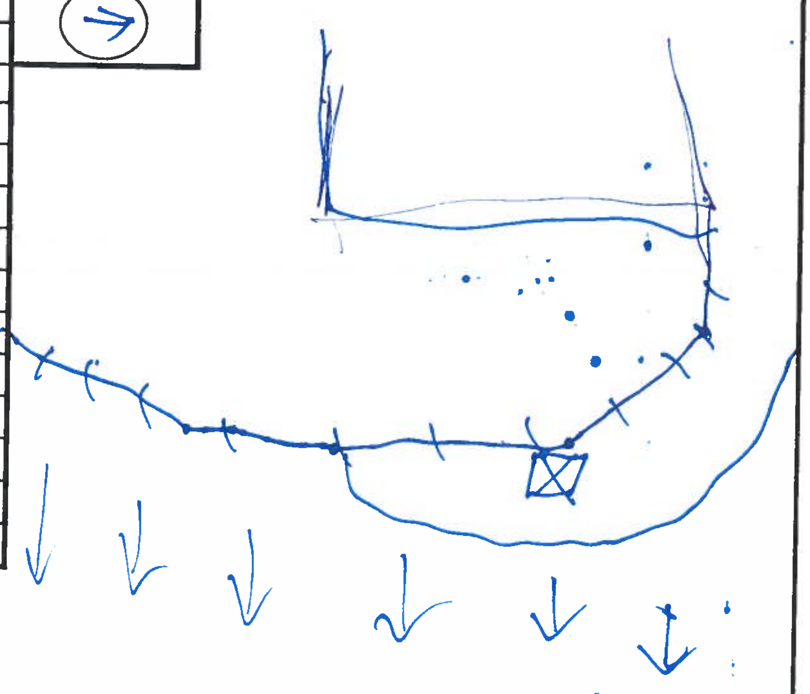
Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1414	Serial #:	5768	Serial #:	2098303
Weighting: A / C / Flat		Calibration Level (dBA):	94 / 114	Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	dBA	Avg Wind Speed/Direction:	1-3
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 81.8	RH (%): 57.2
Terrain: Hard/Soft/Mixed/Snow				Bar Psr (Hg): 1003.4	Cloud Cover (%): 40

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1230								

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: ______ Project #: ______ Date: 7/8 Page 1 of 1

Monitoring Location: LT 3 Analyst: JR

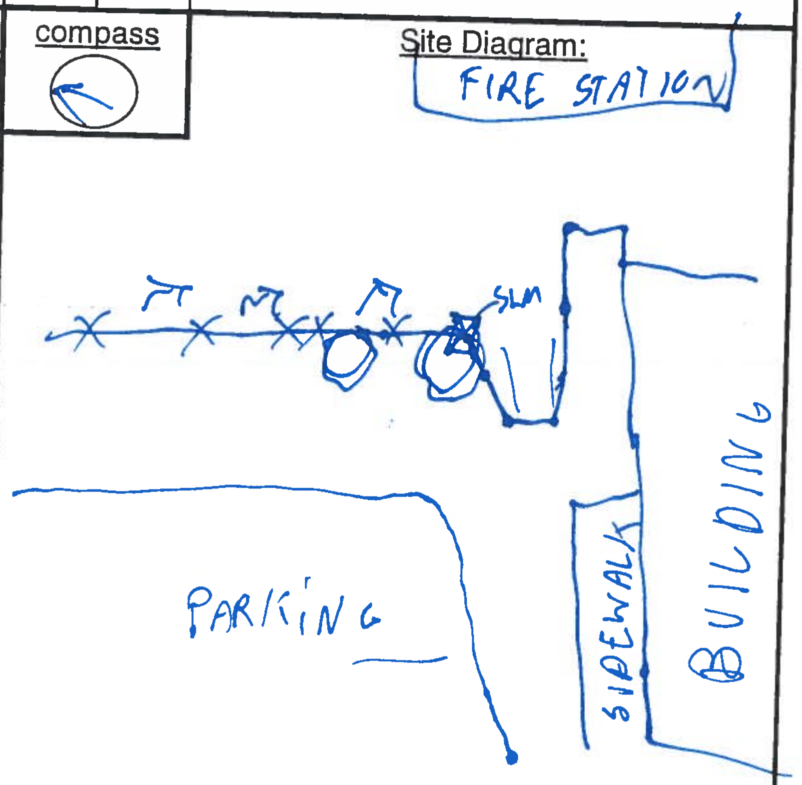
Sound Level Meter		Field Calibration		Weather Data	
Model #:	LXT	Model #:	200	Model #:	3500
Serial #:	04486	Serial #:		Serial #:	205 8303
Weighting:	A / C / Flat	Calibration Level (dBA):	94 / 114	Wind:	Steady/Gusty/Calm
Response:	Slow / Fast / Impl	Pre-Test	114.0 dBA	Precipitation:	Yes (explain) / No
Windscreen	Yes / No (explain)	Post-Test	dBA	Avg Wind Speed/Direction:	
Topo:	Flat / Hilly	GPS Coordinates (at SLM location)#		Temp (°F):	88.9 RH (%): 70.2
Terrain:	Hard/Soft/Mixed/Snow			Bar Psr (Hg):	1002.0 Cloud Cover (%): 50

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	:00								construction at FS

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: construction

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ______ Date: 7/8 Page 1 of 1

Monitoring Location: LT 4 Analyst: JR

Sound Level Meter	Field Calibration	Weather Data
Model #: LXT	Model #: 200	Model #: 3500
Serial #:	Serial #: 5768	Serial #: 2058303
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 113.98 dBA	Precipitation: Yes (explain) / No
Windscreen : Yes / No (explain)	Post-Test dBA	Avg Wind Speed/Direction: 6-9 S
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 82.1 RH (%): 54
Terrain: Hard/Soft/Mixed/Snow		Bar Psr (Hg): 998.1 Cloud Cover (%): 60

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1419								

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Qualcomm Project #: ____________ Date: 7/8 Page 1 of 1

Monitoring Location: ST1 Analyst: JR

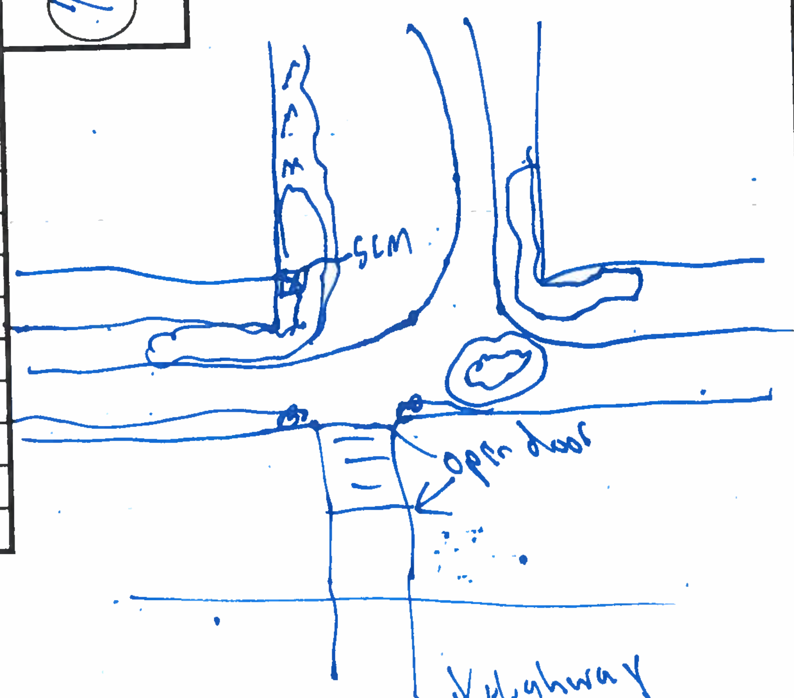
Sound Level Meter	Field Calibration	Weather Data
Model #: 820	Model #: 200	Model #: 3500
Serial #: 1065	Serial #: 5768	Serial #: 2058303
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 113.9 dBA	Precipitation: Yes (explain) / No
Windscreen: Yes / No (explain)	Post-Test 113.7 dBA	Avg Wind Speed/Direction: 1-3 N
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 83.8 RH (%): 44.4
Terrain: Hard/Soft/Mixed/Snow	~~32~~ 7 32.7846 -117.11352	Bar Psr (Hg): 1009.4 Cloud Cover (%): 30

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	415								Major Noise is Highway
		~~430~~							426: Children on sidewalk
		435							433 - Helicopter

Roadway Name/Dir			
Speed (post/obs)*			
Number of Lanes			
Width (pave/row)			
1- or 2- way			
Grade			
Bus Stops			
Stoplights			
Motorcycles			
Automobiles			
Medium Trucks			
Heavy Trucks			
Buses			
Count duration			

compass

Site Diagram:



- note coordinate system / * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ____ Date: 7/9 Page 1 of 1

Monitoring Location: ST 1 Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	
Serial #:	1664	Serial #:	5768	Serial #:	
Weighting:	A / C / Flat	Calibration Level (dBA):	94 / 114	Wind:	Steady/Gusty/Calm
Response:	Slow / Fast / Impl	Pre-Test	114.0 dBA	Precipitation:	Yes (explain) / No
Windscreen:	Yes / No (explain)	Post-Test	113.8 dBA	Avg Wind Speed/Direction:	0-3
Topo:	Flat / Hilly	GPS Coordinates (at SLM location)#		Temp (°F):	78.2 RH (%): 60.7
Terrain:	Hard/Soft/Mixed/Snow			Bar Psr (Hg):	1011.4 Cloud Cover (%): 20

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	2235								
		2250							mostly traffic noise
									some concert
									2236 AIRPLANE
									2241 Resident noise
									2244 some concert
									2245 Airplane

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects concert TVs

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM　Project #: ______　Date: 7/10　Page 1 of 1
Monitoring Location: ST 1　Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	2058303
Weighting: A / C / Flat		Calibration Level (dBA): 94 / 114		Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114.0 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	dBA	Avg Wind Speed/Direction:	0-1 N
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 84.7	RH (%): 50.4
Terrain: Hard/Soft/Mixed/Snow		32.7846	-117.11352	Bar Psr (Hg): 1012.3	Cloud Cover (%): 95

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1129								
									1126 AIRPLANE
									Dominant: Highway
									1143 Things falling off truck
									1144 AIRPLANE

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM   Project #: ______   Date: 2/18   Page 1 of 1

Monitoring Location: ST 2   Analyst: JR

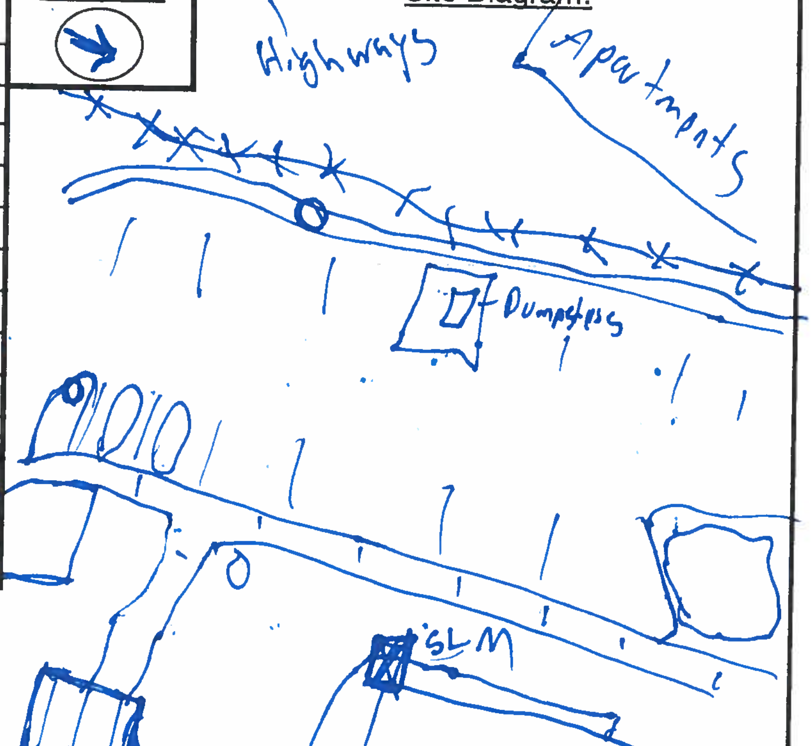
Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	2058303
Weighting:	A / C / Flat	Calibration Level (dBA):	94 / 114	Wind:	Steady/Gusty/Calm
Response:	Slow / Fast / Impl	Pre-Test	113.9 dBA	Precipitation:	Yes (explain) / No
Windscreen:	Yes / No (explain)	Post-Test	113.7 dBA	Avg Wind Speed/Direction:	2-3
Topo:	Flat / Hilly	GPS Coordinates (at SLM location)#		Temp (°F):	77.5 RH (%): 35.8
Terrain:	Hard/Soft/Mixed/Snow	32.7827 -117.1130		Bar Psr (Hg):	1009.0 Cloud Cover (%): 50%

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	455								456 sliding door closing
		510							major noise is traffic

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



\# - note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ________ Date: 7/9/15 Page 1 of 1
Monitoring Location: ST 2 Analyst: JR

Sound Level Meter	Field Calibration	Weather Data
Model #: 820	Model #: 200	Model #:
Serial #: 1665	Serial #: 5768	Serial #:
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 114.0 dBA	Precipitation: Yes (explain) / No
Windscreen : Yes / No (explain)	Post-Test 113.8 dBA	Avg Wind Speed/Direction: 0-1
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 76.3 RH (%): 61.4
Terrain: Hard/Soft/Mixed/Snow		Bar Psr (Hg): 1011.6 Cloud Cover (%): 30%

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	2205								TRAFFIC ~~PRD~~DOMINANT
									MUSIC APPARENT
									10:11 Siren + Buses
									10:12 Aircraft+rd + Microphone
									22:16 loud car nearby
									20:19 children yelling +
									2
		2020							

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

\# - note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

concert

Other Noise Sources: distant aircraft/roadway ~~traffic/trains~~/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM   Project #: ______   Date: 7 10   Page 1 of 1
Monitoring Location: ST 2   Analyst: JR

Sound Level Meter	Field Calibration	Weather Data
Model #: 820	Model #: 200	Model #: 3600
Serial #: 1065	Serial #: 5768	Serial #:
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady / Gusty / Calm
Response: Slow / Fast / Impl	Pre-Test 114.0 dBA	Precipitation: Yes (explain) / No
Windscreen : Yes / No (explain)	Post-Test dBA	Avg Wind Speed/Direction: 2-5 NW
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 76.3 RH (%): 57.0
Terrain: Hard / Soft / Mixed/Snow		Bar Psr (Hg): 1012.4 Cloud Cover (%): 90

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1200								Dominant traffic
									1205 - Residents talking
		215							

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

windchimes

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ______ Date: 1/8 Page 1 of 1
Monitoring Location: ST3 Analyst: JR

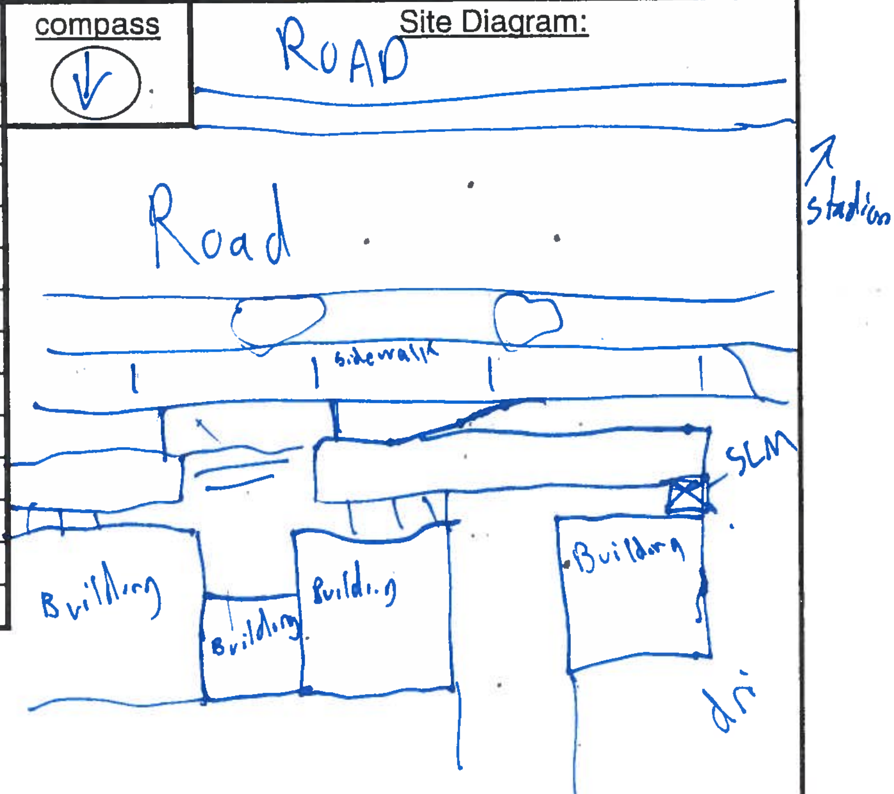
Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	2059305
Weighting: A / C / Flat		Calibration Level (dBA): 94 / 114		Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	113.9 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	113.7 dBA	Avg Wind Speed/Direction:	0-2
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 80.4	RH (%): 54.1
Terrain: Hard/Soft/Mixed/Snow		32.7860	-117.1130	Bar Psr (Hg): 1007.4	Cloud Cover (%): 60

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	525 or								527 dropped clipboard
	530								530 music slightly noticeable
		545							from stadium
									traffic main noise
									543- helicopter and talking

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOM   Project #: ______   Date: 2/9   Page 1 of 1
Monitoring Location: ST3   Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	25068303
Weighting: A / C / Flat		Calibration Level (dBA):	94 / 114	Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114.0 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	113.8 dBA	Avg Wind Speed/Direction:	1-3
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 74.6	RH (%): 62.0
Terrain: Hard/Soft/Mixed/Snow				Bar Psr (Hg): 1009.6	Cloud Cover (%): 80%

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1945								hear the concert intro
									screaming at concert 1947
									1950 Band stopped
									2009 Bird vocalizing next to SLM
									856 concert starting
	2100								2056 fireworks
		2115							21 00,
									Highway + road dominant
									2010 Residents talking loudly

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM   Project #:   Date: 7/10   Page 1 of 1

Monitoring Location: ST 3   Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	2058303
Weighting: A / C / Flat		Calibration Level (dBA):	94 / 114	Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114.0 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	dBA	Avg Wind Speed/Direction:	2-5 W
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 77.9	RH (%): 60.3
Terrain: Hard/Soft/Mixed/Snow				Bar Psr (Hg): 1011.8	Cloud Cover (%): 90

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1225								
									1226 loud Motor
		1240							

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

residents TV

Other Noise Sources: distant aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: Qualcomm Project #: ______ Date: 7/8 Page 1 of 1
Monitoring Location: ST-4 Analyst: JR

Sound Level Meter
Model #: 820
Serial #: 1665
Weighting: A / C / Flat
Response: Slow / Fast / Impl
Windscreen : Yes / No (explain)

Field Calibration
Model #: 200
Serial #: 5768
Calibration Level (dBA): 94 / 114
Pre-Test 113.9 dBA
Post-Test 113.7 dBA

Weather Data
Model #: 3500
Serial #: 2058303
Wind: Steady/Gusty/Calm
Precipitation: Yes (explain) / No
Avg Wind Speed/Direction: 3 SE
Temp (°F): 75.1 RH (%): 58.9
Bar Psr (Hg): 1000.0 Cloud Cover (%): 60

Topo: Flat / Hilly
Terrain: Hard/Soft/Mixed/Snow

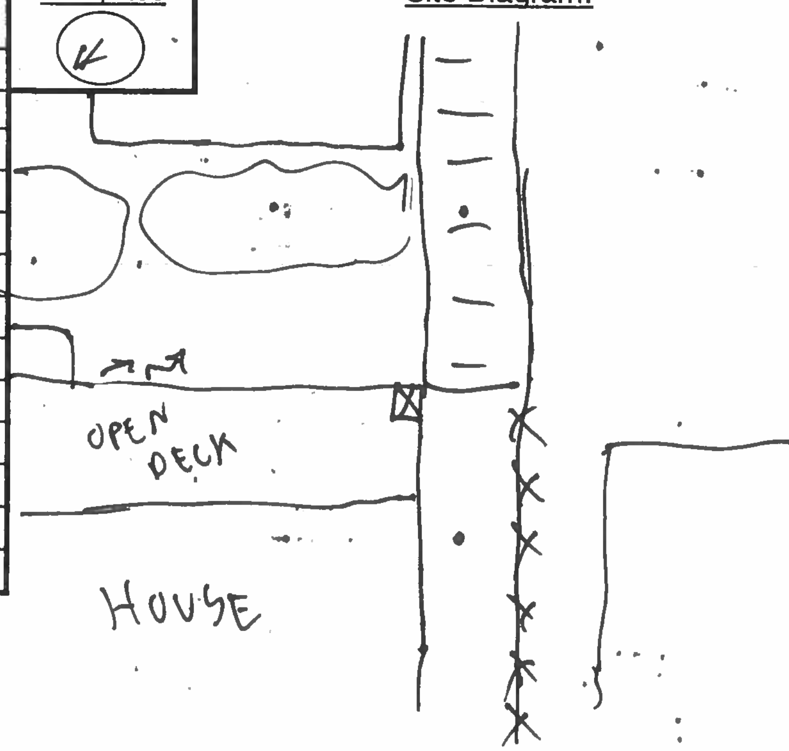
GPS Coordinates (at SLM location)#
32.78885 -117.12266

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	605								Plane 617
		620							co18 resident talking
									highway predominant noise

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOM Project #: ____ Date: 7/9 Page 1 of 1
Monitoring Location: ST 4 Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	
Serial #:	1065	Serial #:	5768	Serial #:	
Weighting: A / C / Flat		Calibration Level (dBA): 94 / 114		Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114.0 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	113.8 dBA	Avg Wind Speed/Direction:	1-3
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 72.0	RH (%): 67.1
Terrain: Hard/Soft/Mixed/Snow				Bar Psr (Hg): 1002.0	Cloud Cover (%): 30

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	2030								Predominantly concert noise
		~~945~~							Aircraft 934
		~~945~~							946 - "Everybody Yell
		2050							

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ____ Date: 7/10 Page 1 of 1
Monitoring Location: ST 4 Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	2058303
Weighting: A / C / Flat		Calibration Level (dBA): 94 / 114		Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114.0 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	dBA	Avg Wind Speed/Direction:	1-3 W
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 75.5	RH (%): 56.7
Terrain: Hard/Soft/Mixed/Snow				Bar Psr (Hg): 1002.5	Cloud Cover (%): 90

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1250								Home
		1305							1253 Phone ringing
									AIRPLANE + helicopter
									1259 Neighbor talking
									1259 Airplane
									101 Airplane
									103 AIRPLANE

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: Raking

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

619 598 4TU

[illegible] Nancy

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Qualcomm | Project #: ______ | Date: 7/8 | Page 1 of 1

Monitoring Location: ST5 | Analyst: JR

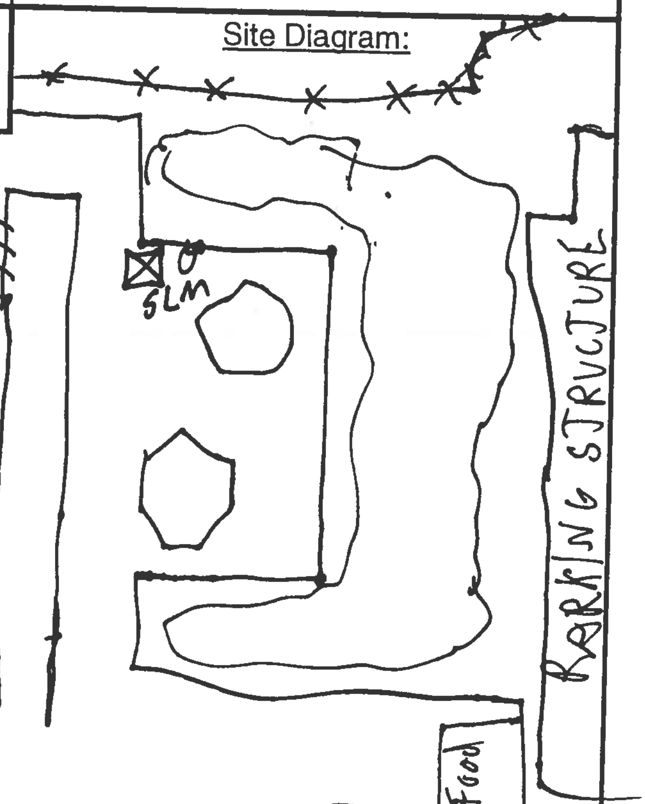
Sound Level Meter	Field Calibration	Weather Data
Model #: 820	Model #: 200	Model #: 3500
Serial #: 1665	Serial #: 5768	Serial #:
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 113.9 dBA	Precipitation: Yes (explain) / No
Windscreen: Yes / No (explain)	Post-Test 113.7 dBA	Avg Wind Speed/Direction: 2-4
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 71.3 RH (%): 69.2
Terrain: Hard/Soft/Mixed/Snow	32.7837 -117.1252	Bar Psr (Hg): 1008.1 Cloud Cover (%): 90

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	640								~~Re...~~ BAND PLAYING
		655							647 BAND STOPPED
									650 Announcer
									651 Train
									652 Truck loading

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: Band Playing

Other Noise Sources: distant aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice

FIELD NOISE MEASUREMENT DATA FORM

Project Name: Qualcomm Project #: ______ Date: 7/10 Page 1 of 1

Monitoring Location: ST 5 Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1069	Serial #:	5768	Serial #:	2058303
Weighting: A / C / Flat		Calibration Level (dBA):	94 / 114	Wind: Steady/Gusty/Calm	
Response: Slow / Fast / Impl		Pre-Test	114.0 dBA	Precipitation: Yes (explain) / No	
Windscreen : Yes / No (explain)		Post-Test	dBA	Avg Wind Speed/Direction:	7-9.5 W
Topo: Flat / Hilly		GPS Coordinates (at SLM location)#		Temp (°F): 78.9	RH (%): 54.2
Terrain: Hard/Soft/Mixed/Snow				Bar Psr (Hg): 1011.0	Cloud Cover (%): 90

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1320								1320 Loading unloading of food tent
		1335							322 Expresso maker
									1325 - Train
									1326 - Airplane
									1330 Food tent people talking
									1331 - Expresso machine
									1332 TRAIN
									1333 - Truck Backup
									1334 - fedex truck

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: right next to food vendor

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ______ Date: 7/18 Page 1 of 1
Monitoring Location: ST-6 Analyst: JR

Sound Level Meter		Field Calibration		Weather Data	
Model #:	820	Model #:	200	Model #:	3500
Serial #:	1665	Serial #:	5768	Serial #:	2058303
Weighting:	A / C / Flat	Calibration Level (dBA):	94 / 114	Wind:	Steady/Gusty/Calm
Response:	Slow / Fast / Impl	Pre-Test	113.9 dBA	Precipitation:	Yes (explain) / No
Windscreen:	Yes / No (explain)	Post-Test	113.7 dBA	Avg Wind Speed/Direction:	3-6 W
Topo:	Flat / Hilly	GPS Coordinates (at SLM location)#		Temp (°F):	70.8
Terrain:	Hard/Soft/Mixed/Snow	32.7805	-117.1194	RH (%):	67.4
				Bar Psr (Hg):	1009.6
				Cloud Cover (%):	95

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	710								
		730							713 TRAIN
									722 TRAIN
									724 TRAIN

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: Girls Screaming

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ______ Date: 7/10 Page 1 of 1
Monitoring Location: ST 6 Analyst: JR

Sound Level Meter	Field Calibration	Weather Data
Model #: 820	Model #: 200	Model #: 3500
Serial #: 1065	Serial #: 5768	Serial #: 2058303
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 114.0 dBA	Precipitation: Yes (explain) / No
Windscreen : Yes / No (explain)	Post-Test dBA	Avg Wind Speed/Direction: 5-10 N 426
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 83.5 RH (%): 65
Terrain: Hard/Soft/Mixed/Snow		Bar Psr (Hg): 1011.8 Cloud Cover (%): 80

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1355								1356 ~~[illegible]~~ STREET SWEEPER
									1358 Plane
									1359 street sweeper
									1401 airplane
									1401 SWEEPER
									1404 sweeper
									1405 TRAIN Yelling
									1406 Percussionist at train station
									1408 TRAIN HORN 7410 DEPART
									1413 microphone
									1414 Train
		1415							

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:

\# - note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments: Road sweepers - high pitched electrical sound

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/insects

Additional Notes and Sketches on Reverse

AECOM Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: QUALCOMM Project #: ______ Date: 7/10 Page 1 of 1

Monitoring Location: ST 7- Library Analyst: JR

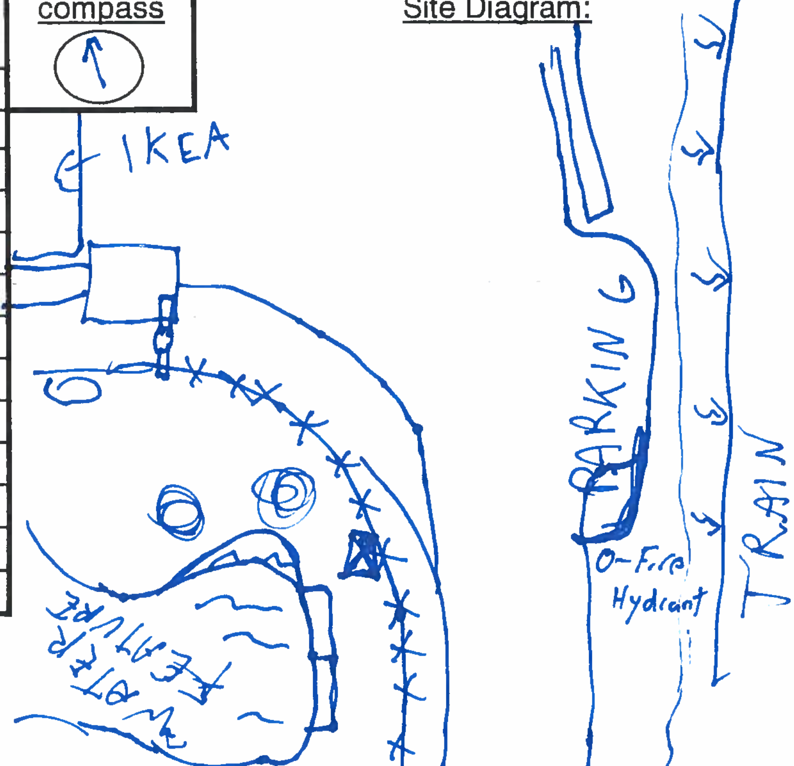
Sound Level Meter	Field Calibration	Weather Data
Model #: 820	Model #: 200	Model #: 3500
Serial #: 1665	Serial #: 5768	Serial #:
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test 114.0 dBA	Precipitation: Yes (explain) / No
Windscreen: Yes / No (explain)	Post-Test dBA	Avg Wind Speed/Direction: 5-7
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): 78.0 RH (%): 57.9
Terrain: Hard/Soft/Mixed/Snow	32.779 -117.126	Bar Psr (Hg): 1011.0 Cloud Cover (%): 30

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	1440								Train beep
		~~1455~~							1444 Train Beep - Train pass
		1500							1451 - car starting
									1453 - car
									1457 - car turning around
									1457 - train
									1458 - train
									1459 - car

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



- note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

HVAC

Other Noise Sources: distant: aircraft/roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

URS Acoustics and Noise Control Practice
FIELD NOISE MEASUREMENT DATA FORM

Project Name: Qualcomm Replacement　Project #: 60431885　Date: 7/9/15　Page 1 of 1

Monitoring Location: One Direction Concert - Interior Boom　Analyst: CK

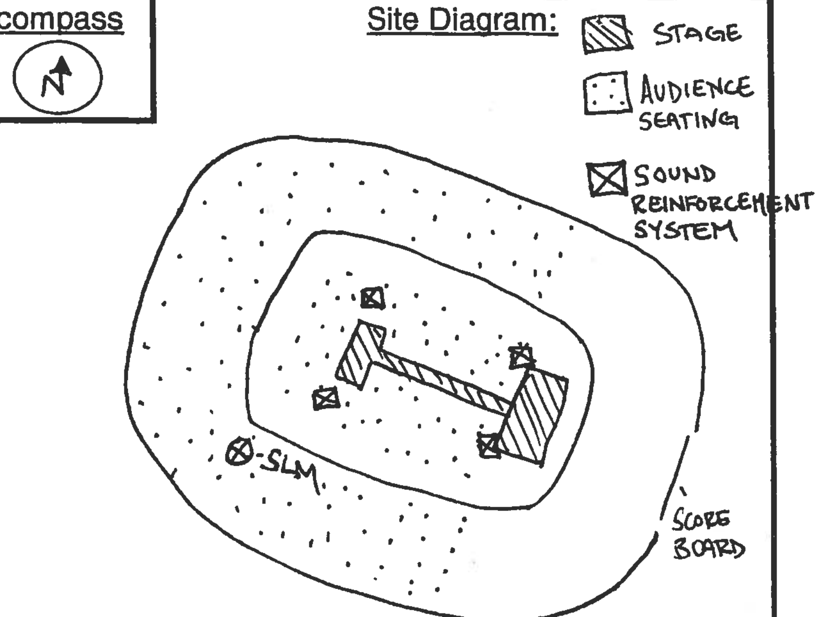
Sound Level Meter	Field Calibration	Weather Data
Model #: LD LxT	Model #: Cal 200	Model #: N/A
Serial #: 2527	Serial #: 6203	Serial #: See Concurrent ST Data Forms
Weighting: A / C / Flat	Calibration Level (dBA): 94 / 114	Wind: Steady/Gusty/Calm
Response: Slow / Fast / Impl	Pre-Test -0.3 dBA	Precipitation: Yes (explain) / No
Windscreen : Yes / No (explain)	Post-Test +0.4 dBA	Avg Wind Speed/Direction: -
Topo: Flat / Hilly	GPS Coordinates (at SLM location)#	Temp (°F): - RH (%): -
Terrain: Hard/Soft/Mixed/Snow		Bar Psr (Hg): - Cloud Cover (%): -

ID	Start Time	Stop Time	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}	Notes/Events
	16:53	22:54							Notes recorded on separate sheet.

Roadway Name/Dir		
Speed (post/obs)*		
Number of Lanes		
Width (pave/row)		
1- or 2- way		
Grade		
Bus Stops		
Stoplights		
Motorcycles		
Automobiles		
Medium Trucks		
Heavy Trucks		
Buses		
Count duration		

compass

Site Diagram:



\# - note coordinate system * - Speed estimated by Radar / Driving / Observation

Photos Taken? Yes/No

Additional Notes/Comments:

Other Noise Sources: distant: aircraft (Held) /roadway traffic/trains/landscaping/rustling leaves/children playing/dogs barking/birds vocalizing/Insects

Additional Notes and Sketches on Reverse

URS

Job Qualcomm - One Direction Project No. 60431885 Sheet ___ of ___

Description Interior - Boom SLM @ Press Box Computed by Chris Kaiser Date 7/9/15

Checked by ___ Date ___

* SRS - Sound Reinforcement System (Stage) Reference

16:57 - Helo overflight (News / Traffic)
16:59 - House music over SRS begins
17:15 - Helo overflight (News/Traffic)
18:10 - Significantly louder music (video)
19:06 - Icona Pop takes stage
19:46 - Set ends, commercials over SRS
19:48 - Return to music videos over SRS
20:00 - Croud cheers for 1D commercial
20:01 - Return to commercials
20:24 - 1D commercial + screams
20:54 - Lights down, cheers
20:56 - Band out + pyrotechnics
21:04 - Talking to crowd - no music
21:05 - Music returns
21:11 - Talking to crowd - No music
21:12 - Music resumes
21:26 - Talking to crowd - No music
21:27 - Music resumes
21:34 - Talking to crowd - No music
21:36 - Music resumes
21:42 - Talking to crowd - No music
21:48 - Music resumes
22:08 - Talking to crowd - No music
22:13 - Music resumes
22:17 - Talking to crowd - No music
22:21 - Music resumes
22:31 - Encore chants
22:33 - Music resumes
22:52 - End of show + pyrotechnics
22:53 - House music plays on SRS