Indian Street Commerce Center

NOISE IMPACT ANALYSIS

CITY OF MORENO VALLEY

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TABLE OF CONTENTS

TABLE OF CONTENTS ..... **III**
APPENDICES ..... **V**
LIST OF EXHIBITS ..... **V**
LIST OF TABLES ..... **VI**
LIST OF ABBREVIATED TERMS ..... **VII**

1 INTRODUCTION **1**
1.1 Site Location 1
1.2 Study Area 1
1.3 Project Description 1
2 FUNDAMENTALS **7**
2.1 Range of Noise 7
2.2 Noise Descriptors 8
2.3 Sound Propagation 8
2.4 Traffic Noise Prediction 9
2.5 Noise Control 10
2.6 Noise Barrier Attenuation 10
2.7 Land Use Compatibility With Noise 10
2.8 Community Response to Noise 10
2.9 Vibration 11
3 REGULATORY SETTING **13**
3.1 State of California Noise Requirements 13
3.2 State of California Green Building Standards Code 13
3.3 Transportation Noise Standards 13
3.4 Stationary/Area-Source Noise Standards 17
3.5 Construction Noise Standards 18
3.6 Vibration Standards 20
3.7 March Air Reserve Base/Inland Port Airport Land Use Compatibility 21
4 THRESHOLDS OF SIGNIFICANCE **25**
4.1 Standards of Significance 25
4.2 Noise Impact Significance Criteria 25
5 EXISTING NOISE LEVEL MEASUREMENTS **33**
5.1 Measurement Procedure and Criteria 33
5.2 Noise Measurement Locations 33
5.3 Noise Measurement Results 35
6 METHODS AND PROCEDURES **37**
6.1 FHWA Traffic Noise Prediction Model 37
6.2 Off-Site Traffic Noise Prediction Model Inputs 37
6.3 Vibration Assessment 41

7 OFF-SITE TRANSPORTATION NOISE IMPACTS 43
7.1 Traffic Noise Contours 43
7.2 Existing Condition Project Traffic Noise Level Contributions 48
7.3 Opening Year 2020 Project Traffic Noise Level Contributions 49
7.4 Off-Site Traffic Noise Impacts to the Project Site 50
8 RECEIVER LOCATIONS 51
9 STATIONARY/AREA-SOURCE NOISE IMPACTS 53
9.1 Stationary/Area-Source Noise Standards 53
9.2 Stationary/Area-Source Noise Sources 54
9.3 Reference Noise Levels 54
9.4 Project Stationary/Area-Source Noise Levels 57
9.5 Project Stationary/Area-Source Noise Level Contributions 60
9.6 Stationary/Area-Source Vibration Impacts 61
10 CONSTRUCTION IMPACTS 63
10.1 Construction Noise Standards 63
10.2 Construction Noise Levels 64
10.3 Construction Reference Noise Levels 65
10.4 Construction Noise Analysis 66
10.5 Construction Noise Thresholds of Significance 71
10.6 Construction Vibration Impacts 71
11 FINDINGS AND CONCLUSIONS 75
11.1 Off-Site Traffic Noise Analysis 75
11.2 Stationary/Area-Source Noise Analysis 75
11.3 Construction Noise and Vibration Analysis 76
12 REFERENCES 77
13 CERTIFICATION 79

APPENDICES

APPENDIX 3.1: CITY OF MORENO VALLEY MUNICIPAL CODE
APPENDIX 3.2: CITY OF PERRIS MUNICIPAL CODE
APPENDIX 5.1: STUDY AREA PHOTOS
APPENDIX 5.2: NOISE LEVEL MEASUREMENT WORKSHEETS
APPENDIX 7.1: OFF-SITE TRAFFIC NOISE CONTOURS
APPENDIX 9.1: REFERENCE DISTRIBUTION/WAREHOUSE NOISE SOURCE PHOTOS
APPENDIX 9.2: STATIONARY/AREA-SOURCE NOISE CALCULATIONS
APPENDIX 10.1: CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS MEMO

LIST OF EXHIBITS

EXHIBIT 1-A: LOCATION MAP 3
EXHIBIT 1-B: EXISTING LAND USES 4
EXHIBIT 1-C: SITE PLAN 5
EXHIBIT 2-A: TYPICAL NOISE LEVELS 7
EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION 11
EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION 12
EXHIBIT 3-A: LAND USE NOISE COMPATIBILITY CRITERIA 15
EXHIBIT 3-B: RC ALUCP SUPPORTING COMPATIBILITY CRITERIA: NOISE 22
EXHIBIT 3-C: MARB/IPA FUTURE AIRPORT NOISE CONTOURS 23
EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS 34
EXHIBIT 8-A: RECEIVER LOCATIONS 52
EXHIBIT 9-A: STATIONARY/AREA-SOURCE NOISE SOURCE LOCATIONS 59

LIST OF TABLES

TABLE 3-1: STATIONARY/AREA-SOURCE NOISE STANDARDS AT 200 FEET FROM THE SOURCE 18
TABLE 3-2: STATIONARY/AREA-SOURCE NOISE STANDARDS AT THE RECEIVING LAND USE..... 18
TABLE 3-3: CONSTRUCTION NOISE STANDARDS AT 200 FEET FROM THE SOURCE LAND USE..... 19
TABLE 3-4: CONSTRUCTION NOISE STANDARDS AT THE RECEIVING LAND USE..... 20
TABLE 4-1: SUMMARY OF SIGNIFICANCE THRESHOLDS..... 31
TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS 36
TABLE 6-1: OFF-SITE ROADWAY PARAMETERS..... 38
TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES 38
TABLE 6-3: TIME OF DAY VEHICLE SPLITS 39
TABLE 6-4: WITHOUT PROJECT CONDITIONS VEHICLE MIX..... 40
TABLE 6-5: EXISTING WITH PROJECT CONDITIONS VEHICLE MIX 40
TABLE 6-6: OPENING YEAR 2020 WITH PROJECT CONDITIONS VEHICLE MIX 41
TABLE 6-7: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT 42
TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS 44
TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS 45
TABLE 7-3: OPENING YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS 46
TABLE 7-4: OPENING YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS 47
TABLE 7-5: EXISTING CONDITION OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS 48
TABLE 7-6: OPENING YEAR 2020 OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS..... 49
TABLE 9-1: REFERENCE NOISE LEVEL MEASUREMENTS 57
TABLE 9-2: STATIONARY/AREA-SOURCE NOISE LEVEL PROJECTIONS AT A DISTANCE OF 200 FEET 58
TABLE 9-3: STATIONARY/AREA-SOURCE NOISE LEVEL PROJECTIONS AT RECEIVER LOCATIONS 58
TABLE 9-4: DAYTIME STATIONARY/AREA-SOURCE NOISE LEVEL CONTRIBUTIONS 60
TABLE 9-5: NIGHTTIME STATIONARY/AREA-SOURCE NOISE LEVEL CONTRIBUTIONS..... 61
TABLE 10-1: CONSTRUCTION REFERENCE NOISE LEVELS 65
TABLE 10-2: SITE PREPARATION EQUIPMENT NOISE LEVELS 66
TABLE 10-3: GRADING EQUIPMENT NOISE LEVELS..... 67
TABLE 10-4: BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS..... 68
TABLE 10-5: PAVING EQUIPMENT NOISE LEVELS..... 69
TABLE 10-6: ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS..... 70
TABLE 10-7: UNMITIGATED CONSTRUCTION NOISE LEVEL SUMMARY (DBA LEQ)..... 71
TABLE 10-8: CONSTRUCTION EQUIPMENT VIBRATION LEVELS (VDB) 72
TABLE 10-9: CONSTRUCTION EQUIPMENT VIBRATION LEVELS (IN/SEC PPV) 73

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
AICUZ	Air Installation Compatible Use Zone Study
ALUCP	Airport Land Use Compatibility Plan
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
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
I-215	Interstate 215
INCE	Institute of Noise Control Engineering
Leq	Equivalent continuous (average) sound level
Lmax	Maximum level measured over the time interval
Lmin	Minimum level measured over the time interval
MARB/IPA	March Air Reserve Base/Inland Port Airport
mph	Miles per hour
PPV	Peak particle velocity
Project	Indian Street Commerce Center
RCNM	Roadway Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Indian Street Commerce Center ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for 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/area-source and short-term construction noise impacts.

1.1 SITE LOCATION

The proposed Indian Street Commerce Center site is located at 17845 Indian Street in the City of Moreno Valley, as shown on Exhibit 1-A. Interstate 215 (I-215) Freeway is located approximately one mile west of the Project site. The March Air Reserve Base/Inland Port Airport (MARB/IPA) is located approximately one-half mile west of the Project site.

1.2 STUDY AREA

The Project site is currently vacant and is designated by the City of Moreno Valley General Plan Land Use Map, Figure 2-2, as Business Park/Light Industrial land use. (1) The properties adjacent to the Project site on all sides are also designated as Business Park/Light Industrial land use. Existing Open Space land use is located west of the Project site at the southern boundary of the MARB/IPA. The existing land uses are shown on Exhibit 1-B.

1.3 PROJECT DESCRIPTION

The Project is proposed to consist of approximately 446,350 square feet, of which 357,080 square feet would be allocated to high-cube warehouse/distribution center use and 89,270 square feet to manufacturing use within a single building. Supporting office uses would be also incorporated in the building design. Please refer to Exhibit 1-C. At the time this noise analysis was prepared the future tenants of the proposed Project were unknown. To present the potential worst-case noise conditions, this analysis assumes the Project would be operational 24 hours per day, seven days per week. Business operations would primarily be conducted within the enclosed buildings, with the exception of traffic movement, parking, and the loading and unloading of trucks at designated loading bays. The on-site Project-related noise sources are expected to include: idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, and roof-top mechanical ventilation equipment. This noise analysis is intended to describe noise level impacts associated with the expected typical warehouse and distribution storage activities at the Project site.

The Project is anticipated to have an Opening Year of 2018. However, the City of Moreno Valley guidelines require the Opening Year to be a minimum of 5 years from baseline (2015) conditions, and therefore, the opening year traffic volumes presented in this analysis are consistent with the Opening Year 2020 volumes used in the *Indian Street Commerce Center Traffic Impact Analysis* prepared by Urban Crossroads, Inc. According to the *Indian Street Commerce Center Traffic Impact Analysis*, the Project is expected to generate a net total of approximately 940 trip-ends per day (actual vehicles) with 104 AM peak hour trips and 109 PM peak hour trips. (2) The net Project trip generation includes 360 truck trip-ends per day from the industrial land uses. While the traffic volumes presented in the *Indian Street Commerce Center Traffic Impact Analysis* are expressed as Passenger Car Equivalent (PCE) trips, the Indian Street Commerce Center Noise Impact Analysis relies on the net Project trips to accurately account for the effect of individual truck trips on the study area roadway network.

EXHIBIT 1-A: LOCATION MAP

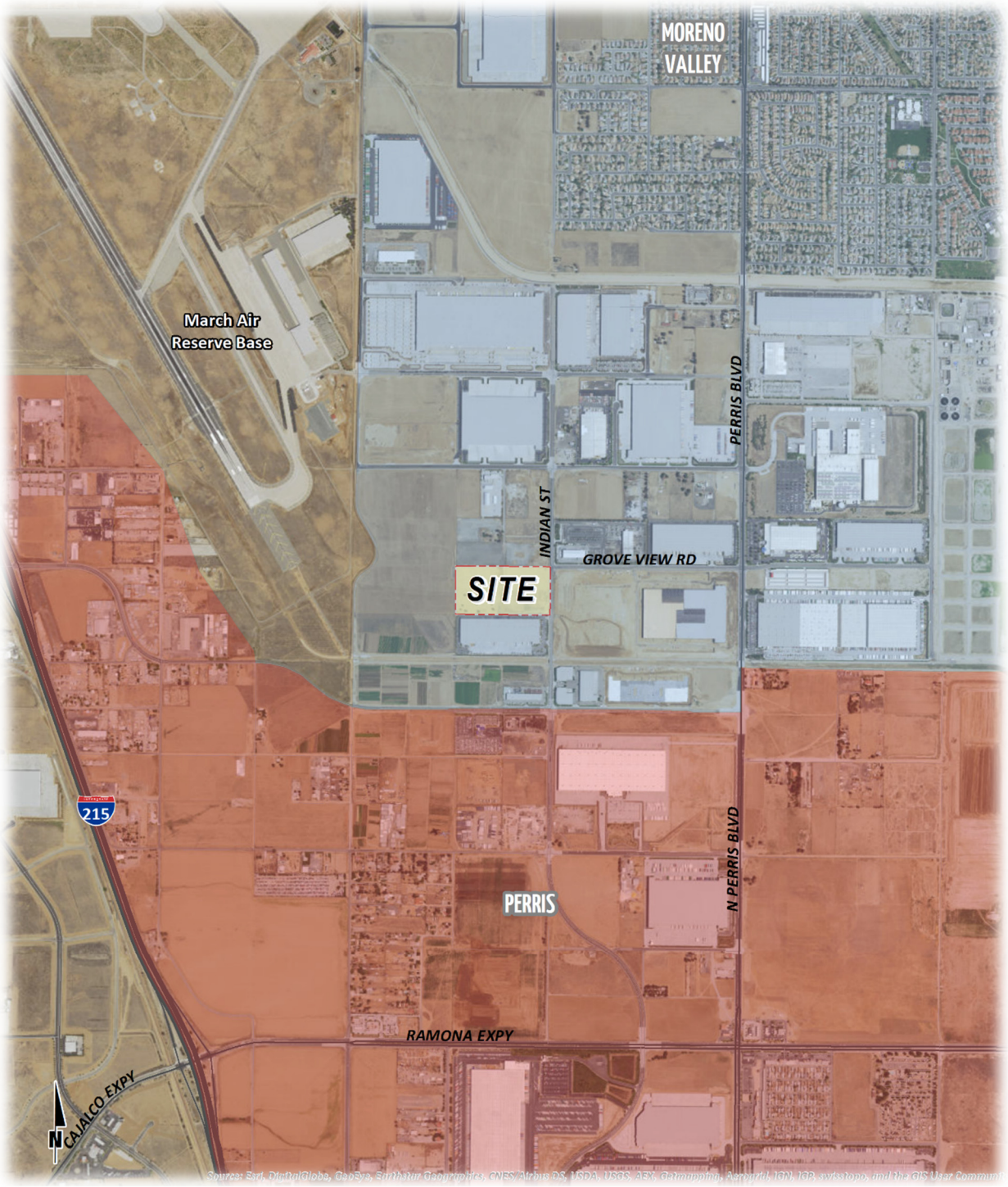
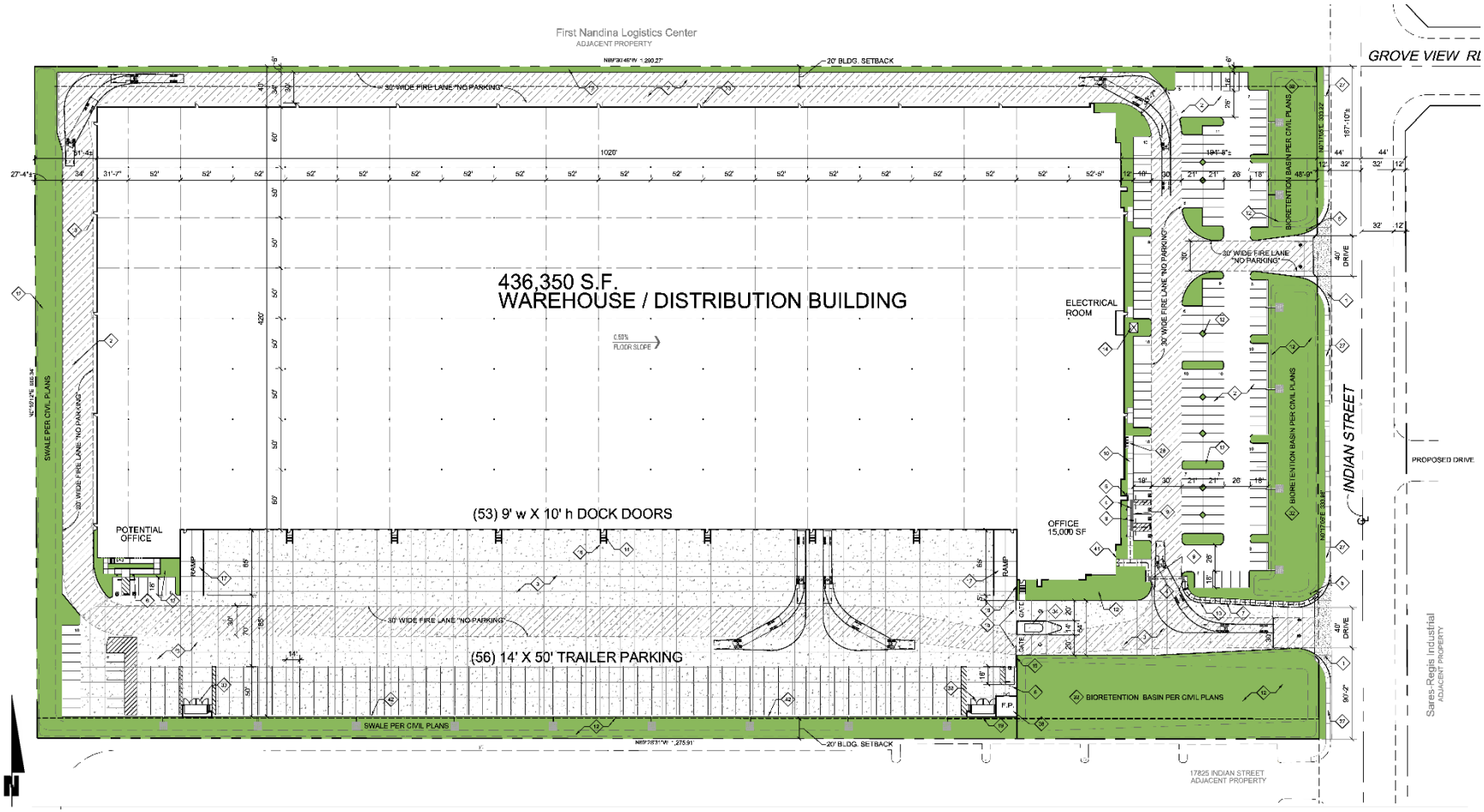


EXHIBIT 1-B: EXISTING LAND USES

Source: Google Earth, Applied Planning.

EXHIBIT 1-C: SITE PLAN



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2 FUNDAMENTALS

Noise has been 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	
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		SLEEP DISTURBANCE
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. (3) 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 100 feet, which can cause serious discomfort. (4) 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 commonly used figure is the equivalent level (Leq). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period 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 twenty-four 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 Leq sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA Leq 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 sound appears louder. CNEL does not represent the actual sound level heard at any particular time, but rather represents the total sound exposure. The City of Moreno Valley 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 manner in which 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.

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor 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 receptor, 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 receptor 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.

2.3.3 ATMOSPHERIC EFFECTS

Receptors 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 ft) 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.

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. 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 resident. 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 FHWA does not consider the planting of vegetation to be a noise abatement measure.

2.4 TRAFFIC NOISE PREDICTION

Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires on the roadway. According to the *Highway Traffic Noise Analysis and Abatement Policy and Guidance,* provided by the Federal Highway Administration (FHWA), the level of traffic noise depends on three primary factors: the volume of the traffic, the speed of the traffic, and the vehicle mix within the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and a greater number of trucks. (5) A doubling of the traffic volume, assuming that the speed and vehicle mix do not change, results in a noise level increase of 3 dBA. The vehicle mix on a given roadway may also have an effect on community noise levels. As the number of medium and heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise level impacts will increase.

2.5 NOISE CONTROL

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

2.6 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 receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (5)

2.7 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)

2.8 COMMUNITY RESPONSE TO NOISE

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon each individual's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

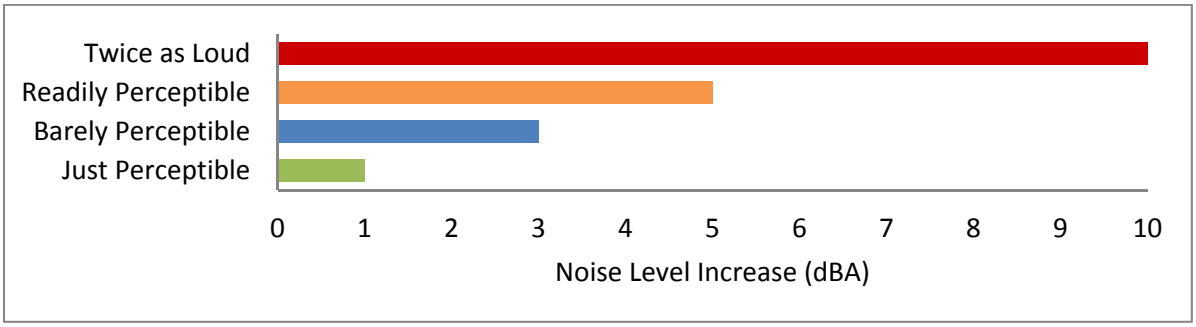
- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten 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 will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (7) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of

one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (7)

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (5)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



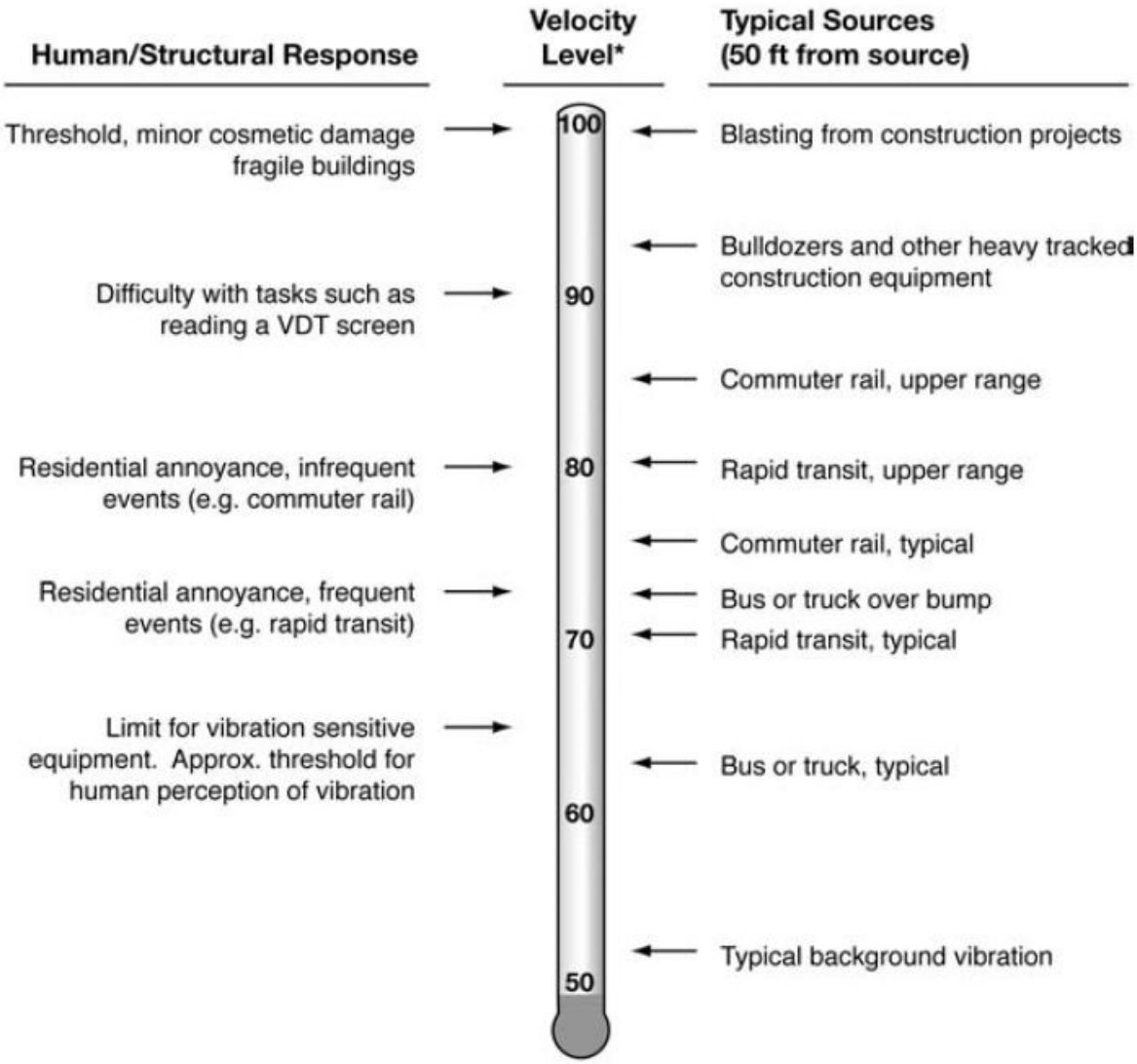
2.9 VIBRATION

According to the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (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.

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 Impact and Vibration Assessment.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains fairly 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 according to guidelines adopted by the Governor's Office of Planning and Research. (9) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*.

3.2 STATE OF CALIFORNIA GREEN BUILDING STANDARDS CODE

The 2014 State of California's Green Building Standards Code contains mandatory measures for non-residential building construction in Section 5.506 on Environmental Comfort. (10) These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when non-residential structures are developed in areas where the exterior noise levels exceed 65 dBA CNEL, such as within a noise contour of an airport, freeway, railroad, and other areas where noise contours are not readily available. If the development falls within an airport or freeway 65 dBA CNEL noise contour, the combined sound transmission class (STC) rating of the wall and roof-ceiling assemblies must be at least 50. For those developments in areas where noise contours are not readily available and the noise level exceeds 65 dBA Leq for any hour of operation, a wall and roof-ceiling combined STC rating of 45, and exterior windows with a minimum STC rating of 40 are required (Section 5.507.4.1).

3.3 TRANSPORTATION NOISE STANDARDS

The Indian Street Commerce Center site is located in the City of Moreno Valley, however, the off-site transportation noise contributions associated with the traffic generated by the Project may potentially affect sensitive land uses along roadways in the City of Perris. Therefore, the following transportation noise standards for each jurisdiction are used in this analysis to evaluate the potential off-site traffic noise impacts as a result of the Project.

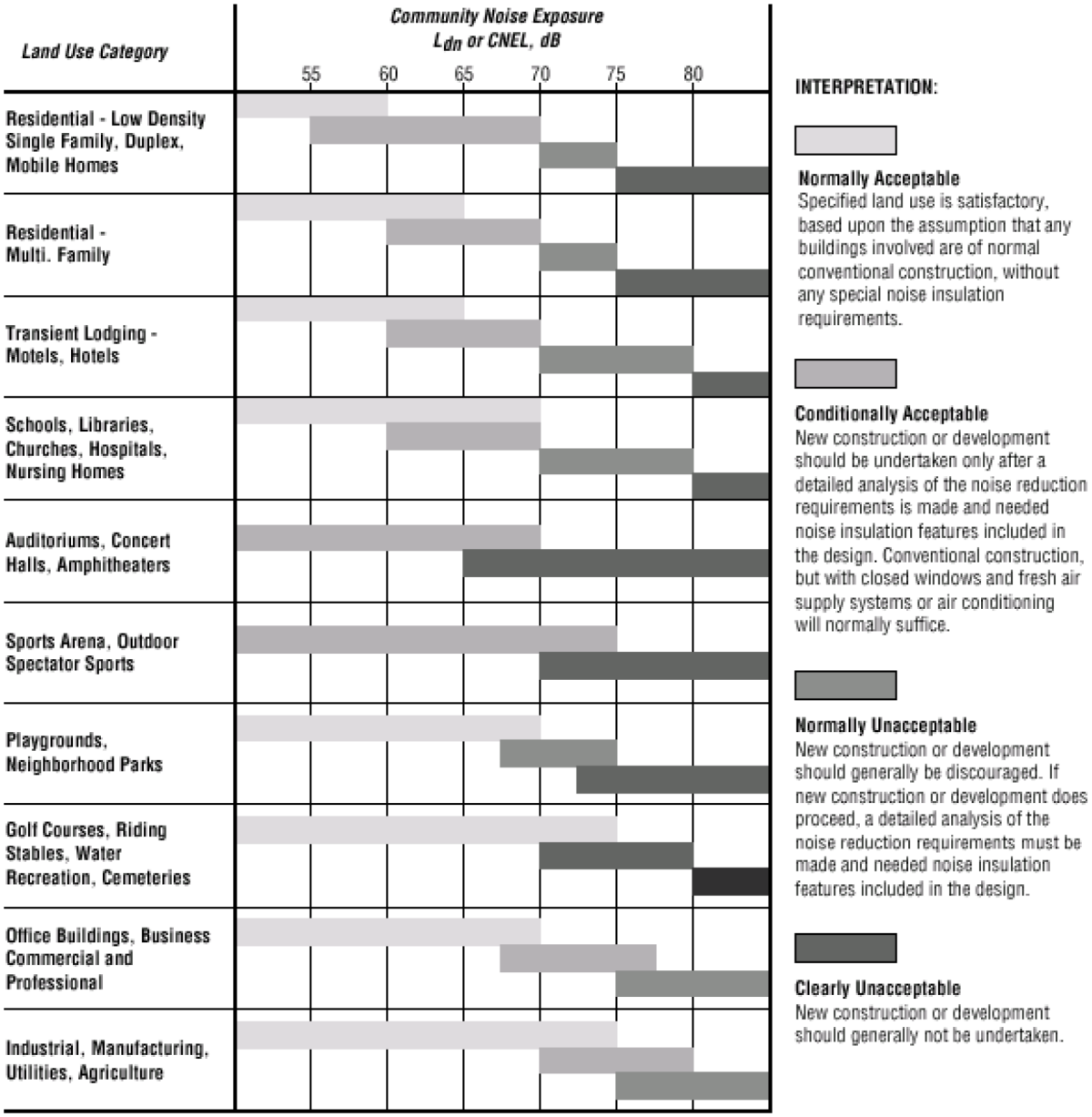
3.3.1 CITY OF MORENO VALLEY GENERAL PLAN SAFETY ELEMENT

The City Noise Element typically provides the standards for land use compatibility for community noise exposure. However, the City of Moreno Valley General Plan does not include a noise element or specific transportation-related noise standards. Rather, noise is considered in the Environmental Safety section of the General Plan Safety Element. (11) While the General Plan provides background and noise fundamentals, it does not identify criteria to assess the impacts associated with off-site transportation-related noise impacts. Therefore, for the purpose of this analysis, the transportation noise criteria are derived from standards contained in the California Office of Planning and Research (OPR) *General Plan Guidelines*.

The OPR land use/noise compatibility standards are used by many California cities and counties and specify the maximum noise levels allowable for new developments impacted by transportation noise sources. The OPR land use/noise compatibility criteria, found in Figure 2 of the *General Plan Guidelines, Appendix C: Noise Element Guidelines,* identify the criteria for industrial land uses such as the Project, as shown on Exhibit 3-A. When the unmitigated exterior noise levels approach 70 dBA CNEL industrial land use is considered *normally acceptable*. With exterior noise levels ranging from 70 to 80 dBA CNEL, industrial land uses are considered *conditionally acceptable*, and with exterior noise levels greater than 80 dBA CNEL, they are considered *normally unacceptable*. For *normally unacceptable* land use, *new construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.* (9) For the purposes of this analysis, industrial land use such as the Project does not contain outdoor living areas requiring exterior noise mitigation as outlined in the OPR *General Plan Guidelines*, and therefore, only the interior noise levels experienced by employees at the Project site are evaluated against the appropriate noise level standards.

The purpose of the transportation noise criteria is to protect, create, and maintain an environment free from noise and vibration that may jeopardize the health or welfare of sensitive receptors, or degrade quality of life. City General Policies (City of Moreno Valley General Plan, pp.9-31, 9-32) act to ensure that when exterior noise levels exceed 65 dBA CNEL at sensitive receptors, mitigation is provided to ensure that interior noise levels of 45 dBA CNEL are maintained. General Plan Policies in this regard are consistent with, and support, the California Building Code interior noise standards.

EXHIBIT 3-A: LAND USE NOISE COMPATIBILITY CRITERIA



Source: OPR General Plan Guidelines, Appendix C: Noise Element Guidelines, Figure 2.

3.3.2 CITY OF PERRIS GENERAL PLAN NOISE ELEMENT

The City of Perris has adopted a Noise Element of the General Plan (12) to control and abate environmental noise, and to protect the citizens of Perris from excessive exposure to noise. 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 the following noise polices and implementation measures designed to protect, create, and maintain an environment free from noise that may jeopardize the health or welfare of sensitive receptors, or degrade quality of life.

I.A.1: All new development proposals will be evaluated with respect to the State Noise/Land Use Compatibility Criteria. Placement of noise sensitive uses will be discouraged within any area exposed to exterior noise levels that fall into the "Normally Unacceptable" range and prohibited within areas exposed to "Clearly Unacceptable" noise ranges.

I.A.2: Site plans for new residential development near roadway and train noise sources shall incorporate increased building setbacks and/or provide for sufficient noise barriers for usable exterior yard areas so that the noise exposure in those areas does not exceed the levels considered "Normally Acceptable" in The State of California Noise/Land Use Compatibility Criteria

I.A.3: Acoustical studies shall be prepared for all new development proposals involving noise sensitive land uses, as defined in Section 16.22.020J of the Perris Municipal Code, where such projects are adjacent to roadways and within existing or projected roadway CNEL levels of 60 dBA or greater.

I.A.4: As part of any approvals of noise sensitive projects where reduction of exterior noise to 65 dBA is not reasonably feasible, the City will require the developer to issue disclosure statements to be identified on all real estate transfers associated with the affected property that identifies regular exposure to roadway noise.

I.A.5: No new residential dwellings shall be placed in areas with mitigated or unmitigated exterior noise levels that exceed 76 dBA CNEL.

The noise standards identified in the City of Perris General Plan are guidelines to evaluate the acceptability of the transportation related noise level impacts. These standards are based on the Governor's Office of Planning and Research and are used to assess the long-term traffic noise impacts on land uses. According to the City's Land Use Compatibility for Community Noise Exposure (Exhibit N-1), noise-sensitive land uses such as single family residences are *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 65 dBA CNEL.

3.4 STATIONARY/AREA-SOURCE NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Indian Street Commerce Center Project, stationary-source (operational) noise such as the expected idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, and roof-top mechanical ventilation equipment are typically evaluated against standards established under a City's Municipal Code.

Although the Project site is located within the City of Moreno Valley, noise-sensitive receivers potentially impacted by stationary/area-source noise activities are also located in the City of Perris. Therefore, to accurately describe the potential Project-related operational noise level contributions, this analysis presents the appropriate stationary/area-source noise standards for each jurisdiction adjacent to the Project site. The City of Moreno Valley and City of Perris Municipal Code stationary-source noise standards are provided in Appendices 3.1 and 3.2, respectively.

3.4.1 CITY OF MORENO VALLEY STATIONARY/AREA-SOURCE NOISE STANDARDS

The City of Moreno Valley Municipal Code, Chapter 11.80 *Noise Regulation*, provides performance standards and noise control guidelines for determining and mitigating non-transportation or stationary-source noise impacts from operations at private properties. The City of Moreno Valley Municipal Code defines *Maximum Sound Levels (in dB(A)) for Source Land Uses* in Table 11.80.030-2 for *Residential* and *Commercial* land uses. As defined by the Municipal Code, Section 11.80.020 *Definitions*, *Commercial* land use *means all uses of land not otherwise classified as residential,* and *Residential* land use *means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.* (13) For the purpose of this analysis, the Indian Street Commerce Center Project is considered *Commercial* land use since it is not classified as residential. Based on this standard, the operational noise level limits for commercial land use, from Table 11.80.030-2, of 65 dBA Leq during the daytime (8:00 a.m. to 10:00 p.m.) hours and 60 dBA Leq during the nighttime (10:01 p.m. to 7:59 a.m.) hours shall apply to the operational noise from the Project.

Further, Section 11.80.030 (C) *Prohibited Acts*, *Nonimpulsive Sound Decibel Limits*, states: *No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimpulsive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on a privately owned property…* (13) Therefore, at a distance of 200 feet from the property line, the Project's operational noise levels shall not exceed the 65 dBA Leq daytime and 60 dBA Leq nighttime noise level standards for commercial land uses, as shown on Table 3-1.

TABLE 3-1: STATIONARY/AREA-SOURCE NOISE STANDARDS AT 200 FEET FROM THE SOURCE

Jurisdiction	Source Land Use	Time Period	Maximum Noise Level For Source Land Uses @ 200' (dBA Leq)[2]
City of Moreno Valley[1]	Commercial	Daytime (8:00 a.m. - 10:00 p.m.)	65
		Nighttime (10:01 p.m. - 7:59 a.m.)	60

[1] Source: City of Moreno Valley Municipal Code, Chapter 11.80 Noise Regulation, Table 11.80.030-2 Maximum Sound Levels (in dB(A)) for Source Land Uses when measured at a distance of 200 feet from the property line of the source land use (Appendix 3.1).
[2] Leq represents a steady state sound level containing the same total energy as a time varying signal over a given sample period.

3.4.2 CITY OF PERRIS STATIONARY/AREA-SOURCE NOISE STANDARDS

The City of Perris Municipal Code, Chapter 7.34 *Noise Control*, Section 7.34.040, establishes the permissible noise level that may intrude into a neighbor's property from the use of sound amplifying equipment. The Municipal Code exterior noise level criteria for residential properties affected by stationary/area noise sources is included in Section 7.34.050 *General Prohibition*, which states that the Section 7.34.040 sound amplifying equipment noise standards shall apply. Therefore, for residential properties, the exterior noise level shall not exceed the Section 7.34.040 80 dBA Leq during daytime hours (7:00 a.m. to 10:00 p.m.) and shall not exceed 60 dBA Leq during the nighttime hours (10:00 p.m. to 7:00 a.m.), as shown on Table 3-2. (14) The City of Perris Municipal Code is included in Appendix 3.2.

TABLE 3-2: STATIONARY/AREA-SOURCE NOISE STANDARDS AT THE RECEIVING LAND USE

Jurisdiction	Receiving Land Use	Time Period	Noise Level Standard (dBA Leq)[2]
City of Perris[1]	Residential	Daytime (7:01 a.m. - 10:00 p.m.)	80
		Nighttime (10:01 p.m. - 7:00 a.m.)	60

[1] Source: City of Perris Municipal Code, Sections 7.34.040 & 7.34.050 (Appendix 3.2).
[2] Leq represents a steady state sound level containing the same total energy as a time varying signal over a given sample period.

3.5 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Indian Street Commerce Center Project, noise from construction activities are typically limited to the hours of operation established under a City's Municipal Code. To accurately describe the potential Project-related construction noise level contributions to the existing noise environment, this analysis presents the appropriate construction noise standards for each jurisdiction adjacent to the Project site including: the City of Moreno Valley and the City of Perris.

3.5.1 CITY OF MORENO VALLEY CONSTRUCTION NOISE STANDARDS

The Municipal Code noise standards for construction are described below for the City of Moreno Valley to determine the potential noise impacts at nearby sensitive receiver locations. As a subset of its stationary-source noise regulations, the City Municipal Code establishes additional restrictions on construction-source noise. More specifically, Municipal Code Section 11.80.030 (D) (7), *Construction and Demolition*, provides the following:

> *No person shall operate or cause operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.*

A *noise disturbance*, as defined by the City of Moreno Valley Municipal Code, means any sound which:

- *Disturbs a reasonable person of normal sensitivities;*
- *Exceeds the sound level limits set forth in this chapter [Table 11.80.030-2];*
- *Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two hundred (200) feet from the real property line of the source of the sound, if the sound occurs on a privately owned property, or from the source of the sound, if the sound occurs on public right, public space or other publicly owned property.*

Therefore, based on the Section 11.80.030 (D) (7) construction regulations, a construction-related *noise disturbance* occurs when the noise levels exceed the *commercial* land use criteria of 65 dBA Leq during the daytime hours and 60 dBA Leq during the nighttime hours at a distance of 200 feet from the property line of the source (Project site). In addition, grading operations shall be limited to the hours identified in Section 8.21.050 (O) of 7:00 a.m. to 6:00 p.m., Monday through Friday, and 8:00 a.m. to 4:00 p.m. on weekends and holidays or as approved by the City Engineer. The City of Moreno Valley construction noise standards are shown on Table 3-3 and included in Appendix 3.1.

TABLE 3-3: CONSTRUCTION NOISE STANDARDS AT 200 FEET FROM THE SOURCE LAND USE

Jurisdiction	Permitted Hours of Construction Activity	Construction Noise Level Standard at 200 Feet (dBA Leq)[2]	
		Daytime	Nighttime
City of Moreno Valley[1]	General Activity: 7:00 a.m. to 8:00 p.m. on any day. Grading is limited to 7:00 a.m. to 6:00 p.m. Monday to Friday; 8:00 a.m. to 4:00 p.m. on weekends and holidays.	65	N/A

[1] Source: City of Moreno Valley Municipal Code, Section 11.80.030 (D) (7) and Section 8.21.050 (O) (Appendix 3.1).
[2] Acceptable threshold for determining the relative significance of short-term Project construction noise levels, based on the City of Moreno Valley stationary noise standards shown on Table 3-1.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m. Construction activities generating substantive or objectionable noise not permitted during nighttime hours.

3.5.2 CITY OF PERRIS CONSTRUCTION NOISE STANDARDS

The City of Perris Municipal Code, Section 7.34.060, identifies the City's construction noise standards and permitted hours of construction activity. Since the Project site is located in the City of Moreno Valley, the City of Perris would not have jurisdictional control over permitted hours of Project construction. Notwithstanding, the City of Perris Municipal Code, Section 7.34.060, noise level standard of 80 dBA Leq at residential properties would apply to the noise-sensitive receiver locations located in the City of Perris. (14) Table 3-4 shows the City of Perris construction noise standards, and the City of Perris Municipal Code is included in Appendix 3.2.

TABLE 3-4: CONSTRUCTION NOISE STANDARDS AT THE RECEIVING LAND USE

Jurisdiction	Construction Noise Level Standard (dBA Leq)
City of Perris[1]	80

[1] Source: City of Perris Municipal Code, Section 7.34.060 (Appendix 3.2). Construction activities generating substantive or objectionable noise not permitted during nighttime hours.

3.6 VIBRATION STANDARDS

The City of Moreno Valley and the City of Perris have not identified or adopted specific vibration level standards. However, the United States Department of Transportation Federal Transit Administration (FTA) provides guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines allow 80 VdB for residential uses and buildings where people normally sleep. (8) Operational and construction activities 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. Large bulldozers and loaded trucks can cause perceptible vibration levels proximate receptors. The FTA guidelines of 80 VdB for sensitive land uses provide a substantiated basis for determining the relative significance of potential Project-related vibration impacts due to on-site operational and construction activities.

Further, construction vibration has the potential to generate vibration levels capable of causing building damage when equipment is operating close to nearby existing structures. The FTA identifies construction vibration levels capable of building damage ranging from 0.12 to 0.5 in/sec in peak-particle-velocity (PPV). (8) Therefore, the lowest potential vibration level of 0.12 in/sec PPV, identified by the FTA, capable of causing building damage is used in this analysis to assess potential impacts at adjacent structures.

3.7 MARCH AIR RESERVE BASE/INLAND PORT AIRPORT LAND USE COMPATIBILITY

The March Air Reserve Base/Inland Port Airport (MARB/IPA) is located approximately one-half mile west of the Project site. The *Riverside County Airport Land Use Compatibility Plan Policy Document* (RC ALUCP) includes the policies for determining the land use compatibility of the Project since it is located within 2 miles of an airport runway. Policy 4.1.5 *Noise Exposure for Other Land Uses* of the RC ALUCP requires that land uses, such as the industrial land use of the Project site, demonstrate compatibility with the acceptable noise levels on Table 2B. The Table 2B *Supporting Compatibility Criteria: Noise* matrix is shown on Exhibit 3-B and indicates that *clearly compatible* industrial land uses experience exterior noise levels below 65 dBA CNEL. For *clearly compatible* noise levels, *the activities associated with the specified land use can be carried out with essentially no interference from the noise exposure*. *Normally acceptable* noise levels for industrial land uses range from 65 to 70 dBA CNEL, and *noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities*. (15)

The noise contour boundaries used to determine the potential aircraft-related noise impacts at the Project site are found on Exhibit MA-4 of the RC ALUCP, and are presented on Exhibit 3-C of this report. Based on the RC ALUCP noise level contours for the MARB/IPA, the Project is partially located in the 60 to 65 dBA CNEL noise level contours, and therefore, represents *normally acceptable* land use based on the RC ALUCP compatibility criteria, and no noise mitigation is required with typical building construction.

EXHIBIT 3-B: RC ALUCP SUPPORTING COMPATIBILITY CRITERIA: NOISE

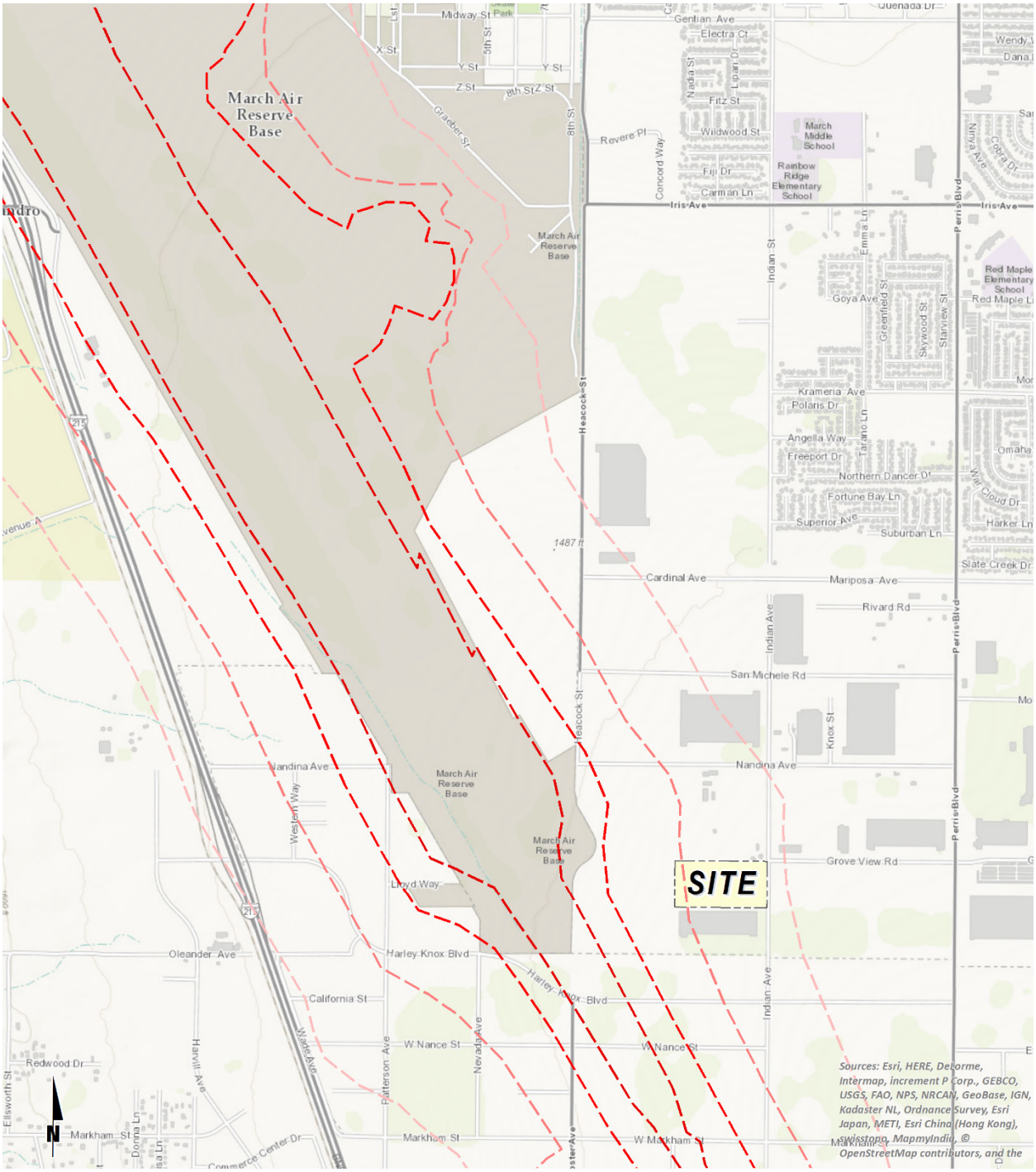
Land Use Category	CNEL (dB) 50–55	55–60	60–65	65–70	70–75
Residential *					
single-family, nursing homes, mobile homes	++	o	–	– –	– –
multi-family, apartments, condominiums	++	+	o	– –	– –
Public					
schools, libraries, hospitals	+	o	–	– –	– –
churches, auditoriums, concert halls	+	o	o	–	– –
transportation, parking, cemeteries	++	++	++	+	o
Commercial and Industrial					
offices, retail trade	++	+	o	o	–
service commercial, wholesale trade, warehousing, light industrial	++	++	+	o	o
general manufacturing, utilities, extractive industry	++	++	++	+	+
Agricultural and Recreational					
cropland	++	++	++	++	+
livestock breeding	++	+	o	o	–
parks, playgrounds, zoos	++	+	+	o	–
golf courses, riding stables, water recreation	++	++	+	o	o
outdoor spectator sports	++	+	+	o	–
amphitheaters	+	o	–	– –	– –

Land Use Acceptability		Interpretation/Comments
++	*Clearly Acceptable*	The activities associated with the specified land use can be carried out with essentially no interference from the noise exposure.
+	*Normally Acceptable*	Noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities.
o	*Marginally Acceptable*	The indicated noise exposure will cause moderate interference with outdoor activities and with indoor activities when windows are open. The land use is acceptable on the conditions that outdoor activities are minimal and construction features which provide sufficient noise attenuation are used (e.g., installation of air conditioning so that windows can be kept closed). Under other circumstances, the land use should be discouraged.
–	*Normally Unacceptable*	Noise will create substantial interference with both outdoor and indoor activities. Noise intrusion upon indoor activities can be mitigated by requiring special noise insulation construction. Land uses which have conventionally constructed structures and/or involve outdoor activities which would be disrupted by noise should generally be avoided.
– –	*Clearly Unacceptable*	Unacceptable noise intrusion upon land use activities will occur. Adequate structural noise insulation is not practical under most circumstances. The indicated land use should be avoided unless strong overriding factors prevail and it should be prohibited if outdoor activities are involved.

* Subtract 5 dB for low-activity outlying airports (Chiriaco Summit and Desert Center)

Source: Riverside County Airport Land Use Compatibility Plan, Table 2B.

EXHIBIT 3-C: MARB/IPA FUTURE AIRPORT NOISE CONTOURS



LEGEND:

- Unmitigated 60 dBA CNEL Noise Level Contour Boundary
- Unmitigated 65 dBA CNEL Noise Level Contour Boundary
- Unmitigated 70 dBA CNEL Noise Level Contour Boundary
- Unmitigated 75 dBA CNEL Noise Level Contour Boundary
- Unmitigated 80 dBA CNEL Noise Level Contour Boundary

Source: Riverside County, Airport Land Use Compatibility Plan, Exhibit MA-4.

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4 THRESHOLDS OF SIGNIFICANCE

This section outlines the applicable thresholds of significance that were used assess the potential Project impacts. The significance criteria for each analysis is summarized on Table 4-1.

4.1 STANDARDS OF SIGNIFICANCE

Based on the noise criteria presented in Section 3, and direction provided within the CEQA Guidelines as implemented by the City of Moreno Valley, Project noise impacts would be considered potentially significant if the Project is determined to result in or cause the following conditions:

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

B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

C. A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or

D. A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.

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

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

4.2 NOISE IMPACT SIGNIFICANCE CRITERIA

The Indian Street Commerce Center noise impact significance criteria are discussed below.

Threshold Consideration: *Potential to expose persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.*

Project Stationary/Area-Source Noise Exceeding City Standards Would be Considered Potentially Significant. The City of Moreno Valley Municipal Code Table 11.80.030-2, shown on Table 3-1, establishes the maximum acceptable noise levels that can be generated by stationary/area noise sources at a distance of 200 feet from the source land use within the City of Moreno Valley. In addition, the City of Perris Municipal Code Section 7.34.040, shown on Table 3-2, establishes the maximum acceptable stationary/area-source noise levels received at nearby residential land uses within the City of Perris. Project stationary/area-source noise that would cause or result in noise levels exceeding the levels in Tables 3-1 and/or 3-2 would potentially expose persons to noise levels in excess of standards established in the City of Moreno Valley and City of Perris Municipal Codes, and would therefore be potentially significant.

As a subset of its stationary-source noise regulations, the City of Moreno Valley Municipal Code establishes additional restrictions on construction-source noise. More specifically, Municipal Code Section 11.80.030 (D) (7), *Construction and Demolition*, prohibits construction activities between the hours of 8:00 p.m. and 7:00 a.m. *such that the sound there from creates a noise disturbance*. (13) A *noise disturbance*, as defined by the City of Moreno Valley Municipal Code, means any sound which: d*isturbs a reasonable person of normal sensitivities; exceeds the sound level limits set forth in this chapter [Table 11.80.030-2]; or is plainly audible as defined in this section.* Therefore, based on the Section 11.80.030 (D) (7) construction regulations, a construction-related *noise disturbance* occurs when the noise levels exceed the stationary/area-source *commercial* land use criteria of 65 dBA Leq during the daytime hours and 60 dBA Leq during the nighttime hours at a distance of 200 feet from the property line of the source (Project site). In addition, grading operations shall be limited to the hours identified in Section 8.21.050 (O) of 7:00 a.m. to 6:00 p.m., Monday through Friday, and 8:00 a.m. to 4:00 p.m. on weekends and holidays or as approved by the City Engineer. (13)

The City of Perris Municipal Code, Section 7.34.060, identifies the City's construction noise standards and permitted hours of construction activity. Since the Project site is located in the City of Moreno Valley, the City of Perris would not have jurisdictional control over permitted hours of Project construction. Notwithstanding, the City of Perris Municipal Code, Section 7.34.060, noise level standard of 80 dBA Leq at residential properties would apply to the noise-sensitive receiver locations located in the City of Perris. (14) The City of Perris construction noise standards are shown on Table 3-4 of this report.

For the purposes of this analysis, the 65 dBA Leq numerical threshold is used to assess the potential construction noise level impacts at a distance of 200 feet from the source land use, and at the nearby sensitive receiver locations in the City of Moreno Valley. Construction noise levels at receiver locations in the City of Perris were evaluated analyzed based on the City of Perris Municipal Code 80 dBA Leq noise level threshold. Project construction stationary/area-source noise that would cause or result in noise levels exceeding the thresholds on Tables 3-3 and/or 3-4 would potentially expose persons to noise levels in excess of standards established as the acceptable threshold for determining the relative significance of Project construction noise levels, and would therefore be potentially significant.

Project Vehicular-Source Noise Exceeding City Standards Would be Considered Potentially Significant. The City Noise Element typically provides the standards for land use compatibility for community noise exposure. However, the City of Moreno Valley General Plan does not include a noise element or specific transportation related noise standards. Rather, noise is considered in the Environmental Safety section of the General Plan Safety Element. (11) While the General Plan provides background and noise fundamentals, it does not identify criteria to assess the impacts associated with off-site transportation related noise impacts. Therefore, for the purpose of this analysis, the transportation noise criteria are derived from standards contained in the *General Plan Guidelines*, a publication of the California Office of Planning and Research (OPR) prepared in October, 2003. (9) The OPR land use/noise compatibility standards are used by many California cities and counties and specify the maximum noise levels allowable for new developments impacted by transportation noise sources. Further, the City of Perris

General Plan Noise Element guidelines and policies are consistent with the OPR criteria for off-site traffic noise on residential land uses.

The purpose of the transportation noise criteria is to protect, create, and maintain an environment free from noise and vibration that may jeopardize the health or welfare of sensitive receptors, or degrade quality of life. City General Policies (City of Moreno Valley General Plan, pp.9-31, 9-32 and City of Perris General Plan I.A.4) act to ensure that when exterior noise levels exceed 65 dBA CNEL at sensitive receptors, mitigation is provided to ensure that interior noise levels of 45 dBA CNEL are maintained. General Plan Policies in this regard are consistent with, and support, the California Building Code interior noise standards.

The 45 dBA CNEL interior noise level parameters established by the OPR take in to account and reflect California Building Code Title 24 residential construction standards, which typically provide 20 dBA noise attenuation from exterior conditions (with windows closed). Based on this assumption, ambient exterior noise levels should not exceed 65 dBA CNEL under normal conditions. Project vehicular-source noise that would cause or result in noise levels exceeding 65 dBA CNEL would therefore potentially expose persons to noise levels in excess of standards established in a local general plan, and would therefore be potentially significant.

The City of Moreno Valley General Plan Safety Element and the City of Perris General Plan Noise Element do not identify specific exterior noise level standards for non-noise-sensitive land uses such as the industrial use of the Project site. Therefore, the land use compatibility criteria for non-noise sensitive land uses is derived from standards contained in the *General Plan Guidelines*, a publication of the OPR. (9) The OPR guideline for the *normally acceptable* exterior noise level for non-noise-sensitive land use, such as industrial use, is 70 dBA CNEL. Noise levels greater than 70 dBA CNEL are considered *conditionally acceptable*. Project vehicular-source noise that would cause or result in noise levels exceeding 70 dBA CNEL would therefore potentially expose persons within non-noise-sensitive land uses to noise levels in excess of standards established in a local general plan, and would therefore be potentially significant.

Project Stationary/Area-Source Vibration Exceeding City Standards Would be Considered Potentially Significant. The City of Moreno Valley and the City of Perris have not identified or adopted specific vibration level standards. However, the United States Department of Transportation Federal Transit Administration (FTA) provides guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines allow 80 VdB for residential uses and buildings where people normally sleep. Project construction-source and/or stationary/area-source vibration that would cause or result in vibration levels exceeding the FTA threshold would potentially expose persons to vibration levels in excess of the quantified standard of 80 VdB, and would therefore be potentially significant. Further, construction vibration has the potential to generate vibration levels capable of causing building damage when equipment is operating close to nearby existing structures. The FTA identifies construction vibration levels capable of building damage ranging from 0.12 to 0.5 in/sec in peak-particle-velocity (PPV). (8) Therefore, the lowest potential vibration level of 0.12 in/sec PPV, identified by the FTA, capable of causing building damage is used in this analysis to assess potential impacts at adjacent structures.

Summary

The potential for the Project to expose persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies would occur if:

- Project stationary/area-source or vehicular-source noise would exceed City of Moreno Valley or City of Perris Municipal Code standards; or would conflict with City of Moreno Valley or City of Perris General Plan standards addressing vehicular-source noise on City roadways; or
- Project stationary/area-source vibration would exceed the FTA Vibration Standards.

Threshold Consideration: *Potential to result in or cause a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project; or*

Threshold Consideration: *Potential to result in or cause a substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project.*

Perceptible Project Stationary/Area-Source Noise Exceeding Maximum Acceptable Ambient Conditions Would be Considered Substantial and Potentially Significant. For the purposes of this analysis, the City of Moreno Valley and City of Perris Municipal Code exterior noise standards are also defined as the maximum acceptable ambient condition when considering stationary/area-source noise impacts. In this regard, the maximum acceptable ambient noise conditions established in this analysis reflect local standards for acceptable noise conditions; correlate with Policies established in the City General Plan(s); and are consistent with applicable California Office of Planning and Research (OPR) Land Use/Noise Compatibility Guidelines.

When ambient noise conditions are within acceptable standards and perceptible (3.0 dBA or greater) Project stationary/area-source noise (whether temporary/periodic or permanent) would individually or in combination with ambient noise levels, would exceed acceptable standards, Project-source increases in ambient conditions could adversely affect area land uses, and land use/noise compatibility standards may not be maintained. Perceptible Project stationary/area-source noise that would cause ambient conditions to exceed acceptable standards would therefore be considered substantial and potentially significant.

Perceptible Project Vehicular-Source Noise Exceeding Maximum Acceptable Ambient Conditions Would be Considered Substantial and Potentially Significant. Similarly, when considering vehicular-source noise, the noise-sensitive 65 dBA CNEL and non-noise sensitive 70 dBA CNEL criteria reflected in the OPR *General Plan Guidelines* are defined as the maximum acceptable ambient conditions when considering vehicular-source noise impacts. When ambient noise conditions are within acceptable parameters and perceptible (3.0 dBA or greater) Project vehicular-source noise would, individually or in combination with ambient conditions, exceed the applicable standard, Project-source increases in ambient conditions could adversely affect area land uses, and land/use noise compatibility standards may not be maintained. Perceptible Project vehicular-source noise that would cause ambient conditions to exceed applicable standards would therefore be considered substantial and potentially significant.

When Noise Levels Exceed Maximum Acceptable Ambient Conditions, Project Stationary/Area-Source Noise Increases of 1.5 dBA or Greater Would Be Considered Substantial and Potentially Significant. If, however, ambient conditions already exceed minimum acceptable standards, subsequent increases in noise levels may be considered substantial as they would contribute to already deficient conditions. Neither local municipalities nor the State have established a quantified incremental increase in noise levels that could be considered "substantial" in instances where ambient conditions may already be considered unacceptable. Guidance in this regard is, however, provided at the federal level through the Federal Interagency Committee on Noise (FICON).[1] FICON guidance facilitates assessment of project-generated increases in noise levels that take into account ambient noise conditions. Although the FICON guidance was specifically developed to assess aircraft noise impacts, this guidance is broadly relevant to all environmental noise assessments in determining perceived effects of noise at noise-sensitive land uses. The FICON guidance indicates that when ambient noise conditions are at or above normally acceptable standards, increases in noise of 1.5 dBA or greater would contribute to existing deficiencies, potentially resulting in increased community annoyance, citizen complaints, and potential litigation.

FICON guidance as applied within this analysis would indicate that when ambient conditions equal or exceed acceptable standards for stationary/area -source noise levels at noise-sensitive land uses, Project stationary/area-source noise increases of 1.5 dBA or greater in ambient conditions could result in increased community annoyance, citizen complaints, and potential litigation. For the purposes of this analysis then, when ambient conditions equal or exceed maximum acceptable standards, Project stationary/area -source noise increases of 1.5 dBA more in ambient conditions would therefore be considered substantial and therefore potentially significant.

When Noise Levels Exceed Maximum Acceptable Ambient Conditions, Project Vehicular-Source Noise Increases of 1.5 dBA or Greater Would be Considered Substantial and Potentially Significant. Similarly, when ambient noise conditions are at or above normally acceptable standards at noise-sensitive land uses, Project vehicular-source increases of 1.5 dBA or greater in ambient conditions would contribute to existing unacceptable conditions and could result in increased community annoyance, citizen complaints, and potential litigation. For the purposes of this analysis then, when ambient conditions equal or exceed acceptable standards, Project vehicular-source noise increase of 1.5 dBA more in ambient conditions would therefore be considered "substantial" and therefore potentially significant at noise-sensitive land uses.

Summary

A substantial temporary or permanent increase in ambient noise conditions would occur if Project-source noise would:

- Result in an perceptible increase in noise levels (3.0 dBA or greater) that would cause the acceptable ambient condition to be exceeded; or

[1] Federal Agency Review of Selected Airport Noise Analysis (Federal Interagency Committee on Noise) 1992.

- Result in an increase of 1.5 dBA in ambient conditions when the noise environment at receiving noise-sensitive land uses already exceeds the acceptable ambient noise condition.

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

Threshold Consideration: *For a project within the vicinity of a private airstrip, expose people residing or working in the Project area to excessive noise levels.*

Aircraft-Source Noise Exceeding Airport Land Use Compatibility Plan (ALUCP) Standards Would be Considered Potentially Significant. [2] The *Riverside County Airport Land Use Compatibility Plan Policy Document* (RC ALUCP) includes the policies for determining the land use compatibility of the Project since it is located within 2 miles of an airport runway. Policy 4.1.5 *Noise Exposure for Other Land Uses* of the RC ALUCP requires that land uses, such as the industrial land use of the Project site, demonstrate compatibility with the acceptable noise levels on Table 2B. The Table 2B *Supporting Compatibility Criteria: Noise* matrix was previously shown on Exhibit 3-B and indicates that *clearly compatible* industrial land uses experience noise levels below 65 dBA CNEL. *Normally acceptable* noise levels for industrial land uses range from 65 to 70 dBA CNEL, and *noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities*. (15) The noise contour boundaries used to determine the potential aircraft-related noise impacts at the Project site are found on Exhibit MA-4 of the RC ALUCP, as previously presented on Exhibit 3-C of this report. Based on the RC ALUCP noise level contours for the MARB/IPA, the Project is partially located in the 60 to 65 dBA CNEL noise level contours, and therefore, represents *normally acceptable* land use based on the RC ALUCP compatibility criteria, and no noise mitigation is required with typical building construction.

[2] The Project site lies within the area regulated under the 2014 Riverside County ALUCP for March ARB/IPA (ALUCP) and the 2005 March Air Reserve Base Air Installation Compatibility Use Zone Study (MARB/IPA AICUZ, AICUZ). The compatibility zones and associated criteria set forth in the ALUCP provide noise and safety compatibility protection equivalent to or greater than correlating criteria presented in the AICUZ (ALUCP, p.1). The analysis presented herein reflects the more stringent criteria established under the ALUCP.

TABLE 4-1: SUMMARY OF SIGNIFICANCE THRESHOLDS

Analysis Scenario	Receptor Land Use	City	Ambient Condition/ Exposure Scenario	Significance Criteria	
				Daytime	Nighttime
Off-Site	Noise-Sensitive[1]	All	if ambient is < 65 dBA	Project plus ambient is > 65 dBA; and a ≥ 3 dBA Project increase	
			if ambient is > 65 dBA	≥ 1.5 dBA Project increase	
	Non-Noise-Sensitive[2]		if ambient is < 70 dBA	Project plus ambient is > 70 dBA; and a ≥ 3 dBA Project increase	
Stationary/Area-Source	Noise-Sensitive	Moreno Valley[3]	At 200' from the property line of the source	65 dBA Leq	60 dBA Leq
		Perris[4]	At residential land use	80 dBA Leq	60 dBA Leq
Construction	Noise-Sensitive	Moreno Valley[5]	General Activity: 7:00 a.m. to 8:00 p.m. on any day. Grading is limited to 7:00 a.m. to 6:00 p.m. Monday to Friday; 8:00 a.m. to 4:00 p.m. on weekends and holidays.		
			At 200' from the property line of the source	65 dBA Leq	60 dBA Leq
		Perris[6]	At residential land use	80 dBA Leq	n/a[7]
Vibration[8]	Noise-Sensitive	All	Operational & Construction	80 VdB	80 VdB
	Adjacent Structures		Construction	0.12 in/sec PPV	0.12 in/sec PPV

[1] Source: FICON, 1992.
[2] Source: Office of Planning and Research, General Plan Guidelines, October 2003.
[3] Source: City of Moreno Valley Municipal Code, Chapter 11.80 Noise Regulation, Table 11.80.030-2 Maximum Sound Levels (in dB(A)) for Source Land Uses when measured at a distance of 200 feet from the property line of the source land use (Appendix 3.1).
[4] Source: City of Perris Municipal Code, Sections 7.34.040 & 7.34.050 (Appendix 3.2).
[5] Source: City of Moreno Valley Municipal Code, Section 11.80.030 (D) (7) and Section 8.21.050 (O) (Appendix 3.1).
[6] Source: City of Perris Municipal Code, Section 7.34.060 (Appendix 3.2).
[7] The City of Perris construction noise level limit only applies to the permitted daytime hours of construction activity.
[8] Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.
"Daytime" = 8:00 a.m. - 10:00 p.m.; "Nighttime" = 10:01 p.m. - 7:59 a.m. (City of Moreno Valley)
"Daytime" = 7:01 a.m. - 10:00 p.m.; "Nighttime" = 10:01 p.m. - 7:00 a.m. (City of Perris)

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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 noise level measurement 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, November 11th, 2015. 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 daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. 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. (16)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned at the nearest sensitive receiver locations to assess the existing ambient hourly noise levels surrounding the Project site. To describe the existing noise environment, 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. 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 Project-related noise level contributions.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

N

LEGEND:

▲ Noise Measurement Locations

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (Leq). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (8:00 a.m. to 10:00 p.m.) and nighttime (10:01 p.m. to 7:59 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels on Nandina Avenue west of Perris Boulevard and north of existing residential homes. The noise level measurements collected show an overall 24-hour exterior noise level of 69.5 dBA CNEL. The hourly noise levels measured at location L1 ranged from 60.8 to 66.3 dBA Leq during the daytime hours and from 58.3 to 66.7 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 64.0 dBA Leq with an average nighttime noise level of 62.9 dBA Leq.
- Location L2 represents the noise levels at the Project site on Indian Avenue north of the existing iHerb, Inc. distribution building. The noise level measurements collected show an overall 24-hour exterior noise level of 70.2 dBA CNEL. The hourly noise levels measured at location L2 ranged from 59.1 to 65.4 dBA Leq during the daytime hours and from 59.6 to 67.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 62.8 dBA Leq with an average nighttime noise level of 63.7 dBA Leq.
- Location L3 represents the noise levels at the southwest corner of Nevada Avenue and Harley Knox Boulevard, north of existing residential homes, near the MARB/IPA runway. The 24-hour CNEL indicates that the overall exterior noise level is 63.3 dBA CNEL. At location L3 the background ambient noise levels ranged from 54.4 to 59.3 dBA Leq during the daytime hours to levels of 51.1 to 60.0 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 57.1 dBA Leq with an average nighttime noise level of 56.5 dBA Leq.
- Located southwest of the Project site on Webster Avenue, location L4 represents the noise levels near existing residential homes. The noise level measurements collected show an overall 24-hour exterior noise level of 63.3 dBA CNEL. The hourly noise levels measured at location L4 ranged from 51.2 to 60.0 dBA Leq during the daytime hours and from 49.6 to 60.6 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 57.4 dBA Leq with an average nighttime noise level of 57.2 dBA Leq.

Table 5-1 provides the (energy average) noise levels used to describe the daytime 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 a summary of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network and the MARB/IPA airport. This includes the auto, heavy truck, and aircraft flyover activities near the noise level

measurement locations. The 24-hour existing noise level measurements shown on Table 5-1 present the worst-case existing unmitigated ambient noise conditions.

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

Location[1]	Distance To Project Boundary (Feet)	Description	Energy Average Hourly Noise Level (dBA Leq)[2]		CNEL
			Daytime	Nighttime	
L1	2,675'	Located on Nandina Avenue west of Perris Boulevard and north of existing residential homes.	64.0	62.9	69.5
L2	0'	Located within the Project site on Indian Avenue north of the existing iHerb, Inc. industrial building.	62.8	63.7	70.2
L3	2,920'	Located at the southwest corner of Nevada Avenue and Harley Knox Boulevard, north of existing residential homes. The March Air Reserve Base runway is located north of this location.	57.1	56.5	63.3
L4	3,285'	Located southwest of the Project site on Webster Avenue near existing residential homes. The March Air Reserve Base runway is north of this location.	57.4	57.2	63.3

[1] See Exhibit 5-A for the noise level measurement locations.
[2] The long-term 24-hour measurement printouts are included in Appendix 5.2.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (17) 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. (18) 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.

6.2 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 12 study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications according to the City of Moreno Valley and City of Perris General Plan Circulation Elements, and the posted vehicle speeds. For the purpose of this analysis, soft site conditions were used to analyze the traffic noise impacts within the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. 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. (19)

The Existing and Opening Year 2020 average daily traffic volumes used for this study are presented on Table 6-2 and were provided by the *Indian Street Commerce Center Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (2) Table 6-3 provides the time of day (daytime, evening, and nighttime) vehicle splits.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Planned Land Use[1]	Distance from Centerline to Nearest Adjacent Land Use (Feet)[2]	Posted Vehicle Speed (mph)
1	Indian St.	n/o Grove View Rd.	Business Park	44'	50
2	Indian St.	s/o Grove View Rd.	Business Park	44'	50
3	Indian St.	s/o Driveway 1	Business Park	44'	50
4	Indian St.	n/o Harley Knox Bl.	Business Park	44'	50
5	Nandina Av.	w/o Indian St.	Business Park	44'	45
6	Nandina Av.	e/o Indian St.	Business Park	44'	45
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	55'	45
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	55'	45
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	55'	45
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	55'	45
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	55'	45
12	Harley Knox Bl.	e/o Indian St.	Business Park	55'	45

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the General Plan Circulation Elements.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Existing 2015 Average Daily Traffic Volumes[1]		Opening Year 2020 Average Daily Traffic Volumes[1]	
			Without Project	With Project	Without Project	With Project
1	Indian St.	n/o Grove View Rd.	12,132	12,266	31,231	31,365
2	Indian St.	s/o Grove View Rd.	13,803	14,743	26,360	27,300
3	Indian St.	s/o Driveway 1	12,634	13,324	25,070	25,760
4	Indian St.	n/o Harley Knox Bl.	13,627	14,317	23,901	24,591
5	Nandina Av.	w/o Indian St.	6,752	6,810	8,900	8,958
6	Nandina Av.	e/o Indian St.	4,399	4,475	7,143	7,219
7	Harley Knox Bl.	w/o I-215 NB Ramps	13,835	14,264	25,508	25,937
8	Harley Knox Bl.	e/o I-215 NB Ramps	17,815	18,331	33,350	33,866
9	Harley Knox Bl.	w/o Patterson Av.	17,720	18,236	33,244	33,760
10	Harley Knox Bl.	w/o Webster Av.	16,592	17,137	31,647	32,192
11	Harley Knox Bl.	w/o Indian St.	20,018	20,563	35,084	35,629
12	Harley Knox Bl.	e/o Indian St.	8,063	8,208	12,725	12,870

[1] Source: Indian Street Commerce Center Traffic Impact Analysis, Urban Crossroads, Inc., January 2016.

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	63.65%	6.76%	29.59%	100.00%
Medium Trucks	74.73%	4.34%	20.93%	100.00%
Heavy Trucks	66.08%	9.83%	24.09%	100.00%

[1] Based on existing 24-hour classification counts by vehicle type taken on 12/16/2015 at the intersection of Harley Knox Boulevard and Indian Street (Indian Street Commerce Center Traffic Impact Analysis, Urban Crossroads, Inc., January 2016). The 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.

According to the *Indian Street Commerce Center Traffic Impact Analysis* prepared by Urban Crossroads, Inc., the Project is expected to generate a net total of approximately 940 trip-ends per day (actual vehicles) with 104 AM peak hour trips and 109 PM peak hour trips. (2) The net Project trip generation includes 360 truck trip-ends per day. While the traffic volumes presented in the *Indian Street Commerce Center Traffic Impact Analysis* are expressed as Passenger Car Equivalent (PCE) trips, the Indian Street Commerce Center Noise Impact Analysis relies on the net Project trips to accurately account for the effect of individual truck trips on the study area roadway network.

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.

The 360 daily Project truck trip-ends trucks were assigned to the 12 individual off-site study area roadway segments based on the estimated Project truck trip distribution percentages. Using the Project truck trips in combination with the Project trip distribution, it is possible to calculate 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 and 6-6 show the vehicle mixes used for the with Project traffic scenarios.

TABLE 6-4: WITHOUT PROJECT CONDITIONS VEHICLE MIX

Classification	Total % Traffic Flow[1]			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments	77.86%	9.26%	12.88%	100.00%

[1] Based on existing 24-hour classification counts by vehicle type taken on 12/16/2015 at the intersection of Harley Knox Boulevard and Indian Street (Indian Street Commerce Center Traffic Impact Analysis, Urban Crossroads, Inc., January 2016). The vehicle mix percentage values rounded to the nearest one-hundredth.

TABLE 6-5: EXISTING WITH PROJECT CONDITIONS VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Indian St.	n/o Grove View Rd.	77.95%	9.19%	12.86%	100.00%
2	Indian St.	s/o Grove View Rd.	76.83%	9.15%	14.03%	100.00%
3	Indian St.	s/o Driveway 1	76.44%	9.28%	14.28%	100.00%
4	Indian St.	n/o Harley Knox Bl.	76.54%	9.28%	14.19%	100.00%
5	Nandina Av.	w/o Indian St.	78.05%	9.18%	12.78%	100.00%
6	Nandina Av.	e/o Indian St.	77.83%	9.19%	12.98%	100.00%
7	Harley Knox Bl.	w/o I-215 NB Ramps	76.13%	9.45%	14.43%	100.00%
8	Harley Knox Bl.	e/o I-215 NB Ramps	76.61%	9.36%	14.02%	100.00%
9	Harley Knox Bl.	w/o Patterson Av.	76.61%	9.36%	14.03%	100.00%
10	Harley Knox Bl.	w/o Webster Av.	76.57%	9.35%	14.08%	100.00%
11	Harley Knox Bl.	w/o Indian St.	76.78%	9.34%	13.88%	100.00%
12	Harley Knox Bl.	e/o Indian St.	78.25%	9.09%	12.66%	100.00%

[1] Source: Indian Street Commerce Center Traffic Impact Analysis, Urban Crossroads, Inc., January 2016.
[2] Vehicle mix percentage values rounded to the nearest one-hundredth.

TABLE 6-6: OPENING YEAR 2020 WITH PROJECT CONDITIONS VEHICLE MIX

ID	Roadway	Segment	With Project[1]			
			Autos	Medium Trucks	Heavy Trucks	Total[2]
1	Indian St.	n/o Grove View Rd.	77.89%	9.23%	12.88%	100.00%
2	Indian St.	s/o Grove View Rd.	77.30%	9.20%	13.50%	100.00%
3	Indian St.	s/o Driveway 1	77.12%	9.27%	13.61%	100.00%
4	Indian St.	n/o Harley Knox Bl.	77.09%	9.27%	13.64%	100.00%
5	Nandina Av.	w/o Indian St.	78.00%	9.20%	12.80%	100.00%
6	Nandina Av.	e/o Indian St.	77.84%	9.21%	12.95%	100.00%
7	Harley Knox Bl.	w/o I-215 NB Ramps	76.90%	9.36%	13.73%	100.00%
8	Harley Knox Bl.	e/o I-215 NB Ramps	77.18%	9.31%	13.50%	100.00%
9	Harley Knox Bl.	w/o Patterson Av.	77.18%	9.31%	13.50%	100.00%
10	Harley Knox Bl.	w/o Webster Av.	77.17%	9.31%	13.52%	100.00%
11	Harley Knox Bl.	w/o Indian St.	77.24%	9.30%	13.46%	100.00%
12	Harley Knox Bl.	e/o Indian St.	78.11%	9.15%	12.74%	100.00%

[1] Source: Indian Street Commerce Center Traffic Impact Analysis, Urban Crossroads, Inc., January 2016.
[2] Vehicle mix percentage values rounded to the nearest one-hundredth.

6.3 VIBRATION ASSESSMENT

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-7. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation:

$$L_{VdB}(D) = L_{VdB}(25\text{ ft}) - 30\log(D/25)$$

To describe the potential building damage associated with vibration impacts the FTA provides the following equation:

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

TABLE 6-7: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet	Vibration Decibels (VdB) at 25 feet
Small bulldozer	0.003	58
Jackhammer	0.035	79
Loaded Trucks	0.076	86
Large bulldozer	0.089	87

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

7 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on the *Indian Street Commerce Center Traffic Impact Analysis*. (2) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Without / With Project: This scenario refers to the existing present-day noise conditions, without and with the proposed Project.
- Opening Year 2020 Without / With Project: This scenario refers to the background noise conditions at future Year 2020 without and with the proposed Project. This scenario corresponds to 2020 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.

7.1 TRAFFIC NOISE CONTOURS

To quantify the Project's traffic noise impacts on the surrounding areas, the changes in traffic noise levels on 12 roadway segments surrounding the Project were calculated based on the changes in the average daily traffic volumes. The noise contours were used to assess the Project's incremental traffic-related noise impacts at the right-of-way of each roadway conveying Project traffic and the property line of the adjacent land uses.

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 take into account the effect of any existing noise barriers or topography that may affect ambient noise levels. In addition, since the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from the surrounding stationary/area noise sources within the Project study area. Tables 7-1 through 7-4 present a summary of the unmitigated exterior traffic noise levels for the 12 study area roadway segments analyzed from the without Project to the with Project conditions in each of the two timeframes: Existing and Opening Year 2020 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the four traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Indian St.	n/o Grove View Rd.	Business Park	78.9	171	369	796
2	Indian St.	s/o Grove View Rd.	Business Park	79.4	187	403	867
3	Indian St.	s/o Driveway 1	Business Park	79.0	176	379	818
4	Indian St.	n/o Harley Knox Bl.	Business Park	79.4	185	399	860
5	Nandina Av.	w/o Indian St.	Business Park	75.5	102	220	475
6	Nandina Av.	e/o Indian St.	Business Park	73.6	77	166	357
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	77.8	182	392	844
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	78.9	215	463	998
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	78.9	214	462	995
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	78.6	205	442	952
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	79.4	232	501	1079
12	Harley Knox Bl.	e/o Indian St.	Business Park	75.4	127	273	589

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest 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 CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Indian St.	n/o Grove View Rd.	Business Park	78.9	172	371	800
2	Indian St.	s/o Grove View Rd.	Business Park	80.0	203	437	941
3	Indian St.	s/o Driveway 1	Business Park	79.6	191	412	888
4	Indian St.	n/o Harley Knox Bl.	Business Park	79.9	200	431	929
5	Nandina Av.	w/o Indian St.	Business Park	75.5	102	221	475
6	Nandina Av.	e/o Indian St.	Business Park	73.7	78	168	362
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	78.3	196	422	910
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	79.3	228	492	1060
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	79.3	228	490	1057
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	79.0	219	471	1015
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	79.7	245	529	1139
12	Harley Knox Bl.	e/o Indian St.	Business Park	75.5	127	274	590

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: OPENING YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Indian St.	n/o Grove View Rd.	Business Park	83.0	322	694	1495
2	Indian St.	s/o Grove View Rd.	Business Park	82.2	288	620	1335
3	Indian St.	s/o Driveway 1	Business Park	82.0	278	599	1291
4	Indian St.	n/o Harley Knox Bl.	Business Park	81.8	269	580	1251
5	Nandina Av.	w/o Indian St.	Business Park	76.7	123	265	571
6	Nandina Av.	e/o Indian St.	Business Park	75.7	106	229	493
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	80.4	273	589	1268
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	81.6	327	704	1517
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	81.6	326	702	1513
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	81.4	316	680	1464
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	81.8	338	728	1569
12	Harley Knox Bl.	e/o Indian St.	Business Park	77.4	172	370	798

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: OPENING YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Planned Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)[2]	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Indian St.	n/o Grove View Rd.	Business Park	83.0	323	695	1498
2	Indian St.	s/o Grove View Rd.	Business Park	82.5	301	647	1395
3	Indian St.	s/o Driveway 1	Business Park	82.3	290	626	1348
4	Indian St.	n/o Harley Knox Bl.	Business Park	82.1	282	607	1308
5	Nandina Av.	w/o Indian St.	Business Park	76.7	123	265	571
6	Nandina Av.	e/o Indian St.	Business Park	75.8	107	231	497
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	80.7	285	614	1323
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	81.8	338	727	1567
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	81.8	337	726	1564
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	81.6	327	704	1516
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	82.0	349	751	1618
12	Harley Knox Bl.	e/o Indian St.	Business Park	77.4	172	371	799

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.
[2] The CNEL is calculated at the boundary of the right-of-way of each roadway and the property line of the nearest adjacent land use.
"RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-1 presents the Existing without Project conditions CNEL noise levels. From this we can see that the exterior noise levels are expected to range from 73.6 to 79.4 dBA CNEL, without accounting for any noise attenuation features such as noise barriers or topography. Table 7-2 shows the Existing with Project conditions will range from 73.7 to 80.0 dBA CNEL. Project traffic would not cause or result in increased noise levels that would exceed the 65 dBA CNEL threshold condition. Nor would Project traffic cause or result in increased noise levels of greater than 1.5 dBA CNEL when the without-Project condition already exceeds 65 dBA CNEL.

TABLE 7-5: EXISTING CONDITION OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Planned Land Use[1]	CNEL at Adjacent Land Use (dBA)[1]			Threshold Exceeded?
				No Project	With Project	Project Addition	
1	Indian St.	n/o Grove View Rd.	Business Park	78.9	78.9	0.0	No
2	Indian St.	s/o Grove View Rd.	Business Park	79.4	80.0	0.6	No
3	Indian St.	s/o Driveway 1	Business Park	79.0	79.6	0.6	No
4	Indian St.	n/o Harley Knox Bl.	Business Park	79.4	79.9	0.5	No
5	Nandina Av.	w/o Indian St.	Business Park	75.5	75.5	0.0	No
6	Nandina Av.	e/o Indian St.	Business Park	73.6	73.7	0.1	No
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	77.8	78.3	0.5	No
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	78.9	79.3	0.4	No
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	78.9	79.3	0.4	No
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	78.6	79.0	0.4	No
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	79.4	79.7	0.3	No
12	Harley Knox Bl.	e/o Indian St.	Business Park	75.4	75.5	0.1	No

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.

7.3 OPENING YEAR 2020 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-6 presents a comparison of the Opening Year 2020 without and with Project conditions CNEL noise levels. Table 7-3 shows that the exterior noise levels without accounting for any noise attenuation features are expected to range from 75.7 to 83.0 dBA CNEL without the Project. Table 7-4 presents the Opening Year 2020 with Project conditions noise level contours that are expected to range from 75.8 to 83.0 dBA CNEL. As shown on Table 7-6 Project traffic would not cause or result in increased noise levels that would exceed the 65 dBA CNEL threshold condition. Nor would Project traffic cause or result in increased noise levels of greater than 1.5 dBA CNEL when the without-Project condition already exceeds 65 dBA CNEL.

TABLE 7-6: OPENING YEAR 2020 OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Planned Land Use[1]	CNEL at Adjacent Land Use (dBA)[1]			Threshold Exceeded?
				No Project	With Project	Project Addition	
1	Indian St.	n/o Grove View Rd.	Business Park	83.0	83.0	0.0	No
2	Indian St.	s/o Grove View Rd.	Business Park	82.2	82.5	0.3	No
3	Indian St.	s/o Driveway 1	Business Park	82.0	82.3	0.3	No
4	Indian St.	n/o Harley Knox Bl.	Business Park	81.8	82.1	0.3	No
5	Nandina Av.	w/o Indian St.	Business Park	76.7	76.7	0.0	No
6	Nandina Av.	e/o Indian St.	Business Park	75.7	75.8	0.1	No
7	Harley Knox Bl.	w/o I-215 NB Ramps	Light Industrial	80.4	80.7	0.3	No
8	Harley Knox Bl.	e/o I-215 NB Ramps	Business Park	81.6	81.8	0.2	No
9	Harley Knox Bl.	w/o Patterson Av.	Light Industrial	81.6	81.8	0.2	No
10	Harley Knox Bl.	w/o Webster Av.	Light Industrial	81.4	81.6	0.2	No
11	Harley Knox Bl.	w/o Indian St.	Light Industrial	81.8	82.0	0.2	No
12	Harley Knox Bl.	e/o Indian St.	Business Park	77.4	77.4	0.0	No

[1] Sources: City of Moreno Valley Land Use Map, Figure 2-2, and the City of Perris General Plan Map.

7.4 OFF-SITE TRAFFIC NOISE IMPACTS TO THE PROJECT SITE

As shown on Table 7-6, the Opening Year 2020 with Project off-site traffic noise levels at the closest roadway segment to the Project site, Indian Street south of Grove View Road, will approach 82.5 dBA CNEL. The OPR *General Plan Guidelines, Appendix C: Noise Element Guidelines*, previously discussed in Section 3.3.1, indicates that industrial land use is considered *normally unacceptable* with exterior noise levels above 80 dBA CNEL. However, the Project's industrial land use does not contain outdoor areas identified by the OPR which require exterior noise mitigation. The Project must still comply with the interior noise reduction requirements of the 2014 State of California's Green Building Standards Code for non-residential land uses experiencing 65 dBA CNEL or greater noise levels. Therefore, the combined sound transmission class (STC) rating of the wall and roof-ceiling assemblies of the Project building must be at least 50 to satisfy the 2014 State of California's Green Building Standards Code. (10)

8 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following five 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, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Representative sensitive receivers in the vicinity of the Project site include the single-family residential homes at locations R1 to R5. The closest noise-sensitive receiver is represented by location R1 where an existing residential home is located approximately 1,968 feet northeast of the Project site boundary.

R1: Located approximately 1,968 feet northeast of the Project site on Nandina Avenue, R1 represents an existing single-family residential home. A long-term noise measurement was taken near this location, L1, to describe the existing ambient noise environment.

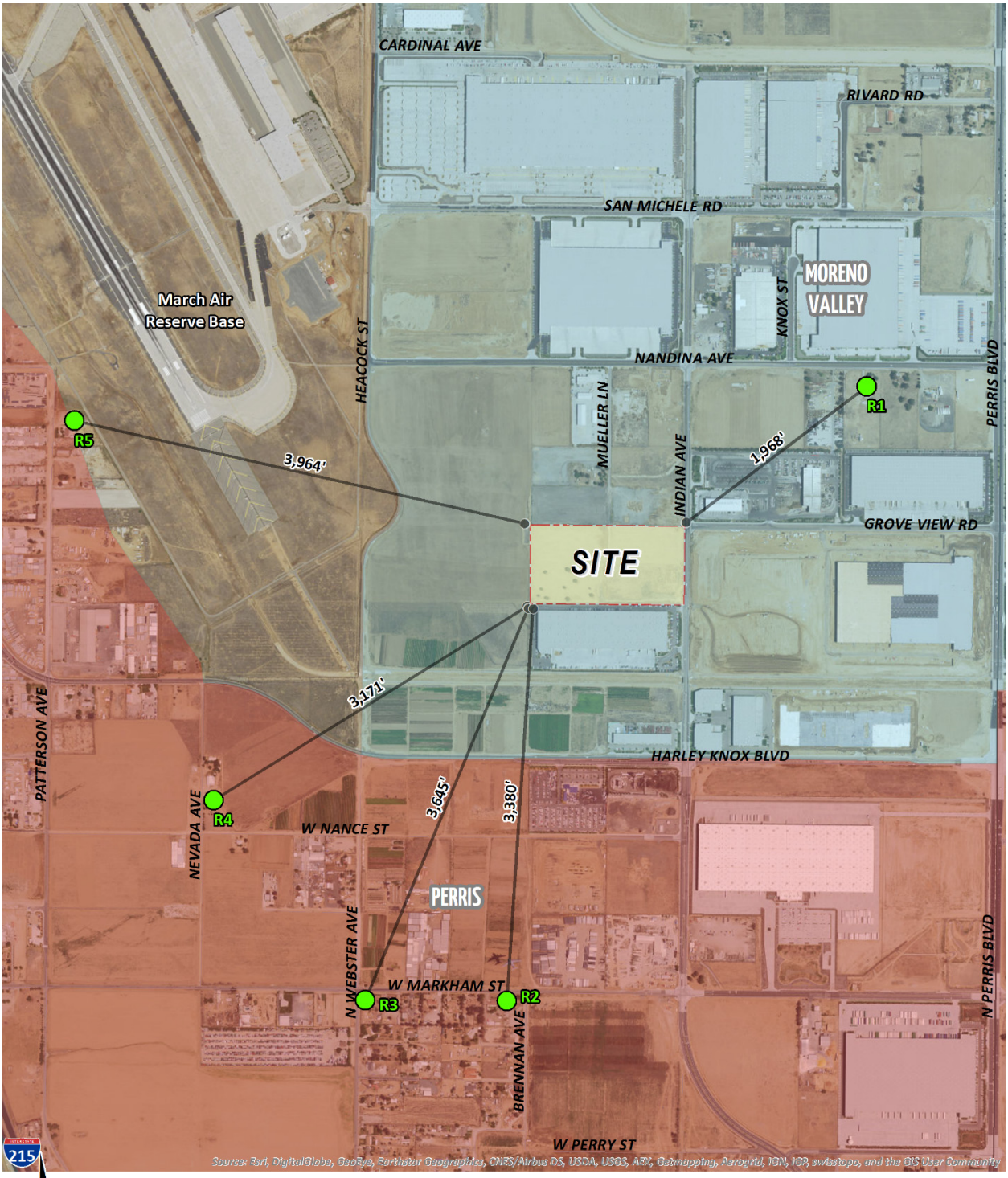
R2: Location R2 represents the existing residential home located roughly 3,380 feet south of the Project site on Markham Street.

R3: Location R3 represents the existing residential homes situated southwest of the Project site at a distance of approximately 3,645 feet on Markham Street.

R4: Location R4 represents the existing residential homes situated approximately 3,171 feet southwest of the Project site on Nevada Avenue. A long-term noise measurement was taken north this location, L3, to describe the existing ambient noise environment.

R5: At a distance of approximately 3,964 feet, location R5 represents a single-family residential home situated on Patterson Avenue west of the Project site.

EXHIBIT 8-A: RECEIVER LOCATIONS



LEGEND:

- Receiver Locations
- Distance from receiver to Project site boundary (in feet)
- Project Site Boundaries

9 STATIONARY/AREA-SOURCE NOISE IMPACTS

This section analyzes the potential stationary/area-source noise impacts at nearby receiver locations resulting from operation of the proposed Indian Street Commerce Center. Exhibit 9-A identifies the representative receiver locations and noise source locations used to assess the stationary/area-source noise levels.

9.1 STATIONARY/AREA-SOURCE NOISE STANDARDS

Although the Project site is located within the City of Moreno Valley, noise-sensitive receivers potentially impacted by stationary/area-source noise activities are also located in the City of Perris. Therefore, to accurately describe the potential Project-related operational noise level contributions, this analysis presents the appropriate stationary/area-source noise standards for each jurisdiction adjacent to the Project site. The City of Moreno Valley and City of Perris Municipal Code stationary-source noise standards are provided in Appendices 3.1 and 3.2, respectively.

9.1.1 CITY OF MORENO VALLEY STATIONARY/AREA-SOURCE NOISE STANDARDS

The City of Moreno Valley Municipal Code, Chapter 11.80 *Noise Regulation*, provides performance standards and noise control guidelines for determining and mitigating non-transportation or stationary-source noise impacts from operations at private properties. The City of Moreno Valley Municipal Code defines *Maximum Sound Levels (in dB(A)) for Source Land Uses* in Table 11.80.030-2 for *Residential* and *Commercial* land uses. As defined by the Municipal Code, Section 11.80.020 *Definitions*, *Commercial* land use *means all uses of land not otherwise classified as residential,* and *Residential* land use *means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.* (13) For the purpose of this analysis, the Indian Street Commerce Center Project is considered *Commercial* land use since it is not classified as residential. Based on this standard, the operational noise level limits for commercial land use, from Table 11.80.030-2, of 65 dBA Leq during the daytime (8:00 a.m. to 10:00 p.m.) hours and 60 dBA Leq during the nighttime (10:01 p.m. to 7:59 a.m.) hours shall apply to the operational noise from the Project.

Further, Section 11.80.030 (C) *Prohibited Acts*, *Nonimpulsive Sound Decibel Limits*, states: *No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimpulsive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on a privately owned property…* (13) Therefore, at a distance of 200 feet from the property line, the Project's operational noise levels shall not exceed the 65 dBA Leq daytime and 60 dBA Leq nighttime noise level standards for commercial land uses, as previously shown on Table 3-1.

9.1.2 CITY OF PERRIS STATIONARY/AREA-SOURCE NOISE STANDARDS

The City of Perris Municipal Code, Chapter 7.34 *Noise Control*, Section 7.34.040, establishes the permissible noise level that may intrude into a neighbor's property from the use of sound amplifying equipment. The Municipal Code exterior noise level criteria for residential properties affected by stationary/area noise sources is included in Section 7.34.050 *General Prohibition*, which states that the Section 7.34.040 sound amplifying equipment noise standards shall apply. Therefore, for residential properties, the exterior noise level shall not exceed the Section 7.34.040 80 dBA Leq during daytime hours (7:00 a.m. to 10:00 p.m.) and shall not exceed 60 dBA Leq during the nighttime hours (10:00 p.m. to 7:00 a.m.), as previously shown on Table 3-2. (14) The City of Perris Municipal Code is included in Appendix 3.2.

9.2 STATIONARY/AREA-SOURCE NOISE SOURCES

At the time this noise analysis was prepared the future tenants of the proposed Project were unknown. To present the potential worst-case noise conditions, this analysis assumes the Project would be operational 24 hours per day, seven days per week. Business operations would primarily be conducted within the enclosed buildings, with the exception of the loading and unloading of trucks at designated loading bays. The on-site Project-related noise sources are expected to include: idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, and roof-top mechanical ventilation equipment.

9.3 REFERENCE NOISE LEVELS

Since the future tenants of the proposed Project are unknown, the Project's stationary/area-source noise levels were estimated based on reference noise level measurements of similar logistics warehouse buildings. The reference noise levels are intended to describe the expected stationary/area noise sources that may include idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, and roof-top mechanical ventilation equipment. To estimate the Project off-site stationary/area-source noise impacts associated with the Indian Street Commerce Center, the following reference noise level measurements were collected, as shown on Table 9-1. Appendix 9.1 includes reference noise source photos for each distribution/warehouse location.

9.3.1 NATURE'S BEST DISTRIBUTION FACILITY (COLD STORAGE)

On Wednesday, January 7th, 2015, Urban Crossroads, Inc. collected short-term operational noise level measurements at the Nature's Best distribution facility located at 16081 Fern Avenue in the City of Chino. Operations at the Nature's Best distribution facility measurements represent the typical weekday logistics warehouse activities with both dry goods and cold storage from a single building with loading dock areas located on both sides of the building. To describe the loading dock activities, a reference noise level measurement was collected to represent the truck idling/reefer activity. A second reference noise level measurement at this location was collected to assess the entry gate noise source activity.

TRUCK IDLING/REEFER ACTIVITY

During the fourteen minute truck idling/reefer activity reference noise level measurement, approximately twenty delivery trucks were docked, idling, or parked in the northern loading dock area. The truck idling/reefer activity 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 70.1 dBA Leq.

Specifically, the truck idling/reefer activity reference noise level measurement represents one truck located approximately thirty 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.

ENTRY GATE ACTIVITY

The entry gate activity reference noise level measurement was taken over a ten minute period and represents the multiple noise sources associated with the eastern entry gate to the loading dock area of the Nature's Best distribution center producing a reference noise level of 69.2 dBA Leq. The entry gate activity noise sources included in this measurement account for the sound of the gates rattling and squeaking during normal opening and closing operations, the gate closure equipment, as well as the associated noise as trucks approach and stop at the gate.

9.3.2 MOTIVATIONAL FULFILLMENT & LOGISTICS SERVICES DISTRIBUTION FACILITY (DRY GOODS)

Additional short-term reference noise level measurements were collected on Wednesday, January 7th, 2015, by Urban Crossroads, Inc. at the Motivational Fulfillment & Logistics Services distribution facility located at 6810 Bickmore Avenue in the City of Chino. The noise level measurements represent the typical weekday dry goods logistics warehouse operation in a single building with a loading dock area on the western side of the building façade. Two reference noise level measurements were taken at this location, including entry gate activity and unloading/docking activity noise sources. Up to ten trucks were observed in the loading dock area including a combination of track trailer semi-trucks, two-axle delivery trucks, and background forklift operations.

ENTRY GATE ACTIVITY

The entry gate activity noise level measurement was taken at the southern entry gate over a fifteen minute period and represents multiple noise sources producing a reference noise level of 64.0 dBA Leq. The noise sources included at this measurement location account for the rattling and squeaking during normal opening and closing operations, the gate closure equipment, truck engines idling outside the entry gate, and background forklift backup alarm noise.

UNLOADING/DOCKING ACTIVITY

The unloading/docking activity noise level measurement was taken over a fifteen minute period and represents multiple noise sources taken from the center of loading dock activities generating a reference noise level of 67.2 dBA Leq. At this measurement location, the noise sources associated with employees unloading a docked truck container included the squeaking of the truck's shocks when weight was removed from the truck, employees playing music over a radio, as well as a forklift horn and backup alarm. In addition, during the noise level measurement a truck entered the loading dock area and proceeded to reverse and dock in a nearby loading bay, adding truck engine and air brakes noise.

9.3.3 VEGFRESH FARMS / FEDEX DISTRIBUTION FACILITY

A fifth noise level measurement, taken on Tuesday, January 22, 2013, by Urban Crossroads, Inc. included 24-hour operational noise level measurements at the Veg Fresh Farms and FedEx distribution facility located at 500 East Orangethorpe Avenue in the City of Anaheim. The Veg Fresh Farms that includes cold storage and FedEx distribution center noise level measurement represent the typical weekday logistics warehouse operation over a 24-hour period consisting of buildings with over 150 loading bays (docks). The reference noise level measurement collected at this location was 69.1 dBA Leq.

9.3.4 ROOF-TOP AIR CONDITIONING UNITS

In order to assess the impacts created by the roof-top mechanical ventilation equipment at the Project site, reference noise levels measurements were taken at the Santee Walmart on July 27th, 2015. Located at 170 Town Center Parkway in the City of Santee, the noise level measurements describe a single mechanical roof-top air conditioning unit on the roof of an existing Walmart store. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. The reference noise level noise level at a distance of 5 feet from the unit was measured at 77.2 dBA Leq. The operating conditions of the reference noise level measurement reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. The roof-top air condition units were observed to operate the most during the daytime hours, for a total of 39 minutes per hour, and are anticipated to operate during the daytime and nighttime hours at the Project site. For the purpose of this noise analysis, the roof-top mechanical ventilation equipment is expected to be located on the roof at a noise elevation of 25 feet. The noise attenuation provided by a parapet wall is not reflected in this reference noise level measurement.

9.3.5 WORST-CASE REFERENCE DISTRIBUTION/WAREHOUSE NOISE LEVELS

In order to accommodate flexibility for future tenants, the reference noise level measurements for the proposed Project were chosen to represent worst-case industrial center stationary/area-source noise levels. To describe the worst-case Project-only stationary/area-source noise levels associated with the Indian Street Commerce Center Project, this analysis relies on a reference noise level of 70.1 dBA Leq at a distance of 30 feet representing truck idling/reefer activity taken at the Nature's Best distribution facility, in addition to the reference roof-top mechanical

ventilation equipment noise level of 77.2 dBA Leq at a distance of 5 feet. This analysis assumes all tenants within the Project buildings would be operational 24 hours per day, seven days per week. In addition, this analysis accounts for the noise associated with cold storage (refrigeration) as a worst-case scenario in case such use of the buildings is proposed by future tenants, and may conservatively overstate the actual noise levels due to tenant operations at the Project site.

While the specific noise levels at the Project site will depend on the actual tenant, the intensity and the daytime/nighttime hours of operation, the reference noise levels are used to describe the peak Project stationary/area-source noise activities since they represent similar operational characteristics. The reference noise levels are intended to describe noise level impacts associated with the expected typical warehouse and distribution storage operations at the Project site and do not account for any special noise generators.

TABLE 9-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source	Duration (hh:mm:ss)	Distance From Source (Feet)	Noise Source Height (Feet)	Noise Level (dBA Leq)
Truck Idle/Reefer Activity[1]	0:14:00	30'	8'	70.1
Entry Gate Activity[1]	0:10:00	20'	8'	69.2
Entry Gate Activity[2]	0:15:00	20'	8'	64.0
Unloading/Docking Activity[2]	0:15:00	30'	8'	67.2
Distribution/Warehouse Activity[3]	24:00:00	25'	8'	69.1
Roof-Top Mechanical Ventilation Equipment[4]	96:00:00	5'	25'	77.2

[1] Reference noise level measurements were collected from the existing operations of the Nature's Best distribution facility located at 16081 Fern Avenue in the City of Chino. The reference noise level measurements were collected on Wednesday, January 7, 2015.
[2] Reference noise level measurements were collected from the existing operations of the Motivational Fulfillment & Logistics Services distribution facility located at 6810 Bickmore Avenue in the City of Chino. The reference noise level measurements were collected on Wednesday, January 7, 2015.
[3] The reference noise level measurements include the daytime and nighttime noise levels associated with idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods. Reference noise level measurements were collected from the existing 24-hour operations of Veg Fresh Farms and FedEx distribution facility located at 500 East Orangethorpe Avenue in the City of Anaheim. The reference noise level measurements were collected on Tuesday, January 22, 2013.
[4] As measured by Urban Crossroads, Inc. on 7/27/2015 at the Santee Walmart located at 170 Town Center Parkway.

9.4 PROJECT STATIONARY/AREA-SOURCE NOISE LEVELS

Based upon the reference noise levels, it is possible to estimate the Project operational stationary-source noise levels at a distance of 200 feet and at each of the five noise receiver locations. The operational noise level calculations shown on Tables 9-2 and 9-3 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. With geometric spreading, sound levels attenuate (or decrease) at a rate of 6 dB for each doubling of distance from a point source (idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, and roof-top mechanical ventilation equipment).

Table 9-2 presents the combined total operational noise level projections at a distance of 200 feet consistent with the City of Moreno Valley Municipal Code. The Project operational noise levels at a distance of 200 feet are estimated at 54.0 dBA Leq. Based on the results of this analysis, the Project operational noise levels associated with the Indian Street Commerce Center will satisfy the City of Moreno Valley Municipal Code 65 dBA Leq daytime and 60 dBA Leq nighttime exterior noise level standards at a distance 200 feet from the source land use.

TABLE 9-2: STATIONARY/AREA-SOURCE NOISE LEVEL PROJECTIONS AT A DISTANCE OF 200 FEET

Noise Source	Ref. Noise Level (dBA Leq)	Distance Atten. @ 200' (dBA Leq)[1]	Hourly Activity (Mins.)[2]	Hourly Activity Adjustment (dBA Leq)	Noise Level @ 200' (dBA Leq)
Truck Idle/Reefer Activity	70.1	-16.5	60	0.0	53.6
Roof-Top Mechanical Ventilation Equipment	77.2	-32.0	39	-1.9	43.3
Combined Total:					54.0

[1] Drop off rate of 6 dBA per doubling of distance (point source).
[2] Anticipated duration (minutes within the hour) of noise activity during peak hourly conditions expected at the Project site.

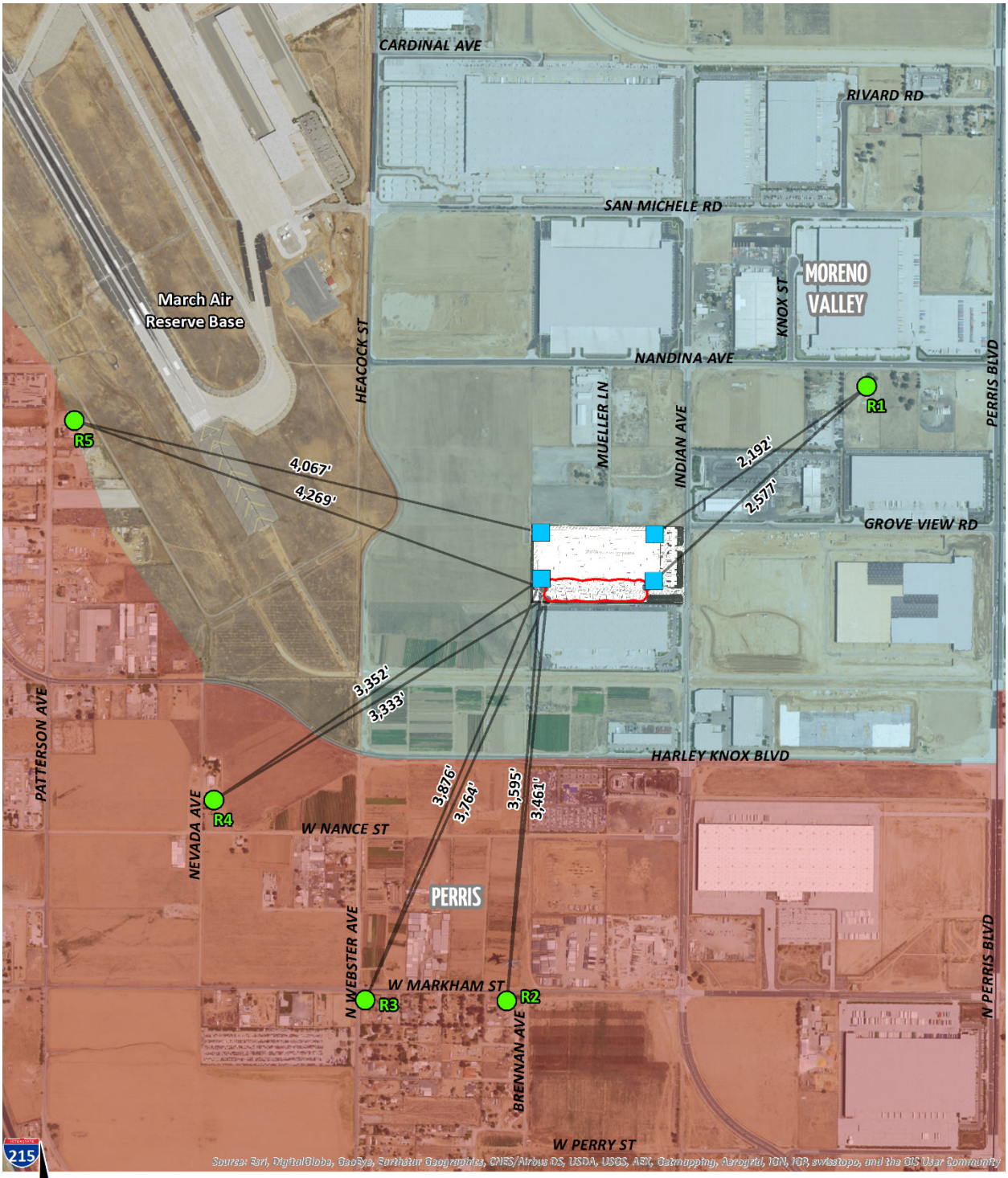
Table 9-3 indicates that the hourly noise levels associated with the Indian Street Commerce Center Project at the five sensitive receiver locations are expected to range from 27.4 to 31.9 dBA Leq. The Project-related stationary/area-source noise levels shown on Table 9-3 will satisfy the City of Moreno Valley 65 dBA Leq daytime and 60 dBA Leq nighttime, as well as the City of Perris 80 dBA Leq daytime and 60 dBA Leq nighttime exterior noise level standards at the nearby sensitive receiver locations. The stationary/area-source noise level calculations are included in Appendix 9.2.

TABLE 9-3: STATIONARY/AREA-SOURCE NOISE LEVEL PROJECTIONS AT RECEIVER LOCATIONS

Receiver Location[1]	Noise Sources[2]		Combined Stationary/Area-Source Noise Levels (dBA Leq)[3]
	Truck Idle/ Reefer Activity	Roof-Top Mechanical Ventilation Equipment	
R1	31.4	22.5	31.9
R2	28.9	18.2	29.3
R3	28.1	17.5	28.5
R4	29.2	18.8	29.6
R5	27.0	17.1	27.4

[1] See Exhibit 9-A for the receiver and noise source locations.
[2] Reference noise sources as shown on Table 9-1.
[3] Calculations for each noise source are provided in Appendix 9.2.

EXHIBIT 9-A: STATIONARY/AREA-SOURCE NOISE SOURCE LOCATIONS



N

LEGEND:

- Receiver Locations
- Roof-Top Mechanical Ventilation Equipment
- Distribution/Warehouse Activity
- Distance from receiver to center of noise source (in feet)

9.5 PROJECT STATIONARY/AREA-SOURCE NOISE LEVEL CONTRIBUTIONS

The Project-related noise level contribution is evaluated at each receiver location based on the magnitude of the Project-related increase on the ambient noise levels. To describe the Project operational noise level contributions, the Project operational noise levels were combined with the existing ambient noise level measurements at the sensitive receiver locations. The difference between the combined Project and ambient noise levels describe the Project noise level contributions. Noise levels that would be experienced at receiver locations when Project-source noise is added to ambient daytime and nighttime conditions are presented on Tables 9-4 and 9-5, respectively.

As indicated on Table 9-4, the Project is not expected to generate a daytime operational noise level contribution at the nearby receiver locations. Table 9-5 shows the Project is not expected to generate a nighttime operational noise level contribution at the nearby receiver locations. Therefore, the Project-related operational noise level contributions to the nighttime ambient noise levels at nearby sensitive receiver locations will not exceed the significance thresholds identified in Section 4. On this basis, Project operational stationary-source noise levels would not result in a substantial temporary/periodic, or permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project.

TABLE 9-4: DAYTIME STATIONARY/AREA-SOURCE NOISE LEVEL CONTRIBUTIONS

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Contribution[6]	Threshold Exceeded?[7]
R1	31.9	L1	64.0	64.0	0.0	No
R2	29.3	L4	57.4	57.4	0.0	No
R3	28.5	L4	57.4	57.4	0.0	No
R4	29.6	L3	57.1	57.1	0.0	No
R5	27.4	L3	57.1	57.1	0.0	No

[1] See Exhibit 9-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 9-3.
[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 Criteria as defined in Section 4.

TABLE 9-5: NIGHTTIME STATIONARY/AREA-SOURCE NOISE LEVEL CONTRIBUTIONS

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Contribution[6]	Threshold Exceeded?[7]
R1	31.9	L1	62.9	62.9	0.0	No
R2	29.3	L4	57.2	57.2	0.0	No
R3	28.5	L4	57.2	57.2	0.0	No
R4	29.6	L3	56.5	56.5	0.0	No
R5	27.4	L3	56.5	56.5	0.0	No

[1] See Exhibit 9-A for the sensitive receiver locations.
[2] Total Project 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 Criteria as defined in Section 4.

9.6 STATIONARY/AREA-SOURCE VIBRATION IMPACTS

Although the human threshold of perception for vibration is around 65 VdB, human response to vibration is not usually significant unless the vibration exceeds 70 VdB. Truck vibration levels are dependent on vehicle characteristics, load, speed, and pavement condition. Typical vibration levels for heavy trucks at normal traffic speeds do not exceed 65 VdB, and therefore, will be below the FTA vibration threshold of 80 VdB at nearby sensitive receiver locations. Truck deliveries transiting on site will be travelling at very low speeds so it is expected that delivery truck vibration impacts at nearby homes will not exceed the 80 VdB vibration threshold.

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10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project.

10.1 CONSTRUCTION NOISE STANDARDS

To accurately describe the potential Project-related construction noise level contributions to the existing noise environment, this analysis presents the appropriate construction noise standards for each jurisdiction adjacent to the Project site including: the City of Moreno Valley and the City of Perris.

10.1.1 CITY OF MORENO VALLEY CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Indian Street Commerce Center Project, noise from construction activities are typically limited to the hours of operation established under a City's Municipal Code. The Municipal Code noise standards for construction are described below for the City of Moreno Valley to determine the potential noise impacts at nearby sensitive receiver locations. As a subset of its stationary-source noise regulations, the City Municipal Code establishes additional restrictions on construction-source noise. More specifically, Municipal Code Section 11.80.030 (D) (7), *Construction and Demolition*, provides the following:

> *No person shall operate or cause operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.*

A *noise disturbance*, as defined by the City of Moreno Valley Municipal Code, means any sound which:

- *Disturbs a reasonable person of normal sensitivities;*
- *Exceeds the sound level limits set forth in this chapter [Table 11.80.030-2];*
- *Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two hundred (200) feet from the real property line of the source of the sound, if the sound occurs on a privately owned property, or from the source of the sound, if the sound occurs on public right, public space or other publicly owned property.*

Therefore, based on the Section 11.80.030 (D) (7) construction regulations, a construction-related *noise disturbance* occurs when the noise levels exceed the *commercial* land use criteria of 65 dBA Leq during the daytime hours and 60 dBA Leq during the nighttime hours at a distance of 200 feet from the property line of the source (Project site). In addition, grading operations shall be limited to the hours identified in Section 8.21.050 (O) of 7:00 a.m. to 6:00 p.m., Monday through Friday, and 8:00 a.m. to 4:00 p.m. on weekends and holidays or as approved by the City

Engineer. The City of Moreno Valley construction noise standards are previously shown on Table 3-3 and included in Appendix 3.1.

10.1.2 CITY OF PERRIS CONSTRUCTION NOISE STANDARDS

The City of Perris Municipal Code, Section 7.34.060, identifies the City's construction noise standards and permitted hours of construction activity. Since the Project site is located in the City of Moreno Valley, the City of Perris would not have jurisdictional control over permitted hours of Project construction. Notwithstanding, the City of Perris Municipal Code, Section 7.34.060, noise level standard of 80 dBA Leq at residential properties would apply to the noise-sensitive receiver locations located in the City of Perris. (14)

10.2 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in each the following five stages within the Project site:

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

This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction. The construction reference noise level measurements, provided in Appendix 10.1, represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 56 dBA to in excess of 68 dBA when measured at 200 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 68 dBA measured at 200 feet from the noise source to the receiver would be reduced to 62 dBA at 400 feet from the source to the receiver, and would be further reduced to 56 dBA at 800 feet from the source to the receiver. The types of equipment for each construction stage are generally consistent with the data used to support the construction emissions in the *Indian Street Commerce Center Air Quality Impact Analysis* prepared by Urban Crossroads Inc. (20)

10.3 CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project construction noise levels, measurements were collected for similar activities at several construction sites. Table 10-1 provides a summary of the fifteen construction reference noise level measurements. Since the reference noise levels were collected at varying distances, all construction noise level measurements presented on Table 10-1 have been adjusted to describe a common reference distance of 50 feet. Appendix 10.1 includes a detailed construction reference noise level memo and reference noise source photos for each type of construction activity.

TABLE 10-1: CONSTRUCTION REFERENCE NOISE LEVELS

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance		Reference Noise Levels @ 50 Feet[5]	
			dBA Leq	dBA Lmax	dBA Leq	dBA Lmax
1	Truck Pass-Bys & Dozer Activity[1]	30'	63.6	68.1	59.2	63.7
2	Dozer Activity[1]	30'	68.6	76.4	64.2	72.0
3	Construction Vehicle Maintenance Activities[2]	30'	71.9	74.8	67.5	70.4
4	Foundation Trenching[2]	30'	72.6	74.9	68.2	70.5
5	Rough Grading Activities[2]	30'	77.9	84.8	73.5	80.4
6	Water Truck Pass-By & Backup Alarm[3]	30'	76.3	82.3	71.9	77.9
7	Dozer Pass-By[3]	30'	84.0	89.9	79.6	85.5
8	Two Scrapers & Water Truck Pass-By[3]	30'	83.4	89.0	79.0	84.6
9	Two Scrapers Pass-By[3]	30'	83.7	86.9	79.3	82.5
10	Scraper, Water Truck, & Dozer Activity[3]	30'	79.7	87.7	75.3	83.3
11	Concrete Mixer Truck Movements[4]	50'	71.2	73.1	71.2	73.1
12	Concrete Paver Activities[4]	30'	70.0	75.7	65.6	71.3
13	Concrete Mixer Pour & Paving Activities[4]	30'	70.3	76.3	65.9	71.9
14	Concrete Mixer Backup Alarms & Air Brakes[4]	50'	71.6	78.8	71.6	78.8
15	Concrete Mixer Pour Activities[4]	50'	67.7	79.2	67.7	79.2

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/30/15 at an industrial construction site located in the City of Ontario.
[4] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[5] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

10.4 CONSTRUCTION NOISE ANALYSIS

Using the reference construction equipment noise levels calculations of the Project construction noise level impacts at 200 feet from the Project site boundary and at the five sensitive receiver locations were completed. Tables 10-2 to 10-6 present the short-term construction noise levels for each stage of construction. Table 10-7 provides a summary of the construction noise levels by phase at the five noise receiver locations. Based on the five stages of construction, the noise impacts associated with the proposed Project are expected to create temporarily high noise levels at the nearby receiver locations. This analysis identifies the highest reference construction equipment noise level for each stage of construction using the reference noise levels provided in Appendix 10.1, based on the construction stages used in the *Indian Street Commerce Center Air Quality Impact Analysis*. To assess the peak construction noise levels at each receiver location, this analysis shows the highest noise impacts when the equipment with the highest reference noise level is operating at the Project site boundary for each stage of construction.

TABLE 10-2: SITE PREPARATION EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)	Noise Level @ 200 Feet (dBA Leq)
Truck Pass-Bys & Dozer Activity	59.2	47.1
Dozer Activity	64.2	52.1
Water Truck Pass-By & Backup Alarm	71.9	59.8
Dozer Pass-By	79.6	67.5
Peak Reference Noise Level at 200 Feet (dBA Leq)		67.5
Distance to 65 dBA Leq Contour (Feet)		267'

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)
R1	1,968'	-19.9	0.0	47.7
R2	3,380'	-24.6	0.0	43.0
R3	3,645'	-25.2	0.0	42.3
R4	3,171'	-24.0	0.0	43.5
R5	3,964'	-25.9	0.0	41.6

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 10.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 10-3: GRADING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)	Noise Level @ 200 Feet (dBA Leq)
Truck Pass-Bys & Dozer Activity	59.2	47.1
Dozer Activity	64.2	52.1
Rough Grading Activities	73.5	61.4
Water Truck Pass-By & Backup Alarm	71.9	59.8
Dozer Pass-By	79.6	67.5
Peak Reference Noise Level at 200 Feet (dBA Leq)		67.5
Distance to 65 dBA Leq Contour (Feet)		267'

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)
R1	1,968'	-19.9	0.0	47.7
R2	3,380'	-24.6	0.0	43.0
R3	3,645'	-25.2	0.0	42.3
R4	3,171'	-24.0	0.0	43.5
R5	3,964'	-25.9	0.0	41.6

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 10.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 10-4: BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)	Noise Level @ 200 Feet (dBA Leq)
Foundation Trenching	68.2	56.1
Two Scrapers & Water Truck Pass-By	79.0	66.9
Two Scrapers Pass-By	79.3	67.2
Peak Reference Noise Level at 200 Feet (dBA Leq)		67.2
Distance to 65 dBA Leq Contour (Feet)		258'

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)
R1	1,968'	-19.9	0.0	47.4
R2	3,380'	-24.6	0.0	42.7
R3	3,645'	-25.2	0.0	42.0
R4	3,171'	-24.0	0.0	43.2
R5	3,964'	-25.9	0.0	41.3

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 10.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 10-5: PAVING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)	Noise Level @ 200 Feet (dBA Leq)
Concrete Mixer Truck Movements	71.2	59.2
Concrete Paver Activities	65.6	53.5
Concrete Mixer Pour & Paving Activities	65.9	53.8
Concrete Mixer Backup Alarms & Air Brakes	71.6	59.6
Concrete Mixer Pour Activities	67.7	55.7
Peak Reference Noise Level at 200 Feet (dBA Leq)		59.6
Distance to 65 dBA Leq Contour (Feet)		107'

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)
R1	1,968'	-19.9	0.0	39.7
R2	3,380'	-24.6	0.0	35.0
R3	3,645'	-25.2	0.0	34.3
R4	3,171'	-24.0	0.0	35.6
R5	3,964'	-25.9	0.0	33.6

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 10.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 10-6: ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)	Noise Level @ 200 Feet (dBA Leq)
Construction Vehicle Maintenance Activities	67.5	55.4
Foundation Trenching	68.2	56.1
Peak Reference Noise Level at 200 Feet (dBA Leq)		56.1
Distance to 65 dBA Leq Contour (Feet)		72'

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA)[3]	Estimated Noise Barrier Attenuation (dBA)[4]	Construction Noise Level (dBA Leq)
R1	1,968'	-19.9	0.0	36.3
R2	3,380'	-24.6	0.0	31.6
R3	3,645'	-25.2	0.0	30.9
R4	3,171'	-24.0	0.0	32.1
R5	3,964'	-25.9	0.0	30.2

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 10.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

10.5 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur when demolition equipment is operating at the Project site boundary. As shown on Table 10-7, the unmitigated peak construction noise levels are expected to range from 56.1 to 67.5 dBA Leq at a distance of 200 feet from the Project site boundary. This shows that Project construction may exceed the 65 dBA Leq daytime City of Moreno Valley Municipal Code standard when equipment is operating at the Project site boundary. However, there are no sensitive receiver locations located within 200 feet of the Project site boundary. Further, the construction noise levels experienced at the nearby sensitive receiver locations are expected to range from 41.6 to 47.7 dBA Leq, as shown on Table 10-7, and will not exceed the 65 dBA Leq daytime City of Moreno Valley Municipal Code standard or the 80 dBA Leq City of Perris Municipal Code standard for construction activity.

TABLE 10-7: UNMITIGATED CONSTRUCTION NOISE LEVEL SUMMARY (DBA LEQ)

Receiver Location	Distance To Receiver (Feet)	Construction Noise Levels (dBA Leq)					
		Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Peak
@200'	200'	67.5	67.5	67.2	59.6	56.1	67.5
R1	1,968'	47.7	47.7	47.4	39.7	36.3	47.7
R2	3,380'	43.0	43.0	42.7	35.0	31.6	43.0
R3	3,645'	42.3	42.3	42.0	34.3	30.9	42.3
R4	3,171'	43.5	43.5	43.2	35.6	32.1	43.5
R5	3,964'	41.6	41.6	41.3	33.6	30.2	41.6

10.6 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate close enough to any residences or buildings to cause a vibration impact.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration. Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include grading and paving. Using the vibration source levels of construction equipment provided on Table 6-7 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 10-8 presents the expected Project related vibration levels at the five receiver locations.

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference level of 87 VdB at a distance of 25 feet. At distances ranging from 1,968 to 3,964 feet from the Project site, construction vibration levels are expected to range from 21.0 to 30.1 VdB. Using the construction vibration assessment methods provided by the FTA the proposed Project site will not include or require equipment, facilities, or activities that would result in a perceptible human response (annoyance). The construction of the Project is not expected to generate vibration levels exceeding the FTA maximum acceptable vibration standard of 80 (VdB).

TABLE 10-8: CONSTRUCTION EQUIPMENT VIBRATION LEVELS (VDB)

Receiver Location[1]	Distance To Construction Activity (Feet)	Receiver Vibration Levels (VdB)[2]					Threshold Exceeded?[3]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
R1	1,968'	1.1	22.1	29.1	30.1	30.1	No
R2	3,380'	0.0	15.1	22.1	23.1	23.1	No
R3	3,645'	0.0	14.1	21.1	22.1	22.1	No
R4	3,171'	0.0	15.9	22.9	23.9	23.9	No
R5	3,964'	0.0	13.0	20.0	21.0	21.0	No

[1] Noise receiver locations are shown on Exhibit 8-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-7.
[3] Does the peak vibration exceed the FTA maximum acceptable vibration standard of 80 VdB?

The vibration levels due to Project construction do not represent vibration levels capable of causing building damage to nearby existing buildings. The FTA identifies construction vibration levels capable of building damage ranging from 0.12 to 0.5 in/sec PPV. (8) The peak Project-construction vibration levels shown on Table 10-9, approaching 0.02 in/sec PPV, will not exceed the FTA vibration levels for building damage at the buildings closest to the Project site, or the closest sensitive receiver locations. Further, the impacts at the site of the closest sensitive receivers 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. Construction at the Project site will be restricted to daytime hours consistent with City requirements thereby eliminating potential vibration impact during the sensitive nighttime hours.

TABLE 10-9: CONSTRUCTION EQUIPMENT VIBRATION LEVELS (IN/SEC PPV)

Receiver[1]	Distance To Const. Activity (Feet)	Receiver PPV Levels (in/sec)[2]					Threshold Exceeded?[3]
		Small Bulldozer	Jack-hammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
Northeast Bldg.	215'	0.000	0.001	0.003	0.004	0.004	No
iHerb Inc. Bldg.	65'	0.001	0.008	0.018	0.021	0.021	No
R1	1,968'	0.000	0.000	0.000	0.000	0.000	No
R2	3,380'	0.000	0.000	0.000	0.000	0.000	No
R3	3,645'	0.000	0.000	0.000	0.000	0.000	No
R4	3,171'	0.000	0.000	0.000	0.000	0.000	No
R5	3,964'	0.000	0.000	0.000	0.000	0.000	No

[1] Receiver locations are shown on Exhibit 9-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-7.
[3] Does the peak vibration exceed the maximum acceptable vibration threshold of 0.12 in/sec PPV?

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11 FINDINGS AND CONCLUSIONS

This report evaluated the potential noise impacts associated with the development of the proposed Project including Project related traffic noise, stationary noise impacts and temporary construction noise impacts. This section summarizes the significance criteria and Project noise impacts.

11.1 OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the off-site traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on 12 roadway segments surrounding the Project site were estimated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in the *Indian Street Commerce Center Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (2) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing and Opening Year 2020 traffic conditions. Under all of the evaluated scenarios Project traffic would not cause or result in an exceedance of applicable thresholds. That is, Project traffic would not cause or result in increased noise levels that would exceed the 65 dBA CNEL threshold condition. Nor would Project traffic cause or result in increased noise levels of greater than 1.5 dBA CNEL when the without-Project condition already exceeds 65 dBA CNEL.

11.1.1 ON-SITE TRAFFIC NOISE ANALYSIS

The Opening Year 2020 with Project off-site traffic noise levels at the roadway segment closest to the Project site, Indian Street south of Grove View Road, will approach 82.5 dBA CNEL. The OPR *General Plan Guidelines, Appendix C: Noise Element Guidelines*, previously discussed in Section 3.3.1, indicate that industrial land use is considered *normally unacceptable* with exterior noise levels above 80 dBA CNEL. However, the Project's industrial land use does not contain outdoor living areas identified by the OPR which require exterior noise mitigation. The Project must still comply with the interior noise reduction requirements of the 2014 State of California's Green Building Standards Code for non-residential land uses experiencing 65 dBA CNEL or greater noise levels, as previously described in Section 3.2. Therefore, the combined sound transmission class (STC) rating of the wall and roof-ceiling assemblies of the Project building must be at least 50 to satisfy the 2014 State of California's Green Building Standards Code. (10)

11.2 STATIONARY/AREA-SOURCE NOISE ANALYSIS

Using reference noise levels to represent the noise sources from the Indian Street Commerce Center site, this analysis estimates the Project-related 24-hour operational stationary/area-source noise levels at nearby sensitive receiver locations. The normal activities associated with the proposed Indian Street Commerce Center are anticipated to include idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, and roof-top mechanical ventilation equipment. The analysis shows that the Project-related operational noise levels will satisfy the City of Moreno Valley and the City of

Perris Municipal Code noise level standards at the sensitive receivers nearest the Project site. Further, this analysis demonstrates that the Project would not contribute an operational noise level impact to the existing ambient noise environment at any of the sensitive receiver locations.

11.3 CONSTRUCTION NOISE AND VIBRATION ANALYSIS

Construction noise represents a short-term increase on the ambient noise levels. Construction-related noise impacts are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the Project site boundary. Using sample reference noise levels to represent the planned construction activities of the Indian Street Commerce Center site, this analysis estimates the Project-related construction noise levels at nearby sensitive receiver locations. The construction noise analysis shows that the unmitigated daytime construction activities may exceed the City of Moreno Valley Municipal Code 65 dBA Leq noise level threshold at 200 feet, however, there are no sensitive receiver locations located within 200 feet of the Project site boundary. Further, the construction noise levels experienced at the nearby sensitive receiver locations are expected to range from 41.6 to 47.7 dBA Leq, as shown on Table 10-7, and will not exceed the 65 dBA Leq daytime City of Moreno Valley Municipal Code standard or the 80 dBA Leq City of Perris Municipal Code standard for construction activity.

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. This analysis shows the construction vibration levels are expected to approach 30.1 VdB at the five receiver locations. Based on the FTA vibration standards of 80 VdB, the proposed Project construction activities will not include or require equipment, facilities, or activities that would result in a *barely perceptible* human response (annoyance).

The vibration levels due to Project construction do not represent vibration levels capable of causing building damage to nearby existing buildings. This analysis shows the construction vibration levels are expected to approach 0.02 in/sec PPV at the nearby existing buildings and the five sensitive receiver locations. Based on the FTA vibration standards of 0.12 in/sec PPV for building damage, the proposed Project construction activities will not include or require equipment, facilities, or activities that would result in building damage to nearby existing structures.

12 REFERENCES

1. **City of Moreno Valley.** *General Plan Land Use Map.* November 2014.
2. **Urban Crossroads, Inc.** *Indian Street Commerce Center Traffic Impact Analysis.* January 2016.
3. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
4. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requsite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March, 1974. EPA/ONAC 550/9/74-004.
5. **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.* June, 1995.
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.* May 2006. FTA-VA-90-1003-06.
9. **Office of Planning and Research.** *State of California General Plan Guidlines 2003.* October 2003.
10. **State of California.** *2014 California Green Building Standards Code.* January 2014.
11. **City of Moreno Valley.** *General Plan Safety Element.* October 2006.
12. **City of Perris.** *General Plan Noise Element.* August 2005.
13. **City of Moreno Valley.** *Municipal Code, Chapter 11.80 Noise Regulation.*
14. **City of Perris.** *Municipal Code, Chapter 7.34 Noise Control.*
15. **Riverside County.** *Airport Land Use Compatibility Plan.* October 2004.
16. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
17. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
18. **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.
19. **California Department of Transportation.** *Traffic Noise Attenuation as a Function of Ground and Vegetation Final Report.* June 1995. FHWA/CA/TL-95/23.
20. **Urban Crossroads, Inc.** *Indian Street Commerce Center Air Quality Impact Analysis.* January 2016.

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13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Indian Street 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) 366-5979.

Bill Lawson, P.E., INCE
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Irvine, CA 92606
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blawson@urbanxroads.com

STATEMENT OF QUALIFICATIONS

Bill Lawson is a Registered Professional Traffic Engineer and a Certified Acoustical Consultant. His educational background includes a Master's Degree in Civic and Environmental Engineering and a Bachelor's Degree in City and Regional Planning from Cal Poly San Luis Obispo. Mr. Lawson maintains a wide range of technical expertise that includes transportation planning, traffic engineering, neighborhood traffic control, and noise impact analysis.

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 Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF MORENO VALLEY MUNICIPAL CODE

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Moreno Valley Municipal Code

Title 11 PEACE, MORALS AND SAFETY

Chapter 11.80 NOISE REGULATION

11.80.010 Legislative findings.

It is found and declared that:

A. Excessive sound within the limits of the city is a condition which has existed for some time, and the amount and intensity of such sound is increasing.

B. Such excessive sound is a detriment to the public health, safety, and welfare and quality of life of the residents of the city.

C. The necessity in the public interest for the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, safety, welfare and quality of life of the city and its inhabitants. (Ord. 740 § 1.2, 2007)

11.80.020 Definitions.

For purposes of this chapter, certain words and phrases used herein are defined as follows:

“A-weighted sound level” means the sound pressure level in decibels as measured with a sound level meter using the A-weighting network. The unit of measurement is the dB(A).

“Commercial” means all uses of land not otherwise classified as residential, as defined in this section.

“Construction” means any site preparation, and/or any assembly, erection, repair, or alteration, excluding demolition, of any structure, or improvements to real property.

“Continuous airborne sound” means sound that is measured by the slow-response setting of a meter manufactured to the specifications of ANSI Section 1.4-1983 (R2006) “Specification for Sound Level Meters,” or its successor.

“Daytime” means eight a.m. to ten p.m. the same day.

“Decibel” (dB) means a unit for measuring the amplitude of sound, equal to twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) microPascals (twenty (20) microNewtons per square meter.)

“Demolition” means any dismantling, intentional destruction or removal of structures or other improvements to real property.

“Disturb” means to interrupt, interfere with, or hinder the enjoyment of peace or quiet or the normal listening activities or the sleep, rest or mental concentration of the hearer.

"Emergency" means any occurrence or set of circumstances involving actual or imminent physical trauma or significant property damage which necessitates immediate action. Economic loss alone shall not constitute an emergency. It shall be the burden of an alleged violator to prove an "emergency."

"Emergency work" means any work made necessary to restore property to a safe condition following an emergency, or to protect persons or property threatened by an imminent emergency, to the extent such work is, in fact, necessary to protect persons or property from exposure to imminent danger or damage.

"Frequency" means the number of complete oscillation cycles per unit of time.

"Impulsive sound" means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and discharge of firearms.

"Nighttime" means 10:01 p.m. to 7:59 a.m. the following day.

"Noise disturbance" means any sound which:

1. Disturbs a reasonable person of normal sensitivities;
2. Exceeds the sound level limits set forth in this chapter; or
3. Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two hundred (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.

"Person" means any person, person's firm, association, copartnership, joint venture, corporation, or any entity public or private in nature.

"Plainly audible" means that the sound or noise produced or reproduced by any particular source, can be clearly distinguished from ambient noise by a person using his/her normal hearing faculties.

"Public right-of-way" means any street, avenue, boulevard, sidewalk, bike path or alley, or similar place normally accessible to the public which is owned or controlled by a governmental entity.

"Public space" means any park, recreational or community facility, or lot which contains at least one building that is open to the general public during its hours of operation.

"Residential" means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.

"Sound" means an oscillation in pressure, particle displacement, particle velocity or other physical parameter, in a medium with internal forces that causes compression and rarefaction of that medium capable of producing an auditory impression. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

"Sound level" means the weighted sound pressure level as measured in dB(A) by a sound level meter and as specified in American National Standards Institute (ANSI) specifications for sound-level meters (ANSI Section 1.4-1971 (R1976)). If the frequency weighting employed is not indicated, the A-weighting shall apply.

"Sound level meter" means an instrument, demonstrably capable of accurately measuring sound levels as defined above.

All technical definitions not defined above shall be in accordance with applicable publications and standards of the American National Standards Institute (ANSI). (Ord. 740 § 1.2, 2007)

11.80.030 Prohibited acts.

A. General Prohibition. It is unlawful and a violation of this chapter to maintain, make, cause, or allow the making of any sound that causes a noise disturbance, as defined in Section 11.80.020.

B. Sound causing permanent hearing loss.

1. Sound level limits. Based on statistics from the Center for Disease Control and Prevention and the National Institute for Occupational Safety and Health, Table 1 and Table 1-A specify sound level limits which, if exceeded, will have a high probability of producing permanent hearing loss in anyone in the area where the sound levels are being exceeded. No sound shall be permitted within the city which exceeds the parameters set forth in Tables 11.80.030-1 and 11.80.030-1-A of this chapter:

Table 11.80.030-1

MAXIMUM CONTINUOUS SOUND LEVELS*

Duration per Day Continuous Hours	Sound level [db(A)]
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

* When the daily sound exposure is composed of two or more periods of sound exposure at different levels, the combined effect of all such periods shall constitute a violation of this section if the sum of the percent of allowed period of sound exposure at each level exceeds 100 percent

Table 11.80.030-1A

MAXIMUM IMPULSIVE SOUND LEVELS

Number of Repetitions per 24-Hour Period	Sound level [dB(A)]

1	145
10	135
100	125

2. Exemptions. No violation shall exist if the only persons exposed to sound levels in excess of those listed in Tables 11.80.030-1 and 11.80.030-1A are exposed as a result of:

a. Trespass;

b. Invitation upon private property by the person causing or permitting the sound; or

c. Employment by the person or a contractor of the person causing or permitting the sound.

C. Nonimpulsive Sound Decibel Limits. No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimplusive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

Table 11.80.030-2

MAXIMUM SOUND LEVELS (IN dB(A)) FOR SOURCE LAND USES

Residential		Commercial	
Daytime	**Nighttime**	**Daytime**	**Nighttime**
60	55	65	60

D. Specific Prohibitions. In addition to the general prohibitions set out in subsection A of this section, and unless otherwise exempted by this chapter, the following specific acts, or the causing or permitting thereof, are regulated as follows:

1. Motor Vehicles. No person shall operate or cause to be operated a public or private motor vehicle, or combination of vehicles towed by a motor vehicle, that creates a sound exceeding the sound level limits in Table 11.80.030-2 when the vehicle(s) are not otherwise subject to noise regulations provided for by the California Vehicle Code.

2. Radios, Televisions, Electronic Audio Equipment, Musical Instruments or Similar Devices from a Stationary Source. No person shall operate, play or permit the operation or playing of any radio, tape player, television, electronic audio equipment, musical instrument, sound amplifier or other mechanical or electronic sound making device that produces, reproduces or amplifies sound in such a manner as to create a noise disturbance. However, this subsection shall not apply to any use or activity exempted in subsection E of this section and any use or activity for which a special permit has been issued pursuant to Section 11.80.040.

3. Radios, Electronic Audio Equipment, or Similar Devices from a Mobile Source Such as a Motor Vehicle. Sound amplification or reproduction equipment on or in a motor vehicle is subject to regulation in accordance with the California Vehicle Code when upon the public right-of-way. When upon public space or publicly owned property other than the public right-of-way or upon private property open to the public, sound amplification or reproduction equipment shall not be operated in such a manner that it is plainly audible at a distance of fifty (50) feet in any direction from the vehicle.

4. Portable, Hand-Held Music or Sound Amplification or Reproduction Equipment. Such equipment shall not be operated on a public right-of-way, public space or other publicly owned property in such a manner as to be plainly audible at a distance of fifty (50) feet in any direction from the operator.

5. Loudspeakers and Public Address Systems.

a. Except as permitted by Section 11.80.040, no person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any commercial purpose:

1. Which produces, reproduces or amplifies sound in such a manner as to create a noise disturbance; or

2. During nighttime hours on a public right-of-way, public space or other publicly owned property.

b. No person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any noncommercial purpose, during nighttime hours in such a manner as to create a noise disturbance.

6. Animals. No person shall own, possess or harbor an animal or bird that howls, barks, meows, squawks, or makes other sounds that:

a. Create a noise disturbance;

b. Are of frequent or continued duration for ten (10) or more consecutive minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound; or

c. Are intermittent for a period of thirty (30) or more minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound.

7. Construction and Demolition. No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection (D)(9) of this section.

8. Emergency Signaling Devices. No person shall intentionally sound or permit the sounding outdoors of any fire, burglar or civil defense alarm, siren or whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing as follows:

a. Testing of a stationary emergency signaling device shall not occur between seven p.m. and seven a.m. the following day;

b. Testing of a stationary emergency signaling device shall use only the minimum cycle test time, in no case to exceed sixty (60) seconds;

c. Testing of a complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall only occur only on weekdays between seven a.m. and seven p.m.

and shall be exempt from the time limit specified in subsection (D)(8)(2) of this section.

9. Power Tools. No person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours so as to cause a noise disturbance across a residential real property boundary.

10. Pumps, Air Conditioners, Air-Handling Equipment and Other Continuously Operating Equipment. Notwithstanding the general prohibitions of subsection a of this section, no person shall operate or permit the operation of any pump, air conditioning, air-handling or other continuously operating motorized equipment in a state of disrepair or in a manner which otherwise creates a noise disturbance distinguishable from normal operating sounds.

E. Exemptions. The following uses and activities shall be exempt from the sound level regulations except the maximum sound levels provided in Tables 11.80.030-1 and 11.80.030-1A:

1. Sounds resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of an emergency.

2. Sounds resulting from emergency work as defined in Section 11.80.020

3. Any aircraft operated in conformity with, or pursuant to, federal law, federal air regulations and air traffic control instruction used pursuant to and within the duly adopted federal air regulations; and any aircraft operating under technical difficulties in any kind of distress, under emergency orders of air traffic control, or being operated pursuant to and subsequent to the declaration of an emergency under federal air regulations.

4. All sounds coming from the normal operations of interstate motor and rail carriers, to the extent that local regulation of sound levels of such vehicles has been preempted by the Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.) or other applicable federal laws or regulations

5. Sounds from the operation of motor vehicles, to the extent they are regulated by the California Vehicle Code.

6. Any constitutionally protected noncommercial speech or expression conducted within or upon a any public right-of-way, public space or other publicly owned property constituting an open or a designated public forum in compliance with any applicable reasonable time, place and manner restrictions on such speech or expression or otherwise pursuant to legal authority.

7. Sounds produced at otherwise lawful and permitted city-sponsored events, organized sporting events, school assemblies, school playground activities, by permitted fireworks, and by permitted parades on public right-of-way, public space or other publicly owned property.

8. An event for which a temporary use permit or special event permit has been issued under other provisions of this code, where the provisions of Section 11.80.040 are met, the permit granted expressly grants an exemption from specific standards contained in this chapter, and the permittee and all persons under the permittee's reasonable control actually comply with all conditions of such permit. Violation of any condition of such a permit related to sound or sound equipment shall be a violation of this chapter and punishable as such.

F. Nothing in this chapter shall be construed to limit, modify or repeal any other regulation elsewhere in this code relating to the regulation of noise sources, nor shall any such other regulation be read to permit the emission of noise in violation of any provision of this chapter. (Ord. 740 § 1.2, 2007)

11.80.040 Special provisions for temporary use and special event permits.

The exemption by permit set forth in Section 11.80.030(E)(8) shall be subject to the following requirements and conditions:

A. The permit application shall include the name, address and telephone number of the permit applicant; the date, hours and location for which the permit is requested; and the nature of the event or activity. It shall also specify the types of sounds and/or sound equipment to be permitted, the proposed duration of such sound, the specific standards from which the sound is to be exempted, and the reasons for each requested exemption.

B. The permit shall be issued provided the proposed activity meets the requirements of this section and the issuing official determines that the sound to be emitted at the event as proposed would not be detrimental to the public health, safety or welfare, that the event cannot reasonably achieve its legitimate aims and purposes without the exemption and that the sound levels proposed will not unreasonably damage the peace and quiet enjoyment of the lawful users of surrounding properties, nor constitute a public nuisance.

C. The official issuing the permit may prescribe any reasonable conditions or requirements he/she deems necessary to minimize noise disturbances upon the community or the surrounding neighborhood, and/or to protect the health, safety or welfare of the public, including participants in the permitted event, including use of mufflers, screens or other sound-attenuating devices.

D. Any permit granted must be in writing and shall contain all conditions upon which the permit shall be effective.

E. No more than six events requiring a sound limit exemption may be held at any particular location upon privately owned or controlled property per calendar year, provided further that the number of events shall not exceed the number permitted under the regulations for the type of permit issued. For purposes of this subsection, “location” means a legal parcel of real property or a complete shopping or commercial center or mall sharing common parking and access even if comprised of multiple legal parcels.

F. The exemption from sound limits under such permit shall not exceed maximum period of four hours in one twenty-four (24) hour day.

G. The permit will only be granted for hours between nine a.m. and ten p.m. on all days other than Friday and Saturday; and, on Friday and Saturday, between the hours of nine a.m. and one a.m. of the following day, except in the following circumstances:

1. A permit may be granted for hours between nine a.m. on New Year’s Eve and one a.m. the following day (New Year’s Day).

2. A permit may be granted for hours between nine a.m. and two a.m. the following day if there are no residences, hospitals, or nursing homes within a 0.5 mile radius of the property where the function is taking place.

H. Functions for which the permits are issued shall be limited to a continuous airborne sound level not to exceed seventy (70) dB(A), as measured two hundred (200) feet from the real property boundary of the source property if on private property, or from the source if on public right of way, public space or other publicly owned property. (Ord. 740 § 1.2, 2007)

11.80.050 Measurement or assessment of sound.

A. Measurement With Sound Meter.

1. The measurement of sound shall be made with a sound level meter meeting the standards prescribed by ANSI Section 1.4-1983 (R2006). The instruments shall be maintained in calibration and good working order. A calibration check shall be made of the system at the time of any sound level measurement. Measurements recorded shall be taken so as to provide a proper representation of the source of the sound. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured sound. A windscreen for the microphone shall be used at all times. However, a violation of this chapter may occur without the occasion of the measurements being made as otherwise provided.

2. The slow meter response of the sound level meter shall be used in order to best determine the average amplitude.

3. The measurement shall be made at any point on the property into which the sound is being transmitted and shall be made at least three feet away from any ground, wall, floor, ceiling, roof and other plane surface.

4. In case of multiple occupancy of a property, the measurement may be made at any point inside the premises to which any complainant has right of legal private occupancy; provided that the measurement shall not be made within three feet of any ground, wall, floor, ceiling, roof or other plane surface.

5. All measurements of sound provided for in this chapter will be made by qualified officials of the city who are designated by the city manger or designee to operate the apparatus used to make the measurements.

B. Assessment Without Sound Level Meter. Any police officer, code enforcement officer, or other official designated by the city manager or designee who hears a noise or sound that is plainly audible, as defined in Section 11.80.020, in violation of this chapter, may enforce this chapter and shall assess the noise or sound according to the following standards:

1. The primary means of detection shall be by means of the official's normal hearing faculties, not artificially enhanced.

2. The official shall first attempt to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates so that the official can readily identify the offending source of the sound or noise and the distance involved. If the official is unable to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates, then the official shall confirm the source of the sound or noise by approaching the suspected vehicle or real property until the official is able to obtain a direct line of sight and hearing, and confirm the source of the sound or noise that was heard at the place of the original assessment of the sound or noise.

3. The official need not be required to identify song titles, artists, or lyrics in order to establish a violation. (Ord. 740 § 1.2, 2007)

11.80.060 Violation.

A. Violation of Sound Level Limits. Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable by a fine not to exceed one thousand dollars ($1,000.00) and/or six months in the county jail, or both.

Notwithstanding the foregoing, any violation of the provisions of this chapter may, in the discretion of the citing officer or the city attorney, be cited and/or prosecuted as an infraction or be subject to civil citation pursuant to Chapter 1.10.

B. Joint and Several Responsibility. In addition to the person causing the offending sound, the owner, tenant or lessee of property, or a manager, overseer or agent, or any other person lawfully entitled to possess the property from which the offending sound is emitted at the time the offending sound is emitted, shall be responsible for compliance with this chapter if the additionally responsible party knows or should have known of the offending noise disturbance. It shall not be a lawful defense to assert that some other person caused the sound. The lawful possessor or operator of the premises shall be responsible for operating or maintaining the premises in compliance with this chapter and may be cited regardless of whether or not the person actually causing the sound is also cited.

C. Violation May be Declared a Public Nuisance. The operation or maintenance of any device, equipment, instrument, vehicle or machinery in violation of any provisions of this chapter which endangers the public health, safety and quality of life of residents in the area is declared to be a public nuisance, and may be subject to abatement summarily or by a restraining order or injunction issued

by a court of competent jurisdiction. (Ord. 824 § 1.2, 2011; Ord. 740 § 1.2, 2007)

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APPENDIX 3.2:

CITY OF PERRIS MUNICIPAL CODE

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Chapter 7.34 - NOISE CONTROL

Sections:

FOOTNOTE(S):

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Prior ordinance history: Ord. 440.

7.34.010 - Declaration of policy.

Excessive noise levels are detrimental to the health and safety of individuals. Noise is considered a public nuisance, and the city discourages unnecessary, excessive or annoying noises from all sources. Creating, maintaining, causing, or allowing to be created, caused or maintained, any noise or vibration in a manner prohibited by the provisions of the ordinance codified in this chapter is a public nuisance and shall be punishable as a misdemeanor.

(Ord. 1082 § 2(part), 2000).

7.34.020 - Definitions.

A. The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this chapter except when the context clearly indicates a different meaning:
   1. "Ambient noise" means the all-encompassing noise associated with a given environment usually being composed of sounds from many sources near and far. For the purpose of this chapter, ambient noise level is the level obtained when the noise level is averaged over a period of five minutes without inclusion of noise from isolated identifiable sources at the location and time of day near that at which a comparison is to be made.
   2. "Decibel (dB)" means an intensity unit which denotes the ratio between two quantities which are proportional to power; the number of decibels corresponding to the ratio is ten times the common logarithm of this ratio.
   3. "Person" means a person, firm, association, co-partnership, joint venture, corporation or any entity, public or private in nature.
   4. "Sound amplifying equipment" means any machine or device for the amplification of the human voice, music or any other sound. "Sound amplifying equipment" shall not include standard vehicle radios when used and heard only by the occupants of the vehicle in which the vehicle radio is installed. "Sound amplifying equipment," as used in this chapter, shall not include warning devices on any vehicle used only for traffic safety purposes and shall not include communications equipment used by public or private utilities when restoring utility service following a public emergency or when doing work required to protect person or property from an imminent exposure to danger.
   5. "Sound level" (noise level) in decibels is the value of a sound measurement using the "A" weighting network of a sound level meter. Slow response of the sound level meter needle shall be used except where the sound is impulsive or rapidly varying in nature, in which case, fast response shall be used.
   6.

"Sound level meter" means an instrument, including a microphone, an amplifier, an output meter and frequency weighting networks, for the measurement of sound levels, which satisfies the pertinent requirements in American National Standards Institute's specification S1.4-1971 or the most recent revision for type S-2A general purpose sound level meters.

B. Supplementary Definitions of Technical Terms. Definitions of technical terms not defined in this section shall be obtained from the American National Standards Institute's Acoustical Terminology S1-1971 or the most recent revision thereof.

(Ord. 1082 § 2(part), 2000).

7.34.030 - Measurement methods.

A. Sound shall be measured with a sound level meter as defined in Section 7.34.020.

B. Unless otherwise provided, outdoor measurements shall be taken with the microphone located at any point on the property line of the noise source but no closer than five feet from any wall or vertical obstruction and three to five feet above ground level whenever possible.

C. Unless otherwise provided, indoor measurements shall be taken inside the structure with the microphone located at any point as follows: (1) no less than three feet above floor level; (2) no less than five feet from any wall or vertical obstruction; and (3) not under common possession and control with the building or portion of the building from which the sound is emanating.

(Ord. 1082 § 2(part), 2000).

7.34.040 - Sound amplification.

No person shall amplify sound using sound amplifying equipment contrary to any of the following:

A. The only amplified sound permitted shall be either music or the human voice, or both.

B. The volume of amplified sound shall not exceed the noise levels set forth in this subsection when measured outdoors at or beyond the property line of the property from which the sound emanates.

Time Period	Maximum Noise Level
10:01 p.m.—7:00 a.m.	60 dBA
7:01 a.m.—10:00 p.m.	80 dBA

(Ord. 1082 § 2(part), 2000).

7.34.050 - General prohibition.

A. It unlawful for any person to willfully make, cause or suffer, or permit to be made or caused, any loud excessive or offensive noises or sounds which unreasonably disturb the peace and quiet of any residential neighborhood or which are physically annoying to persons of ordinary sensitivity or which are so harsh, prolonged or unnatural or unusual in their use, time or place as to occasion physical discomfort to the inhabitants of the city, or any section thereof. The standards for dBA noise level in Section 7.34.040 shall apply to this section. To the extent that the noise created causes the noise level at the property line to exceed the ambient noise level by more than 1.0 decibels, it shall be presumed that the noise being created also is in violation of this section.

B. The characteristics and conditions which should be considered in determining whether a violation of the provisions of this section exists should include, but not be limited to, the following:
   1. The level of the noise;
   2. Whether the nature of the noise is usual or unusual;
   3. Whether the origin of the noise is natural or unnatural;
   4. The level of the ambient noise;
   5. The proximity of the noise to sleeping facilities;
   6. The nature and zoning of the area from which the noise emanates and the area where it is received;
   7. The time of day or night the noise occurs;
   8. The duration of the noise; and
   9. Whether the noise is recurrent, intermittent or constant.

(Ord. 1082 § 2(part), 2000).

7.34.060 - Construction noise.

It is unlawful for any person between the hours of seven p.m. of any day and seven a.m. of the following day, or on a legal holiday, with the exception of Columbus Day and Washington's birthday, or on Sundays to erect, construct, demolish, excavate, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise. Construction activity shall not exceed eighty dBA in residential zones in the city.

(Ord. 1082 § 2(part), 2000).

7.34.070 - Refuse vehicles and parking lot sweepers.

No person shall operate or permit to be operated a refuse compacting, processing or collection vehicle or parking lot sweeper between the hours of seven p.m. to seven a.m. in any residential area unless a permit has been applied for and granted by the city of Perris.

(Ord. 1082 § 2(part), 2000).

7.34.080 - Disturbing, excessive, offensive noises—Declaration of certain acts constituting.

The following activities, among others, are declared to cause loud, disturbing, excessive or offensive noises in violation of this section and are unlawful, namely:

A. Horns, Signaling Devices, etc. Unnecessary use or operation of horns, signaling devices or other similar devices on automobiles, motorcycles or any other vehicle;
B. Radios, Television Sets, Phonographs, Loud Speaking Amplifiers and Similar Devices. The use or operation of any sound production or reproduction device, radio receiving set, musical instrument, drums, phonograph, television set, loud speakers, sound amplifier, or other similar machine or device for the producing or reproducing of sound, in such a manner as to disturb the peace, quiet or comfort of any reasonable person of normal sensitivity in any area of the city is prohibited. This provision shall not apply to any participant in a licensed parade or to any person who has been otherwise duly authorized by the city of Perris to engage in such conduct;
C. Animals.
   1.

The keeping or maintenance, or the permitting to be kept or maintained, upon any premises owned, occupied or controlled by any person of any animal or animals which by any frequent or long-continued noise shall cause annoyance or discomfort to a reasonable person of normal sensitiveness in the vicinity,

2. The noise from any such animal or animals that disturbs two or more residents residing in separate residences adjacent to any part of the property on which the subject animal or animals are kept or maintained, or three or more residents residing in separate residences in close proximity to the property on which the subject animal or animals are kept or maintained, shall be prima facie evidence of a violation of this section;

D. Hospitals, Schools, Libraries, Rest Homes, Long-Term Medical or Mental Care Facilities. To make loud, disturbing, excessive noises adjacent to a hospital, school, library, rest home or long-term medical or mental care facility, which noise unreasonably interferes with the workings of such institutions or which disturbs or unduly annoys occupants in said institutions;

E. Playing of Radios on Buses and Trolleys. The operation of any radio, phonograph or tape player on an urban transit bus or trolley so as to emit noise that is audible to any other person in the vehicle is prohibited;

F. Playing of Radios, Phonographs and Other Sound Production or Reproduction Devices in Public Parks and Public Parking Lots and Streets Adjacent Thereto. The operation of any radio, phonograph, television set or any other sound production or reproduction device in any public park or any public parking lot, or street adjacent to such park or beach, without the prior written approval of the city manager or the administrator, in such a manner that such radio, phonograph, television set or sound production or reproduction device emits a sound level exceeding those found in the table in Section 7.34.040;

G. Leaf Blowers.

1. A "leaf blower" means any portable, hand-held or backpack, engine-powered device with a nozzle that creates a directable airstream which is capable of and intended for moving leaves and light materials.
2. No person shall operate a leaf blower in any residential zoned area between the hours of seven p.m. and eight a.m. on weekdays and five p.m. and nine a.m. on weekends or on legal holidays.
3. No person may operate any leaf blower at a sound level in excess of eighty decibels measured at a distance of fifty feet or greater from the point of noise origin.
4. Leaf blowers shall be equipped with functional mufflers and an approved sound limiting device required to ensure that the leaf blower is not capable of generating a sound level exceeding any limit prescribed in this section.

(Ord. 1082 § 2(part), 2000).

7.34.090 - Burglar alarms.

A. Audible burglar alarms for structures or motor vehicles are prohibited unless the operation of such burglar alarm can be terminated within twenty minutes of being activated.

B. Notwithstanding the requirements of this provision, any member of the Riverside County sheriff's department, Perris Division, shall have the right to take such steps as may be reasonable and necessary to disconnect any such alarm installed in any building, dwelling or motor vehicle at any time during the period of its activation. On or after thirty days from the effective date of the ordinance

codified in this chapter, any building, dwelling or motor vehicle upon which a burglar alarm has been installed shall prominently display the telephone number at which communication may be made with the owner of such building, dwelling or motor vehicle.

(Ord. 1082 § 2(part), 2000).

7.34.100 - Motor vehicles.

A. Off-Highway.

1. Except as otherwise provided for in this chapter, it shall be unlawful to operate any motor vehicle of any type on any site, other than on a public street or highway as defined in the California Vehicle Code, in any manner so as to cause noise in excess of those noise levels permitted for on-highway motor vehicles as specified in the table for "forty-five-mile-per-hour or less speed limits" contained in Section 23130 of the California Vehicle Code and as corrected for distances set forth in subsection (A)(2) below.
2. The maximum noise level as the on-highway vehicle passes may be measured at a distance of other than fifty feet from the center line of travel, provided the measurement is further adjusted by adding algebraically the application correction as follows:

DISTANCE (FEET)	CORRECTION (DECIBELS)
25	-6
28	-5
32	-4
35	-3
40	-2
45	-1
50 (preferred distance)	0
56	+1
63	+2
70	+3
80	+4
90	+5
100	+6

B. Nothing in this section shall apply to authorized emergency vehicles when being used in emergency situations including the blowing of sirens and/or horns.

(Ord. 1082 § 2(part), 2000).

APPENDIX 5.1:

STUDY AREA PHOTOS

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L1
33, 51' 59.348100", 117, 13' 39.717400"

L1_E
33, 51' 59.348100", 117, 13' 39.717400"

L1_N
33, 51' 59.348100", 117, 13' 39.717400"

L1_S
33, 51' 59.348100", 117, 13' 39.717400"

L1_S2
33, 51' 59.348100", 117, 13' 39.717400"

L1_W
33, 51' 59.348100", 117, 13' 39.717400"

L2
33, 51' 59.348100", 117, 13' 39.717400"

L2_E
33, 51' 42.772500", 117, 14' 5.343000"

L2_N
33, 51' 42.772500", 117, 14' 5.343000"

L2_NW
33, 51' 42.772500", 117, 14' 5.343000"

L2_SE
33, 51' 42.772500", 117, 14' 5.343000"

L2_SW
33, 51' 42.772500", 117, 14' 5.343000"

L2_W
33, 51' 42.772500", 117, 14' 5.343000"

L3
33, 51' 31.058300", 117, 14' 54.012400"

L3_E
33, 51' 31.058300", 117, 14' 54.012400"

L3_NE
33, 51' 31.058300", 117, 14' 54.012400"

L3_S
33, 51' 31.058300", 117, 14' 54.012400"

L3_W
33, 51' 31.058300", 117, 14' 54.012400"

L4
33, 51' 10.582500", 117, 14' 38.109700"

L4_N
33, 51' 10.582500", 117, 14' 38.109700"

L4_S
33, 51' 10.582500", 117, 14' 38.109700"

L4_W
33, 51' 10.582500", 117, 14' 38.109700"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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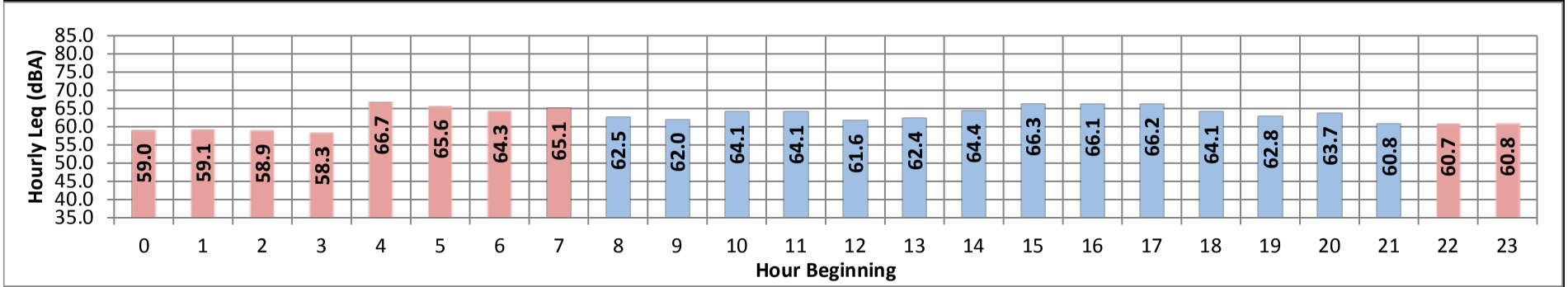
24-Hour Noise Level Measurement Summary

Project Name:	MoVal Industrial	*JN:*	9914	*Energy Average Leq*		*24-Hour*
Location:	L1 - Located on Nandina Avenue west of Perris Boulevard and north of existing residential homes.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	11/11/2015	64.0	62.9	69.5

Hourly Leq dBA Readings (unadjusted)



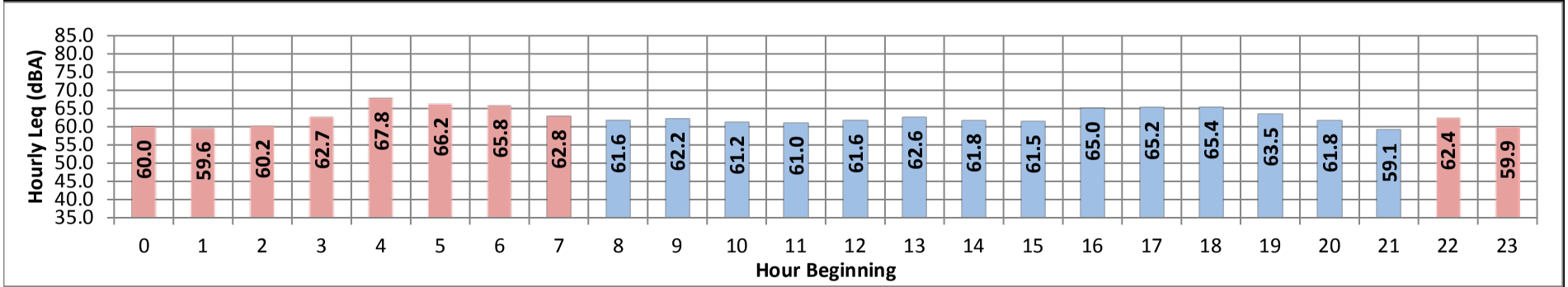
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	60.8	79.6	40.5	73.0	69.0	64.0	61.0	55.0	51.0	46.0	44.0	42.0
	Max	66.3	92.9	48.7	78.0	75.0	71.0	70.0	64.0	60.0	54.0	52.0	51.0
Energy Average:		64.0	Average:		75.2	72.6	68.4	65.8	58.9	55.0	49.9	48.4	46.4
Night	Min	58.3	79.3	43.4	68.0	66.0	60.0	57.0	51.0	48.0	45.0	44.0	43.0
	Max	66.7	93.3	55.3	76.0	74.0	72.0	71.0	67.0	62.0	57.0	57.0	56.0
Energy Average:		62.9	Average:		73.2	70.3	65.5	63.1	58.0	55.0	50.7	49.9	48.6
Hourly Summary													
Night	0	59.0	80.7	43.4	72.0	69.0	63.0	60.0	54.0	52.0	46.0	45.0	44.0
	1	59.1	85.2	43.4	72.0	68.0	60.0	57.0	51.0	48.0	45.0	44.0	43.0
	2	58.9	79.3	44.8	70.0	67.0	62.0	60.0	57.0	52.0	47.0	47.0	46.0
	3	58.3	82.5	46.9	68.0	66.0	62.0	60.0	55.0	53.0	49.0	48.0	47.0
	4	66.7	82.2	50.8	76.0	74.0	72.0	71.0	67.0	62.0	55.0	53.0	52.0
	5	65.6	83.6	51.8	76.0	74.0	71.0	69.0	63.0	60.0	56.0	55.0	53.0
	6	64.3	85.3	55.3	76.0	72.0	68.0	66.0	61.0	60.0	57.0	57.0	56.0
	7	65.1	93.3	52.0	76.0	73.0	68.0	65.0	59.0	57.0	55.0	54.0	53.0
Day	8	62.5	86.2	48.6	74.0	71.0	66.0	63.0	58.0	56.0	53.0	52.0	51.0
	9	62.0	82.3	43.4	73.0	71.0	68.0	66.0	58.0	54.0	49.0	48.0	45.0
	10	64.1	83.5	42.8	76.0	74.0	70.0	66.0	57.0	54.0	49.0	47.0	45.0
	11	64.1	85.9	40.5	77.0	74.0	70.0	67.0	56.0	51.0	46.0	44.0	42.0
	12	61.6	86.4	41.5	74.0	71.0	66.0	63.0	55.0	51.0	46.0	44.0	43.0
	13	62.4	79.6	42.3	75.0	73.0	68.0	66.0	58.0	54.0	47.0	46.0	44.0
	14	64.4	88.7	42.8	76.0	74.0	70.0	67.0	58.0	53.0	48.0	46.0	44.0
	15	66.3	92.9	43.8	76.0	74.0	70.0	67.0	61.0	56.0	49.0	47.0	45.0
	16	66.1	84.9	48.0	78.0	75.0	71.0	69.0	64.0	60.0	54.0	52.0	50.0
	17	66.2	85.9	48.6	77.0	75.0	71.0	70.0	64.0	59.0	53.0	52.0	50.0
	18	64.1	85.5	44.8	75.0	72.0	69.0	67.0	61.0	57.0	51.0	49.0	47.0
	19	62.8	81.6	48.7	75.0	72.0	68.0	65.0	59.0	56.0	52.0	51.0	50.0
	20	63.7	91.2	47.2	74.0	71.0	67.0	64.0	59.0	56.0	52.0	51.0	48.0
	21	60.8	82.4	44.8	73.0	69.0	64.0	61.0	56.0	53.0	49.0	48.0	46.0
Night	22	60.7	79.3	45.3	73.0	70.0	65.0	62.0	57.0	54.0	49.0	48.0	46.0
	23	60.8	82.7	45.0	73.0	70.0	64.0	61.0	56.0	52.0	48.0	48.0	46.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	MoVal Industrial	*JN:*	9914	*Energy Average Leq*		*24-Hour*
Location:	L2 - Located within the Project site on Indian Avenue north of the existing iHerb, Inc. industrial building.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	11/11/2015	62.8	63.7	70.2

Hourly Leq dBA Readings (unadjusted)



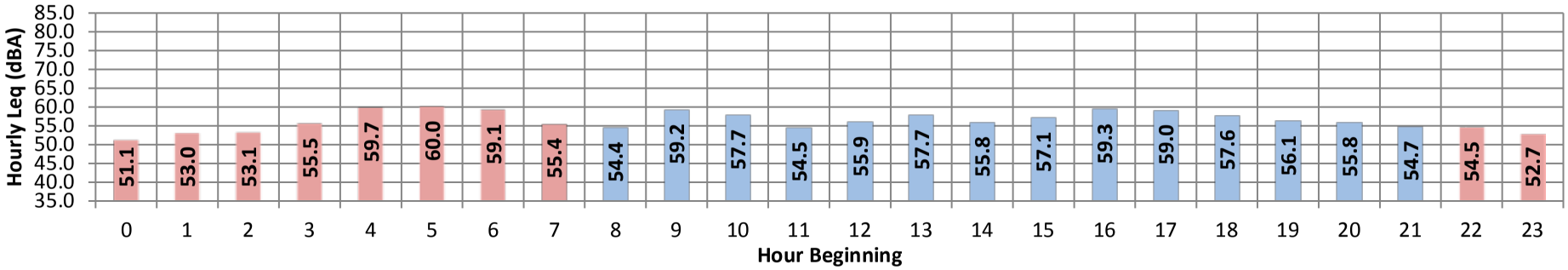
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	59.1	77.4	39.3	70.0	68.0	65.0	64.0	57.0	50.0	43.0	42.0	40.0
	Max	65.4	85.9	48.4	74.0	72.0	70.0	69.0	65.0	63.0	56.0	54.0	51.0
Energy Average:		62.8	Average:		72.2	70.6	68.2	66.6	61.0	55.5	47.1	45.8	44.1
Night	Min	59.6	76.4	41.6	71.0	69.0	65.0	63.0	54.0	48.0	44.0	43.0	42.0
	Max	67.8	88.1	52.0	76.0	73.0	71.0	70.0	68.0	66.0	59.0	56.0	53.0
Energy Average:		63.7	Average:		72.8	70.8	68.3	66.7	60.7	55.4	49.2	47.7	46.3
Hourly Summary													
Night	0	60.0	82.6	42.7	71.0	69.0	66.0	64.0	54.0	49.0	45.0	44.0	43.0
	1	59.6	82.3	42.2	71.0	69.0	65.0	63.0	54.0	48.0	44.0	43.0	43.0
	2	60.2	76.4	43.2	72.0	70.0	67.0	65.0	56.0	50.0	46.0	45.0	44.0
	3	62.7	80.0	45.2	73.0	71.0	69.0	67.0	62.0	55.0	48.0	47.0	46.0
	4	67.8	88.1	49.1	76.0	73.0	71.0	70.0	68.0	66.0	59.0	56.0	52.0
	5	66.2	82.2	52.0	75.0	73.0	71.0	70.0	67.0	63.0	56.0	54.0	53.0
	6	65.8	83.0	49.5	74.0	72.0	70.0	69.0	66.0	63.0	55.0	53.0	50.0
	7	62.8	81.4	46.8	73.0	71.0	69.0	67.0	61.0	56.0	50.0	48.0	47.0
Day	8	61.6	81.8	42.3	72.0	70.0	68.0	66.0	59.0	52.0	45.0	44.0	43.0
	9	62.2	78.2	40.7	72.0	71.0	69.0	67.0	61.0	54.0	44.0	43.0	42.0
	10	61.2	79.0	39.3	72.0	70.0	68.0	66.0	59.0	52.0	43.0	42.0	40.0
	11	61.0	80.5	39.3	72.0	70.0	67.0	65.0	59.0	52.0	43.0	42.0	40.0
	12	61.6	78.3	40.2	72.0	70.0	68.0	66.0	60.0	54.0	44.0	42.0	40.0
	13	62.6	82.8	39.9	72.0	70.0	68.0	67.0	62.0	56.0	46.0	44.0	42.0
	14	61.8	78.6	41.2	72.0	71.0	68.0	66.0	60.0	55.0	45.0	44.0	42.0
	15	61.5	78.1	42.7	71.0	70.0	67.0	65.0	61.0	56.0	47.0	45.0	44.0
	16	65.0	81.9	46.8	74.0	72.0	70.0	68.0	64.0	62.0	54.0	52.0	49.0
	17	65.2	79.9	48.4	73.0	72.0	70.0	69.0	65.0	63.0	56.0	54.0	51.0
	18	65.4	85.9	46.8	74.0	72.0	70.0	69.0	65.0	60.0	51.0	50.0	48.0
	19	63.5	84.1	45.6	73.0	72.0	69.0	68.0	62.0	56.0	49.0	48.0	47.0
	20	61.8	77.4	44.9	72.0	70.0	68.0	67.0	60.0	55.0	48.0	47.0	46.0
	21	59.1	77.7	42.2	70.0	68.0	65.0	64.0	57.0	50.0	44.0	44.0	43.0
Night	22	62.4	80.3	42.2	72.0	71.0	69.0	67.0	62.0	54.0	45.0	44.0	43.0
	23	59.9	76.4	41.6	71.0	69.0	66.0	65.0	57.0	50.0	44.0	43.0	42.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	MoVal Industrial	*JN:*	9914	*Energy Average Leq*		*24-Hour*
Location:	L3 - Located at the southwest corner of Nevada Avenue and Harley Knox Boulevard, north of existing residential homes. The March Air Reserve Base runway is located north of this location.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	11/11/2015	57.1	56.5	63.3

Hourly Leq dBA Readings (unadjusted)



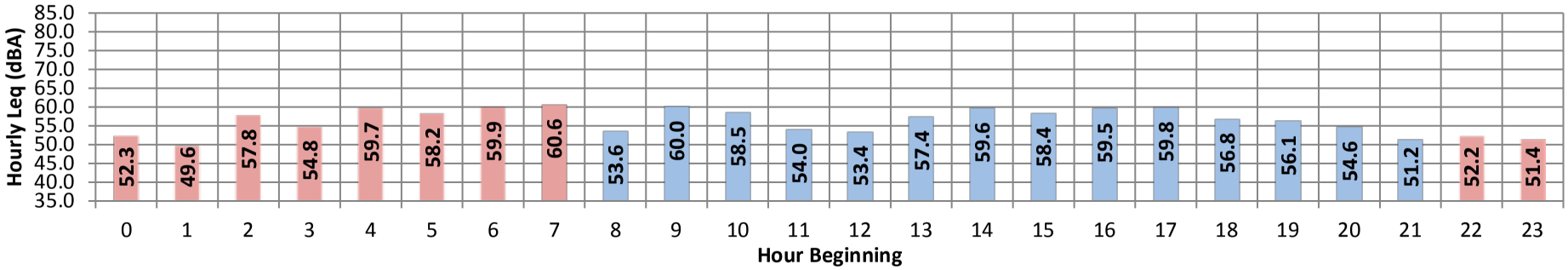
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	54.4	69.3	44.8	63.0	62.0	59.0	58.0	53.0	49.0	45.0	45.0	44.0
	Max	59.3	84.8	47.0	68.0	66.0	64.0	62.0	58.0	55.0	50.0	48.0	47.0
Energy Average:		57.1	Average:		65.6	63.8	61.5	60.0	55.6	51.4	46.5	45.9	45.4
Night	Min	51.1	68.2	44.4	62.0	60.0	56.0	54.0	48.0	46.0	44.0	44.0	44.0
	Max	60.0	79.3	51.0	69.0	67.0	65.0	64.0	59.0	57.0	52.0	52.0	51.0
Energy Average:		56.5	Average:		65.1	63.3	60.6	58.8	53.6	50.8	48.1	47.6	47.1
Hourly Summary													
Night	0	51.1	68.2	45.4	62.0	60.0	56.0	54.0	48.0	46.0	46.0	45.0	45.0
	1	53.0	71.7	45.3	64.0	62.0	59.0	56.0	49.0	47.0	46.0	45.0	45.0
	2	53.1	73.2	46.0	64.0	62.0	58.0	56.0	50.0	48.0	47.0	46.0	46.0
	3	55.5	70.1	47.1	65.0	63.0	61.0	59.0	54.0	51.0	48.0	48.0	47.0
	4	59.7	76.4	48.1	69.0	67.0	64.0	63.0	59.0	57.0	52.0	51.0	49.0
	5	60.0	79.3	51.0	69.0	67.0	65.0	64.0	59.0	56.0	52.0	52.0	51.0
	6	59.1	77.0	50.5	67.0	66.0	64.0	62.0	58.0	55.0	52.0	51.0	51.0
	7	55.4	70.7	48.3	64.0	62.0	60.0	59.0	55.0	52.0	49.0	49.0	49.0
Day	8	54.4	70.8	45.6	64.0	62.0	59.0	58.0	53.0	50.0	46.0	46.0	46.0
	9	59.2	84.8	45.3	64.0	62.0	60.0	58.0	54.0	50.0	46.0	46.0	45.0
	10	57.7	79.6	44.9	67.0	64.0	61.0	59.0	54.0	49.0	45.0	45.0	45.0
	11	54.5	69.3	44.9	63.0	62.0	60.0	59.0	54.0	49.0	45.0	45.0	45.0
	12	55.9	69.7	44.9	65.0	63.0	61.0	60.0	56.0	51.0	46.0	45.0	45.0
	13	57.7	74.0	45.1	68.0	66.0	63.0	61.0	57.0	52.0	46.0	45.0	45.0
	14	55.8	75.0	45.1	64.0	62.0	61.0	60.0	56.0	52.0	46.0	45.0	45.0
	15	57.1	74.4	45.2	66.0	65.0	62.0	61.0	57.0	52.0	46.0	45.0	45.0
	16	59.3	82.7	45.5	68.0	66.0	64.0	62.0	58.0	55.0	49.0	47.0	46.0
	17	59.0	81.0	46.6	68.0	65.0	63.0	62.0	58.0	54.0	50.0	48.0	47.0
	18	57.6	76.1	47.0	67.0	66.0	63.0	61.0	57.0	53.0	48.0	48.0	47.0
	19	56.1	69.4	45.7	65.0	64.0	62.0	60.0	56.0	52.0	47.0	46.0	46.0
	20	55.8	74.5	45.2	65.0	63.0	61.0	60.0	54.0	51.0	46.0	46.0	45.0
	21	54.7	69.4	44.8	64.0	63.0	61.0	59.0	54.0	49.0	45.0	45.0	44.0
Night	22	54.5	73.0	44.7	64.0	63.0	60.0	58.0	53.0	49.0	45.0	45.0	44.0
	23	52.7	73.5	44.4	63.0	61.0	59.0	57.0	51.0	47.0	44.0	44.0	44.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	MoVal Industrial	*JN:*	9914	*Energy Average Leq*		*24-Hour*
Location:	L4 - Located southwest of the Project site on Webster Avenue near existing residential homes. The March Air Reserve Base runway is north of this location.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	11/11/2015	57.4	57.2	63.3

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	51.2	71.9	37.4	64.0	60.0	56.0	52.0	46.0	43.0	40.0	39.0	38.0
	Max	60.0	87.4	46.7	72.0	68.0	63.0	60.0	54.0	51.0	49.0	48.0	48.0
Energy Average:		57.4	Average:		67.9	64.6	59.9	57.1	50.1	46.7	43.4	42.7	42.0
Night	Min	49.6	67.3	39.2	58.0	54.0	52.0	51.0	46.0	44.0	41.0	40.0	40.0
	Max	60.6	86.0	54.2	70.0	66.0	62.0	60.0	59.0	57.0	56.0	55.0	55.0
Energy Average:		57.2	Average:		64.8	61.3	57.3	55.6	52.7	51.1	48.7	48.4	47.7
Hourly Summary													
Night	0	52.3	72.4	43.4	64.0	60.0	54.0	53.0	49.0	47.0	45.0	45.0	44.0
	1	49.6	67.3	43.4	58.0	54.0	52.0	51.0	49.0	47.0	45.0	45.0	44.0
	2	57.8	83.6	46.2	65.0	62.0	56.0	53.0	51.0	50.0	48.0	47.0	47.0
	3	54.8	75.6	47.2	61.0	58.0	57.0	56.0	55.0	53.0	50.0	50.0	48.0
	4	59.7	79.3	50.7	70.0	66.0	62.0	60.0	57.0	56.0	53.0	53.0	52.0
	5	58.2	75.3	53.9	65.0	63.0	60.0	59.0	58.0	57.0	55.0	55.0	54.0
	6	59.9	78.7	54.2	69.0	65.0	62.0	60.0	59.0	57.0	56.0	55.0	55.0
	7	60.6	86.0	51.1	70.0	64.0	60.0	59.0	56.0	55.0	52.0	52.0	52.0
Day	8	53.6	76.6	43.6	64.0	60.0	56.0	55.0	51.0	48.0	45.0	45.0	44.0
	9	60.0	85.0	40.4	68.0	64.0	59.0	56.0	49.0	45.0	42.0	41.0	41.0
	10	58.5	81.8	39.2	72.0	66.0	60.0	58.0	49.0	44.0	41.0	40.0	40.0
	11	54.0	79.0	39.1	66.0	63.0	58.0	56.0	47.0	44.0	41.0	40.0	39.0
	12	53.4	74.6	39.1	66.0	63.0	58.0	55.0	47.0	43.0	40.0	40.0	39.0
	13	57.4	82.8	39.0	70.0	66.0	60.0	56.0	46.0	43.0	40.0	40.0	39.0
	14	59.6	84.9	37.4	71.0	66.0	61.0	57.0	48.0	44.0	40.0	39.0	38.0
	15	58.4	81.2	40.3	71.0	67.0	62.0	59.0	51.0	46.0	42.0	41.0	40.0
	16	59.5	87.4	42.9	69.0	67.0	63.0	60.0	53.0	50.0	46.0	45.0	44.0
	17	59.8	84.1	46.2	70.0	68.0	63.0	60.0	54.0	51.0	48.0	47.0	47.0
	18	56.8	75.7	46.7	68.0	65.0	62.0	60.0	54.0	51.0	49.0	48.0	48.0
	19	56.1	77.3	44.6	67.0	65.0	61.0	59.0	53.0	50.0	47.0	46.0	45.0
	20	54.6	73.7	42.3	65.0	63.0	59.0	57.0	53.0	50.0	45.0	44.0	43.0
	21	51.2	71.9	40.3	64.0	61.0	56.0	52.0	47.0	45.0	42.0	42.0	41.0
Night	22	52.2	75.8	40.4	64.0	62.0	56.0	53.0	47.0	45.0	42.0	42.0	41.0
	23	51.4	77.4	39.2	62.0	59.0	54.0	52.0	46.0	44.0	41.0	40.0	40.0

URBAN CROSSROADS

APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Indian St.
Road Segment: n/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,132	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,213	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.54	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.79	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-10.35	1.98	-1.20	-5.50	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:	68.4	65.6	61.9	63.6	70.2	70.4
Medium Trucks:	70.0	67.9	61.6	63.7	70.8	70.9
Heavy Trucks:	75.8	73.2	71.0	70.1	77.0	77.3
Vehicle Noise:	77.4	74.9	71.9	71.7	78.6	78.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	165	356	767	1,652
CNEL:	171	369	796	1,714

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Indian St.
Road Segment: s/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,803	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,380	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-1.98	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.23	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-9.79	1.98	-1.20	-5.50	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:	69.0	66.2	62.5	64.1	70.8	71.0
Medium Trucks:	70.6	68.5	62.2	64.2	71.3	71.5
Heavy Trucks:	76.4	73.8	71.5	70.6	77.6	77.8
Vehicle Noise:	78.0	75.4	72.5	72.3	79.2	79.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	180	388	836	1,800
CNEL:	187	403	867	1,869

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Indian St.
Road Segment: s/o Driveway 1
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,634	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,263	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.37	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.62	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-10.18	1.98	-1.20	-5.50	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:	68.6	65.8	62.1	63.7	70.4	70.6
Medium Trucks:	70.2	68.1	61.8	63.8	71.0	71.1
Heavy Trucks:	76.0	73.4	71.1	70.3	77.2	77.5
Vehicle Noise:	77.6	75.1	72.1	71.9	78.8	79.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	170	366	788	1,697
CNEL:	176	379	818	1,761

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Indian St.
Road Segment: n/o Harley Knox Bl.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,627	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,363	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.04	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.29	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-9.85	1.98	-1.20	-5.50	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:	68.9	66.1	62.4	64.1	70.7	70.9
Medium Trucks:	70.5	68.4	62.1	64.2	71.3	71.4
Heavy Trucks:	76.3	73.7	71.5	70.6	77.5	77.8
Vehicle Noise:	77.9	75.4	72.4	72.2	79.1	79.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	178	385	828	1,785
CNEL:	185	399	860	1,853

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nandina Av.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,752 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	675 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.63	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-13.88	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-12.44	1.98	-1.20	-5.50	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:	64.6	61.8	58.1	59.7	66.4	66.6
Medium Trucks:	66.4	64.3	58.0	60.0	67.1	67.3
Heavy Trucks:	72.6	70.0	67.7	66.9	73.8	74.1
Vehicle Noise:	74.0	71.5	68.6	68.3	75.3	75.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	99	212	457	985
CNEL:	102	220	475	1,023

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Nandina Av.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,399 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	440 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.49	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.74	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-14.30	1.98	-1.20	-5.50	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:	62.7	60.0	56.2	57.9	64.5	64.7
Medium Trucks:	64.5	62.4	56.1	58.2	65.3	65.4
Heavy Trucks:	70.7	68.1	65.9	65.0	71.9	72.2
Vehicle Noise:	72.2	69.7	66.7	66.5	73.4	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	160	344	740
CNEL:	77	166	357	769

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,835 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,384 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	73 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.51	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-10.76	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-9.33	1.15	-1.20	-5.38	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:	66.9	64.1	60.4	62.0	68.7	68.9
Medium Trucks:	68.6	66.6	60.2	62.3	69.4	69.6
Heavy Trucks:	74.9	72.3	70.0	69.2	76.1	76.4
Vehicle Noise:	76.3	73.8	70.9	70.6	77.5	77.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	175	377	812	1,750
CNEL:	182	392	844	1,817

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Harley Knox Bl.
Road Segment: e/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,815 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,782 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	73 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	55.0 feet
Centerline Dist. to Observer:	55.0 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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.42	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-9.67	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-8.23	1.15	-1.20	-5.38	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:	68.0	65.2	61.5	63.1	69.8	70.0
Medium Trucks:	69.7	67.7	61.3	63.4	70.5	70.7
Heavy Trucks:	76.0	73.4	71.1	70.2	77.2	77.5
Vehicle Noise:	77.4	74.9	72.0	71.7	78.6	78.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	207	446	961	2,071
CNEL:	215	463	998	2,151

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o Patterson Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,720	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,772	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.44	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-9.69	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-8.25	1.15	-1.20	-5.38	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:	67.9	65.2	61.5	63.1	69.8	69.9
Medium Trucks:	69.7	67.7	61.3	63.4	70.5	70.7
Heavy Trucks:	76.0	73.4	71.1	70.2	77.2	77.4
Vehicle Noise:	77.4	74.9	71.9	71.7	78.6	78.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	206	445	958	2,064
CNEL:	214	462	995	2,143

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o Webster Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,592	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,659	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.73	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-9.97	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-8.54	1.15	-1.20	-5.38	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:	67.7	64.9	61.2	62.8	69.5	69.7
Medium Trucks:	69.4	67.4	61.0	63.1	70.2	70.4
Heavy Trucks:	75.7	73.1	70.8	69.9	76.9	77.2
Vehicle Noise:	77.1	74.6	71.7	71.4	78.3	78.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	198	426	917	1,976
CNEL:	205	442	952	2,051

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,018	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,002	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.09	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-9.16	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-7.72	1.15	-1.20	-5.38	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:	68.5	65.7	62.0	63.6	70.3	70.5
Medium Trucks:	70.2	68.2	61.8	63.9	71.0	71.2
Heavy Trucks:	76.5	73.9	71.6	70.8	77.7	78.0
Vehicle Noise:	77.9	75.4	72.5	72.2	79.1	79.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	224	482	1,039	2,239
CNEL:	232	501	1,079	2,325

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Harley Knox Bl.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,063	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	806	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.86	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-13.11	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-11.67	1.15	-1.20	-5.38	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:	64.5	61.8	58.0	59.7	66.4	66.5
Medium Trucks:	66.3	64.2	57.9	60.0	67.1	67.2
Heavy Trucks:	72.5	69.9	67.7	66.8	73.7	74.0
Vehicle Noise:	74.0	71.5	68.5	68.3	75.2	75.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	122	263	567	1,221
CNEL:	127	273	589	1,268

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Indian St.
Road Segment: n/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,266 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,227 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 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:	63.6%	6.8%	29.6%	77.95%
Medium Trucks:	74.7%	4.3%	20.9%	9.19%
Heavy Trucks:	66.1%	9.8%	24.1%	12.86%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.49	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.78	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-10.32	1.98	-1.20	-5.50	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:	68.5	65.7	62.0	63.6	70.3	70.5
Medium Trucks:	70.0	67.9	61.6	63.7	70.8	70.9
Heavy Trucks:	75.8	73.2	71.0	70.1	77.0	77.3
Vehicle Noise:	77.4	74.9	71.9	71.7	78.7	78.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	166	358	771	1,661
CNEL:	172	371	800	1,724

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Indian St.
Road Segment: s/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,743 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,474 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 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:	63.6%	6.8%	29.6%	76.83%
Medium Trucks:	74.7%	4.3%	20.9%	9.15%
Heavy Trucks:	66.1%	9.8%	24.1%	14.03%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-1.75	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.00	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-9.14	1.98	-1.20	-5.50	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	66.4	62.7	64.4	71.0	71.2
Medium Trucks:	70.8	68.7	62.4	64.5	71.6	71.7
Heavy Trucks:	77.0	74.4	72.2	71.3	78.2	78.5
Vehicle Noise:	78.5	76.0	73.0	72.8	79.7	80.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	195	421	906	1,952
CNEL:	203	437	941	2,027

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Indian St.
Road Segment: s/o Driveway 1
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,324 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,332 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 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:	63.6%	6.8%	29.6%	76.44%
Medium Trucks:	74.7%	4.3%	20.9%	9.28%
Heavy Trucks:	66.1%	9.8%	24.1%	14.28%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-2.22	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.37	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-9.50	1.98	-1.20	-5.50	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:	68.7	66.0	62.3	63.9	70.6	70.7
Medium Trucks:	70.4	68.4	62.0	64.1	71.2	71.3
Heavy Trucks:	76.7	74.1	71.8	70.9	77.9	78.1
Vehicle Noise:	78.1	75.6	72.7	72.4	79.3	79.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	184	397	855	1,842
CNEL:	191	412	888	1,913

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Indian St.
Road Segment: n/o Harley Knox Bl.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,317 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,432 vehicles
Vehicle Speed:	50 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 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:	63.6%	6.8%	29.6%	76.54%
Medium Trucks:	74.7%	4.3%	20.9%	9.28%
Heavy Trucks:	66.1%	9.8%	24.1%	14.19%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	-1.90	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-11.06	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-9.22	1.98	-1.20	-5.50	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:	69.0	66.3	62.6	64.2	70.9	71.1
Medium Trucks:	70.7	68.7	62.3	64.4	71.5	71.7
Heavy Trucks:	76.9	74.3	72.1	71.2	78.1	78.4
Vehicle Noise:	78.4	75.9	72.9	72.7	79.6	79.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	193	415	894	1,927
CNEL:	200	431	929	2,001

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Nandina Av.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,810	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	681	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	78.05%
Medium Trucks:	74.7%	4.3%	20.9%	9.18%
Heavy Trucks:	66.1%	9.8%	24.1%	12.78%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-13.88	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-12.44	1.98	-1.20	-5.50	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:	64.6	61.9	58.1	59.8	66.5	66.6
Medium Trucks:	66.4	64.3	58.0	60.0	67.1	67.3
Heavy Trucks:	72.6	70.0	67.7	66.9	73.8	74.1
Vehicle Noise:	74.0	71.5	68.6	68.3	75.3	75.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	99	212	458	986
CNEL:	102	221	475	1,024

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Nandina Av.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,475	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	448	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.83%
Medium Trucks:	74.7%	4.3%	20.9%	9.19%
Heavy Trucks:	66.1%	9.8%	24.1%	12.98%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.42	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.70	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-14.20	1.98	-1.20	-5.50	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:	62.8	60.0	56.3	57.9	64.6	64.8
Medium Trucks:	64.5	62.5	56.1	58.2	65.3	65.5
Heavy Trucks:	70.8	68.2	66.0	65.1	72.0	72.3
Vehicle Noise:	72.3	69.8	66.8	66.6	73.5	73.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	162	349	751
CNEL:	78	168	362	780

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Harley Knox Bl.
Road Segment: w/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,264	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,426	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	76.13%
Medium Trucks:	74.7%	4.3%	20.9%	9.45%
Heavy Trucks:	66.1%	9.8%	24.1%	14.43%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.48	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-10.54	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-8.70	1.15	-1.20	-5.38	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:	66.9	64.1	60.4	62.1	68.7	68.9
Medium Trucks:	68.9	66.8	60.5	62.5	69.7	69.8
Heavy Trucks:	75.5	72.9	70.7	69.8	76.7	77.0
Vehicle Noise:	76.8	74.3	71.4	71.1	78.0	78.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	189	406	876	1,887
CNEL:	196	422	910	1,960

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Harley Knox Bl.
Road Segment: e/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,331	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,833	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	76.61%
Medium Trucks:	74.7%	4.3%	20.9%	9.36%
Heavy Trucks:	66.1%	9.8%	24.1%	14.02%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.36	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-9.49	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-7.74	1.15	-1.20	-5.38	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:	68.0	65.3	61.5	63.2	69.9	70.0
Medium Trucks:	69.9	67.9	61.5	63.6	70.7	70.8
Heavy Trucks:	76.5	73.9	71.6	70.7	77.7	78.0
Vehicle Noise:	77.8	75.3	72.4	72.1	79.0	79.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	220	474	1,021	2,199
CNEL:	228	492	1,060	2,284

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Harley Knox Bl.
Road Segment: w/o Patterson Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,236	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,824	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	76.61%
Medium Trucks:	74.7%	4.3%	20.9%	9.36%
Heavy Trucks:	66.1%	9.8%	24.1%	14.03%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-0.39	1.12	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-9.51	1.15	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-7.76	1.15	-1.20	*-5.38*	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:	68.0	65.2	61.5	63.2	69.8	70.0
Medium Trucks:	69.9	67.8	61.5	63.6	70.7	70.8
Heavy Trucks:	76.4	73.9	71.6	70.7	77.7	77.9
Vehicle Noise:	77.8	75.3	72.4	72.1	79.0	79.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	219	472	1,017	2,192
CNEL:	228	490	1,057	2,276

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Harley Knox Bl.
Road Segment: w/o Webster Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,137	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,714	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	76.57%
Medium Trucks:	74.7%	4.3%	20.9%	9.35%
Heavy Trucks:	66.1%	9.8%	24.1%	14.08%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-0.66	1.12	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-9.79	1.15	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-8.01	1.15	-1.20	*-5.38*	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:	67.7	65.0	61.2	62.9	69.6	69.7
Medium Trucks:	69.6	67.6	61.2	63.3	70.4	70.6
Heavy Trucks:	76.2	73.6	71.3	70.5	77.4	77.7
Vehicle Noise:	77.5	75.0	72.1	71.8	78.7	79.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	211	454	978	2,106
CNEL:	219	471	1,015	2,188

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Harley Knox Bl.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,563	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,056	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	76.78%
Medium Trucks:	74.7%	4.3%	20.9%	9.34%
Heavy Trucks:	66.1%	9.8%	24.1%	13.88%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.15	1.12	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-9.00	1.15	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-7.28	1.15	-1.20	*-5.38*	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:	68.5	65.8	62.1	63.7	70.4	70.5
Medium Trucks:	70.4	68.3	62.0	64.1	71.2	71.3
Heavy Trucks:	76.9	74.3	72.1	71.2	78.1	78.4
Vehicle Noise:	78.3	75.8	72.9	72.6	79.5	79.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	236	509	1,096	2,362
CNEL:	245	529	1,139	2,453

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing + Project
Road Name: Harley Knox Bl.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,208	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	821	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	78.25%
Medium Trucks:	74.7%	4.3%	20.9%	9.09%
Heavy Trucks:	66.1%	9.8%	24.1%	12.66%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-3.76	1.12	-1.20	*-4.67*	0.000	0.000
Medium Trucks:	79.45	-13.11	1.15	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-11.67	1.15	-1.20	*-5.38*	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:	64.6	61.9	58.1	59.8	66.5	66.6
Medium Trucks:	66.3	64.2	57.9	60.0	67.1	67.2
Heavy Trucks:	72.5	69.9	67.7	66.8	73.7	74.0
Vehicle Noise:	74.0	71.5	68.5	68.3	75.2	75.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	122	264	568	1,224
CNEL:	127	274	590	1,271

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Indian St.
Road Segment: n/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,231	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,123	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	1.56	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-7.68	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-6.25	1.98	-1.20	*-5.50*	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:	72.5	69.8	66.0	67.7	74.3	74.5
Medium Trucks:	74.1	72.0	65.7	67.8	74.9	75.0
Heavy Trucks:	79.9	77.3	75.1	74.2	81.1	81.4
Vehicle Noise:	81.5	79.0	76.0	75.8	82.7	83.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	310	668	1,440	3,103
CNEL:	322	694	1,495	3,220

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Indian St.
Road Segment: s/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,360	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,636	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.83	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-8.42	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-6.98	1.98	-1.20	*-5.50*	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:	71.8	69.0	65.3	66.9	73.6	73.8
Medium Trucks:	73.4	71.3	65.0	67.0	74.2	74.3
Heavy Trucks:	79.2	76.6	74.3	73.4	80.4	80.7
Vehicle Noise:	80.8	78.3	75.3	75.1	82.0	82.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	277	597	1,286	2,771
CNEL:	288	620	1,335	2,876

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Indian St.
Road Segment: s/o Driveway 1
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,070	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,507	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.61	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-8.64	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-7.20	1.98	-1.20	*-5.50*	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:	71.6	68.8	65.1	66.7	73.4	73.6
Medium Trucks:	73.1	71.1	64.7	66.8	73.9	74.1
Heavy Trucks:	79.0	76.4	74.1	73.2	80.2	80.4
Vehicle Noise:	80.5	78.0	75.0	74.8	81.8	82.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	268	577	1,244	2,680
CNEL:	278	599	1,291	2,782

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Indian St.
Road Segment: n/o Harley Knox Bl.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,901	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,390	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	70.20	0.40	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	81.00	-8.85	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	85.38	-7.41	1.98	-1.20	*-5.50*	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:	71.3	68.6	64.9	66.5	73.2	73.4
Medium Trucks:	72.9	70.9	64.5	66.6	73.7	73.9
Heavy Trucks:	78.7	76.2	73.9	73.0	80.0	80.2
Vehicle Noise:	80.3	77.8	74.8	74.6	81.6	81.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	260	559	1,205	2,596
CNEL:	269	580	1,251	2,694

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nandina Av.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,900	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	890	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.43	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-12.68	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-11.24	1.98	-1.20	-5.50	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:	65.8	63.0	59.3	60.9	67.6	67.8
Medium Trucks:	67.6	65.5	59.2	61.2	68.3	68.5
Heavy Trucks:	73.8	71.2	68.9	68.1	75.0	75.3
Vehicle Noise:	75.2	72.7	69.8	69.5	76.5	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	118	255	550	1,184
CNEL:	123	265	571	1,230

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nandina Av.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,143	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	714	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.39	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-13.63	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-12.20	1.98	-1.20	-5.50	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:	64.8	62.1	58.3	60.0	66.6	66.8
Medium Trucks:	66.6	64.5	58.2	60.3	67.4	67.5
Heavy Trucks:	72.8	70.2	68.0	67.1	74.0	74.3
Vehicle Noise:	74.3	71.8	68.8	68.6	75.5	75.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	102	220	475	1,023
CNEL:	106	229	493	1,062

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,508	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,551	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.14	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-8.11	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-6.67	1.15	-1.20	-5.38	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:	69.5	66.8	63.0	64.7	71.4	71.5
Medium Trucks:	71.3	69.2	62.9	65.0	72.1	72.2
Heavy Trucks:	77.5	74.9	72.7	71.8	78.7	79.0
Vehicle Noise:	79.0	76.5	73.5	73.3	80.2	80.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	263	567	1,221	2,631
CNEL:	273	589	1,268	2,733

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Harley Knox Bl.
Road Segment: e/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,350	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,335	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.31	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-6.94	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.51	1.15	-1.20	-5.38	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:	70.7	67.9	64.2	65.9	72.5	72.7
Medium Trucks:	72.5	70.4	64.1	66.1	73.3	73.4
Heavy Trucks:	78.7	76.1	73.9	73.0	79.9	80.2
Vehicle Noise:	80.1	77.6	74.7	74.4	81.4	81.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	315	678	1,460	3,146
CNEL:	327	704	1,517	3,267

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o Patterson Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,244	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,324	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.29	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-6.96	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.52	1.15	-1.20	-5.38	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:	70.7	67.9	64.2	65.8	72.5	72.7
Medium Trucks:	72.4	70.4	64.0	66.1	73.2	73.4
Heavy Trucks:	78.7	76.1	73.8	73.0	79.9	80.2
Vehicle Noise:	80.1	77.6	74.7	74.4	81.3	81.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	314	676	1,457	3,140
CNEL:	326	702	1,513	3,260

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o Webster Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,647	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,165	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.08	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-7.17	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.73	1.15	-1.20	-5.38	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:	70.5	67.7	64.0	65.6	72.3	72.5
Medium Trucks:	72.2	70.2	63.8	65.9	73.0	73.2
Heavy Trucks:	78.5	75.9	73.6	72.7	79.7	80.0
Vehicle Noise:	79.9	77.4	74.5	74.2	81.1	81.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	304	655	1,410	3,038
CNEL:	316	680	1,464	3,155

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Harley Knox Bl.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,084	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,508	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.53	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-6.72	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.28	1.15	-1.20	-5.38	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:	70.9	68.2	64.4	66.1	72.7	72.9
Medium Trucks:	72.7	70.6	64.3	66.3	73.5	73.6
Heavy Trucks:	78.9	76.3	74.1	73.2	80.1	80.4
Vehicle Noise:	80.4	77.9	74.9	74.7	81.6	81.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	325	701	1,511	3,255
CNEL:	338	728	1,569	3,380

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Harley Knox Bl.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,725	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,273	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.86%
Medium Trucks:	74.7%	4.3%	20.9%	9.26%
Heavy Trucks:	66.1%	9.8%	24.1%	12.89%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.88	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-11.13	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-9.69	1.15	-1.20	-5.38	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:	66.5	63.7	60.0	61.7	68.3	68.5
Medium Trucks:	68.3	66.2	59.9	61.9	69.1	69.2
Heavy Trucks:	74.5	71.9	69.7	68.8	75.7	76.0
Vehicle Noise:	76.0	73.4	70.5	70.3	77.2	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	166	357	768	1,655
CNEL:	172	370	798	1,719

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Indian St.
Road Segment: n/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,365	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,137	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.89%
Medium Trucks:	74.7%	4.3%	20.9%	9.23%
Heavy Trucks:	66.1%	9.8%	24.1%	12.88%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	1.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-7.68	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-6.23	1.98	-1.20	-5.50	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:	72.5	69.8	66.1	67.7	74.4	74.5
Medium Trucks:	74.1	72.0	65.7	67.8	74.9	75.0
Heavy Trucks:	79.9	77.3	75.1	74.2	81.1	81.4
Vehicle Noise:	81.5	79.0	76.0	75.8	82.7	83.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	311	670	1,443	3,110
CNEL:	323	695	1,498	3,228

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Indian St.
Road Segment: s/o Grove View Rd.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,730	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.30%
Medium Trucks:	74.7%	4.3%	20.9%	9.20%
Heavy Trucks:	66.1%	9.8%	24.1%	13.50%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.95	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-8.30	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-6.63	1.98	-1.20	-5.50	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:	71.9	69.1	65.4	67.1	73.7	73.9
Medium Trucks:	73.5	71.4	65.1	67.2	74.3	74.4
Heavy Trucks:	79.5	76.9	74.7	73.8	80.7	81.0
Vehicle Noise:	81.1	78.5	75.6	75.3	82.3	82.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	289	624	1,344	2,895
CNEL:	301	647	1,395	3,005

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Indian St.
Road Segment: s/o Driveway 1
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,760	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,576	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.12%
Medium Trucks:	74.7%	4.3%	20.9%	9.27%
Heavy Trucks:	66.1%	9.8%	24.1%	13.61%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.69	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-8.52	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-6.85	1.98	-1.20	-5.50	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:	71.6	68.9	65.2	66.8	73.5	73.6
Medium Trucks:	73.3	71.2	64.9	66.9	74.1	74.2
Heavy Trucks:	79.3	76.7	74.5	73.6	80.5	80.8
Vehicle Noise:	80.8	78.3	75.4	75.1	82.0	82.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	280	603	1,298	2,797
CNEL:	290	626	1,348	2,903

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Indian St.
Road Segment: n/o Harley Knox Bl.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,591	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,459	vehicles
Vehicle Speed:	50	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.09%
Medium Trucks:	74.7%	4.3%	20.9%	9.27%
Heavy Trucks:	66.1%	9.8%	24.1%	13.64%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	70.20	0.48	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	81.00	-8.72	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	85.38	-7.04	1.98	-1.20	-5.50	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:	71.4	68.7	65.0	66.6	73.3	73.4
Medium Trucks:	73.1	71.0	64.7	66.7	73.9	74.0
Heavy Trucks:	79.1	76.5	74.3	73.4	80.3	80.6
Vehicle Noise:	80.6	78.1	75.2	74.9	81.9	82.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	271	585	1,260	2,715
CNEL:	282	607	1,308	2,818

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Nandina Av.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,958	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	896	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	78.00%
Medium Trucks:	74.7%	4.3%	20.9%	9.20%
Heavy Trucks:	66.1%	9.8%	24.1%	12.80%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.39	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-12.68	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-11.24	1.98	-1.20	-5.50	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:	65.8	63.0	59.3	61.0	67.6	67.8
Medium Trucks:	67.6	65.5	59.2	61.2	68.3	68.5
Heavy Trucks:	73.8	71.2	68.9	68.1	75.0	75.3
Vehicle Noise:	75.2	72.7	69.8	69.5	76.5	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	119	255	550	1,185
CNEL:	123	265	571	1,231

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Nandina Av.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,219	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	722	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	50	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	44.0	feet
Centerline Dist. to Observer:	44.0	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:	63.6%	6.8%	29.6%	77.84%
Medium Trucks:	74.7%	4.3%	20.9%	9.21%
Heavy Trucks:	66.1%	9.8%	24.1%	12.95%

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:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.34	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-13.61	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-12.13	1.98	-1.20	-5.50	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:	64.9	62.1	58.4	60.0	66.7	66.9
Medium Trucks:	66.6	64.6	58.2	60.3	67.4	67.6
Heavy Trucks:	72.9	70.3	68.1	67.2	74.1	74.4
Vehicle Noise:	74.3	71.8	68.9	68.6	75.6	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	103	222	479	1,032
CNEL:	107	231	497	1,072

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Harley Knox Bl.
Road Segment: w/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,937	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,594	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	76.90%
Medium Trucks:	74.7%	4.3%	20.9%	9.36%
Heavy Trucks:	66.1%	9.8%	24.1%	13.73%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.16	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-7.98	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-6.32	1.15	-1.20	-5.38	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:	69.5	66.8	63.1	64.7	71.4	71.5
Medium Trucks:	71.4	69.4	63.0	65.1	72.2	72.4
Heavy Trucks:	77.9	75.3	73.0	72.2	79.1	79.4
Vehicle Noise:	79.3	76.7	73.8	73.5	80.5	80.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	274	591	1,274	2,744
CNEL:	285	614	1,323	2,850

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Harley Knox Bl.
Road Segment: e/o I-215 NB Ramps
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,866	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,387	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.18%
Medium Trucks:	74.7%	4.3%	20.9%	9.31%
Heavy Trucks:	66.1%	9.8%	24.1%	13.50%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.34	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-6.85	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.24	1.15	-1.20	-5.38	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:	70.7	68.0	64.2	65.9	72.6	72.7
Medium Trucks:	72.6	70.5	64.2	66.2	73.4	73.5
Heavy Trucks:	79.0	76.4	74.1	73.2	80.2	80.5
Vehicle Noise:	80.4	77.8	74.9	74.6	81.6	81.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	325	700	1,509	3,250
CNEL:	338	727	1,567	3,376

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Harley Knox Bl.
Road Segment: w/o Patterson Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,760	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,376	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.18%
Medium Trucks:	74.7%	4.3%	20.9%	9.31%
Heavy Trucks:	66.1%	9.8%	24.1%	13.50%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.32	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-6.86	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.25	1.15	-1.20	-5.38	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:	70.7	67.9	64.2	65.9	72.5	72.7
Medium Trucks:	72.5	70.5	64.1	66.2	73.3	73.5
Heavy Trucks:	79.0	76.4	74.1	73.2	80.2	80.4
Vehicle Noise:	80.3	77.8	74.9	74.6	81.6	81.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	324	699	1,506	3,244
CNEL:	337	726	1,564	3,369

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Harley Knox Bl.
Road Segment: w/o Webster Av.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,192	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,219	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.17%
Medium Trucks:	74.7%	4.3%	20.9%	9.31%
Heavy Trucks:	66.1%	9.8%	24.1%	13.52%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.11	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-7.07	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.45	1.15	-1.20	-5.38	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:	70.5	67.7	64.0	65.7	72.3	72.5
Medium Trucks:	72.3	70.3	63.9	66.0	73.1	73.3
Heavy Trucks:	78.8	76.2	73.9	73.0	80.0	80.2
Vehicle Noise:	80.1	77.6	74.7	74.4	81.4	81.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	314	677	1,460	3,144
CNEL:	327	704	1,516	3,266

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Harley Knox Bl.
Road Segment: w/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	35,629	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	3,563	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	77.24%
Medium Trucks:	74.7%	4.3%	20.9%	9.30%
Heavy Trucks:	66.1%	9.8%	24.1%	13.46%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.56	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-6.63	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-5.03	1.15	-1.20	-5.38	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:	70.9	68.2	64.5	66.1	72.8	72.9
Medium Trucks:	72.8	70.7	64.4	66.4	73.6	73.7
Heavy Trucks:	79.2	76.6	74.3	73.4	80.4	80.7
Vehicle Noise:	80.6	78.1	75.1	74.9	81.8	82.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	336	723	1,558	3,357
CNEL:	349	751	1,618	3,487

Monday, January 18, 2016

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 + Project
Road Name: Harley Knox Bl.
Road Segment: e/o Indian St.
Project Name: Indian Street Commerce
Job Number: 9914

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,870	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,287	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	73	feet

Site Data

Barrier Height:	**0.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	55.0	feet
Centerline Dist. to Observer:	55.0	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:	63.6%	6.8%	29.6%	78.11%
Medium Trucks:	74.7%	4.3%	20.9%	9.15%
Heavy Trucks:	66.1%	9.8%	24.1%	12.74%

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:	41.446
Medium Trucks:	41.232
Heavy Trucks:	41.253

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.81	1.12	-1.20	-4.67	0.000	0.000
Medium Trucks:	79.45	-11.13	1.15	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-9.69	1.15	-1.20	-5.38	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:	66.6	63.8	60.1	61.7	68.4	68.6
Medium Trucks:	68.3	66.2	59.9	61.9	69.1	69.2
Heavy Trucks:	74.5	71.9	69.7	68.8	75.7	76.0
Vehicle Noise:	76.0	73.5	70.5	70.3	77.2	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	166	357	769	1,657
CNEL:	172	371	799	1,721

Monday, January 18, 2016

APPENDIX 9.1:

REFERENCE DISTRIBUTION/WAREHOUSE NOISE SOURCE PHOTOS

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Reference Measurement: Nature's Best
16081 Fern Avenue, Chino

Nature's Best_01

Nature's Best_02

Nature's Best_03

Nature's Best_04

Nature's Best_05

Nature's Best_06

Reference Measurement: Nature's Best
16081 Fern Avenue, Chino

Nature's Best_07

Nature's Best_08

Nature's Best_09

Nature's Best_10

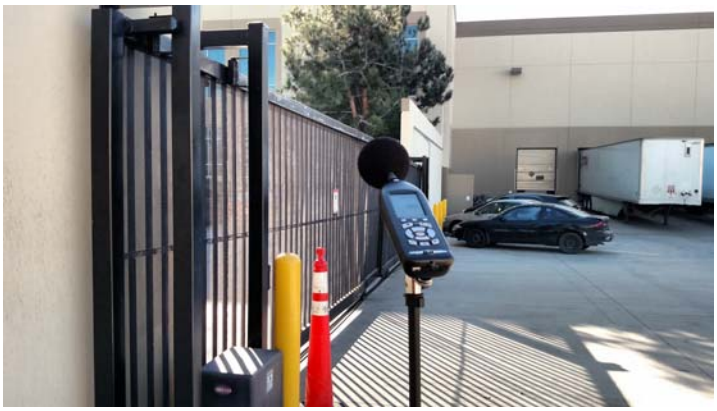
Source_1-1

Source_1-2

Reference Measurement: Nature's Best
16081 Fern Avenue, Chino

Source_1-3

Source_1-4



Source_2-1

Source_2-2

Source_2-3

Source_2-4

Reference Measurement: Nature's Best
16081 Fern Avenue, Chino

Source_2-5

Source_2-6

Source_2-7

Source_2-8

Reference Measurement: Motivational Fulfillment
6810 Bickmore Avenue, Chino

Motivational Fulfillment_01

Motivational Fulfillment_02

Motivational Fulfillment_03

Source_1-1

Source_1-2

Source_1-3

Reference Measurement: Motivational Fulfillment
6810 Bickmore Avenue, Chino

Source_1-4

Source_2-1

Source_2-2

Source_2-3

Source_2-4

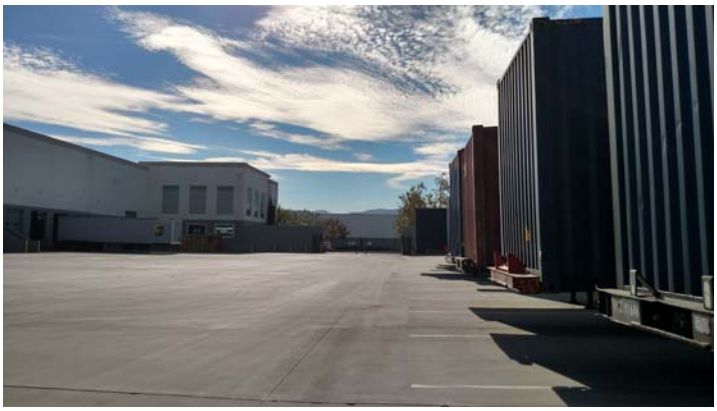
Source_2-5

Reference Measurement: Motivational Fulfillment
6810 Bickmore Avenue, Chino

Source_2-6

Source_2-7

Source_2-8



Source_2-9

Reference **Measurement: Veg Fresh Farms / FedEx**

IMG_0857
33, 51' 31.200000", 117, 54' 48.000000"

IMG_0862
33, 51' 30.600000", 117, 54' 48.600000"

IMG_0863
33, 51' 30.600000", 117, 54' 48.000000"

IMG_0872
33, 51' 33.000000", 117, 54' 42.600000"

APPENDIX 9.2:

STATIONARY/AREA-SOURCE NOISE CALCULATIONS

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STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R1**
Source: Truck Idle/Reefer Activity
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	2,577.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	2,577.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,468.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,463.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,468.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	70.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	2,577.0	-38.7	-38.7	-38.7	-38.7	-38.7	-38.7
Shielding (Barrier Attenuation)	2,577.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		31.4	-38.7	-38.7	-38.7	-38.7	-38.7
60 Minute Hourly Adjustment		**31.4**	**-38.7**	**-38.7**	**-38.7**	**-38.7**	**-38.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R2**
Source: Truck Idle/Reefer Activity
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	3,461.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	3,461.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,471.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,468.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,471.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	70.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	3,461.0	-41.2	-41.2	-41.2	-41.2	-41.2	-41.2
Shielding (Barrier Attenuation)	3,461.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		28.9	-41.2	-41.2	-41.2	-41.2	-41.2
60 Minute Hourly Adjustment		**28.9**	**-41.2**	**-41.2**	**-41.2**	**-41.2**	**-41.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R3**
Source: Truck Idle/Reefer Activity
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	3,764.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	3,764.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,477.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,468.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,477.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	70.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	3,764.0	-42.0	-42.0	-42.0	-42.0	-42.0	-42.0
Shielding (Barrier Attenuation)	3,764.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		28.1	-42.0	-42.0	-42.0	-42.0	-42.0
60 Minute Hourly Adjustment		**28.1**	**-42.0**	**-42.0**	**-42.0**	**-42.0**	**-42.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R4**
Source: Truck Idle/Reefer Activity
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	3,333.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	3,333.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,484.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,468.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,484.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	70.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	3,333.0	-40.9	-40.9	-40.9	-40.9	-40.9	-40.9
Shielding (Barrier Attenuation)	3,333.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		29.2	-40.9	-40.9	-40.9	-40.9	-40.9
60 Minute Hourly Adjustment		**29.2**	**-40.9**	**-40.9**	**-40.9**	**-40.9**	**-40.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R5**
Source: Truck Idle/Reefer Activity
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	4,269.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	4,269.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,489.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,468.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,489.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	30.0	70.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	4,269.0	-43.1	-43.1	-43.1	-43.1	-43.1	-43.1
Shielding (Barrier Attenuation)	4,269.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		27.0	-43.1	-43.1	-43.1	-43.1	-43.1
60 Minute Hourly Adjustment		**27.0**	**-43.1**	**-43.1**	**-43.1**	**-43.1**	**-43.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R1**
Source: Roof-Top Mech. Vent. Equipment
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	2,192.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	2,192.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,468.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,483.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,468.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	2,192.0	-52.8	-52.8	-52.8	-52.8	-52.8	-52.8
Shielding (Barrier Attenuation)	2,192.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		24.4	-52.8	-52.8	-52.8	-52.8	-52.8
39 Minute Hourly Adjustment		**22.5**	**-54.7**	**-54.7**	**-54.7**	**-54.7**	**-54.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R2**
Source: Roof-Top Mech. Vent. Equipment
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	3,595.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	3,595.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,471.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,488.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,471.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	3,595.0	-57.1	-57.1	-57.1	-57.1	-57.1	-57.1
Shielding (Barrier Attenuation)	3,595.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		20.1	-57.1	-57.1	-57.1	-57.1	-57.1
39 Minute Hourly Adjustment		**18.2**	**-59.0**	**-59.0**	**-59.0**	**-59.0**	**-59.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R3**
Source: Roof-Top Mech. Vent. Equipment
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	3,876.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	3,876.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,477.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,488.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,477.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	3,876.0	-57.8	-57.8	-57.8	-57.8	-57.8	-57.8
Shielding (Barrier Attenuation)	3,876.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		19.4	-57.8	-57.8	-57.8	-57.8	-57.8
39 Minute Hourly Adjustment		**17.5**	**-59.7**	**-59.7**	**-59.7**	**-59.7**	**-59.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R4**
Source: Roof-Top Mech. Vent. Equipment
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	3,352.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	3,352.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,484.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,488.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,484.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	3,352.0	-56.5	-56.5	-56.5	-56.5	-56.5	-56.5
Shielding (Barrier Attenuation)	3,352.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		20.7	-56.5	-56.5	-56.5	-56.5	-56.5
39 Minute Hourly Adjustment		**18.8**	**-58.4**	**-58.4**	**-58.4**	**-58.4**	**-58.4**

STATIONARY SOURCE NOISE PREDICTION MODEL

6/23/2016

Observer Location: **R5**
Source: Roof-Top Mech. Vent. Equipment
Condition: Operational

Project Name: Indian Street Commerce
Job Number: 9914
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	4,067.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	4,067.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,489.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,488.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,489.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	4,067.0	-58.2	-58.2	-58.2	-58.2	-58.2	-58.2
Shielding (Barrier Attenuation)	4,067.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		19.0	-58.2	-58.2	-58.2	-58.2	-58.2
39 Minute Hourly Adjustment		**17.1**	**-60.1**	**-60.1**	**-60.1**	**-60.1**	**-60.1**

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APPENDIX 10.1:

CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS MEMO

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SUBJECT: CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS MEMO

This Construction Reference Noise Level Measurements Memo has been prepared to summarize the sample reference noise level measurements collected by Urban Crossroads, Inc. To describe peak construction noise activities, we have historically relied on reference noise level measurements provided in the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). However, our experience demonstrates that the RCNM significantly overstates the predicted construction noise levels. This is largely due the fact that RCNM is based on construction equipment data collected from the Central Artery/Tunnel project in Boston, Massachusetts in the early 1990's. Due to substantial changes in the air quality emission requirements in the State of California Air Resources Board (ARB), the RCNM reference noise level measurements do not adequately describe modern construction equipment noise levels. In addition, the RCNM methodology places all construction equipment at a single point near the property line. This scenario simply does not occur in the real world as typical construction activity represents a variety of equipment operating at different locations throughout the project site.

REFERENCE NOISE LEVEL MEASUREMENTS

To estimate a project's construction-related noise levels, sample reference noise level measurements of similar construction activities were collected by Urban Crossroads, Inc. to describe the different stages of construction. The reference noise levels are intended to represent typical construction noise levels when multiple pieces of equipment are operating simultaneously at a construction site. The following reference noise level measurements were collected from existing construction operations with similar equipment as those expected with future construction of comparable land uses. Appendix A includes the data collected from each of the reference noise level measurements adjusted to present noise levels at a uniform reference distance of 50 feet. Appendix B includes the reference noise source photos by identification number ("ID"). Table 1 summarizes the reference noise level measurements. The reference noise level measurements are identified by land use type and location below.

BUSINESS PARK CONSTRUCTION SITE, CITY OF IRVINE

On Wednesday, October 14th, 2015, Urban Crossroads, Inc. collected short-term construction noise level measurements at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine. The reference noise level measurements include the following noise source activities: a truck pass-by and background dozer activity (ID 1) and dozer activity (ID 2). Both measurements were taken at a distance of approximately 30 feet from the source and represent typical construction activities during the grading stage of construction.

RESIDENTIAL CONSTRUCTION SITE, CITY OF RANCHO MISSION VIEJO

On Tuesday, October 20th, 2015, Urban Crossroads, Inc. collected short-term construction noise level measurements at a residential construction site located in the unincorporated area within the County of Orange known as Rancho Mission Viejo. The reference noise level measurements include the following noise source activities: construction vehicle maintenance (ID 3), foundation trenching (ID 4), rough grading activities (ID 5), and residential building framing (ID 6). All reference measurements were taken at this location at a distance of approximately 30 feet from the noise source.

INDUSTRIAL SITE, CITY OF ONTARIO

Additional short-term reference noise level measurements were collected on Friday, October 30th, 2015, by Urban Crossroads, Inc. at an active industrial construction site in the City of Ontario. The reference noise level measurements represent the grading activities associated with industrial/warehousing construction. Five reference noise level measurements were taken at this location to describe: a water truck pass-by and backup alarm (ID 7), a dozer pass-by (ID 8), two scrapers and a water truck pass-by (ID 9), two scrapers pass-by (ID 10), and scraper, water truck and dozer activities over a 30-minute period (ID 11). All reference measurements taken at this location were at a distance of approximately 30 feet from the source.

INDUSTRIAL SITE, CITY OF REDLANDS

On July 1st, 2015, Urban Crossroads, Inc. collected short-term construction noise level measurements of a nighttime concrete pour at an industrial construction site located at 27334 San Bernardino Avenue in the City of Redlands. The reference noise level measurements include the following nighttime building construction and paving-related noise source activities: concrete mixer truck movements (ID 12), concrete paver activities (ID 13), concrete mixer pour & paving activities (ID 14), concrete mixer backup alarms and air brakes (ID 15), and a one-hour measurement over the duration of all reference measurements at this location of concrete mixer pour activities (ID 16).

TABLE 1: CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS SUMMARY

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance		Reference Noise Levels @ 50 Feet[6]	
			dBA Leq	dBA Lmax	dBA Leq	dBA Lmax
1	Truck Pass-Bys & Dozer Activity[1]	30'	63.6	68.1	59.2	63.7
2	Dozer Activity[1]	30'	68.6	76.4	64.2	72.0
3	Construction Vehicle Maintenance Activities[2]	30'	71.9	74.8	67.5	70.4
4	Foundation Trenching[2]	30'	72.6	74.9	68.2	70.5
5	Rough Grading Activities[2]	30'	77.9	84.8	73.5	80.4
6	Residential Framing[3]	30'	66.7	76.7	62.3	72.3
7	Water Truck Pass-By & Backup Alarm[4]	30'	76.3	82.3	71.9	77.9
8	Dozer Pass-By[4]	30'	84.0	89.9	79.6	85.5
9	Two Scrapers & Water Truck Pass-By[4]	30'	83.4	89.0	79.0	84.6
10	Two Scrapers Pass-By[4]	30'	83.7	86.9	79.3	82.5
11	Scraper, Water Truck, & Dozer Activity[4]	30'	79.7	87.7	75.3	83.3
12	Concrete Mixer Truck Movements[5]	50'	71.2	73.1	71.2	73.1
13	Concrete Paver Activities[5]	30'	70.0	75.7	65.6	71.3
14	Concrete Mixer Pour & Paving Activities[5]	30'	70.3	76.3	65.9	71.9
15	Concrete Mixer Backup Alarms & Air Brakes[5]	50'	71.6	78.8	71.6	78.8
16	Concrete Mixer Pour Activities[5]	50'	67.7	79.2	67.7	79.2

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.
[4] As measured by Urban Crossroads, Inc. on 10/30/15 during grading operations within an industrial construction site located in the City of Ontario.
[5] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[6] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

MODELED AND MEASURED CONSTRUCTION NOISE LEVELS

A RCNM construction noise analysis was prepared by Urban Crossroads, Inc. on October 17th, 2014 for an industrial project site in the City of Ontario. The noise levels due to construction in the industrial portion of the project site (Planning Area 1) were estimated at up to thirteen receiver locations to determine the potential noise impacts at adjacent sensitive land uses. Returning to the same industrial project site over a year later, in October 2015, Urban Crossroads, Inc. collected noise level measurements at the same receiver locations to validate the modeled RCNM construction noise levels with actual construction noise level measurements collected in the field. The grading stage of construction was chosen for this comparison since grading activities typically represent the worst-case construction activities due to the number and size of the mobile equipment used in the grading process.

MODELED CONSTRUCTION NOISE LEVELS

As shown on Table 2, the modeled RCNM noise levels during the grading stage of construction were estimated to produce a noise level approaching 92.6 dBA Leq at a distance of 50 feet from the project site boundary. The RCNM noise levels reflect the combined construction noise level impacts of excavators, graders, tractors, loaders, backhoes, rubber tired dozers, and scrapers producing a noise level of 92.6 dBA Leq. At nearby receiver locations, this results in a short-term construction noise level approaching 88.2 dBA Leq.

TABLE 2: RCNM MODELED CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Leq)	Combined Level @ 50 Feet (dBA Leq)
Excavator	2	40%	3.2	81.0	80.0
Grader	8	40%	3.2	85.0	90.1
Tractor/Loader/Backhoe	5	40%	3.2	78.0	81.0
Rubber Tired Dozer	2	40%	3.2	79.0	78.0
Scraper	5	40%	3.2	84.0	87.0
Combined Hourly Noise Levels 50 Feet (Leq dBA)					92.6

Receiver Location	Distance To Property Line (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Noise Barrier Attenuation (dBA Leq)	Construction Noise Level (dBA Leq)
R2	83'	-4.4	0.0	88.2
R3	78'	-3.9	-5.6	83.1

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

MEASURED CONSTRUCTION NOISE LEVELS

To describe the actual construction noise levels based on typical conditions, short-term construction noise level measurements were collected in the field during grading activities at receiver locations R2 and R3. Appendix C includes study area photos of the measurement locations and the construction activities observed from each location at the project site. To validate the construction noise levels, measurements were collected during continuous on-site grading activities on Friday, October 30th, and again on Friday, November 6th, 2015.

Grading activities observed on the site during the short-term noise level measurements include water trucks queuing and refilling at a stationary tank, trencher activity, up to three scrapers operating simultaneously, and dozer activity. The water truck queuing activity was the closest equipment observed near the project site boundaries due to the stationary location of the water refill tank, at a distance of approximately 100 feet from the receiver locations. The trencher was observed at a distance of roughly 600 feet from the receiver locations, and the scrapers and dozer activities were at approximately 900 feet from the receiver locations. Additional stationary scrapers were located at a distance of approximately 700 feet from the receiver locations. Additional background construction noise sources include forklifts, cranes, and man lifts used in the building construction stage of a portion of the site located roughly 900 feet southeast of the receiver locations. The construction activities observed during the short-term measurements represent typical grading activities within an industrial construction site, with multiple pieces of equipment operating at varying distances from the project site boundaries.

Table 3 shows the modeled RCNM noise levels using the actual distances from each receiver location to the nearest equipment activity observed during the short-term noise level measurements. Based on the RCNM model, the peak grading construction noise levels would range from 80.9 to 86.5 dBA Leq when equipment is located at 100 feet from each receiver location. By calculating the modeled RCNM noise level at each location, a comparison can be made between the modeled and measured grading construction noise levels to calibrate the construction noise model.

TABLE 3: MODELED CONSTRUCTION NOISE LEVELS BASED ON ACTUAL EQUIPMENT DISTANCES

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Leq)	Combined Level @ 50 Feet (dBA Leq)
Excavator	2	40%	3.2	81.0	80.0
Grader	8	40%	3.2	85.0	90.1
Tractor/Loader/Backhoe	5	40%	3.2	78.0	81.0
Rubber Tired Dozer	2	40%	3.2	79.0	78.0
Scraper	5	40%	3.2	84.0	87.0
Combined Hourly Noise Levels 50 Feet (Leq dBA)					92.6

Receiver Location	Distance To Closest Equipment Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Noise Barrier Attenuation (dBA Leq)	Construction Noise Level (dBA Leq)
R2	100'	-6.0	0.0	86.5
R3	100'	-6.0	-5.6	80.9

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

To determine the project-only construction noise levels at each receiver location during the grading activities observed at the project site, the ambient without project noise level measurements are compared to the short-term with project noise level measurements. The ambient noise level measurements from the original noise study are shown on Table 4 in addition to the new short-term noise level measurements collected during typical grading activity at the receiver locations on Day 1, Friday, October 30th 2015. By subtracting the previous ambient noise level from the new combined (project construction plus ambient) noise level measurements at each receiver, the project-only construction noise levels can be logarithmically calculated. Table 4 shows the project-only construction noise levels ranged from 61.4 to 63.4 dBA Leq, and are significantly lower than those modeled with the RCNM at the same receiver locations.

Based on the Day 1 analysis, the differences between the peak RCNM model and typical measured construction noise levels range from 19.6 to 23.2 dBA Leq. This analysis demonstrates how the RCNM overstates the potential construction noise level impacts by placing all equipment at a single point at the project site boundary. In reality, the grading equipment within the project site was observed to operate in different locations throughout the project site. . In addition, the typical construction noise levels

measured at the receiver locations reflect modern construction equipment noise level emissions that are largely overstated using the older RCNM reference noise levels.

TABLE 4: DAY 1 CONSTRUCTION NOISE LEVEL COMPARISON

Original Noise Study			Calibration			
Receiver Location[1]	Measured Daytime Ambient Noise Levels (dBA Leq)[2]	Peak Modeled RCNM Grading Construction Noise Levels (dBA Leq)[3]	Calculated RCNM Noise Levels to Closest Observed Equipment (dBA Leq)[4]	Measured Typical Grading Construction Noise Levels at Receivers (dBA Leq)[5]	Calculated Project-Only Construction Noise Levels (dBA Leq)[6]	Difference Between Modeled & Measured Noise Levels (dBA Leq)[7]
R2	70.3	88.2	86.5	71.1	63.4	23.2
R3	68.3	83.1	80.9	69.1	61.4	19.6

[1] Receiver locations from the construction noise analysis which are closest to the Planning Area 1 construction activities.
[2] Ambient noise level measurements taken on 3/13/14 at the receiver locations during the Ontario industrial project noise study.
[3] Estimated construction noise levels based on the RCNM peak construction noise analysis methodology. These conditions are not likely to occur as the RCNM assumes all equipment is operating simultaneously at a single point at the project site boundary.
[4] Modeled RCNM construction noise levels at each receiver location based on the observed distance to the nearest construction equipment activity during the noise level measurements, shown on Table 3.
[5] Measured noise levels at the receiver locations during one hour of typical grading activities in the center of the construction site.
[6] Project only construction noise levels calculated based on the logarithmic noise level difference between the measured noise levels during grading activity and the ambient without project noise levels measured at each receiver location.
[7] Difference between the peak RCNM modeled noise levels and the typical noise levels measured at the receiver locations during typical grading activities.

Similarly, the Day 2 short-term construction noise level measurements are shown on Table 5 in relation to the RCNM modeled noise levels. Table 5 shows the project-only construction noise levels ranged from 64.1 to 65.3 dBA Leq, and are significantly lower than those modeled with the RCNM at the same receiver locations. Based on the Day 2 analysis, the differences between the peak RCNM model and typical measured construction noise levels range from 16.8 to 21.2 dBA Leq. This Day 2 analysis is consistent with the Day 1 typical grading construction noise level measurements taken a week later at the same receiver locations.

TABLE 5: DAY 2 CONSTRUCTION NOISE LEVEL COMPARISON

Original Noise Study			Calibration			
Receiver Location[1]	Measured Daytime Ambient Noise Levels (dBA Leq)[2]	Peak Modeled RCNM Grading Construction Noise Levels (dBA Leq)[3]	Calculated RCNM Noise Levels to Closest Observed Equipment (dBA Leq)[4]	Measured Typical Grading Construction Noise Levels at Receivers (dBA Leq)[5]	Calculated Project-Only Construction Noise Levels (dBA Leq)[6]	Difference Between Modeled & Measured Noise Levels (dBA Leq)[7]
R2	70.3	88.2	86.5	71.5	65.3	21.2
R3	68.3	83.1	80.9	69.7	64.1	16.8

[1] Receiver locations from the construction noise analysis which are closest to the Planning Area 1 construction activities.
[2] Ambient noise level measurements taken on 3/13/14 at the receiver locations during the Ontario industrial project noise study.
[3] Estimated construction noise levels based on the RCNM peak construction noise analysis methodology. These conditions are not likely to occur as the RCNM assumes all equipment is operating simultaneously at a single point at the project site boundary.
[4] Modeled RCNM construction noise levels at each receiver location based on the observed distance to the nearest construction equipment activity during the noise level measurements, shown on Table 3.
[5] Measured noise levels at the receiver locations during one hour of typical grading activities in the center of the construction site.
[6] Project only construction noise levels calculated based on the logarithmic noise level difference between the measured noise levels during grading activity and the ambient without project noise levels measured at each receiver location.
[7] Difference between the peak RCNM modeled noise levels and the typical noise levels measured at the receiver locations during typical grading activities.

CONCLUSIONS

The sample reference noise level measurements were taken by Urban Crossroads, Inc. in order to better describe the noise levels from various typical construction activities at different land use types. To quantify the difference between the modeled RCNM and measured construction noise levels in the field, Urban Crossroads, Inc. compared the modeled results of a RCNM construction noise level analysis with the actual measured noise levels observed in the field during typical grading activities at the same project site. While the RCNM equipment database and methodology provides conservative, worst-case, construction noise levels for specific pieces of equipment, our field measurements show how the RCNM methodology overstates the noise levels experienced at the nearby receiver locations during actual construction activities.

This analysis demonstrates how the RCNM overstates the potential construction noise level impacts by placing all equipment at a single point at the project site boundary. In reality based on our observations in the field, the grading equipment within the project site was observed to operate at different locations throughout the project site. In addition, the typical construction noise levels measured at the receiver locations reflect modern construction equipment noise level emissions that are largely overstated using the older RCNM reference noise levels. The reference noise level measurements presented in this memo are, therefore, representative of typical construction noise levels to accurately describe potential construction noise impacts at nearby receiver locations for a given project. This memo presents typical construction activity reference noise levels. Detailed site specific analysis is needed to assess potential

construction noise level impacts at nearby sensitive receiver locations on a project by project basis and to identify the appropriate mitigation measures as needed at future construction sites.

Prepared by:

URBAN CROSSROADS, INC.

Bill Lawson, P.E., INCE
Principal

Alex Wolfe
Assistant Analyst

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APPENDIX A

REFERENCE NOISE LEVEL MEASUREMENTS SUMMARY TABLE

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Appendix A

Construction Equipment Reference Noise Levels

ID	Reference Source	Type of Project (Land Use)	Typical Construction Stage(s)	Reference Measurement Duration (h:mm:ss)	Reference Distance From Source (Feet)	Reference Noise Levels		Reference Noise Levels @ 50 Feet	
						dBA Leq	dBA Lmax	dBA Leq	dBA Lmax
1	Truck Pass-Bys & Dozer Activity	Business Park	Grading	0:01:15	30'	63.6	68.1	59.2	63.7
2	Dozer Activity	Business Park	Grading	0:01:00	30'	68.6	76.4	64.2	72.0
3	Construction Vehicle Maintenance Activities	Residential	Grading	0:01:00	30'	71.9	74.8	67.5	70.4
4	Foundation Trenching	Residential	Trenching, Building Const.	0:01:01	30'	72.6	74.9	68.2	70.5
5	Rough Grading Activities	Residential	Grading	0:05:00	30'	77.9	84.8	73.5	80.4
6	Residential Framing	Residential	Building Const.	0:02:00	30'	66.7	76.7	62.3	72.3
7	Water Truck Pass-By & Backup Alarm	Industrial	Grading	0:00:45	30'	76.3	82.3	71.9	77.9
8	Dozer Pass-By	Industrial	Grading	0:00:32	30'	84.0	89.9	79.6	85.5
9	Two Scrapers & Water Truck Pass-By	Industrial	Grading	0:00:32	30'	83.4	89.0	79.0	84.6
10	Two Scrapers Pass-By	Industrial	Grading	0:00:30	30'	83.7	86.9	79.3	82.5
11	Scraper, Water Truck, & Dozer Activity	Industrial	Grading	0:30:00	30'	79.7	87.7	75.3	83.3
12	Concrete Mixer Truck Movements	Industrial	Building Const., Paving	0:01:00	50'	71.2	*73.1*	71.2	73.1
13	Concrete Paver Activities	Industrial	Building Const., Paving	0:01:00	30'	70.0	*75.7*	65.6	71.3
14	Concrete Mixer Pour & Paving Activities	Industrial	Building Const., Paving	0:01:00	30'	70.3	*76.3*	65.9	71.9
15	Concrete Mixer Backup Alarms & Air Brakes	Industrial	Building Const., Paving	0:00:20	50'	71.6	*78.8*	71.6	78.8
16	Concrete Mixer Pour Activities	Industrial	Building Const., Paving	1:00:00	50'	67.7	79.2	67.7	79.2

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APPENDIX B

REFERENCE NOISE SOURCE PHOTOS

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Construction Reference Noise Source Photos

1.1_TruckPass-By&DozerActivity
33, 39' 0.101600", 117, 43' 56.773600"

2.1_DozerActivity
33, 39' 0.101600", 117, 43' 56.773600"

3.1_ConstructionVehicleMaintenance
33, 31' 16.600000", 117, 36' 58.060000"

4.1_FoundationTrenching
33, 32' 8.530000", 117, 35' 55.490000"

4.2_FoundationTrenching
33, 32' 8.540000", 117, 35' 55.710000"

5.1_RoughGradingActivities
33, 31' 16.710000", 117, 37' 0.530000"

Construction Reference Noise Source Photos

5.2_RoughGradingActivities
33, 31' 16.600000", 117, 37' 0.450000"

5.3_RoughGradingActivities
33, 31' 16.570000", 117, 37' 0.450000"

5.4_RoughGradingActivities
33, 31' 16.660000", 117, 37' 0.310000"

6.1_ResidentialFraming
33, 32' 15.610000", 117, 36' 2.740000"

7.1_WaterTruckPassBy&BackupAlarm
34, 4' 19.318500", 117, 36' 25.015800"

8.1_DozerPass-By
34, 4' 19.373400", 117, 36' 24.988400"

Construction Reference Noise Source Photos

9.1_TwoScrapers&WaterTruckPass-By
34, 4' 19.332200", 117, 36' 24.988400"

10.1_TwoScrapersPass-By
34, 4' 19.373400", 117, 36' 25.070800"

10.2_TwoScrapersPass-By
34, 4' 19.373400", 117, 36' 25.070800"

11.1_Scraper,WaterTruck,&DozerActivity
34, 4' 19.373400", 117, 36' 25.070800"

11.2_Scraper,WaterTruck,&DozerActivity
34, 4' 19.318500", 117, 36' 25.125700"

11.3_Scraper,WaterTruck,&DozerActivity
34, 4' 19.346000", 117, 36' 25.043300"

Construction Reference Noise Source Photos

11.4_Scraper,WaterTruck,&DozerActivity
34, 4' 19.291000", 117, 36' 25.070800"

12.1_ConcreteMixerTruckMovements
34, 4' 43.200000", 117, 12' 25.779400"

13.1_ConcretePaverActivities
34, 4' 43.625700", 117, 12' 25.312500"

14.1_ConcreteMixerPour&PavingActivities
34, 4' 42.746800", 117, 12' 24.955400"

15.1_ConcreteMixerBackupAlarms&AirBrakes
34, 4' 43.666900", 117, 12' 24.763100"

16.1_ConcreteMixerPourActivities
34, 4' 43.158800", 117, 12' 25.944200"

APPENDIX C

SHORT-TERM MEASUREMENTS & CONSTRUCTION ACTIVITY PHOTOS

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ConstructionSite_1
34, 4' 39.808000", 117, 36' 22.955900"

ConstructionSite_2
34, 4' 39.808000", 117, 36' 22.955900"

ConstructionSite_3
34, 4' 39.533300", 117, 36' 23.312900"

ConstructionSite_4
34, 4' 39.533300", 117, 36' 23.312900"

ConstructionSite_5
34, 4' 39.341100", 117, 36' 28.064500"

ConstructionSite_6
34, 4' 39.684400", 117, 36' 23.477700"

ConstructionSite_7
34, 4' 39.684400", 117, 36' 23.477700"

R2
34, 4' 39.341100", 117, 36' 28.064500"

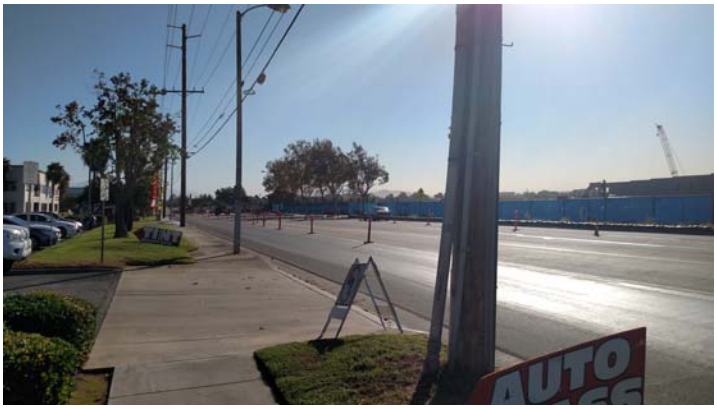
R2_South
34, 4' 39.217500", 117, 36' 29.108200"

R2_Southwest
34, 4' 39.217500", 117, 36' 29.108200"

R2_Southwest2
34, 4' 39.505900", 117, 36' 28.970900"

R2_West
34, 4' 39.217500", 117, 36' 29.108200"

R3
34, 4' 39.972800", 117, 36' 16.803500"



R3_E
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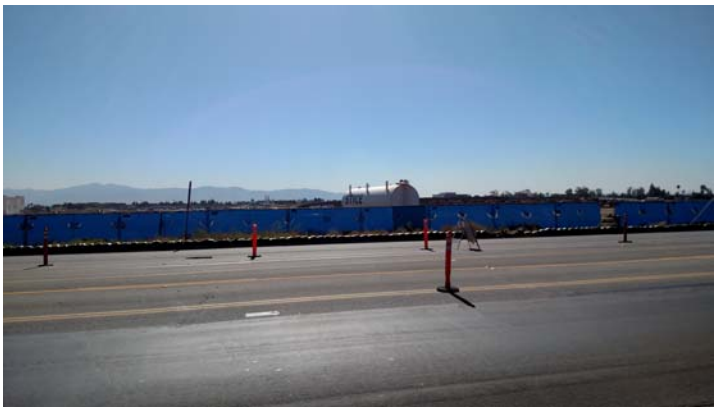
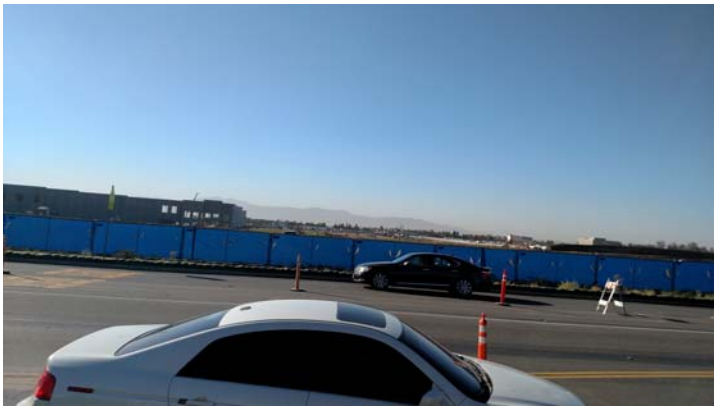
R3_South
34, 4' 39.972800", 117, 36' 16.803500"



R3_South2
34, 4' 39.519600", 117, 36' 17.050700"



R3_South3
34, 4' 39.698100", 117, 36' 14.221800"

R3_Southeast
34, 4' 39.698100", 117, 36' 14.221800"

R3_Southwest
34, 4' 39.972800", 117, 36' 16.803500"