

Central Avenue Commercial Retail Project

Noise Impact Study

County of Riverside, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This purpose of this noise impact study is to evaluate the potential noise impacts for the project study area and compare results to City and CEQA thresholds. The assessment was conducted and compared to the noise standards set forth by the Federal, State and Local agencies. Consistent with the California Environmental Quality Act (CEQA) and CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined to result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable agencies.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An evaluation of the existing ambient noise environment
- An analysis of stationary noise impacts from the project site to adjacent land uses
- Construction noise and vibration evaluation

1.2 Site Location and Study Area

The project site is located at the northwest corner of the intersection of Central Avenue (Hwy 74) and Allan Street in an unincorporated area of the County of Riverside within the Sphere of Influence of the City of Lake Elsinore, California, as shown in Exhibit A. The County of Riverside Elsinore Area Plan identifies the land use designation of the site as Business Park. Furthermore, the project site has a current land use classification of Business Professional and the current zoning is Scenic Highway Commercial (C-P-S) according to the City of Lake Elsinore North Central Sphere Specific Plan Land Use Plan. The proposed use is commercial. Land uses surrounding the site include vacant land to the north, 8th Street to the west, single-family residential uses to the east (across Central Avenue), and a car repair shop, a single-family residential use, and vacant land to the south.

1.3 Proposed Project Description

The Project proposes to develop the site with three buildings: Building A consists of 4,050 square feet of convenience market, Building B consists of 3,525 square feet of retail/fast-food with drive-through (includes 1,510 square feet of fast-food restaurant with drive-through and 2,015 square feet of retail

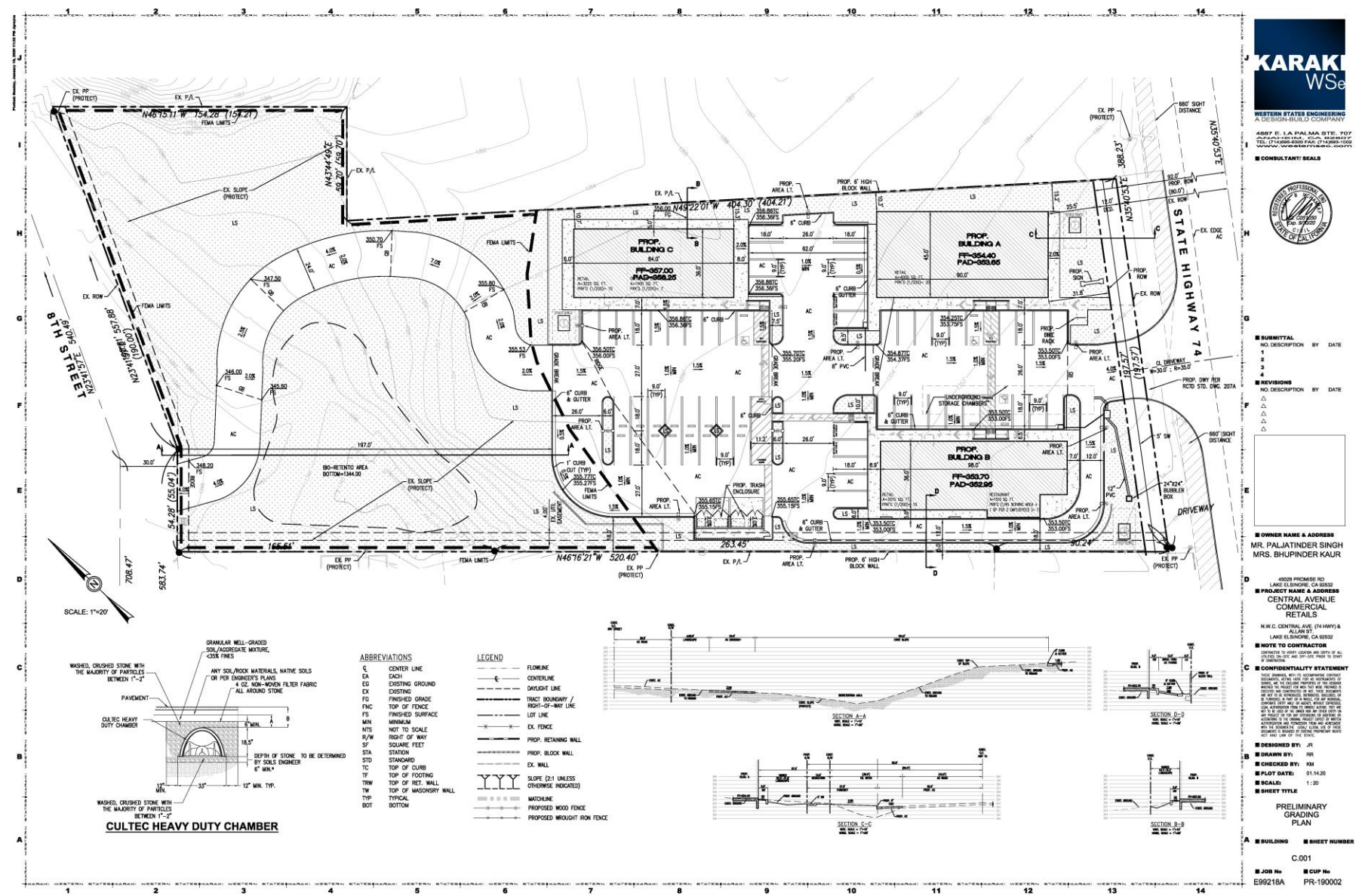
use), and Building C consists of 4,425 square feet of retail/office space (includes a 1,400 square foot second floor office space) on approximately 1.27 acres. The site is also to include a parking lot with 61 parking stalls. Exhibit B demonstrates the site plan for the project.

Construction activities within the Project area will consist of site preparation, on-site grading, building, paving, and architectural coating.

Exhibit A Location Map



Exhibit B Site Plan



2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used in the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

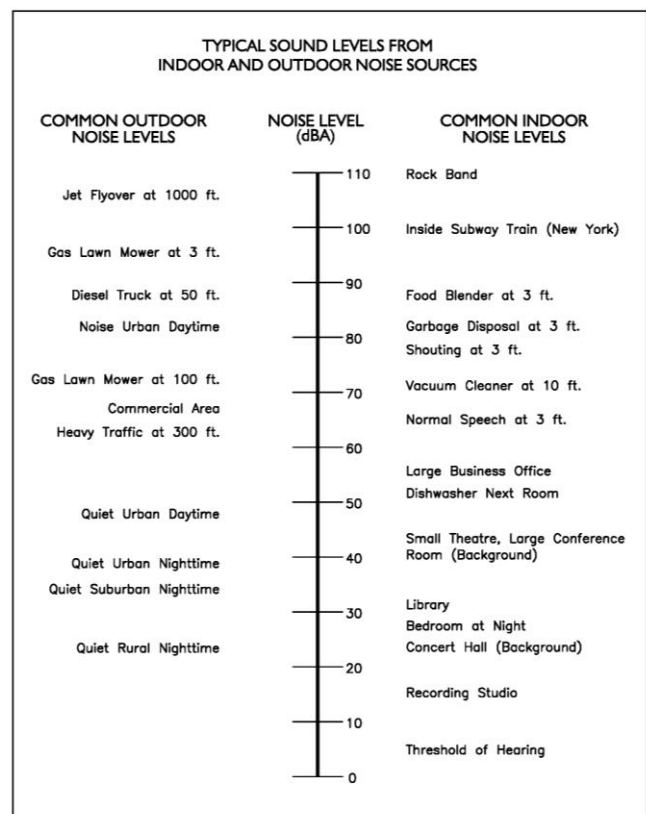
2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter ($\mu\text{N}/\text{m}^2$), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.0000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB. Exhibit C illustrates references sound levels for different noise sources.

Exhibit C: Typical A-Weighted Noise Levels



2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA), a scale designed to account for the frequency-dependent sensitivity of the ear. Typically, the human ear can barely perceive a change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code, or other applicable regulations, which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90, and L99, etc.

Noise: Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2–3 axle) and heavy truck percentage (4 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the

receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity, and turbulence can further impact how far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Propagation

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in an unincorporated area of the County of Riverside within the Sphere of Influence of the City of Lake Elsinore, California and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers. The Housing and Urban Development (HUD) is responsible for establishing noise regulations as it relates to exterior/interior noise levels for new HUD-assisted housing developments near high noise areas.

The federal government advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

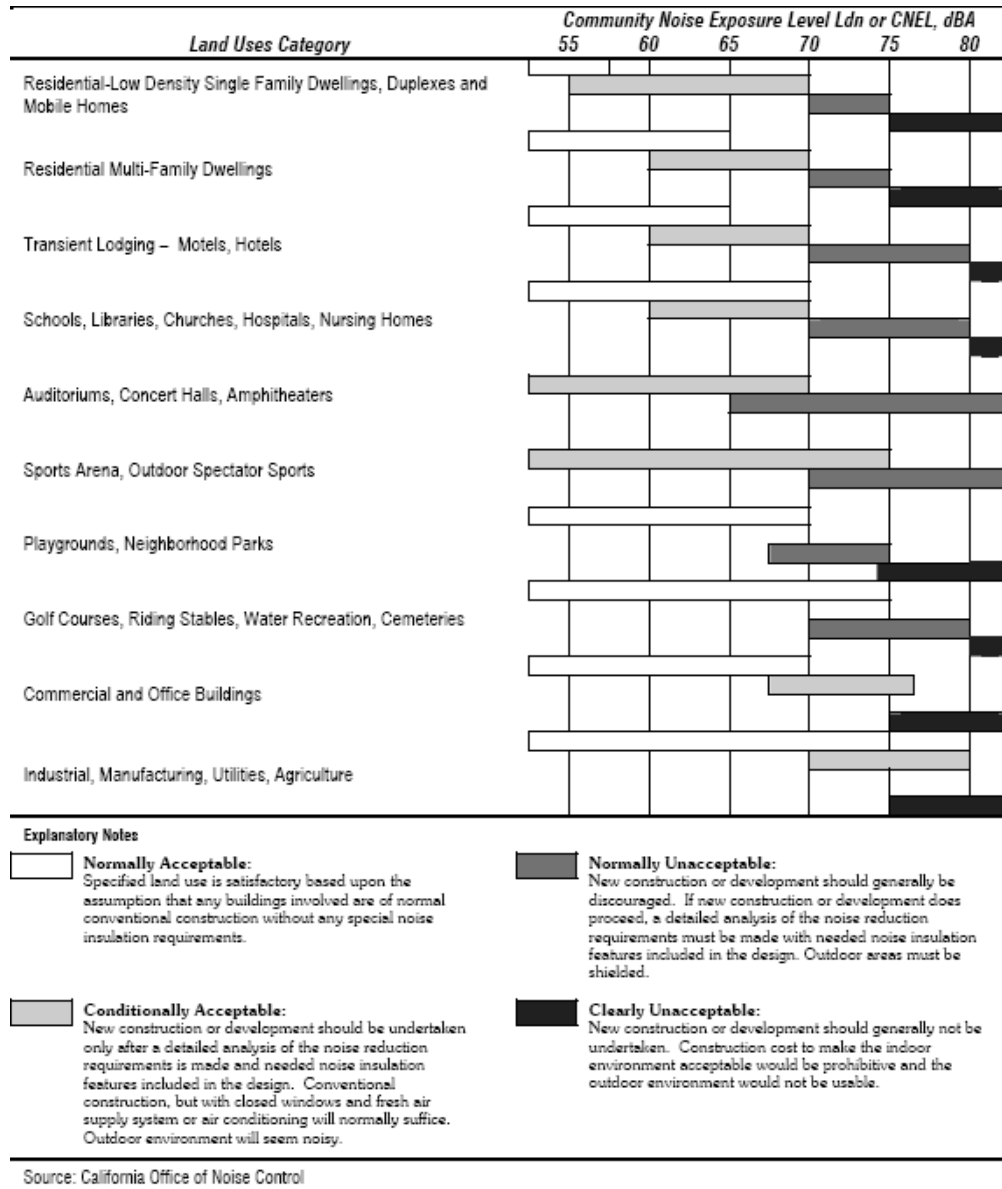
4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the “Land Use Compatibility for Community Noise Environments Matrix.” The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that

the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines



4.3 County of Riverside Noise Regulations

The County of Riverside outlines their noise regulations and standards within the Municipal Code and the Noise Element of the County of Riverside General Plan.

County of Riverside Municipal Code

CHAPTER 9.52 –Noise Regulations

9.52.010. - Intent

At certain levels, sound becomes noise and may jeopardize the health, safety or general welfare of Riverside County residents and degrade their quality of life. Pursuant to its police power, the board of supervisors declares that noise shall be regulated in the manner described in this chapter. This chapter is intended to establish county-wide standards regulating noise. This chapter is not intended to establish thresholds of significance for the purpose of any analysis required by the California Environmental Quality Act and no such thresholds are established.

(Ord. 847 § 1, 2006)

9.52.020. - Exemptions

- A. Sound emanating from the following sources is exempt from the provisions of this chapter:
- B. Facilities owned or operated by or for a governmental agency;
- C. Capital improvement projects of a governmental agency;
- D. The maintenance or repair of public properties;
- E. Public safety personnel in the course of executing their official duties, including, but not limited to, sworn peace officers, emergency personnel and public utility personnel. This exemption includes, without limitation, sound emanating from all equipment used by such personnel, whether stationary or mobile;
- F. Public or private schools and school-sponsored activities;
- G. Agricultural operations on land designated "Agriculture" in the Riverside County general plan, or land zoned A-I (light agriculture), A-P (light agriculture with poultry), A-2 (heavy agriculture), A-D (agriculture-dairy) or C/V (citrus/vineyard), provided such operations are carried out in a manner consistent with accepted industry standards. This exemption includes, without limitation, sound emanating from all equipment used during such operations, whether stationary or mobile;
- H. Wind energy conversion systems (WECS), provided such systems comply with the WECS noise provisions of Riverside County Ordinance No. 348;
- I. Private construction projects located one-quarter of a mile or more from an inhabited dwelling;
- J. Private construction projects located within one-quarter of a mile from an inhabited dwelling, provided that:
 - 1. Construction does not occur between the hours of six p.m. and six a.m. during the months of June through September, and
 - 2. Construction does not occur between the hours of six p.m. and seven a.m. during the months of October through May;

- K. Property maintenance, including, but not limited to, the operation of lawnmowers, leaf blowers, etc., provided such maintenance occurs between the hours of seven a.m. and eight p.m.;
- L. Motor vehicles, other than off-highway vehicles. This exemption does not include sound emanating from motor vehicle sound systems;
- M. Heating and air conditioning equipment;
Safety, warning and alarm devices, including, but not limited to, house and car alarms, and other warning devices that are designed to protect the public health, safety, and welfare;
- N. The discharge of firearms consistent with all state laws.

(Ord. 847 § 2, 2006)

County of Riverside – Noise Ordinance

No person shall create any sound, or allow the creation of any sound, on any property that causes the exterior sound level on any other occupied property to exceed the sound level standards set forth in Table 1.

Table 1: Riverside County Allowable Exterior Noise Level¹
Sound Level Standards (dBA Leq)*

General Plan Land Use Designation	Maximum Decibel Level	
	7 a.m. - 10 p.m.	10 p.m. - 7 a.m.
Low Density Residential	55	45

(Ord. 847 § 4, 2006)

County of Riverside General Plan

Goals, Policies, and Implementation Measures

Policies, goals and implementation program measures from the Noise Element that would mitigate potential impacts on noise include the following.

N2.1 Create a County Noise Inventory to identify major noise generators and noise-sensitive land uses, and to establish appropriate noise mitigation strategies.

N2.2 Require a qualified acoustical specialist to prepare acoustical studies for proposed noise-sensitive projects within noise impacted areas to mitigate existing noise.

N2.3 Mitigate exterior and interior noises to the levels listed in the table below to the extent feasible, for stationary sources

City of Lake Elsinore Municipal Code

CHAPTER 17.176 - NOISE CONTROL

Sec. 17.176.010. - Purpose

In order to control unnecessary, excessive and annoying noise and vibration in the City, it is hereby declared to be the policy of the City to prohibit such noise and vibration generated from or by all sources as specified in this chapter. It shall be the policy of the City to maintain quiet in those areas which exhibit low noise levels and to implement programs aimed at reducing noise in those areas within the City where noise levels are above acceptable values.

It is determined that certain noise levels and vibrations are detrimental to the public health, welfare and safety, and are contrary to public interest. Therefore, the City Council does ordain and declare that creating, maintaining, causing or allowing to be created, caused or maintained, any noise or vibration in a manner prohibited by or not in conformity with the provisions of this chapter, is a public nuisance and shall be punishable as such.

[Ord. 772 § 17.78.010, 1986. Code 1987 § 17.78.010].

City of Lake Elsinore – Noise Ordinance

Section 17.176.060 from the noise ordinance outlines the City's exterior noise limits as it relates to stationary noise sources.

Table 2: Lake Elsinore Allowable Exterior Noise Level¹

Sound Level Standards (dBA Leq)*

General Plan Land Use Designation	Maximum Decibel Level	
	7 a.m. - 10 p.m.	10 p.m. - 7 a.m.
Single-Family Residential	50	40
Multiple Dwelling Residential	50	45
Commercial and Office	60	55
General Commercial	65	60
Light Industrial	70	70
Heavy Industrial	75	75

(Ord. 772 § 17.78.060, 1986. Code 1987 § 17.78.060)

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to the City's and Caltrans (TeNS) technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

Noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed onsite noise sources. one (1) long-term 24-hour noise measurements was conducted at or near the project site and are illustrated in Exhibit E. Appendix A includes photos, field sheet, and measured noise data.

5.3 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources (parking spaces, restaurant drive through speakers). The model

assumes approximately 61 parking spots and a 3,525 square foot fast food restaurant with drive through speaker phone.

The drive through speaker phone was calibrated with a reference level of 64 dBA at 10 feet. The reference equipment sound level data is provided in Appendix B.

The SP model assumes that all noise sources are operating simultaneously (worst-case scenario), when in actuality the noise will be intermittent and lower in noise level. SP modeling inputs and outputs are provided in Appendix C.

5.4 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Roadway volumes and percentages correspond to the project's traffic scoping agreement as prepared by Integrated Engineering Group (Central Avenue Commercial Retail), The City's traffic counts, and roadway classification. The referenced traffic data was applied to the model and is in Appendix B. The following outlines the key adjustments made to the REMEL for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic Volumes (ADT), Travel Speeds, Percentages of automobiles, medium trucks and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour through-out a 24-hour period

Table 3 indicates the roadway parameters and vehicle distribution utilized for this study.

<Table 3 Next Page>

Table 3: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT	Existing Plus Project ADT	Speed (MPH)	Site Conditions
SH-74/Central Ave	Ardenwood Way to Conard Ave	33,168	34,258	45	Soft
Vehicle Distribution (Truck Mix)²					
Motor-Vehicle Type		Daytime % (7AM to 7 PM)	Evening % (7 PM to 10 PM)	Night % (10 PM to 7 AM)	Total % of Traffic Flow
Automobiles		75.5	14.0	10.5	97.42
Medium Trucks		48.9	2.2	48.9	1.84
Heavy Trucks		47.3	5.4	47.3	0.74
Notes: ² Integrated Engineering Group (Central Avenue Commercial Retail), and The City's traffic counts.					

The following outlines key adjustments to the REMEL for project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra
- Topography

5.5 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading, concrete and building phases of construction. The construction noise calculation output worksheet is located in Appendix E. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 6 month to 1 year time period. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

Exhibit E

Measurement Locations

1 = long-term
Monitoring Location



6.0 Existing Noise Environment

A twenty-four (24) hour ambient noise measurement was conducted at the property site. The noise measurement was taken to determine the existing ambient noise levels. Noise data indicates that traffic along SH-74/Central Avenue is the primary source of noise impacting the site and the adjacent uses. This assessment utilizes the ambient noise data as a basis and compares project operational levels to said data.

6.1 Long-Term Noise Measurement Results

The results of the Long-term noise data are presented in Table 4.

Table 4: Long-Term Noise Measurement Data¹

Date	Time	dB(A)							
		L _{EQ}	L _{MAX}	L _{MIN}	L ₂	L ₈	L ₂₅	L ₅₀	L ₉₀
7/20/2020	2PM-3PM	58.0	81.3	44.2	65.4	60.4	56.8	54.0	48.7
7/20/2020	3PM-4PM	59.2	82.5	45.4	66.6	61.6	58.0	55.2	49.9
7/20/2020	4PM-5PM	60.7	84.0	46.9	68.1	63.1	59.5	56.7	51.4
7/20/2020	5PM-6PM	60.3	83.6	46.5	67.7	62.7	59.1	56.3	51.0
7/20/2020	6PM-7PM	58.6	81.9	44.8	66.0	61.0	57.4	54.6	49.3
7/20/2020	7PM-8PM	57.3	80.6	43.5	64.7	59.7	56.1	53.3	48.0
7/20/2020	8PM-9PM	56.2	79.5	42.4	63.6	58.6	55.0	52.2	46.9
7/20/2020	9PM-10PM	55.5	78.8	41.7	62.9	57.9	54.3	51.5	46.2
7/20/2020	10PM-11PM	54.5	77.8	40.7	61.9	56.9	53.3	50.5	45.2
7/20/2020	11PM-12AM	53.9	77.2	40.1	61.3	56.3	52.7	49.9	44.6
7/21/2020	12AM-1AM	52.3	75.6	38.5	59.7	54.7	51.1	48.3	43.0
7/21/2020	1AM-2AM	49.9	73.2	36.1	57.3	52.3	48.7	45.9	40.6
7/21/2020	2AM-3AM	48.6	71.9	34.8	56.0	51.0	47.4	44.6	39.3
7/21/2020	3AM-4AM	46.9	70.2	33.1	54.3	49.3	45.7	42.9	37.6
7/21/2020	4AM-5AM	47.8	71.1	34.0	55.2	50.2	46.6	43.8	38.5
7/21/2020	5AM-6AM	51.6	74.9	37.8	59.0	54.0	50.4	47.6	42.3
7/21/2020	6AM-7AM	58.1	81.4	44.3	65.5	60.5	56.9	54.1	48.8
7/21/2020	7AM-8AM	60.3	83.6	46.5	67.7	62.7	59.1	56.3	51.0
7/21/2020	8AM-9AM	58.5	81.8	44.7	65.9	60.9	57.3	54.5	49.2
7/21/2020	9AM-10AM	57.5	80.8	43.7	64.9	59.9	56.3	53.5	48.2
7/21/2020	10AM-11AM	57.4	80.7	43.6	64.8	59.8	56.2	53.4	48.1
7/21/2020	11AM-12PM	57.6	80.9	43.8	65.0	60.0	56.4	53.6	48.3
7/21/2020	12PM-1PM	57.7	81.0	43.9	65.1	60.1	56.5	53.7	48.4
7/21/2020	1PM-2PM	57.7	81.0	43.9	65.1	60.1	56.5	53.7	48.4
LDN		61.1							
Notes: 1 Long-term noise monitoring location (LT1) is illustrated in Exhibit E. The quietest hourly nighttime noise interval is highlighted in blue when project operations could occur.									

Noise data indicates the ambient noise level ranged between 46.9 dBA Leq(h) to 60.7 dBA Leq(h) at the project site. Maximum levels reach 84 dBA as a result of traffic along SH-74/Central Avenue. Additional field notes and photographs are provided in Appendix A.

For this evaluation, MD has utilized the quietest hourly level (during potential operational hours) and has compared the project's projected noise levels to the said ambient level. The quietest (lowest) nighttime hourly level occurred between 3AM to 4AM (50.9 dBA, Leq(h)).

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts as a result of the project. The analysis details the estimated exterior noise levels. Stationary noise impacts are analyzed from the on-site noise sources such as cars coming and going, and drive-thru restaurant speakerphone.

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed project.

7.1.1 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Sensitive receptors that may be affected by project operational noise include single family residential to the north west and single family residential to the east (across SH-74/Central Ave). The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes that all project activities are always operational when in reality the noise will be intermittent and cycle on/off depending on customer usage. Project stores are anticipated hours of operation will be 8 to 10 hours with the drive through running 24-hours a day.

A total of two (2) receptors were modeled to evaluate the proposed project's operational impact. A receptor is denoted by a yellow dot. All yellow dots represent either a property line or a sensitive receptor such as an outdoor sensitive area (courtyard, patio, backyard, etc). See Exhibit F.

This study compares the Project's operational noise levels to two (2) different noise assessment scenarios: 1) Project Only operational noise level projections, 2) Project plus ambient noise level projections.

Project Operational Noise Levels

Exhibit F shows the "project only" operational noise levels at the project site and illustrates how the noise will propagate at the property lines and/or sensitive receptor area. Operational noise levels at the adjacent uses are anticipated to range between 33 dBA to 50 dBA Leq (depending on the location).

Project Plus Ambient Operational Noise Levels

Table 5 demonstrates the project plus the ambient noise levels. Project plus ambient noise level projections are anticipated to range between 47 to 52 dBA Leq depending on location. Therefore, the project has been compared to the quietest hourly average ambient noise level for comparative purposes.

<Table 5 on Next Page>

Table 5: Worst-case Predicted Noise Level (dBA, Leq)

Receptor ¹	Floor	Existing Ambient Noise Level (dBA, Leq) ²	Project Noise Level (dBA, Leq) ³	Total Combined Noise Level (dBA, Leq)	Nighttime (10PM – 7AM) Stationary Noise Limit (dBA, Leq) ⁴	Change in Noise Level as Result of Project
1	1	47	33	47	40	0.2
2	1		34	47	45	0.2

Notes:
¹ Receptors 1 represent single family residential. Receptor 2 represents commercial.
² Existing ambient taken as one-hour measurement.
³ See Exhibit G for the operational noise level projections at said receptors.
⁴ Receptor 1 follows the City of Lake Elsinore Per the City of Lake Elsinore if the ambient exceeds the standard the ambient becomes the standard. Receptor 2 follows the County of Riverside Commercial noise standard.

As shown in Table 5, the project does not exceed the County of Riverside and City of Lake Elsinore’s nighttime exterior noise limit. The predicted exterior noise level will range between 33 to 34 dBA. Project operations are anticipated to remain below the County and City respective noise limits. Therefore, the impact is less than significant.

When comparing the baseline plus project condition the change in noise level will be between 0.0 to 4.8 dBA, Leq as shown in Table 5.

Table 6 provides the characteristics associated with changes in noise levels.

Table 6: Change in Noise Level Characteristics¹

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

The change in noise level at all receptors would fall within the “Not Perceptible” acoustic characteristic depending on location.

7.1.2 Noise Impacts to Off-Site Receptors Due to Project Generated Traffic

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated 50 feet from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. In addition, the noise contours for 60, 65 and 70 dBA CNEL were calculated. The potential

off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions.

Existing Year (Plus Project): This scenario refers to existing year + project traffic noise conditions.

Table 7 compares the without and with project scenario and shows the change in traffic noise levels as a result of the proposed project. It takes a change of 3 dB or more to hear a perceptible difference. As demonstrated in Table 7, the project is anticipated to change the noise 0.1 dBA CNEL.

Although there is an increase in traffic noise levels the impact is considered less than significant as the noise levels at or near any existing proposed sensitive receptor would be 74.0 dBA CNEL or less and the change in noise level is 3 dBA or less. No further mitigation is required.

Table 7: Existing Scenario - Noise Levels Along Roadways (dBA CNEL)

Existing Without Project Exterior Noise Levels

Roadway	Segment	CNEL at 50 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
SH-74/Central Ave	Ardenwood Way to Conard Ave	73.9	91	196	421	908

Existing With Project Exterior Noise Levels

Roadway	Segment	CNEL at 50 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
SH-74/Central Ave	Ardenwood Way to Conard Ave	74.0	93	200	430	927

Change in Existing Noise Levels as a Result of Project

Roadway ¹	Segment	CNEL at 50 Feet dBA ²			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
SH-74/Central Ave	Ardenwood Way to Conard Ave	73.9	74.0	0.1	No
Notes: ¹ Exterior noise levels calculated at 5 feet above ground level. ² Noise levels calculated from centerline of subject roadway.					

7.1.3 Noise Impacts to On-Site Receptors Due to Project Generated Traffic

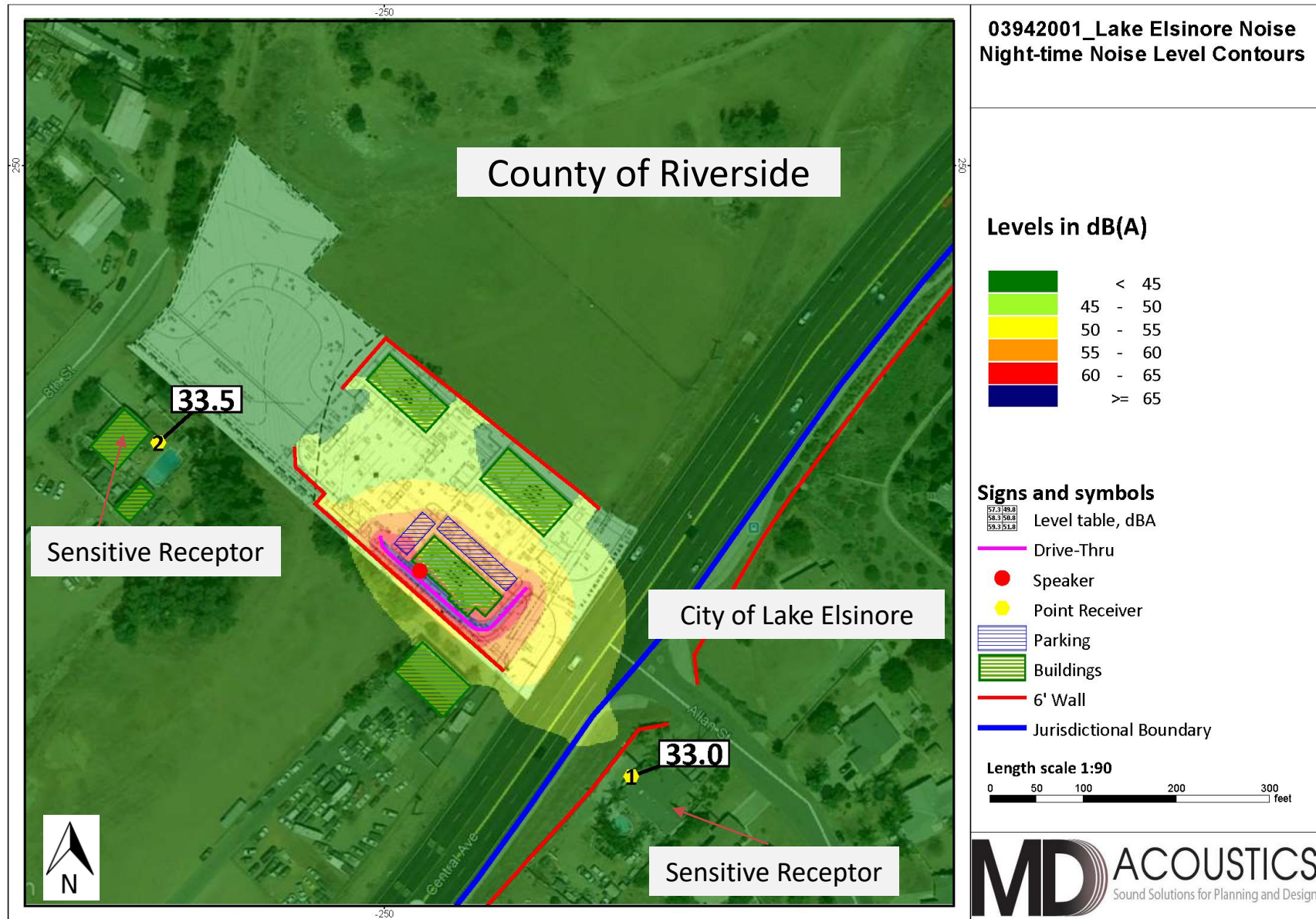
The project site is located approximately 81 feet from the center line of SH-74/Central Ave and would fall within the 70 dBA CNEL or less contour. Therefore, the project would be normally acceptable per the County's Land Use Compatibility Matrix.

7.2 Mitigation Measures

The project will meet the County's nighttime noise ordinance as well as the City of Lake Elsinore's Nighttime noise standard. Therefore, no further mitigation is required.

Exhibit F

Operational Noise Levels Leq(h)



8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 8.

Table 8: Typical Construction Equipment Noise Levels¹

Type	Lmax (dBA) at 50 Feet
Backhoe	80
Truck	88
Concrete Mixer	85
Pneumatic Tool	85
Pump	76
Saw, Electric	76
Air Compressor	81
Generator	81
Paver	89
Roller	74
Notes: ¹ Referenced Noise Levels from FTA noise and vibration manual.	

Construction noise is considered a short-term impact and would be considered significant if construction activities are taken outside the allowable times as described in the County of Riverside's Municipal Code Section 9.52.20, and the City of Lake Elsinore's Noise Element Section 17.176.060 Table 1. Construction is anticipated to occur during the permissible hours according to the County's Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise. The impact is considered less than significant however construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of 1-grader, 1-dozer, 1-excavators, 1-scrapers and 1-backhoes operating at 137 feet from the nearest sensitive receptor.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 137 feet have the potential to reach 76 dBA L_{eq} at the nearest sensitive receptors during building construction. Noise levels for the other construction phases would be lower, approximately 73 dBA.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bulldozer. A large bulldozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{\text{equipment}} = PPV_{\text{ref}} (100/D_{\text{rec}})^n$$

Where: PPV_{ref} = reference PPV at 100ft.

D_{rec} = distance from equipment to receiver in ft.

$n = 1.1$ (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 9 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 9: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5
Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013. Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.		

Table 10 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 10: Vibration Source Levels for Construction Equipment¹

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

¹ Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 40 feet, a large bulldozer would yield a worst-case 0.053 PPV (in/sec) which may be perceptible for short periods of time during grading along the southern property line of the project site, but is below any threshold of damage. The impact is less than significant and no mitigation is required.

8.3 Construction Noise Reduction Measures

Construction operations must follow the County's and City's General Plan and the Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following measures should be taken:

1. Construction should occur during the permissible hours as defined in the County's Ordinance No.847 and Section 17.176.080 of the City of Lake Elsinore.
2. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.
3. The contractor should locate equipment staging areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.
4. Idling equipment should be turned off when not in use.
5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 *References*

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of Lake Elsinore: General Plan Noise Element. Chapter 3.

City of Lake Elsinore: Municipal Code. Chapter 17.176 Noise Control

City of Lake Elsinore: Traffic Counts

Integrated Engineering Group, Central Avenue Commercial Retail Scoping Agreement

County of Riverside Municipal Code Chapter 9.52-Noise Regulations

Appendix A:
Photographs and Field Measurement Data

24-Hour Continuous Noise Measurement Datasheet

Project: Lake Elsinore Retail
Site Address/Location: E99218A Central Ave, CA route 74 Elsinore, CA
Date: 7/20/2020-7/21/2020
Field Tech/Engineer: Jason Schuyler
Site Observations: Clear sky, Temps in high 90's some wind 5-7Mph.

General Location:
Sound Meter: NTi XL2 **SN:** 80206
Settings: A-weighted, slow, 1-min, 24-hour duration
Meteorological Con.: 77 degrees F, 2 to 5 mph wind, eastern direction
Site ID: LT-1

Site Topo: Flat
Ground Type: Soft site, Open raw ground with a road

Noise Source(s) w/ Distance:

LT1 is 50' from S. P/L

LT1 is 150ish ft. from edge of CA 74

Figure 1: LT-1 Monitoring Location

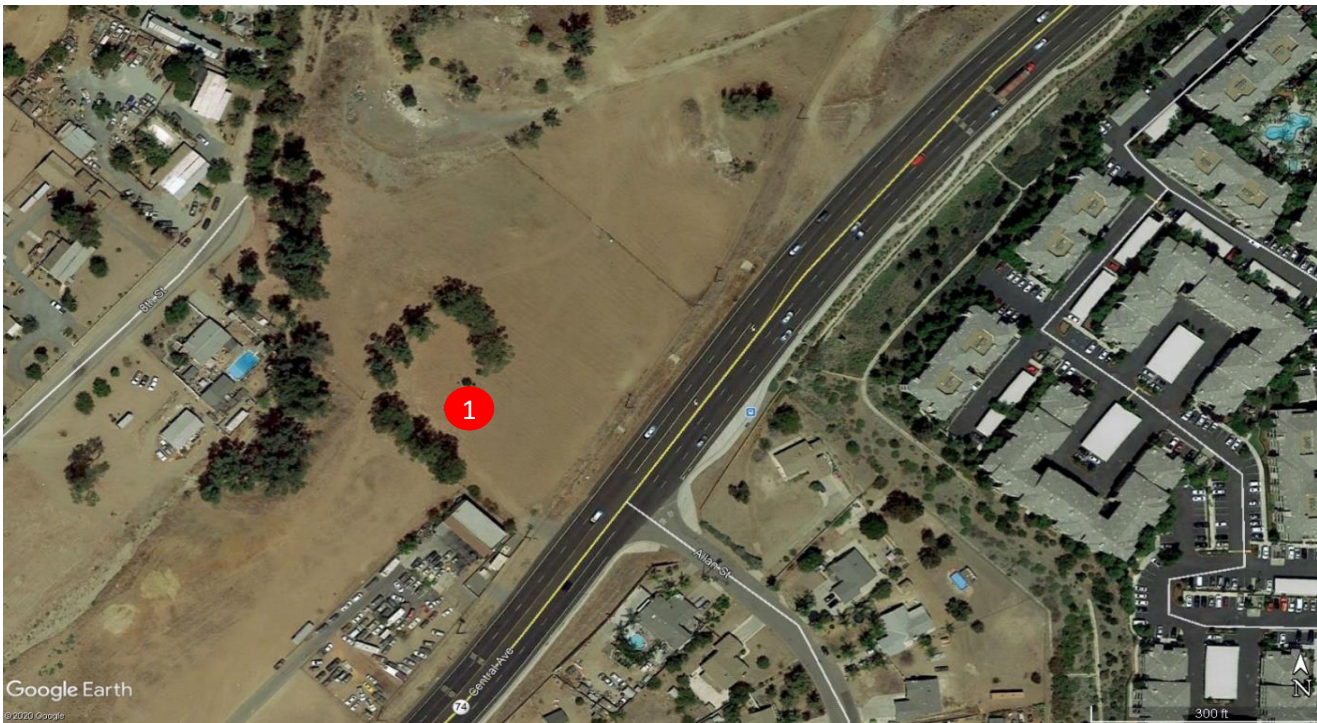


Figure 2: LT-1 Photo



24-Hour Noise Measurement Datasheet - Cont.

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Project: Lake Elsinore Retail
Site Address/Location: E99218A Central Ave, CA route 74 Elsinore, CA
Site ID: LT-1

Day: 1 of 1

Date	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
7/20/2020	2:00 PM	3:00 PM	58.0	81.3	44.2	65.4	60.4	56.8	54.0	48.7
7/20/2020	3:00 PM	4:00 PM	59.2	82.5	45.4	66.6	61.6	58.0	55.2	49.9
7/20/2020	4:00 PM	5:00 PM	60.7	84.0	46.9	68.1	63.1	59.5	56.7	51.4
7/20/2020	5:00 PM	6:00 PM	60.3	83.6	46.5	67.7	62.7	59.1	56.3	51.0
7/20/2020	6:00 PM	7:00 PM	58.6	81.9	44.8	66.0	61.0	57.4	54.6	49.3
7/20/2020	7:00 PM	8:00 PM	57.3	80.6	43.5	64.7	59.7	56.1	53.3	48.0
7/20/2020	8:00 PM	9:00 PM	56.2	79.5	42.4	63.6	58.6	55.0	52.2	46.9
7/20/2020	9:00 PM	10:00 PM	55.5	78.8	41.7	62.9	57.9	54.3	51.5	46.2
7/20/2020	10:00 PM	11:00 PM	54.5	77.8	40.7	61.9	56.9	53.3	50.5	45.2
7/20/2020	11:00 PM	12:00 AM	53.9	77.2	40.1	61.3	56.3	52.7	49.9	44.6
7/21/2020	12:00 AM	1:00 AM	52.3	75.6	38.5	59.7	54.7	51.1	48.3	43.0
7/21/2020	1:00 AM	2:00 AM	49.9	73.2	36.1	57.3	52.3	48.7	45.9	40.6
7/21/2020	2:00 AM	3:00 AM	48.6	71.9	34.8	56.0	51.0	47.4	44.6	39.3
7/21/2020	3:00 AM	4:00 AM	46.9	70.2	33.1	54.3	49.3	45.7	42.9	37.6
7/21/2020	4:00 AM	5:00 AM	47.8	71.1	34.0	55.2	50.2	46.6	43.8	38.5
7/21/2020	5:00 AM	6:00 AM	51.6	74.9	37.8	59.0	54.0	50.4	47.6	42.3
7/21/2020	6:00 AM	7:00 AM	58.1	81.4	44.3	65.5	60.5	56.9	54.1	48.8
7/21/2020	7:00 AM	8:00 AM	60.3	83.6	46.5	67.7	62.7	59.1	56.3	51.0
7/21/2020	8:00 AM	9:00 AM	58.5	81.8	44.7	65.9	60.9	57.3	54.5	49.2
7/21/2020	9:00 AM	10:00 AM	57.5	80.8	43.7	64.9	59.9	56.3	53.5	48.2
7/21/2020	10:00 AM	11:00 AM	57.4	80.7	43.6	64.8	59.8	56.2	53.4	48.1
7/21/2020	11:00 AM	12:00 PM	57.6	80.9	43.8	65.0	60.0	56.4	53.6	48.3
7/21/2020	12:00 PM	1:00 PM	57.7	81.0	43.9	65.1	60.1	56.5	53.7	48.4
7/21/2020	1:00 PM	2:00 PM	57.7	81.0	43.9	65.1	60.1	56.5	53.7	48.4

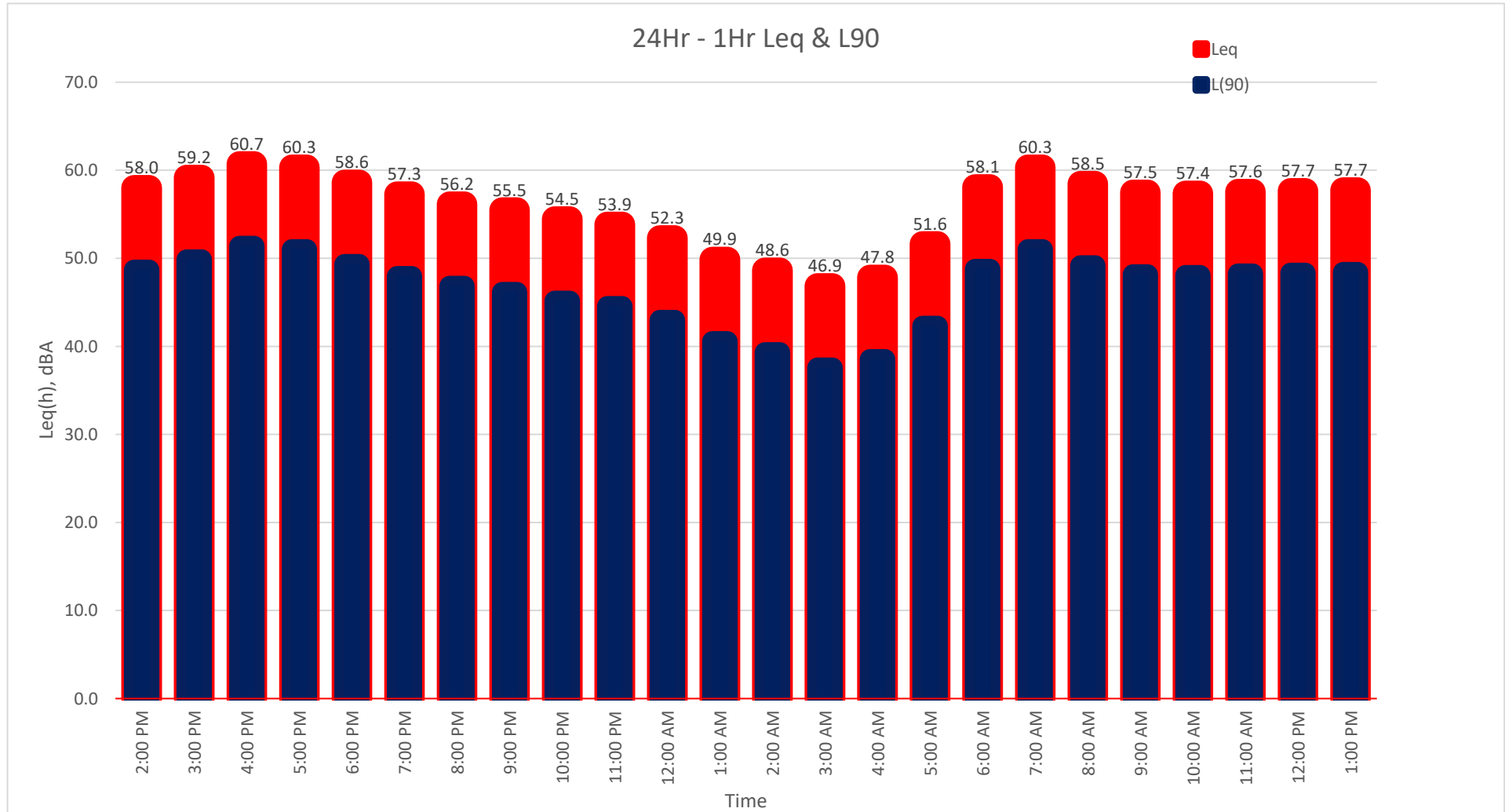
CNEL: 61.1

24-Hour Continuous Noise Measurement Datasheet - Cont.

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Project: Lake Elsinore Retail
Site Address/Location: E99218A Central Ave, CA route 74 Elsinore, CA
Site ID: LT-1

Day: 1 of 1



Appendix B:
Manufacturers Cut Sheet

Project: CyrusOne - Bldg. 8 - Chiller Noise Evaluation
Site Location: 1901 N Pebble Creek Pkway, Goodyear, AZ
Date: #####
Field Tech/Engineer: Robert Pearson
Source/System: Speaker Phone

Site Observations:

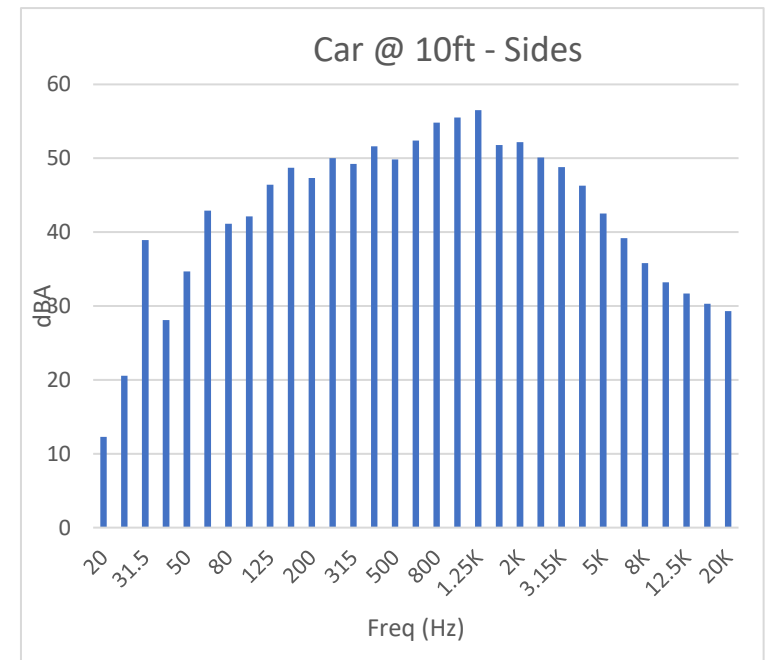
Clear sky, measurements were performed within 10ft of source while a order was being placed.

Location: 10 feet from source
Sound Meter: NTi XL2 **SN:** A2A-05967-E0
Settings: A-weighted, slow, 1-sec, 10-sec duration
Meteorological Cond.: 77 degrees F, 2 mph wind

Table 1: Summary Measurement Data

Source	System	Overall dB(A)	3rd Octave Band Data (dBA)																														
			20	25	32	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
Speaker Phone		64.0	12	21	39	28	35	43	41	42	46	49	47	50	49	52	50	52	55	56	57	52	52	50	49	46	43	39	36	33	32	30	29

Figure 1: Example Measurement Position



Appendix C:
SoundPlan Input/Output

Lake Elsinore Noise

Octave spectra of the sources in dB(A) - Situation 2: Outdoor SP

3

Name	Source type	I or A m,m²	Li dB(A)	R'w dB	L'w dB(A)	Lw dB(A)	KI dB	KT dB	LwMax dB(A)	DO-Wall dB	Time histogram	Emission spectrum	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	
	Line	66.91			66.0	84.3	0.0	0.0		0	100%/24h	Car, driving open ramp, drive in	65.8	69.8	73.8	76.8	79.8	77.8	72.8	67.8	
	Point				65.0	65.0	0.0	0.0		0	100%/24h	Speaker Phone				65.0					
Parking 1	PLot	167.36			54.8	77.0	0.0	0.0		0	100%/24h					77.0					
Parking 2	PLot	77.78			55.1	74.0	0.0	0.0		0	100%/24h					74.0					

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	MD Acoustics LLC 4960 S. Gilbert Rd Chandler, AZ 85249 Phone: 602 774 1950	1
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Lake Elsinore Noise Contribution level - Situation 2: Outdoor SP

9

Source	Source group	Source ty	Tr. lane	Ldn dB(A)	A dB	
Receiver -169,50 FI G dB(A) Ldn 33.0 dB(A)						
Parking 1 Parking 2	Default industrial noise	Line		32.6	0.0	
	Default industrial noise	Point		4.7	0.0	
	Default parking lot noise	PLot		21.6	0.0	
	Default parking lot noise	PLot		3.9	0.0	
Receiver Building 24 FI G dB(A) Ldn 33.5 dB(A)						
Parking 1 Parking 2	Default industrial noise	Line		32.5	0.0	
	Default industrial noise	Point		19.3	0.0	
	Default parking lot noise	PLot		22.0	0.0	
	Default parking lot noise	PLot		23.4	0.0	

Lake Elsinore Noise
Contribution spectra - Situation 2: Outdoor SP

23

Source	Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	
		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Receiver -169,50 FI G dB(A) Ldn 33.0 dB(A)																											
1	Ldn	32.6	18.1	18.1	18.1	18.5	18.5	18.5	19.8	19.8	19.8	21.2	21.2	21.2	22.1	22.1	22.1	18.8	18.8	18.8	9.4	9.4	9.4	-5.0	-5.0	-5.0	
2	Ldn	4.7										-0.1	-0.1	-0.1													
Parking 1	Ldn	21.6										16.8	16.8	16.8													
Parking 2	Ldn	3.9										-0.9	-0.9	-0.9													
Receiver Building 24 FI G dB(A) Ldn 33.5 dB(A)																											
1	Ldn	32.5	15.4	15.4	15.4	15.5	15.5	15.5	18.5	18.5	18.5	20.4	20.4	20.4	23.1	23.1	23.1	20.7	20.7	20.7	12.7	12.7	12.7	-3.1	-3.1	-3.1	
2	Ldn	19.3										14.5	14.5	14.5													
Parking 1	Ldn	22.0										17.2	17.2	17.2													
Parking 2	Ldn	23.4										18.6	18.6	18.6													

Appendix D:
Traffic Noise Modeling Output

FHWA-RD-77-108 ROADWAY TRAFFIC NOISE PREDICTION MODEL (CNEL) - CALVENO

PROJECT: Lake Elsinore Retail Project
ROADWAY: SH-74/Central Ave
SEGMENT: Ardenwood Way to Conard Ave
LOCATION: City of Lake Elsinore

SCENARIO: Existing

JOB #: 0641-19-01
DATE: 6-Nov-20
ENGINEER: R. Pearson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT = 33,168
SPEED = 45
PK HR % = 10
NEAR LANE/FAR LANE DIST = 44
ROAD ELEVATION = 0
GRADE = 0
PK HR VOL = 3,317

RECEIVER INPUT DATA

RECEIVER DISTANCE = 50
DIST C/L TO WALL = 0
RECEIVER HEIGHT = 5
WALL DISTANCE FROM RECEIVER = 50
PAD ELEVATION = 0
ROADWAY VIEW: LF ANGLE -90
RT ANGLE 90
DF ANGLE 180

SITE CONDITIONS

AUTOMOBILES 15
MED TRUCKS 15 (HARD SITE=10, SOFT SITE=15)
HVY TRUCKS 15

WALL INFORMATION

HTH WALL = 0 FT
AMBIENT = 0
BARRIER = 0 (0=WALL,1=BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.105	0.974
MEDIUM TRUCKS	0.489	0.022	0.489	0.018
HEAVY TRUCKS	0.473	0.054	0.473	0.007

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES =	2.00	45.0	--
MEDIUM TRUCKS=	4.00	44.9	--
HEAVY TRUCKS =	8.01	45.0	0.0

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	72.0	70.0	68.7	62.6	71.1	71.7
MEDIUM TRUCKS	63.0	59.1	51.7	60.4	66.6	66.6
HEAVY TRUCKS	63.6	59.5	56.1	60.8	67.0	67.1
VEHICULAR NOISE	73.0	70.7	69.0	66.2	73.5	73.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	91	196	421	908
LDN	85	184	396	854

FHWA-RD-77-108 ROADWAY TRAFFIC NOISE PREDICTION MODEL (CNEL) - CALVENO

PROJECT: Corydon Development
ROADWAY: SH-74/Central Ave
SEGMENT: Ardenwood Way to Conard Ave
LOCATION: City of Lake Elsinore

SCENARIO: E+P

JOB #: 0641-19-01
DATE: 6-Nov-20
ENGINEER: R. Pearson

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT = 34,258
SPEED = 45
PK HR % = 10
NEAR LANE/FAR LANE DIST = 44
ROAD ELEVATION = 0
GRADE = 0
PK HR VOL = 3,426

RECEIVER INPUT DATA

RECEIVER DISTANCE = 50
DIST C/L TO WALL = 0
RECEIVER HEIGHT = 5
WALL DISTANCE FROM RECEIVER = 50
PAD ELEVATION = 0
ROADWAY VIEW: LF ANGLE -90
RT ANGLE 90
DF ANGLE 180

SITE CONDITIONS

AUTOMOBILES 15
MED TRUCKS 15 (HARD SITE=10, SOFT SITE=15)
HVY TRUCKS 15

WALL INFORMATION

HTH WALL = 0 FT
AMBIENT = 0
BARRIER = 0 (0=WALL,1=BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVE	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.105	0.974
MEDIUM TRUCKS	0.489	0.022	0.489	0.018
HEAVY TRUCKS	0.473	0.054	0.473	0.007

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES =	2.00	45.0	--
MEDIUM TRUCKS=	4.00	44.9	--
HEAVY TRUCKS =	8.01	45.0	0.0

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	72.1	70.1	68.8	62.8	71.2	71.8
MEDIUM TRUCKS	63.2	59.3	51.8	60.5	66.7	66.7
HEAVY TRUCKS	63.7	59.7	56.3	60.9	67.1	67.2
VEHICULAR NOISE	73.2	70.8	69.1	66.3	73.6	74.0

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	93	200	430	927
LDN	87	188	405	872

Exhibit B

SCOPING AGREEMENT FOR TRAFFIC IMPACT STUDY

This letter acknowledges the Riverside County Transportation Department requirements for traffic impact analysis of the following project. The analysis must follow the Riverside County Transportation Department Traffic Study Guidelines dated February 2005.

Case No. CUP# 20006

Related Cases -

SP No. _____

EIR No. _____

GPA No. _____

CZ No. _____

Project Name: Central Avenue Commercial Retails

Project Address: Central Avenue and Allan Street

Project Description: Project is proposing the construction of 12,000 sf of retail center

Consultant
Name: Integrated Engineering Group
Address: 23905 Clinton Keith Road 114-280
Wildomar CA 92562
Telephone: 951-833-3105
Fax: _____

Developer
Name: Western States Engineering
Address: 4887 E. La Palma, ste. 707
Anaheim CA, 92807
Telephone: 714-695-9300
Fax: _____

A. Trip Generation Source: (ITE 10th Edition)

Current GP Land Use Provide General Plan Land
Use Designation (e.g.: MDR,
CR, etc)

Current Zoning C-P-S

Proposed Land Use _____

Proposed Zoning I-P

Current Trip Generation

	In	Out	Total
AM Trips	<u>0</u>	<u>0</u>	<u>0</u>
PM Trips	<u>0</u>	<u>0</u>	<u>0</u>

Proposed Trip Generation

	In	Out	Total
	<u>98</u>	<u>60</u>	<u>158</u>
	<u>36</u>	<u>39</u>	<u>75</u>

Internal Trip Allowance
Trip Allowance

☐ Yes
☐ Yes

Yes
Yes

☐ No
☐ No

No
No

(34 % PM Trip Discount) Pass-By p
(0 % Trip Discount)

A passby trip discount of 25% is allowed for appropriate land uses. The passby trips at adjacent study area intersections and project driveways shall be indicated on a report figure.

B. Trip Geographic Distribution: N 10 % S 30 % E 35 % W 25 % (attach exhibit for detailed assignment)

C. Background Traffic

Project Build-out Year: 2021

Annual Ambient Growth Rate: 2 %

Phase Year(s) N/A

Other area projects to be analyzed: _____

Model/Forecast methodology No buildout analysis

Exhibit B – Scoping Agreement – Page 2

D. Study intersections: (NOTE: Subject to revision after other projects, trip generation and distribution are determined, or comments from other agencies.)

- | | |
|--|-----------|
| 1. SH-74/Central Avenue and Ardenwood Way | 6. _____ |
| 2. SH-74/Central Avenue and Conrad Avenue | 7. _____ |
| 3. SH-74/Central Avenue and Allan Street | 8. _____ |
| 4. SH-74/Central Avenue and Rosetta Canyon Dr. | 9. _____ |
| 5. Highway 74/Crater Drive | 10. _____ |

E. Study Roadway Segments: (NOTE: Subject to revision after other projects, trip generation and distribution are determined, or comments from other agencies.)

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

E. Other Jurisdictional Impacts

Is this project within a City's Sphere of Influence or one-mile radius of City boundaries? ☐ Yes ☐ No

If so, name of City Jurisdiction: Lake Elsinore

F. Site Plan (please attach reduced copy)

G. Specific issues to be addressed in the Study (in addition to the standard analysis described in the Guideline) (To be filled out by Transportation Department)

(NOTE: If the traffic study states that "a traffic signal is warranted" (or "a traffic signal appears to be warranted," or similar statement) at an existing unsignalized intersection under existing conditions, 8-hour approach traffic volume information must be submitted in addition to the peak hourly turning movement counts for that intersection.)

H. Existing Conditions

Traffic count data must be new or recent. Provide traffic count dates if using other than new counts.

Date of counts _____

Due to the current ongoing COVID-19 pandemic, County staff will provide historic traffic counts (collected in 2019 or earlier) that were collected when local schools were in session and operating on normal bell schedules would be utilized in conjunction with an annual 2% adjustment factor to develop baseline conditions.

***NOTE* Traffic Study Submittal Form and appropriate fee must be submitted with, or prior to submittal of this form. Transportation Department staff will not process the Scoping Agreement prior to receipt of the fee.**

George Ghossain 8/5/20
Consultant's Representative Date

Revised on 9/8/20

Riverside County Transportation
Department

Trip Generation Calculation:

Project Trip Generation Rate

Land Use ¹	Units ²	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Fast Food Restaurant W/Drive Through	TSF	934	20.50	19.69	40.19	16.99	15.68	32.67	471
Shopping Center ³	TSF	820	9.28	5.69	14.97	4.69	5.08	9.77	123.7

¹ Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Tenth Edition.

² TSF = Thousand Square Feet

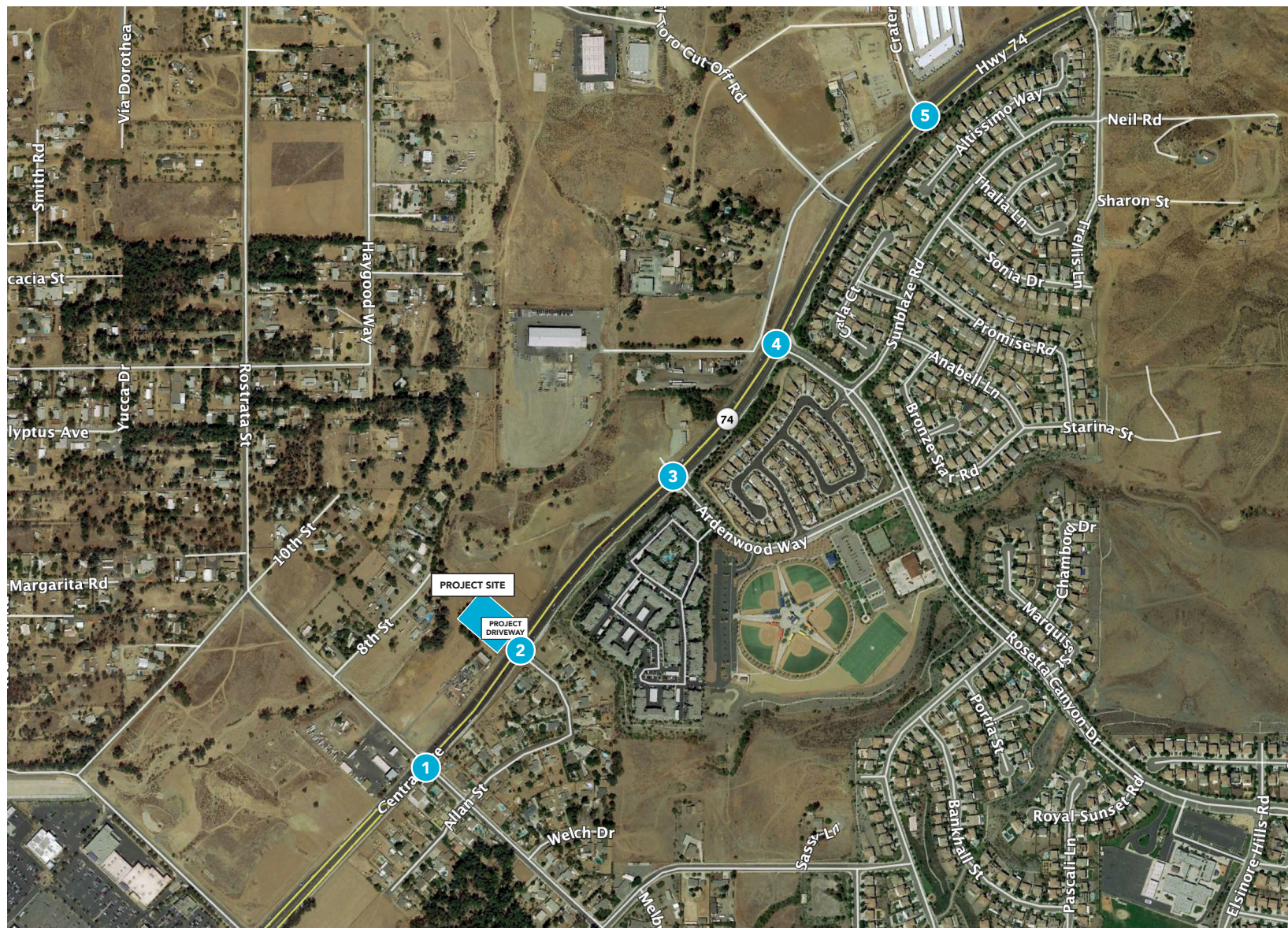
³ Trip generation rates based on the regression equation for ITE Land Use 820.

Project Trip Generation

Land Use	Intensity	Units ¹	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Shopping Center	10.49	TSF	97	60	157	49	53	102	1,298
Pass-by Reduction (34% - PM Peak Hour Only) ²			-	-	-	17	18	35	441
<i>Subtotal</i>			97	60	157	32	35	67	856
Fast Food Restaurant W/Drive Through	1.51	TSF	31	30	61	26	24	50	711
Pass-by Reduction (49% AM Peak Hour, 50% - PM Peak Hour) ²			15	15	30	13	12	25	356
<i>Subtotal</i>			16	15	31	13	12	25	355
TOTAL			113	75	188	45	47	92	1,212

¹ TSF = Thousand Square Feet

² Pass-by reduction percentage is based on the ITE methodology per Table E of ITE Trip Generation Handbook (3rd Edition, 2017).

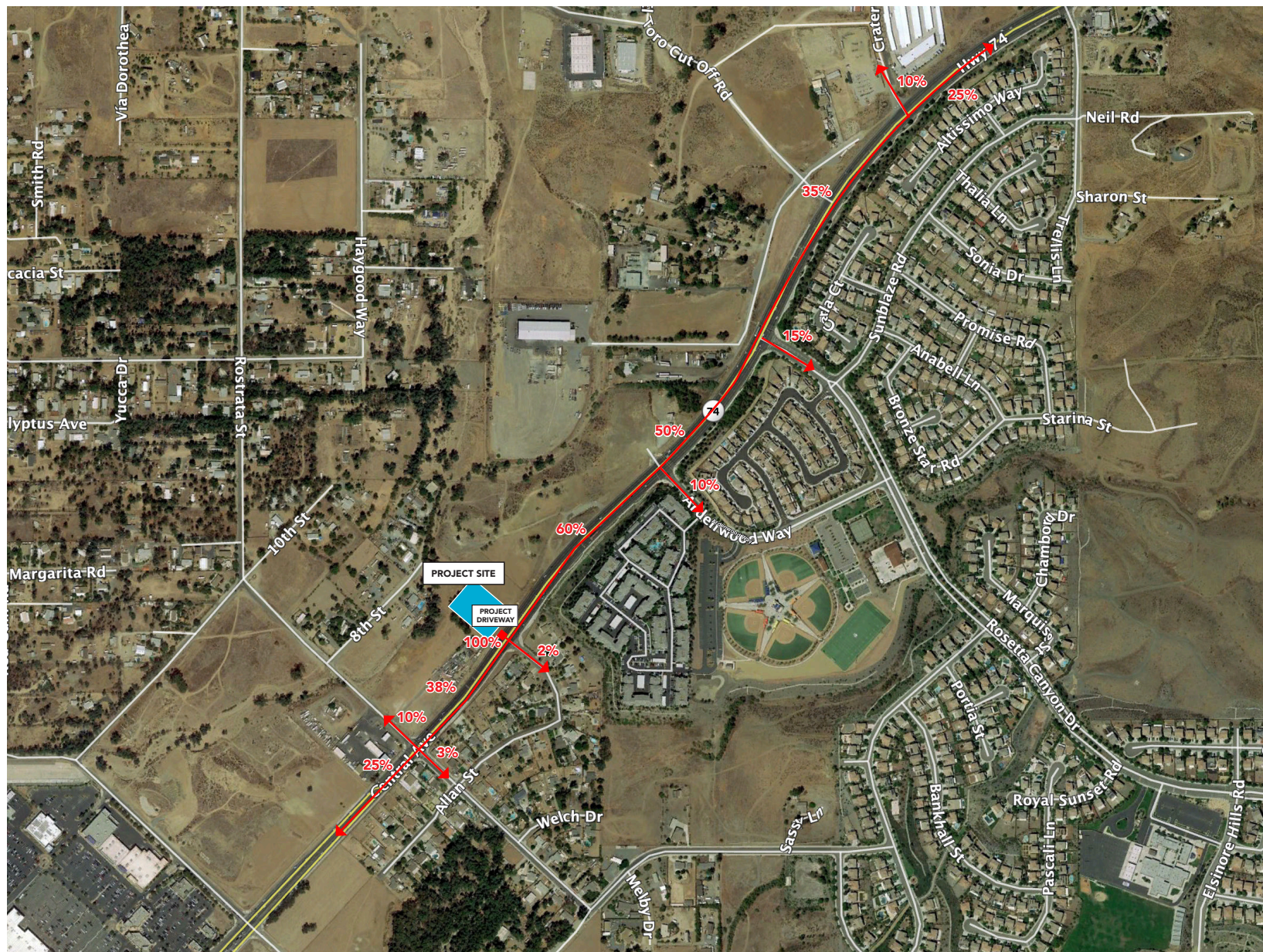


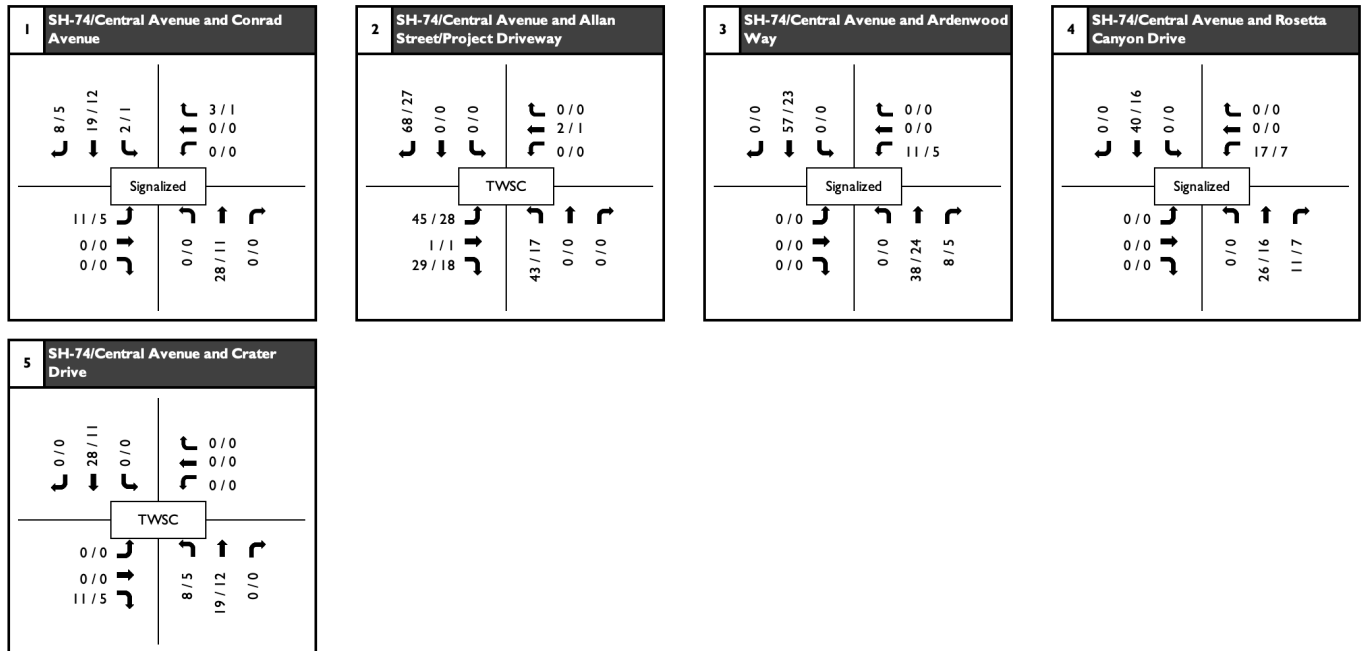
LEGEND

Intersection



INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING





LEGEND

(AM/PM) Peak Hour Volumes



INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

City of Lake Elsinore
Highway 74
B/ Ardenwood Way - Conard Avenue
24 Hour Directional Volume Count

Counts Unlimited, Inc
PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

LKE012
Site Code: 017-14077

Start Time	01-Apr-14 Tue	Eastbound		Hour Totals		Westbound		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		41	209			22	205				
12:15		40	210			21	203				
12:30		27	204			16	192				
12:45		28	226	136	849	19	226	78	826	214	1675
01:00		23	246			15	215				
01:15		17	244			19	218				
01:30		16	268			15	203				
01:45		22	301	78	1059	13	288	62	924	140	1983
02:00		17	246			15	304				
02:15		14	255			13	256				
02:30		14	306			14	281				
02:45		16	356	61	1163	18	233	60	1074	121	2237
03:00		17	330			26	213				
03:15		22	343			24	240				
03:30		13	325			55	276				
03:45		17	345	69	1343	75	242	180	971	249	2314
04:00		27	325			102	240				
04:15		39	342			117	260				
04:30		37	342			145	242				
04:45		55	442	158	1451	184	263	548	1005	706	2456
05:00		63	402			190	241				
05:15		51	393			213	263				
05:30		65	383			257	274				
05:45		80	371	259	1549	269	246	929	1024	1188	2573
06:00		113	365			233	215				
06:15		145	300			274	221				
06:30		174	304			278	192				
06:45		198	286	630	1255	303	210	1088	838	1718	2093
07:00		213	278			394	191				
07:15		250	234			407	158				
07:30		319	228			394	151				
07:45		256	221	1038	961	370	132	1565	632	2603	1593
08:00		187	228			314	111				
08:15		155	212			246	122				
08:30		147	171			255	102				
08:45		156	173	645	784	261	107	1076	442	1721	1226
09:00		146	178			191	82				
09:15		150	130			253	83				
09:30		141	120			257	59				
09:45		161	101	598	529	238	69	939	293	1537	822
10:00		146	103			219	56				
10:15		167	79			200	49				
10:30		204	77			199	52				
10:45		182	79	699	338	199	44	817	201	1516	539
11:00		205	64			193	51				
11:15		172	38			198	35				
11:30		169	48			254	34				
11:45		196	52	742	202	216	19	861	139	1603	341
Total		5113	11483	5113	11483	8203	8369	8203	8369	13316	19852
Combined Total		16596		16596		16572		16572		33168	
AM Peak	-	07:00	-	-	-	07:00	-	-	-	-	-
Vol.	-	1038	-	-	-	1565	-	-	-	-	-
P.H.F.		0.813				0.961					
PM Peak	-	-	04:45	-	-	-	01:45	-	-	-	-
Vol.	-	-	1620	-	-	-	1129	-	-	-	-
P.H.F.			0.916				0.928				
Percentage		30.8%	69.2%			49.5%	50.5%				
ADT/AADT		ADT 33,168	AADT 33,168								

Appendix E:
Construction Noise Modeling Output

Activity	L_{eq} at 137 feet dBA	L_{Max} at 137 feet dBA
Grading	76	78
Building Construction	72	73
Paving	73	76

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Source: MD Acoustics, Nov 2020.	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	86
Air Compressors	86
Trucks	86

Grading		L _{Max} at 137 feet dBA									
Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements											
No.	Equipment Description	Reference (dBA)	Quantity	Usage Factor ¹	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA)		Energy	
		50 ft Lmax							Lmax		Leq
1	Grader	86	1	40	137	0.5	0	75.1	71.1	12813966.5	
2	Dozer	85	1	40	137	0.5	0	74.1	70.1	10178495.4	
3	Excavator	86	1	40	137	0.5	0	75.1	71.1	12813966.5	
4	Tractor/Backhoe	80	1	40	137	0.5	0	69.1	65.1	3218722.86	
Source: MD Acoustics, Nov 2020.							Lmax*	78	Leq	76	
1- Percentage of time that a piece of equipment is operating at full power.							Lw	109	Lw	108	

Source: MD Acoustics, Nov 2020.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

			No	1 dBA	2 dBA	3 dBA	4 dBA	5 dBA	6 dBA	7 dBA	8 dBA	9 dBA	10 dBA	11 dBA	12 dBA	13 dBA	14 dBA	15 dBA
			Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding
Feet	Meters	Ground Effect	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	LeqdBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA
50	15.2	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
60	18.3	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
70	21.3	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
80	24.4	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
90	27.4	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
100	30.5	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
110	33.5	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
120	36.6	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
130	39.6	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
140	42.7	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
150	45.7	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
160	48.8	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
170	51.8	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
180	54.9	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
190	57.9	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
200	61.0	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
210	64.0	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
220	67.1	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
230	70.1	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
240	73.1	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
250	76.2	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
260	79.2	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
270	82.3	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
280	85.3	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
290	88.4	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
300	91.4	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
310	94.5	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
320	97.5	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
330	100.6	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
340	103.6	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
350	106.7	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
360	109.7	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
370	112.8	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39

Building Construction L_{Max} at 137 feet dBA

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
No.	Equipment Description	Reference (dBA)	Quantity	Usage Factor ¹	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA)		Energy
		50 ft Lmax							Lmax	
1	Cranes	82	1	40	137	0.5	0	71.1	67.1	5101331.95
2	Forklift/Tractor	80	1	40	137	0.5	0	69.1	65.1	3218722.86
3	Generator	80	1	40	137	0.5	0	69.1	65.1	3218722.86
4	Tractor/Backhoe	80	1	40	137	0.5	0	69.1	65.1	3218722.86
Source: MD Acoustics, Nov 2020.							Lmax*	73	Leq	72
1- Percentage of time that a piece of equipment is operating at full power.							Lw	105	Lw	103
dBA – A-weighted Decibels										
Lmax- Maximum Level										
Leq- Equivalent Level										

			No	1 dBA	2 dBA	3 dBA	4 dBA	5 dBA	6 dBA	7 dBA	8 dBA	9 dBA	10 dBA	11 dBA	12 dBA	13 dBA	14 dBA	15 dBA
			Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding	Shielding
Feet	Meters	Ground Effect	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA	LeqdBA	Leq dBA	Leq dBA	Leq dBA	Leq dBA
50	15.2	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
60	18.3	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
70	21.3	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
80	24.4	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
90	27.4	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
100	30.5	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
110	33.5	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
120	36.6	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
130	39.6	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
140	42.7	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
150	45.7	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
160	48.8	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
170	51.8	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
180	54.9	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
190	57.9	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
200	61.0	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
210	64.0	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
220	67.1	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
230	70.1	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
240	73.1	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
250	76.2	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
260	79.2	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
270	82.3	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
280	85.3	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
290	88.4	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
300	91.4	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
310	94.5	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
320	97.5	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
330	100.6	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
340	103.6	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
350	106.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
360	109.7	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
370	112.8	0.5	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35

Paving		L _{Max} at 137 feet dBA								
Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements										
No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor ¹	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA)		Energy
								Lmax	Leq	
1	Pavers	86	1	40	137	0.5	0	75.1	71.1	12813966.5
2	Rollers	80	1	40	137	0.5	0	69.1	65.1	3218722.86
3	Paving Equipment	80	1	40	137	0.5	0	69.1	65.1	3218722.86
Source: MD Acoustics, Nov 2020.							Lmax*	76	Leq	73
1- Percentage of time that a piece of equipment is operating at full power.							Lw	108	Lw	104

			No Shielding	1 dBA	2 dBA	3 dBA	4 dBA	5 dBA	6 dBA	7 dBA	8 dBA	9 dBA	10 dBA	11 dBA	12 dBA	13 dBA	14 dBA	15 dBA
Feet	Meters	Ground Effect	Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA	Shielding Leq dBA
50	15.2	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
60	18.3	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
70	21.3	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
80	24.4	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
90	27.4	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
100	30.5	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
110	33.5	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
120	36.6	0.5	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
130	39.6	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
140	42.7	0.5	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47
150	45.7	0.5	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
160	48.8	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
170	51.8	0.5	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45
180	54.9	0.5	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44
190	57.9	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
200	61.0	0.5	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43
210	64.0	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
220	67.1	0.5	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42
230	70.1	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
240	73.1	0.5	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
250	76.2	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
260	79.2	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
270	82.3	0.5	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40
280	85.3	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
290	88.4	0.5	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39
300	91.4	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
310	94.5	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
320	97.5	0.5	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38
330	100.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
340	103.6	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
350	106.7	0.5	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37
360	109.7	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36
370	112.8	0.5	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36

VIBRATION LEVEL IMPACT		
Project:	Lake Elsinore Retail Project	Date: 11/6/20
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Project Site	
Address:		
PPV = $PPV_{ref}(25/D)^n$ (in/sec)		

DATA INPUT		
Equipment = Type	2	Large Bulldozer
		INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.
D =	40.00	Distance from Equipment to Receiver (ft)
n =	1.10	Vibration attenuation rate through the ground
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.		

DATA OUT RESULTS		
PPV =	0.053	IN/SEC
		OUTPUT IN RED