

NOISE IMPACT ANALYSIS
LAKEVIEW MANOR PROJECT
CITY OF LAKE ELSINORE

LEAD AGENCY:

CITY OF LAKE ELSINORE
PLANNING DIVISION
COMMUNITY DEVELOPMENT DEPARTMENT
130 SOUTH MAIN STREET
LAKE ELSINORE, CA 92530

PREPARED BY:

VISTA ENVIRONMENTAL
1021 DIDRIKSON WAY
LAGUNA BEACH, CALIFORNIA 92651
MARISA JUE
GREG TONKOVICH, INCE
TELEPHONE (949) 510-5355
FACSIMILE (949) 494-3150

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TABLE OF CONTENTS

1.0	Introduction.....	1
	1.1 Purpose of Analysis and Study Objectives	1
	1.2 Site Location and Study Area	1
	1.3 Proposed Project Description.....	1
	1.4 Standard Noise Regulatory Conditions.....	1
	1.5 Summary of Analysis Results	2
	1.6 Project Design Features Incorporated into the Proposed Project.....	3
	1.7 Recommended Measures for the Proposed Project.....	3
2.0	Noise Fundamentals.....	7
	2.1 Noise Descriptors.....	7
	2.2 Tone Noise	7
	2.3 Noise Propagation.....	7
	2.4 Ground Absorption	8
3.0	Ground-Borne Vibration Fundamentals	9
	3.1 Vibration Descriptors.....	9
	3.2 Vibration Perception	9
	3.3 Vibration Propagation.....	9
4.0	Regulatory Setting	10
	4.1 Federal Regulations	10
	4.2 State Regulations	11
	4.3 Local Regulations	12
5.0	Existing Noise Conditions.....	17
	5.1 Noise Measurement Equipment.....	17
	5.2 Noise Measurement Results.....	17
6.0	Modeling Parameters and Assumptions	20
	6.1 Construction Noise.....	20
	6.2 Operations-Related Noise	21
	6.3 Vibration	22
7.0	Impact Analysis.....	24
	7.1 CEQA Thresholds of Significance.....	24
	7.2 Generation of Noise Levels in Excess of Standards	24
	7.3 Generation of Excessive Groundborne Vibration.....	27
	7.4 Permanent Noise Level Increase.....	28
	7.5 Temporary Noise Level Increase.....	29
	7.6 Aircraft Noise	30
8.0	References.....	31

TABLE OF CONTENTS CONTINUED

APPENDIX

- Appendix A – Study Area Photo Index
- Appendix B – Field Noise Measurement Printouts
- Appendix C – RCNM Model Construction Noise Calculations
- Appendix D – FHWA Model Proposed Patio/Balcony Noise Calculations
- Appendix E – FHWA Model Traffic Noise Contour Calculations

LIST OF FIGURES

Figure 1 – Project Location Map	5
Figure 2 – Proposed Site Plan	6
Figure 3 – Field Noise Measurements Graph	19

LIST OF TABLES

Table A – FTA Project Effects on Cumulative Noise Exposure	10
Table B – City of Lake Elsinore Noise and Land Use Compatibility Matrix	12
Table C – City of Lake Elsinore Interior and Exterior Noise Standards.....	13
Table D – City of Lake Elsinore Exterior Noise Limits	14
Table E – City of Lake Elsinore Interior Noise Standards.....	15
Table F – City of Lake Elsinore Construction Noise Standards	16
Table G – Existing (Ambient) Noise Level Measurements	18
Table H – Construction Equipment Noise Emissions and Usage Factors	20
Table I – FHWA Model Roadway Parameters	21
Table J – Average Daily Traffic Volumes	22
Table K – Roadway Vehicle Mix	22
Table L – Vibration Source Levels for Construction Equipment	23
Table M – Worst Case Construction Noise Levels at Nearest Receptors.....	25
Table N – Proposed Exterior Patio/Balcony Noise Levels	26
Table O – Proposed Residential Units Interior Noise Levels	26
Table P – Project-Related Traffic Noise Contributions	29

ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	A-weighted decibels
DOT	Department of Transportation
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
EPA	Environmental Protection Agency
Hz	Hertz
Ldn	Day-night average noise level
Leq	Equivalent sound level
Lmax	Maximum noise level
ONAC	Federal Office of Noise Abatement and Control
OSB	Oriented Strand Board
OSHA	Occupational Safety and Health Administration
PPV	Peak particle velocity
RMS	Root mean square
SEL	Single Event Level or Sound Exposure Level
STC	Sound Transmission Class
UMTA	Federal Urban Mass Transit Administration

1.0 INTRODUCTION

1.1 Purpose of Analysis and Study Objectives

This Noise Impact Analysis has been prepared to determine the noise impacts associated with the proposed Lakeview Manor Project (proposed project). The following is provided in this report:

- A description of the study area and the proposed project;
- Information regarding the fundamentals of noise;
- Information regarding the fundamentals of vibration;
- A description of the local noise guidelines and standards;
- An evaluation of the current noise environment;
- An analysis of the potential short-term construction-related noise impacts from the proposed project; and,
- An analysis of long-term operations-related noise impacts from the proposed project.

1.2 Site Location and Study Area

The project site is located in the western portion of the City of Lake Elsinore (City) on the southwest side of the intersection of Lakeshore Drive and Gunnerson Street. The approximately 7.5-acre project site is located on a vacant parcel that is bounded by Lakeshore Drive and vacant land to the northeast, vacant land and single-family residential uses to the southeast, multi-family residential uses to the southwest, and mobile homes and a preschool to the northwest. The project study area is shown in Figure 1.

Sensitive Receptors in Project Vicinity

The nearest offsite sensitive receptors to the project site consist of residents at the mobile homes and offsite workers at the preschool that are both located as near as 10 feet northwest of the project site. The nearest K-12 school to the project site is Machado Elementary School, which is located as near as 700 feet southwest of the project site.

1.3 Proposed Project Description

The proposed project would consist of the development of 104 residential apartments units that would range from one to three bedrooms. The proposed project would also include a clubhouse with a pool, tennis court, and playground. The proposed project would also provide 114 covered and open 128 parking spaces for a total of 242 parking spaces. The proposed site plan is shown in Figure 2.

1.4 Standard Noise Regulatory Conditions

The proposed project will be required to comply with the following regulatory conditions from the City of Lake Elsinore and State of California.

City of Lake Elsinore General Plan

The following lists the City of Lake Elsinore General Plan Policies that are applicable to all residential development projects in the City

General Plan Policy 7.1 –Noise Standards

The City’s General Plan Policy 7.1 requires that new multi-family residential development limit the exterior noise impacts to all proposed private patios and balconies to 60 dBA L_{dn} and limit the interior noise levels to 45 dBA L_{dn}. Compliance with this regulation will reduce the noise impacts to the occupants of the proposed residential units.

City of Lake Elsinore Municipal Code

The following lists the City of Lake Elsinore Municipal Code regulations that are applicable to all development projects in the City.

Section 17.176.080(F) – Construction Noise Limits

Section 17.176.080(F)(1) of the City’s Municipal Code restricts construction activities from occurring between the weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on weekends or holidays. Section 17.176.080(F)(2) of the City’s Municipal Code limits construction noise that occurs during the allowable times for construction activities to occur to 75 dBA for mobile equipment and 60 dBA for stationary equipment, which are based on the Type I areas that are classified as single-family residential areas and for Type II Areas that are classified as multi-family residential area the noise limits are 80 dBA for mobile equipment and 65 dBA for stationary equipment. Compliance with this regulation will reduce the construction-related noise impacts to the nearby sensitive receptors.

Section 17.176.080(G) – Vibration Limits

Section 17.176.080(G) of the City’s Municipal Code restricts the operation of any device that creates a vibration which is above the vibration threshold of any individual at or beyond the property boundary of the source. Compliance with this regulation will reduce the construction-related vibration impacts to the nearby sensitive receptors.

State of California Rules

The following lists the State of California rules that are applicable to all industrial projects in the State.

California Vehicle Code Section 27200-27207 – On-Road Vehicle Noise

California Vehicle Code Section 27200-27207 provides noise limits for vehicles operated in California. For vehicles over 10,000 pounds noise is limited to 88 dB for vehicles manufactured before 1973, 86 dB for vehicles manufactured before 1975, 83 dB for vehicles manufactured before 1988, and 80 dB for vehicles manufactured after 1987. All measurements are based at 50 feet from the vehicle.

California Vehicle Section 38365-38380 – Off-Road Vehicle Noise

California Vehicle Code Section 38365-38380 provides noise limits for off-highway motor vehicles operated in California. 92 dBA for vehicles manufactured before 1973, 88 dBA for vehicles manufactured before 1975, 86 dBA for vehicles manufactured before 1986, and 82 dBA for vehicles manufactured after December 31, 1985. All measurements are based at 50 feet from the vehicle.

1.5 Summary of Analysis Results

The following is a summary of the proposed project’s impacts with regard to the State CEQA Guidelines noise checklist questions.

Expose persons to noise levels in excess of standards?

Potentially significant impact. Implementation of Recommended Measures 1, 2, and 3 would reduce the impact to less than significant levels.

Expose persons to excessive groundborne vibration?

Less than significant impact.

Result in a substantial permanent increase in ambient noise levels above existing levels without the proposed project?

Less than significant impact.

Result in a substantial temporary increase in ambient noise levels above existing levels without the proposed project?

Potentially significant impact. Implementation of Recommended Measure 1 would reduce the impact to less than significant levels.

Expose persons to excessive noise levels from aircraft?

Less than significant impact.

1.6 Project Design Features Incorporated into the Proposed Project

This analysis was based on implementation of the following project design features that are either already depicted on the proposed project site plan and architectural plans or are required from City and State Regulations.

Project Design Feature 1:

The project applicant shall require the proposed seven foot high wall as detailed on the site plan for the northwest, southwest, and southeast sides of the project site be constructed prior to the start of grading and other construction activities (prior to wall construction, minimal grading will be required at the locations of the proposed walls).

1.7 Recommended Measures for the Proposed Project

This analysis found that through adherence to the noise and vibration regulations detailed in Section 1.4 above and through implementation of the following recommended measures all noise and vibration impacts would be reduced to less than significant levels.

Recommended Measure 1:

The project applicant shall require any construction contractor that needs to use stationary construction equipment within 100 feet of any offsite sensitive receptors (homes or preschool) to place a temporary sound barrier between the stationary equipment and nearest sensitive receptors.

Recommended Measure 2:

The project applicant shall construct a minimum 5.0-foot high solid wall on the northeast side of the first floor patios and a minimum 3.5-foot high solid wall on the northeast side of second floor balconies for the residential units located on the northeast side of Building 11. The walls shall be constructed of a solid material (e.g., glass, wood or plaster) that are free of any cutouts or openings. (If the 7 to 8-foot high solid wall that is depicted on the site plan is constructed, than the 5.0-foot high first floor patio wall will not be required)

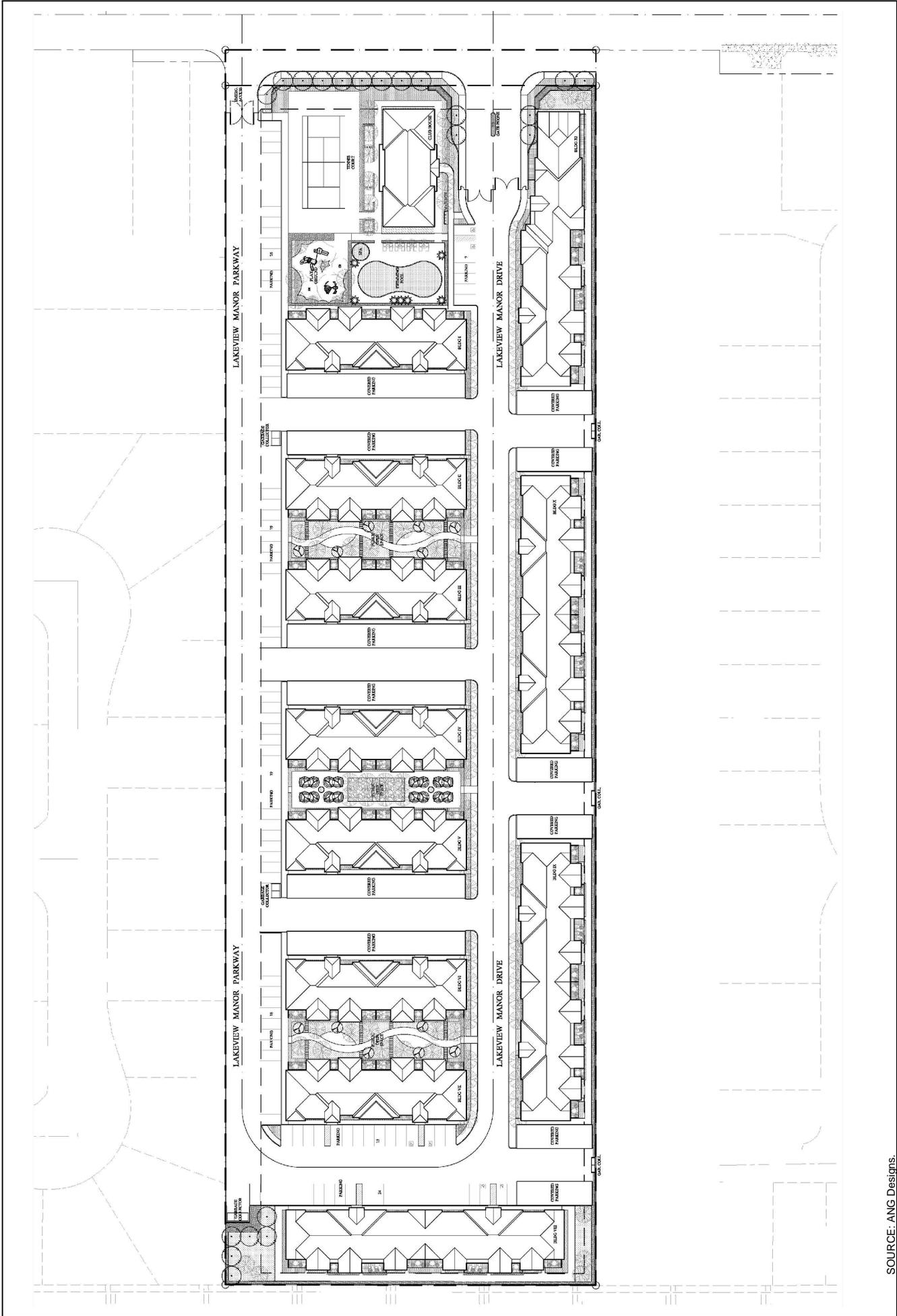
Recommended Measure 3:

The project applicant shall provide a “windows closed” condition for each proposed residential unit. A “window closed” condition requires a means of mechanical ventilation per Chapter 12, Section 1205 of the Uniform Building Code. This shall be achieved with a standard forced air conditioning and heating system with a filtered outside air intake vent for each residential unit.



SOURCE: Google Earth.

Figure 1
Project Location Map



SOURCE: ANG Designs.

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Figure 2
Proposed Site Plan

2.0 NOISE FUNDAMENTALS

Noise is defined as unwanted sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit which expresses the ratio of the sound pressure level being measured to a standard reference level. A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear.

2.1 Noise Descriptors

Noise Equivalent sound levels are not measured directly, but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. The peak traffic hour Leq is the noise metric used by California Department of Transportation (Caltrans) for all traffic noise impact analyses.

The Day-Night Average Level (Ldn) is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of ten decibels to sound levels at night between 10 p.m. and 7 a.m. While the Community Noise Equivalent Level (CNEL) is similar to the Ldn, except that it has another addition of 4.77 decibels to sound levels during the evening hours between 7 p.m. and 10 p.m. These additions are made to the sound levels at these time periods because during the evening and nighttime hours, when compared to daytime hours, there is a decrease in the ambient noise levels, which creates an increased sensitivity to sounds. For this reason the sound appears louder in the evening and nighttime hours and is weighted accordingly. The City of Lake Elsinore relies on the Ldn noise standard to assess transportation-related impacts on noise sensitive land uses.

2.2 Tone Noise

A pure tone noise is a noise produced at a single frequency and laboratory tests have shown that humans are more perceptible to changes in noise levels of a pure tone. For a noise source to contain a “pure tone,” there must be a significantly higher A-weighted sound energy in a given frequency band than in the neighboring bands, thereby causing the noise source to “stand out” against other noise sources. A pure tone occurs if the sound pressure level in the one-third octave band with the tone exceeds the average of the sound pressure levels of the two contiguous one-third octave bands by:

- 5 dB for center frequencies of 500 hertz (Hz) and above
- 8 dB for center frequencies between 160 and 400 Hz
- 15 dB for center frequencies of 125 Hz or less

2.3 Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiate uniformly outward as it travels away

from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

2.4 Ground Absorption

The sound drop-off rate is highly dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in traffic noise models, soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA/DD is typically observed over soft ground with landscaping, as compared with a 6.0 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone and very hard packed earth. For line sources a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3.0 dBA/DD drop-off rate for hard-site conditions. Caltrans research has shown that the use of soft-site conditions is more appropriate for the application of the Federal Highway Administration (FHWA) traffic noise prediction model used in this analysis.

3.0 GROUND-BORNE VIBRATION FUNDAMENTALS

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.

3.1 *Vibration Descriptors*

There are several different methods that are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (rms) amplitude of the vibration velocity. Due to the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels and is denoted as (L_v) and is based on the rms velocity amplitude. A commonly used abbreviation is “VdB”, which in this text, is when L_v is based on the reference quantity of 1 micro inch per second.

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. Off-site 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.

3.3 *Vibration Propagation*

The propagation of ground-borne vibration is not as simple to model as airborne noise. This is due to the fact that noise in the air travels through a relatively uniform median, while ground-borne vibrations travel through the earth which may contain significant geological differences. There are three main types of vibration propagation; surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground’s surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a “push-pull” fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse or “side-to-side and perpendicular to the direction of propagation.”

As vibration waves propagate from a source, the 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 project site is located in the City of Lake Elsinore. 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:

- Promulgating noise emission standards for interstate commerce
- Assisting state and local abatement efforts
- Promoting noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was initially tasked with implementing the Noise Control Act. However, the ONAC has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and interagency committees. For example, the Occupational Safety and Health Administration (OSHA) agency prohibits exposure of workers to excessive sound levels. The Department of Transportation (DOT) assumed a significant role in noise control through its various operating agencies. The Federal Aviation Administration (FAA) regulates noise of aircraft and airports. Surface transportation system noise is regulated by a host of agencies, including the Federal Transit Administration (FTA). Transit noise is regulated by the federal Urban Mass Transit Administration (UMTA), while freeways that are part of the interstate highway system are regulated by the Federal Highway Administration (FHWA). Finally, the federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being sited adjacent to a highway or, alternately that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Although the proposed project is not under the jurisdiction of the FTA, the FTA is the only agency that has defined what constitutes a significant noise impact from implementing a project. The FTA standards are based on extensive studies by the FTA and other governmental agencies on the human effects and reaction to noise and a summary of the FTA findings are provided below in Table A.

Table A – FTA Project Effects on Cumulative Noise Exposure

Existing Noise Exposure (dBA Leq or Ldn)	Allowable Noise Impact Exposure dBA Leq or Ldn		
	Project Only	Combined	Noise Exposure Increase
45	51	52	+7
50	53	55	+5
55	55	58	+3
60	57	62	+2
65	60	66	+1
70	64	71	+1
75	65	75	0

Source: Federal Transit Administration, 2006.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation sources, 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

Noise Standards

California Department of Health Services Office of Noise Control

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

California Noise Insulation Standards

Title 24, Chapter 1, Article 4 of the California Administrative Code (California Noise Insulation Standards) requires noise insulation in new hotels, motels, apartment houses, and dwellings (other than single-family detached housing) that provides an annual average noise level of no more than 45 dBA CNEL. When such structures are located within a 60-dBA CNEL (or greater) noise contour, an acoustical analysis is required to ensure that interior levels do not exceed the 45-dBA CNEL annual threshold. In addition, Title 21, Chapter 6, Article 1 of the California Administrative Code requires that all habitable rooms, hospitals, convalescent homes, and places of worship shall have an interior CNEL of 45 dB or less due to aircraft noise.

Government Code Section 65302

Government Code Section 65302 mandates that the legislative body of each county and city in California 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.

Vibration Standards

Title 14 of the California Administrative Code Section 15000 requires that all state and local agencies implement the California Environmental Quality Act (CEQA) Guidelines, which requires the analysis of exposure of persons to excessive groundborne vibration. However, no statute has been adopted by the state that quantifies the level at which excessive groundborne vibration occurs.

Caltrans issued the *Transportation- and Construction-Induced Vibration Guidance Manual* in 2004. The manual provides practical guidance to Caltrans engineers, planners, and consultants who must address vibration issues associated with the construction, operation, and maintenance of Caltrans projects. However, this manual is also used as a reference point by many lead agencies and CEQA practitioners throughout California, as it provides numeric thresholds for vibration impacts. Thresholds are established for continuous (construction-related) and transient (transportation-related) sources of vibration, which found that the human response becomes distinctly perceptible at 0.25 inch per second PPV for transient sources and 0.04 inch per second PPV for continuous sources.

4.3 Local Regulations

The City of Lake Elsinore General Plan and Municipal Code establishes the following applicable policies related to noise and vibration.

City of Lake Elsinore General Plan

The following applicable goals and policies to the proposed project are from the Noise Element of the General Plan.

Goal 7 Maintain an environment for all City residents and visitors free of unhealthy, obtrusive, or otherwise excessive noise.

Policies:

7.1 Apply the noise standards set forth in the Lake Elsinore Noise and Land Use Compatibility Matrix (see Table B) and Interior and Exterior Noise Standards (see Table C) when considering all new development and redevelopment proposed within the City.

7.2 Require that mixed-use structures and areas be designed to prevent transfer of noise and vibration from commercial areas to residential areas.

Table B – City of Lake Elsinore Noise and Land Use Compatibility Matrix

Land Use Categories	Uses	Day-Night Noise Level (L _{dn})						
		<55	55-60	60-65	65-70	70-75	75-80	>80
Residential	Single-Family, Duplex, Multiple-Family	A	A	B	B	C	D	D
	Mobile Homes	A	A	B	C	C	D	D
Commercial Regional District	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D
Commercial Regional Village, District Special	Commercial, Retail, Bank, Restaurant, Movie Theatre	A	A	A	A	B	B	C
Commercial Industrial Institutional	Office Building, Research and Development, Professional Offices, City Office Building	A	A	A	B	B	C	D
Commercial Regional Institutional Civic Center	Amphitheatre, Concert Hall, Auditorium, Meeting Hall	B	B	C	C	D	D	D
Commercial Recreation	Children’s Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club	A	A	A	B	B	D	D
Commercial General, Special Industrial Institutional	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
Institutional General	Hospital, Church, Library, Schools, Classroom	A	A	B	C	C	D	D
Open Space	Parks	A	A	A	B	C	D	D

Land Use Categories	Uses	Day-Night Noise Level (L _{dn})						
		<55	55-60	60-65	65-70	70-75	75-80	>80
	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	A	B	C	C
Agriculture	Agriculture	A	A	A	A	A	A	A

Interpretation:

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

Zone B: Normally Compatible. New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Zone C: Normally Incompatible. New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.

Zone D: Clearly Incompatible. New construction or development should generally not be undertaken.

Source: City of Lake Elsinore General Plan, 2011.

Table C – City of Lake Elsinore Interior and Exterior Noise Standards

Land Use Categories	Uses	Energy Average L _{dn}	
		Interior ⁽¹⁾	Exterior ⁽²⁾
Residential	Single-Family, Duplex, Multiple-Family	45 ^(3,5)	60
	Mobile Homes	--	60 ⁽⁴⁾
Commercial, Institutional	Hotel, Motel, Transient Lodging	45 ⁽⁵⁾	--
	Hospital, School's Classroom	45	--
	Church, Library	45	--

Interpretation:

¹ Indoor environment excluding: bathrooms, toilets, closets, corridors.

² Outdoor environment limited to: private yard of single-family, multi-family private patio or balcony which is served by a means of exit from inside, Mobile Home Park.

³ Noise level requirement with closed windows. Mechanical ventilation system or other means of natural ventilation shall be provided as of Chapter 12, Section 1205 of UBC.

⁴ Exterior noise level should be such that interior noise level will not exceed 45 CNEL.

⁵ As per California Administrative Code, Title 24, Part 6, Division T25, Chapter 1, Subchapter 1, Article 4, Section T25-28.

Source: City of Lake Elsinore General Plan, 2011.

City of Lake Elsinore Municipal Code

The Lake Elsinore Municipal Code establishes the following applicable standards related to noise.

17.44.050 Acoustical analysis.

Within all residential structures, noise levels from exterior sources shall be mitigated so as not to exceed an interior CNEL level of 45 dBA with windows closed. To ensure that this standard is complied with, the following requirements shall apply:

A. For projects consisting of four or more single-family dwellings or any number of multiple-family dwellings, proposed to be located in an area where the noise level from any source has the potential to

exceed a CNEL of 65 dBA, an acoustical analysis, including on-site monitoring prior to building final, shall be performed by an engineer specializing in acoustics.

17.176.060 Exterior Noise Limits.

A. Maximum Permissible Sound Levels by Receiving Land Use.

1. The noise standards for the various categories of land use identified by the Noise Control Office(r) as presented in Table 1 (see Table D) shall, unless otherwise specifically indicated, apply to all such property within a designated zone.
2. No person shall operate, or cause to be operated, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured on any other property, either incorporated or unincorporated to exceed:
 - a. The noise standard for that land use as specified in Table 1 for a cumulative period of more than 30 minutes in any hour; or
 - b. The noise standard plus five dB for a cumulative period of more than 15 minutes in any hour; or
 - c. The noise standard plus 10 dB for a cumulative period of more than five minutes in any hour; or
 - d. The noise standard plus 15 dB for a cumulative period of more than one minute in any hour; or
 - e. The noise standard plus 20 dB or the maximum measured ambient level, for any period of time.
3. If the measured ambient level differs from that permissible within any of the last four noise limit categories above, the allowable noise exposure standard shall be adjusted in five dB increments in each category as appropriate to encompass or reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.
4. If the measurement location is on a boundary between two different zones, the noise level limit applicable to the lower noise zone plus six dB shall apply.

Table D – City of Lake Elsinore Exterior Noise Limits

Receiving Land Use Category	Time Period	Noise Level (dBA)
Single-Family Residential	10:00 p.m. – 7:00 a.m.	40
	7:00 a.m. – 10:00 p.m.	50
Multiple Dwelling Residential	10:00 p.m. – 7:00 a.m.	45
	7:00 a.m. – 10:00 p.m.	50
Public Space		
Limited Commercial and Office	10:00 p.m. – 7:00 a.m.	55
	7:00 a.m. – 10:00 p.m.	60
General Commercial	10:00 p.m. – 7:00 a.m.	60

Receiving Land Use Category	Time Period	Noise Level (dBA)
	7:00 a.m. – 10:00 p.m.	65
Light Industrial	Anytime	70
Heavy Industrial	Anytime	75

Source: City of Lake Elsinore Municipal Code Section 17.176.060.

17.176.070 Interior noise standards.

A. Maximum Permissible Dwelling Interior Sound Levels.

1. The interior noise standards for multifamily residential dwellings as presented in Table 2 (see Table E) shall apply, unless otherwise specifically indicated, within all such dwellings with windows in their normal seasonal configuration.

Table E – City of Lake Elsinore Interior Noise Standards

Noise Zone	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Multifamily Residential	10:00 p.m. – 7:00 a.m.	35
		7:00 a.m. – 10:00 p.m.	45

Source: City of Lake Elsinore Municipal Code Section 17.176.070.

2. No person shall operate or cause to be operated within a dwelling unit, any source of sound or allow the creation of any noise which causes the noise level when measured inside a neighboring receiving dwelling unit to exceed:
 - a. The noise standard as specified in Table 2 for a cumulative period of more than five minutes in any hour; or
 - b. The noise standard plus five dB for a cumulative period of more than one minute in any hour; or
 - c. The noise standard plus 10 dB or the maximum measured ambient, for any period of time.

17.176.080 Prohibited acts.

No person shall unnecessarily make, continue, or cause to be made or continued, any noise disturbance. The following acts, and the causing or permitting thereof, are declared to be in violation of this chapter:

F. Construction/Demolition

1. Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on weekends or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work of public service utilities or by variance issued by the City.

2. Noise Restrictions at Affected Properties. Where technically and economically feasible, construction activities shall be conducted in such a manner the maximum noise levels at affected properties will not exceed those listed in the following schedule (see Table F):

Table F – City of Lake Elsinore Construction Noise Standards

Time Interval	Type I Areas Single-Family Residential	Type II Areas Multifamily Residential	Type III Areas Semi-Residential/Commercial
Mobile Equipment			
Daily, except Sundays and Legal Holidays 7:00 a.m. to 7:00 p.m.	75 dBA	80 dBA	85 dBA
Daily, 7:00 p.m. to 7:00 a.m. and all day Sunday and Legal Holidays	60 dBA	65 dBA	70 dBA
Stationary Equipment			
Daily, except Sundays and Legal Holidays 7:00 a.m. to 7:00 p.m.	60 dBA	65 dBA	70 dBA
Daily, 7:00 p.m. to 7:00 a.m. and all day Sunday and Legal Holidays	50 dBA	55 dBA	60 dBA

Source: City of Lake Elsinore Municipal Code Section 17.176.080.

3. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with suitable exhaust and air intake silencers in proper working order.

G. Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property or at 150 feet (46 meters) from the source if on public space or public right-of-way.

5.0 EXISTING NOISE CONDITIONS

To determine the existing noise level environment noise measurements have been taken in the vicinity of the project site. The field survey noted that noise within the proposed project area is generally characterized by vehicular traffic on Lakeshore Drive. The following describes the measurement procedures, measurement locations, noise measurement results, and the modeling of the existing noise environment.

5.1 Noise Measurement Equipment

The noise measurements were taken using two Extech Model 407780 Type 2 integrating sound level meters programmed in “slow” mode to record the sound pressure level at 3-second intervals for approximately 24 hours in “A” weighted form. In addition, the L_{eq} averaged over the entire measuring time and L_{max} were recorded. The sound level meters and microphones were mounted on trees approximately five feet above the ground and were equipped with a windscreen. The sound level meters were calibrated before and after the monitoring using an Extech calibrator, Model 407766. The noise level measurement equipment meets American National Standards Institute specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

Noise Measurement Location

The noise monitoring locations were selected in order to obtain noise measurements of the current noise levels on the project site. The noise measurement sites were selected to provide a representative sampling of the noise levels created by nearby noise sources. Descriptions of the noise monitoring sites are provided below in Table G. Appendix A includes a photo index of the study area and noise level measurement locations.

Noise Measurement Timing and Climate

The noise measurements were recorded between 10:37 a.m. on Tuesday May 23, 2017 and 10:44 a.m. on Wednesday, May 24, 2017. When the noise measurements were started the sky was partly cloudy, the temperature was 94 degrees Fahrenheit, the humidity was 25 percent, barometric pressure was 29.85 inches of mercury, and the wind was blowing around three miles per hour. Overnight the sky was partly cloudy and the temperature dropped to 61 degrees Fahrenheit. At the conclusion of the noise measurements, the sky was partly cloudy, the temperature was 78 degrees Fahrenheit, the humidity was 43 percent, barometric pressure was 29.77 inches of mercury, and the wind was blowing around two miles per hour.

5.2 Noise Measurement Results

The results of the noise level measurements are presented in Table G. The measured sound pressure levels in dBA have been used to calculate the minimum and maximum L_{eq} averaged over 1-hour intervals. Table G also shows the L_{eq} , L_{max} , and L_{dn} , based on the entire measurement time. The noise monitoring data printouts are included in Appendix B. Figure 4 shows a graph of the 24-hour noise measurements.

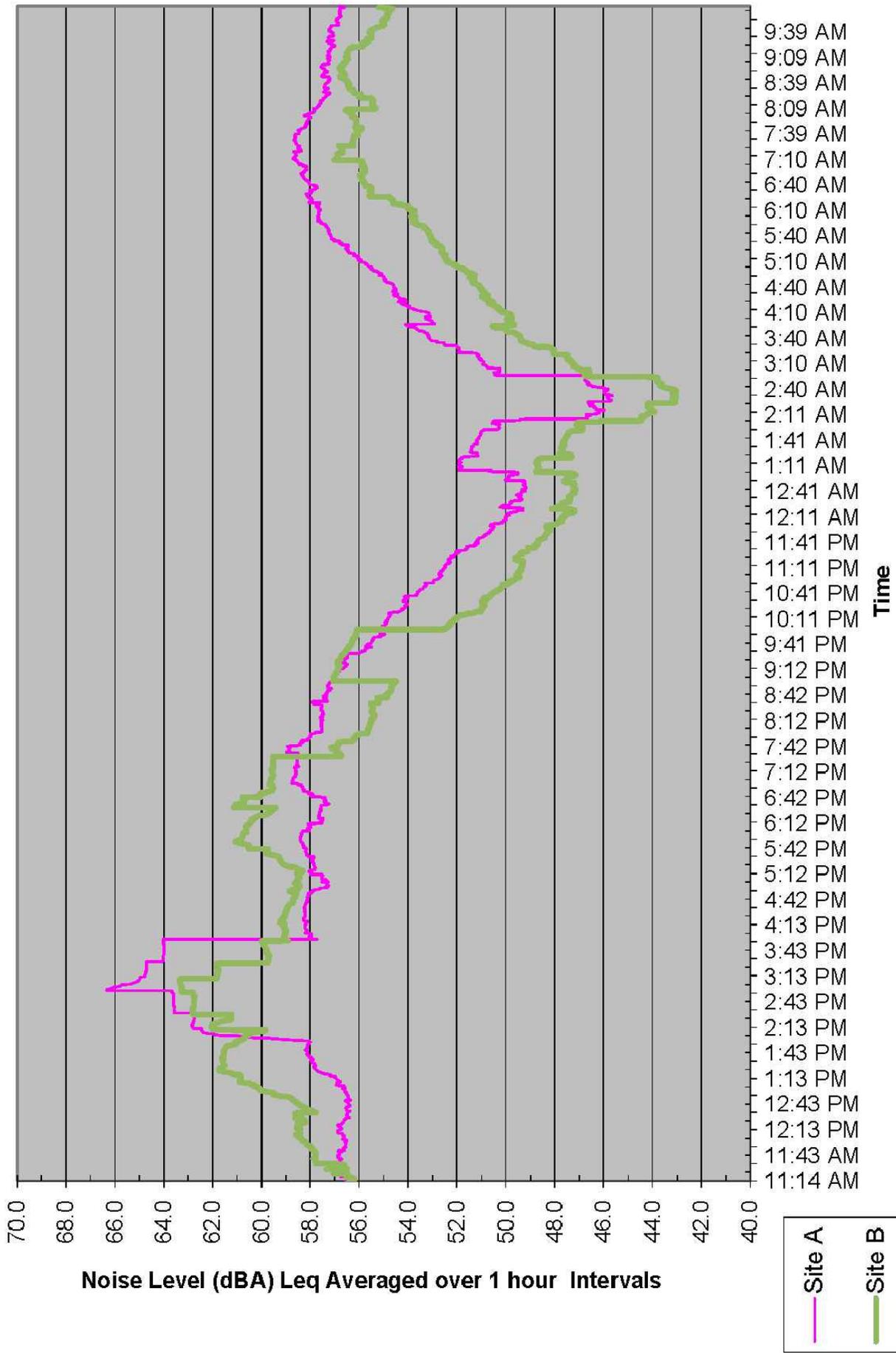
Table G – Existing (Ambient) Noise Level Measurements

Site No.	Site Description	Average (dBA L_{eq})	Maximum (dBA L_{max})	Min. 1-Hour Interval (dBA L_{eq}/Time)	Max. 1-Hour Interval (dBA L_{eq}/Time)	Average (dBA L_{dn})
A	Located on a tree near the eastern corner of the project site, 100 feet from centerline of Lakeshore Drive.	57.8	92.9	45.7 2:25 AM	66.3 2:54 PM	61.5
B	Located on a tree near the northwestern side of the project site, 190 feet from centerline of Lakeshore Drive.	57.1	87.2	43.0 2:38 AM	63.3 2:55 PM	59.7

Source: Noise measurements taken with two Extech Model 407780 Type 2 integrating sound level meters between Tuesday May 23, 2017 and Wednesday May 24, 2017.

Table G shows that Site A currently exceeds the City exterior multi-family residential noise standard of 60 dBA L_{dn}.

Figure 3
Field Noise Measurements Graph



SOURCE: Exttech Model 407780 Type 2 Integrated Sound Level Meters.

6.0 MODELING PARAMETERS AND ASSUMPTIONS

6.1 Construction Noise

The noise impacts from construction of the proposed project have been analyzed through use of the FHWA’s Roadway Construction Noise Model (RCNM). The FHWA compiled noise measurement data regarding the noise generating characteristics of several different types of construction equipment used during the Central Artery/Tunnel project in Boston. Table H below provides a list of the construction equipment anticipated to be used for each phase of construction as detailed in *Air Quality and Greenhouse Gas Emissions Impact Analysis Lakeview Manor Project*, prepared by Vista Environmental, May 25, 2017.

Table H – Construction Equipment Noise Emissions and Usage Factors

Equipment Description	Number of Equipment	Acoustical Use Factor ¹ (percent)	Spec 721.560 Lmax at 50 feet ² (dBA, slow ³)	Actual Measured Lmax at 50 feet ⁴ (dBA, slow ³)
Grading				
Excavator	1	40	85	81
Grader	1	40	85	83
Rubber Tired Dozer	1	40	85	82
Tractor, Loader or Backhoe ⁵	3	40	84	N/A
Building Construction				
Crane	1	16	85	81
Forklift (Gradall)	3	40	85	83
Generator	1	50	82	81
Welder	1	40	73	74
Tractor, Loader or Backhoe ⁵	3	40	84	N/A
Paving				
Paver	2	50	85	77
Paving Equipment	2	50	85	77
Roller	2	20	85	80
Architectural Coating				
Air Compressor	1	40	80	78

Notes:

¹ Acoustical use factor is the percentage of time each piece of equipment is operational during a typical workday.

² Spec 721.560 is the equipment noise level utilized by the RCNM program.

³ The “slow” response averages sound levels over 1-second increments. A “fast” response averages sound levels over 0.125-second increments.

⁴ Actual Measured is the average noise level measured of each piece of equipment during the Central Artery/Tunnel project in Boston, Massachusetts primarily during the 1990s.

⁵ For the tractor/loader/backhoe, the tractor noise level was utilized, since it is the loudest of the three types of equipment.

Source: Federal Highway Administration, 2006 and CalEEMod default equipment mix.

Table H also shows the associated measured noise emissions for each piece of equipment from the RCNM model and measured percentage of typical equipment use per day. Construction noise impacts to the nearby sensitive receptors have been calculated according to the equipment noise levels and usage factors listed in Table H and through use of the RCNM. For each phase of construction, the nearest piece of equipment was placed at the shortest distance of the proposed activity to the nearest home and each subsequent piece of equipment was placed an additional 50 feet away

6.2 Operations-Related Noise

The proposed project would result in increases in traffic noise to the nearby roadways as well as introduce new sensitive receptors to the project site. The project impacts to the offsite roadways and onsite noise impacts to the proposed residential units were analyzed through use of the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108 (FHWA Model). The following section provides a discussion of the software and modeling input parameters used in this analysis and a discussion of the resultant existing noise model.

FHWA Model Methodology

In order to quantify the potential noise impacts created and received by the proposed project and compare them to the existing noise levels, the existing roadway noise environment was modeled using the FHWA Model. The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments are then made to the reference energy mean emission level to account for: the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT) and the percentage of ADT which flows during the day, evening and night, the travel speed, the vehicle mix on the roadway, which is a percentage of the volume of automobiles, medium trucks and heavy trucks, the roadway grade, the angle of view of the observer exposed to the roadway and site conditions ("hard" or "soft" relates to the absorption of the ground, pavement or landscaping). The following section provides a discussion of the software and modeling input parameters used in this analysis and a discussion of the resultant existing noise model.

FHWA Model Traffic Noise Prediction Model Inputs

The roadway parameters used for this study are presented in Table I. The roadway classifications are based on the City's General Plan Circulation Element. The roadway speeds are based on the posted speed limits. The distance to the nearest sensitive receptor was determined by measuring the distance from the roadway centerline to the nearest residence. Since the study area is located in a suburban environment and landscaping or natural vegetation exists along the sides of all analyzed roadways, soft site conditions were modeled.

Table I – FHWA Model Roadway Parameters

Roadway	Segment	General Plan Classification	Vehicle Speed (MPH)	Distance to Nearest Receptor (feet)
Lakeshore Drive	East of Gunnerson Street	Urban Arterial	40	65
Lakeshore Drive	West of Gunnerson Street	Urban Arterial	40	60

Source: LOS Engineering, Inc., 2017; and City of Lake Elsinore, 2011.

The without project and with project for the existing plus ambient growth average daily traffic (ADT) volumes on the study area roadways were obtained from the *Lakeview Manor (PAR 2016-09) Traffic Impact Analysis* (Traffic Impact Analysis), prepared by LOS Engineering, Inc., January 9, 2017. The ADT volumes were calculated by multiplying the PM peak hour volumes by 12. The General Plan Buildout ADT volumes were obtained from the *City of Lake Elsinore General Plan Update Draft Program EIR*, adopted December 2011. The ADT volumes used in this analysis are shown in Table J.

Table J – Average Daily Traffic Volumes

Roadway	Segment	Average Daily Traffic Volumes		
		Existing+ Ambient	Existing + Ambient+ Project	General Plan Buildout
Lakeshore Drive	West of Gunnerson Street	18,876	19,390	32,000
Lakeshore Drive	East of Gunnerson Street	18,389	18,560	30,000

Source: LOS Engineering, Inc., 2017; City of Lake Elsinore, 2011.

The vehicle mix used in the FHWA-RD-77-108 Model is shown in Table K. the State Route 74 distribution was obtained from the *2015 Annual Average Daily Truck Traffic on the California State Highway System* (Caltrans, 2016) for State Route 74 north of Grand Avenue, which is the nearest available measured vehicle mix to the project site. The vehicle mix provides the hourly distribution percentages of automobiles, medium trucks, and heavy trucks for input into the FHWA model.

Table K – Roadway Vehicle Mix

Vehicle Type	Traffic Flow Distributions			Overall
	Day (7 a.m. to 7 p.m.)	Evening (7 p.m. to 10 p.m.)	Night (10 p.m. to 7 a.m.)	
Automobiles	63.75%	13.07%	15.28%	92.10%
Medium Trucks	3.53%	0.64%	1.79%	5.96%
Heavy Trucks	1.06%	0.10%	0.77%	1.94%

Source: Caltrans, 2016.

FHWA Model Source Assumptions

To assess the roadway noise generation in a uniform manner, all vehicles are analyzed at the single lane equivalent acoustic center of the roadway being analyzed. In order to determine the height above the road grade where the noise is being emitted from, each type of vehicle has been analyzed independently with autos at road grade, medium trucks at 2.3 feet above road grade, and heavy trucks at 8 feet above road grade. These elevations were determined through a noise-weighted average of the elevation of the exhaust pipe, tires and mechanical parts in the engine, which are the primary noise emitters from a vehicle.

6.3 Vibration

Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the construction site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. Table L gives approximate vibration levels for particular construction activities. The data in Table L provides a reasonable estimate for a wide range of soil conditions.

Table L – Vibration Source Levels for Construction Equipment

Equipment		Peak Particle Velocity (inches/second)	Approximate Vibration Level (L_v)at 25 feet
Pile driver (impact)	Upper range	1.518	112
	typical	0.644	104
Pile driver (sonic)	Upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Vibratory Roller		0.210	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

Source: Federal Transit Administration, May 2006.

The construction-related and operational vibration impacts have been calculated through the vibration levels shown above in Table L and through typical vibration propagation rates. The equipment assumptions were based on the equipment lists provided above in Table H.

7.0 IMPACT ANALYSIS

7.1 CEQA Thresholds of Significance

Consistent with the California Environmental Quality Act (CEQA) and the State 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 standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above existing levels without the proposed project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above noise levels existing without the proposed project; or
- Exposure of persons residing or working in the project area to excessive noise levels from aircraft.

7.2 Generation of Noise Levels in Excess of Standards

The proposed project would not expose persons to or generate noise levels in excess of standards established in the General Plan or Noise Ordinance or applicable standards of other agencies. The following section calculates the potential noise emissions associated with the construction and operations of the proposed project and compares the noise levels to the City standards.

Construction-Related Noise

The construction activities for the proposed project are anticipated to include grading of the 7.5-acre project site, building construction of the 104 apartment units, paving of the onsite roads and parking areas, and application of architectural coatings. Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. The nearest sensitive receptors to the project site are residents of the mobile homes and offsite workers at the Kids Cottage preschool that are both located as near as 10 feet northwest of the project site. There are also single-family homes located as near as 50 feet southeast of the project site and multi-family homes located as near as 50 feet southwest of the project site.

Section 17.176.080(F)(1) of the City's Municipal Code restricts construction activities from occurring between the weekday hours of 7:00 p.m. and 7:00 a.m., or at any time on weekends or holidays. Section 17.176.080(F)(2) of the City's Municipal Code limits construction noise that occurs during the allowable times in Type I (single-family residential) areas to 75 dBA for mobile equipment and 60 dBA for stationary equipment. Section 17.176.080(F)(2) also limits construction noise that occurs during the allowable times in Type II (multi-family residential) areas to 80 dBA for mobile equipment and 65 dBA for stationary equipment.

Construction noise impacts to the nearby sensitive receptors have been calculated through use of the RCNM and the parameters and assumptions detailed in Section 6.1 of this report including Table H – Construction Equipment Noise Emissions and Usage Factors. The results are shown below in Table M and the RCNM printouts are provided in Appendix C.

Table M – Worst Case Construction Noise Levels at Nearest Receptors

Construction Phase	Mobile Homes & Preschool to Northwest ¹		Single-Family Homes to Southeast ¹		Multi-Family Homes to Southwest ²	
	Distance (feet)	Noise Level (dBA Leq) ³	Distance (feet)	Noise Level (dBA Leq) ³	Distance (feet)	Noise Level (dBA Leq) ³
Grading	150	66	200	64	150	66
Building Construction	60	70	70	69	30	74
Paving	25	74	50	69	50	69
Painting	60	65	70	64	30	71
City's Mobile Equipment Threshold		75		75		80
City's Stationary Equipment Threshold		60		60		65

Notes:

¹ City construction noise threshold from Section 17.176.080(F)(2) of the Municipal Code for Type I Areas.

² City construction noise threshold from Section 17.176.080(F)(2) of the Municipal Code for Type II Areas.

³ 7 dBA of attenuation was added to the RCNM model in order to account for Project Design Feature 1, which requires the proposed 7 foot high wall around the project site be constructed prior to the start of construction activities.

Source: RCNM, Federal Highway Administration, 2006

Table M shows that the greatest noise impacts would occur during the building construction and paving phases of construction, with a noise level as high as 74 dBA at the mobile homes and preschool to the northwest and at the multi-family homes to the southwest of the project site. Project Design Feature 1 is provided that would require the proposed seven foot high wall as detailed on the site plan for the northwest, southeast, and southwest sides of the project site to be constructed prior to the start of grading and construction activities. Table M shows that with implementation of Project Design Feature 1, none of the construction phases would exceed the City's mobile equipment thresholds. However, all phases of construction have the potential to exceed the City's stationary equipment thresholds. This would be considered a significant impact.

Recommended Measure 1 is provided that would require any stationary construction equipment that is used within 100 feet of any off-site sensitive receptor to place a temporary sound barrier between the stationary equipment and nearby sensitive receptors. With implementation of Recommended Measure 1, construction-related noise impacts would be reduced to within the City noise standards.

Operational-Related Noise

The proposed project would consist of the development of 104 residential apartment units. The proposed development would be adjacent to Lakeshore Drive, which may create noise levels in excess of City standards at the proposed residential uses.

The City's General Plan Policy 7.1 requires that new multi-family residential development limit the exterior noise impacts to all proposed private patios and balconies to 60 dBA L_{dn} and limit the interior noise levels to 45 dBA L_{dn}. The exterior and interior noise impacts to the proposed apartment units have been analyzed separately below.

Exterior Patio and Balcony Noise

All residential buildings are anticipated to have either a private patio or balcony. These private patios and balconies have the potential to exceed the City's 60 dB L_{dn} noise standard. The anticipated noise levels have been calculated for the nearest patios and balconies to Lakeshore Drive on proposed Buildings 1 and 11, which are the nearest residential buildings to Lakeshore Drive. A summary of the results are shown below in Table N and the FHWA model printouts of the proposed patio/balcony noise calculations are provided in Appendix D.

Table N – Proposed Exterior Patio/Balcony Noise Levels

Building Number	Floor	Patio/Balcony Noise Levels (dBA L _{dn})		Sound Wall Height (feet)
		Unmitigated	Mitigated	
1	First	59	--	0
	Second	59	--	0
11	First	64	59	5.0
	Second	64	60	3.5

Notes:

Exceedance of City’s 60 dBA L_{dn} noise standard shown in bold.

Source: FHWA RD-77-108 Model.

Table N shows that the proposed first floor patios and second floor balconies on Building 11 that face Lakeshore Drive would exceed the City’s 60 dBA L_{dn} residential exterior noise standard. This would result in a significant impact.

Recommended Measure 2 is provided that would require the applicant to construct a minimum 5.0-foot high solid wall on the northeast side of the first floor patios and a minimum 3.5-foot high solid wall on the northeast side of the second floor balconies for the residential units located on the northeast side of Building 11. The solid walls shall be constructed of a solid material (e.g., glass, wood or plaster) that are free of any cutouts or openings.

Table N above, shows that with application of the proposed 5.0-foot high first floor patio sound walls and 3.5-foot high second floor balcony sound walls specified in Recommended Measure 2, the noise levels at the proposed patios and balconies would be reduced to within the City’s exterior residential noise standard. Impacts would be less than significant after implementation of the recommended measures.

Interior Noise

To assess the interior noise levels related to the compliance with the City’s 45 dBA L_{dn} criteria, the exterior to interior attenuation rates of the units facing Lakeshore Drive were calculated and compared to the calculated exterior noise levels at the first and second floor building facades in order to calculate the interior noise levels within the future on-site residential units. The interior noise levels were calculated based on 12 dB of attenuation for the “windows open” condition and 20 dB for the “windows closed” condition (County of Riverside, 2003), which are also shown in Table O below. The exterior noise level at façade calculations are provided in Appendix D.

Table O – Proposed Residential Units Interior Noise Levels

Building	Floor	Exterior Noise Level at Façade (dBA L _{dn})	Interior Noise Levels With: (dBA L _{dn})	
			Windows Open ¹	Windows Closed ²
1	First	59	47	34
	Second	59	47	34
11	First	58	46	33
	Second	63	51	38

Notes:

¹ A minimum of 12 dBA noise reduction is assumed with windows open condition.

² A minimum of 20 dBA noise reduction is assumed with windows closed condition.

Exceedance of City 45 dBA L_{dn} noise standard shown in bold.

Source: FHWA RD-77-108 Model.

Table O above shows that all analyzed units would be within the City's 45 dBA Ldn interior noise standard for the "windows closed" condition. Table O also shows that all analyzed units would exceed the City's 45 dBA Ldn interior noise standard for the "windows open" condition. This would be considered a significant impact.

Recommended Measure 3 is provided that would require that the applicant provide a "windows closed" condition for all proposed residential units. A "windows closed" condition requires a means of mechanical ventilation per the California Building Code standards. This shall be achieved with a standard forced air conditioning system for each residential unit. Therefore, with implementation of Recommended Measure 3 the interior noise levels would be reduced to a less than significant impact.

Level of Significance Before Mitigation

Potentially significant impact.

Recommended Measures

Recommended Measure 1:

The project applicant shall require any construction contractor that needs to use stationary construction equipment within 100 feet of any offsite sensitive receptors (homes or preschool) to place a temporary sound barrier between the stationary equipment and nearest sensitive receptors.

Recommended Measure 2:

The project applicant shall construct a minimum 5.0-foot high solid wall on the northeast side of the first floor patios and a minimum 3.5-foot high solid wall on the northeast side of second floor balconies for the residential units located on the northeast side of Building 11. The walls shall be constructed of a solid material (e.g., glass, wood or plaster) that are free of any cutouts or openings. (If the 7 to 8-foot high solid wall that is depicted on the site plan is constructed, than the 5.0-foot high first floor patio wall will not be required)

Recommended Measure 3:

The project applicant shall provide a "windows closed" condition for each proposed residential unit. A "window closed" condition requires a means of mechanical ventilation per Chapter 12, Section 1205 of the Uniform Building Code. This shall be achieved with a standard forced air conditioning and heating system with a filtered outside air intake vent for each residential unit.

Level of Significance After Mitigation

Less than significant impact.

7.3 Generation of Excessive Groundborne Vibration

The proposed project would not expose persons to or generation of excessive groundborne vibration or groundborne noise levels. The following section analyzes the potential vibration impacts associated with the construction and operations of the proposed project.

Construction-Related Vibration Impacts

The construction activities for the proposed project are anticipated to include grading of the 7.5-acre project site, building construction of the 104 apartment units, paving of the onsite roads and parking areas, and application of architectural coatings. The nearest sensitive receptors to the project site are the mobile home residents and offsite workers at the Kids Cottage preschool that are both located as near as 10 feet northwest of the project site.

Section 17.176.080(G) of the City's Municipal Code restricts the operation of any device that creates a vibration which is above the vibration threshold of any individual at or beyond the property boundary of the source. Since the City's Municipal does not provide a quantifiable vibration level, Caltrans guidance that is detailed above in Section 4.2 has been utilized, which defines the threshold of perception from transient sources at 0.25 inch per second PPV.

The primary source of vibration during construction would be from the operation of a bulldozer. From Table L above a large bulldozer would create a vibration level of 0.089 inch per second PPV at 25 feet. Based on typical propagation rates, the vibration level at the nearest offsite receptor (10 feet away) would be 0.24 inch per second PPV. The vibration level at the nearest offsite receptor would be within the 0.25 inch per second PPV threshold detailed above. Impacts would be less than significant.

Operations-Related Vibration Impacts

The on-going operation of the proposed project would not include the operation of any known vibration sources. Therefore, a less than significant vibration impact is anticipated from the operation of the proposed project.

Level of Significance

Less than significant impact.

7.4 Permanent Noise Level Increase

The ongoing operation of the proposed project may result in a potential substantial permanent increase in ambient noise levels in the project vicinity above existing levels without the proposed project. Potential noise impacts associated with the operations of the proposed project would be from project-generated vehicular traffic on the project vicinity roadways.

Vehicle noise is a combination of the noise produced by the engine, exhaust and tires. The level of traffic noise depends on three primary factors (1) the volume of traffic, (2) the speed of traffic, and (3) the number of trucks in the flow of traffic. The proposed project does not propose any uses that would require a substantial number of truck trips and the proposed project would not alter the speed limit on any existing roadway so the proposed project's potential offsite noise impacts have been focused on the noise impacts associated with the change of volume of traffic that would occur with development of the proposed project.

Neither the General Plan nor the CEQA Guidelines define what constitutes a "substantial permanent increase to ambient noise levels", as such, this impact analysis has utilized guidance from the Federal Transit Administration for a moderate impact that has been detailed above in Table A.

The potential offsite traffic noise impacts created by the on-going operations of the proposed project have been analyzed through utilization of the FHWA model and parameters described above in Section 6.2 and the FHWA model noise calculation spreadsheets are provided in Appendix E. The proposed project's potential offsite noise impacts have been calculated through a comparison of the without project scenario to the with project scenarios for the existing plus ambient growth conditions. The results of this comparison are shown in Table P.

Table P – Project-Related Traffic Noise Contributions

Roadway	Segment	dBA Ldn at Nearest Receptor ¹			Increase Threshold ²
		No Project	With Project	Project Increase	
Lakeshore Drive	East of Gunnerson Street	66.0	66.2	0.2	+1 dBA
Lakeshore Drive	West of Gunnerson Street	67.7	67.8	0.1	+1 dBA

Notes:

¹ Distance to nearest residential use shown in Table I, does not take into account existing noise barriers.

² Increase Threshold obtained from the FTA's allowable noise impact exposures detailed above in Table A.

Source: FHWA Traffic Noise Prediction Model FHWA-RD-77-108.

Table P shows that for all scenarios analyzed, the proposed project's permanent noise increases to the nearby homes from the generation of additional vehicular traffic would not exceed the increase thresholds detailed above. Therefore, the proposed project would not result in a substantial permanent increase in ambient noise levels. Impacts would be less than significant.

Level of Significance

Less than significant impact.

7.5 Temporary Noise Level Increase

The proposed project may create a substantial temporary or periodic increase in ambient noise levels in the project vicinity above noise levels existing without the proposed project. The construction activities for the proposed project are anticipated to include grading of the 7.5-acre project site, building construction of the 104 apartment units, paving of the onsite roads and parking areas, and application of architectural coatings. Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. The nearest sensitive receptors to the project site are residents of the mobile homes and offsite workers at the Kids Cottage preschool that are both located as near as 10 feet northwest of the project site.

The construction noise impacts to the nearby sensitive receptors has been previously analyzed above in Section 7.2, which found that that greatest noise impacts would occur during the building construction and paving phases of construction, with a noise level as high as 74 dBA Leq at the mobile homes and preschool to the northwest and at the multi-family homes to the southwest of the project site. Section 7.2 found that with implementation of Project Design Feature 1, which requires the proposed seven foot high wall around the project site to be completed before the start of grading of the site and other construction activities, none of the construction phases would exceed the City's mobile equipment threshold. However, all phases of construction would have the potential to exceed the City's stationary equipment threshold. This would be considered a significant impact.

Recommended Measure 1 is provided that would require any stationary construction equipment that is used within 100 feet of any off-site sensitive receptor to place a temporary sound barrier between the stationary equipment and nearby sensitive receptors. With implementation of Recommended Measure 1, the proposed project would not create a substantial temporary or periodic increase in ambient noise levels.

Level of Significance Before Mitigation

Potentially significant impact.

Recommended Measures

Recommended Measure 1 provided above in Section 7.2.

Level of Significance After Mitigation

Less than significant impact.

7.6 Aircraft Noise

The proposed project would not expose people residing or working in the project area to excessive noise levels from aircraft. The nearest airport is Skylark Airport, located approximately five miles southeast of the project site. The project site is located outside of the 60 dBA CNEL noise contours of this airport and the site observations during the noise measurements found that although aircraft noise is occasionally audible at the project site, the noise created by the aircraft is not loud enough to measurably increase the ambient noise levels, which is primarily created by Lakeshore Drive. Impacts would be less than significant.

Level of Significance

Less than significant impact.

8.0 REFERENCES

California Department of Transportation, *2015 Annual Average Daily Truck Traffic on the California State Highway System*, 2016.

California Department of Transportation (Caltrans), *Technical Noise Supplement to the Traffic Noise Analytics Protocol*, September 2013.

California Department of Transportation, *Transportation- and Construction-Induced Vibration Guidance Manual*, September 2013.

City of Lake Elsinore, *City of Lake Elsinore General Plan*, December 13, 2011.

City of Lake Elsinore, *City of Lake Elsinore General Plan Update Final Recirculated Program Environmental Impact Report*, December 13, 2011.

City of Lake Elsinore, *Lake Elsinore Municipal Code*, February 24, 2015.

County of Riverside, *Comprehensive Update to the General Plan*, December 2008.

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

U.S. Department of Transportation, *FHWA Roadway Construction Noise Model User's Guide*, January, 2006.

Vista Environmental, *Air Quality and Greenhouse Gas Emissions Impact Analysis Lakeview Manor Project, City of Lake Elsinore*, May 30, 2017.

APPENDIX A

Study Area Photo Index



Noise Measurement Site A - looking north



Noise Measurement Site A - looking northeast



Noise Measurement Site A - looking east



Noise Measurement Site A - looking southeast



Noise Measurement Site A - looking south



Noise Measurement Site A - looking southwest



Noise Measurement Site A - looking west



Noise Measurement Site A - looking northwest



Noise Measurement Site B - looking north



Noise Measurement Site B - looking northeast



Noise Measurement Site B - looking east



Noise Measurement Site B - looking southeast



Noise Measurement Site B - looking south



Noise Measurement Site B - looking southwest



Noise Measurement Site B - looking west



Noise Measurement Site B - looking northwest

APPENDIX B

Field Noise Measurement Printouts

Site A - East Corner
 Date Time=09/23/17 10:37:00 AM
 Sampling Time=3 Weighting=A
 Record Num= 29000 Weighting=Slow CNEL(24hr)= 62.0
 Leq 57.8 SEL Value=107.6 Ldn(24hr)= 61.5
 MAX 92.9 Min Leq1hr = 45.7 2:25 AM
 MIN 30.5 Max Leqhr = 66.3 2:54 PM

Site B - Northwest Side
 Date Time=09/23/17 10:44:00 AM
 Sampling Time=3 Freq Weighting=A
 Record Num= 28800 Weighting=Slow CNEL(24hr)= 60.3
 Leq 57.1 SEL Value=106.6 Ldn(24hr)= 59.7
 MAX 87.2 Min Leq1hr = 43.0 2:38 AM
 MIN 35.3 Max Leqhr = 63.3 2:55 PM

Site A - East Corner

SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
51.8	10:37:00	51.8	51.8	51.8
67.3	10:37:03	67.3	67.3	67.3
60.1	10:37:06	60.1	60.1	60.1
62.5	10:37:09	62.5	62.5	62.5
52.6	10:37:12	52.6	52.6	52.6
56.2	10:37:15	56.2	56.2	56.2
67.6	10:37:18	67.6	67.6	67.6
57.2	10:37:21	57.2	57.2	57.2
58.1	10:37:24	58.1	58.1	58.1
63.2	10:37:27	63.2	63.2	63.2
65.2	10:37:30	65.2	65.2	65.2
66.8	10:37:33	66.8	66.8	66.8
60.3	10:37:36	60.3	60.3	60.3
52.1	10:37:39	52.1	52.1	52.1
54.1	10:37:42	54.1	54.1	54.1
69.1	10:37:45	69.1	69.1	69.1
54.6	10:37:48	54.6	54.6	54.6
62.1	10:37:51	62.1	62.1	62.1
67.7	10:37:54	67.7	67.7	67.7
56.9	10:37:57	56.9	56.9	56.9
60.4	10:38:00	60.4	60.4	60.4
57.5	10:38:03	57.5	57.5	57.5
56	10:38:06	56	56	56
66	10:38:09	66	66	66
61.5	10:38:12	61.5	61.5	61.5
63.4	10:38:15	63.4	63.4	63.4
62.2	10:38:18	62.2	62.2	62.2
54.2	10:38:21	54.2	54.2	54.2
63.2	10:38:24	63.2	63.2	63.2
57.4	10:38:27	57.4	57.4	57.4
49.4	10:38:30	49.4	49.4	49.4
66.3	10:38:33	66.3	66.3	66.3
50.9	10:38:36	50.9	50.9	50.9
62.6	10:38:39	62.6	62.6	62.6
60	10:38:42	60	60	60
66.7	10:38:45	66.7	66.7	66.7
60.7	10:38:48	60.7	60.7	60.7
60.5	10:38:51	60.5	60.5	60.5
59.3	10:38:54	59.3	59.3	59.3
55.5	10:38:57	55.5	55.5	55.5
57.2	10:39:00	57.2	57.2	57.2
54.2	10:39:03	54.2	54.2	54.2
54.6	10:39:06	54.6	54.6	54.6
54.1	10:39:09	54.1	54.1	54.1
55.8	10:39:12	55.8	55.8	55.8
55.8	10:39:15	55.8	55.8	55.8
47.7	10:39:18	47.7	47.7	47.7
45.1	10:39:21	45.1	45.1	45.1
52.9	10:39:24	52.9	52.9	52.9
57.2	10:39:27	57.2	57.2	57.2
53.2	10:39:30	53.2	53.2	53.2
56.2	10:39:33	56.2	56.2	56.2
51.9	10:39:36	51.9	51.9	51.9
45.8	10:39:39	45.8	45.8	45.8
43.5	10:39:42	43.5	43.5	43.5
47.4	10:39:45	47.4	47.4	47.4
54.3	10:39:48	54.3	54.3	54.3
54.3	10:39:51	54.3	54.3	54.3
56.3	10:39:54	56.3	56.3	56.3
52.2	10:39:57	52.2	52.2	52.2
57.3	10:40:00	57.3	57.3	57.3
54	10:40:03	54	54	54
50.2	10:40:06	50.2	50.2	50.2
47.8	10:40:09	47.8	47.8	47.8
54.7	10:40:12	54.7	54.7	54.7
50.3	10:40:15	50.3	50.3	50.3
42.4	10:40:18	42.4	42.4	42.4
41.5	10:40:21	41.5	41.5	41.5
41.2	10:40:24	41.2	41.2	41.2
43.4	10:40:27	43.4	43.4	43.4
49.3	10:40:30	49.3	49.3	49.3
50.2	10:40:33	50.2	50.2	50.2
59.2	10:40:36	59.2	59.2	59.2
57.8	10:40:39	57.8	57.8	57.8
56.8	10:40:42	56.8	56.8	56.8
49.7	10:40:45	49.7	49.7	49.7
53.7	10:40:48	53.7	53.7	53.7
55.5	10:40:51	55.5	55.5	55.5
60	10:40:54	60	60	60
61.5	10:40:57	61.5	61.5	61.5
69.7	10:41:00	69.7	69.7	69.7
52.9	10:41:03	52.9	52.9	52.9
62.1	10:41:06	62.1	62.1	62.1
60	10:41:09	60	60	60
57.6	10:41:12	57.6	57.6	57.6
53.4	10:41:15	53.4	53.4	53.4
53	10:41:18	53	53	53
51.4	10:41:21	51.4	51.4	51.4
58.4	10:41:24	58.4	58.4	58.4
54.1	10:41:27	54.1	54.1	54.1
47.5	10:41:30	47.5	47.5	47.5
45.4	10:41:33	45.4	45.4	45.4
50.1	10:41:36	50.1	50.1	50.1
52.9	10:41:39	52.9	52.9	52.9
50.4	10:41:42	50.4	50.4	50.4
49.2	10:41:45	49.2	49.2	49.2
49.7	10:41:48	49.7	49.7	49.7
53.5	10:41:51	53.5	53.5	53.5
53.9	10:41:54	53.9	53.9	53.9
49.3	10:41:57	49.3	49.3	49.3
48.1	10:42:00	48.1	48.1	48.1
55.3	10:42:03	55.3	55.3	55.3
59.4	10:42:06	59.4	59.4	59.4
59.2	10:42:09	59.2	59.2	59.2
61.7	10:42:12	61.7	61.7	61.7
62.2	10:42:15	62.2	62.2	62.2
59.7	10:42:18	59.7	59.7	59.7
56.8	10:42:21	56.8	56.8	56.8
54.4	10:42:24	54.4	54.4	54.4
50.6	10:42:27	50.6	50.6	50.6
52	10:42:30	52	52	52
57.7	10:42:33	57.7	57.7	57.7
57.5	10:42:36	57.5	57.5	57.5
63.4	10:42:39	63.4	63.4	63.4
63.1	10:42:42	63.1	63.1	63.1
58.7	10:42:45	58.7	58.7	58.7
53	10:42:48	53	53	53
51	10:42:51	51	51	51
53.8	10:42:54	53.8	53.8	53.8
56.1	10:42:57	56.1	56.1	56.1
52.9	10:43:00	52.9	52.9	52.9
53.3	10:43:03	53.3	53.3	53.3
54.4	10:43:06	54.4	54.4	54.4
61.3	10:43:09	61.3	61.3	61.3
57.8	10:43:12	57.8	57.8	57.8
55.3	10:43:15	55.3	55.3	55.3
48.2	10:43:18	48.2	48.2	48.2
48.6	10:43:21	48.6	48.6	48.6
54.3	10:43:24	54.3	54.3	54.3
56	10:43:27	56	56	56
56.4	10:43:30	56.4	56.4	56.4
60.8	10:43:33	60.8	60.8	60.8

Site B - Northwest Side

SPL	Time	Leq (1 hour Avg.)	Ldn	CNEL
51.1	10:44:00	51.1	51.1	51.1
50.8	10:44:03	50.8	50.8	50.8
62	10:44:06	62	62	62
68.1	10:44:09	68.1	68.1	68.1
53.9	10:44:12	53.9	53.9	53.9
52.5	10:44:15	52.5	52.5	52.5
48.7	10:44:18	48.7	48.7	48.7
69.5	10:44:21	69.5	69.5	69.5
60.8	10:44:24	60.8	60.8	60.8
63	10:44:27	63	63	63
61.1	10:44:30	61.1	61.1	61.1
55.9	10:44:33	55.9	55.9	55.9
57.5	10:44:36	57.5	57.5	57.5
64.3	10:44:39	64.3	64.3	64.3
59.3	10:44:42	59.3	59.3	59.3
66.1	10:44:45	66.1	66.1	66.1
56.9	10:44:48	56.9	56.9	56.9
57.1	10:44:51	57.1	57.1	57.1
55.9	10:44:54	55.9	55.9	55.9
62.8	10:44:57	62.8	62.8	62.8
61.9	10:45:00	61.9	61.9	61.9
63.7	10:45:03	63.7	63.7	63.7
67.4	10:45:06	67.4	67.4	67.4
60.7	10:45:09	60.7	60.7	60.7
59.1	10:45:12	59.1	59.1	59.1
66.2	10:45:15	66.2	66.2	66.2
64.6	10:45:18	64.6	64.6	64.6
52	10:45:21	52	52	52
52.1	10:45:24	52.1	52.1	52.1
61.6	10:45:27	61.6	61.6	61.6
59.2	10:45:30	59.2	59.2	59.2
54	10:45:33	54	54	54
52	10:45:36	52	52	52
48.9	10:45:39	48.9	48.9	48.9
48.7	10:45:42	48.7	48.7	48.7
50.5	10:45:45	50.5	50.5	50.5
52.2	10:45:48	52.2	52.2	52.2
48.5	10:45:51	48.5	48.5	48.5
48.6	10:45:54	48.6	48.6	48.6
45.8	10:45:57	45.8	45.8	45.8
45.6	10:46:00	45.6	45.6	45.6
44.6	10:46:03	44.6	44.6	44.6
45.6	10:46:06	45.6	45.6	45.6
46.5	10:46:09	46.5	46.5	46.5
49.3	10:46:12	49.3	49.3	49.3
49.9	10:46:15	49.9	49.9	49.9
47.3	10:46:18	47.3	47.3	47.3
48.2	10:46:21	48.2	48.2	48.2
49.1	10:46:24	49.1	49.1	49.1
50.5	10:46:27	50.5	50.5	50.5
49.3	10:46:30	49.3	49.3	49.3
48.9	10:46:33	48.9	48.9	48.9
50.8	10:46:36	50.8	50.8	50.8
51.5	10:46:39	51.5	51.5	51.5
50.9	10:46:42	50.9	50.9	50.9
50.4	10:46:45	50.4	50.4	50.4
48.2	10:46:48	48.2	48.2	48.2
47.1	10:46:51	47.1	47.1	47.1
48.7	10:46:54	48.7	48.7	48.7
46	10:46:57	46	46	46
46.6	10:47:00	46.6	46.6	46.6
46.7	10:47:03	46.7	46.7	46.7
46.3	10:47:06	46.3	46.3	46.3
48.2	10:47:09	48.2	48.2	48.2
53.5	10:47:12	53.5	53.5	53.5
51	10:47:15	51	51	51
50.5	10:47:18	50.5	50.5	50.5
50.4	10:47:21	50.4	50.4	50.4
52.2	10:47:24	52.2	52.2	52.2
51.8	10:47:27	51.8	51.8	51.8
51.3	10:47:30	51.3	51.3	51.3
52.3	10:47:33	52.3	52.3	52.3
52.6	10:47:36	52.6	52.6	52.6
52.1	10:47:39	52.1	52.1	52.1
57.5	10:47:42	57.5	57.5	57.5
53.4	10:47:45	53.4	53.4	53.4
54.3	10:47:48	54.3	54.3	54.3
54.8	10:47:51	54.8	54.8	54.8
53.2	10:47:54	53.2	53.2	53.2
50.6	10:47:57	50.6	50.6	50.6
49.7	10:48:00	49.7	49.7	49.7
48.5	10:48:03	48.5	48.5	48.5
47.4	10:48:06	47.4	47.4	47.4
50	10:48:09	50	50	50
49	10:48:12	49	49	49
49.5	10:48:15	49.5	49.5	49.5
52.6	10:48:18	52.6	52.6	52.6
52.3	10:48:21	52.3	52.3	52.3
51	10:48:24	51	51	51

Site A - East Corner				Site B - Northwest Side			
SPL	Time	Leq (1 hour Avg.)	Ldn CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn CNEL
57.3	10:43:38	57.3	57.3	50.6	10:50:36	50.6	50.6
53	10:43:39	53	53	47.5	10:50:39	47.5	47.5
51.2	10:43:42	51.2	51.2	48.1	10:50:42	48.1	48.1
47.6	10:43:45	47.6	47.6	50.7	10:50:45	50.7	50.7
48.3	10:43:48	48.3	48.3	53.9	10:50:48	53.9	53.9
56.7	10:43:51	56.7	56.7	56.8	10:50:51	56.8	56.8
55.3	10:43:54	55.3	55.3	55.8	10:50:54	55.8	55.8
55.7	10:43:57	55.7	55.7	56.1	10:50:57	56.1	56.1
57.2	10:44:00	57.2	57.2	55.8	10:51:00	55.8	55.8
56.3	10:44:03	56.3	56.3	54.4	10:51:03	54.4	54.4
59.5	10:44:06	59.5	59.5	53	10:51:06	53	53
56	10:44:09	56	56	53.1	10:51:09	53.1	53.1
50.9	10:44:12	50.9	50.9	50.7	10:51:12	50.7	50.7
54.3	10:44:15	54.3	54.3	51.9	10:51:15	51.9	51.9
52.3	10:44:18	52.3	52.3	52.2	10:51:18	52.2	52.2
58.4	10:44:21	58.4	58.4	52.3	10:51:21	52.3	52.3
58.2	10:44:24	58.2	58.2	51.9	10:51:24	51.9	51.9
54.2	10:44:27	54.2	54.2	51	10:51:27	51	51
55.1	10:44:30	55.1	55.1	49.8	10:51:30	49.8	49.8
54.6	10:44:33	54.6	54.6	50.1	10:51:33	50.1	50.1
55.3	10:44:36	55.3	55.3	51.6	10:51:36	51.6	51.6
50.5	10:44:39	50.5	50.5	49.9	10:51:39	49.9	49.9
44.3	10:44:42	44.3	44.3	52	10:51:42	52	52
40.5	10:44:45	40.5	40.5	57.6	10:51:45	57.6	57.6
39.8	10:44:48	39.8	39.8	59.5	10:51:48	59.5	59.5
43.2	10:44:51	43.2	43.2	57.4	10:51:51	57.4	57.4
46.1	10:44:54	46.1	46.1	56.5	10:51:54	56.5	56.5
46.3	10:44:57	46.3	46.3	55.1	10:51:57	55.1	55.1
45.1	10:45:00	45.1	45.1	55.4	10:52:00	55.4	55.4
44.6	10:45:03	44.6	44.6	54.2	10:52:03	54.2	54.2
48.8	10:45:06	48.8	48.8	49.7	10:52:06	49.7	49.7
53.4	10:45:09	53.4	53.4	49.7	10:52:09	49.7	49.7
58.9	10:45:12	58.9	58.9	49.4	10:52:12	49.4	49.4
62.7	10:45:15	62.7	62.7	50.3	10:52:15	50.3	50.3
55	10:45:18	55	55	49.8	10:52:18	49.8	49.8
51.1	10:45:21	51.1	51.1	52.1	10:52:21	52.1	52.1
48.5	10:45:24	48.5	48.5	49.1	10:52:24	49.1	49.1
45.2	10:45:27	45.2	45.2	46.9	10:52:27	46.9	46.9
42.6	10:45:30	42.6	42.6	46.3	10:52:30	46.3	46.3
43.5	10:45:33	43.5	43.5	49.4	10:52:33	49.4	49.4
49.5	10:45:36	49.5	49.5	51.6	10:52:36	51.6	51.6
54.1	10:45:39	54.1	54.1	54.4	10:52:39	54.4	54.4
52.6	10:45:42	52.6	52.6	55.3	10:52:42	55.3	55.3
46.7	10:45:45	46.7	46.7	54.3	10:52:45	54.3	54.3
43.3	10:45:48	43.3	43.3	53.9	10:52:48	53.9	53.9
42.9	10:45:51	42.9	42.9	55.5	10:52:51	55.5	55.5
42.5	10:45:54	42.5	42.5	55.6	10:52:54	55.6	55.6
43.5	10:45:57	43.5	43.5	54.1	10:52:57	54.1	54.1
46.9	10:46:00	46.9	46.9	56.2	10:53:00	56.2	56.2
48.7	10:46:03	48.7	48.7	54.4	10:53:03	54.4	54.4
50.6	10:46:06	50.6	50.6	54.9	10:53:06	54.9	54.9
53.6	10:46:09	53.6	53.6	51.8	10:53:09	51.8	51.8
54.6	10:46:12	54.6	54.6	52.9	10:53:12	52.9	52.9
49.6	10:46:15	49.6	49.6	55.5	10:53:15	55.5	55.5
44.9	10:46:18	44.9	44.9	59.2	10:53:18	59.2	59.2
43.9	10:46:21	43.9	43.9	61.1	10:53:21	61.1	61.1
45.6	10:46:24	45.6	45.6	56.3	10:53:24	56.3	56.3
52.4	10:46:27	52.4	52.4	53.8	10:53:27	53.8	53.8
53.7	10:46:30	53.7	53.7	53.9	10:53:30	53.9	53.9
54.5	10:46:33	54.5	54.5	50.8	10:53:33	50.8	50.8
52.1	10:46:36	52.1	52.1	51.3	10:53:36	51.3	51.3
54.1	10:46:39	54.1	54.1	52.1	10:53:39	52.1	52.1
53.6	10:46:42	53.6	53.6	49.9	10:53:42	49.9	49.9
52.4	10:46:45	52.4	52.4	47.4	10:53:45	47.4	47.4
53.3	10:46:48	53.3	53.3	47.2	10:53:48	47.2	47.2
51	10:46:51	51	51	46.6	10:53:51	46.6	46.6
46.4	10:46:54	46.4	46.4	49	10:53:54	49	49
48.8	10:46:57	48.8	48.8	47.8	10:53:57	47.8	47.8
55.9	10:47:00	55.9	55.9	49.3	10:54:00	49.3	49.3
57.2	10:47:03	57.2	57.2	51.7	10:54:03	51.7	51.7
56.7	10:47:06	56.7	56.7	53.3	10:54:06	53.3	53.3
55.2	10:47:09	55.2	55.2	55.6	10:54:09	55.6	55.6
56.6	10:47:12	56.6	56.6	56.2	10:54:12	56.2	56.2
58.6	10:47:15	58.6	58.6	55.7	10:54:15	55.7	55.7
56.7	10:47:18	56.7	56.7	57.1	10:54:18	57.1	57.1
56.6	10:47:21	56.6	56.6	55.2	10:54:21	55.2	55.2
54.2	10:47:24	54.2	54.2	51.7	10:54:24	51.7	51.7
56.7	10:47:27	56.7	56.7	48	10:54:27	48	48
55.3	10:47:30	55.3	55.3	45.9	10:54:30	45.9	45.9
59.5	10:47:33	59.5	59.5	47.8	10:54:33	47.8	47.8
55.1	10:47:36	55.1	55.1	51.3	10:54:36	51.3	51.3
52.6	10:47:39	52.6	52.6	48.8	10:54:39	48.8	48.8
57.6	10:47:42	57.6	57.6	51.3	10:54:42	51.3	51.3
58.7	10:47:45	58.7	58.7	55.2	10:54:45	55.2	55.2
55.2	10:47:48	55.2	55.2	53.7	10:54:48	53.7	53.7
49.7	10:47:51	49.7	49.7	53.5	10:54:51	53.5	53.5
54	10:47:54	54	54	51.5	10:54:54	51.5	51.5
48.6	10:47:57	48.6	48.6	51.1	10:54:57	51.1	51.1
54.5	10:48:00	54.5	54.5	51.8	10:55:00	51.8	51.8
57.4	10:48:03	57.4	57.4	52.6	10:55:03	52.6	52.6
55	10:48:06	55	55	49.8	10:55:06	49.8	49.8
54.2	10:48:09	54.2	54.2	48.4	10:55:09	48.4	48.4
48.3	10:48:12	48.3	48.3	47.9	10:55:12	47.9	47.9
48	10:48:15	48	48	49	10:55:15	49	49
55.6	10:48:18	55.6	55.6	52	10:55:18	52	52
52.5	10:48:21	52.5	52.5	52.9	10:55:21	52.9	52.9
55.4	10:48:24	55.4	55.4	53.1	10:55:24	53.1	53.1
52.7	10:48:27	52.7	52.7	52.2	10:55:27	52.2	52.2
52.3	10:48:30	52.3	52.3	51.9	10:55:30	51.9	51.9
54.4	10:48:33	54.4	54.4	52.8	10:55:33	52.8	52.8
54.9	10:48:36	54.9	54.9	54.3	10:55:36	54.3	54.3
54.9	10:48:39	54.9	54.9	53.3	10:55:39	53.3	53.3
57.4	10:48:42	57.4	57.4	52.4	10:55:42	52.4	52.4
54.2	10:48:45	54.2	54.2	51.7	10:55:45	51.7	51.7
49.3	10:48:48	49.3	49.3	48.9	10:55:48	48.9	48.9
54.4	10:48:51	54.4	54.4	49.2	10:55:51	49.2	49.2
49.9	10:48:54	49.9	49.9	50.5	10:55:54	50.5	50.5
55.4	10:48:57	55.4	55.4	48.3	10:55:57	48.3	48.3
57.4	10:49:00	57.4	57.4	46.8	10:56:00	46.8	46.8
51.9	10:49:03	51.9	51.9	47.4	10:56:03	47.4	47.4
55.1	10:49:06	55.1	55.1	50.7	10:56:06	50.7	50.7
50.9	10:49:09	50.9	50.9	50.9	10:56:09	50.9	50.9
47.2	10:49:12	47.2	47.2	50.2	10:56:12	50.2	50.2
53.5	10:49:15	53.5	53.5	50.9	10:56:15	50.9	50.9
53.4	10:49:18	53.4	53.4	52.3	10:56:18	52.3	52.3
59.2	10:49:21	59.2	59.2	52	10:56:21	52	52
58.3	10:49:24	58.3	58.3	50.2	10:56:24	50.2	50.2
59.6	10:49:27	59.6	59.6	47.1	10:56:27	47.1	47.1
59.4	10:49:30	59.4	59.4	45.5	10:56:30	45.5	45.5
59.2	10:49:33	59.2	59.2	44.8	10:56:33	44.8	44.8
56	10:49:36	56	56	46.4	10:56:36	46.4	46.4
51.1	10:49:39	51.1	51.1	48.8	10:56:39	48.8	48.8
46.6	10:49:42	46.6	46.6	49.4	10:56:42	49.4	49.4
52.6	10:49:45	52.6	52.6	51.1	10:56:45	51.1	51.1
49.3	10:49:48	49.3	49.3	51.7	10:56:48	51.7	51.7
45.7	10:49:51	45.7	45.7	52.4	10:56:51	52.4	52.4
51.7	10:49:54	51.7	51.7	51.2	10:56:54	51.2	51.2
55.6	10:49:57	55.6	55.6	50	10:56:57	50	50
55	10:50:00	55	55	48.5	10:57:00	48.5	48.5
51.3	10:50:03	51.3	51.3	49.2	10:57:03	49.2	49.2
57.2	10:50:06	57.2	57.2	50.5	10:57:06	50.5	50.5
59.9	10:50:09	59.9	59.9	63.4	10:57:09	63.4	63.4
57.6	10:50:12	57.6	57.6	52.8	10:57:12	52.8	52.8
52.1	10:50:15	52.1	52.1	49.6	10:57:15	49.6	49.6
48.3	10:50:18	48.3	48.3	50.5	10:57:18	50.5	50.5
53.5	10:50:21	53.5	53.5	52.4	10:57:21	52.4	52.4
55.8	10:50:24	55.8	55.8	51.9	10:57:24	51.9	51.9
54.3	10:50:27	54.3	54.3	53.2	10:57:27	53.2	53.2
50.6	10:50:30	50.6	50.6	53.5	10:57:30	53.5	53.5
54.2	10:50:33	54.2	54.2	53.3	10:57:33	53.3	53.3
54.9	10:50:36	54.9	54.9	52.4	10:57:36	52.4	52.4
53.8	10:50:39	53.8	53.8	50.1	10:57:39	50.1	50.1
49.1	10:50:42	49.1	49.1	48.1	10:57:42	48.1	48.1

Site A - East Corner				Site B - Northwest Side			
SPL	Time	Leq (1 hour Avg.)	Ldn CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn CNEL
56	10:50:48	56	56	47.4	10:57:45	47.4	47.4
59.1	10:50:48	59.1	59.1	48.8	10:57:48	48.8	48.8
59.7	10:50:51	59.7	59.7	52	10:57:51	52	52
59	10:50:54	59	59	50.2	10:57:54	50.2	50.2
56.9	10:50:57	56.9	56.9	49.5	10:57:57	49.5	49.5
54.6	10:51:00	54.6	54.6	52.2	10:58:00	52.2	52.2
50.2	10:51:03	50.2	50.2	52.8	10:58:03	52.8	52.8
49.3	10:51:06	49.3	49.3	52.0	10:58:06	52.0	52.0
46.5	10:51:09	46.5	46.5	54.4	10:58:09	54.4	54.4
48.5	10:51:12	48.5	48.5	54.2	10:58:12	54.2	54.2
51.9	10:51:15	51.9	51.9	54.5	10:58:15	54.5	54.5
53.3	10:51:18	53.3	53.3	69	10:58:18	69	69
53.1	10:51:21	53.1	53.1	65.9	10:58:21	65.9	65.9
51.6	10:51:24	51.6	51.6	59	10:58:24	59	59
56.3	10:51:27	56.3	56.3	51.3	10:58:27	51.3	51.3
60.6	10:51:30	60.6	60.6	51.8	10:58:30	51.8	51.8
62.2	10:51:33	62.2	62.2	53.2	10:58:33	53.2	53.2
60.1	10:51:36	60.1	60.1	51.2	10:58:36	51.2	51.2
56.7	10:51:39	56.7	56.7	49.3	10:58:39	49.3	49.3
51.7	10:51:42	51.7	51.7	50.7	10:58:42	50.7	50.7
46.2	10:51:45	46.2	46.2	51.3	10:58:45	51.3	51.3
47.2	10:51:48	47.2	47.2	54.3	10:58:48	54.3	54.3
54.1	10:51:51	54.1	54.1	54.3	10:58:51	54.3	54.3
57.2	10:51:54	57.2	57.2	50.3	10:58:54	50.3	50.3
56.1	10:51:57	56.1	56.1	47.5	10:58:57	47.5	47.5
50.2	10:52:00	50.2	50.2	48.3	10:59:00	48.3	48.3
48.8	10:52:03	48.8	48.8	49.1	10:59:03	49.1	49.1
47.2	10:52:06	47.2	47.2	51.5	10:59:06	51.5	51.5
49.1	10:52:09	49.1	49.1	50.5	10:59:09	50.5	50.5
51.5	10:52:12	51.5	51.5	47.7	10:59:12	47.7	47.7
54.2	10:52:15	54.2	54.2	49.3	10:59:15	49.3	49.3
53.5	10:52:18	53.5	53.5	50.2	10:59:18	50.2	50.2
53.7	10:52:21	53.7	53.7	52.2	10:59:21	52.2	52.2
52.6	10:52:24	52.6	52.6	53.4	10:59:24	53.4	53.4
45.8	10:52:27	45.8	45.8	52.9	10:59:27	52.9	52.9
49.2	10:52:30	49.2	49.2	52.4	10:59:30	52.4	52.4
60	10:52:33	60	60	60	10:59:33	60	60
55.4	10:52:36	55.4	55.4	52.1	10:59:36	52.1	52.1
57.4	10:52:39	57.4	57.4	52.6	10:59:39	52.6	52.6
58.1	10:52:42	58.1	58.1	51.4	10:59:42	51.4	51.4
59	10:52:45	59	59	47.2	10:59:45	47.2	47.2
56.4	10:52:48	56.4	56.4	44.8	10:59:48	44.8	44.8
56	10:52:51	56	56	45.2	10:59:51	45.2	45.2
54.5	10:52:54	54.5	54.5	45.2	10:59:54	45.2	45.2
53.3	10:52:57	53.3	53.3	46.9	10:59:57	46.9	46.9
54.7	10:53:00	54.7	54.7	48.1	11:00:00	48.1	48.1
59.4	10:53:03	59.4	59.4	49.5	11:00:03	49.5	49.5
61.9	10:53:06	61.9	61.9	49.4	11:00:06	49.4	49.4
60.2	10:53:09	60.2	60.2	50.3	11:00:09	50.3	50.3
54.9	10:53:12	54.9	54.9	50.7	11:00:12	50.7	50.7
56.5	10:53:15	56.5	56.5	50.7	11:00:15	50.7	50.7
53	10:53:18	53	53	51.7	11:00:18	51.7	51.7
56	10:53:21	56	56	52.7	11:00:21	52.7	52.7
57.2	10:53:24	57.2	57.2	55.1	11:00:24	55.1	55.1
50.2	10:53:27	50.2	50.2	58.4	11:00:27	58.4	58.4
52.8	10:53:30	52.8	52.8	60.7	11:00:30	60.7	60.7
53.3	10:53:33	53.3	53.3	60.8	11:00:33	60.8	60.8
47.8	10:53:36	47.8	47.8	55.2	11:00:36	55.2	55.2
42.8	10:53:39	42.8	42.8	52.3	11:00:39	52.3	52.3
42.3	10:53:42	42.3	42.3	50.6	11:00:42	50.6	50.6
47	10:53:45	47	47	49.6	11:00:45	49.6	49.6
50.7	10:53:48	50.7	50.7	50.1	11:00:48	50.1	50.1
52.4	10:53:51	52.4	52.4	50.9	11:00:51	50.9	50.9
59.5	10:53:54	59.5	59.5	51.5	11:00:54	51.5	51.5
56.9	10:53:57	56.9	56.9	49.9	11:00:57	49.9	49.9
57.5	10:54:00	57.5	57.5	49.6	11:01:00	49.6	49.6
57.5	10:54:03	57.5	57.5	46.1	11:01:03	46.1	46.1
56.2	10:54:06	56.2	56.2	46.3	11:01:06	46.3	46.3
59.3	10:54:09	59.3	59.3	46.5	11:01:09	46.5	46.5
57	10:54:12	57	57	48.4	11:01:12	48.4	48.4
49	10:54:15	49	49	52.3	11:01:15	52.3	52.3
44.6	10:54:18	44.6	44.6	52.7	11:01:18	52.7	52.7
43.1	10:54:21	43.1	43.1	50.8	11:01:21	50.8	50.8
47.3	10:54:24	47.3	47.3	48.1	11:01:24	48.1	48.1
55.2	10:54:27	55.2	55.2	47.6	11:01:27	47.6	47.6
52.5	10:54:30	52.5	52.5	51	11:01:30	51	51
50	10:54:33	50	50	61.8	11:01:33	61.8	61.8
56.4	10:54:36	56.4	56.4	55.6	11:01:36	55.6	55.6
55.8	10:54:39	55.8	55.8	52.4	11:01:39	52.4	52.4
55	10:54:42	55	55	49.8	11:01:42	49.8	49.8
52.6	10:54:45	52.6	52.6	53.4	11:01:45	53.4	53.4
52.1	10:54:48	52.1	52.1	53.1	11:01:48	53.1	53.1
55.8	10:54:51	55.8	55.8	53.3	11:01:51	53.3	53.3
56.3	10:54:54	56.3	56.3	54.6	11:01:54	54.6	54.6
56.6	10:54:57	56.6	56.6	55.1	11:01:57	55.1	55.1
50.2	10:55:00	50.2	50.2	54	11:02:00	54	54
51.9	10:55:03	51.9	51.9	50.9	11:02:03	50.9	50.9
53.5	10:55:06	53.5	53.5	50	11:02:06	50	50
55.7	10:55:09	55.7	55.7	47	11:02:09	47	47
56.5	10:55:12	56.5	56.5	46.5	11:02:12	46.5	46.5
58.5	10:55:15	58.5	58.5	47.3	11:02:15	47.3	47.3
58.1	10:55:18	58.1	58.1	49.1	11:02:18	49.1	49.1
54.4	10:55:21	54.4	54.4	50.2	11:02:21	50.2	50.2
47.8	10:55:24	47.8	47.8	50.4	11:02:24	50.4	50.4
51	10:55:27	51	51	50.1	11:02:27	50.1	50.1
55.7	10:55:30	55.7	55.7	48.8	11:02:30	48.8	48.8
59.7	10:55:33	59.7	59.7	47.9	11:02:33	47.9	47.9
56.4	10:55:36	56.4	56.4	48.7	11:02:36	48.7	48.7
55.6	10:55:39	55.6	55.6	51	11:02:39	51	51
48.4	10:55:42	48.4	48.4	50.7	11:02:42	50.7	50.7
45.5	10:55:45	45.5	45.5	48.4	11:02:45	48.4	48.4
46.1	10:55:48	46.1	46.1	47.3	11:02:48	47.3	47.3
45.8	10:55:51	45.8	45.8	47.1	11:02:51	47.1	47.1
47.3	10:55:54	47.3	47.3	47.6	11:02:54	47.6	47.6
53.2	10:55:57	53.2	53.2	45.6	11:02:57	45.6	45.6
56.7	10:56:00	56.7	56.7	45	11:03:00	45	45
54	10:56:03	54	54	44.9	11:03:03	44.9	44.9
55.1	10:56:06	55.1	55.1	47.4	11:03:06	47.4	47.4
57.7	10:56:09	57.7	57.7	52.4	11:03:09	52.4	52.4
58.1	10:56:12	58.1	58.1	50.8	11:03:12	50.8	50.8
51	10:56:15	51	51	50.2	11:03:15	50.2	50.2
45.2	10:56:18	45.2	45.2	47.7	11:03:18	47.7	47.7
43.6	10:56:21	43.6	43.6	49.4	11:03:21	49.4	49.4
46.5	10:56:24	46.5	46.5	49.5	11:03:24	49.5	49.5
50.3	10:56:27	50.3	50.3	47.9	11:03:27	47.9	47.9
51.5	10:56:30	51.5	51.5	46.8	11:03:30	46.8	46.8
55	10:56:33	55	55	47.1	11:03:33	47.1	47.1
59.9	10:56:36	59.9	59.9	48.2	11:03:36	48.2	48.2
56.8	10:56:39	56.8	56.8	48.3	11:03:39	48.3	48.3
54.1	10:56:42	54.1	54.1	50.5	11:03:42	50.5	50.5
50.1	10:56:45	50.1	50.1	52.4	11:03:45	52.4	52.4
51.2	10:56:48	51.2	51.2	50.7	11:03:48	50.7	50.7
45.7	10:56:51	45.7	45.7	50.9	11:03:51	50.9	50.9
44.5	10:56:54	44.5	44.5	50.8	11:03:54	50.8	50.8
42.9	10:56:57	42.9	42.9	48.7	11:03:57	48.7	48.7
46	10:57:00	46	46	47.9	11:04:00	47.9	47.9
55.5	10:57:03	55.5	55.5	48.6	11:04:03	48.6	48.6
52	10:57:06	52	52	47.1	11:04:06	47.1	47.1
54	10:57:09	54	54	51.8	11:04:09	51.8	51.8
57	10:57:12	57	57	50.3	11:04:12	50.3	50.3
60	10:57:15	60	60	51.5	11:04:15	51.5	51.5
58.2	10:57:18	58.2	58.2	52.6	11:04:18	52.6	52.6
58.1	10:57:21	58.1	58.1	52.9	11:04:21	52.9	52.9
57.9	10:57:24	57.9	57.9	52.7	11:04:24	52.7	52.7
57.2	10:57:27	57.2	57.2	53	11:04:27	53	53
51.6	10:57:30	51.6	51.6	51.2	11:04:30	51.2	51.2
45.8	10:57:33	45.8	45.8	49.4	11:04:33	49.4	49.4
42.7	10:57:36	42.7	42.7	48.6	11:04:36	48.6	48.6
50.7	10:57:39	50.7	50.7	49.2	11:04:39	49.2	49.2
59.5	10:57:42	59.5	59.5	50.2	11:04:42	50.2	50.2
51.4	10:57:45	51.4	51.4	48.3	11:04:45	48.3	48.3
48.1	10:57:48	48.1	48.1	47.2	11:04:48	47.2	47.2
55.2	10:57:51	55.2	55.2	46.5	11:04:51	46.5	46.5

Site A - East Corner				Site B - Northwest Side			
SPL	Time	Leq (1 hour Avg.)	Ldn CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn CNEL
57.4	10:37:54		57.4	48	11:04:54		48
57.9	10:37:57		57.9	50.9	11:04:57		50.9
57	10:58:00		57	49.7	11:05:00		49.7
53.1	10:58:03		53.1	51	11:05:03		51
67	10:58:06		67	54.5	11:05:06		54.5
74.5	10:58:09		74.5	53.8	11:05:09		53.8
67.6	10:58:12		67.6	52.8	11:05:12		52.8
56.9	10:58:15		56.9	53.3	11:05:15		53.3
57.5	10:58:18		57.5	49.7	11:05:18		49.7
55.5	10:58:21		55.5	48.3	11:05:21		48.3
52.7	10:58:24		52.7	51.5	11:05:24		51.5
57.1	10:58:27		57.1	51.8	11:05:27		51.8
51.8	10:58:30		51.8	53.2	11:05:30		53.2
55.7	10:58:33		55.7	53.2	11:05:33		53.2
57.7	10:58:36		57.7	52.5	11:05:36		52.5
55.4	10:58:39		55.4	50.6	11:05:39		50.6
57.8	10:58:42		57.8	52.5	11:05:42		52.5
51.4	10:58:45		51.4	50.1	11:05:45		50.1
51	10:58:48		51	49.5	11:05:48		49.5
57.7	10:58:51		57.7	49.8	11:05:51		49.8
53.8	10:58:54		53.8	48	11:05:54		48
49.6	10:58:57		49.6	47.1	11:05:57		47.1
50.9	10:59:00		50.9	46.9	11:06:00		46.9
52.4	10:59:03		52.4	47.2	11:06:03		47.2
54.2	10:59:06		54.2	45.5	11:06:06		45.5
56.9	10:59:09		56.9	45.7	11:06:09		45.7
55.5	10:59:12		55.5	46.9	11:06:12		46.9
54.6	10:59:15		54.6	46.2	11:06:15		46.2
55.7	10:59:18		55.7	47.4	11:06:18		47.4
56.6	10:59:21		56.6	48.5	11:06:21		48.5
56.3	10:59:24		56.3	51.9	11:06:24		51.9
56.8	10:59:27		56.8	51.9	11:06:27		51.9
51.7	10:59:30		51.7	51.2	11:06:30		51.2
45.6	10:59:33		45.6	52.8	11:06:33		52.8
45.1	10:59:36		45.1	56.3	11:06:36		56.3
46.1	10:59:39		46.1	51.5	11:06:39		51.5
46.3	10:59:42		46.3	53	11:06:42		53
46.4	10:59:45		46.4	56	11:06:45		56
51.1	10:59:48		51.1	56.6	11:06:48		56.6
48.1	10:59:51		48.1	60.5	11:06:51		60.5
50.4	10:59:54		50.4	62.6	11:06:54		62.6
50.8	10:59:57		50.8	56.2	11:06:57		56.2
54.6	11:00:00		54.6	51	11:07:00		51
55.9	11:00:03		55.9	50.1	11:07:03		50.1
54	11:00:06		54	50.8	11:07:06		50.8
57.4	11:00:09		57.4	52.2	11:07:09		52.2
61.4	11:00:12		61.4	53.3	11:07:12		53.3
64.7	11:00:15		64.7	47.5	11:07:15		47.5
64.6	11:00:18		64.6	49	11:07:18		49
58.7	11:00:21		58.7	52.1	11:07:21		52.1
57.5	11:00:24		57.5	51.3	11:07:24		51.3
55.7	11:00:27		55.7	49.4	11:07:27		49.4
54.6	11:00:30		54.6	48.6	11:07:30		48.6
49.5	11:00:33		49.5	51	11:07:33		51
46.9	11:00:36		46.9	53	11:07:36		53
52.7	11:00:39		52.7	51.6	11:07:39		51.6
51.5	11:00:42		51.5	49.1	11:07:42		49.1
56.6	11:00:45		56.6	46.7	11:07:45		46.7
57.4	11:00:48		57.4	46.2	11:07:48		46.2
53.3	11:00:51		53.3	51.4	11:07:51		51.4
49.6	11:00:54		49.6	52	11:07:54		52
52	11:00:57		52	48.1	11:07:57		48.1
51.8	11:01:00		51.8	46.3	11:08:00		46.3
44.5	11:01:03		44.5	47	11:08:03		47
49.5	11:01:06		49.5	48.8	11:08:06		48.8
57.8	11:01:09		57.8	56.5	11:08:09		56.5
50.7	11:01:12		50.7	54.8	11:08:12		54.8
48.7	11:01:15		48.7	54.5	11:08:15		54.5
45.2	11:01:18		45.2	51.8	11:08:18		51.8
49.6	11:01:21		49.6	51.3	11:08:21		51.3
55.1	11:01:24		55.1	51.5	11:08:24		51.5
60.7	11:01:27		60.7	45.3	11:08:27		45.3
52.3	11:01:30		52.3	44.4	11:08:30		44.4
54.1	11:01:33		54.1	45.2	11:08:33		45.2
50.4	11:01:36		50.4	46.5	11:08:36		46.5
57	11:01:39		57	54.2	11:08:39		54.2
58	11:01:42		58	55	11:08:42		55
55.9	11:01:45		55.9	52.5	11:08:45		52.5
50.9	11:01:48		50.9	50	11:08:48		50
50.7	11:01:51		50.7	52.8	11:08:51		52.8
51.9	11:01:54		51.9	48.7	11:08:54		48.7
47.5	11:01:57		47.5	47.2	11:08:57		47.2
46.7	11:02:00		46.7	49.2	11:09:00		49.2
49.8	11:02:03		49.8	48.7	11:09:03		48.7
48.6	11:02:06		48.6	51.3	11:09:06		51.3
53.6	11:02:09		53.6	50.7	11:09:09		50.7
53.9	11:02:12		53.9	47.5	11:09:12		47.5
52.1	11:02:15		52.1	49.2	11:09:15		49.2
44.2	11:02:18		44.2	51.8	11:09:18		51.8
49.6	11:02:21		49.6	52.8	11:09:21		52.8
53.2	11:02:24		53.2	54.1	11:09:24		54.1
49.4	11:02:27		49.4	52.5	11:09:27		52.5
52	11:02:30		52	54.5	11:09:30		54.5
55.6	11:02:33		55.6	52	11:09:33		52
50.8	11:02:36		50.8	48.7	11:09:36		48.7
45.3	11:02:39		45.3	45.6	11:09:39		45.6
48.2	11:02:42		48.2	44.6	11:09:42		44.6
52.9	11:02:45		52.9	46.9	11:09:45		46.9
48.5	11:02:48		48.5	50.5	11:09:48		50.5
44.6	11:02:51		44.6	51.3	11:09:51		51.3
47.9	11:02:54		47.9	53	11:09:54		53
53.5	11:02:57		53.5	49.7	11:09:57		49.7
50.2	11:03:00		50.2	50.6	11:10:00		50.6
53	11:03:03		53	52.3	11:10:03		52.3
48.5	11:03:06		48.5	51.4	11:10:06		51.4
49.5	11:03:09		49.5	50.9	11:10:09		50.9
54.1	11:03:12		54.1	51.1	11:10:12		51.1
53.2	11:03:15		53.2	68.7	11:10:15		68.7
47.8	11:03:18		47.8	54.2	11:10:18		54.2
50.2	11:03:21		50.2	49.8	11:10:21		49.8
51.2	11:03:24		51.2	47.4	11:10:24		47.4
54.8	11:03:27		54.8	47.4	11:10:27		47.4
54	11:03:30		54	49.3	11:10:30		49.3
47.6	11:03:33		47.6	50.7	11:10:33		50.7
52.6	11:03:36		52.6	51.6	11:10:36		51.6
55.1	11:03:39		55.1	52.4	11:10:39		52.4
51.2	11:03:42		51.2	53.4	11:10:42		53.4
58	11:03:45		58	50.5	11:10:45		50.5
51.5	11:03:48		51.5	50.8	11:10:48		50.8
45.1	11:03:51		45.1	53	11:10:51		53
48.6	11:03:54		48.6	49.3	11:10:54		49.3
60.3	11:03:57		60.3	47.9	11:10:57		47.9
58.6	11:04:00		58.6	50.5	11:11:00		50.5
56.8	11:04:03		56.8	53	11:11:03		53
56.1	11:04:06		56.1	53.4	11:11:06		53.4
58.4	11:04:09		58.4	52.2	11:11:09		52.2
59.1	11:04:12		59.1	50.2	11:11:12		50.2
55.8	11:04:15		55.8	47.6	11:11:15		47.6
56.9	11:04:18		56.9	45.0	11:11:18		45.0
59.5	11:04:21		59.5	47.8	11:11:21		47.8
54.4	11:04:24		54.4	52.7	11:11:24		52.7
53.3	11:04:27		53.3	52.7	11:11:27		52.7
49.5	11:04:30		49.5	50.1	11:11:30		50.1
50.9	11:04:33		50.9	52.6	11:11:33		52.6
52.6	11:04:36		52.6	50	11:11:36		50
54.2	11:04:39		54.2	50.1	11:11:39		50.1
53.2	11:04:42		53.2	53.2	11:11:42		53.2
45.9	11:04:45		45.9	53.8	11:11:45		53.8
56.5	11:04:48		56.5	55	11:11:48		55
51.1	11:04:51		51.1	58	11:11:51		58
54.9	11:04:54		54.9	59.5	11:11:54		59.5
61	11:04:57		61	59.5	11:11:57		59.5
61.4	11:05:00		61.4	55.8	11:12:00		55.8
53.6	11:05:03		53.6	56	11:12:03		56
56.4	11:05:06		56.4	58.1	11:12:06		58.1
51.8	11:05:09		51.8	58.5	11:12:09		58.5
51.5	11:05:12		51.5	59.7	11:12:12		59.7
57	11:05:15		57	55.7	11:12:15		55.7
59	11:05:18		59	57.9	11:12:18		57.9
50.2	11:05:21		50.2	56.7	11:12:21		56.7
50.9	11:05:24		50.9	54.1	11:12:24		54.1
53.8	11:05:27		53.8	50.6	11:12:27		50.6
49.4	11:05:30		49.4	48.5	11:12:30		48.5
54.3	11:05:33		54.3	49.9	11:12:33		49.9
52.1	11:05:36		52.1	49.9	11:12:36		49.9
47.5	11:05:39		47.5	51.9	11:12:39		51.9

Site A - East Corner				Site B - Northwest Side			
SPL	Time	Leq (1 hour Avg.)	Ldn CNEL	SPL	Time	Leq (1 hour Avg.)	Ldn CNEL
44.9	11:05:45		44.9	44.9	11:12:45		55.1
45	11:05:48		45	45	11:12:48		55.1
47.6	11:05:51		47.6	47.6	11:12:51		47.7
44	11:05:54		44	44	11:12:54		46.9
45	11:05:57		45	45	11:12:57		46.9
51.7	11:06:00		51.7	51.7	11:13:00		46.3
49.1	11:06:03		49.1	49.1	11:13:03		48
48.6	11:06:06		48.6	48.6	11:13:06		49.8
48.8	11:06:09		48.8	48.8	11:13:09		48.4
52.7	11:06:12		52.7	52.7	11:13:12		46.1
55.4	11:06:15		55.4	55.4	11:13:15		47.1
57.5	11:06:18		57.5	57.5	11:13:18		50.5
53.1	11:06:21		53.1	53.1	11:13:21		53.2
51.3	11:06:24		51.3	51.3	11:13:24		54.3
55.8	11:06:27		55.8	55.8	11:13:27		53.9
57.8	11:06:30		57.8	57.8	11:13:30		48.8
59	11:06:33		59	59	11:13:33		47.5
64.6	11:06:36		64.6	64.6	11:13:36		50.8
66.2	11:06:39		66.2	66.2	11:13:39		52.7
59.6	11:06:42		59.6	59.6	11:13:42		52.6
56.9	11:06:45		56.9	56.9	11:13:45		53.1
57.3	11:06:48		57.3	57.3	11:13:48		51.9
54.9	11:06:51		54.9	54.9	11:13:51		51.1
55.7	11:06:54		55.7	55.7	11:13:54		49.6
58.3	11:06:57		58.3	58.3	11:13:57		48
55.2	11:07:00	56.9	55.2	55.2	11:14:00	56.4	51.4
47.8	11:07:03	56.9	47.8	47.8	11:14:03	56.4	52.8
53.6	11:07:06	56.9	53.6	53.6	11:14:06	56.4	54
54.7	11:07:09	56.9	54.7	54.7	11:14:09	56.4	55.2
56.7	11:07:12	56.9	56.7	56.7	11:14:12	56.3	56
51.1	11:07:15	56.9	51.1	51.1	11:14:15	56.3	52.8
56.1	11:07:18	56.9	56.1	56.1	11:14:18	56.4	49.2
51.8	11:07:21	56.9	51.8	51.8	11:14:21	56.3	50.2
54.1	11:07:24	56.9	54.1	54.1	11:14:24	56.4	50.7
59.2	11:07:27	56.9	59.2	59.2	11:14:27	56.3	51.4
56.5	11:07:30	56.9	56.5	56.5	11:14:30	56.3	55.4
54.6	11:07:33	56.8	54.6	54.6	11:14:33	56.3	56.1
46	11:07:36	56.8	46	46	11:14:36	56.3	56.1
45.7	11:07:39	56.8	45.7	45.7	11:14:39	56	56
54.9	11:07:42	56.8	54.9	54.9	11:14:42	56.3	56.2
57.5	11:07:45	56.8	57.5	57.5	11:14:45	56.3	56.6
51.7	11:07:48	56.7	51.7	51.7	11:14:48	56.2	56.5
50.6	11:07:51	56.7	50.6	50.6	11:14:51	56.2	52.4
54.1	11:07:54	56.7	54.1	54.1	11:14:54	56.2	53.4
57	11:07:57	56.7	57	57	11:14:57	56.2	53.4
57.2	11:08:00	56.7	57.2	57.2	11:15:00	56.2	53.8
54.9	11:08:03	56.7	54.9	54.9	11:15:03	56.2	54
59.5	11:08:06	56.7	59.5	59.5	11:15:06	56.2	54
54.7	11:08:09	56.7	54.7	54.7	11:15:09	56.2	54.4
49.2	11:08:12	56.6	49.2	49.2	11:15:12	56.2	53.4
51.5	11:08:15	56.6	51.5	51.5	11:15:15	56.2	52
43.8	11:08:18	56.6	43.8	43.8	11:15:18	56.2	52
45.6	11:08:21	56.6	45.6	45.6	11:15:21	56.2	49
46.4	11:08:24	56.5	46.4	46.4	11:15:24	56.2	47.5
50.6	11:08:27	56.5	50.6	50.6	11:15:27	56.2	47.5
57.6	11:08:30	56.5	57.6	57.6	11:15:30	56.2	50.4
61.7	11:08:33	56.6	61.7	61.7	11:15:33	56.2	54.1
55.1	11:08:36	56.5	55.1	55.1	11:15:36	56.2	53.8
55.2	11:08:39	56.5	55.2	55.2	11:15:39	56.2	55.4
53.4	11:08:42	56.5	53.4	53.4	11:15:42	56.2	50.8
53.8	11:08:45	56.5	53.8	53.8	11:15:45	56.2	60.4
49.5	11:08:48	56.5	49.5	49.5	11:15:48	56.2	51.7
50.4	11:08:51	56.5	50.4	50.4	11:15:51	56.2	54.1
52.2	11:08:54	56.5	52.2	52.2	11:15:54	56.2	54.4
51.2	11:08:57	56.5	51.2	51.2	11:15:57	56.2	55.2
55	11:09:00	56.5	55	55	11:16:00	56.2	56.1
52	11:09:03	56.5	52	52	11:16:03	56.2	56.9
47.8	11:09:06	56.5	47.8	47.8	11:16:06	56.2	52
51.1	11:09:09	56.5	51.1	51.1	11:16:09	56.2	50
58	11:09:12	56.5	58	58	11:16:12	56.2	51.2
57.8	11:09:15	56.5	57.8	57.8	11:16:15	56.2	50.1
52.9	11:09:18	56.5	52.9	52.9	11:16:18	56.2	54.9
54.4	11:09:21	56.5	54.4	54.4	11:16:21	56.2	56.7
54.9	11:09:24	56.5	54.9	54.9	11:16:24	56.3	59.6
48	11:09:27	56.5	48	48	11:16:27	56.3	61.6
43.4	11:09:30	56.5	43.4	43.4	11:16:30	56.3	57.2
47.3	11:09:33	56.5	47.3	47.3	11:16:33	56.3	55.8
54.3	11:09:36	56.5	54.3	54.3	11:16:36	56.3	53.2
56.8	11:09:39	56.5	56.8	56.8	11:16:39	56.3	51.2
55.8	11:09:42	56.5	55.8	55.8	11:16:42	56.3	50.8
55.3	11:09:45	56.5	55.3	55.3	11:16:45	56.3	50.6
54.5	11:09:48	56.5	54.5	54.5	11:16:48	56.3	46.2
54.5	11:09:51	56.5	54.5	54.5	11:16:51	56.3	45.2
56.3	11:09:54	56.5	56.3	56.3	11:16:54	56.3	47.2
57.8	11:09:57	56.5	57.8	57.8	11:16:57	56.3	52.2
56.2	11:10:00	56.5	56.2	56.2	11:17:00	56.3	54.7
54.1	11:10:03	56.5	54.1	54.1	11:17:03	56.4	54.6
52.3	11:10:06	56.5	52.3	52.3	11:17:06	56.4	54
48.9	11:10:09	56.5	48.9	48.9	11:17:09	56.4	50.2
50.3	11:10:12	56.5	50.3	50.3	11:17:12	56.4	49.5
47.1	11:10:15	56.5	47.1	47.1	11:17:15	56.4	52
50	11:10:18	56.5	50	50	11:17:18	56.4	51.9
57.5	11:10:21	56.5	57.5	57.5	11:17:21	56.4	52.1
57.6	11:10:24	56.5	57.6	57.6	11:17:24	56.4	52.8
58.9	11:10:27	56.5	58.9	58.9	11:17:27	56.4	51.9
56.2	11:10:30	56.5	56.2	56.2	11:17:30	56.4	53.7
56.6	11:10:33	56.5	56.6	56.6	11:17:33	56.4	54.1
55.5	11:10:36	56.5	55.5	55.5	11:17:36	56.4	55.1
49.2	11:10:39	56.5	49.2	49.2	11:17:39	56.4	59.7
48.7	11:10:42	56.5	48.7	48.7	11:17:42	56.4	53.4
53.2	11:10:45	56.5	53.2	53.2	11:17:45	56.4	58.2
54.3	11:10:48	56.5	54.3	54.3	11:17:48	56.4	53.8
53.7	11:10:51	56.5	53.7	53.7	11:17:51	56.4	51.7
57.8	11:10:54	56.5	57.8	57.8	11:17:54	56.4	51.4
59.5	11:10:57	56.5	59.5	59.5	11:17:57	56.4	51.9
54.9	11:11:00	56.5	54.9	54.9	11:18:00	56.4	53.2
48	11:11:03	56.5	48	48	11:18:03	56.4	51.8
42.1	11:11:06	56.4	42.1	42.1	11:18:06	56.4	48.5
42.4	11:11:09	56.4	42.4	42.4	11:18:09	56.4	49.1
48.1	11:11:12	56.4	48.1	48.1	11:18:12	56.4	50.5
57.2	11:11:15	56.4	57.2	57.2	11:18:15	56.5	50.3
56.6	11:11:18	56.4	56.6	56.6	11:18:18	56.5	51.3
54.6	11:11:21	56.4	54.6	54.6	11:18:21	56.5	49.2
54.6	11:11:24	56.4	54.6	54.6	11:18:24	56.5	47.3
56.7	11:11:27	56.4	56.7	56.7	11:18:27	56.5	47.9
59.1	11:11:30	56.4	59.1	59.1	11:18:30	56.5	46.2
58.8	11:11:33	56.4	58.8	58.8	11:18:33	56.5	44.2
60.4	11:11:36	56.5	60.4	60.4	11:18:36	56.5	44.2
61.7	11:11:39	56.5	61.7	61.7	11:18:39	56.5	45.8
60.9	11:11:42	56.5	60.9	60.9	11:18:42	56.5	48.3
61.6	11:11:45	56.5	61.6	61.6	11:18:45	56.5	51.2
60	11:11:48	56.5	60	60	11:18:48	56.5	51.1
56.8	11:11:51	56.5	56.8	56.8	11:18:51	56.5	52.1
56	11:11:54	56.5	56	56	11:18:54	56.5	52.2
57.6	11:11:57	56.5	57.6	57.6	11:18:57	56.5	50.8
56.9	11:12:00	56.5	56.9	56.9	11:19:00	56.5	52.2
58.9	11:12:03	56.5	58.9	58.9	11:19:03	56.5	51.8
63.6	11:12:06	56.5	63.6	63.6	11:19:06	56.5	51.7
57.7	11:12:09	56.5	57.7	57.7	11:19:09	56.5	52.1
52.4	11:12:12	56.5	52.4	52.4	11:19:12	56.5	52.3
54.1	11:12:15	56.5	54.1	54.1	11:19:15	56.5	49.3
49	11:12:18	56.5	49	49	11:19:18	56.5	47.1
46.2	11:12:21	56.5	46.2	46.2	11:19:21	56.5	47
45.4	11:12:24	56.5	45.4	45.4	11:19:24	56.5	49.7
50.9	11:12:27	56.5	50.9	50.9	11:19:27	56.5	48.1
57.9	11:12:30	56.5	57.9	57.9	11:19:30	56.5	52.4
54	11:12:33	56.6	54	54	11:19:33	56.5	52.5
62.1	11:12:36	56.6	62.1	62.1	11:19:36	56.5	53.8
51.9	11:12:39	56.6	51.9	51.9	11:19:39	56.5	53.6
47.3	11:12:42	56.6	47.3	47.3	11:19:42	56.5	53.8
48.4	11:12:45	56.6	48.4	48.4	11:19:45	56.5	56.9
50.5	11:12:48	56.6	50.5	50.5	11:19:48	56.5	51.1
51.2	11:12:51	56.5	51.2	51.2	11:19:51	56.5	47.2
45.8	11:12:54	56.5	45.8	45.8	11:19:54	56.5	49.2
43.8	11:12:57	56.5	43.8	43.8	11:19:57	56.5	47.7
45	11:13:00	56.5	45	45	11:20:00	56.5	44.5
47.9	11:13:03	56.5	47.9	47.9	11:20:03	56.5	44.4
52.4	11:13:06	56.5	52.4	52.4	11:20:06	56.5	44.7
52	11:13:09	56.5					

APPENDIX C

RCNM Model Construction Noise Calculations

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 5/29/2017
 Case Description: Lakeview Manor - Grading Mitigated

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home & Pr	Residential	57.1	57.1	57.1

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	150	7
Grader	No	40	85		200	7
Dozer	No	40		81.7	250	7
Tractor	No	40	84		300	7
Tractor	No	40	84		350	7
Tractor	No	40	84		400	7

Equipment	Results						
	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day Lmax	Leq	Evening		Leq
Excavator	64.2	60.2	N/A	N/A	N/A	N/A	N/A
Grader	66.0	62.0	N/A	N/A	N/A	N/A	N/A
Dozer	60.7	56.7	N/A	N/A	N/A	N/A	N/A
Tractor	61.4	57.5	N/A	N/A	N/A	N/A	N/A
Tractor	60.1	56.1	N/A	N/A	N/A	N/A	N/A
Tractor	58.9	55.0	N/A	N/A	N/A	N/A	N/A
Total	66	66	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to SE Residential		57	57	57.1

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	200	7
Grader	No	40	85		250	7
Dozer	No	40		81.7	300	7
Tractor	No	40	84		350	7
Tractor	No	40	84		400	7
Tractor	No	40	84		450	7

Equipment	Results				Noise Limits (dBA)		
	Calculated (dBA)		Day		Evening		
	*Lmax	Leq	Lmax	Leq	Lmax	Leq	
Excavator	62	58	N/A	N/A	N/A	N/A	N/A
Grader	64	60	N/A	N/A	N/A	N/A	N/A
Dozer	59	55	N/A	N/A	N/A	N/A	N/A
Tractor	60.1	56.1	N/A	N/A	N/A	N/A	N/A
Tractor	58.9	55.0	N/A	N/A	N/A	N/A	N/A
Tractor	57.9	53.9	N/A	N/A	N/A	N/A	N/A
Total	64	65	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S	Residential	57	57	57.1

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	150	7
Grader	No	40	85		200	7
Dozer	No	40		81.7	250	7
Tractor	No	40	84		300	7
Tractor	No	40	84		350	7
Tractor	No	40	84		400	7

Equipment	Calculated (dBA)			Results			
	*Lmax	Leq	Day Lmax	Noise Limits (dBA)			
				Leq	Lmax	Leq	
Excavator	64	60	N/A	N/A	N/A	N/A	
Grader	66	62	N/A	N/A	N/A	N/A	
Dozer	61	57	N/A	N/A	N/A	N/A	
Tractor	61	58	N/A	N/A	N/A	N/A	
Tractor	60	56	N/A	N/A	N/A	N/A	
Tractor	58.9	55.0	N/A	N/A	N/A	N/A	
Total	66	66	N/A	N/A	N/A	N/A	

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 5/30/2017
 Case Description: Lakeview Manor - Construction

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home & P	Residential	57.1	57.1	57.1

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)	Estimated Shielding (dBA)
			Spec Lmax (dBA)	Actual Lmax (dBA)		
Crane	No	16		80.6	60	7
Gradall	No	40		83.4	110	7
Gradall	No	40		83.4	160	7
Gradall	No	40		83.4	210	7
Generator	No	50		80.6	260	7
Welder / Torch	No	40		74	310	7
Tractor	No	40	84		360	7
Tractor	No	40	84		410	7
Tractor	No	40	84		460	7

Equipment	Results				Noise Limits (dBA)	
	Calculated (dBA)		Day		Evening	
	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	72.0	64.0	N/A	N/A	N/A	N/A
Gradall	69.6	65.6	N/A	N/A	N/A	N/A
Gradall	66.3	62.3	N/A	N/A	N/A	N/A
Gradall	63.9	60.0	N/A	N/A	N/A	N/A
Generator	59.3	56.3	N/A	N/A	N/A	N/A
Welder / Torch	51.2	47.2	N/A	N/A	N/A	N/A
Tractor	59.9	55.9	N/A	N/A	N/A	N/A
Tractor	58.7	54.7	N/A	N/A	N/A	N/A
Tractor	57.7	53.7	N/A	N/A	N/A	N/A
Total	72	70	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S Residential		57.1	57.1	57.1

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)	Estimated Shielding (dBA)
			Spec Lmax (dBA)	Actual Lmax (dBA)		
Crane	No	16		80.6	70	7
Gradall	No	40		83.4	120	7
Gradall	No	40		83.4	170	7
Gradall	No	40		83.4	220	7
Generator	No	50		80.6	270	7
Welder / Torch	No	40		74	320	7
Tractor	No	40	84		370	7
Tractor	No	40	84		420	7
Tractor	No	40	84		470	7

Results

Equipment	Calculated (dBA)		Noise Limits (dBA)			
	*Lmax	Leq	Day		Evening	
			Lmax	Leq	Lmax	Leq
Crane	70.6	62.7	N/A	N/A	N/A	N/A
Gradall	68.8	64.8	N/A	N/A	N/A	N/A
Gradall	65.8	61.8	N/A	N/A	N/A	N/A
Gradall	63.5	59.6	N/A	N/A	N/A	N/A
Generator	59.0	56.0	N/A	N/A	N/A	N/A
Welder / Torch	50.9	46.9	N/A	N/A	N/A	N/A
Tractor	59.6	55.6	N/A	N/A	N/A	N/A
Tractor	58.5	54.5	N/A	N/A	N/A	N/A
Tractor	57.5	53.6	N/A	N/A	N/A	N/A
Total	71	69	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S Residential		57	57	57.1

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)	Estimated Shielding (dBA)
			Spec Lmax (dBA)	Actual Lmax (dBA)		
Crane	No	16		80.6	30	7
Gradall	No	40		83.4	80	7
Gradall	No	40		83.4	130	7
Gradall	No	40		83.4	180	7
Generator	No	50		80.6	230	7
Welder / Torch	No	40		74	280	7
Tractor	No	40	84		330	7
Tractor	No	40	84		380	7
Tractor	No	40	84		430	7

Equipment	Calculated (dBA)		Results			
	*Lmax	Leq	Day		Noise Limits (dBA)	
			Lmax	Leq	Evening	Leq
Crane	78.0	70.0	N/A	N/A	N/A	N/A
Gradall	72.3	68.3	N/A	N/A	N/A	N/A
Gradall	68.1	64.1	N/A	N/A	N/A	N/A
Gradall	65.3	61.3	N/A	N/A	N/A	N/A
Generator	60.4	57.4	N/A	N/A	N/A	N/A
Welder / Torch	52.0	48.1	N/A	N/A	N/A	N/A
Tractor	60.6	56.6	N/A	N/A	N/A	N/A
Tractor	59.4	55.4	N/A	N/A	N/A	N/A
Tractor	58.3	54.3	N/A	N/A	N/A	N/A
Total	78	74	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 5/30/2017

Case Description: Lakeview Manor - Paving Mitigated

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home & P	Residential	57.1	57.1	57.1

Description	Impact Device	Usage(%)	Equipment		Receptor Distance (feet)	Estimated Shielding (dBA)
			Spec Lmax (dBA)	Actual Lmax (dBA)		
Paver	No	50		77.2	25	7
Paver	No	50		77.2	75	7
Paver	No	50		77.2	125	7
Paver	No	50		77.2	175	7
Roller	No	20		80	225	7
Roller	No	20		80	275	7

Equipment	Results					
	Calculated (dBA)			Noise Limits (dBA)		
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq
Paver	76.2	73.2	N/A	N/A	N/A	N/A
Paver	66.7	63.7	N/A	N/A	N/A	N/A
Paver	62.3	59.3	N/A	N/A	N/A	N/A
Paver	59.3	56.3	N/A	N/A	N/A	N/A
Roller	59.9	52.9	N/A	N/A	N/A	N/A
Roller	58.2	51.2	N/A	N/A	N/A	N/A
Total	76	74	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S Residential		57	57	57.1

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	50	7
Paver	No	50		77.2	100	7
Paver	No	50		77.2	150	7
Paver	No	50		77.2	200	7
Roller	No	20		80	250	7
Roller	No	20		80	300	7

Equipment	Results						
	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	
Paver	70		67	N/A	N/A	N/A	N/A
Paver	64		61	N/A	N/A	N/A	N/A
Paver	61		58	N/A	N/A	N/A	N/A
Paver	58		55	N/A	N/A	N/A	N/A
Roller	59		52	N/A	N/A	N/A	N/A
Roller	57		50	N/A	N/A	N/A	N/A
Total	70		69	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S Residential		57	57	57.1

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	50	7
Paver	No	50		77.2	100	7
Paver	No	50		77.2	150	7
Paver	No	50		77.2	200	7
Roller	No	20		80	250	7
Roller	No	20		80	300	7

Equipment	Results						
	Calculated (dBA)			Noise Limits (dBA)			
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	
Paver	70	67	N/A	N/A	N/A	N/A	
Paver	64	61	N/A	N/A	N/A	N/A	
Paver	61	58	N/A	N/A	N/A	N/A	
Paver	58	55	N/A	N/A	N/A	N/A	
Roller	59	52	N/A	N/A	N/A	N/A	
Roller	57	50	N/A	N/A	N/A	N/A	
Total	70	69	N/A	N/A	N/A	N/A	

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 5/30/2017

Case Description: Lakeview Manor - Painting Mitigated

---- Receptor #1 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home & P	Residential	57.1	57.1	57.1

Description	Impact Device	Usage(%)	Equipment Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Compressor (air)	No	40		77.7	60	7

Equipment	Total	Calculated (dBA)		Results			
		*Lmax	Leq	Day		Noise Limits (dBA)	
				Lmax	Leq	Evening Lmax	Leq
Compressor (air)		69.1	65.1	N/A	N/A	N/A	N/A
	Total	69	65	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S	Residential	57	57	57.1

Description	Impact Device	Usage(%)	Equipment Spec	Actual	Receptor	Estimated
			Lmax (dBA)	Lmax (dBA)	Distance (feet)	Shielding (dBA)
Compressor (air)	No	40		77.7	70	7

Equipment	Total	Calculated (dBA)		Results			
		*Lmax	Leq	Day		Noise Limits (dBA)	
				Lmax	Leq	Evening Lmax	Leq
Compressor (air)		68	64	N/A	N/A	N/A	N/A
	Total	68	64	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Nearest Home to S	Residential	57	57	57.1

Description	Impact Device	Usage(%)	Equipment	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
			Spec Lmax (dBA)			
Compressor (air)	No	40		77.7	30	7

Equipment	Calculated (dBA)	Results					
		Day		Noise Limits (dBA)			
		*Lmax	Leq	Leq	Lmax	Leq	Evening
Compressor (air)	75	71	N/A	N/A	N/A	N/A	N/A
Total	75	71	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

APPENDIX D

FHWA Model Proposed Patio/Balcony Noise Calculations

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Lakeshore Drive West
Building: 1

Project Name: Lakeview Manor
Job Number: 17023

NOISE MODEL INPUTS

Highway Data		Vehicle Mix				
Average Daily Traffic:	32,000 vehicles	Day	Evening	Night	Daily	
Peak Hour Volume:	3,200 vehicles	Autos:	63.8%	13.1%	15.3%	92.1%
Vehicle Speed:	40 mph	Medium Trucks:	3.5%	0.6%	1.8%	6.0%
Near/Far Lane Distance:	78 feet	Heavy Trucks:	1.1%	0.1%	0.8%	1.9%
Site Data		Elevations				
Barrier Height:	0 feet	Barrier Base Elevation:	0.0 feet			
Barrier Type(Wall/Berm):	Wall	Road Elevation:	0.0 feet			
Site Conditions(Hard/Soft):	Soft	Noise Source Elevation above Road				
Centerline (C.L.) Dist. to Barrier:	244 feet	Autos:	0 feet			
C.L. Dist. To Observer (Backyard):	249 feet	Med Trucks:	2.3 feet			
Barrier Dist. To Observer (Backyard):	5 feet	Hvy Trucks:	8 feet			
C.L. Dist. To Observer (Structure):	252 feet	Pad Elevation:	0.0 feet			
Barrier Dist. To Observer (Structure):	8 feet	Observer Heights Above Pad Elevation				
Road Grade:	0.00 %	Exterior:	5 feet			
Left View:	-90 degrees	First Floor:	5.5 feet			
Right View:	90 degrees	Second Floor:	14 feet			

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation		
						Exterior	1st Flr	2nd Flr
Autos:	67.36	3.37	-10.48	-1.20	0.00	0	0	0
Med Trucks:	76.31	-8.52	-10.48	-1.20	0.00	0	0	0
Hvy Trucks:	81.16	-13.41	-10.48	-1.20	0.00	0	0	0

UNMITIGATED NOISE LEVELS (with topographical and existing barrier attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.3	55.4	51.3	58.9	59.4
Med Trucks:	56.1	40.8	39.4	39.1	45.7	46.0
Hvy Trucks:	56.1	35.5	31.4	35.4	41.8	41.9
Traffic Noise:	62.1	56.5	55.6	51.7	59.1	59.6

MITIGATED NOISE LEVELS (Backyard)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.3	55.4	51.3	58.9	59.4
Med Trucks:	56.1	40.8	39.4	39.1	45.7	46.0
Hvy Trucks:	56.1	35.5	31.4	35.4	41.8	41.9
Traffic Noise:	62.1	56.5	55.6	51.7	59.1	59.6

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.2	55.4	51.3	58.8	59.3
Med Trucks:	56.0	40.7	39.3	39.0	45.7	45.9
Hvy Trucks:	56.0	35.5	31.3	35.3	41.7	41.8
Traffic Noise:	62.0	56.4	55.5	51.6	59.1	59.5

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.0	56.2	55.3	51.3	58.8	59.3
Med Trucks:	56.0	40.7	39.3	39.0	45.7	45.9
Hvy Trucks:	56.0	35.4	31.3	35.3	41.7	41.8
Traffic Noise:	62.0	56.4	55.5	51.6	59.1	59.5

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Road Name: Lakeshore Drive East
 Building: 11

Project Name: Lakeview Manor
 Job Number: 17023

NOISE MODEL INPUTS

Highway Data		Vehicle Mix				
Average Daily Traffic:	30,000 vehicles	Day	Evening	Night	Daily	
Peak Hour Volume:	3,000 vehicles	Autos:	63.8%	13.1%	15.3%	92.1%
Vehicle Speed:	40 mph	Medium Trucks:	3.5%	0.6%	1.8%	6.0%
Near/Far Lane Distance:	78 feet	Heavy Trucks:	1.1%	0.1%	0.8%	1.9%
Site Data		Elevations				
Barrier Height:	5 feet	Barrier Base Elevation:	0.0 feet			
Barrier Type(Wall/Berm):	Wall	Road Elevation:	0.0 feet			
Site Conditions(Hard/Soft):	Soft	Noise Source Elevation above Road				
Centerline (C.L.) Dist. to Barrier:	84 feet	Autos:	0 feet			
C.L. Dist. To Observer (Backyard):	89 feet	Med Trucks:	2.3 feet			
Barrier Dist. To Observer (Backyard):	5 feet	Hvy Trucks:	8 feet			
C.L. Dist. To Observer (Structure):	96 feet	Pad Elevation:	0.0 feet			
Barrier Dist. To Observer (Structure):	12 feet	Observer Heights Above Pad Elevation				
Road Grade:	0.00 %	Exterior:	5 feet			
Left View:	-90 degrees	First Floor:	5.5 feet			
Right View:	10 degrees	Second Floor:	14 feet			

FHWA NOISE MODEL CALCULATIONS

	REMEL	Traffic Flow	Distance	Finite Road	Grade	Barrier Attenuation		
						Exterior	1st Flr	2nd Flr
Autos:	67.36	3.09	-3.18	-3.60	0.00	-5.1	-4.9	0
Med Trucks:	76.31	-8.80	-3.18	-3.60	0.00	-4.9	-4.9	0
Hvy Trucks:	81.16	-13.69	-3.18	-3.60	0.00	-4.9	-3.9	0

UNMITIGATED NOISE LEVELS (with topographical and existing barrier attenuation)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	60.9	60.1	56.0	63.5	64.0
Med Trucks:	60.7	45.4	44.0	43.7	50.4	50.6
Hvy Trucks:	60.7	40.2	36.0	40.0	46.4	46.5
Traffic Noise:	66.7	61.1	60.2	56.3	63.8	64.3

MITIGATED NOISE LEVELS (Backyard)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	55.8	55.0	50.9	58.4	58.9
Med Trucks:	55.8	40.5	39.1	38.8	45.5	45.7
Hvy Trucks:	55.8	35.3	31.1	35.1	41.5	41.6
Traffic Noise:	61.7	56.0	55.1	51.2	58.7	59.2

MITIGATED NOISE LEVELS (First Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.2	55.4	54.6	50.5	58.0	58.5
Med Trucks:	55.2	39.9	38.5	38.2	44.9	45.1
Hvy Trucks:	56.2	35.7	31.5	35.5	41.9	42.0
Traffic Noise:	61.5	55.6	54.7	50.9	58.3	58.8

MITIGATED NOISE LEVELS (Second Floor)

	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.0	60.2	59.4	55.3	62.8	63.3
Med Trucks:	60.1	44.8	43.4	43.0	49.7	50.0
Hvy Trucks:	60.0	39.5	35.3	39.4	45.7	45.8
Traffic Noise:	66.0	60.4	59.5	55.6	63.1	63.6

APPENDIX E

FHWA Model Traffic Noise Contour Calculations

FHWA-RD-77-108 HIGHWAY TRAFFIC NOISE PREDICTION MODEL

Scenario: EXISTING + AMBIENT CONDITIONS

Project: Lakeview Manor
Site Conditions: Soft

Vehicle Type	Vehicle Mix 1 (Local)			Vehicle Mix 2 (Arterial)			Vehicle Mix 3 (SR-74)		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Automobiles	73.60%	13.60%	10.22%	69.50%	12.90%	9.60%	63.75%	13.07%	15.28%
Medium Trucks	0.90%	0.90%	0.04%	1.44%	0.06%	1.50%	3.53%	0.64%	1.79%
Heavy Trucks	0.35%	0.04%	0.35%	2.40%	0.10%	2.50%	1.06%	0.10%	0.77%
			0.74%	5.00%					1.94%

Road Name: Lakeshore Drive		Segment: West of Gunnerson Street												
Average Daily Traffic: 18876 Vehicles		Vehicle Speed: 40 MPH					Vehicle Mix: 3					Roadway Classification: Urban Arterial		
		NOISE PARAMETERS AT 65 FEET FROM CENTERLINE (Equiv. Lane Dist: 60 ft)												
Vehicle Type	Noise Adjustments					Unmitigated Noise Levels					Noise Contour (in feet)			
	REME L Traffic Adj.	Dist Adj.	Finite Adj.	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL	Ldn	CNEL	Ldn	CNEL	
Automobiles	67.36	1.08	-1.29	-1.20	65.9	63.2	62.3	58.2	65.8	66.26	70 dBA:	35	38	
Medium Trucks	76.31	-10.81	-1.29	-1.20	63.0	47.7	46.3	46.0	52.6	52.91	65 dBA:	76	82	
Heavy Trucks	81.16	-15.70	-1.29	-1.20	63.0	42.4	38.3	42.3	48.7	48.77	60 dBA:	164	177	
					Total:	69.0	63.4	62.5	58.6	66.0	66.5	55 dBA:	354	381

Road Name: Lakeshore Drive		Segment: East of Gunnerson Street												
Average Daily Traffic: 18389 Vehicles		Vehicle Speed: 40 MPH					Vehicle Mix: 3					Roadway Classification: Urban Arterial		
		NOISE PARAMETERS AT 60 FEET FROM CENTERLINE (Equiv. Lane Dist: 45.6 ft)												
Vehicle Type	Noise Adjustments					Unmitigated Noise Levels					Noise Contour (in feet)			
	REME L Traffic Adj.	Dist Adj.	Finite Adj.	Leq Peak	Leq Day	Leq Eve.	Leq Night	Ldn	CNEL	Ldn	CNEL	Ldn	CNEL	
Automobiles	67.36	0.96	0.50	-1.20	67.6	64.9	64.0	59.9	67.4	67.9	70 dBA:	42	46	
Medium Trucks	76.31	-10.92	0.50	-1.20	64.7	49.4	48.0	47.7	54.3	54.6	65 dBA:	91	98	
Heavy Trucks	81.16	-15.81	0.50	-1.20	64.6	44.1	39.9	44.0	50.3	50.4	60 dBA:	196	211	
					Total:	70.7	65.0	64.1	60.3	67.7	68.2	55 dBA:	423	455

