Appendix D
Noise Technical Study

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NOISE TECHNICAL STUDY FOR:

THE HONDA CENTER

prepared for:

CITY OF ANAHEIM

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JANUARY 2012

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Table of Contents

Table of Contents

List of Tables

1. Introduction and Summary

1.1 PROJECT LOCATION AND SETTING

The Honda Center is located at 2695 East Katella Avenue in the City of Anaheim, east of the State Route 57 (SR-57) and west of the Santa Ana River. It is bound on the north by Cerritos Avenue and to the south by Katella Avenue. The Honda Center is within a half mile northeast of the Stadium of Anaheim and the Anaheim Metrolink Station.

Operational Characteristics

The 650,000-square-foot Honda Center opened on June 19, 1993, after two years of construction. It can accommodate a maximum of 18,900 spectators depending on seating configuration, and the parking lots surrounding the Honda Center have 4,500 parking spaces to accommodate visitors. The Honda Center facilities are in operation on event days, although some functions (e.g., ticket sales) are open on non-event days. Maximum capacities for hockey, basketball, and other events (e.g., concerts, circus, etc.) are shown in Table 1.

Table 1
Honda Center Events and Event Population

Event Type	Seating Capacity	Staff/ Employees	Team Members/ Production[1]
Basketball Games[2]	18,336	950	200+[3]
Hockey Games[4]	17,174	950	200
Concerts and Other Events	18,325 – End Stage 18,900 – Center Stage	1,000 (max)	200
Maximum Events Permitted	162		
Nonevent Days	200		

Source: Starkey 2011

[1] Team members and production staff include players, coaches, trainers, media, road crew, and others not included as spectators.

[2] Basketball games include Lakers Preseason, the John Wooden Classic, the Big West Tournament, the National Collegiate Athletic Association (NCAA) Tournament, and University of California, Los Angeles (UCLA), games.

[3] For the purpose of this air quality and GHG technical report, up to 250 team members are assumed for a basketball game for a conservative modeling scenario.

[4] The National Hockey League (NHL) has 41 home games during the regular season. During the Stanley Cup Playoffs and Stanley Cup, up to 20 additional games could occur.

In 2010, the Honda Center welcomed more than 1.3 million guests, of which over 600,000 attended the Ducks' hockey games (Starkey 2011). Table 2 identifies a five-year snapshot of attendance, number of events, and the average number of visitors during an event based on the annual attendance. Average attendance per event was calculated based on the highest 3-year average of attendance in order to provide a conservative estimate of future annual attendance. Based on the attendance history of the Honda Center over the last five years, there are, on average, 11,264 visitors per event and currently up to 153 events per year (e.g., approximately three events per week).

Table 2
Honda Center Event Attendance

Year	Visitors	Events	Average Visitors Per Event
2006	1,600,000	**154**	10,390
2007	1,760,000	**144**	**12,222**
2008	1,590,000	**162**	9,815
2009	1,460,000	136	**10,735**
2010	1,300,000	120	**10,833**
Highest 3-year Average		**153**	**11,264**

Source: Starkey 2011.

1.2 EXECUTIVE SUMMARY

The Honda Center Noise Technical Study has been prepared to analyze potential operation-related mobile- and stationary-source noise impacts from an increase in the number of permitted annual events at the Honda Center. The 1990 Environmental Impact Report (EIR) for the Honda Center (formerly the Arrowhead Pond) capped the number of annual events at 162 per year. The Honda Center averages up to 153 events per year with average attendance at an event of 11,264 people. The proposed project seeks to increase the maximum number of events by 60 from the permitted 162 events for a total of 222 events per year. Currently, there are on average, three events per week at the Honda Center and the proposed project would result in four events per week on average. The purpose of the project would be to accommodate a new permanent tenent at the Honda Center.

Implementation of the proposed project would not increase the capacity of the arena. Seating capacity of a sellout event is 18,336 and the proposed project would not result in a change in the maximum seating capacity of current events (see Table 1). Because project-generated vehicle trips would be similar to the current events held at the Honda Center area, noise increases in the ambient environment attributable to project-related trips would be comparable to the existing events currently permitted. Similarly, the proposed project would not generate stationary sources (e.g., mechanical systems, parking lots, etc.) of noise that would different from the events currently permitted at the arena. Therefore, no noise impacts would occur from implementation of the project.

2. Environmental Setting

2.1 NOISE SETTING

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as “noisiness” or “loudness.”

2.1.1 Terminology and Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- ***Noise.*** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- ***Decibel (dB).*** A unitless measure of sound on a logarithmic scale.
- ***A-Weighted Decibel (dBA).*** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- ***Equivalent Continuous Noise Level (L_{eq}).*** The mean of the noise level averaged over the measurement period, regarded as an average level.
- ***Day-Night Level (L_{dn}).*** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.
- ***Community Noise Equivalent Level (CNEL).*** The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the sound levels occurring during the period from 7:00 PM to 10:00 PM and 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

L_{dn} and CNEL values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment.

2.1.2 Characteristics of Sound

When an object vibrates, it radiates part of its energy as acoustical pressure in the form of a sound wave. Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). Human hearing is not equally sensitive to sound at all frequencies. Therefore, to approximate a human response, the A-weighted filter system is used to adjust measured sound levels. In terms of loudness, the normal range of human hearing extends from approximately 0 dBA to 140 dBA.

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. Because of the physical characteristics of noise transmission and noise perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 3, *Change in Sound Pressure Level*, presents the subjective effect of changes in sound pressure levels.

Table 3
Change in Sound Pressure Level

Change in Apparent Loudness	
± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen 2003.

Sound is generated from a source and dissipates exponentially with distance from that source. This phenomenon is known as "spreading loss."

When sound is measured for distinct time intervals, the statistical distribution of the overall sound level during that period can be obtained. The energy-equivalent sound level (L_{eq}) is the most common parameter associated with such measurements. The L_{eq} metric is a single-number noise descriptor that represents the average sound level over a given period of time. For example, the L_{50} noise level represents the level that is exceeded 50 percent of the time. Half the time the noise exceeds this level and half the time it is less than this level. This level also represents the level that is exceeded 30 minutes in an hour. Similarly, the L_{02}, L_{08} and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet-time noise levels in a 24-hour noise descriptor, the CNEL or L_{dn}.

2.1.3 Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire biological system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and nervous system. Extended periods of noise exposure above 90 dBA result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear, called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas. Table 4 shows *Typical Noise Levels from Noise Sources*.

Table 4
Typical Noise Levels from Noise Sources

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

Source: Caltrans 1998, Table 9-2136.2.

2.2 PHYSICAL SETTING AND EXISTING LAND USES

The project site currently is developed with the Honda Center arena in addition to the associated surface lots serving the arena. It is bordered by Katella Avenue to the south and Cerritos Avenue to the north. To the west

is SR-57 and the Santa Ana River to the east. Douglass Road traverses through the site in a north/south orientation and separates the western surface lot from the arena and eastern surface parking lot.

2.2.1 Noise-Sensitive Receptors

Certain land uses are particularly sensitive to noise and vibration, including residential, school, and open space/recreation areas where quiet environments are necessary for enjoyment, public health, and safety. The project site is primarily surrounded by commercial and light industrial land uses. Commercial and industrial uses are not considered noise sensitive. The Angel Stadium of Anaheim is located to the southwest. Information regarding sensitive receptors near the project site is provided below.

- **Westwood College.** Generally located northwest of the project site across Douglass Road.
- **Ayres Hotel of Anaheim**. Located south of the project site across Katella Avenue.
- **Sunkist Gardens Mobile Home Park**. Located approximately 1,675 feet to the northwest of the project site.

2.2.2 Existing Noise Environment

Noise from motor vehicles is generated by engine vibrations, the interaction between tires and the road, and the exhaust system. Reducing the average motor vehicle speed reduces the noise exposure of receptors adjacent to the road. Each reduction of five miles per hour reduces noise by about 1 dBA. In order to assess the potential for mobile-source noise impacts, it is necessary to determine the noise currently generated by vehicles traveling through the project area.

Average daily traffic (ADT) volumes were based on the existing daily traffic volumes provided by Parsons Brinkerhoff (2012). Noise levels for existing conditions (without and with event) along analyzed roadways are presented in Table 5. The results of this modeling indicate that current average noise levels along arterial segments for a typical day without an event range from approximately 63 to 77 dBA CNEL at 50-feet from the roadway centerline. Average noise levels along the arterial segments range from 66 to 78 dBA CNEL at 50-feet from the roadway centerline on a day with an event (based on an average attendance event).

Table 5
Existing Ambient Noise Environment

Location	Existing No Event		Existing with Average Attendance Event		Increase in CNEL (dBA) from Events
	ADT	CNEL[1]	ADT	CNEL[1]	
Ball Road					
Between Sunkist St and SR-57 SB Ramp	50,970	77.2	52,630	77.3	0.1
Between SR-57 SB Ramp and Phoenix Club Dr	31,670	75.1	33,730	75.4	0.3
Cerritos Avenue					
Between Sunkist St and Douglass Rd	4,270	66.4	5,780	67.7	1.3
Douglass Road					
Between Katella Ave and Cerritos Ave	7,040	67.6	10,120	69.2	1.6
Katella Avenue					
Between Lewis Street and State College Blvd	33,500	75.4	34,120	75.4	0.0
Between State College Blvd and Howell Ave	34,130	75.4	35,310	75.6	0.2
Between Howell Ave and SR-57 SB Ramps	52,030	77.3	55,550	77.5	0.2
Between SR-57 SB Rmps and SR-57 NB Rmps	34,720	75.5	38,170	75.9	0.4
Between SR-57 NB Ramps and Douglass Rd	34,470	75.5	39,970	76.1	0.6
Between Douglass Rd and Struck Ave	29,480	74.8	32,820	75.3	0.5
Between Struck Ave and Main St	23,170	73.8	24,840	74.1	0.3
Between Main St and Batavia St	25,630	74.2	26,630	74.4	0.2
Main Street					
Between Katella Ave and Struck Ave	15,000	71.9	15,640	72.4	0.5
Phoenix Club Drive					
Between Honda Center and Ball Rd	3,470	63.4	5,220	65.3	1.9
State College Boulevard					
Between Howell Ave and Katella Ave	21,030	73.3	21,590	73.5	0.2
Sunkist Street					
Between Cerritos Ave and Ball Rd	6,790	68.4	7870	69.1	0.7

Source: FHWA, Highway Traffic Noise Prediction Model, based on traffic volumes obtained from the traffic analysis prepared by Parsons Brinkerhoff (2012) and speed limits obtained from Google Earth Street View.

[1] Noise levels are calculated at 50 feet from the roadway centerline.

[2] The "Increase from Existing No Event" is the difference in traffic noise between the existing year without event and average attendance event and represents the increase in noise attributable to event-related traffic.

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3. Regulatory Setting

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. The City of Anaheim regulates noise through the City of Anaheim Municipal Code and General Plan. Potential noise impacts were evaluated based on the City of Anaheim Municipal Code and General Plan to determine whether a significant adverse noise impact would result from the operation of the proposed project.

3.1 STATE OF CALIFORNIA BUILDING CODE

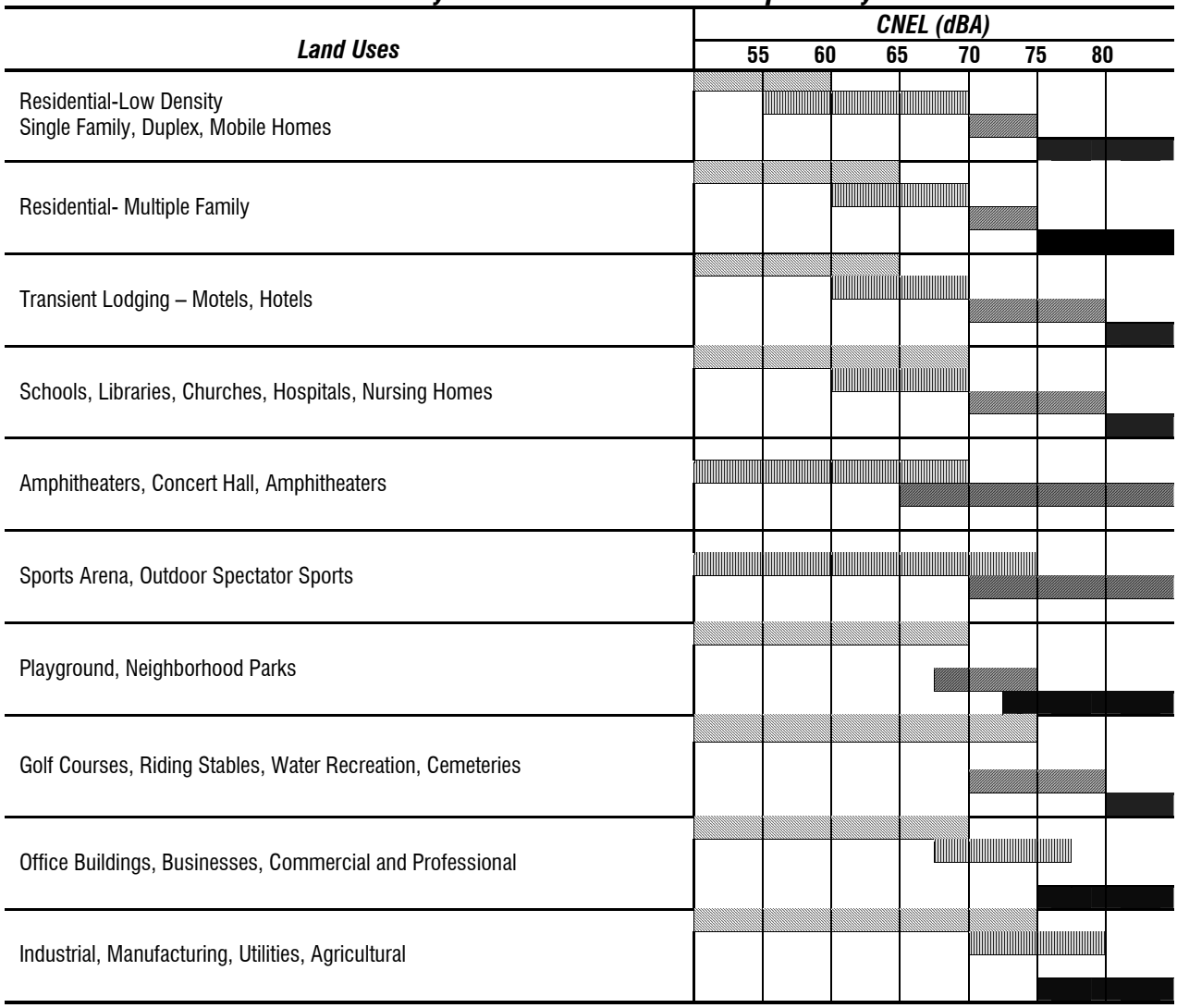
The state of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Part 2, California Building Code. These noise standards are applied to new construction in California for the purpose of interior noise compatibility from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are located near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels.

3.2 CITY OF ANAHEIM NOISE STANDARDS

3.2.1 Land Use Compatibility

Table 6 presents a land use compatibility chart for community noise adopted by the City of Anaheim's General Plan Noise Element. This table provides urban planners with a tool to gauge the compatibility of new land uses relative to existing and future noise levels. This table identifies normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements.

Table 6
Community Noise and Land Use Compatibility



Explanatory Notes

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

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

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

Clearly Unacceptable:
New construction/development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be useable.

Source: City of Anaheim, City of Anaheim General Plan, Chapter 9, Noise Element. Adopted May 2004.

3.2.2 Municipal Code

The City of Anaheim regulates noise through the City of Anaheim's Municipal Code, Chapter 6.70, Sound Pressure Levels. Pursuant to the municipal code, the City restricts noise levels generated at a property from exceeding 60 dBA for extended period of time. The City applies these standards to nontransportation stationary noise sources. These standards do not gauge the compatibility of developments in the noise environment, but provide restrictions on the amount and duration of noise generated at a property, as measured at the property line of the noise receptor. The City's noise ordinance is designed to protect people from objectionable nontransportation noise sources such as music, construction activity, machinery, pumps, and air conditioners.

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4. Environmental Impacts

4.1 METHODOLOGY

This noise technical study has been prepared to analyze potential operational phase noise impacts related to an increase in the number of annual events at the Honda Center to accommodate a NBA franchise. The Honda Center is permitted to host up to 162 events per year. The proposed project seeks to increase the maximum number of events by 60 for a total of 222 events per year. Currently, there are on average three events per week at the Honda Center (153 games per year) and the proposed project would result in four events per week on average. Seating capacity of a basketball game is 18,336 and the proposed project would not result in a change in the maximum seating capacity of current events (see Table 1). No construction activities would be necessary in order to accommodate an increase of events at the Honda Center.

4.2 THRESHOLDS OF SIGNIFICANCE

According to Appendix G of the CEQA Guidelines, a project would normally have a significant effect on the environment if the project would result in:

N-1 Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

N-2 Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

N-3 A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

N-4 A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

N-5 For a project located within an airport land use plan or where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

N-6 For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

4.2.1 City of Anaheim Thresholds

Noise

There are two criteria for judging noise impacts used in this analysis. First, noise levels projected for the proposed project must comply with all relevant state and local standards and regulations. Noise impacts on the surrounding community are enforced through local noise ordinances, supported by nuisance complaints and subsequent investigation. The second measure of impact used in this analysis is whether the increase in noise above the ambient noise level, as a result of a new noise source (either through on-site emissions or through noise generated by project traffic), has the potential to adversely impact noise-sensitive land uses.

Substantial Increase in Traffic Noise Levels

The traffic noise thresholds are based on human tolerance to noise (see Table 3, shown previously) and are widely used for assessing traffic noise impacts. In general, people tend to compare intruding noise with the existing background noise. If the new noise is readily identifiable or considerably louder than the background, it has the potential to be objectionable or annoying (Caltrans 2009). Noise impacts can be broken down into three categories. The first is audible impacts. Audible increases in noise levels generally refer to a change of 3 dBA or more, as this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change of between 1 and 3 dBA. This range of noise levels was found to be noticeable to sensitive people in laboratory environments. The last category, inaudible, includes changes of less than 1 dBA, which are typically inaudible to the human ear except under quiet conditions in controlled environments. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving of sound level. Only audible changes of 3 dBA or greater in noise levels at sensitive receptors are considered potentially significant when noise levels exceed the compatibility criteria (see Table 6, shown previously). Based on the City of Anaheim's noise compatibility criteria of 60 dBA CNEL for residential uses, the City considers audible (3+ dBA) increases in project-related traffic noise to be substantial when the ambient noise environment along the roadway segments within the project's study area under with project conditions exceeds 60 dBA CNEL.

Stationary-Source Noise

The stationary noise thresholds are based on a combination of the human tolerance to noise (see Table 3) and local criteria for stationary noise sources as established by the City of Anaheim for noise control (Anaheim Municipal Code, Chapter 6.70, Sound Pressure Levels). Pursuant to the municipal code, the City restricts noise levels generated at a property from exceeding 60 dBA L_{eq} for extended period of time.

4.3 THE HONDA CENTER

Mobile-source noise generated by the proposed project includes noise from vehicles traveling to and from the project site. The proposed project would also result in generation of stationary-source noise which includes noise from heating, ventilation, and air conditioning (HVAC) systems, landscaping activities, truck deliveries, and surface parking lots.

4.3.1 Non-Transportation (Stationary) Sources of Noise

Unlike transportation noise sources, whose effects can extend well beyond the limits of the project site, stationary noise only impacts sensitive receptors adjacent to a project site. Stationary sources of noise include mechanical equipment (HVAC systems) and parking lots. The proposed project would not introduce any new or different stationary sources of noise at the project site compared to the types of noise currently generated during a permitted event at the Honda Center. Installation of additional mechanical systems or expansion of the parking lots would not be required. The City of Anaheim restricts stationary noise generated on a property from creating a nuisance to other offsite noise-sensitive receptors through implementation of the noise limits in the City's municipal code. The proposed project would add approximately 15,000 square feet of restaurant and an approximately 5,000 square-foot team store. There would be no new HVAC units or an expansion of the parking lot as part of the project. While the project may increase parking utilization and cause a marginal increase in the utilization of existing HVAC units, these changes are minimal and therefore the project would not cause discernable noise increases to any noise-sensitive use. No mitigation measures would be required.

4.3.2 Transportation Sources of Noise

The operations phase of the project would generate noise primarily associated with vehicular trips. Traffic noise modeling is based on average daily traffic volumes on roadway segments within the analysis conducted by Parsons Brinkerhoff (2012).

2011 Traffic Noise with Project (Sellout Event)

Traffic noise modeling was compiled for year 2011No Event and 2011 Plus Project (sellout event), and shown in Table 7. The significance criteria for roadway noise impacts are based on whether the proposed project would result in a substantial increase (3 dB or more) in the ambient noise environment along the roadways when the ambient noise environment exceeds 60 dBA CNEL (daily noise levels). The proposed project would result in similar noise levels along the roadways within the study area of the project, and no traffic noise impacts due to the project would occur.

Table 7
Year 2011 Traffic Noise Levels

Location	*Existing No Event CNEL*	*Year 2011 Plus Project (Sellout Event)*		
		ADT	*CNEL[1]*	*Increase [2]*
Ball Road				
Between Sunkist St and SR-57 SB Ramp	77.2	53,760	77.4	0.2
Between SR-57 SB Ramp and Phoenix Club Dr	75.1	35,140	75.6	0.5
Cerritos Avenue				
Between Sunkist St and Douglass Rd	66.4	6,800	68.4	2.0
Douglass Road				
Between Katella Ave and Cerritos Ave	67.6	12,220	70.0	2.4
Katella Avenue				
Between Lewis Street and State College Blvd	75.4	34,540	75.5	0.1
Between State College Blvd and Howell Ave	75.4	36,110	75.7	0.3
Between Howell Ave and SR-57 SB Ramps	77.3	57,930	77.7	0.4
Between SR-57 SB Ramps and SR-57 NB Ramps	75.5	40,500	76.2	0.7
Between SR-57 NB Ramps and Douglass Rd	75.5	43,690	76.5	1.0
Between Douglass Rd and Struck Ave	74.8	35,090	75.6	0.8
Between Struck Ave and Main St	73.8	25,970	74.2	0.4
Between Main St and Batavia St	74.2	27,310	74.5	0.3
Main Street				
Between Katella Ave and Struck Ave	71.9	16,080	72.2	0.3
Phoenix Club Drive				
Between Honda Center and Ball Rd	63.4	6,410	66.1	2.7
State College Boulevard				
Between Howell Ave and Katella Ave	73.3	21,970	73.5	0.2
Sunkist Street				
Between Cerritos Ave and Ball Rd	68.4	8,600	69.4	1.0

Source: FHWA, Highway Traffic Noise Prediction Model, based on traffic volumes obtained from the traffic analysis prepared by Parsons Brinkerhoff (2012) and speed limits obtained from Google Earth Street View.
Bold: Audible (+3 dB) changes in the ambient noise environment from traffic noise.

Table 7
Year 2011 Traffic Noise Levels

Location	Existing No Event CNEL	Year 2011 Plus Project (Sellout Event)		
		ADT	CNEL[1]	Increase [2]

[1] Noise levels are calculated at 50 feet from the roadway centerline.
[2] The "Increase" is the difference in traffic noise between Existing No Event and Year 2011 Plus Project (sellout event) conditions and represents the change in traffic noise levels from the project.

2013 Traffic Noise with Project Event

Traffic noise modeling was compiled for year 2013 without and with a Sellout Event, and shown in Table 8. The proposed project would increase the number of events from an average of 153 events to a maximum of 222 events per year. The significance criteria for roadway noise impacts are based on whether the proposed project would result in a substantial increase (3 dB or more) in the ambient noise environment along the roadways when the ambient noise environment exceeds 60 dBA CNEL (daily noise levels). As shown in Table 1, a full-capacity event at the Honda Center has the potential to generate between 17,174 spectators and 18,900 spectators, and the capacity of the arena would not increase as a result of the proposed project. The events under the proposed project would have similar operational characteristics and seating capacity (18,336) and would generate comparable vehicle trips as current events (e.g., Anaheim Ducks hockey games, concerts, NCAA basketball games, and NBA exhibition games) at the Honda Center arena. While the number of Honda Center events would increase from an average of 3 events per week to an average of 4 events per week, average daily noise levels generated by an event would not change with the project. The proposed project would result in similar noise levels along the roadways within the study area of the project, and no traffic noise impacts would occur.

Table 8
Year 2013 Traffic Noise Levels

Location	2013 No Event	Year 2013 Average Attendance Event		Year 2013 with Project (Sellout Event)		Increase in CNEL (dBA)	
		ADT	CNEL[1]	ADT	CNEL[1]	from Existing No Event [2]	from AverageEvent[3]
Ball Road							
Between Sunkist St and SR-57 SB Ramp	77.2	57,730	77.7	58,860	77.8	0.6	0.1
Between SR-57 SB Ramp and Phoenix Club Dr	75.1	36,900	75.8	38,310	75.9	0.8	0.1
Cerritos Avenue							
Between Sunkist St and Douglass Rd	66.4	6,210	68.0	7,230	68.7	2.3	1.8
Douglass Road							
Between Katella Ave and Cerritos Ave	67.6	10,820	69.5	12,920	70.2	2.6	0.7
Katella Avenue							
Between Lewis Street and State College Blvd	75.4	37,470	75.8	37,890	75.9	0.5	0.1
Between State College Blvd and Howell Ave	75.4	38,720	76.0	39,520	76.1	0.7	0.1
Between Howell Ave and SR-57 SB Ramps	77.3	60,750	77.9	63,130	78.1	0.8	0.2
Between SR-57 SB Ramps and SR-57 NB Ramps	75.5	41,640	76.3	43,970	76.5	1.0	0.2
Between SR-57 NB Ramps and Douglass Rd	75.5	43,420	76.5	47,140	76.8	1.3	0.3
Between Douglass Rd and Struck Ave	74.8	35,770	75.6	38,040	75.9	1.1	0.3
Between Struck Ave and Main St	73.8	27,160	74.4	28,290	74.6	0.8	0.2
Between Main St and Batavia St	74.2	29,190	74.8	29,870	74.9	0.7	0.1
Main Street							
Between Katella Ave and Struck Ave	71.9	17,140	72.4	17,580	72.6	0.7	0.2
Phoenix Club Drive							
Between Honda Center and Ball Rd	63.4	5,570	65.4	6,760	66.3	2.9	0.9
State College Boulevard							
Between Howell Ave and Katella Ave	73.3	23,690	73.8	24,070	73.9	0.6	0.1
Sunkist Street							
Between Cerritos Ave and Ball Rd	68.4	8,550	69.4	9,280	69.8	1.4	0.4

Source: FHWA, Highway Traffic Noise Prediction Model, based on traffic volumes obtained from the traffic analysis prepared by Parsons Brinkerhoff (2012) and speed limits obtained from Google Earth Street View.

Bold: Audible (+3 dB) changes in the ambient noise environment from traffic noise.

[1] Noise levels are calculated at 50 feet from the roadway centerline.

[2] The "Increase from Existing No Event" is the difference in traffic noise between the existing year without event and Year 2013 with project (sellout event) and represents the overall increase in cumulative noise.

[3] The "Increase from Average Event" is the difference in traffic noise between Year 2013 with average attendance event and Year 2013 with project (sellout event) conditions and represents the change in noise traffic noise levels from event traffic.

Year 2030 with Project Events

Traffic noise increases associated with the proposed project was also assessed under future Year 2030 with the buildout of the General Plan and are shown in Table 9. Similar to the Existing with Project Event analysis, traffic noise impacts from project-generated traffic under Year 2030 conditions would be comparable to traffic noise impacts of events currently permitted at Honda Center. While audible (+3 dB) changes in the noise environment would occur on event days compared to existing non-event days, the project itself would not increase attendance during a Honda Center event and associated traffic levels. Therefore, no project-related traffic noise impacts would occur under Year 2030 conditions.

Table 9
Year 2030 Traffic Noise Levels

Location	Existing No Event CNEL	Year 2030 Average Attendance Event		Year 2030 with Project (Sellout Event)		Increase in CNEL (dBA)	
		ADT	CNEL[1]	ADT	CNEL[1]	from Existing No Event [2]	Due to Project
Ball Road							
Between Sunkist St and SR-57 SB Ramp	77.2	70,960	78.6	72,090	78.7	1.5	0.1
Between SR-57 SB Ramp and Phoenix Club Dr	75.1	78,310	79.0	79,720	79.1	4.0	0.1
Cerritos Avenue							
Between Sunkist St and Douglass Rd	66.4	28,880	74.7	29,900	74.9	8.5	0.2
Douglass Road							
Between Katella Ave and Cerritos Ave	67.6	32,000	74.2	34,100	74.4	6.8	0.2
Katella Avenue							
Between Lewis Street and State College Blvd	75.4	59,260	77.8	59,680	77.9	2.5	0.1
Between State College Blvd and Howell Ave	75.4	63,940	78.2	64,740	78.2	2.8	0.0
Between Howell Ave and SR-57 SB Ramps	77.3	75,280	78.9	77,660	79.0	1.7	0.1
Between SR-57 SB Ramps and SR-57 NB Ramps	75.5	70,690	78.6	73,020	78.7	3.2	0.1
Between SR-57 NB Ramps and Douglass Rd	75.5	68,570	78.5	72,290	78.7	3.2	0.2
Between Douglass Rd and Struck Ave	74.8	75,510	78.9	77,780	79.0	4.2	0.1
Between Struck Ave and Main St	73.8	65,510	78.3	66,640	78.3	4.5	0.0
Between Main St and Batavia St	74.2	53,950	77.4	54,630	77.5	3.3	0.1
Main Street							
Between Katella Ave and Struck Ave	71.9	35,480	75.6	35,920	75.7	3.8	0.1
Phoenix Club Drive							
Between Honda Center and Ball Rd	63.4	40,850	74.1	42,040	74.2	10.8	0.1
State College Boulevard							
Between Howell Ave and Katella Ave	73.3	48,140	76.9	48,520	77.0	3.7	0.1
Sunkist Street							
Between Cerritos Ave and Ball Rd	68.4	15,400	72.0	16,130	72.2	3.8	0.2

Source: FHWA, Highway Traffic Noise Prediction Model, based on traffic volumes obtained from the traffic analysis prepared by Parsons Brinkerhoff (2012) and speed limits obtained from Google Earth Street View.

Bold: Audible (+3 dB) changes in the ambient noise environment from traffic noise.

[1] Noise levels are calculated at 50 feet from the roadway centerline.

[2] The "Increase from Existing" is the difference in traffic noise between the existing year without event and Year 2030 with project (sellout event) and represents the overall increase in cumulative noise.

[3] The "Increase Due to Project" is the difference in traffic noise between Year 2030 with average attendance event and Year 2030 with project (sellout event) conditions and represents the change in noise traffic noise levels from event traffic.

4.3.3 Cumulative Impacts

Traffic Noise modeling was conducted to identify cumulative impacts from concurrent scheduling of events at the Honda Center and the Angel Stadium of Anaheim for year 2013 and year 2030 (General Plan buildout) conditions shown in Table 10 and Table 11, respectively. While concurrent events at the Honda Center and the Angel Stadium of Anaheim generate audible (+3 dB) increase in noise levels in year 2030 conditions compared to existing conditions without events, the project would not result in a change in overall attendance at events held at the Honda Center and therefore would not contribute to increases in the ambient noise environment. No cumulative impact would occur due an increase in number of annual events held at the Honda Center.

Table 10
Cumulative Conditions - Year 2013 Traffic Noise Levels

Location	Existing No Event CNEL	Year 2013 with Average Attendance Event plus Angels Stadium Event		Year 2013 with Project (Sellout Event) plus Angels Stadium Event		Increase in CNEL (dBA)	
		ADT	CNEL[1]	ADT	CNEL[1]	Cumulative [2]	Project[3]
Ball Road							
Between Sunkist St and SR-57 SB Ramp	77.2	57,730	77.7	58,860	77.8	0.6	0.1
Between SR-57 SB Ramp and Phoenix Club Dr	75.1	36,900	75.8	38,310	75.9	0.8	0.1
Cerritos Avenue							
Between Sunkist St and Douglass Rd	66.4	6,210	68.0	7,230	68.7	2.3	0.7
Douglass Road							
Between Katella Ave and Cerritos Ave	67.6	10,820	69.5	12,920	70.2	2.6	0.7
Katella Avenue							
Between Lewis Street and State College Blvd	75.4	38,810	76.0	39,230	76.0	0.6	0.0
Between State College Blvd and Howell Ave	75.4	41,130	76.2	41,930	76.3	0.9	0.1
Between Howell Ave and SR-57 SB Ramps	77.3	60,750	77.9	63,130	78.1	0.8	0.2
Between SR-57 SB Ramps and SR-57 NB Ramps	75.5	43,010	76.4	45,340	76.7	1.2	0.3
Between SR-57 NB Ramps and Douglass Rd	75.5	46,360	76.8	50,080	77.1	1.6	0.3
Between Douglass Rd and Struck Ave	74.8	36,550	75.7	38,820	76.0	1.2	0.3
Between Struck Ave and Main St	73.8	27,160	74.4	28,290	74.6	0.8	0.2
Between Main St and Batavia St	74.2	29,190	74.8	29,870	74.9	0.7	0.1
Main Street							
Between Katella Ave and Struck Ave	71.9	18,530	72.8	18,970	72.9	1.0	0.1
Phoenix Club Drive							
Between Honda Center and Ball Rd	63.4	5,710	65.5	6,900	66.4	**3.0**	0.9
State College Boulevard							
Between Howell Ave and Katella Ave	73.3	23,910	73.9	24,290	74.0	0.7	0.1
Sunkist Street							
Between Cerritos Ave and Ball Rd	68.4	8,550	69.4	9,280	69.8	1.4	0.4

Source: FHWA, Highway Traffic Noise Prediction Model, based on traffic volumes obtained from the traffic analysis prepared by Parsons Brinkerhoff (2012) and speed limits obtained from Google Earth Street View.

Bold: Audible (+3 dB) changes in the ambient noise environment from traffic noise.

[1] Noise levels are calculated at 50 feet from the roadway centerline.

[2] The "Cumulative" increase is the difference in traffic noise between the existing year without event and Year 2013 with Project (sellout events) at the Honda Center plus the Angels Stadium of Anaheim, and represents the overall increase in cumulative noise.

[3] The "Project" increase is the difference in traffic noise between Year 2013 with Honda Center sellout events plus Angeles Stadium of Anaheim event, and Year 2013 with average attendance Honda Center event plus Angels Stadium of Anaheim event conditions, and represents the project contribution to the overall cumulative noise increase.

Table 11
Cumulative Conditions - Year 2030 Traffic Noise Levels

Location	Existing No Event CNEL	Year 2030 with Average Attendance Event plus Angels Stadium Event		Year 2030 with Project (Sellout Event) plus Angels Stadium Event		Increase in CNEL (dBA)	
		ADT	CNEL[1]	ADT	ADT	Cumulative [2]	Project[3]
Ball Road							
Between Sunkist St and SR-57 SB Ramp	77.2	70,960	78.6	72,090	78.7	1.5	0.1
Between SR-57 SB Ramp and Phoenix Club Dr	75.1	78,310	79.0	79,720	79.1	**4.0**	0.1
Cerritos Avenue							
Between Sunkist St and Douglass Rd	66.4	28,880	74.7	29,900	74.9	**8.5**	0.2
Douglass Road							
Between Katella Ave and Cerritos Ave	67.6	32,000	74.2	34,100	74.4	**6.8**	0.2
Katella Avenue							
Between Lewis Street and State College Blvd	75.4	60,600	77.9	61,020	78.0	2.6	0.1
Between State College Blvd and Howell Ave	75.4	66,350	78.3	67,150	78.4	**3.0**	0.1
Between Howell Ave and SR-57 SB Ramps	77.3	75,280	78.9	77,660	79.0	1.7	0.1
Between SR-57 SB Ramps and SR-57 NB Ramps	75.5	72,060	78.7	74,390	78.8	**3.3**	0.1
Between SR-57 NB Ramps and Douglass Rd	75.5	71,510	78.6	75,230	78.9	**3.4**	0.3
Between Douglass Rd and Struck Ave	74.8	76,290	78.9	78,560	79.1	**4.3**	0.2
Between Struck Ave and Main St	73.8	65,510	78.3	66,640	78.3	**4.5**	0.0
Between Main St and Batavia St	74.2	53,950	77.4	54,630	77.5	**3.3**	0.1
Main Street							
Between Katella Ave and Struck Ave	71.9	36,870	75.8	37,310	75.8	**3.9**	0.0
Phoenix Club Drive							
Between Honda Center and Ball Rd	63.4	40,990	74.1	42,180	74.2	**10.8**	0.1
State College Boulevard							
Between Howell Ave and Katella Ave	73.3	48,360	76.9	48,740	77.0	**3.7**	0.1
Sunkist Street							
Between Cerritos Ave and Ball Rd	68.4	15,400	72.0	16,130	72.2	**3.8**	0.2

Source: FHWA, Highway Traffic Noise Prediction Model, based on traffic volumes obtained from the traffic analysis prepared by Parsons Brinkerhoff (2012) and speed limits obtained from Google Earth Street View.

Bold: Audible (+3 dB) changes in the ambient noise environment from traffic noise.

[1] Noise levels are calculated at 50 feet from the roadway centerline.

[2] The "Cumulative" increase is the difference in traffic noise between the existing year without event and Year 2030 with project (sellout events) at the Honda Center plus the Angels Stadium of Anaheim and represents the overall increase in cumulative noise.

[3] The "Project" increase is the difference in traffic noise between Year 2030 with Honda Center sellout events plus Angeles Stadium of Anaheim event, and Year 2030 with average attendance Honda Center event plus Angels Stadium of Anaheim event conditions, and represents the project contribution to the overall cumulative noise increase.

4.4 EXISTING REGULATIONS

- Community noise standards adopted by the City of Anaheim in the General Plan, Noise Element.
- City of Anaheim Municipal Code, Chapter 6.20, Sound Pressure Levels: Stationary Noise Standards.

4.5 LEVEL OF SIGNIFICANCE BEFORE MITIGATION

Stationary Noise

Stationary-source noise impacts from implementation of the proposed project would be less than significant.

Traffic Noise

A potentially significant cumulative noise impact to residential areas located east of Sunkist Street between Cerritos Avenue and Ball Road could occur with concurrent scheduling of events at the Honda Center and the Angel Stadium of Anaheim for year 2030 when added to future cumulative development.

4.6 MITIGATION MEASURES

Stationary Noise

No significant impacts were identified and no mitigation measures are necessary.

Traffic Noise

MM-1 Prior to issuance of building permits, the project applicant shall contribute fair-share funding to repave Sunkist Street between Cerritos Avenue and Ball Road with rubberized asphalt. Studies have shown that asphalt rubber overlays resulted in a reduction in road noise in the order of 6 dB. (Rymer and Donavan, 2005)

4.7 LEVEL OF SIGNIFICANCE AFTER MITIGATION

No significant project-related impacts have been identified. With implementation of MM-1, cumulative noise impacts would be less than significant.

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5. References

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Model

Federal Highway Administration (FHWA). 1978, December. *Federal Highway Traffic Noise Prediction Model*, U.S. Dept. of Transportation. Report No. FHWA-RD77-108.

5. References

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Appendix A
FHWA Federal Highway Traffic Noise Prediction Model Files

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Federal Highway Administration (FHWA) Traffic Noise Prediction Model
Existing Conditions

Roadway Segment	Speed	Existing Without Event	Existing With Average Event	Distance to CNEL from Roadway Centerline: Existing 50.0 Feet	Existing 60 CNEL	Existing 65 CNEL	Existing 70 CNEL	Ex W/ Average 50.0 Feet	Ex W/ Average 60 CNEL	Ex W/ Average 65 CNEL	Ex W/ Average 70 CNEL	Change From Existing	Change due to Project
Ball Road				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Sunkist St and SR-57 SB Ramps	40	50,970	52,630	77.2	698	324	150	77.3	713	331	154	0.1	0.1
btwn SR-57 SB Ramps and Phoenix Club Dr	40	31,670	33,730	75.1	508	236	110	75.4	530	246	114	0.3	0.3
Cerritos Avenue				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Sunkist St and Douglass Rd	40	4,270	5,780	66.4	134	62	29	67.7	164	76	35	1.3	1.3
Douglass Road				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Katella Ave and Cerritos Ave	35	7,040	10,120	67.6	160	74	35	69.2	204	95	44	1.6	1.6
Katella Avenue				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Lewis Street and State College Blvd	40	33,500	34,120	75.4	528	245	114	75.4	534	248	115	0.0	0.0
btwn State Colege Blvd and Howell Ave	40	34,130	35,310	75.4	534	248	115	75.6	547	254	118	0.2	0.2
btwn Howell Ave and SR-57 SB Ramps	40	52,030	55,550	77.3	708	328	152	77.5	739	343	159	0.2	0.2
btwn SR-57 SB Ramps and SR-57 NB Ramps	40	34,720	38,170	75.5	540	251	116	75.9	576	267	124	0.4	0.4
btwn SR-57 NB Ramps and Douglass Rd	40	34,470	39,970	75.5	538	250	116	76.1	594	276	128	0.6	0.6
btwn Douglass Rd and Struck Ave	40	29,480	32,820	74.8	485	225	104	75.3	521	242	112	0.5	0.5
btwn Struck Ave and Main St	40	23,170	24,840	73.8	413	192	89	74.1	432	201	93	0.3	0.3
btwn Main St and Batavia St	40	25,630	26,630	74.2	441	205	95	74.4	453	210	98	0.2	0.2
Main Street				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Katella Ave and Struck Ave	40	15,000	15,640	71.9	309	143	67	72.0	318	147	68	0.1	0.1
Phoenix Club Drive				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Honda Center and Ball Rd	25	3,470	5,220	63.4	84	39	18	65.2	110	51	24	1.8	1.8
State College Boulevard				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Howell Ave and Katella Ave	40	21,030	21,590	73.3	387	180	83	73.4	394	183	85	0.1	0.1
Sunkist Street				4.8	0	0	0	4.8	0	0	0	0.0	0.0
btwn Cerritos Ave and Ball Rd	40	6,790	7,870	68.4	182	85	39	69.1	201	93	43	0.7	0.7

Assumptions:

Roadway volumes provided by Parson Brinkerhoff (2011) and posted speed limits.

Federal Highway Administration Highway Traffic Noise Prediction Model, December, 1978. Baseline California vehicle noise levels from Caltrans, TAN 95-03, 1995

Simplified to 2 lanes meters= 20.0

future meters= 20.0

Noise path decay parameter for hard site

24-hour distribution of traffic volumes based (Day 73%

Evening 13%

Night 14%

California base noise levels:

Autos 5.2+38.8 Log10 (speed, mi/hr) = -2.8 + 38.8 Log10 (speed, km/hr)

Light trucks: 35.3 + 25.6 Log10 (speed, mi/hr) = 30 + 25.6 Log10 (speed, km/hr)

Heavy trucks: 25-31 mi/hr:

35-65 mi/hr:

31-35 mi/hr:

Federal Highway Administration (FHWA) Traffic Noise Prediction Model

Existing Conditions: With Sellout Event, With Average Event and Angel Stadium, With Sellout Event and Angel Stadium.

Roadway Segment	Speed	24-hour Traffic Volume			Distance to CNEL from Roadway Centerline											
					Existing				Ex w/ Av + Angels				Ex w/ Sell + Angels			
		Existing With Sellout	Existing With Average+ Angel Stadium	Existing With Sellout+ Angel Stadium	50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL
Ball Road																
btwn Sunkist St and SR-57 SB Ramps	40	53,760	52,630	53,760	77.4	723	336	156	77.3	713	331	154	77.4	723	336	156
btwn SR-57 SB Ramps and Phoenix Club Dr	40	35,140	33,730	35,140	75.6	545	253	117	75.4	530	246	114	75.6	545	253	117
Cerritos Avenue					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Sunkist St and Douglass Rd	40	6,800	5,780	6,800	68.4	182	85	39	67.7	164	76	35	68.4	182	85	39
Douglass Road					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Cerritos Ave	35	12,220	10,120	12,220	70.0	232	107	50	69.2	204	95	44	70.0	232	107	50
Katella Avenue					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Lewis Street and State College Blvd	40	34,540	35,460	35,880	75.5	539	250	116	75.6	548	254	118	75.6	552	256	119
btwn State Colege Blvd and Howell Ave	40	36,110	37,720	38,520	75.7	555	258	120	75.9	571	265	123	76.0	579	269	125
btwn Howell Ave and SR-57 SB Ramps	40	57,930	55,550	57,930	77.7	760	353	164	77.5	739	343	159	77.7	760	353	164
btwn SR-57 SB Ramps and SR-57 NB Ramps	40	40,500	39,540	41,870	76.2	599	278	129	76.1	589	274	127	76.3	612	284	132
btwn SR-57 NB Ramps and Douglass Rd	40	43,690	42,910	46,630	76.5	630	292	136	76.4	622	289	134	76.8	658	305	142
btwn Douglass Rd and Struck Ave	40	35,090	33,600	35,870	75.6	544	253	117	75.4	529	245	114	75.6	552	256	119
btwn Struck Ave and Main St	40	25,970	24,840	25,970	74.2	445	207	96	74.1	432	201	93	74.2	445	207	96
btwn Main St and Batavia St	40	27,310	26,630	27,310	74.5	461	214	99	74.4	453	210	98	74.5	461	214	99
Main Street					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Struck Ave	40	16,080	17,030	17,470	72.2	324	150	70	72.4	336	156	72	72.5	342	159	74
Phoenix Club Drive					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Honda Center and Ball Rd	25	6,410	5,360	6,550	66.1	127	59	27	65.3	112	52	24	66.1	128	60	28
State College Boulevard					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Howell Ave and Katella Ave	40	21,970	21,810	22,190	73.5	398	185	86	73.5	396	184	85	73.6	401	186	86
Sunkist Street					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Cerritos Ave and Ball Rd	40	8,600	7,870	8,600	69.4	213	99	46	69.1	201	93	43	69.4	213	99	46
					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0

Assumptions:

Roadway volumes provided by Parson Brinkerhoff (2011) and posted speed limits.

Federal Highway Administration Highway Traffic Noise Prediction Model, December, 1978. Baseline California vehicle noise levels from Caltrans, TAN 95-03, 1995

Simplified to 2 lanes 6.1 meters= 20.0

future 6.1 meters= 20.0

Noise path decay parameter for hard site

24-hour distribution of traffic volumes based on:

Day	73%	LDA	92%
Evening	13%	MDT	3%
Night	14%	HDT	5%

California base noise levels:

Autos 5.2+38.8 Log10 (speed, mi/hr) = -2.8 + 38.8 Log10 (speed, km/hr)

Light trucks: 35.3 + 25.6 Log10 (speed, mi/hr) = 30 + 25.6 Log10 (speed, km/hr)

Heavy trucks:

25-31 mi/hr: 51.9 + 19.2 Log10 (speed, mi/hr) = 47.9 + 19.2 Log10 (speed, km/hr)

35-65 mi/hr: 50.4 + 19.2 Log10 (speed, mi/hr) = 46.4 + 19.2 Log10 (speed, km/hr)

31-35 mi/hr: straight line interpolation between above two curves

Federal Highway Administration (FHWA) Traffic Noise Prediction Model
Year 2013

Roadway Segment	Speed	24-hour Traffic Volume			Distance to CNEL from Roadway Centerline											
					2013 Without Event				2013 w/ Average Event				2013 w/Sellout Event			
		2013 Without Event	2013 W/Average Event	2013 W/Sellout Sellout Even	50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL
Ball Road																
btwn Sunkist St and SR-57 SB Ramps	40	56,070	57,730	58,860	77.6	744	345	160	77.7	759	352	163	77.8	768	357	166
btwn SR-57 SB Ramps and Phoenix Club Dr	40	34,830	36,900	38,310	75.5	542	251	117	75.8	563	261	121	75.9	577	268	124
Cerritos Avenue					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Sunkist St and Douglass Rd	40	4,700	6,210	7,230	66.8	142	66	31	68.0	172	80	37	68.7	190	88	41
Douglass Road					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Cerritos Ave	35	7,740	10,820	12,920	68.0	171	79	37	69.5	214	99	46	70.2	240	112	52
Katella Avenue					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Lewis Street and State College Blvd	40	36,850	37,470	37,890	75.8	562	261	121	75.8	569	264	123	75.9	573	266	123
btwn State Colege Blvd and Howell Ave	40	37,540	38,720	39,520	75.8	569	264	123	76.0	581	270	125	76.1	589	273	127
btwn Howell Ave and SR-57 SB Ramps	40	57,230	60,750	63,130	77.7	754	350	162	77.9	785	364	169	78.1	805	374	173
btwn SR-57 SB Ramps and SR-57 NB Ramps	40	38,190	41,640	43,970	75.9	576	267	124	76.3	610	283	131	76.5	633	294	136
btwn SR-57 NB Ramps and Douglass Rd	40	37,920	43,420	47,140	75.9	573	266	123	76.5	627	291	135	76.8	663	308	143
btwn Douglass Rd and Struck Ave	40	32,430	35,770	38,040	75.2	516	240	111	75.6	551	256	119	75.9	574	267	124
btwn Struck Ave and Main St	40	25,490	27,160	28,290	74.2	440	204	95	74.4	459	213	99	74.6	471	219	102
btwn Main St and Batavia St	40	28,190	29,190	29,870	74.6	470	218	101	74.8	481	223	104	74.9	489	227	105
Main Street					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Struck Ave	40	16,500	17,140	17,580	72.3	329	153	71	72.4	338	157	73	72.6	343	159	74
Phoenix Club Drive					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Honda Center and Ball Rd	25	3,820	5,570	6,760	63.8	90	42	19	65.4	115	54	25	66.3	131	61	28
State College Boulevard					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Howell Ave and Katella Ave	40	23,130	23,690	24,070	73.7	412	191	89	73.8	419	194	90	73.9	423	196	91
Sunkist Street					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Cerritos Ave and Ball Rd	40	7,470	8,550	9,280	68.8	194	90	42	69.4	212	99	46	69.8	224	104	48
					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0

Assumptions:

Roadway volumes provided by Parson Brinkerhoff (2011) and posted speed limits.

Federal Highway Administration Highway Traffic Noise Prediction Model, December, 1978. Baseline California vehicle noise levels from Caltrans, TAN 95-03, 1995

Simplified to 2 lanes 6.1 meters= 20.0

future 6.1 meters= 20.0

Noise path decay parameter for hard site

24-hour distribution of traffic volumes based on:

Day	73%	LDA	92%
Evening	13%	MDT	3%
Night	14%	HDT	5%

California base noise levels:

Autos: 5.2+38.8 Log10 (speed, mi/hr) = -2.8 + 38.8 Log10 (speed, km/hr)

Light trucks: 35.3 + 25.6 Log10 (speed, mi/hr) = 30 + 25.6 Log10 (speed, km/hr)

Heavy trucks:

25-31 mi/hr: 51.9 + 19.2 Log10 (speed, mi/hr) = 47.9 + 19.2 Log10 (speed, km/hr)

35-65 mi/hr: 50.4 + 19.2 Log10 (speed, mi/hr) = 46.4 + 19.2 Log10 (speed, km/hr)

31-35 mi/hr: straight line interpolation between above two curves

Federal Highway Administration (FHWA) Traffic Noise Prediction Model
Year 2013

Roadway Segment	Speed	24-hour Traffic Volume		Distance to CNEL from Roadway Centerline							
		2013 With Average Event+ Angel Stadium	2013 With Sellout Event+ Angel Stadium	2013 With Average+Angels				2013 With Sellout+Angels			
				50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL
Ball Road											
btwn Sunkist St and SR-57 SB Ramps	40	57,730	58,860	77.7	759	352	163	77.8	768	357	166
btwn SR-57 SB Ramps and Phoenix Club Dr	40	36,900	38,310	75.8	563	261	121	75.9	577	268	124
Cerritos Avenue				4.8	0	0	0	4.8	0	0	0
btwn Sunkist St and Douglass Rd	40	6,210	7,230	68.0	172	80	37	68.7	190	88	41
Douglass Road				4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Cerritos Ave	35	10,820	12,920	69.5	214	99	46	70.2	240	112	52
Katella Avenue				4.8	0	0	0	4.8	0	0	0
btwn Lewis Street and State College Blvd	40	38,810	39,230	76.0	582	270	125	76.0	586	272	126
btwn State Colege Blvd and Howell Ave	40	41,130	41,930	76.2	605	281	130	76.3	613	284	132
btwn Howell Ave and SR-57 SB Ramps	40	60,750	63,130	77.9	785	364	169	78.1	805	374	173
btwn SR-57 SB Ramps and SR-57 NB Ramps	40	43,010	45,340	76.4	623	289	134	76.7	646	300	139
btwn SR-57 NB Ramps and Douglass Rd	40	46,360	50,080	76.8	655	304	141	77.1	690	320	149
btwn Douglass Rd and Struck Ave	40	36,550	38,820	75.7	559	260	120	76.0	582	270	125
btwn Struck Ave and Main St	40	27,160	28,290	74.4	459	213	99	74.6	471	219	102
btwn Main St and Batavia St	40	29,190	29,870	74.8	481	223	104	74.9	489	227	105
Main Street				4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Struck Ave	40	18,530	18,970	72.8	356	165	77	72.9	361	168	78
Phoenix Club Drive				4.8	0	0	0	4.8	0	0	0
btwn Honda Center and Ball Rd	25	5,710	6,900	65.5	117	54	25	66.4	133	62	29
State College Boulevard				4.8	0	0	0	4.8	0	0	0
btwn Howell Ave and Katella Ave	40	23,910	24,290	73.9	421	196	91	74.0	426	198	92
Sunkist Street				4.8	0	0	0	4.8	0	0	0
btwn Cerritos Ave and Ball Rd	40	8,550	9,280	69.4	212	99	46	69.8	224	104	48
				4.8	0	0	0	4.8	0	0	0

Assumptions:

Roadway volumes provided by Parson Brinkerhoff (2011) and posted speed limits.

Federal Highway Administration Highway Traffic Noise Prediction Model, December, 1978. Baseline California vehicle noise levels from Caltrans, TAN 95-

Simplified to 2 lanes	6.1	20.0
future	6.1	20.0

Noise path decay parameter for hard site

24-hour distribution of traffic volumes based on:	Day	73%	LDA	92%
	Evening	13%	MDT	3%
	Night	14%	HDT	5%

Federal Highway Administration (FHWA) Traffic Noise Prediction Model
Year 2030

Roadway Segment	Speed	24-hour Traffic Volume			Distance to CNEL from Roadway Centerline											
					2030 No Event				2030 w/ Average Event				2030 w/ Sellout Avent			
		2030 No Event	2030 With Average Event	2030 With Sellout Even	50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL	50.0 Feet	60 CNEL	65 CNEL	70 CNEL
Ball Road																
btwn Sunkist St and SR-57 SB Ramps	40	69,300	70,960	72,090	78.5	857	398	185	78.6	870	404	188	78.7	880	408	190
btwn SR-57 SB Ramps and Phoenix Club Dr	40	76,240	78,310	79,720	78.9	913	424	197	79.0	929	431	200	79.1	941	437	203
Cerritos Avenue					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Sunkist St and Douglass Rd	40	27,370	28,880	29,900	74.5	461	214	99	74.7	478	222	103	74.9	489	227	105
Douglass Road					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Cerritos Ave	35	28,920	32,000	34,100	73.7	411	191	89	74.2	440	204	95	74.4	459	213	99
Katella Avenue					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Lewis Street and State College Blvd	40	58,640	59,260	59,680	77.8	766	356	165	77.8	772	358	166	77.9	775	360	167
btwn State Colege Blvd and Howell Ave	40	62,760	63,940	64,740	78.1	802	372	173	78.2	812	377	175	78.2	819	380	176
btwn Howell Ave and SR-57 SB Ramps	40	71,760	75,280	77,660	78.7	877	407	189	78.9	905	420	195	79.0	924	429	199
btwn SR-57 SB Ramps and SR-57 NB Ramp	40	67,240	70,690	73,020	78.4	840	390	181	78.6	868	403	187	78.7	887	412	191
btwn SR-57 NB Ramps and Douglass Rd	40	63,070	68,570	72,290	78.1	805	373	173	78.5	851	395	183	78.7	881	409	190
btwn Douglass Rd and Struck Ave	40	72,170	75,510	77,780	78.7	880	409	190	78.9	907	421	195	79.0	925	429	199
btwn Struck Ave and Main St	40	63,840	65,510	66,640	78.2	811	376	175	78.3	825	383	178	78.3	835	387	180
btwn Main St and Batavia St	40	52,950	53,950	54,630	77.3	716	332	154	77.4	725	337	156	77.5	731	339	158
Main Street					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Struck Ave	40	34,840	35,480	35,920	75.5	542	251	117	75.6	548	254	118	75.7	553	257	119
Phoenix Club Drive					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Honda Center and Ball Rd	25	39,100	40,850	42,040	73.9	423	196	91	74.1	435	202	94	74.2	444	206	96
State College Boulevard					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Howell Ave and Katella Ave	40	47,580	48,140	48,520	76.9	667	309	144	76.9	672	312	145	77.0	676	314	146
Sunkist Street					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0
btwn Cerritos Ave and Ball Rd	40	14,320	15,400	16,130	71.7	299	139	65	72.0	314	146	68	72.2	324	150	70
					4.8	0	0	0	4.8	0	0	0	4.8	0	0	0

Assumptions:

Roadway volumes provided by Parson Brinkerhoff (2011) and posted speed limits.

Federal Highway Administration Highway Traffic Noise Prediction Model, December, 1978. Baseline California vehicle noise levels from Caltrans, TAN 95-03, 1995

Simplified to 2 lanes 6.1 meters= 20.0

future 6.1 meters= 20.0

Noise path decay parameter for hard site

24-hour distribution of traffic volumes based on:

Day	73%	LDA	92%
Evening	13%	MDT	3%
Night	14%	HDT	5%

California base noise levels:

Autos: 5.2+38.8 Log10 (speed, mi/hr) = -2.8 + 38.8 Log10 (speed, km/hr)

Light trucks: 35.3 + 25.6 Log10 (speed, mi/hr) = 30 + 25.6 Log10 (speed, km/hr)

Heavy trucks:

25-31 mi/hr: 51.9 + 19.2 Log10 (speed, mi/hr) = 47.9 + 19.2 Log10 (speed, km/hr)

35-65 mi/hr: 50.4 + 19.2 Log10 (speed, mi/hr) = 46.4 + 19.2 Log10 (speed, km/hr)

31-35 mi/hr: straight line interpolation between above two curves

Federal Highway Administration (FHWA) Traffic Noise Prediction Model
Year 2030

Roadway Segment	Speed	24-hour Traffic Volume 2030 With Average Event + Angel Stadium	24-hour Traffic Volume 2030 With Sellout Event + Angel Stadium	Distance to CNEL from Roadway Centerline: Existing 50.0 Feet	Existing 60 CNEL	Existing 65 CNEL	Existing 70 CNEL	Future No Project 50.0 Feet	Future No Project 60 CNEL	Future No Project 65 CNEL	Future No Project 70 CNEL
Ball Road											
btwn Sunkist St and SR-57 SB Ramps	40	70,960	72,090	78.6	870	404	188	78.7	880	408	190
btwn SR-57 SB Ramps and Phoenix Club Dr	40	78,310	79,720	79.0	929	431	200	79.1	941	437	203
Cerritos Avenue				4.8	0	0	0	4.8	0	0	0
btwn Sunkist St and Douglass Rd	40	28,880	29,900	74.7	478	222	103	74.9	489	227	105
Douglass Road				4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Cerritos Ave	35	32,000	34,100	74.2	440	204	95	74.4	459	213	99
Katella Avenue				4.8	0	0	0	4.8	0	0	0
btwn Lewis Street and State College Blvd	40	60,600	61,020	77.9	783	364	169	78.0	787	365	170
btwn State Colege Blvd and Howell Ave	40	66,350	67,150	78.3	832	386	179	78.4	839	389	181
btwn Howell Ave and SR-57 SB Ramps	40	75,280	77,660	78.9	905	420	195	79.0	924	429	199
btwn SR-57 SB Ramps and SR-57 NB Ramps	40	72,060	74,390	78.7	879	408	189	78.8	898	417	194
btwn SR-57 NB Ramps and Douglass Rd	40	71,510	75,230	78.6	875	406	188	78.9	905	420	195
btwn Douglass Rd and Struck Ave	40	76,290	78,560	78.9	913	424	197	79.1	931	432	201
btwn Struck Ave and Main St	40	65,510	66,640	78.3	825	383	178	78.3	835	387	180
btwn Main St and Batavia St	40	53,950	54,630	77.4	725	337	156	77.5	731	339	158
Main Street				4.8	0	0	0	4.8	0	0	0
btwn Katella Ave and Struck Ave	40	36,870	37,310	75.8	563	261	121	75.8	567	263	122
Phoenix Club Drive				4.8	0	0	0	4.8	0	0	0
btwn Honda Center and Ball Rd	25	40,990	42,180	74.1	436	202	94	74.2	445	206	96
State College Boulevard				4.8	0	0	0	4.8	0	0	0
btwn Howell Ave and Katella Ave	40	48,360	48,740	76.9	674	313	145	77.0	678	314	146
Sunkist Street				4.8	0	0	0	4.8	0	0	0
btwn Cerritos Ave and Ball Rd	40	15,400	16,130	72.0	314	146	68	72.2	324	150	70
				4.8	0	0	0	4.8	0	0	0

Assumptions:

Roadway volumes provided by Parson Brinkerhoff (2011) and posted speed limits

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Noise path decay parameter for hard site

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Day	73%	LDA	92%
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California base noise levels:

Autos	5.2+38.8 Log10 (speed, mi/hr) = -2.8 + 38.8 Log10 (speed, km/hr)	
Light trucks:	35.3 + 25.6 Log10 (speed, mi/hr) = 30 + 25.6 Log10 (speed, km/hr)	
Heavy trucks:	25-31 mi/hr:	51.9 + 19.2 Log10 (speed, mi/hr) = 47.9 + 19.2 Log10 (speed, km/hr)
	35-65 mi/hr:	50.4 + 19.2 Log10 (speed, mi/hr) = 46.4 + 19.2 Log10 (speed, km/hr)
	31-35 mi/hr:	straight line interpolation between above two curves