Appendix G:
Noise and Vibration Analysis

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Mapes & Sherman Commerce Center(DEV2022-003)

NOISE AND VIBRATION ANALYSIS

CITY OF MENIFEE

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Hz	Hertz
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
OPR	Office of Planning and Research
PPV	Peak particle velocity
Project	Mapes & Sherman Commerce Center
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the potential noise impacts and the necessary noise mitigation measures, if any, for the proposed Mapes & Sherman Commerce Center development ("Project"). The proposed Project is to consist of the development of 277,578 square feet of high-cube fulfillment center warehouse use within a single building. This study has been prepared to satisfy applicable City of Menifee standards and thresholds of significance based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines (1).

The results of this Mapes & Sherman Commerce Center Noise and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	*Less Than Significant*	-
Operational Noise	9	*Less Than Significant*	-
Construction Noise	10	*Less Than Significant*	-
Nighttime Concrete Pour Noise		*Less Than Significant*	-
Construction Vibration		*Less Than Significant*	-

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Mapes & Sherman Commerce Center ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for transportation related CNEL traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term stationary-source operational noise and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed project is located on the southwest corner of Sherman Road and Mapes Road in the City of Menifee as shown on Exhibit 1-A.

1.2 PROJECT DESCRIPTION

The Project is proposed to consist of the development of 277,578 square feet of high-cube fulfillment center warehouse use within a single building, as shown on Exhibit 1-B. The on-site Project-related noise sources are expected to include: loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements. This noise analysis is intended to describe noise level impacts associated with the expected typical operational activities at the Project site.

EXHIBIT 1-A: LOCATION MAP

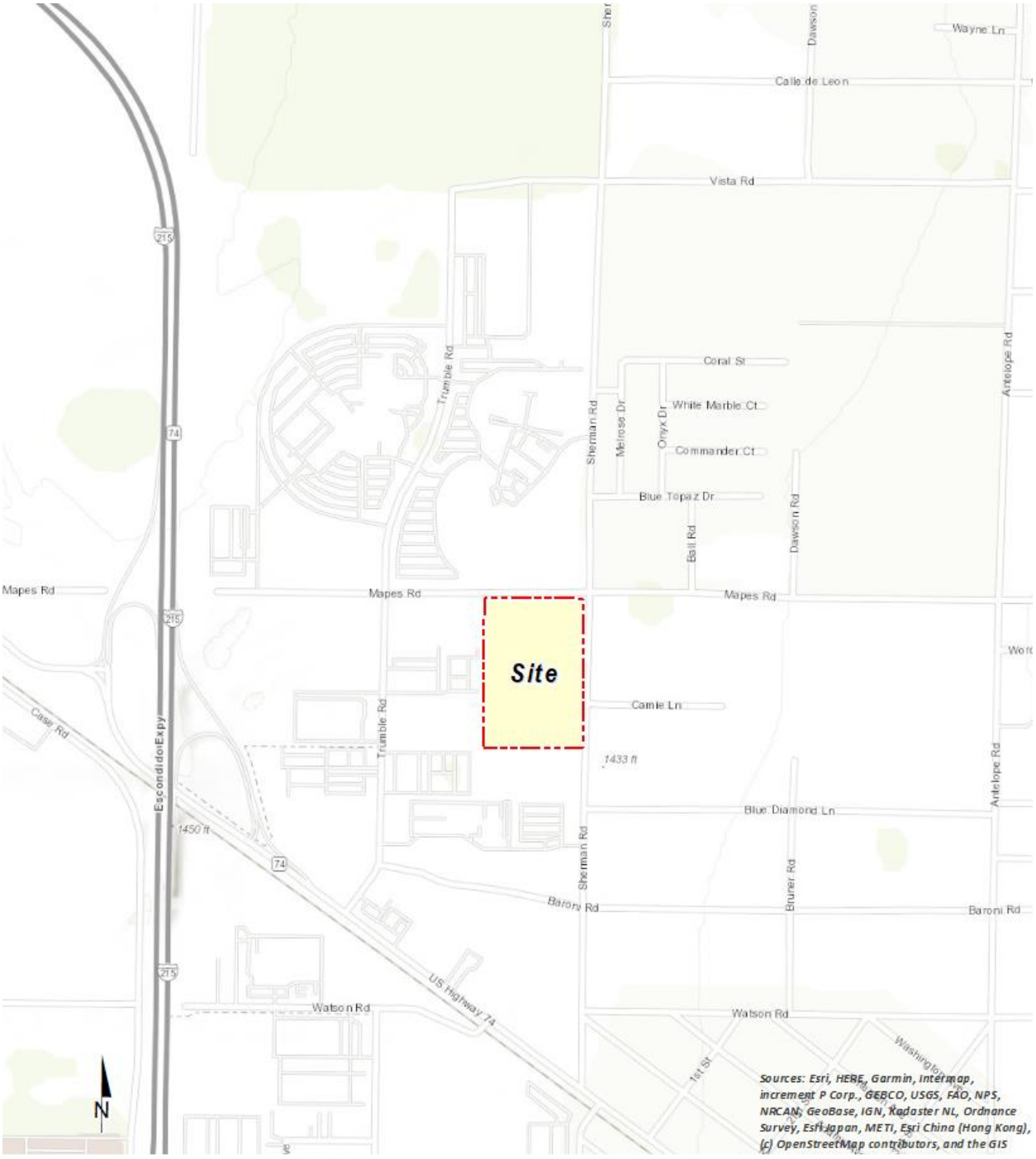
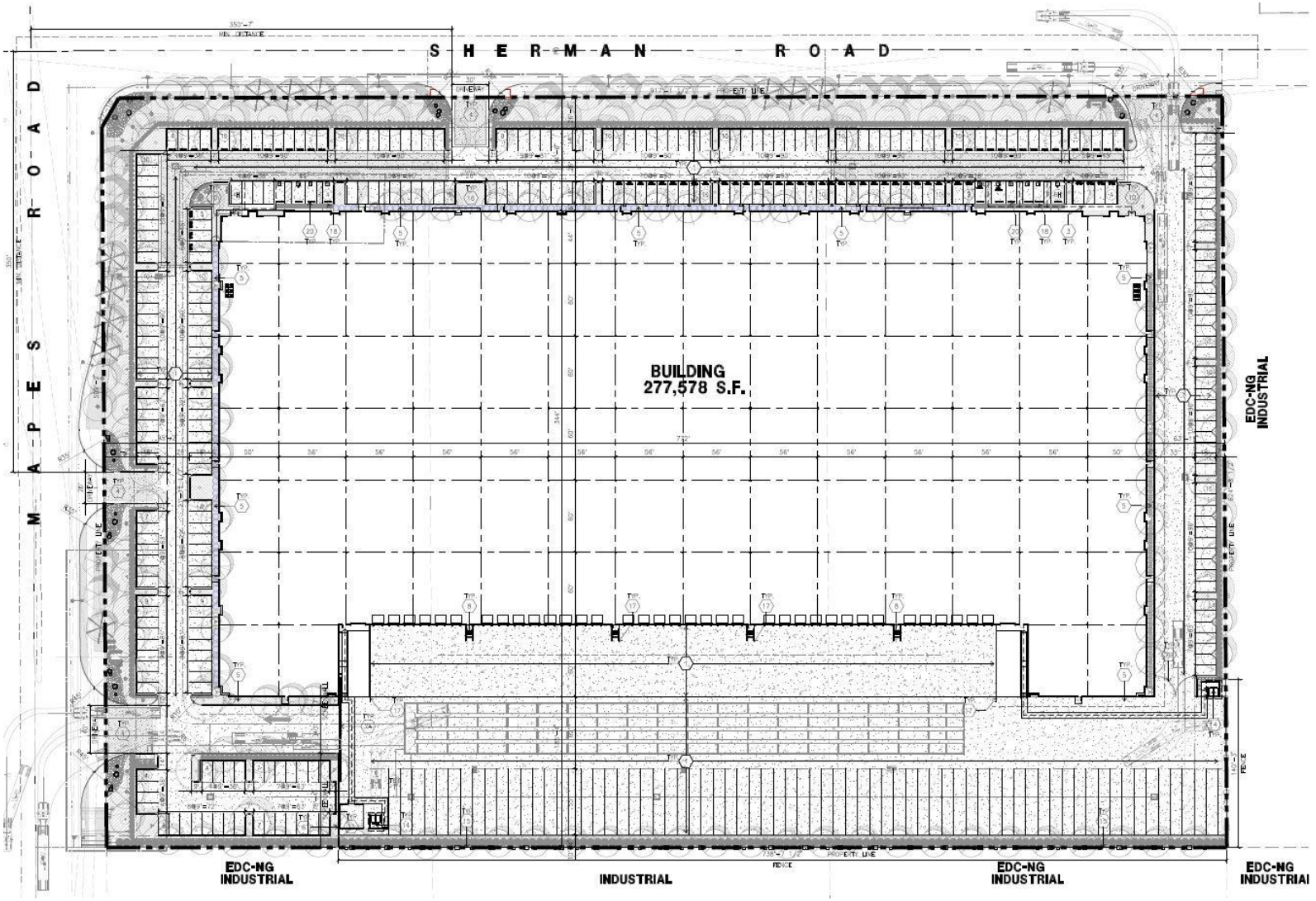


EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise is simply 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. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to 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. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 1,000 feet, which can cause serious discomfort (3). Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used metric is the equivalent level (L_{eq}). 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 (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL 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 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when noise can become more intrusive. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Menifee relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually

sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (2)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an "out of sight, out of mind" effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of-sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (5)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must block the line-of-sight path of sound from the noise source.

2.6 LAND USE COMPATIBILITY WITH NOISE

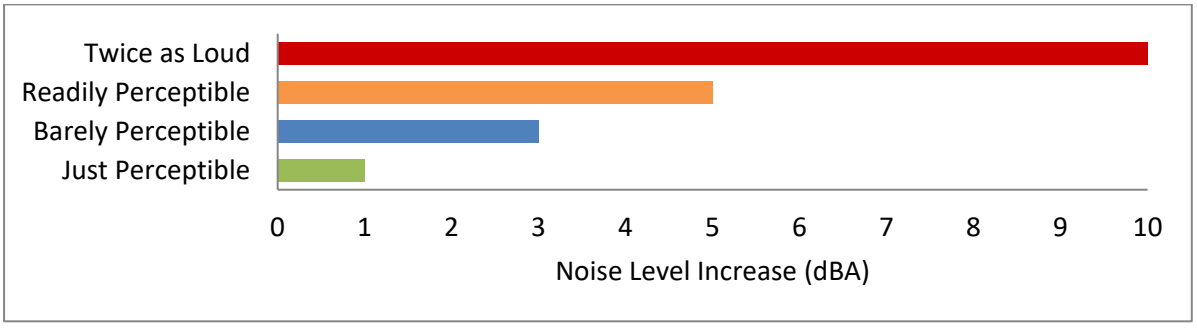
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (6)

2.7 COMMUNITY RESPONSE TO NOISE

Approximately sixteen percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints may occur. Twenty to thirty percent of the population will not complain even in very severe noise environments. (7 pp. 8-6) Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises averaging from 10 dB below existing to 25 dB above existing. (8) According to research originally published in the Noise Effects Handbook (7), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. A change of 3 dBA is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



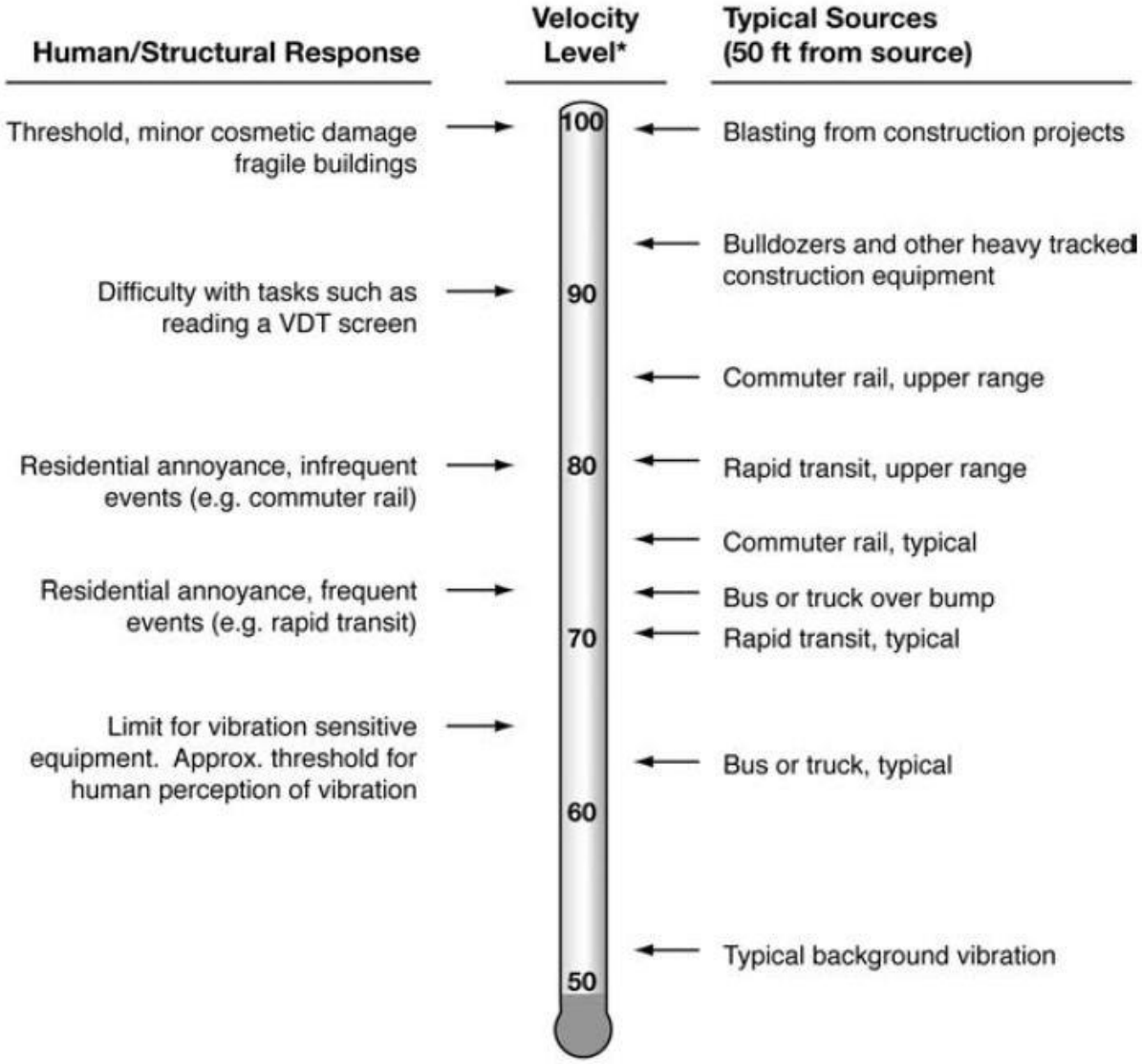
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Impact Assessment Manual* (8) , vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment and/or activities.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual.

3 REGULATORY SETTING

The federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (9) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 CITY OF MENIFEE GENERAL PLAN NOISE ELEMENT

The City of Menifee has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of City of Menifee from excessive exposure to noise (10). The Noise Element specifies the maximum allowable unmitigated exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies several polices to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To protect City of Menifee residents from excessive noise, the Noise Element contains the following goal related to the Project:

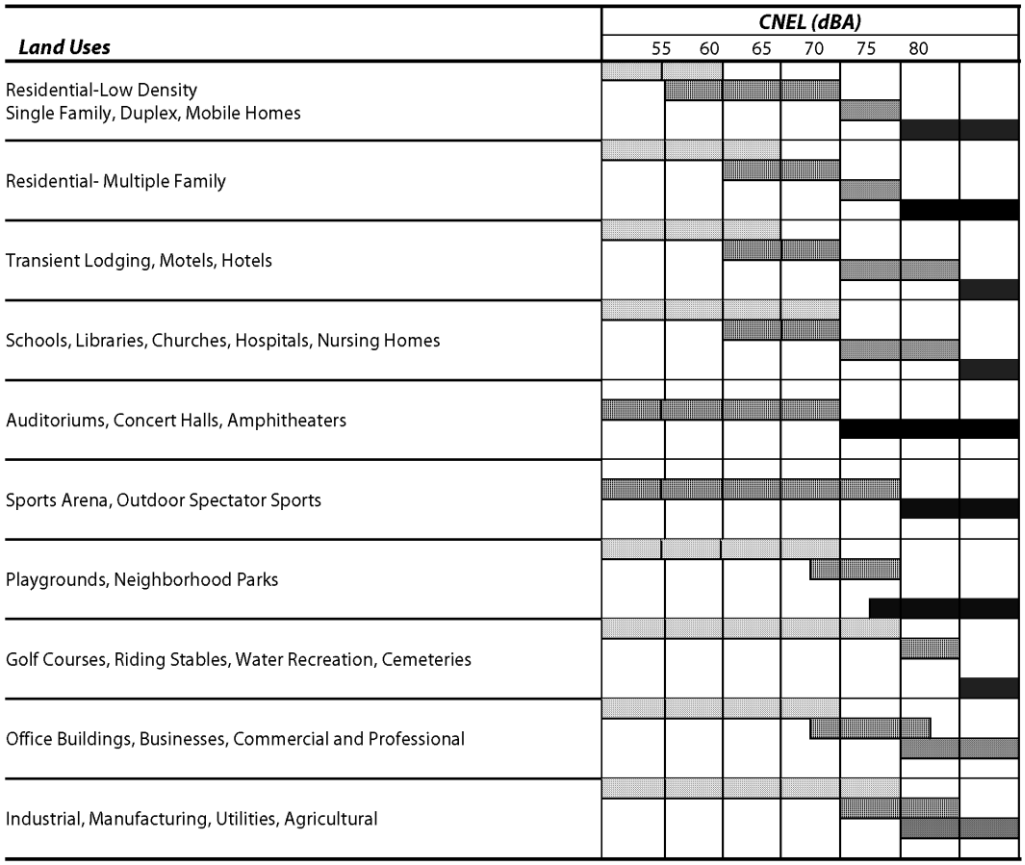
N-1 Noise-sensitive land uses are protected from excessive noise and vibration exposure.

The noise policies specified in the City of Menifee Noise Element provide the guidelines necessary to satisfy this goal. Policy N-1.2 states that new developments are required to *comply with the noise standards of local, regional, and state building code regulations, including but not limited to the city's Municipal Code, Title 24 of the California Code of Regulations, the California Green Building Code, and subdivision and development codes.* In addition, the Noise Element provides Policy N-1.11 to *discourage the siting of noise-sensitive uses in areas in excess of 65 dBA CNEL without appropriate mitigation* (10).

3.2.1 LAND USE COMPATIBILITY

The noise criteria identified in the City of Menifee Noise Element are guidelines to evaluate the land use compatibility of transportation related noise. The compatibility criteria, shown on Exhibit 3-A, provides the city with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels. Per the City's *Noise Element Background Document and Definitions*, *Land Use Compatibility for Community Noise Environments* (Table N-b3), non-noise sensitive land use is considered *normally acceptable* with noise levels up to 70 dBA CNEL. (10)

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS



Source: City of Menifee General Plan, Noise Background Document and Definitions, Table N-b3.

3.3 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as Mapes & Sherman Commerce Center Project, stationary-source (operational) noise such as the expected loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements are typically evaluated against standards established under a jurisdiction's Development Code or General Plan.

The City of Menifee Development Code, Chapter 9.215 Noise Control Regulations, Section 9.215.060 Table 9.215.060-1 establishes the permissible noise level that may intrude into a neighbor's property. The Development Code establishes the exterior noise level criteria for noise-sensitive residential properties affected by stationary noise sources. For residential properties, the exterior noise level shall not exceed 65 dBA L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and shall not exceed 45 dBA L_{eq} during the nighttime hours (10:00 p.m. to 7:00 a.m.). (11) Since existing uses in the Project study area include non-residential, medical/hospital, and school uses, and the City of Menifee does not identify exterior noise level standards specific to these uses, the residential exterior noise level limits are applied to all noise-sensitive receiver locations in the Project study area. The City of Menifee Development Code noise regulations are included in Appendix 3.1.

TABLE 3-1: OPERATIONAL NOISE STANDARDS

City	Land Use	Exterior Noise Level Standards (dBA L_{eq})[3]	
		Daytime	Nighttime
Menifee[1]	Residential	65	45

[1] City of Menifee Development Code, Section 9.215.060 (Appendix 3.1).
[2] L_{eq} represents a steady state sound level containing the same total energy as a time varying signal over a given period.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

3.4 CONSTRUCTION NOISE STANDARDS

To control noise impacts associated with the construction of the proposed Project, the City of Menifee has established limits to the hours of operation. Section 9.215.060(C) of the City's Development Code indicates that private construction projects, located within one-quarter of a mile from an occupied residence, are considered exempt from the Development Code noise standards if they occur within the permitted hours of 6:30 a.m. and 7:00 p.m., with no activity allowed on Sundays and nationally recognized holidays (11). However, neither the City of Menifee General Plan Noise Element or Development Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified determination of what CEQA constitutes a *substantial temporary or permanent increase in ambient noise levels*. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use (8 p. 179).

3.5 VIBRATION STANDARDS

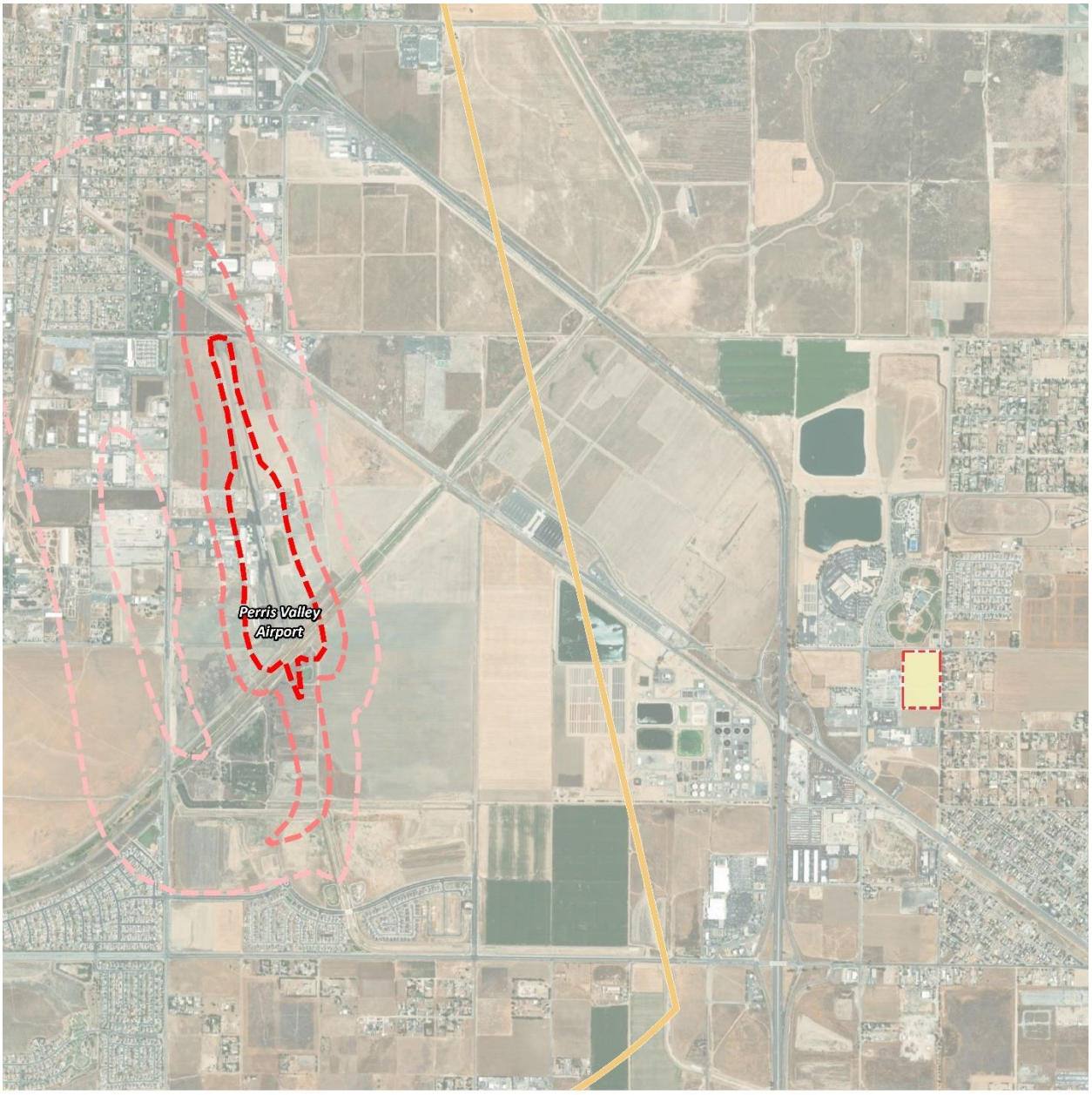
Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration (8). To analyze vibration impacts originating from the operation and construction of the Mapes & Sherman Commerce Center, vibration-generating activities are appropriately evaluated against standards established under a City's Municipal Code, if such standards exist. However, the City of Menifee does not identify specific vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (12 p. 38) Table 19, vibration damage are used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as "older residential structures" with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

3.6 PERRIS VALLEY AIRPORT (PV)

The Perris Valley Airport (PV) is located approximately 2 miles west of the Project Site. This places the Project site outside the Perris Valley Airport Influence Area and is not subject to the *Riverside County Airport Land Use Compatibility Plan Policy Document* (RC ALUCP). The RC ALUCP outlines policies for determining the land use compatibility planning in the vicinity of airports throughout Riverside County. (13)

The noise contour boundaries used to determine the potential aircraft-related noise impacts at the Project site are found on Map PV-3 of the RC ALUCP. As shown on Exhibit 3-B, the Project site is located outside the 55 dBA CNEL noise level contour boundaries and is considered *clearly acceptable.* Therefore, based on the (RC ALUCP) compatibility criteria, *the activities associated with the specified land use can be carried out with essentially no interference from the noise exposure.*

EXHIBIT 3-B: PERRIS VALLEY AIRPORT (PV) NOISE CONTOURS



Source: Riverside County Airport Land Use Compatibility Plan Policy Document (July 2010)

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4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the Guidelines for Implementation of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

B. Generation of excessive ground-borne vibration or ground-borne noise levels?

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the closest sensitive receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of noise-sensitive receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (14) This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged.

4.1.1 NOISE-SENSITIVE RECEIVERS

The Federal Interagency Committee on Noise (FICON) (15) developed guidance to be used for the assessment of project-generated increases in noise levels that consider the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}).

As previously stated, the approach used in this noise study recognizes *that there is no single noise increase that renders the noise impact significant*, based on a 2008 California Court of Appeal ruling on Gray v. County of Madera. (14) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a *readily perceptible* 5 dBA or greater project-related noise level increase is considered a significant impact when the without project

noise levels are below 60 dBA. Per the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance. The FICON guidance provides an established source of criteria to assess the impacts of substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the without Project (baseline) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or *readily perceptible*, 3 dBA or *barely perceptible*, and 1.5 dBA depending on the underlying without Project noise levels for noise-sensitive uses. These levels of increases and their perceived acceptance are consistent with guidance provided by both the Federal Highway Administration (4 p. 9) and Caltrans (16 p. 2_48).

4.1.2 NON-NOISE-SENSITIVE RECEIVERS

The City of Menifee General Plan Noise Element, Table N-b3, *Land Use Compatibility for Community Noise Environments* was used to establish the satisfactory noise levels of significance for non-noise-sensitive land uses in the Project study area. As previously shown on Exhibit 3-A, the *normally acceptable* exterior noise level for non-noise-sensitive land uses is 70 dBA CNEL. (17) To determine if Project-related traffic noise level increases are significant at off-site non-noise-sensitive land uses, a *barely perceptible* 3 dBA criteria is used. When the without Project noise levels are greater than the *normally acceptable* 70 dBA CNEL land use compatibility criteria, a *barely perceptible* 3 dBA or greater noise level increase is considered a significant impact since the noise level criteria is already exceeded. The noise level increases used to determine significant impacts for non-noise-sensitive land uses is generally consistent with the FICON noise level increase thresholds for noise-sensitive land uses but instead rely on the City of Menifee General Plan Noise Element, Table N-b3, *Land Use Compatibility for Community Noise Environments normally acceptable* 70 dBA CNEL exterior noise level criteria.

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.4, the vibration impacts originating from the construction of Mapes & Sherman Commerce Center, vibration-generating activities are appropriately evaluated using the Caltrans vibration damage thresholds to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise sensitive buildings adjacent to the Project site can best be described as “older residential structures” with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

The closest airport which would require additional noise analysis under CEQA Appendix G Guideline C is the Perris Valley Airport located approximately 2 miles west of the Project site. As previously described in Section 3.6, the Project site is located outside the PV Airport Influence Area and the 55 dBA CNEL noise level contours. Therefore, the potential impacts under CEQA Appendix G Guideline C, are *less than significant* and are not further analyzed in this noise study.

4.4 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix that includes the allowable criteria used to identify potentially significant incremental noise level increases.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Off-Site	Noise-Sensitive[1]	If ambient is < 60 dBA Leq[1]	≥ 5 dBA L_{eq} Project increase	
		If ambient is 60 - 65 dBA Leq[1]	≥ 3 dBA L_{eq} Project increase	
		If ambient is > 65 dBA Leq[1]	≥ 1.5 dBA L_{eq} Project increase	
	Non-Noise-Sensitive[2]	if ambient is > 70 dBA CNEL	≥ 3 dBA CNEL Project increase	
Operational	Noise-Sensitive[1]	Exterior Noise Level Limit[3]	65 dBA L_{eq}	45 dBA L_{eq}
		If ambient is < 60 dBA Leq[1]	≥ 5 dBA L_{eq} Project increase	
		If ambient is 60 - 65 dBA Leq[1]	≥ 3 dBA L_{eq} Project increase	
		If ambient is > 65 dBA Leq[1]	≥ 1.5 dBA L_{eq} Project increase	
Construction	Noise-Sensitive[1]	Permitted hours of 6:30 a.m. and 7:00 p.m.[4]		
		Noise Level Threshold[5]	80 dBA L_{eq}	n/a
		Vibration Level Threshold[6]	0.3 PPV (in/sec)	

[1] FICON, 1992.
[2] City of Menifee General Plan Noise Element, Table N-b3.
[3] City of Menifee Development Code, Section 9.215.060 (Appendix 3.1).
[4] Section 9.215.060(C) of the City of Menifee Municipal Code (Appendix 3.1).
[5] Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.
[6] Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at four locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, October 13th, 2021. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (18)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources*. (2) Further, FTA guidance states, t*hat it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community*. (8)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (8) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels

and is necessary to assess potential noise impacts due to the Project's contribution to the ambient noise levels.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location.

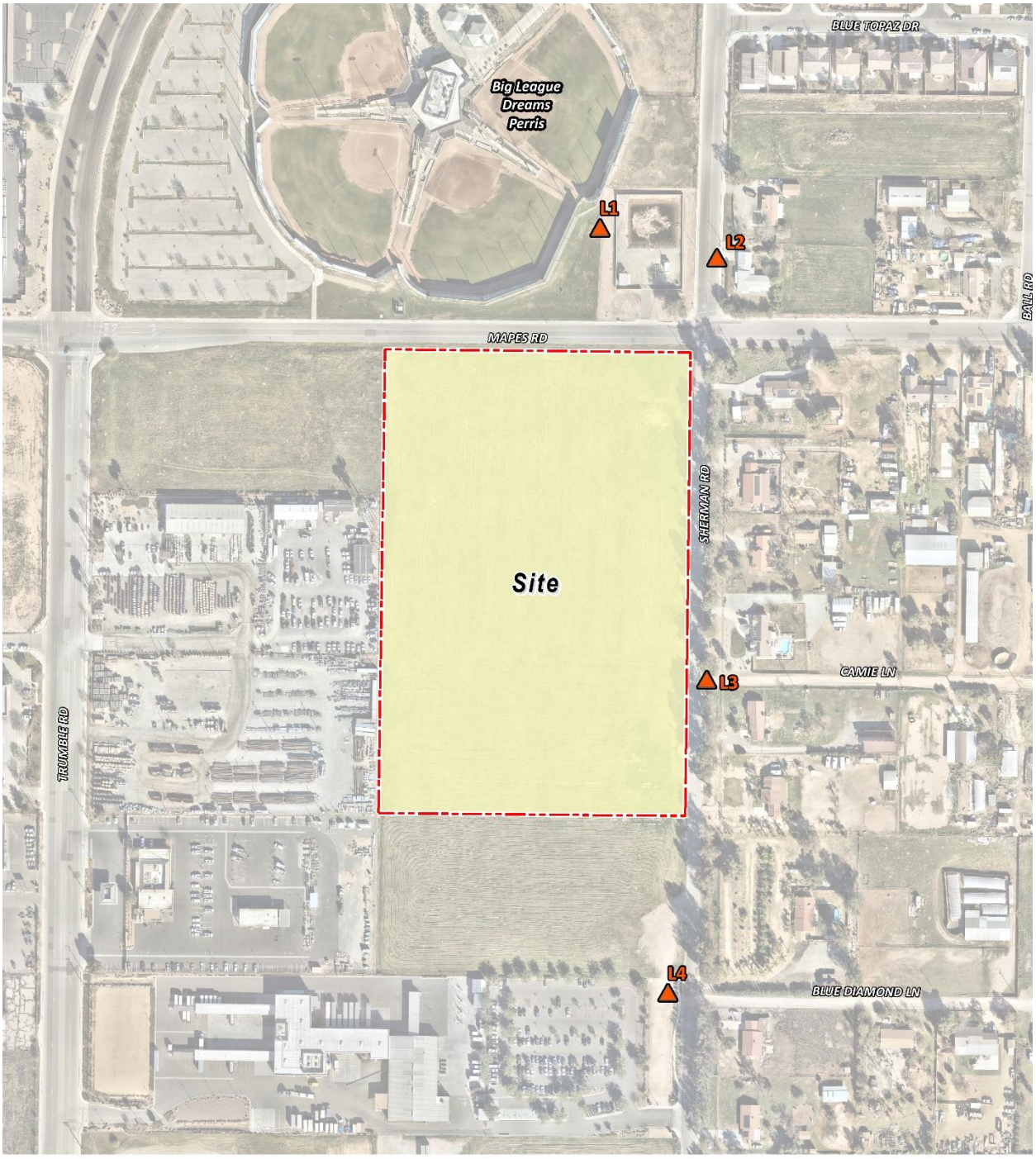
TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Description	Energy Average Noise Level (dBA L_{eq})[2]	
		Daytime	Nighttime
L1	Located north of the Project site near Big League Dreams Park at 2155 Trumble Road.	52.9	53.0
L2	Located northeast of the Project site near single-family residence at 27570 Mapes Road.	61.5	58.3
L3	Located east of the Project site near single-family residence at 25100 Sherman Road.	53.7	50.6
L4	Located southeast of the Project site near single-family residence at 25210 Sherman Road.	56.0	54.1

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Table 5-1 provides the equivalent noise levels used to describe the daytime, evening, and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each of the daytime and nighttime hours.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



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6 TRAFFIC NOISE METHODS AND PROCEDURES

The following section outlines the methods and procedures used to estimate and analyze the future traffic noise environment. Consistent with the City of Menifee *Land Use Compatibility for Community Noise Environments* (see Exhibit 3-A), all transportation related noise levels are presented in terms of the 24-hour CNEL's.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The expected roadway noise level increases from vehicular traffic were calculated by Urban Crossroads, Inc. using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (19) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (20) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), 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), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period. Research conducted by Caltrans has shown that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (21)

6.1.1 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the six off-site study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications per the City of Menifee General Plan Circulation Element, and the vehicle speeds. The ADT volumes used in this study area presented on Table 6-2 are based on *Mapes & Sherman Commerce Center Traffic Analysis*, prepared by Urban Crossroads, Inc. (22)

- Existing Conditions 2022 (E)
- Existing Conditions plus Project (E+P)
- Opening Year Cumulative Without Project (2024) Conditions
- Opening Year Cumulative With Project (2024) Conditions

The ADT volumes vary for each roadway segment based on the existing traffic volumes and the combination of project traffic distributions. This analysis relies on a comparative evaluation of the off-site traffic noise impacts at the boundary of the right-of-way of the receiving adjacent land use, without and with project ADT traffic volumes from the Project traffic study.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Classification[1]	Receiving Land Use[2]	Distance from Centerline to Receiving Land Use (Feet)[3]	Vehicle Speed (mph)
1	Trumble Rd.	n/o Mapes Rd.	Major Arterial	Non-Sensitive	50'	45
2	Trumble Rd.	s/o Mapes Rd.	Major Arterial	Non-Sensitive	50'	45
3	Sherman Rd.	s/o Mapes Rd.	Collector	Sensitive	37'	40
4	Mapes Rd.	e/o Trumble Rd.	Major Arterial	Non-Sensitive	50'	45
5	Bonnie Dr.	w/o I-215 SB Ramps	Collector	Non-Sensitive	37'	40
6	Hwy. 74	e/o Trumble Rd.	Major Arterial	Non-Sensitive	50'	55

[1] City of Menifee General Plan Circulation Element.
[2] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[3] Distance to receiving land use is based upon the right-of-way distances.

To quantify the off-site noise levels, the Project related truck trips were added to the heavy truck category in the FHWA noise prediction model. The addition of the Project related truck trips increases the percentage of heavy trucks in the vehicle mix. This approach recognizes that the FHWA noise prediction model is significantly influenced by the number of heavy trucks in the vehicle mix.

Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits. The daily Project truck trip-ends were assigned to the individual off-site study area roadway segments based on the Project truck trip distribution percentages documented in the *Mapes & Sherman Commerce Center Traffic Analysis*. Using the Project truck trips in combination with the Project trip distribution, Urban Crossroads, Inc. calculated the number of additional Project truck trips and vehicle mix percentages for each of the study area roadway segments. Table 6-4 shows the traffic flow by vehicle type (vehicle mix) used for all without Project traffic scenarios, and Tables 6-5 to 6-6 show the vehicle mixes used for the with Project traffic scenarios.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic Volumes[1]			
			Existing 2022		Opening Year Cumulative (2024)	
			Without Project	With Project	Without Project	With Project
1	Trumble Rd.	n/o Mapes Rd.	4,190	4,215	5,316	5,340
2	Trumble Rd.	s/o Mapes Rd.	8,237	8,538	10,021	10,321
3	Sherman Rd.	s/o Mapes Rd.	872	1,155	925	1,208
4	Mapes Rd.	e/o Trumble Rd.	5,505	5,829	6,252	6,576
5	Bonnie Dr.	w/o I-215 SB Ramps	5,544	5,592	9,034	9,083
6	Hwy. 74	e/o Trumble Rd.	18,726	19,091	22,606	22,971

[1] Mapes & Sherman Commerce Center Traffic Analysis, Urban Crossroads, Inc.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Vehicle Type	Time of Day Splits[1]			Total of Time of Day Splits
	Daytime	Evening	Nighttime	
Autos	67.96%	11.48%	20.55%	100.00%
Medium Trucks	71.70%	7.70%	20.60%	100.00%
Heavy Trucks	79.97%	6.03%	14.00%	100.00%

[1] Based on an existing vehicle count taken at State Route 74 west of Trumble Road (Mapes & Sherman Commerce Center Traffic Analysis, Urban Crossroads, Inc.). Vehicle mix percentage values rounded to the nearest one-hundredth. "Daytime" = 7:00 a.m. to 7:00 p.m.; "Evening" = 7:00 p.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

TABLE 6-4: WITHOUT PROJECT VEHICLE MIX

Classification	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments	76.84%	13.91%	9.26%	100.00%

Based on an existing vehicle count taken at State Route 74 west of Trumble Road (Mapes & Sherman Commerce Center Traffic Analysis, Urban Crossroads, Inc.). Vehicle mix percentage values rounded to the nearest one-hundredth.

Due to the added Project truck trips, the increase in Project traffic volumes and the distributions of trucks on the study area road segments, the percentage of autos, medium trucks and heavy trucks will vary for each of the traffic scenarios. This explains why the existing and future traffic volumes and vehicle mixes vary between seemingly identical study area roadway segments.

TABLE 6-5: EXISTING WITH PROJECT VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Trumble Rd.	n/o Mapes Rd.	76.97%	13.83%	9.21%	100.00%
2	Trumble Rd.	s/o Mapes Rd.	76.41%	13.95%	9.64%	100.00%
3	Sherman Rd.	s/o Mapes Rd.	81.14%	11.09%	7.77%	100.00%
4	Mapes Rd.	e/o Trumble Rd.	76.31%	13.91%	9.78%	100.00%
5	Bonnie Dr.	w/o I-215 SB Ramps	77.04%	13.79%	9.18%	100.00%
6	Hwy. 74	e/o Trumble Rd.	77.28%	13.64%	9.08%	100.00%

[1] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

TABLE 6-6: OPENING YEAR CUMULATIVE (2024) WITH PROJECT VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Trumble Rd.	n/o Mapes Rd.	76.94%	13.84%	9.22%	100.00%
2	Trumble Rd.	s/o Mapes Rd.	76.48%	13.94%	9.57%	100.00%
3	Sherman Rd.	s/o Mapes Rd.	80.95%	11.21%	7.84%	100.00%
4	Mapes Rd.	e/o Trumble Rd.	76.37%	13.91%	9.72%	100.00%
5	Bonnie Dr.	w/o I-215 SB Ramps	76.96%	13.83%	9.21%	100.00%
6	Hwy. 74	e/o Trumble Rd.	77.20%	13.69%	9.11%	100.00%

[1] Total of vehicle mix percentage values rounded to the nearest one-hundredth.

7 OFF-SITE TRAFFIC NOISE ANALYSIS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on the *Mapes & Sherman Commerce Center Traffic Analysis* prepared by Urbana Crossroads, Inc. (22) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway.

7.1 TRAFFIC NOISE CONTOURS

Noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. The noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. In addition, because the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary noise sources within the Project study area. Tables 7-1 to 7-5 present a summary of the exterior traffic noise levels for each traffic condition. Appendix 7.1 includes the traffic noise level contours worksheets for each traffic condition.

TABLE 7-1: EXISTING WITHOUT PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Mapes Rd.	Non-Sensitive	70.6	55	119	256
2	Trumble Rd.	s/o Mapes Rd.	Non-Sensitive	73.6	86	186	401
3	Sherman Rd.	s/o Mapes Rd.	Sensitive	64.0	RW	RW	68
4	Mapes Rd.	e/o Trumble Rd.	Non-Sensitive	71.8	66	142	307
5	Bonnie Dr.	w/o I-215 SB Ramps	Non-Sensitive	72.0	51	109	235
6	Hwy. 74	e/o Trumble Rd.	Non-Sensitive	78.9	195	420	906

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Mapes Rd.	Non-Sensitive	70.6	55	119	256
2	Trumble Rd.	s/o Mapes Rd.	Non-Sensitive	73.8	90	193	417
3	Sherman Rd.	s/o Mapes Rd.	Sensitive	64.5	RW	RW	74
4	Mapes Rd.	e/o Trumble Rd.	Non-Sensitive	72.2	70	151	325
5	Bonnie Dr.	w/o I-215 SB Ramps	Non-Sensitive	72.0	51	109	235
6	Hwy. 74	e/o Trumble Rd.	Non-Sensitive	78.9	196	422	909

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Mapes Rd.	Non-Sensitive	71.7	65	139	300
2	Trumble Rd.	s/o Mapes Rd.	Non-Sensitive	74.4	99	212	457
3	Sherman Rd.	s/o Mapes Rd.	Sensitive	64.3	RW	RW	71
4	Mapes Rd.	e/o Trumble Rd.	Non-Sensitive	72.4	72	155	334
5	Bonnie Dr.	w/o I-215 SB Ramps	Non-Sensitive	74.2	70	151	325
6	Hwy. 74	e/o Trumble Rd.	Non-Sensitive	79.7	221	477	1027

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONTOURS

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Trumble Rd.	n/o Mapes Rd.	Non-Sensitive	71.7	65	139	300
2	Trumble Rd.	s/o Mapes Rd.	Non-Sensitive	74.6	102	219	472
3	Sherman Rd.	s/o Mapes Rd.	Sensitive	64.8	RW	RW	77
4	Mapes Rd.	e/o Trumble Rd.	Non-Sensitive	72.7	76	163	351
5	Bonnie Dr.	w/o I-215 SB Ramps	Non-Sensitive	74.2	70	151	325
6	Hwy. 74	e/o Trumble Rd.	Non-Sensitive	79.7	222	478	1030

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of the receiving adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING PROJECT TRAFFIC NOISE LEVEL INCREASES

An analysis of existing traffic noise levels plus traffic noise generated by the proposed Project has been included in this report for informational purposes and to fully analyze all the existing traffic scenarios identified in the Traffic Analysis prepared by Urban Crossroads, Inc. However, the analysis of existing off-site traffic noise levels plus traffic noise generated by the proposed Project scenario will not actually occur since the Project would not be fully constructed and operational until Year 2023 conditions. Table 7-1 shows the Existing without Project conditions CNEL noise levels. The Existing without Project exterior noise levels range from 64.0 to 78.9 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions ranging from 64.5 to 78.9 dBA CNEL. Table 7-5 shows that the Project off-site traffic noise level increases range from 0.0 to 0.5 dBA CNEL on the study area roadway segments. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway segments would experience *less than significant* noise level increases on receiving land uses due to the Project-related traffic.

7.3 OPENING YEAR CUMULATIVE (2024) TRAFFIC NOISE LEVEL INCREASES

Table 7-3 presents the Opening Year Cumulative (2024) without Project conditions CNEL noise levels. The Opening Year Cumulative (2024) without Project exterior noise levels range from 64.3 to 79.7 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-4 shows that the Opening Year Cumulative (2024) with Project conditions will range from 64.8 to 79.7 dBA CNEL. Table 7-6 shows that the Project off-site traffic noise level increases range from 0.0 to 0.5 dBA CNEL. Based on the significance criteria for off-site traffic noise presented in Table 4-1, land uses adjacent to the study area roadway segments would experience *less than significant* noise level increases on receiving land uses due to the Project-related traffic.

TABLE 7-5: EXISTING WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Trumble Rd.	n/o Mapes Rd.	Non-Sensitive	70.6	70.6	0.0	3.0	No
2	Trumble Rd.	s/o Mapes Rd.	Non-Sensitive	73.6	73.8	0.2	3.0	No
3	Sherman Rd.	s/o Mapes Rd.	Sensitive	64.0	64.5	0.5	3.0	No
4	Mapes Rd.	e/o Trumble Rd.	Non-Sensitive	71.8	72.2	0.4	3.0	No
5	Bonnie Dr.	w/o I-215 SB Ramps	Non-Sensitive	72.0	72.0	0.0	3.0	No
6	Hwy. 74	e/o Trumble Rd.	Non-Sensitive	78.9	78.9	0.0	3.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

TABLE 7-6: OPENING YEAR CUMULATIVE (2024) WITH PROJECT TRAFFIC NOISE LEVEL INCREASES

ID	Road	Segment	Receiving Land Use[1]	CNEL at Receiving Land Use (dBA)[1]			Incremental Noise Level Increase Threshold[2]	
				No Project	With Project	Project Addition	Limit	Exceeded?
1	Trumble Rd.	n/o Mapes Rd.	Non-Sensitive	71.7	71.7	0.0	3.0	No
2	Trumble Rd.	s/o Mapes Rd.	Non-Sensitive	74.4	74.6	0.2	3.0	No
3	Sherman Rd.	s/o Mapes Rd.	Sensitive	64.3	64.8	0.5	3.0	No
4	Mapes Rd.	e/o Trumble Rd.	Non-Sensitive	72.4	72.7	0.3	3.0	No
5	Bonnie Dr.	w/o I-215 SB Ramps	Non-Sensitive	74.2	74.2	0.0	3.0	No
6	Hwy. 74	e/o Trumble Rd.	Non-Sensitive	79.7	79.7	0.0	3.0	No

[1] Based on a review of existing aerial imagery. Noise sensitive uses limited to existing residential land uses.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the receiving land use.
[3] Does the Project create an incremental noise level increase exceeding the significance criteria (Table 4-1)?

8 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following sensitive receiver locations, as shown on Exhibit 8-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, four receiver locations in the vicinity of the Project site were identified. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the project boundary to each receiver location.

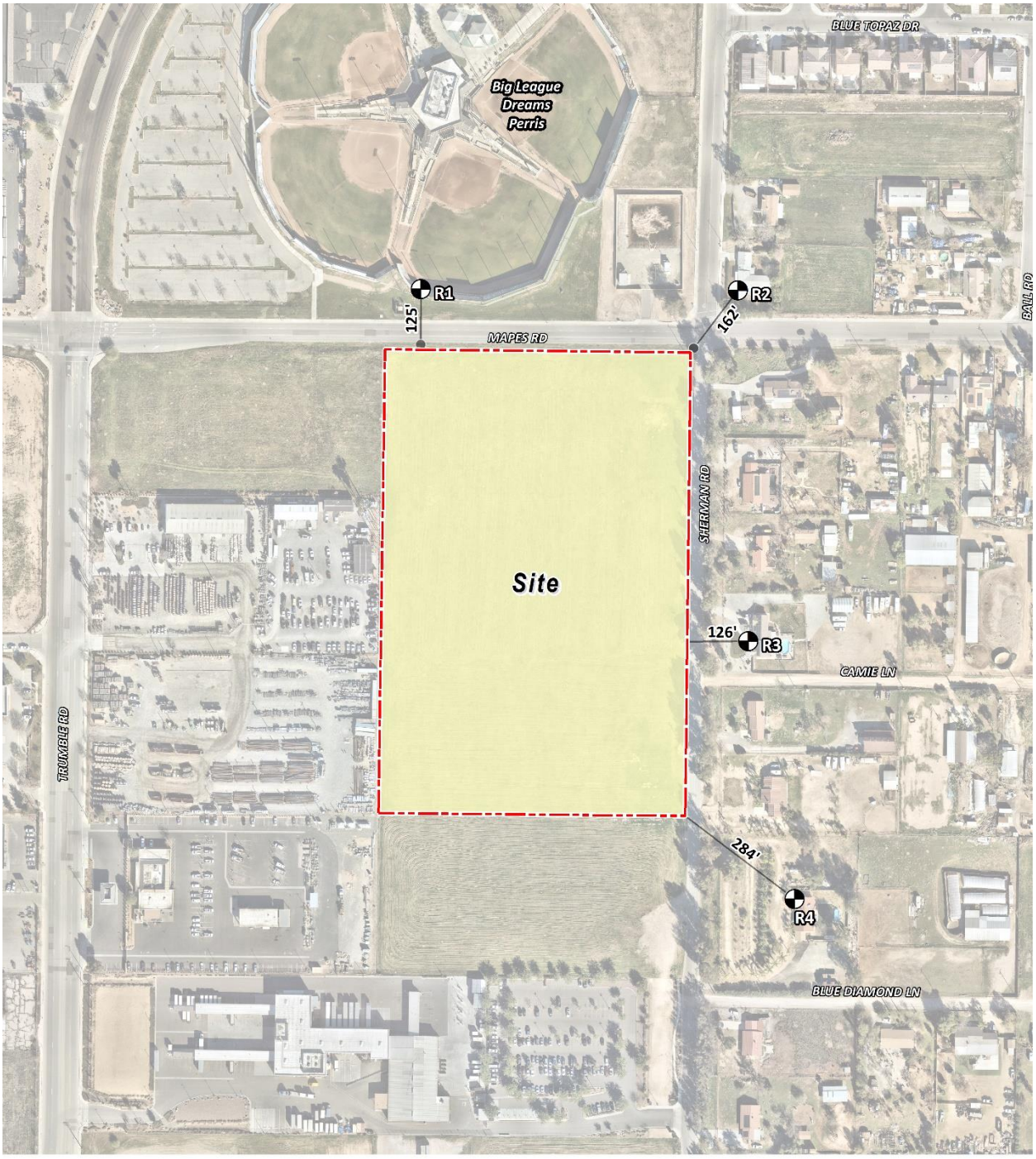
R1: Location R1 represents Big League Dreams Perris sports complex located at 2155 Trumble Road, approximately 125 feet north of the Project site. The Big League Dreams baseball park and does not include any noise sensitive nighttime receivers. R1 is placed in the outfield of the nearest baseball field. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

R2: Location R2 represents an existing residence at 27570 Mapes Road, approximately 162 feet northeast of the Project site. R2 is placed in the private outdoor living areas (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.

R3: Location R3 represents the existing residence at 25100 Sherman Road, approximately 126 feet east of the Project site. Because there are no private outdoor living areas (backyards) facing the Project site, R4 is placed at the building façade. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.

R4: Location R4 represents the existing residence at 25210 Sherman Road, approximately 284 feet southeast of the Project site. Because there are no private outdoor living areas (backyards) facing the Project site, R4 is placed at the building façade. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

EXHIBIT 8-A: RECEIVER LOCATIONS



9 OPERATIONAL NOISE IMPACTS

This section analyzes the potential stationary-source operational noise impacts at the nearest receiver locations, identified in Section 8, resulting from the operation of the proposed Mapes & Sherman Commerce Center Project. Exhibit 9-A identifies the noise source locations used to assess the operational noise levels.

9.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with the expected typical of daytime and nighttime activities at the Project site. Consistent with similar warehouse uses, the Project business operations would primarily be conducted within the enclosed building, except for traffic movement, parking, as well as loading and unloading of trucks at designated loading bays. The on-site Project-related noise sources are expected to include: loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements.

9.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 9-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements all operating at the same time. These sources of noise activity will likely vary throughout the day.

9.2.1 MEASUREMENT PROCEDURES

The reference noise level measurements presented in this section were collected using a Larson Davis LxT Type 1 precision sound level meter (serial number 01146). The LxT sound level meter was calibrated using a Larson-Davis calibrator, Model CAL 200, was programmed in "slow" mode to record noise levels in "A" weighted form and was located at approximately five feet above the ground elevation for each measurement. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (18)

EXHIBIT 9-A: OPERATIONAL NOISE SOURCE LOCATIONS

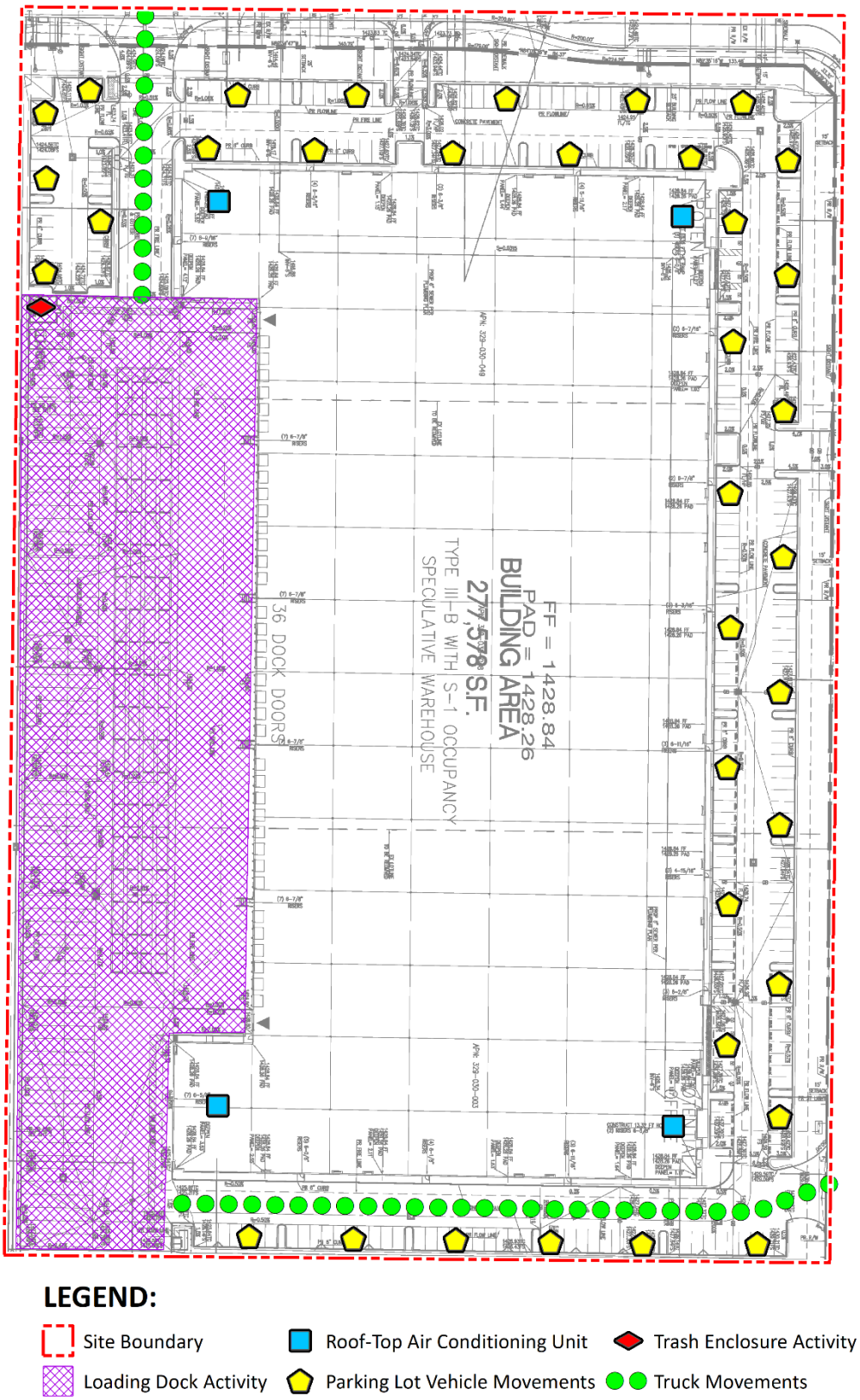


TABLE 9-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source[1]	Noise Source Height (Feet)	Min./ Hour[2]		Reference Noise Level (dBA L_{eq}) @ 50 Feet	Sound Power Level (dBA)[3]
		Day	Night		
Loading Dock Activity	8'	60	60	65.7	111.5
Roof-Top Air Conditioning Units	5'	39	28	57.2	88.9
Trash Enclosure Activity	5'	10	10	57.3	89.0
Parking Lot Vehicle Movements	5'	60	60	52.6	81.1
Truck Movements	8'	60	60	59.8	93.2

[1] As measured by Urban Crossroads, Inc.
[2] Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.
[3] Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calculated using the CadnaA noise model at the reference distance to the noise source. Numbers may vary due to size differences between point and area noise sources.

9.2.2 LOADING DOCK ACTIVITY

The reference loading dock activities are intended to describe the typical outdoor operational noise activities associated with the Project. This includes truck idling, reefer activity (refrigerator truck/cold storage), deliveries, backup alarms, trailer docking including a combination of tractor trailer semi-trucks, two-axle delivery trucks, and background operation activities. Since the noise levels generated by cold storage loading dock activity can be slightly higher due to the use of refrigerated trucks or reefers.

The reference noise level measurement was taken in the center of the loading dock activity area and represents multiple concurrent noise sources resulting in a combined noise level of 65.7 dBA L_{eq} at a uniform distance of 50 feet. Specifically, the reference noise level measurement represents one truck located approximately 30 feet from the noise level meter with another truck passing by to park roughly 20 feet away, both with their engines idling. Throughout the reference noise level measurement, a separate docked and running reefer truck was located approximately 50 feet east of the measurement location. Additional background noise sources included truck pass-by noise, truck drivers talking to each other next to docked trucks, and air brake release noise when trucks parked.

9.2.3 ROOF-TOP AIR CONDITIONING UNITS

The noise level measurements describe a single mechanical roof-top air conditioning unit. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. At the uniform reference distance of 50 feet, the reference noise levels are 57.2 dBA L_{eq}. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for and average 39 minutes per hour during the daytime hours, and 28 minutes per hour during the nighttime hours. These operating conditions reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. For this noise analysis, the air conditioning units are expected to be located on the roof of the Project building.

9.2.4 TRASH ENCLOSURE ACTIVITY

To describe the noise levels associated with a trash enclosure activity, Urban Crossroads collected a reference noise level measurement at an existing trash enclosure containing two dumpster bins. The trash enclosure noise levels describe metal gates opening and closing, metal scraping against concrete floor sounds, dumpster movement on metal wheels, and trash dropping into the metal dumpster. The reference noise levels describe trash enclosure noise activities when trash is dropped into an empty metal dumpster, as would occur at the Project Site. The measured reference noise level at the uniform 50-foot reference distance is 57.3 dBA L_{eq} for the trash enclosure activity. The reference noise level describes the expected noise source activities associated with the trash enclosures for the Project's proposed building. Typical trash enclosure activities are estimated to occur for 10 minutes per hour.

9.2.5 PARKING LOT VEHICLE MOVEMENTS

To describe the on-site parking lot activity, a long-term 29-hour reference noise level measurement was collected in the center of activity within the staff parking lot of an Amazon warehouse distribution center. At 50 feet from the center of activity, the parking lot produced a reference noise level of 52.6 dBA L_{eq}. Parking activities are expected to take place during the full hour (60 minutes) throughout the daytime and evening hours. The parking lot noise levels are mainly due cars pulling in and out of parking spaces in combination with car doors opening and closing.

9.2.6 TRUCK MOVEMENTS

The truck movements reference noise level measurement was collected over a period of 1 hour and 28 minutes and represents multiple heavy trucks entering and exiting the outdoor loading dock area producing a reference noise level of 59.8 dBA L_{eq} at 50 feet. The noise sources included at this measurement location account for trucks entering and existing the Project driveways and maneuvering in and out of the outdoor loading dock activity area.

9.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels.

Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source. Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (L_w) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (L_w) are connected to the sound source and are independent of distance. Sound pressure levels vary substantially with distance from the

source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment.

The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the CadnaA noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 9.1 includes the detailed noise model inputs used to estimate the Project operational noise levels presented in this section.

9.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the proposed Project operations that include loading dock activity, roof-top air conditioning units, trash enclosure activity, parking lot vehicle movements, and truck movements, Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 9-2 shows the Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 41.1 to 54.2 dBA L_{eq}.

TABLE 9-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	53.3	29.9	30.4	40.6
Roof-Top Air Conditioning Units	34.4	32.6	32.8	31.2
Trash Enclosure Activity	27.7	3.9	0.0	0.0
Parking Lot Vehicle Movements	40.8	38.9	41.8	35.8
Truck Movements	45.3	33.4	33.6	37.7
Total (All Noise Sources)	**54.2**	**41.1**	**43.1**	**43.5**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

Tables 9-3 shows the Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the off-site receiver locations are expected to range from 40.8 to 54.2 dBA L_{eq}. The minor differences between the daytime and nighttime noise levels are largely related to the estimated duration of noise activity as outlined in Table 9-1 and Appendix 9.1.

TABLE 9-3: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source[1]	Operational Noise Levels by Receiver Location (dBA Leq)			
	R1	R2	R3	R4
Loading Dock Activity	53.3	29.9	30.4	40.6
Roof-Top Air Conditioning Units	32.0	30.2	30.4	28.8
Trash Enclosure Activity	26.7	3.0	0.0	0.0
Parking Lot Vehicle Movements	40.8	38.9	41.8	35.8
Truck Movements	45.3	33.4	33.6	37.7
Total (All Noise Sources)	**54.2**	**40.8**	**42.9**	**43.4**

[1] See Exhibit 9-A for the noise source locations. CadnaA noise model calculations are included in Appendix 9.1.

9.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Menifee exterior noise level standards at nearby noise-sensitive receiver locations. Table 9-4 shows the operational noise levels associated with Mapes & Sherman Commerce Center Project will satisfy the City of Menifee daytime and nighttime exterior noise level standards. Therefore, the operational noise impacts are considered *less than significant* at the nearby noise-sensitive receiver locations.

TABLE 9-4: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Project Operational Noise Levels (dBA Leq)[2]		Noise Level Standards (dBA Leq)[3]		Noise Level Standards Exceeded?[4]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	54.2	54.2	65.0	-[5]	No	-[5]
R2	41.1	40.8	65.0	45.0	No	No
R3	43.1	42.9	65.0	45.0	No	No
R4	43.5	43.4	65.0	45.0	No	No

[1] See Exhibit 8-A for the receiver locations.
[2] Proposed Project operational noise level calculations are included in Appendix 9-1.
[3] City of Menifee Development Code, Chapter 9.215 Noise Control Regulations, Table 9.215.060-1 (Appendix 3-1).
[4] Do the estimated Project operational noise source activities exceed the noise level standards?
[5] Receiver location R1 represents the Big League Dreams and does not include any noise sensitive nighttime receivers.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

9.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (2) Instead, they must be logarithmically added using the following base equation:

$$SPL_{Total} = 10\log_{10}[10^{SPL1/10} + 10^{SPL2/10} + \ldots 10^{SPLn/10}]$$

Where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented on Tables 9-5 and 9-6, respectively. As indicated on Tables 9-5, the Project will generate a daytime operational noise level increases ranging from 0.0 to 3.7 dBA L_{eq} at the nearest receiver locations. Table 9-6 shows that the Project will generate a nighttime operational noise level increases ranging from 0.1 to 3.6 dBA L_{eq} at the nearest receiver locations. Project-related operational noise level increases will satisfy the operational noise level increase significance criteria presented in Table 4-1, and, therefore, the increases at the sensitive receiver locations will be *less than significant.*

TABLE 9-5: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	54.2	L1	52.9	56.6	3.7	5.0	No
R2	41.1	L2	61.5	61.5	0.0	5.0	No
R3	43.1	L3	53.7	54.1	0.4	5.0	No
R4	43.5	L4	56.0	56.2	0.2	5.0	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project daytime operational noise levels as shown on Table 9-2.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

TABLE 9-6: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Increase[6]	Increase Criteria[7]	Increase Criteria Exceeded?
R1	54.2	L1	53.0	56.6	3.6	5.0	No
R2	40.8	L2	58.3	58.4	0.1	5.0	No
R3	42.9	L3	50.6	51.3	0.7	5.0	No
R4	43.4	L4	54.1	54.5	0.4	5.0	No

[1] See Exhibit 8-A for the receiver locations.
[2] Total Project nighttime operational noise levels as shown on Table 9-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance increase criteria as shown on Table 4-1.

10 CONSTRUCTION ANALYSIS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 10-A shows the construction activity boundaries in relation to the nearest sensitive receiver locations previously described in Section 6. Section 9.215.060(C) of the City's Development Code indicates that private construction projects, located within one-quarter of a mile from an occupied residence, are considered exempt from the Development Code noise standards if they occur within the permitted hours of 6:30 a.m. and 7:00 p.m., with no activity allowed on Sundays and nationally recognized holidays (11). In addition, since neither the City of Menifee General Plan or Development Code establish numeric maximum acceptable construction source noise levels at potentially affected receivers for CEQA analysis purposes. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual is used for analysis of daytime construction impacts. The FTA considers a daytime exterior construction noise level of 80 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (8 p. 179).

10.1 CONSTRUCTION NOISE LEVELS

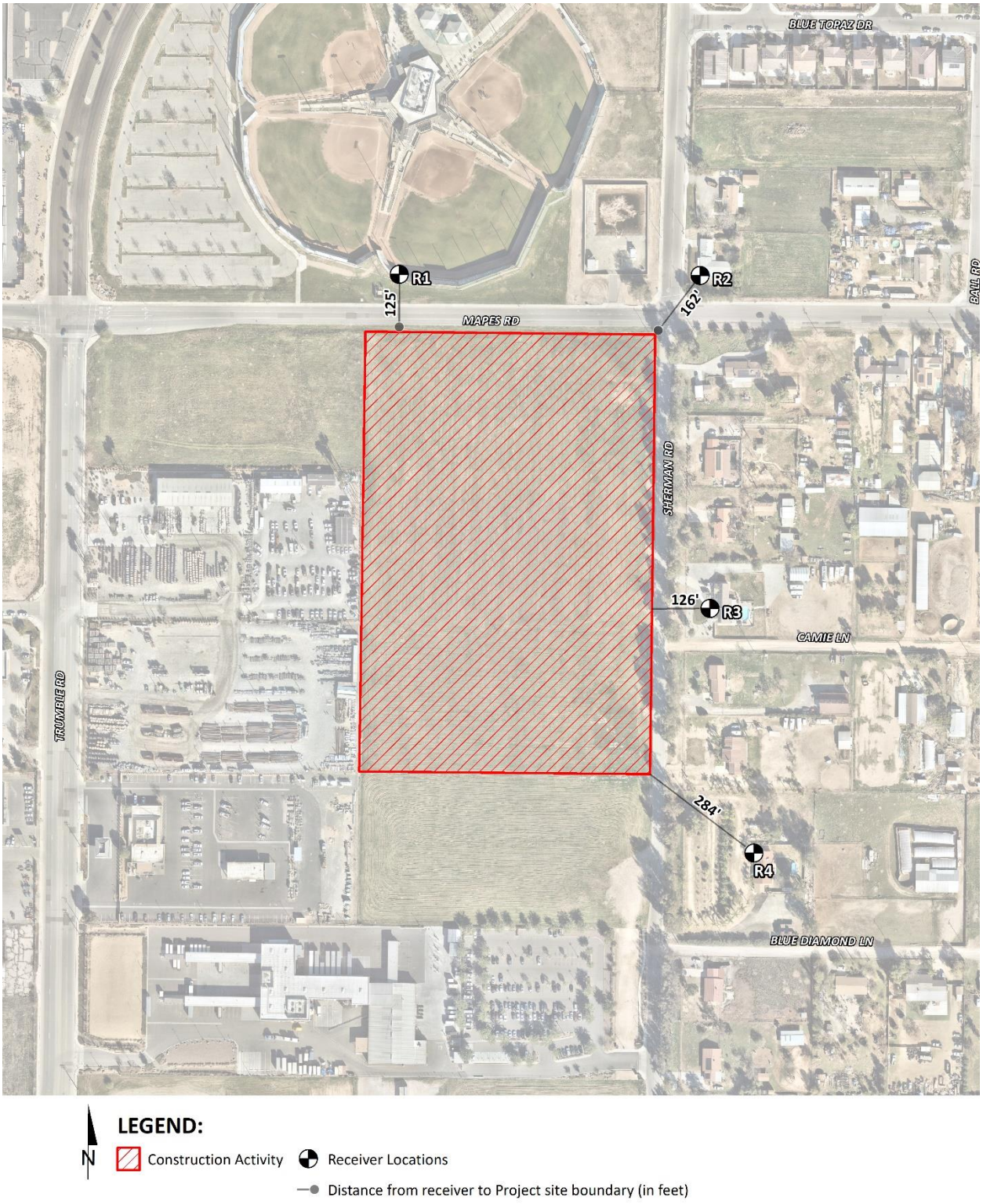
The FTA *Transit Noise and Vibration Impact Assessment Manual* recognizes that construction projects are accomplished in several different stages and outlines the procedures for assessing noise impacts during construction. Each stage has a specific equipment mix, depending on the work to be completed during that stage. As a result of the equipment mix, each stage has its own noise characteristics; some stages have higher continuous noise levels than others, and some have higher impact noise levels than others. The Project construction activities are expected to occur in the following stages:

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating

10.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (23) The RCNM equipment database, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

EXHIBIT 10-A: CONSTRUCTION NOISE SOURCE LOCATIONS



10.3 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts at the nearby sensitive receiver locations were completed. Consistent with FTA guidance for general construction noise assessment, Table 10-1 presents the combined noise levels for the loudest construction equipment, assuming they operate at the same time. As shown on Table 10-2, the construction noise levels are expected to range from 54.4 to 65.6 dBA L_{eq} at the nearby receiver locations. Appendix 10.1 includes the detailed CadnaA construction noise model inputs.

TABLE 10-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Activity	Reference Noise Level @ 50 Feet (dBA L_{eq})[1]	Combined Noise Level (dBA L_{eq})[2]	Combined Sound Power Level (PWL)[3]
Site Preparation	Crawler Tractors	78	80	112
	Hauling Trucks	72		
	Rubber Tired Dozers	75		
Grading	Graders	81	83	115
	Excavators	77		
	Compactors	76		
Building Construction	Cranes	73	81	113
	Tractors	80		
	Welders	70		
Paving	Pavers	74	83	115
	Paving Equipment	82		
	Rollers	73		
Architectural Coating	Cranes	73	77	109
	Air Compressors	74		
	Generator Sets	70		

[1] FHWA Roadway Construction Noise Model (RCNM).
[2] Represents the combined noise level for all equipment assuming they operate at the same time consistent with FTA Transit Noise and Vibration Impact Assessment guidance.
[3] Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calibrated using the CadnaA noise model at the reference distance to the noise source.

TABLE 10-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})					
	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels[2]
R1	61.4	64.4	62.4	64.4	58.4	64.4
R2	59.3	62.3	60.3	62.3	56.3	62.3
R3	62.6	65.6	63.6	65.6	59.6	65.6
R4	57.4	60.4	58.4	60.4	54.4	60.4

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix 10.1.

10.4 CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at nearest receiver locations, a construction-related daytime noise level threshold of 80 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities as shown on Table 8-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 10-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels[2]	Threshold[3]	Threshold Exceeded?[4]
R1	64.4	80	No
R2	62.3	80	No
R3	65.6	80	No
R4	60.4	80	No

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations as shown on Table 10-2.
[3] Construction noise level thresholds as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the construction noise level threshold?

10.5 NIGHTTIME CONCRETE POUR NOISE ANALYSIS

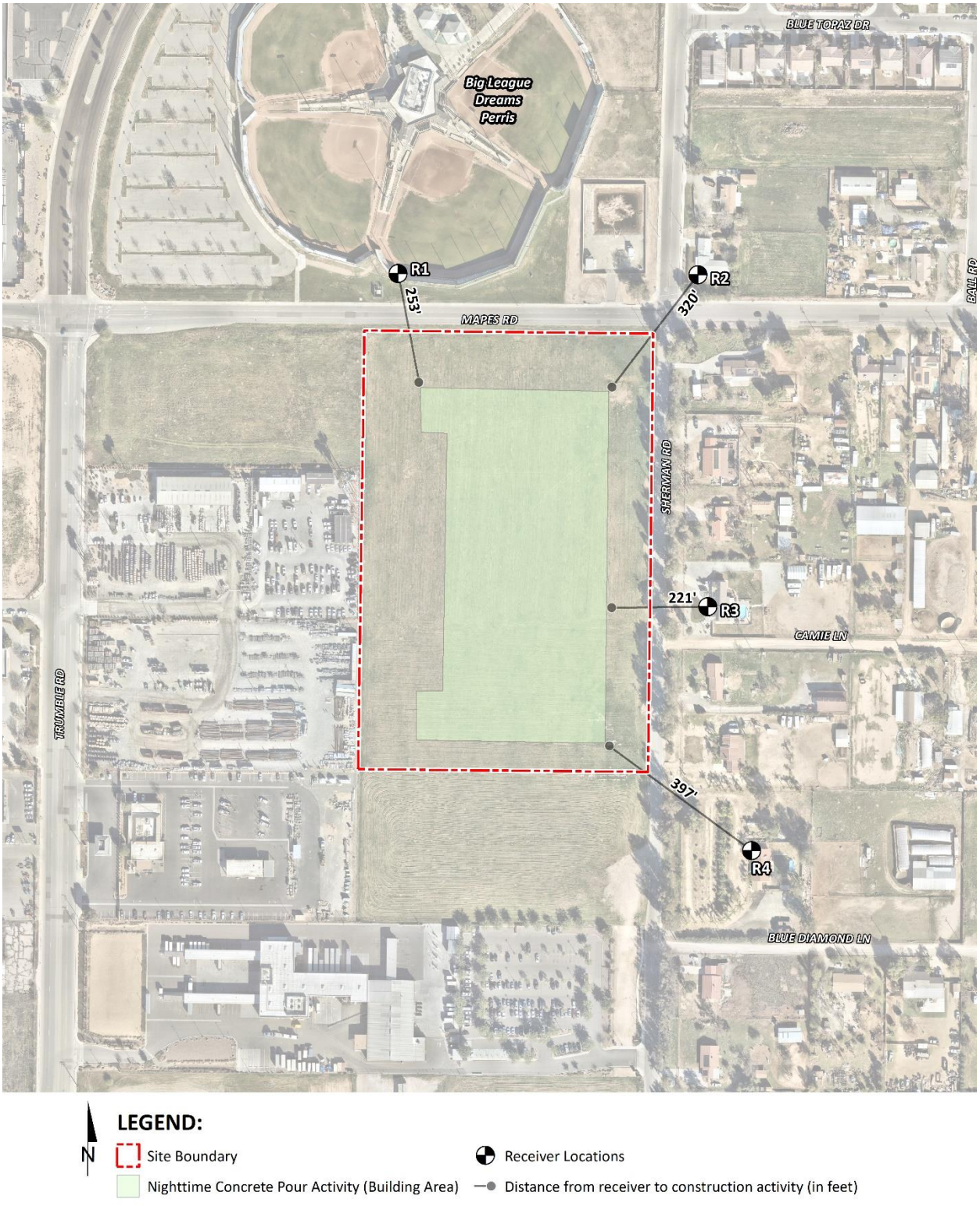
It is our understanding that nighttime concrete pouring activities may occur as a part of Project building construction activities. Nighttime concrete pouring activities are often used to support reduced concrete mixer truck transit times and lower air temperatures than during the daytime hours and are generally limited to the actual building pad area as shown on Exhibit 10-B. Since the nighttime concrete pours will take place outside the permitted City of Menifee Development Code, Section 9.215.060(C) of the City of Menifee Development Code indicates that construction activity is restricted to the hours within 6:30 a.m. and 7:00 p.m. with no activity allowed on Sundays and nationally recognized holidays. The Project Applicant will be required to obtain authorization for nighttime work from the City of Menifee. Any nighttime construction noise activities shall satisfy the noise limits outlined in Table 4-1.

8.5.1 NIGHTTIME CONCRETE POUR REFERENCE NOISE LEVEL MEASUREMENTS

To estimate the noise levels due to nighttime concrete pour activities, sample reference noise level measurements were taken during a nighttime concrete pour at a construction site. Urban Crossroads, Inc. collected short-term nighttime concrete pour reference noise level measurements during the noise-sensitive nighttime hours between 1:00 a.m. to 2:00 a.m. at 27334 San Bernardino Avenue in the City of Redlands. The reference noise levels describe the expected concrete pour noise sources that may include concrete mixer truck movements and pouring activities, concrete paving equipment, rear mounted concrete mixer truck backup alarms, engine idling, air brakes, generators, and workers communicating/whistling.

To describe the nighttime concrete pour noise levels associated with the construction of the Mapes & Sherman Commerce Center, this analysis relies on reference sound power level of 100.3 dBA L_w. While the Project noise levels will depend on the actual duration of activities and specific equipment fleet in use at the time of construction, the reference sound power level of 100.3 dBA L_w is used to describe the expected Project nighttime concrete pour noise activities.

EXHIBIT 10-B: NIGHTTIME CONCRETE POUR NOISE SOURCE AND RECEIVER LOCATIONS



10.5.2 NIGHTTIME CONCRETE POUR NOISE LEVEL COMPLIANCE

As shown on Table 10-4, the noise levels associated with the nighttime concrete pour activities are estimated to range from 41.0 to 44.9 dBA L_{eq} and will satisfy the City of Menifee stationary-source nighttime exterior hourly average L_{eq} residential noise level threshold at all the receiver locations. Based on the results of this analysis, all nearest noise receiver locations will experience *less than significant* impacts due to the Project related nighttime concrete pour activities. Appendix 10.2 includes the CadnaA nighttime concrete pour noise model inputs.

TABLE 10-4: NIGHTTIME CONCRETE POUR NOISE LEVEL COMPLIANCE

Receiver Location[1]	Construction Noise Levels (dBA L_{eq})		
	Paving Construction[2]	Nighttime Threshold[3]	Threshold Exceeded?[4]
R1	42.9	45	No
R2	41.9	45	No
R3	44.9	45	No
R4	41.0	45	No

[1] Noise receiver locations are shown on Exhibit 10-B.
[2] Paving construction noise level calculations based on distance from the construction noise source activity to nearby receiver locations.
[3] Exterior nighttime noise level standards as shown on Table 4-1.
[4] Do the estimated Project construction noise levels exceed the nighttime construction noise level threshold?

10.6 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized on Table 10-5. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by the FTA. To describe the vibration impacts the FTA provides the following equation: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$

TABLE 10-5: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Table 10-6 presents the expected Project related vibration levels at the nearby receiver locations. At distances ranging from 125 to 284 feet from Project construction activities, construction vibration velocity levels are estimated to range from 0.005 to 0.019 in/sec PPV. Based on maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec), the typical Project construction vibration levels will fall below the building damage thresholds at all the noise sensitive receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during typical construction activities at the Project site.

Moreover, the vibration levels reported at the sensitive receiver locations are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter.

TABLE 10-6: PROJECT CONSTRUCTION VIBRATION LEVELS

Location[1]	Distance to Const. Activity (Feet)[2]	Typical Construction Vibration Levels PPV (in/sec)[3]						Thresholds PPV (in/sec)[4]	Thresholds Exceeded?[5]
		Small bulldozer	Jackhammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	125'	0.000	0.003	0.007	0.008	0.019	0.019	0.3	No
R2	162'	0.000	0.002	0.005	0.005	0.013	0.013	0.3	No
R3	126'	0.000	0.003	0.007	0.008	0.019	0.019	0.3	No
R4	284'	0.000	0.001	0.002	0.002	0.005	0.005	0.3	No

[1] Receiver locations are shown on Exhibit 10-A.
[2] Distance from receiver building facade to Project construction boundary (Project site boundary).
[3] Based on the Vibration Source Levels of Construction Equipment (Table 10-5).
[4] Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.
[5] Does the peak vibration exceed the acceptable vibration thresholds?
"PPV" = Peak Particle Velocity

11 REFERENCES

1. **State of California.** *California Environmental Quality Act, Environmental Checklist Form Appendix G.* 2021.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.
5. **U.S. Department of Transportation Federal Highway Administration.** *Highway Noise Barrier Design Handbook.* 2001.
6. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
7. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
8. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual.* September 2018.
9. **Office of Planning and Research.** *State of California General Plan Guidlines.* October 2019.
10. **City of Menifee.** *General Plan Noise Element.* July 2015.
11. —. *Development Code, Chapter 9.215: Performance Standards.*
12. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* April 2020.
13. **Riverside County Airport Land Use Commission.** *Riverside County Airport Land Use Compatibility Plan Policy Document.* October 2004.
14. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
15. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
16. **California Department of Transportation.** *Technical Noise Supplement.* November 2009.
17. **County of Riverside.** *General Plan Noise Element.* December 2015.
18. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
19. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
20. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.

21. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.

22. **Urban Crossroads, Inc.** *Mapes & Sherman Commerce Center Traffic Analysis.* August 2022.

23. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.

12 CERTIFICATIONS

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Mapes & Sherman Commerce Center Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 584-3148.

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EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of San Diego • March, 2018
Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF MENIFEE DEVELOPMENT CODE

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TITLE 9: PLANNING AND ZONING

ARTICLE 4: SITE DEVELOPMENT REGULATIONS AND PERFORMANCE STANDARDS

Chapter 9.215 Performance Standards

9.215.060 Noise Control Regulations

A. **Intent.** At certain levels, sound becomes noise and may jeopardize the health, safety or general welfare of city residents and degrade their quality of life. Pursuant to its police power, the City Council hereby declares that noise shall be regulated in the manner described herein. This chapter is intended to establish citywide standards regulating noise. This chapter is not intended to establish thresholds of significance for the purpose of any analysis required by the California Environmental Quality Act (CEQA), and no such thresholds are hereby established.

B. **General Exemptions.** Sound emanating from the following sources are exempt from the provisions of this chapter:

1. Facilities owned or operated by or for a governmental agency.
2. Capital improvement projects of a governmental agency.
3. The maintenance or repair of public properties.
4. Public safety personnel in the course of executing their official duties, including, but not limited to, sworn peace officers, emergency personnel and public utility personnel. This exemption includes, without limitation, sound emanating from all equipment used by such personnel, whether stationary or mobile.
5. Public and private schools and school-sponsored activities.
6. Agricultural operations on land designated Agriculture in the City's General Plan, or land zoned AG (Agriculture), provided such operations are carried out in a manner consistent with accepted industry standards. This exemption includes, without limitation, sound emanating from all equipment used during such operations, whether stationary or mobile.
7. Wind energy conversion systems (WECS), provided such systems comply with the noise provisions of the Menifee Municipal Code.
8. Property maintenance, including, but not limited to, the operation of lawnmowers, leaf blowers, etc., provided such maintenance occurs between the hours of 7:00 a.m. and 8:00 p.m.
9. Motor vehicles (factory equipped), other than off-highway vehicles. This exemption does not include sound emanating from motor vehicle sound systems.
10. Heating and air conditioning equipment in proper repair.
11. Safety, warning and alarm devices, including, but not limited to, house and car alarms, and other warning devices that are designed to protect the public health, safety and welfare.
12. The discharge of firearms consistent with all state laws.
13. Bars, nightclubs, cocktail lounges, cabarets, billiards/pool halls, restaurants, drive-ins and eating establishments that have a Conditional Use Permit for on-site alcohol sales and live entertainment (interior noise). Outdoor patios and similar areas shall be subject to the requirements of this chapter, unless conditioned otherwise under Conditional Use Permit review.

C. **Construction-Related Exemptions.** Exceptions may be requested from the standards set forth in Section 9.215.060 of this chapter and may be characterized as construction-related, single event or continuous events exceptions.

1. Private construction projects, with or without a Building Permit, located one-quarter of a mile or more from an inhabited dwelling.
2. Private construction projects, with or without a building permit, located within one-quarter of a mile from an inhabited dwelling, shall be permitted Monday through Saturday, except nationally recognized holidays, 6:30 a.m. to 7:00 p.m., or specified in Section 8.01.010. There shall be no construction permitted on Sunday or nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.
3. Construction-related exceptions. If construction occurs during off hours or exceeds noise thresholds, an application for a construction-related exception shall be made using the temporary use application provided by the Community Development Director in Chapter 9.110 of this Title. For construction activities on Sunday or nationally recognized holidays, Section 8.01.010 of this Code shall prevail.

D. **General Sound Level Standards.** No person shall create any sound, or allow the creation of any sound, on any property that causes the exterior and interior sound level on any other occupied property to exceed the sound level standards set forth in Table 9.215.060-1, Stationary Source Noise Standards.

Table 9.215.060-1 Stationary Source Noise Standards

Land Use	Interior Standards	Exterior Standards
10:00 p.m. to 7:00 a.m.	40 L_{eq} (10-minute)	45 L_{eq} (10-minute)
7:00 a.m. to 10:00 p.m.	55 L_{eq} (10-minute)	65 L_{eq} (10-minute)

Development Director in Chapter 9.110 of this Title. For construction activities on Sunday or nationally recognized holidays, Section 8.01.010 of this Code shall prevail.

D. **General Sound Level Standards**. No person shall create any sound, or allow the creation of any sound, on any property that causes the exterior and interior sound level on any other occupied property to exceed the sound level standards set forth in Table 9.215.060-1, Stationary Source Noise Standards.

Table 9.215.060-1 Stationary Source Noise Standards

Land Use	Interior Standards	Exterior Standards
10:00 p.m. to 7:00 a.m.	40 L_{eq} (10-minute)	45 L_{eq} (10-minute)
7:00 a.m. to 10:00 p.m.	55 L_{eq} (10-minute)	65 L_{eq} (10-minute)

E. **Sound Level Measurement Methodology**. Sound level measurements may be made anywhere within the boundaries of an occupied property. The actual location of a sound level measurement shall be at the discretion of the enforcement officials identified in Section 9.215.060.G. Sound level measurements shall be made with a sound level meter. Immediately before a measurement is made, the sound level meter shall be calibrated utilizing an acoustical calibrator meeting the standards of the American National Standards Institute. Following a sound level measurement, the calibration of the sound level meter shall be reverified. Sound level meters and calibration equipment shall be certified annually.

F. **Special Sound Level Measurement Methodology**. The general sound level standards set forth in Section 9.215.060.E apply to sound emanating from all sources, including the following special sound sources, and the person creating, or allowing the creation of, the sound is subject to the requirements of that section. The following special sound sources are also subject to the following additional standards; failure to comply with these standards constitutes separate violations of this chapter.

1. Motor vehicles.
   a. Off-highway vehicles.
      i. No person shall operate an off-highway vehicle unless it is equipped with a USDA-qualified spark arrester and a constantly operating and properly maintained muffler. A muffler is not considered constantly operating and properly maintained if it is equipped with a cutout, bypass or similar device.
      ii. No person shall operate an off-highway vehicle unless the noise emitted by the vehicle is not more than 96 dBA if the vehicle was manufactured on or after January 1, 1986, or is not more than 101 dBA if the vehicle was manufactured before January 1, 1986. For purposes of this division, emitted noise shall be measured a distance of 20 inches from the vehicle tailpipe using test procedures established by the Society of Automotive Engineers under Standard J-1287.
   b. Sound systems. No person shall operate a motor vehicle sound system, whether affixed to the vehicle or not, between the hours of 10:00 p.m. and 8:00 a.m. the following morning, such that the sound system is audible to the human ear inside any inhabited dwelling. No person shall operate a motor vehicle sound system, whether affixed to the vehicle or not, at any other time such that the sound system is audible to the human ear at a distance greater than 100 feet from the vehicle.
2. Power tools and equipment. No person shall operate any power tools or equipment as specified in Section 8.01.010, such that the power tools or equipment is audible to the human ear inside an inhabited dwelling other than a dwelling in which the power tools or equipment may be located. No person shall operate any power tools or equipment at any other time such that the power tools or equipment are audible to the human ear at a distance greater than 100 feet from the power tools or equipment.
3. Audio equipment. No person shall operate any audio equipment, whether portable or not, between the hours of 10:00 p.m. and 8:00 a.m. the following morning such that the equipment is audible to the human ear inside an inhabited dwelling other than a dwelling in which the equipment may be located. No person shall operate any audio equipment, whether portable or not, at any other time such that the equipment is audible to the human ear at a distance greater than 100 feet from the equipment.
4. Sound-amplifying equipment and live music. No person shall install, use or operate sound-amplifying equipment, or perform, or allow to be performed, live music unless such activities comply with the following requirements. To the extent that these requirements conflict with any conditions of approval attached to an underlying land use permit, these requirements shall control.
   a. Sound-amplifying equipment or live music is prohibited between the hours of 10:00 p.m. and 8:00 a.m. the following morning on Sunday through Thursday and between the hours of 11:00 p.m. and 8:00 a.m. the following morning on Friday and Saturday.
   b. Sound emanating from sound-amplifying equipment or live music at any other time shall not be audible to the human ear at a distance greater than 200 feet from the equipment or music.

G. **Duty to Cooperate**. No person shall refuse to cooperate with, or obstruct, any peace officer or code enforcement officer when he or she is engaged in the process of enforcing the provisions of this chapter. This duty to cooperate may require a person to extinguish a sound source so that it can be determined whether sound emanating from the source violates the provisions of this chapter.

APPENDIX 5.1:

STUDY AREA PHOTOS

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JN: 14804 Study Area Photos

L1_E
33, 45' 29.770000"117, 10' 52.010000"

L1_N
33, 45' 29.770000"117, 10' 52.150000"

L1_S
33, 45' 29.790000"117, 10' 52.040000"

L1_W
33, 45' 29.770000"117, 10' 52.070000"

L2_E
33, 45' 29.430000"117, 10' 49.180000"

L2_N
33, 45' 30.080000"117, 10' 49.070000"

JN: 14804 Study Area Photos

L2_S
33, 45' 29.760000"117, 10' 49.130000"

L2_W
33, 45' 29.180000"117, 10' 49.210000"

L3_E
33, 45' 20.590000"117, 10' 49.350000"

L3_N
33, 45' 20.600000"117, 10' 49.350000"

L3_S
33, 45' 20.570000"117, 10' 49.350000"

L3_W
33, 45' 20.570000"117, 10' 49.370000"

JN: 14804 Study Area Photos

L4_E
33, 45' 14.200000"117, 10' 50.340000"

L4_N
33, 45' 14.420000"117, 10' 50.780000"

L4_S
33, 45' 14.280000"117, 10' 50.470000"

L4_W
33, 45' 14.170000"117, 10' 50.250000"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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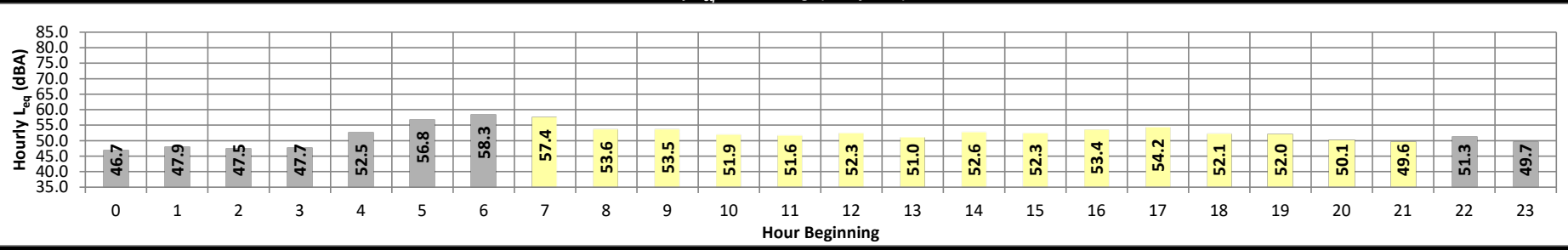
24-Hour Noise Level Measurement Summary

Date: Wednesday, October 13, 2021 *Location:* L1 - Located north of the Project site near Big League Dream *Meter:* Piccolo II *JN:* 14804

Project: Sherman and Mapes *Source:* Park at 2155 Trumble Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	46.7	53.8	42.5	53.5	53.1	51.3	50.1	46.9	45.1	43.1	42.9	42.6	46.7	10.0	56.7
	1	47.9	55.1	43.1	54.7	54.2	52.9	51.4	48.1	46.3	44.0	43.6	43.2	47.9	10.0	57.9
	2	47.5	55.9	41.3	55.6	55.2	53.4	51.9	47.5	44.9	42.1	41.7	41.4	47.5	10.0	57.5
	3	47.7	54.7	44.1	54.4	54.0	52.5	51.1	47.7	46.3	44.8	44.5	44.2	47.7	10.0	57.7
	4	52.5	59.3	48.4	59.1	58.8	57.5	56.1	52.7	50.8	49.1	48.9	48.5	52.5	10.0	62.5
	5	56.8	62.5	53.7	62.3	62.0	60.6	59.5	57.1	55.7	54.3	54.1	53.8	56.8	10.0	66.8
	6	58.3	62.9	55.9	62.7	62.4	61.6	60.7	58.6	57.7	56.5	56.3	56.0	58.3	10.0	68.3
Day	7	57.4	64.3	53.2	63.8	63.5	62.2	60.7	57.7	56.0	54.0	53.7	53.4	57.4	0.0	57.4
	8	53.6	64.2	48.2	63.8	63.6	62.0	59.5	54.2	51.9	49.2	48.7	48.4	53.6	0.0	53.6
	9	53.5	61.3	45.1	60.9	60.5	59.4	58.1	54.4	50.9	46.4	45.9	45.3	53.5	0.0	53.5
	10	51.9	61.2	42.4	60.9	60.5	59.4	58.4	54.8	51.3	45.2	43.5	42.7	51.9	0.0	51.9
	11	51.6	59.4	41.1	59.0	58.6	57.4	56.2	52.8	48.2	43.0	41.8	41.3	51.6	0.0	51.6
	12	52.3	61.6	42.4	61.3	60.9	59.8	58.5	54.8	50.0	44.2	43.1	42.5	52.3	0.0	52.3
	13	51.0	60.0	42.6	59.7	59.2	57.5	55.5	50.8	47.7	43.9	43.3	42.8	51.0	0.0	51.0
	14	52.6	60.5	43.2	60.2	59.7	58.3	57.0	53.3	50.2	45.0	44.2	43.3	52.6	0.0	52.6
	15	52.3	60.9	43.0	60.4	59.9	58.6	57.4	52.8	48.7	44.5	43.9	43.2	52.3	0.0	52.3
	16	53.4	62.6	44.0	62.2	61.8	59.9	57.8	53.6	50.4	45.8	45.1	44.2	53.4	0.0	53.4
	17	54.2	64.7	46.7	63.7	62.8	60.6	59.2	55.1	51.7	47.9	47.4	46.9	54.2	0.0	54.2
	18	52.1	60.3	46.9	60.0	59.6	58.1	56.9	53.6	51.2	47.9	47.5	47.0	52.1	0.0	52.1
	19	52.0	59.1	46.0	58.7	58.2	57.3	56.0	52.7	50.2	47.2	46.8	46.2	52.0	5.0	57.0
	20	50.1	59.7	43.7	59.3	58.9	57.4	55.5	51.2	47.8	44.8	44.4	43.9	50.1	5.0	55.1
	21	49.6	59.1	42.4	58.8	58.4	57.3	56.4	53.4	48.6	43.4	43.0	42.6	49.6	5.0	54.6
Night	22	51.3	57.4	47.3	57.1	56.7	55.6	54.8	51.8	49.9	48.0	47.7	47.4	51.3	10.0	61.3
	23	49.7	56.4	45.3	56.1	55.7	54.7	53.4	50.2	48.0	46.0	45.7	45.4	49.7	10.0	59.7

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	49.6	59.1	41.1	58.7	58.2	57.3	55.5	50.8	47.7	43.0	41.8	41.3
	Max	57.4	64.7	53.2	63.8	63.6	62.2	60.7	57.7	56.0	54.0	53.7	53.4
Energy Average		52.9	Average:		60.9	60.4	59.0	57.5	53.7	50.3	46.1	45.5	44.9
Night	Min	46.7	53.8	41.3	53.5	53.1	51.3	50.1	46.9	44.9	42.1	41.7	41.4
	Max	58.3	62.9	55.9	62.7	62.4	61.6	60.7	58.6	57.7	56.5	56.3	56.0
Energy Average		53.0	Average:		57.3	56.9	55.6	54.3	51.2	49.4	47.5	47.3	47.0

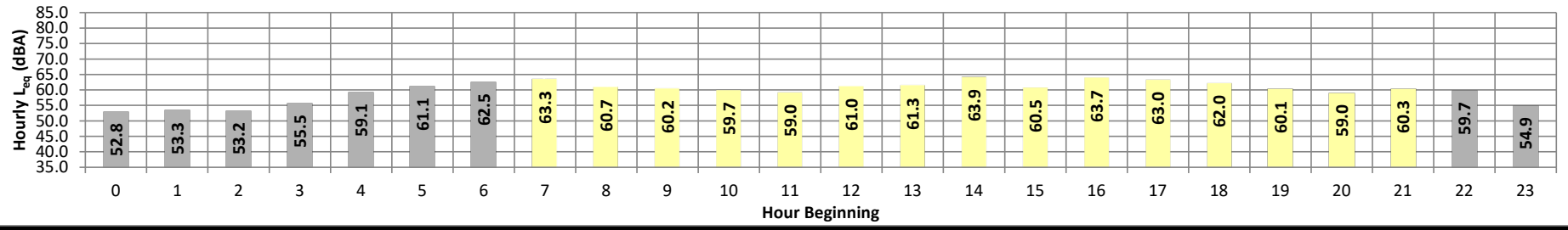
24-Hour	L_{eq} (dBA) Daytime (7am-10pm)	Nighttime (10pm-7am)
53.0	**52.9**	**53.0**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 13, 2021 *Location:* L2 - Located northeast of the Project site near single-family *Meter:* Piccolo II *JN:* 14804

Project: Sherman and Mapes *Source:* residence at 27570 Mapes Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	52.8	64.8	44.8	64.3	63.3	59.7	56.7	50.3	48.1	45.6	45.3	44.9	52.8	10.0	62.8
	1	53.3	64.8	45.6	64.4	63.7	60.1	56.8	51.2	48.8	46.4	46.0	45.7	53.3	10.0	63.3
	2	53.2	64.7	43.8	64.1	63.1	59.9	57.5	51.6	48.5	45.0	44.4	44.0	53.2	10.0	63.2
	3	55.5	66.9	46.8	66.4	65.5	62.6	60.4	53.1	50.2	47.7	47.3	46.9	55.5	10.0	65.5
	4	59.1	69.2	51.9	68.9	68.3	65.7	63.6	58.2	55.2	52.8	52.4	52.0	59.1	10.0	69.1
	5	61.1	69.8	55.6	69.4	68.7	66.6	65.4	61.1	58.2	56.2	55.9	55.6	61.1	10.0	71.1
	6	62.5	70.8	57.4	70.4	69.8	67.8	66.3	62.7	60.2	58.1	57.8	57.5	62.5	10.0	72.5
Day	7	63.3	72.1	55.5	71.7	71.0	69.0	67.8	63.8	60.0	56.3	56.0	55.6	63.3	0.0	63.3
	8	60.7	71.7	50.5	71.4	70.9	69.2	67.9	60.9	55.7	51.3	50.9	50.6	60.7	0.0	60.7
	9	60.2	70.3	46.1	69.9	69.3	66.9	65.3	60.3	55.0	48.0	47.1	46.3	60.2	0.0	60.2
	10	59.7	77.9	45.1	77.5	76.4	72.8	68.6	59.9	54.6	47.2	46.1	45.3	59.7	0.0	59.7
	11	59.0	69.8	44.3	69.3	68.4	65.6	64.0	58.6	53.2	45.9	45.1	44.5	59.0	0.0	59.0
	12	61.0	71.7	45.2	71.4	70.8	68.3	66.1	60.3	55.1	47.4	46.4	45.5	61.0	0.0	61.0
	13	61.3	73.2	45.7	72.8	72.1	69.0	66.2	58.8	53.7	47.5	46.7	45.9	61.3	0.0	61.3
	14	63.9	77.3	45.5	76.9	75.6	71.4	67.6	59.8	54.6	47.8	46.9	45.8	63.9	0.0	63.9
	15	60.5	71.6	47.1	71.1	70.2	67.4	65.1	59.9	55.4	49.0	48.2	47.4	60.5	0.0	60.5
	16	63.7	77.0	48.7	76.2	74.9	70.5	67.1	61.2	57.2	51.0	49.9	49.0	63.7	0.0	63.7
	17	63.0	74.8	50.9	74.1	73.1	69.7	67.2	62.0	58.0	52.4	51.6	51.0	63.0	0.0	63.0
	18	62.0	73.0	51.0	72.6	71.8	68.8	66.4	61.1	56.6	52.1	51.7	51.1	62.0	0.0	62.0
	19	60.1	70.4	50.5	69.9	69.2	66.7	64.7	59.6	55.8	51.7	51.2	50.6	60.1	5.0	65.1
	20	59.0	68.9	47.0	68.5	67.8	65.6	64.3	58.8	54.2	48.2	47.7	47.1	59.0	5.0	64.0
	21	60.3	72.7	45.6	71.9	70.8	67.5	65.1	58.6	52.3	46.8	46.4	45.8	60.3	5.0	65.3
Night	22	59.7	71.8	49.5	71.4	70.7	67.1	64.1	57.0	52.9	50.3	50.0	49.6	59.7	10.0	69.7
	23	54.9	64.9	47.7	64.5	63.9	61.6	59.7	53.8	50.6	48.4	48.2	47.9	54.9	10.0	64.9

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	59.0	68.9	44.3	68.5	67.8	65.6	64.0	58.6	52.3	45.9	45.1	44.5
	Max	63.9	77.9	55.5	77.5	76.4	72.8	68.6	63.8	60.0	56.3	56.0	55.6
Energy Average		61.5	Average:		72.3	71.5	68.6	66.2	60.2	55.4	49.5	48.8	48.1
Night	Min	52.8	64.7	43.8	64.1	63.1	59.7	56.7	50.3	48.1	45.0	44.4	44.0
	Max	62.5	71.8	57.4	71.4	70.7	67.8	66.3	62.7	60.2	58.1	57.8	57.5
Energy Average		58.3	Average:		67.1	66.3	63.5	61.1	55.5	52.5	50.0	49.7	49.4

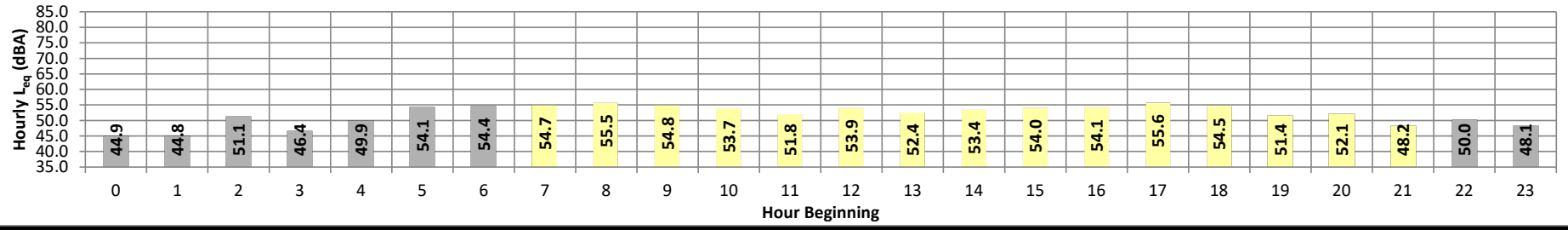
L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
60.5	**61.5**	**58.3**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 13, 2021 *Location:* L3 - Located east of the Project site near single-family *Meter:* Piccolo II *JN:* 14804

Project: Sherman and Mapes *Source:* residence at 25100 Sherman Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	44.9	56.0	39.9	55.5	54.2	50.0	47.2	43.6	42.3	40.6	40.3	40.0	44.9	10.0	54.9
	1	44.8	54.5	40.9	53.8	52.6	49.1	47.1	44.4	43.0	41.5	41.3	41.0	44.8	10.0	54.8
	2	51.1	62.8	40.3	62.4	61.7	59.3	55.9	49.0	43.5	41.2	40.8	40.4	51.1	10.0	61.1
	3	46.4	67.5	42.8	66.9	65.8	61.1	56.4	46.4	44.9	43.4	43.2	43.0	46.4	10.0	56.4
	4	49.9	57.2	47.2	56.7	55.9	53.2	51.6	49.9	49.0	47.8	47.5	47.3	49.9	10.0	59.9
	5	54.1	64.4	50.2	64.0	63.3	59.8	56.7	52.6	51.6	50.7	50.5	50.3	54.1	10.0	64.1
	6	54.4	64.3	51.0	63.6	62.5	59.5	57.1	53.3	52.3	51.5	51.3	51.1	54.4	10.0	64.4
Day	7	54.7	66.0	49.9	65.5	64.3	60.6	57.9	52.8	51.5	50.3	50.1	50.0	54.7	0.0	54.7
	8	55.5	71.6	45.8	70.9	69.3	64.4	60.7	54.0	49.0	46.5	46.3	46.0	55.5	0.0	55.5
	9	54.8	71.2	40.4	70.6	69.1	64.3	60.5	53.3	48.6	41.1	40.9	40.6	54.8	0.0	54.8
	10	53.7	65.6	41.3	65.0	64.0	61.1	59.4	54.6	49.2	42.8	42.3	41.5	53.7	0.0	53.7
	11	51.8	67.6	40.5	66.9	65.5	62.0	59.6	54.1	49.4	42.8	41.9	40.9	51.8	0.0	51.8
	12	53.9	68.2	41.3	67.7	66.6	63.2	61.0	54.6	48.9	43.1	42.4	41.5	53.9	0.0	53.9
	13	52.4	65.0	41.1	64.4	63.3	59.6	56.7	49.6	46.0	42.3	41.8	41.3	52.4	0.0	52.4
	14	53.4	68.7	41.7	67.8	66.2	62.2	59.5	53.0	48.7	43.8	43.1	42.0	53.4	0.0	53.4
	15	54.0	66.3	41.6	65.4	64.3	60.8	58.5	52.2	47.7	43.3	42.4	41.9	54.0	0.0	54.0
	16	54.1	67.1	42.8	66.4	65.0	61.3	58.5	50.9	47.0	43.9	43.3	42.9	54.1	0.0	54.1
	17	55.6	68.3	45.1	67.6	66.5	62.9	60.0	52.6	48.2	45.9	45.5	45.2	55.6	0.0	55.6
	18	54.5	67.2	45.6	66.6	65.4	62.1	59.8	53.0	48.8	46.4	46.1	45.7	54.5	0.0	54.5
	19	51.4	63.3	44.2	62.7	61.6	57.7	55.0	49.5	47.3	45.0	44.6	44.3	51.4	5.0	56.4
	20	52.1	68.2	43.2	67.7	66.5	62.3	58.9	50.8	47.1	44.2	43.7	43.3	52.1	5.0	57.1
	21	48.2	61.2	42.2	60.6	59.6	56.7	55.2	51.1	46.4	43.1	42.7	42.4	48.2	5.0	53.2
Night	22	50.0	61.2	45.0	60.3	59.1	55.8	53.4	48.4	47.2	45.7	45.4	45.1	50.0	10.0	60.0
	23	48.1	61.7	43.9	61.1	59.9	55.9	53.1	48.3	45.8	44.4	44.2	44.0	48.1	10.0	58.1

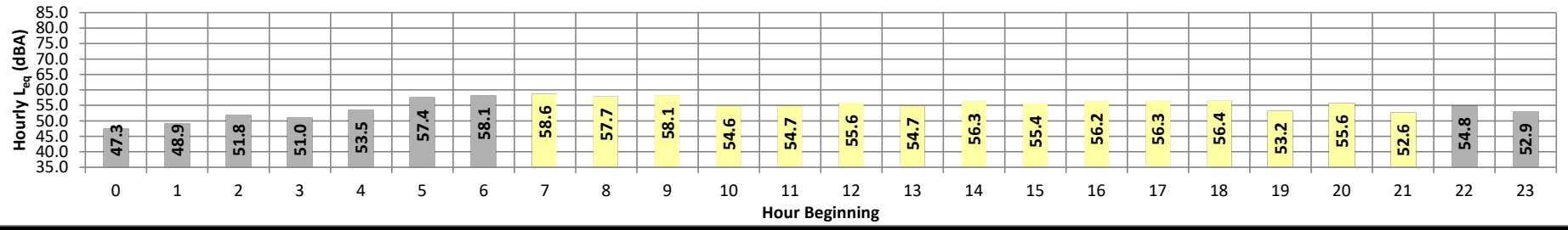
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	48.2	61.2	40.4	60.6	59.6	56.7	55.0	49.5	46.0	41.1	40.9	40.6
	Max	55.6	71.6	49.9	70.9	69.3	64.4	61.0	54.6	51.5	50.3	50.1	50.0
Energy Average		53.7	Average:		66.4	65.1	61.4	58.7	52.4	48.2	44.3	43.8	43.3
Night	Min	44.8	54.5	39.9	53.8	52.6	49.1	47.1	43.6	42.3	40.6	40.3	40.0
	Max	54.4	67.5	51.0	66.9	65.8	61.1	57.1	53.3	52.3	51.5	51.3	51.1
Energy Average		50.6	Average:		60.5	59.4	56.0	53.2	48.4	46.6	45.2	45.0	44.7

24-Hour	L_{eq} (dBA) Daytime (7am-10pm)	Nighttime (10pm-7am)
52.8	**53.7**	**50.6**

24-Hour Noise Level Measurement Summary

Date: Wednesday, October 13, 2021 *Location:* L4 - Located southeast of the Project site near single-family *Meter:* Piccolo II *JN:* 14804
Project: Sherman and Mapes *Source:* residence at 25210 Sherman Road. *Analyst:* A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	47.3	55.7	43.6	55.2	54.4	51.6	49.9	47.1	46.0	44.3	44.0	43.7	47.3	10.0	57.3
	1	48.9	55.8	44.6	55.5	54.9	53.3	52.2	48.9	47.5	45.4	45.1	44.7	48.9	10.0	58.9
	2	51.8	61.4	44.1	60.9	60.0	58.1	56.5	51.5	48.7	45.2	44.6	44.2	51.8	10.0	61.8
	3	51.0	62.0	46.4	61.4	60.2	56.3	53.5	49.6	48.4	47.1	46.8	46.5	51.0	10.0	61.0
	4	53.5	58.8	51.0	58.5	58.0	56.4	55.5	53.9	52.9	51.6	51.3	51.1	53.5	10.0	63.5
	5	57.4	64.8	54.6	64.4	63.8	61.5	60.0	57.1	56.1	55.1	54.9	54.7	57.4	10.0	67.4
	6	58.1	65.9	55.4	65.4	64.6	61.8	60.6	57.7	56.8	55.8	55.6	55.5	58.1	10.0	68.1
Day	7	58.6	68.8	54.5	68.4	67.5	64.4	61.8	57.1	56.0	54.9	54.8	54.6	58.6	0.0	58.6
	8	57.7	69.4	50.1	68.7	67.5	64.5	61.9	56.3	52.9	50.7	50.5	50.2	57.7	0.0	57.7
	9	58.1	69.6	44.7	69.3	68.5	65.4	63.0	56.3	50.9	45.9	45.4	44.9	58.1	0.0	58.1
	10	54.6	65.2	43.4	64.8	64.1	61.2	59.0	53.9	50.1	45.1	44.3	43.6	54.6	0.0	54.6
	11	54.7	67.4	43.0	66.9	65.8	61.8	58.2	52.1	49.4	44.2	43.7	43.2	54.7	0.0	54.7
	12	55.6	67.0	43.7	66.5	65.6	62.5	60.3	54.8	49.9	45.1	44.6	43.9	55.6	0.0	55.6
	13	54.7	66.7	44.4	66.2	65.2	62.2	60.0	51.2	48.0	45.3	44.9	44.5	54.7	0.0	54.7
	14	56.3	67.7	43.6	67.2	66.2	63.5	61.7	54.0	50.1	45.6	44.8	43.8	56.3	0.0	56.3
	15	55.4	68.1	44.9	67.5	66.5	62.4	59.3	52.9	49.1	45.9	45.5	45.0	55.4	0.0	55.4
	16	56.2	67.8	47.0	67.3	66.3	63.5	61.3	54.0	50.7	48.0	47.6	47.1	56.2	0.0	56.2
	17	56.3	67.3	49.6	66.8	65.8	62.6	60.3	55.0	52.4	50.4	50.1	49.7	56.3	0.0	56.3
	18	56.4	66.4	50.4	66.0	65.2	62.4	60.5	55.6	53.1	51.1	50.8	50.5	56.4	0.0	56.4
	19	53.2	62.2	48.5	61.8	61.1	58.6	56.9	52.8	50.8	49.2	48.9	48.6	53.2	5.0	58.2
	20	55.6	65.0	48.9	64.6	64.0	61.9	60.0	54.8	52.5	49.9	49.6	49.1	55.6	5.0	60.6
	21	52.6	62.1	46.4	61.4	60.6	58.1	56.7	52.6	49.8	47.3	46.9	46.5	52.6	5.0	57.6
Night	22	54.8	65.7	49.4	65.4	64.6	60.9	57.7	52.8	51.5	50.0	49.7	49.5	54.8	10.0	64.8
	23	52.9	62.8	48.3	62.6	61.8	58.6	55.9	51.6	50.4	48.9	48.7	48.4	52.9	10.0	62.9

Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	52.6	62.1	43.0	61.4	60.6	58.1	56.7	51.2	48.0	44.2	43.7	43.2
	Max	58.6	69.6	54.5	69.3	68.5	65.4	63.0	57.1	56.0	54.9	54.8	54.6
Energy Average		56.0	Average:		66.2	65.3	62.3	60.1	54.2	51.0	47.9	47.5	47.0
Night	Min	47.3	55.7	43.6	55.2	54.4	51.6	49.9	47.1	46.0	44.3	44.0	43.7
	Max	58.1	65.9	55.4	65.4	64.6	61.8	60.6	57.7	56.8	55.8	55.6	55.5
Energy Average		54.1	Average:		61.0	60.3	57.6	55.7	52.3	50.9	49.3	49.0	48.7

L_{eq} (dBA)		
24-Hour	Daytime (7am-10pm)	Nighttime (10pm-7am)
55.4	**56.0**	**54.1**

APPENDIX 7.1:

CADNAA OPERATIONAL NOISE MODEL INPUTS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E
Road Name: Trumble Rd.
Road Segment: n/o Mapes Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,190 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	327 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.84	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.26	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.03	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.1	58.7	57.0	54.8	62.0	62.3
Medium Trucks:	63.7	62.6	58.9	58.4	65.6	65.8
Heavy Trucks:	66.8	66.1	60.9	59.8	67.6	67.8
Vehicle Noise:	69.1	68.2	64.0	62.9	70.4	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	246	529
CNEL:	55	119	256	551

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P
Road Name: Trumble Rd.
Road Segment: n/o Mapes Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,215 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	329 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.97%
Medium Trucks:	71.7%	7.7%	20.6%	13.83%
Heavy Trucks:	80.0%	6.0%	14.0%	9.21%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.81	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.26	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.03	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.2	58.8	57.1	54.8	62.0	62.4
Medium Trucks:	63.7	62.6	58.9	58.4	65.6	65.8
Heavy Trucks:	66.8	66.1	60.9	59.8	67.6	67.8
Vehicle Noise:	69.1	68.2	64.0	62.9	70.4	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	246	530
CNEL:	55	119	256	551

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC 2024
Road Name: Trumble Rd.
Road Segment: n/o Mapes Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,316 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	415 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.81	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.23	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-16.00	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.8	58.1	55.8	63.0	63.4
Medium Trucks:	64.8	63.6	59.9	59.4	66.6	66.8
Heavy Trucks:	67.8	67.1	61.9	60.8	68.6	68.9
Vehicle Noise:	70.1	69.2	65.0	63.9	71.4	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	134	288	620
CNEL:	65	139	300	646

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC+P 2024
Road Name: Trumble Rd.
Road Segment: n/o Mapes Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,340 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	417 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.94%
Medium Trucks:	71.7%	7.7%	20.6%	13.84%
Heavy Trucks:	80.0%	6.0%	14.0%	9.22%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.78	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.23	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-16.00	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.8	58.1	55.9	63.0	63.4
Medium Trucks:	64.8	63.6	59.9	59.4	66.6	66.8
Heavy Trucks:	67.8	67.1	61.9	60.8	68.6	68.9
Vehicle Noise:	70.1	69.2	65.0	63.9	71.4	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	62	134	288	620
CNEL:	65	139	300	646

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E | Project Name: Mapes & Sherman
Road Name: Trumble Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,237 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	643 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.90	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.33	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-14.09	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.1	61.7	60.0	57.7	64.9	65.3
Medium Trucks:	66.7	65.5	61.8	61.3	68.5	68.7
Heavy Trucks:	69.7	69.0	63.8	62.7	70.5	70.8
Vehicle Noise:	72.0	71.1	66.9	65.8	73.3	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	83	179	385	830
CNEL:	86	186	401	864

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | Project Name: Mapes & Sherman
Road Name: Trumble Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,538 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	666 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.41%
Medium Trucks:	71.7%	7.7%	20.6%	13.95%
Heavy Trucks:	80.0%	6.0%	14.0%	9.64%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.77	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.16	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-13.76	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.2	61.8	60.1	57.9	65.0	65.4
Medium Trucks:	66.8	65.7	62.0	61.5	68.7	68.9
Heavy Trucks:	70.0	69.3	64.1	63.0	70.8	71.1
Vehicle Noise:	72.3	71.4	67.2	66.1	73.6	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	186	400	863
CNEL:	90	193	417	898

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC 2024 | Project Name: Mapes & Sherman
Road Name: Trumble Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,021 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	782 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.05	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.48	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-13.24	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.5	60.8	58.6	65.7	66.1
Medium Trucks:	67.5	66.4	62.7	62.2	69.3	69.6
Heavy Trucks:	70.5	69.9	64.7	63.5	71.4	71.6
Vehicle Noise:	72.9	72.0	67.8	66.7	74.2	74.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	95	204	439	946
CNEL:	99	212	457	985

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC+P 2024 | Project Name: Mapes & Sherman
Road Name: Trumble Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,321 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	805 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.48%
Medium Trucks:	71.7%	7.7%	20.6%	13.94%
Heavy Trucks:	80.0%	6.0%	14.0%	9.57%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.94	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.34	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-12.97	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.6	60.9	58.7	65.8	66.2
Medium Trucks:	67.7	66.5	62.8	62.3	69.5	69.7
Heavy Trucks:	70.8	70.1	64.9	63.8	71.6	71.9
Vehicle Noise:	73.1	72.2	68.0	66.9	74.4	74.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	98	210	453	977
CNEL:	102	219	472	1,017

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E | Project Name: Mapes & Sherman
Road Name: Sherman Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	872 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	68 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-14.14	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-21.57	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-23.33	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.7	50.0	47.7	54.9	55.2
Medium Trucks:	56.9	55.7	52.0	51.5	58.7	59.0
Heavy Trucks:	60.4	59.7	54.5	53.4	61.2	61.4
Vehicle Noise:	62.5	61.6	57.3	56.2	63.7	64.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	31	66	142
CNEL:	15	32	68	147

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | Project Name: Mapes & Sherman
Road Name: Sherman Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,155 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	90 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	81.14%
Medium Trucks:	71.7%	7.7%	20.6%	11.09%
Heavy Trucks:	80.0%	6.0%	14.0%	7.77%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-12.69	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-21.33	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-22.87	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	54.5	53.1	51.4	49.2	56.3	56.7
Medium Trucks:	57.1	56.0	52.3	51.8	58.9	59.2
Heavy Trucks:	60.8	60.2	55.0	53.8	61.7	61.9
Vehicle Noise:	63.0	62.1	57.9	56.8	64.3	64.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	15	33	71	154
CNEL:	16	35	74	160

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC 2024 | Project Name: Mapes & Sherman
Road Name: Sherman Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	925 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	72 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-13.89	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-21.31	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-23.08	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.3	51.9	50.2	48.0	55.1	55.5
Medium Trucks:	57.1	56.0	52.3	51.8	59.0	59.2
Heavy Trucks:	60.6	60.0	54.8	53.6	61.5	61.7
Vehicle Noise:	62.8	61.9	57.6	56.5	64.0	64.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	15	32	68	147
CNEL:	15	33	71	153

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC+P 2024 | Project Name: Mapes & Sherman
Road Name: Sherman Rd. | Job Number: 14804
Road Segment: s/o Mapes Rd.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,208 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	94 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	80.95%
Medium Trucks:	71.7%	7.7%	20.6%	11.21%
Heavy Trucks:	80.0%	6.0%	14.0%	7.84%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-12.50	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-21.09	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-22.64	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	54.7	53.3	51.6	49.4	56.5	56.9
Medium Trucks:	57.4	56.2	52.5	52.0	59.2	59.4
Heavy Trucks:	61.1	60.4	55.2	54.1	61.9	62.1
Vehicle Noise:	63.3	62.4	58.2	57.0	64.5	64.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	16	34	74	159
CNEL:	17	36	77	166

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E
Road Name: Mapes Rd.
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,505 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	429 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-6.65	0.71	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-14.08	0.74	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-15.84	0.73	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.3	59.9	58.2	56.0	63.1	63.5
Medium Trucks:	64.9	63.8	60.1	59.6	66.7	67.0
Heavy Trucks:	67.9	67.3	62.1	60.9	68.8	69.0
Vehicle Noise:	70.3	69.4	65.2	64.1	71.6	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	63	137	295	635
CNEL:	66	142	307	661

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P
Road Name: Mapes Rd.
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,829 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	455 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	68.0%	11.5%	20.6%	76.31%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.78%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-6.43	0.71	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-13.83	0.74	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-15.36	0.73	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.5	60.1	58.4	56.2	63.4	63.7
Medium Trucks:	65.2	64.0	60.3	59.8	67.0	67.2
Heavy Trucks:	68.4	67.7	62.5	61.4	69.2	69.5
Vehicle Noise:	70.7	69.8	65.5	64.4	71.9	72.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	67	145	312	672
CNEL:	70	151	325	699

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC 2024
Road Name: Mapes Rd.
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,252 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	488 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-6.10	0.71	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-13.52	0.74	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-15.29	0.73	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.9	60.5	58.8	56.5	63.7	64.1
Medium Trucks:	65.5	64.3	60.6	60.1	67.3	67.5
Heavy Trucks:	68.5	67.8	62.6	61.5	69.3	69.6
Vehicle Noise:	70.8	69.9	65.7	64.6	72.1	72.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	69	149	321	691
CNEL:	72	155	334	719

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC+P 2024
Road Name: Mapes Rd.
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,576 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	513 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	68.0%	11.5%	20.6%	76.37%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.72%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-5.91	0.71	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-13.30	0.74	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-14.86	0.73	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.1	60.7	59.0	56.7	63.9	64.2
Medium Trucks:	65.7	64.5	60.9	60.4	67.5	67.8
Heavy Trucks:	68.9	68.2	63.0	61.9	69.7	70.0
Vehicle Noise:	71.2	70.3	66.0	64.9	72.4	72.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	73	157	337	727
CNEL:	76	163	351	756

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E | Project Name: Mapes & Sherman
Road Name: Bonnie Dr. | Job Number: 14804
Road Segment: w/o I-215 SB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,544 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	432 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-6.11	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-13.54	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-15.30	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.1	59.7	58.0	55.8	62.9	63.3
Medium Trucks:	64.9	63.7	60.1	59.6	66.7	67.0
Heavy Trucks:	68.4	67.7	62.5	61.4	69.2	69.5
Vehicle Noise:	70.5	69.7	65.4	64.3	71.8	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	486
CNEL:	51	109	235	506

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P | Project Name: Mapes & Sherman
Road Name: Bonnie Dr. | Job Number: 14804
Road Segment: w/o I-215 SB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,592 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	436 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	77.04%
Medium Trucks:	71.7%	7.7%	20.6%	13.79%
Heavy Trucks:	80.0%	6.0%	14.0%	9.18%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-6.06	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-13.54	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-15.30	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.1	59.7	58.0	55.8	63.0	63.3
Medium Trucks:	64.9	63.7	60.1	59.6	66.7	67.0
Heavy Trucks:	68.4	67.7	62.5	61.4	69.2	69.5
Vehicle Noise:	70.5	69.7	65.4	64.3	71.8	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	487
CNEL:	51	109	235	506

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC 2024 | Project Name: Mapes & Sherman
Road Name: Bonnie Dr. | Job Number: 14804
Road Segment: w/o I-215 SB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,034 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	705 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-3.99	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-11.41	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-13.18	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.2	61.8	60.1	57.9	65.0	65.4
Medium Trucks:	67.0	65.9	62.2	61.7	68.9	69.1
Heavy Trucks:	70.5	69.9	64.6	63.5	71.4	71.6
Vehicle Noise:	72.7	71.8	67.5	66.4	73.9	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	67	145	312	673
CNEL:	70	151	325	701

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC+P 2024 | Project Name: Mapes & Sherman
Road Name: Bonnie Dr. | Job Number: 14804
Road Segment: w/o I-215 SB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,083 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	708 vehicles
Vehicle Speed:	40 mph
Near/Far Lane Distance:	12 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	37.0 feet
Centerline Dist. to Observer:	37.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.96%
Medium Trucks:	71.7%	7.7%	20.6%	13.83%
Heavy Trucks:	80.0%	6.0%	14.0%	9.21%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	36.851
Medium Trucks:	36.610
Heavy Trucks:	36.634

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	-3.96	1.88	-1.20	-4.56	0.000	0.000
Medium Trucks:	77.72	-11.41	1.93	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-13.18	1.92	-1.20	-5.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.2	61.8	60.1	57.9	65.1	65.4
Medium Trucks:	67.0	65.9	62.2	61.7	68.9	69.1
Heavy Trucks:	70.5	69.9	64.6	63.5	71.4	71.6
Vehicle Noise:	72.7	71.8	67.5	66.4	73.9	74.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	67	145	313	674
CNEL:	70	151	325	701

Wednesday, September 21, 2022

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E
Road Name: Hwy. 74
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,726 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	1,461 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-2.21	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	82.40	-9.63	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-11.40	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.1	67.7	66.0	63.7	70.9	71.3
Medium Trucks:	72.3	71.2	67.5	67.0	74.1	74.4
Heavy Trucks:	74.5	73.8	68.6	67.5	75.4	75.6
Vehicle Noise:	77.3	76.4	72.3	71.1	78.6	78.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	187	404	870	1,874
CNEL:	195	420	906	1,952

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: E+P
Road Name: Hwy. 74
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,091 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	1,489 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	77.28%
Medium Trucks:	71.7%	7.7%	20.6%	13.64%
Heavy Trucks:	80.0%	6.0%	14.0%	9.08%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-2.10	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	82.40	-9.63	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-11.40	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.8	66.1	63.9	71.0	71.4
Medium Trucks:	72.3	71.2	67.5	67.0	74.1	74.4
Heavy Trucks:	74.5	73.8	68.6	67.5	75.4	75.6
Vehicle Noise:	77.3	76.4	72.3	71.2	78.6	78.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	188	405	872	1,879
CNEL:	196	422	909	1,957

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC 2024
Road Name: Hwy. 74
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,606 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	1,763 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	76.84%
Medium Trucks:	71.7%	7.7%	20.6%	13.91%
Heavy Trucks:	80.0%	6.0%	14.0%	9.26%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-1.39	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	82.40	-8.81	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-10.58	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.5	66.8	64.6	71.7	72.1
Medium Trucks:	73.1	72.0	68.3	67.8	75.0	75.2
Heavy Trucks:	75.4	74.7	69.5	68.3	76.2	76.4
Vehicle Noise:	78.1	77.2	73.1	72.0	79.4	79.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	212	458	986	2,125
CNEL:	221	477	1,027	2,213

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (9/12/2021)

Scenario: OYC+P 2024
Road Name: Hwy. 74
Road Segment: e/o Trumble Rd.
Project Name: Mapes & Sherman
Job Number: 14804

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,971 vehicles
Peak Hour Percentage:	7.80%
Peak Hour Volume:	1,792 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	48 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	68.0%	11.5%	20.6%	77.20%
Medium Trucks:	71.7%	7.7%	20.6%	13.69%
Heavy Trucks:	80.0%	6.0%	14.0%	9.11%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.004	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	44.147
Medium Trucks:	43.947
Heavy Trucks:	43.966

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-1.30	0.71	-1.20	-4.65	0.000	0.000
Medium Trucks:	82.40	-8.81	0.74	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-10.58	0.73	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.6	66.9	64.7	71.8	72.2
Medium Trucks:	73.1	72.0	68.3	67.8	75.0	75.2
Heavy Trucks:	75.4	74.7	69.5	68.3	76.2	76.4
Vehicle Noise:	78.1	77.2	73.1	72.0	79.4	79.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	213	459	988	2,130
CNEL:	222	478	1,030	2,218

APPENDIX 10.1:

CADNAA CONSTRUCTION NOISE MODEL INPUTS

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14804 - Mapes & Sherman

CadnaA Noise Prediction Model: 14804-02_Construction.cna
Date: 21.09.22
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	64.4	-40.4	61.4	65.0	45.0	0.0				5.00	a	6278284.73	2220674.10	5.00
RECEIVERS		R2	62.3	-42.5	59.3	65.0	45.0	0.0				5.00	a	6278938.53	2220671.62	5.00
RECEIVERS		R3	65.6	-39.1	62.6	65.0	45.0	0.0				5.00	a	6278960.23	2219947.28	5.00
RECEIVERS		R4	60.4	-44.4	57.4	65.0	45.0	0.0				5.00	a	6279055.75	2219415.37	5.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
SITEBOUNDARY		CONSTRUCTION	119.8	15.0	15.0	72.3	-32.5	-32.5	PWL-Pt	115					8	a

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
SITEBOUNDARY	8.00	a		6278197.28	2219592.88	8.00	0.00
				6278210.90	2220549.58	8.00	0.00
				6278840.86	2220542.88	8.00	0.00
				6278829.61	2219586.87	8.00	0.00

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APPENDIX 10.2:

CADNAA CONCRETE POUR NOISE MODEL INPUTS

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14804 - Mapes & Sherman

CadnaA Noise Prediction Model: 14804-02_Concrete.cna
Date: 22.09.22
Analyst: B. Lawson

Calculation Configuration

Configuration	
Parameter	**Value**
General	
Max. Error (dB)	**0.00**
Max. Search Radius (#(Unit,LEN))	**2000.01**
Min. Dist Src to Rcvr	**0.00**
Partition	
Raster Factor	**0.50**
Max. Length of Section (#(Unit,LEN))	**999.99**
Min. Length of Section (#(Unit,LEN))	**1.01**
Min. Length of Section (%)	**0.00**
Proj. Line Sources	**On**
Proj. Area Sources	**On**
Ref. Time	
Reference Time Day (min)	**960.00**
Reference Time Night (min)	**480.00**
Daytime Penalty (dB)	**0.00**
Recr. Time Penalty (dB)	**5.00**
Night-time Penalty (dB)	**10.00**
DTM	
Standard Height (m)	**0.00**
Model of Terrain	**Triangulation**
Reflection	
max. Order of Reflection	**2**
Search Radius Src	**100.00**
Search Radius Rcvr	**100.00**
Max. Distance Source - Rcvr	**1000.00 1000.00**
Min. Distance Rvcr - Reflector	**1.00 1.00**
Min. Distance Source - Reflector	**0.10**
Industrial (ISO 9613)	
Lateral Diffraction	**some Obj**
Obst. within Area Src do not shield	**On**
Screening	**Incl. Ground Att. over Barrier**
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	**3.0 20.0 0.0**
Temperature (#(Unit,TEMP))	**10**
rel. Humidity (%)	**70**
Ground Absorption G	**0.50**
Wind Speed for Dir. (#(Unit,SPEED))	**3.0**
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height		Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
RECEIVERS		R1	42.9	42.9	49.6	65.0	45.0	0.0				5.00	a	6278284.73	2220674.10	5.00
RECEIVERS		R2	41.9	41.9	48.5	65.0	45.0	0.0				5.00	a	6278938.53	2220671.62	5.00
RECEIVERS		R3	44.9	44.9	51.6	65.0	45.0	0.0				5.00	a	6278960.23	2219947.28	5.00
RECEIVERS		R4	41.0	41.0	47.6	65.0	45.0	0.0				5.00	a	6279055.75	2219415.37	5.00

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
BUILDING		CONCRETE	100.3	100.3	100.3	56.1	56.1	56.1	Lw	100.3					8	a

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(ft)		(ft)	(ft)	(ft)	(ft)	(ft)
BUILDING	8.00	a		6278332.57	2220425.32	8.00	0.00
				6278743.89	2220417.15	8.00	0.00
				6278735.71	2219649.85	8.00	0.00
				6278324.32	2219656.48	8.00	0.00
				6278323.76	2219763.06	8.00	0.00
				6278381.63	2219763.69	8.00	0.00
				6278391.06	2220325.32	8.00	0.00
				6278335.08	2220327.21	8.00	0.00

Building(s)

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
BUILDING		BUILDING00002	x	0		15.00	a	6278968.41	2220002.65	15.00	0.00
								6278999.16	2220002.65	15.00	0.00
								6278997.85	2219914.99	15.00	0.00
								6278965.79	2219914.99	15.00	0.00
BUILDING		BUILDING00003	x	0		15.00	a	6278974.30	2220162.93	15.00	0.00
								6279016.17	2220162.93	15.00	0.00
								6279015.51	2220091.62	15.00	0.00
								6278971.03	2220092.93	15.00	0.00
BUILDING		BUILDING00004	x	0		15.00	a	6278957.94	2219825.36	15.00	0.00
								6278991.96	2219824.05	15.00	0.00
								6278992.62	2219744.24	15.00	0.00
								6278966.45	2219744.24	15.00	0.00

Ground Absorption(s)

Name	M.	ID	G	Coordinates	
				x	y
				(ft)	(ft)
GROUND		0	1.0	6278871.34	2220423.57
				6278910.19	2220427.08
				6278901.51	2219644.09
				6278861.93	2219645.82