APPENDIX J: NOISE REPORT

Waterman Avenue High Cube Warehouse

NOISE IMPACT ANALYSIS

CITY OF SAN BERNARDINO

PREPARED BY:

Bill Lawson, PE, INCE
blawson@urbanxroads.com
(949) 660-1994 x203

Alex Wolfe
awolfe@urbanxroads.com
(949) 660-1994 x209

OCTOBER 17, 2014

TABLE OF CONTENTS

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

1 INTRODUCTION **1**
1.1 Site Location 1
1.2 Project Description 1
1.3 Study Area 4
2 FUNDAMENTALS **5**
2.1 Range of Noise 5
2.2 Noise Descriptors 6
2.3 Sound Propagation 6
2.4 Traffic Noise Prediction 7
2.5 Noise Control 8
2.6 Noise Barrier Attenuation 8
2.7 Land Use Compatibility With Noise 8
2.8 Community Response to Noise 8
2.9 Vibration 9
3 REGULATORY SETTING **11**
3.1 State of California Noise Requirements 11
3.2 State of California Green Building Standards Code 11
3.3 City of San Bernardino General Plan Noise Element 11
3.4 City of San Bernardino Municipal Code Standards 14
3.5 Vibration Standards 15
4 SIGNIFICANCE CRITERIA **17**
5 EXISTING NOISE LEVEL MEASUREMENTS **19**
5.1 Measurement Procedure and Criteria 19
5.2 Noise Measurement Locations 19
5.3 Noise Measurement Results 21
6 METHODS AND PROCEDURES **25**
6.1 FHWA Traffic Noise Prediction Model 25
6.2 Off-Site Traffic Noise Prediction Model Inputs 25
6.3 Vibration Assessment 30
7 OFF-SITE TRANSPORTATION NOISE IMPACTS **31**
7.1 Traffic Noise Contours 31
7.2 Existing Project Traffic Noise Level Contributions 37
7.3 Year 2015 Project Traffic Noise Level Contributions 37
7.4 Year 2035 Project Traffic Noise Level Contributions 37
7.5 Cumulative Project Traffic Noise Impacts 38
8 NOISE-SENSITIVE RECEIVERS **41**

9 OPERATIONAL IMPACTS 43
9.1 Operational Noise Standards 43
9.2 Operational Noise Sources 43
9.3 Reference Noise Levels 43
9.4 Project Operational Noise Levels 46
9.5 Operational Noise Impacts 46
9.6 Operational Noise Abatement Measures 50
9.7 Operational Vibration Impacts 50
10 CONSTRUCTION IMPACTS 51
10.1 Construction Noise Standards 51
10.2 Construction Noise Levels 51
10.3 Construction Noise Analysis 52
10.4 Construction Noise Thresholds of Significance 60
10.5 Construction Noise Abatement Measures 60
10.6 Construction Vibration Impacts 61
11 REFERENCES 63
12 CERTIFICATION 65

APPENDICES

APPENDIX 3.1: CITY OF SAN BERNARDINO NOISE ELEMENT
APPENDIX 3.2: CITY OF SAN BERNARDINO MUNICIPAL CODE
APPENDIX 5.1: STUDY AREA PHOTOS
APPENDIX 5.2: NOISE LEVEL MEASUREMENT WORKSHEETS
APPENDIX 7.1: TRAFFIC NOISE CONTOURS
APPENDIX 9.1: REFERENCE NOISE SOURCE PHOTOS
APPENDIX 9.2: STATIONARY SOURCE OPERATIONAL NOISE CALCULATIONS
APPENDIX 10.1: RCNM EQUIPMENT DATABASE
APPENDIX 10.2: CONSTRUCTION NOISE LEVEL CALCULATIONS

LIST OF EXHIBITS

EXHIBIT 1-A: LOCATION MAP 2
EXHIBIT 1-B: SITE PLAN 3
EXHIBIT 1-C: EXISTING LAND USES 4
EXHIBIT 2-A: TYPICAL NOISE LEVELS 5
EXHIBIT 2-B: TYPICAL LEVELS OF GROUND-BORNE VIBRATION 10
EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE EXPOSURE 13
EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS 20
EXHIBIT 8-A: NOISE RECEIVER LOCATIONS 42
EXHIBIT 9-A: OPERATIONAL NOISE SOURCE LOCATIONS 45
EXHIBIT 10-A: CONSTRUCTION NOISE SOURCE LOCATION 53

LIST OF TABLES

TABLE 4-1: SIGNIFICANCE OF NOISE IMPACTS 18
TABLE 5-1: LONG-TERM AMBIENT NOISE LEVEL MEASUREMENTS 22
TABLE 6-1: OFF-SITE ROADWAY PARAMETERS 26
TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES 26
TABLE 6-3: EXISTING TIME OF DAY VEHICLE SPLITS 27
TABLE 6-4: EXISTING CONDITIONS TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX) 28
TABLE 6-5: YEAR 2015 CONDITIONS TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX) 28
TABLE 6-6: YEAR 2035 CONDITIONS TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX) 29
TABLE 6-7: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT 30
TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS 32
TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS 32
TABLE 7-3: YEAR 2015 WITHOUT PROJECT CONDITIONS NOISE CONTOURS 33
TABLE 7-4: YEAR 2015 WITH PROJECT CONDITIONS NOISE CONTOURS 33
TABLE 7-5: YEAR 2035 WITHOUT PROJECT CONDITIONS NOISE CONTOURS 34
TABLE 7-6: YEAR 2035 WITH PROJECT CONDITIONS NOISE CONTOURS 34
TABLE 7-7: EXISTING OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS 35
TABLE 7-8: YEAR 2015 OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS 35
TABLE 7-9: YEAR 2035 OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS 36
TABLE 7-10: YEAR 2035 OFF-SITE CUMULATIVE TRAFFIC NOISE INCREASE 39
TABLE 9-1: OPERATIONAL NOISE LEVEL PROJECTIONS (DBA LEQ) 47
TABLE 9-2: OPERATIONAL NOISE LEVEL COMPLIANCE (DBA LEQ) 47
TABLE 9-3: DAYTIME (7:00 A.M. TO 10:00 P.M.) OPERATIONAL NOISE LEVEL IMPACTS (DBA LEQ) 49
TABLE 9-4: NIGHTTIME (10:00 P.M. TO 7:00 A.M.) OPERATIONAL NOISE LEVEL IMPACTS (DBA LEQ) 49
TABLE 10-1: DEMOLITION CONSTRUCTION NOISE LEVELS 54
TABLE 10-2: SITE PREPARATION CONSTRUCTION NOISE LEVELS 55
TABLE 10-3: GRADING CONSTRUCTION NOISE LEVELS 56
TABLE 10-4: BUILDING CONSTRUCTION NOISE LEVELS 57
TABLE 10-5: ARCHITECTURAL COATINGS CONSTRUCTION NOISE LEVELS 58
TABLE 10-6: PAVING CONSTRUCTION NOISE LEVELS 59
TABLE 10-7: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY 60
TABLE 10-9: CONSTRUCTION EQUIPMENT VIBRATION LEVELS 62

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
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
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
mph	Miles per hour
Project	Waterman Avenue High Cube Warehouse
RCNM	Roadway Construction Noise Model
REMEL	Reference Energy Mean Emission Level
VdB	Vibration Decibels

1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Waterman Avenue High Cube Warehouse ("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 operational noise impacts and short-term construction noise impacts.

1.1 SITE LOCATION

The proposed Waterman Avenue High Cube Warehouse Project is located on the east side of Waterman Avenue, north of E. Mill Street and south of E. Rialto Avenue, in the City of San Bernardino as shown on Exhibit 1-A.

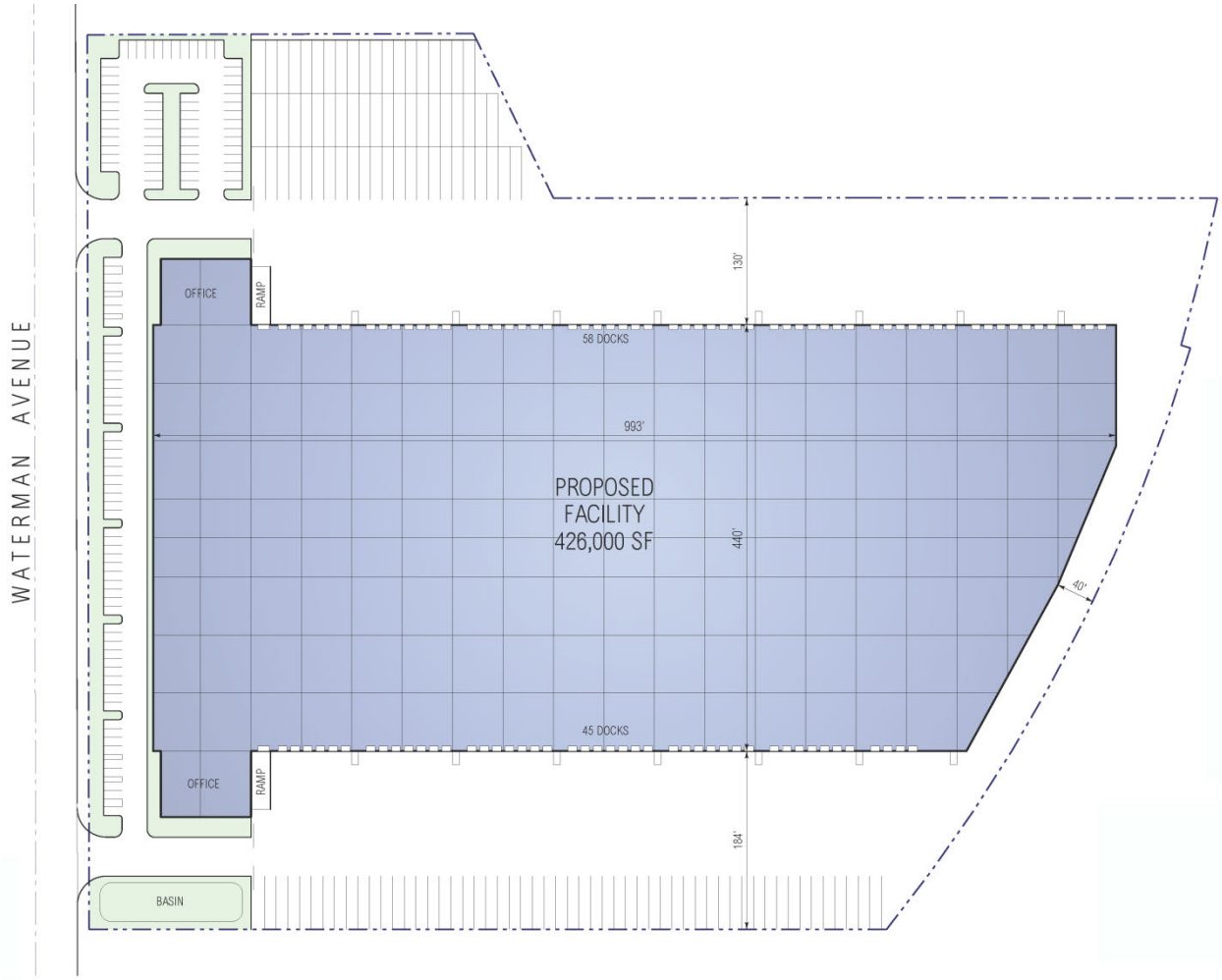
1.2 PROJECT DESCRIPTION

The proposed Project is anticipated to consist of the development of a high-cube warehouse/distribution use within a single building of approximately 426,000 square feet (sf), as shown on Exhibit 1-B. According the *Waterman Avenue High Cube Warehouse Traffic Impact Analysis* prepared by Urban Crossroads, Inc.(1), the Project is expected to generate a net total of approximately 722 trip-ends per day (actual vehicles) with 47 AM peak hour trips and 52 PM peak hour trips. The net Project trip generation includes 148 truck trip-ends per day with 10 AM peak hour truck trips and 11 PM peak hour truck trips. The warehouse structure within the Project site will include 103 roll-up dock high doors on the north and south sides of the building and ramps. Office locations are planned for the northwest and southwest corners of the building near the Waterman Avenue frontage. Parking is provided on site with 117 automobile parking stalls located along the western portion of the site adjacent to Waterman Avenue. Additional automobile parking stalls could be located within the truck court area. 117 truck and trailer parking stalls are proposed along the northerly and southerly portions of the Project site.

At the time this noise analysis was prepared, the future tenants of the proposed Project were unknown. For the purposes of this analysis, the targeted types of tenants for occupancy of the facility would include fulfillment center tenants, warehousing, retail distribution, bulk storage and distribution, logistics, value add assembly, light manufacturing or similar uses. The Project site is currently designated as Office/Industrial Park (OIP) and Multi-family Residential (MFR) in the City's Zoning Code and Industrial and Residential in the City's General Plan. 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 This analysis does not account for any special noise generators that may consist of HVAC equipment, outdoor compressors, air scrubbers, heavy materials handlings, emergency generators, etc. This noise analysis is intended to describe noise level impacts associated with the expected typical warehouse and distribution storage activities at the Project site.

EXHIBIT 1-A: LOCATION MAP

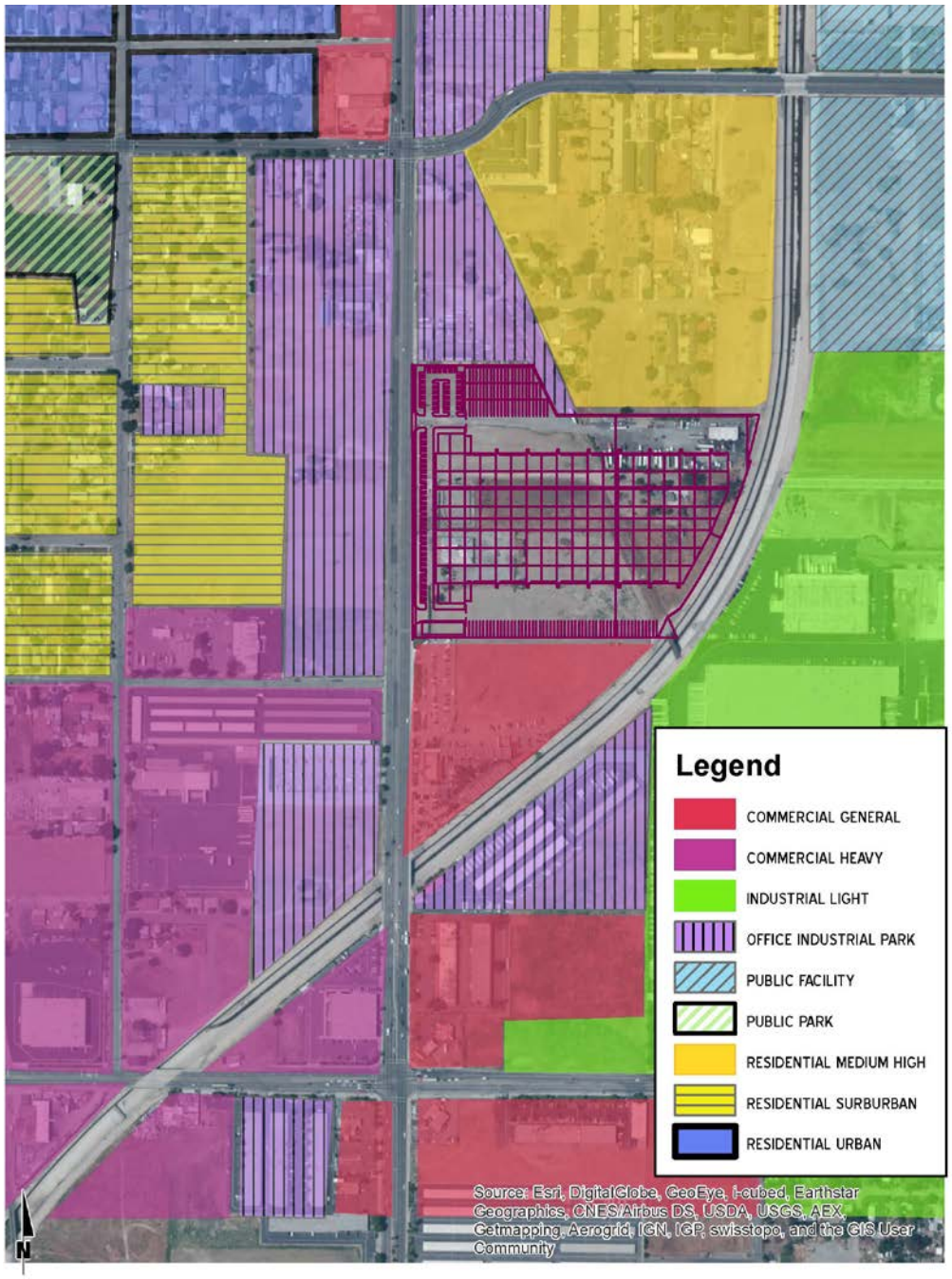
EXHIBIT 1-B: SITE PLAN



1.3 STUDY AREA

The Project site is located within an area developed with residential, office industrial park, commercial general, and other land uses. Existing surrounding land uses are graphically presented on Exhibit 1-C.

EXHIBIT 1-C: EXISTING LAND USES



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 sources 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.(2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA at approximately 100 feet, which can cause serious discomfort.(3) Another

important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most 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.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than the 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 San Bernardino 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.(4) 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. (4)

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. (5)

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. (6) 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. (6)

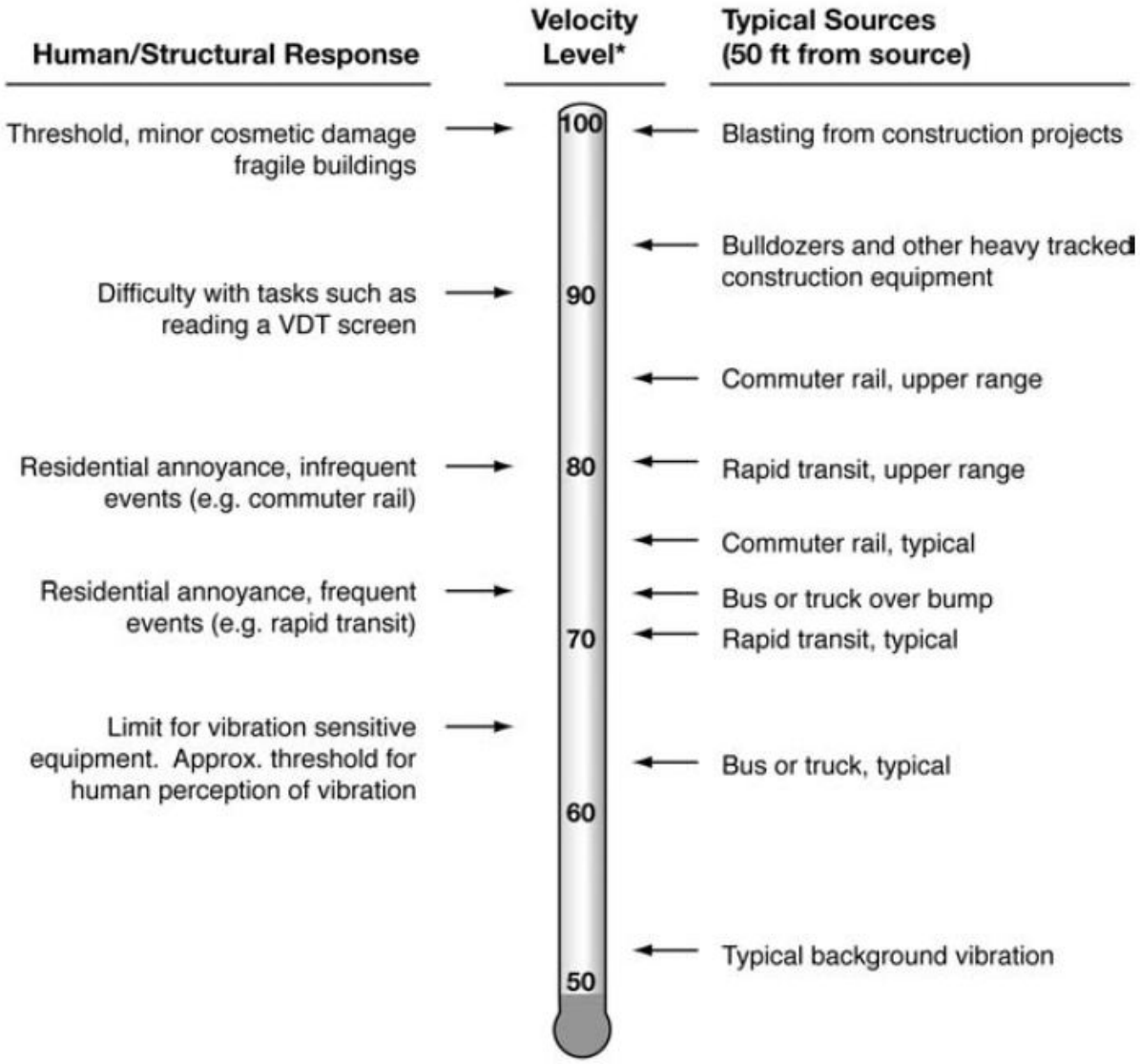
Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

2.9 VIBRATION

According to the Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment (7), 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. Vibration is often described in units of velocity (inches per second), and discussed in decibel (dB) units in order to compress the range of numbers required to describe vibration. Vibration impacts are generally associated with activities such as train operations, construction and heavy truck movements.

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-B illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-B: 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, May 2006.

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. (8) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA GREEN BUILDING STANDARDS CODE

The State of California's Green Building Standards Code contains mandatory measures for non-residential building construction in Section 5.506 on Environmental Comfort. (9) 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 CITY OF SAN BERNARDINO GENERAL PLAN NOISE ELEMENT

The City of San Bernardino General Plan Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community.(10) The General Plan Noise Element goals and policies are focused on land use planning and design, transportation related noise sources, and non-transportation related noise sources.

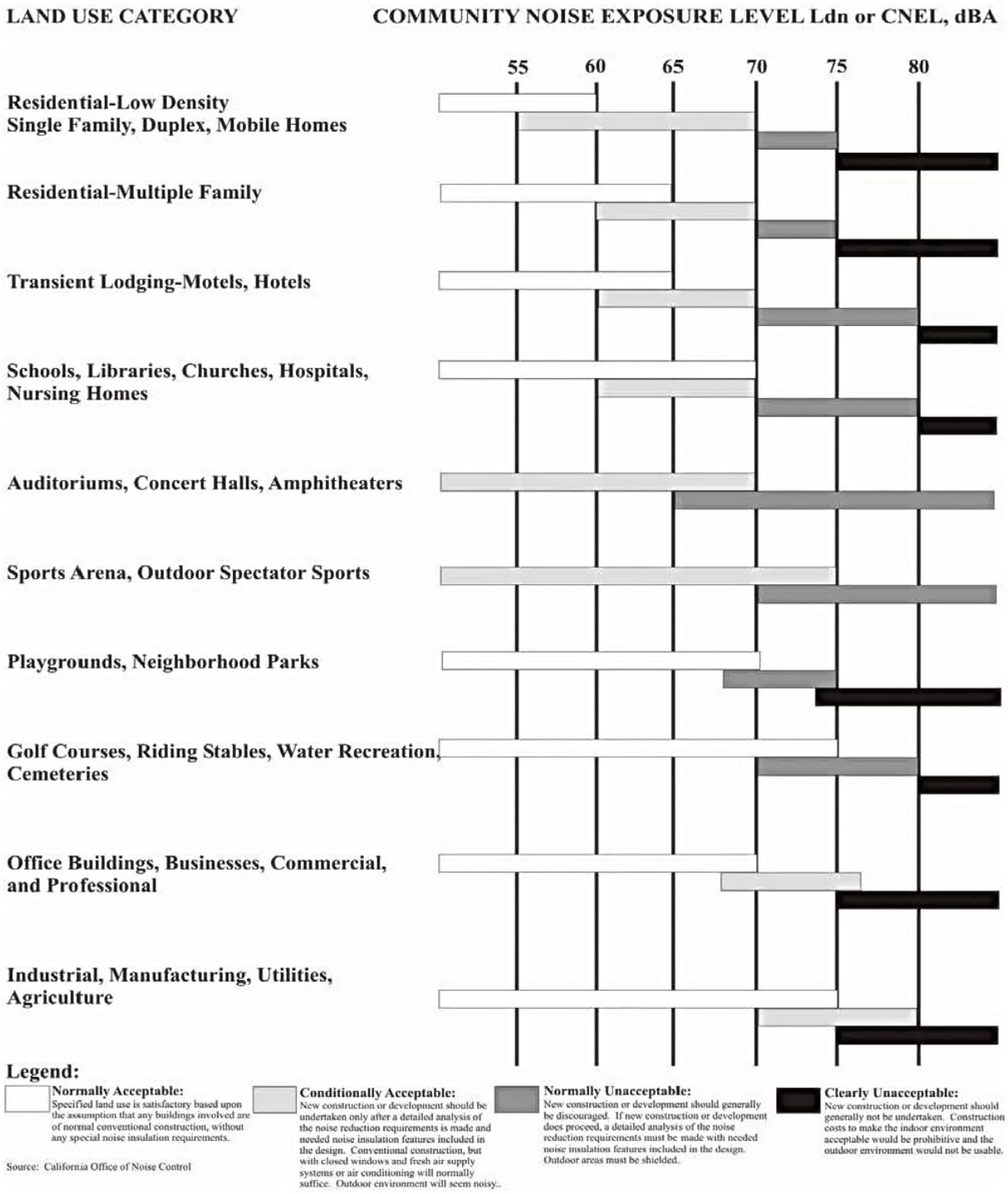
3.3.1 LAND USE COMPATIBILITY

To ensure that residents are protected from excessive noise through careful land planning (Goal 14.1), the City of San Bernardino General Plan Noise Element provides guidelines to evaluate the *Land Use Compatibility for Community Noise Exposure* (Figure N-1). These guidelines are based on the Governor's Office of Planning and Research (8) and are used to assess the compatibility of community noise exposure by land use category. According to the *Land Use Compatibility for Community Noise Exposure* guidelines, noise sensitive land uses such as single-family residences are considered *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 70 dBA CNEL. For office and commercial land uses, exterior noise levels below 70 dBA CNEL are considered *normally acceptable* and noise levels of less than 75 are considered *conditionally acceptable*. Industrial, and manufacturing land uses are considered *normally acceptable* with noise levels below 75 dBA CNEL and conditionally acceptable with noise levels of less than 80 dBA CNEL. The City of San Bernardino General Plan Noise Element is included in Appendix 3.1.

3.3.2 TRANSPORTATION NOISE STANDARDS

To encourage the reduction of noise from transportation related noise sources such as motor vehicles, aircraft operations and railroad movements (Goal 14.2), Table N-3 of the City of San Bernardino General Plan Noise Element identifies a maximum allowable exterior noise level of 65 dBA CNEL and an interior noise level limit of 45 dBA CNEL for new residential developments. While the City specifically identifies an exterior noise level limit for noise sensitive residential land uses such as hotels, hospitals, schools and parks, the City of San Bernardino does not maintain exterior noise standards for non-noise sensitive land uses such as office, retail, manufacturing, utilities, agriculture, and industrial.

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



3.4 CITY OF SAN BERNARDINO MUNICIPAL CODE STANDARDS

While the City of San Bernardino maintains several policies in the Municipal Code Noise Ordinance to control the negative effects of nuisance noise, it does not identify specific exterior noise level limits. However, the policies in the Municipal Code Development Code, Chapter 19.20, *Property Development Standards* contains the exterior and interior noise level standards for residential land uses. Therefore, the stationary source noise such as idling trucks, delivery truck activities, parking, backup alarms and the refrigerated containers or reefers originating from a designated fixed location or private property such as the Waterman Avenue High Cube Warehouse site, are evaluated against the policies adopted in the City's Development Code.(11)

3.4.1 OPERATIONAL NOISE STANDARDS

The Project operational noise impacts are governed by the City of San Bernardino Municipal Code, Section 8.54, included in Appendix 3.2. Section 8.54.060 states when: *such noises are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose*…these activities shall be exempt (Section 8.54.060(B)).(12) However, due to the Project's close proximity to residential land uses, located north of the Project site boundary, Development Code, Section 19.20.030.15(A), limits the operational stationary-source noise from the Waterman Avenue High Cube Warehouse to an exterior noise level of 65 dBA for residential land use.(11) The City of San Bernardino Municipal Code and Development Code noise standards are included in Appendix 3.2.

3.4.2 CONSTRUCTION NOISE STANDARDS

The City of San Bernardino has set restrictions to control noise impacts associated with the construction of the proposed project. Section 8.54.070 of the City's Noise Control Ordinance states: *No person shall be engaged or employed, or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and 8:00 p.m.*(12) While the City establishes limits to the hours during which construction activity may take place, it does not identify specific noise level limits for construction noise levels. In effect, if Project construction only occurs during the permitted hours of the Noise Control Ordinance, then the construction noise levels are considered exempt from the provisions of the ordinance.

3.5 VIBRATION STANDARDS

The City of San Bernardino has not identified specific vibration standards. To assess vibration impacts from the Project site, this analysis uses the United States Department of Transportation Federal Transit Administration (FTA) provided guidelines (7) 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.

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. Occasionally large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity. The FTA guidelines of 80 VdB for sensitive land uses provide the basis for determining the relative significance of potential Project related vibration impacts.

This page intentionally left blank

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. For the purposes of this report, impacts would be potentially significant if the Project is determined to result in or cause:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.

While the CEQA Guidelines and the City of San Bernardino General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts under the first threshold, they do not define the levels at which increases are considered substantial for use under the second, third and fourth threshold. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels and the location of noise-sensitive receptors in order to determine if a noise increase represents a significant adverse environmental impact.

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged. With this in mind, the Federal Interagency Committee on Noise (FICON) (13) developed guidance to be used for the assessment of project-generated increases in noise levels that take into account the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (i.e., CNEL).

For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur even though the noise criteria might not be exceeded. Therefore, for the purpose of this analysis, a *readily perceptible* 5 dBA or greater project related noise level increase is considered a significant impact when nearby noise-sensitive receivers are affected. According to the FICON, in areas where the without project

noise levels range from 60 to 65 dBA a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if noise-sensitive receivers are affected, since it likely contributes to an existing noise deficiency. Table 4.1 below provides a summary of the potential noise impact significance criteria.

TABLE 4-1: SIGNIFICANCE OF NOISE IMPACTS

Without Project Noise Level (CNEL)	Potential Significant Impact
< 60 dBA	5 dBA or more
60 - 65 dBA	3 dBA or more
> 65 dBA	1.5 dBA or more

Federal Interagency Committee on Noise (FICON), 1992

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development:

- If the off-site traffic noise impacts at nearby noise-sensitive receivers adjacent to roadways conveying Project traffic
    - are less than 60 dBA and the project creates a *readily perceptible* 5 dBA or greater project related noise level increase, or:
    - range from 60 to 65 dBA and the project creates a *barely perceptible* 3 dBA or greater project noise level increase, or;
    - already exceed 65 dBA, and the project creates a community noise level impact of greater than 1.5 dBA.
- If Project-related operational (stationary-source) noise levels exceed 65 dBA Leq at the adjacent residential land uses at any time (City of San Bernardino Development Code, Section 19.20.030.15(A)).
- If Project-related construction activities occur anytime other than between the permitted hours of 7:00 a.m. and 8:00 p.m. (City of San Bernardino Municipal Code, Section 8.54.070).
- If short-term Project generated construction source vibration levels could exceed the FTA maximum acceptable vibration standard of 80 vibration decibels (VdB) at noise sensitive receiver locations.

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, five long-term noise level measurements were taken at noise-sensitive receiver locations in the Project study area. The noise receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. The noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, August 6th, 2014. 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 meets American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-1983 (R2006)/ANSI S1.4a-1985 (R2006).(14)

5.2 NOISE MEASUREMENT LOCATIONS

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 the potential cumulative noise impacts.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

LEGEND:

▲ Noise Measurement Locations

5.3 NOISE MEASUREMENT RESULTS

To describe the existing ambient noise environment, 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 average hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Located approximately 1,000 feet southwest of the Project site, location L1 represents the off-site noise levels at nearby noise-sensitive residential dwellings located on Allen Street south of Valley Street. Based on the noise level measurements, the existing daytime hourly ambient noise levels ranged from 59.0 to 65.3 dBA Leq resulting in an energy (logarithmic) average daytime noise level of 61.2 dBA Leq. During the nighttime hours, the measured ambient noise levels ranged from 51.3 to 62.5 dBA Leq producing an energy (logarithmic) average nighttime noise level of 58.2 dBA Leq. A review of the 24-hour Community Noise Equivalent Level (CNEL) indicates that the overall unmitigated exterior noise level is 65.5 dBA CNEL.
- Location L2 represents the single-family residential dwellings located roughly 946 feet west of the Project site along Allen Street. The noise level measurements show an overall 24-hour unmitigated exterior noise level of 58.5 dBA CNEL. The hourly noise levels measured at Location L2 ranged from 51.9 to 56.4 dBA Leq during the daytime hours and from 46.6 to 54.6 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 54.8 dBA Leq with an average nighttime noise level of 50.7 dBA Leq.
- Location L3 represents the unmitigated ambient noise levels at the vacant lot across Waterman Avenue approximately 105 feet west of the Project site, south of an existing residential dwelling. According the noise measurement results, the overall unmitigated 24-hour CNEL was calculated at 72.5 dBA based on the hourly noise levels. A review of the hourly noise levels show that the existing daytime hourly ambient noise levels ranged from 64.9 to 70.2 dBA Leq resulting in an energy (logarithmic) average daytime noise level of 66.7 dBA Leq. During the nighttime hours, the measured ambient noise levels ranged from 61.8 to 70.4 dBA Leq producing an energy (logarithmic) average nighttime noise level of 65.6 dBA Leq.
- Location L4 represents the existing ambient noise levels 320 feet north of the Project site in a vacant lot near existing noise-sensitive residential dwellings along San Felipe Road. At this location, the unmitigated 24-hour Land Use Compatibility noise level was calculated based on the hourly noise levels at 61.9 dBA CNEL. The existing daytime hourly noise levels were measured at 46.4 to 56.0 dBA Leq with the nighttime hours ranging from 47.9 to 59.4 dBA Leq. The energy (logarithmic) average daytime noise level was calculated at 52.9 dBA Leq with an average nighttime noise level of 55.6 dBA Leq.

- Located approximately 435 feet northwest of the Project site, location L5 represents the off-site noise levels adjacent to Dominguez Elementary School, east of Waterman Avenue. Based on the noise level measurements, the existing daytime hourly ambient noise levels ranged from 50.8 to 57.5 dBA Leq resulting in an energy (logarithmic) average daytime noise level of 53.9 dBA Leq. During the nighttime hours, the measured ambient noise levels ranged from 44.5 to 58.2 dBA Leq producing an energy (logarithmic) average nighttime noise level of 52.1 dBA Leq. A review of the 24-hour Community Noise Equivalent Level (CNEL) indicates that the overall unmitigated exterior noise level is 59.0 dBA CNEL.

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 hourly noise levels for each hour as well as the minimum and maximum noise level observed during the daytime and nighttime period.

TABLE 5-1: LONG-TERM AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Date	Description	Hourly Noise Level (Leq dBA)[2]		CNEL
			Daytime (7am to 10pm)	Nighttime (10pm to 7am)	
L1	8/6/2014	Located on Allen Street south of Valley Street near existing residential dwellings.	61.2	58.2	65.5
L2	8/6/2014	Located west of the Project site on Allen Street in a vacant lot near existing residential dwellings.	54.8	50.7	58.5
L3	8/6/2014	Located across Waterman Avenue from the western Project site boundary in a vacant lot south of an existing residential dwelling.	66.7	65.6	72.5
L4	8/6/2014	Located north of the Project site on San Felipe Road in a vacant lot adjacent to existing residential dwellings.	52.9	55.6	61.9
L5	8/6/2014	Located northwest of the Project site adjacent to Dominguez Elementary School.	53.9	52.1	59.0

[1] See Exhibit 5-A for the location of the noise level measurement locations.
[2] Energy (logarithmic) average hourly levels. The long-term measurements printouts are included in Appendix 5.2.

The background ambient noise levels in the Project study area are dominated by the transportation related noise associated with the arterial roadway network. This includes the auto and heavy truck activities near the noise level measurement locations. Secondary background ambient noise is also included in the noise level measurements, however, these impacts are generally overshadowed by the nearby vehicular traffic noise levels. The long-term noise level measurements shown on Table 5-1 present the worst-case existing unmitigated ambient noise conditions.

This page intentionally left blank

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.(15) 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.(16) 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 seven study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications according to the City of San Bernardino General Plan Circulation Element, and the 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.

The Existing, Year 2015 and Year 2035 average daily traffic volumes used for this study are presented on Table 6-2 and were provided by the *Waterman Avenue High Cube Warehouse Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (1) Table 6-3 provides the time of day (daytime, evening and nighttime) vehicle splits.

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. According to the *Waterman Avenue High Cube Warehouse Traffic Impact Analysis* prepared by Urban Crossroads, Inc.,(1) the Project will generate approximately 148 daily truck trips. These trucks were assigned to the seven 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. Tables 6-4 to 6-6 describe the distribution of traffic flow by vehicle type (vehicle mix) by roadway segment for each of the off-site Project traffic conditions.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Land Use[1]	Distance from Centerline to Nearest Adjacent Land Use (Feet)[2]	Vehicle Speed (MPH)
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	50'	45
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	50'	45
3	Waterman Av.	s/o Driveway 2	Commercial General	50'	45
4	Waterman Av.	n/o Mill St.	Commercial General	50'	45
5	Waterman Av.	s/o Mill St.	Commercial General	50'	45
6	Mill St.	w/o Waterman Av.	Commercial General	50'	35
7	Mill St.	e/o Waterman Av.	Commercial General	50'	40

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.
[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 Element.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic[1]					
			Existing		Year 2015		Year 2035	
			No Project	With Project	No Project	With Project	No Project	With Project
1	Waterman Av.	n/o Driveway 1	22,100	22,405	23,300	23,605	25,000	25,305
2	Waterman Av.	n/o Driveway 2	22,100	22,649	23,300	23,849	25,000	25,549
3	Waterman Av.	s/o Driveway 2	22,100	22,795	23,300	23,995	26,000	26,695
4	Waterman Av.	n/o Mill St.	22,000	22,695	23,100	23,795	26,000	26,695
5	Waterman Av.	s/o Mill St.	22,600	22,840	23,800	24,040	26,700	26,940
6	Mill St.	w/o Waterman Av.	16,500	16,855	17,500	17,855	29,000	29,355
7	Mill St.	e/o Waterman Av.	15,300	15,400	16,100	16,200	21,600	21,700

[1] Source: Waterman Avenue High Cube Warehouse Traffic Impact Analysis, Urban Crossroads, Inc., September 2014.

TABLE 6-3: EXISTING TIME OF DAY VEHICLE SPLITS

Time Period	Vehicle Type		
	Autos	**Medium Trucks**	**Heavy Trucks**
Daytime (7am-7pm)	78.61%	84.78%	67.15%
Evening (7pm-10pm)	7.34%	4.18%	9.13%
Nighttime (10pm-7am)	14.05%	11.04%	23.72%
Total:	100.0%	100.0%	100.0%

Source: 24-hour vehicle mix count taken at Mill Street west of Waterman Avenue by Urban Crossroads, Inc. on August 19, 2014.

TABLE 6-4: EXISTING CONDITIONS TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

ID	Roadway	Segment	No Project				With Project			
			Autos	Medium Trucks	Heavy Trucks	Total	Autos	Medium Trucks	Heavy Trucks	Total
1	Waterman Av.	n/o Driveway 1	90.02%	4.26%	5.71%	100.00%	90.14%	4.21%	5.65%	100.00%
2	Waterman Av.	n/o Driveway 2	90.02%	4.26%	5.71%	100.00%	90.05%	4.20%	5.76%	100.00%
3	Waterman Av.	s/o Driveway 2	90.02%	4.26%	5.71%	100.00%	89.91%	4.20%	5.89%	100.00%
4	Waterman Av.	n/o Mill St.	90.02%	4.26%	5.71%	100.00%	89.91%	4.20%	5.89%	100.00%
5	Waterman Av.	s/o Mill St.	90.02%	4.26%	5.71%	100.00%	89.95%	4.25%	5.80%	100.00%
6	Mill St.	w/o Waterman Av.	90.02%	4.26%	5.71%	100.00%	89.91%	4.23%	5.87%	100.00%
7	Mill St.	e/o Waterman Av.	90.02%	4.26%	5.71%	100.00%	90.09%	4.24%	5.68%	100.00%

Source: Waterman Avenue High Cube Warehouse Traffic Impact Analysis, Urban Crossroads, Inc., September 2014.

TABLE 6-5: YEAR 2015 CONDITIONS TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

ID	Roadway	Segment	No Project				With Project			
			Autos	Medium Trucks	Heavy Trucks	Total	Autos	Medium Trucks	Heavy Trucks	Total
1	Waterman Av.	n/o Driveway 1	90.02%	4.26%	5.71%	100.00%	90.13%	4.21%	5.66%	100.00%
2	Waterman Av.	n/o Driveway 2	90.02%	4.26%	5.71%	100.00%	90.05%	4.20%	5.75%	100.00%
3	Waterman Av.	s/o Driveway 2	90.02%	4.26%	5.71%	100.00%	89.92%	4.21%	5.88%	100.00%
4	Waterman Av.	n/o Mill St.	90.02%	4.26%	5.71%	100.00%	89.92%	4.21%	5.88%	100.00%
5	Waterman Av.	s/o Mill St.	90.02%	4.26%	5.71%	100.00%	89.96%	4.25%	5.79%	100.00%
6	Mill St.	w/o Waterman Av.	90.02%	4.26%	5.71%	100.00%	89.91%	4.23%	5.86%	100.00%
7	Mill St.	e/o Waterman Av.	90.02%	4.26%	5.71%	100.00%	90.08%	4.24%	5.68%	100.00%

Source: Waterman Avenue High Cube Warehouse Traffic Impact Analysis, Urban Crossroads, Inc., September 2014.

TABLE 6-6: YEAR 2035 CONDITIONS TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

ID	Roadway	Segment	No Project				With Project			
			Autos	Medium Trucks	Heavy Trucks	Total	Autos	Medium Trucks	Heavy Trucks	Total
1	Waterman Av.	n/o Driveway 1	90.02%	4.26%	5.71%	100.00%	90.12%	4.22%	5.66%	100.00%
2	Waterman Av.	n/o Driveway 2	90.02%	4.26%	5.71%	100.00%	90.05%	4.20%	5.75%	100.00%
3	Waterman Av.	s/o Driveway 2	90.02%	4.26%	5.71%	100.00%	89.93%	4.21%	5.86%	100.00%
4	Waterman Av.	n/o Mill St.	90.02%	4.26%	5.71%	100.00%	89.93%	4.21%	5.86%	100.00%
5	Waterman Av.	s/o Mill St.	90.02%	4.26%	5.71%	100.00%	89.96%	4.25%	5.79%	100.00%
6	Mill St.	w/o Waterman Av.	90.02%	4.26%	5.71%	100.00%	89.96%	4.24%	5.80%	100.00%
7	Mill St.	e/o Waterman Av.	90.02%	4.26%	5.71%	100.00%	90.07%	4.24%	5.69%	100.00%

Source: Waterman Avenue High Cube Warehouse Traffic Impact Analysis, Urban Crossroads, Inc., September 2014.

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

TABLE 6-7: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Vibration Decibels (VdB) at 25 feet
Small bulldozer	58
Jackhammer	79
Loaded Trucks	86
Large bulldozer	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 *Waterman Avenue High Cube Warehouse Traffic Impact Analysis*.(1) 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 the Project and with the construction of the proposed Project.
- Year (2015) Without / With Project: This scenario refers to the background noise conditions at future Year 2015 with and without the proposed Project. This scenario corresponds to 2015 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.
- Year (2035) Without / With Project: This scenario refers to the background noise conditions at future Year 2035 with and without the proposed Project. This scenario corresponds to 2035 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 seven 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 land uses adjacent to roadways conveying Project traffic. Based on the off-site traffic noise impact significance criteria described in Section 4, a significant off-site traffic noise level impact occurs when the without Project noise levels at nearby noise-sensitive receivers:

- are less than 60 dBA and the project creates a *readily perceptible* 5 dBA or greater project related noise level increase, or:
- range from 60 to 65 dBA and the project creates a *barely perceptible* 3 dBA or greater project noise level increase, or;
- already exceed 65 dBA, and the project creates a community noise level impact of greater than 1.5 dBA.

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 along area roadways, they appropriately do not reflect noise contribution from the surrounding commercial and industrial uses within the Project study area. Tables 7-1 through 7-6 present a summary of the unmitigated exterior traffic noise levels for the seven study area roadway segments analyzed from the without Project to the with Project conditions in each of the three timeframes: Existing; Year 2015; and Year 2035 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the six traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.6	138	297	640
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	76.6	138	297	640
3	Waterman Av.	s/o Driveway 2	Commercial General	76.6	138	297	640
4	Waterman Av.	n/o Mill St.	Commercial General	76.6	138	296	638
5	Waterman Av.	s/o Mill St.	Commercial General	76.7	140	302	650
6	Mill St.	w/o Waterman Av.	Commercial General	73.4	84	181	390
7	Mill St.	e/o Waterman Av.	Commercial General	74.1	94	202	434

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.

TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.6	138	298	643
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	76.7	141	303	652
3	Waterman Av.	s/o Driveway 2	Commercial General	76.8	143	307	662
4	Waterman Av.	n/o Mill St.	Commercial General	76.8	142	306	660
5	Waterman Av.	s/o Mill St.	Commercial General	76.8	142	306	659
6	Mill St.	w/o Waterman Av.	Commercial General	73.6	86	186	401
7	Mill St.	e/o Waterman Av.	Commercial General	74.1	94	202	435

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.

TABLE 7-3: YEAR 2015 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.8	143	308	663
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	76.8	143	308	663
3	Waterman Av.	s/o Driveway 2	Commercial General	76.8	143	308	663
4	Waterman Av.	n/o Mill St.	Commercial General	76.8	142	306	660
5	Waterman Av.	s/o Mill St.	Commercial General	76.9	145	312	673
6	Mill St.	w/o Waterman Av.	Commercial General	73.6	87	188	406
7	Mill St.	e/o Waterman Av.	Commercial General	74.3	97	209	449

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.

TABLE 7-4: YEAR 2015 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.9	143	309	666
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	77.0	145	313	675
3	Waterman Av.	s/o Driveway 2	Commercial General	77.0	147	318	685
4	Waterman Av.	n/o Mill St.	Commercial General	77.0	147	316	681
5	Waterman Av.	s/o Mill St.	Commercial General	77.0	147	316	681
6	Mill St.	w/o Waterman Av.	Commercial General	73.8	90	193	416
7	Mill St.	e/o Waterman Av.	Commercial General	74.3	97	209	450

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.

TABLE 7-5: YEAR 2035 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	77.1	150	323	695
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	77.1	150	323	695
3	Waterman Av.	s/o Driveway 2	Commercial General	77.3	154	331	714
4	Waterman Av.	n/o Mill St.	Commercial General	77.3	154	331	714
5	Waterman Av.	s/o Mill St.	Commercial General	77.4	156	337	726
6	Mill St.	w/o Waterman Av.	Commercial General	75.8	122	264	568
7	Mill St.	e/o Waterman Av.	Commercial General	75.6	118	254	547

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.

TABLE 7-6: YEAR 2035 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	77.2	150	324	697
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	77.3	152	328	707
3	Waterman Av.	s/o Driveway 2	Commercial General	77.5	158	341	734
4	Waterman Av.	n/o Mill St.	Commercial General	77.5	158	341	734
5	Waterman Av.	s/o Mill St.	Commercial General	77.5	158	341	735
6	Mill St.	w/o Waterman Av.	Commercial General	75.9	124	268	577
7	Mill St.	e/o Waterman Av.	Commercial General	75.6	118	254	547

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.

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

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				No Project	With Project	Project Addition	
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.6	76.6	0.0	No
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	76.6	76.7	0.1	No
3	Waterman Av.	s/o Driveway 2	Commercial General	76.6	76.8	0.2	No
4	Waterman Av.	n/o Mill St.	Commercial General	76.6	76.8	0.2	No
5	Waterman Av.	s/o Mill St.	Commercial General	76.7	76.8	0.1	No
6	Mill St.	w/o Waterman Av.	Commercial General	73.4	73.6	0.2	No
7	Mill St.	e/o Waterman Av.	Commercial General	74.1	74.1	0.0	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.
[2] Significance of Impacts (Table 4-1).

TABLE 7-8: YEAR 2015 OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				No Project	With Project	Project Addition	
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.8	76.9	0.0	No
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	76.8	77.0	0.1	No
3	Waterman Av.	s/o Driveway 2	Commercial General	76.8	77.0	0.2	No
4	Waterman Av.	n/o Mill St.	Commercial General	76.8	77.0	0.2	No
5	Waterman Av.	s/o Mill St.	Commercial General	76.9	77.0	0.1	No
6	Mill St.	w/o Waterman Av.	Commercial General	73.6	73.8	0.2	No
7	Mill St.	e/o Waterman Av.	Commercial General	74.3	74.3	0.0	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.
[2] Significance of Impacts (Table 4-1).

TABLE 7-9: YEAR 2035 OFF-SITE PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				No Project	With Project	Project Addition	
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	77.1	77.2	0.0	No
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	77.1	77.3	0.1	No
3	Waterman Av.	s/o Driveway 2	Commercial General	77.3	77.5	0.2	No
4	Waterman Av.	n/o Mill St.	Commercial General	77.3	77.5	0.2	No
5	Waterman Av.	s/o Mill St.	Commercial General	77.4	77.5	0.1	No
6	Mill St.	w/o Waterman Av.	Commercial General	75.8	75.9	0.1	No
7	Mill St.	e/o Waterman Av.	Commercial General	75.6	75.6	0.0	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.
[2] Significance of Impacts (Table 4-1).

7.2 EXISTING PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-7 presents a comparison of the Existing without and with Project conditions CNEL noise levels. From this we can see that the unmitigated exterior noise levels are expected to range from 73.4 to 76.7 dBA CNEL. Existing with Project noise level contours are expected to range from 73.6 to 76.8 dBA CNEL. Overall the Project is expected to generate an unmitigated exterior noise level increase of up to 0.2 dBA CNEL. Based on the criteria in Section 4 and a review of the data on Table 7-7, the Project's contribution to the existing noise levels is considered less than significant for all of the study area roadway segments.

7.3 YEAR 2015 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-8 presents a comparison of the Year 2015 without and with Project conditions CNEL noise levels. Table 7-3 shows that the unmitigated exterior noise levels are expected to range from 73.6 to 76.9 dBA CNEL. Table 7-4 presents the Year 2015 with Project conditions noise level contours that are expected to range from 73.8 to 77.0 dBA CNEL. As shown on Table 7-8 the Project is expected to generate an unmitigated exterior noise level increase of up to 0.2 dBA CNEL. Based on the criteria in Section 4 and a review of the data on Table 7-7, the Project's contribution to the Year 2025 without Project noise levels is considered less than significant for all of the study area roadway segments.

7.4 YEAR 2035 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-9 presents a comparison of the Year 2035 without and with Project conditions CNEL noise levels. Table 7-5 shows that the unmitigated exterior noise levels are expected to range from 75.6 to 77.4 dBA CNEL. Table 7-6 presents the Year 2035 with Project conditions noise level contours that are expected to range from 75.6 to 77.5 dBA CNEL. As shown on Table 7-9 the Project is expected to generate an unmitigated exterior noise level increase of up to 0.2 dBA CNEL. Based on the cumulative noise impact significance criteria described in Section 4, the Project contributions to the study area roadway segments are considered a less than significant off-site traffic noise level impact for Year 2035 conditions.

7.5 CUMULATIVE PROJECT TRAFFIC NOISE IMPACTS

According to the U.S. Environmental Protection Agency (EPA), cumulative impacts represent the combined incremental effects of human activities that accumulate over time. (17) While the incremental impacts may be insignificant by themselves, the combined effect may result in a significant impact. The level of significance attributed to a cumulative Project noise impact is based on a comparison of the existing without Project noise levels with the future Year 2035 with Project noise levels. A significant impact occurs when the existing noise levels at nearby noise-sensitive receivers are: below 60 dBA CNEL and the Project contribution is 5 dBA or more; between 60 to 65 dBA CNEL and the Project contribution is 3 dBA or more; or above 65 dBA CNEL and the Project contribution is 1.5 dBA or more, as discussed in Section 4.2.

Table 7-10 describes the Waterman Avenue High Cube Warehouse future Year 2035 off-site cumulative traffic noise increase. While the peak noise level contribution approaches 2.5 dBA CNEL on Mill Street east and west of Waterman Avenue. Table 7-10 shows that the adjacent land uses do not contain any noise-sensitive receivers. Since, there are no nearby noise-sensitive receivers affected, this increase is considered a less than significant impact on the adjacent land uses along the study area roadway segments.

TABLE 7-10: YEAR 2035 OFF-SITE CUMULATIVE TRAFFIC NOISE INCREASE

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Cumulative Impact?
				Existing	Year 2035	Increase	
1	Waterman Av.	n/o Driveway 1	Office Industrial Park	76.6	77.2	0.6	No
2	Waterman Av.	n/o Driveway 2	Office Industrial Park	76.6	77.3	0.7	No
3	Waterman Av.	s/o Driveway 2	Commercial General	76.6	77.5	0.9	No
4	Waterman Av.	n/o Mill St.	Commercial General	76.6	77.5	0.9	No
5	Waterman Av.	s/o Mill St.	Commercial General	76.7	77.5	0.8	No
6	Mill St.	w/o Waterman Av.	Commercial General	73.4	75.9	2.5	No[2]
7	Mill St.	e/o Waterman Av.	Commercial General	74.1	75.6	1.5	No[2]

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.
[2] Adjacent land use does not contain any noise-sensitive receivers.

This page intentionally left blank

8 NOISE-SENSITIVE RECEIVERS

To assess the long-term operational and short-term construction noise impacts, the following eight sensitive receiver locations as shown on Exhibit 8-A were identified. 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 which 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.

Sensitive receivers in the vicinity of the Project site include the single-family residential dwellings located at receiver locations R1 to R4 and R6 to R8. Receiver location R5 represents Dominguez Elementary School. The closest noise-sensitive receiver is represented by location R8 at a distance of approximately 92 feet north of the Project site, south of San Felipe Road.

R1: Located approximately 1,074 feet southwest of the Project site, R1 represents the existing single-family residential dwellings along Allen Street. Long-term measurement location L1 is used to describe the existing ambient noise conditions at this location.

R2 Location R2 represents single-family residential dwellings located approximately 1,050 feet west of the Project site along Allen Street. A long-term noise level measurement was taken near this location, L2, to describe the existing ambient noise environment at the existing vacant lot.

R3: Location R3 represents the existing single-family residential dwellings located roughly 800 feet west of the Project Site east of Allen Street.

R4: Location R4 represents the existing single-family home located approximately 292 feet west of the Project site across Waterman Avenue. A long-term measurement was taken at this location, L3, to describe the existing ambient noise environment.

R5: Location R5 represents Dominguez Elementary School which is situated approximately 369 feet west of the northern Project site boundary, at the southeast corner of Rialto Avenue and Allen Street.

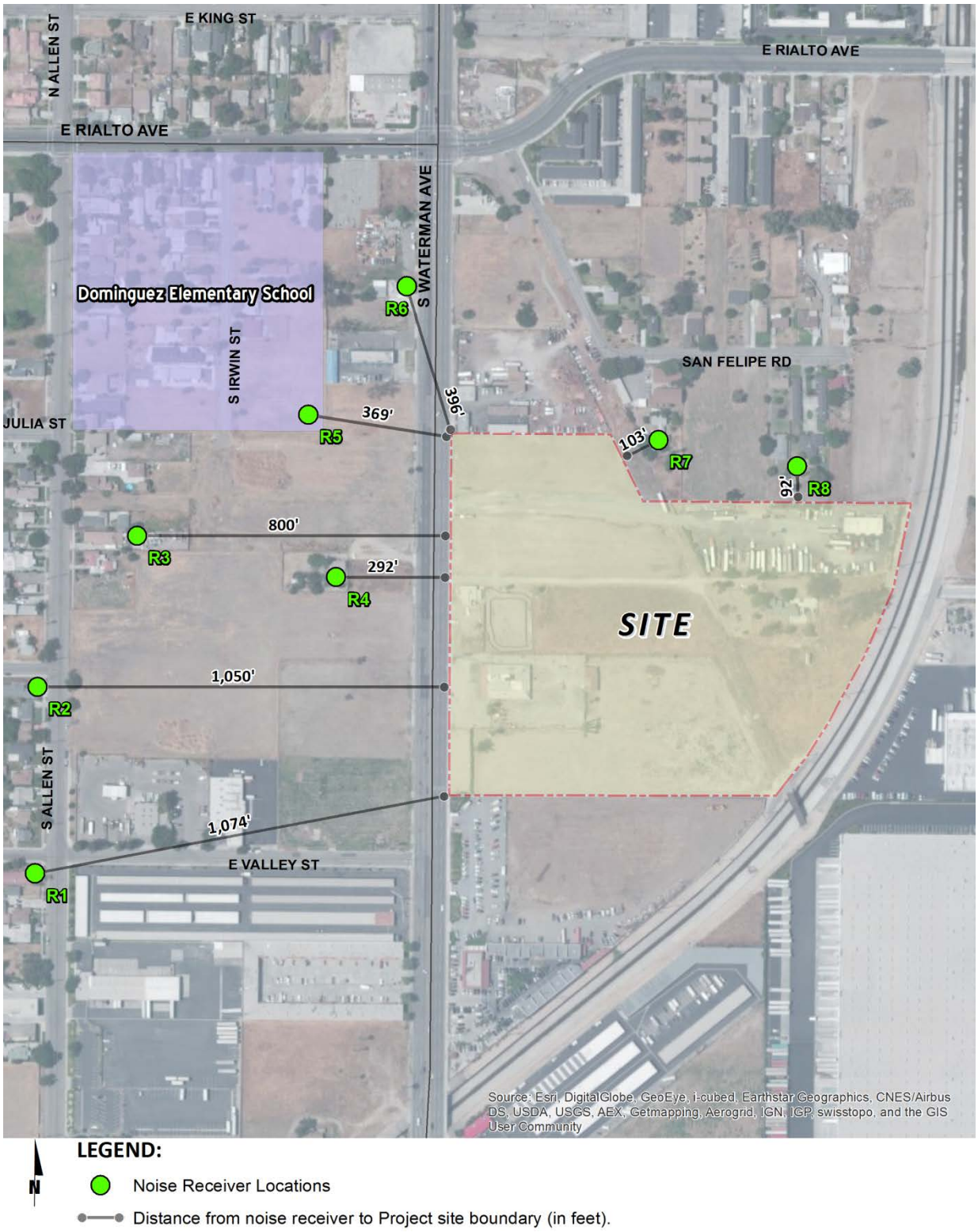
R6: At a distance of approximately 396 feet northwest of the Project site, location R6 represents the noise-sensitive single-family residential dwelling across Waterman Avenue.

R7: At a distance of 103 feet from the northern Project site boundary, R7 represents the nearest noise-sensitive residential dwellings located south of San Felipe Road. Long-term measurement location L4 is used to describe the existing ambient noise conditions at this location.

R8: Location R8 represents the single-family residential development located approximately 92 feet north of the Project site and south of San Felipe Road. R8 represents the

nearest noise-sensitive receiver to the Project site. Long-term measurement location L4 is used to describe the existing ambient noise conditions at this location.

EXHIBIT 8-A: NOISE RECEIVER LOCATIONS



LEGEND:

N

Noise Receiver Locations

Distance from noise receiver to Project site boundary (in feet).

9 OPERATIONAL IMPACTS

This section analyzes the potential stationary-source operational noise and vibration impacts at nearby receiver locations resulting from the development of the proposed Waterman Avenue High Cube Warehouse. Exhibit 8-A identifies the location of the eight noise receiver locations used to assess the operational noise level impacts.

9.1 OPERATIONAL NOISE STANDARDS

The Project operational noise impacts are governed by the City of San Bernardino Municipal Code, Section 8.54, included in Appendix 3.2. Section 8.54.060 states when: *such noises are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose*…these activities shall be exempt (Section 8.54.060(B)).(12) However, due to the Project's close proximity to residential land uses, located north of the Project site boundary, Development Code, Section 19.20.030.15(A), limits the operational stationary-source noise from the Waterman Avenue High Cube Warehouse to an exterior noise level of 65 dBA for residential land use.(11)

9.2 OPERATIONAL NOISE SOURCES

At the time this noise analysis was prepared, the future tenants of the proposed Project were unknown. Furthermore, this analysis assumes the Project would be operational 24 hours per day, seven days per week. The Project Applicant estimates that the building is designed to accommodate "fulfillment" center tenants, warehousing, retail distribution, bulk storage and distribution, logistics, value add assembly, light manufacturing or similar uses. Although the proposed buildings are not necessarily expected to accommodate tenants that require cold storage (refrigeration), this analysis assumes that the buildings could house a tenant(s) that uses cold storage. Business operations would primarily be conducted within the enclosed building, with the exception of traffic movement, parking, and the loading and unloading of trucks at designated loading bays. The operational noise impacts associated with the proposed Project 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. The locations of the operational noise sources are shown on Exhibit 9-A.

This analysis does not account for any special noise generators that may occupy the building, inside or outside of the proposed location. Special noise generators may consist of outdoor compressors, air scrubbers, emergency generators, or outdoor amplification (speakers). This noise analysis is intended to describe noise level impacts associated with the expected typical warehouse and distribution storage operations at the Project site.

9.3 REFERENCE NOISE LEVELS

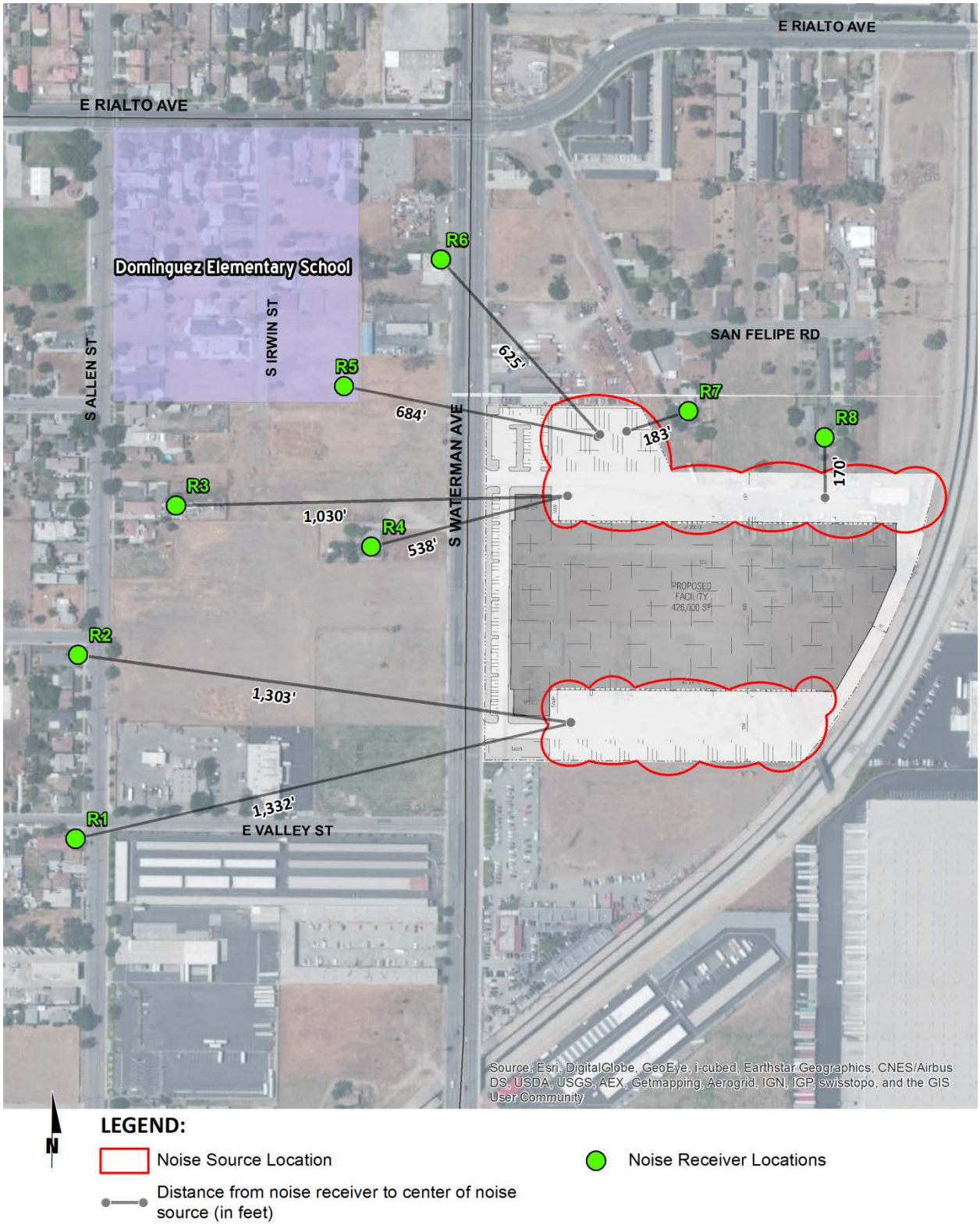
Since the future tenants of the proposed Project are unknown, the Project noise levels were estimated based on reference noise level measurements of a similar logistics warehouse building. The reference noise levels are intended to describe the expected operational noise

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.

To estimate the Project off-site operational noise impacts associated with the Waterman Avenue High Cube Warehouse, reference noise level measurements were collected from an existing logistics warehouse operation containing similar operational noise sources. On Tuesday, January 22, 2013, Urban Crossroads, Inc. collected long-term 24-hour operational noise level measurements at the at Veg Fresh Farms and FedEx distribution facility located at 500 East Orangethorpe Avenue in the City of Anaheim. Reference noise source photos are included in Appendix 9.1. The Veg Fresh Farms and FedEx distribution center noise level measurements represent the typical weekday logistics warehouse operation consisting of over 150 loading bays (docks). Since the reference noise level measurements include the use of refrigerated containers or reefers that may not reflect the actual tenant operations at the Waterman Avenue High Cube Warehouse, the analysis may conservatively overstate the Project operational noise levels.

At a distance of 25 feet from the reference loading bay (docks) noise source and with an estimated noise source height of 8 feet, the 24-hour measurements produced an exterior reference noise level of 69.1 dBA Leq. While the specific noise levels at the Project site will depend on the actual tenant, the intensity and the daytime / nighttime hours of operation, a reference noise level of 69.1 dBA Leq is used in this analysis to describe the Waterman Avenue High Cube Warehouse operational noise level impacts. 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.

EXHIBIT 9-A: OPERATIONAL NOISE SOURCE LOCATIONS



LEGEND:

- Noise Source Location
- Distance from noise receiver to center of noise source (in feet)
- Noise Receiver Locations

9.4 PROJECT OPERATIONAL NOISE LEVELS

Using the 69.1 dBA Leq reference noise level to represent the proposed logistics warehouse operations that include idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods, it is possible to estimate the Project operational source noise levels at the Project site (direct project impacts) at each of the eight noise receiver locations and estimate the Project contribution (cumulative project impacts).

The operational noise level calculations shown on Table 9-1 identify the distance from the reference noise source to the noise receivers, the distance attenuation, the noise barrier attenuation, and the estimated Project related hourly noise levels. The hourly noise levels associated with the Waterman Avenue High Cube Warehouse operations are expected to generate a direct Project noise level impact ranging from 34.6 to 52.4 dBA Leq. The stationary source operational noise calculations are included in Appendix 9.2.

9.5 OPERATIONAL NOISE IMPACTS

The operational noise level projections for each receiver near the Project site are identified in Table 9-1. Table 9-2 shows a comparison of the Project operational noise level projections with the City of San Bernardino noise standards for residential land uses. The off-site operational noise level calculations, shown on Tables 9-3 and 9-4, identify the cumulative Project impacts to daytime and nighttime noise levels.

9.5.1 DIRECT PROJECT OPERATIONAL NOISE IMPACTS

The Project only operational noise level projections, shown on Table 9-2, 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. The direct Project operational noise levels, shown on Table 9-2, will range from 34.6 to 52.4 dBA Leq and will not exceed the City of San Bernardino noise level standards at the residential land uses adjacent to the Project site, and therefore, the Project will create a less than significant direct Project noise level impact on the adjacent land uses.

TABLE 9-1: OPERATIONAL NOISE LEVEL PROJECTIONS (DBA LEQ)

Receiver Location[1]	Project Noise[2]	Distance From Source To Receiver (Feet)[3]	Distance Attenuation[4]	Noise Barrier Attenuation	Hourly Noise Levels[5]
R1	69.1	1,332'	-34.5	0.0	34.6
R2	69.1	1,303'	-34.3	0.0	34.8
R3	69.1	1,030'	-32.3	0.0	36.8
R4	69.1	538'	-26.7	0.0	42.4
R5	69.1	684'	-28.7	0.0	40.4
R6	69.1	625'	-28.0	0.0	41.1
R7	69.1	183'	-17.3	0.0	51.8
R8	69.1	170'	-16.7	0.0	52.4

[1] See Exhibit 8-A for the noise receiver locations.
[2] The reference hourly noise level measurements represents the 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.
[3] Estimated distances to nearest loading dock activities.
[4] Noise levels diminish at a rate 6 dBA per doubling of distance and a reference distance of 25 feet.
[5] Estimated Project stationary source noise levels.

TABLE 9-2: OPERATIONAL NOISE LEVEL COMPLIANCE (DBA LEQ)

Receiver Location[1]	Land Use[2]	Noise Standards (dBA Leq)[3]		Project Operational Noise Levels[4]	Compliance[5]	
		Daytime 7am - 10pm	Nighttime 10pm - 7am		Daytime 7am - 10pm	Nighttime 10pm - 7am
R1	Commercial Heavy	65.0	65.0	34.6	Yes	Yes
R2	Residential	65.0	65.0	34.8	Yes	Yes
R3	Residential	65.0	65.0	36.8	Yes	Yes
R4	Office Industrial Park	65.0	65.0	42.4	Yes	Yes
R5	Residential	65.0	65.0	40.4	Yes	Yes
R6	Office Industrial Park	65.0	65.0	41.1	Yes	Yes
R7	Residential	65.0	65.0	51.8	Yes	Yes
R8	Residential	65.0	65.0	52.4	Yes	Yes

[1] See Exhibit 8-A for the noise receiver locations.
[2] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2, July 2005.
[3] City of San Bernardino Development Code, Section 19.20.030.15(A).
[4] Estimated Project stationary source noise levels as shown on Table 9-1.
[5] Do the estimated Project stationary source noise levels meet the City of San Bernardino Development Code standards for residential land uses?

9.5.2 CUMULATIVE PROJECT OPERATIONAL NOISE IMPACTS

To describe the daytime and nighttime cumulative operational noise impacts, the Project only noise levels, were compared to the existing ambient noise level measurements shown on Table 5-1. By combining the Project only (direct) noise level projections with the existing ambient noise level measurements, it is possible to identify the future noise levels represented by the combined Project and ambient noise levels. The combined noise levels can then be used to calculate the cumulative Project contribution to the ambient noise conditions.

The expected daytime and nighttime cumulative Project operational noise impacts at the eight receiver locations are presented on Tables 9-3 and 9-4. The difference between the combined Project and ambient noise levels and the existing ambient noise levels were then compared with the cumulative significance criteria. The analysis shows that the Project will contribute an operational noise level impact of up to 2.8 dBA Leq at receiver location R8. The Project contribution at the receiver locations will vary depending on the existing noise levels at each location. The significance criteria presented in Section 4.2 recognizes that the significance of cumulative noise impacts varies depending on the condition of the environment and the Project related noise level increases.

Since the Project contribution is less than 5 dBA and the existing noise levels are below 60 dBA CNEL, the expected noise level increase of up to 2.8 dBA Leq is considered less than significant at the impacted receiver locations. The analysis demonstrates that the operational noise impacts associated with the proposed Project such as idling trucks, delivery truck activities, parking, backup alarms, refrigerated containers or reefers, as well as loading and unloading of dry goods will be less than significant.

TABLE 9-3: DAYTIME (7:00 A.M. TO 10:00 P.M.) OPERATIONAL NOISE LEVEL IMPACTS (DBA LEQ)

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]	Potential Cumulative Significant Impact?[7]
R1	34.6	L1	61.2	61.2	0.0	No
R2	34.8	L2	54.8	54.8	0.0	No
R3	36.8	L2	54.8	54.9	0.1	No
R4	42.4	L3	66.7	66.7	0.0	No
R5	40.4	L5	53.9	54.1	0.2	No
R6	41.1	L5	53.9	54.1	0.2	No
R7	51.8	L4	52.9	55.4	2.5	No
R8	52.4	L4	52.9	55.7	2.8	No

[1] See Exhibit 8-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 9-1.
[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] Cumulative Significant Impacts as defined in Section 4.2.

TABLE 9-4: NIGHTTIME (10:00 P.M. TO 7:00 A.M.) OPERATIONAL NOISE LEVEL IMPACTS (DBA LEQ)

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]	Potential Cumulative Significant Impact?[7]
R1	34.6	L1	58.2	58.2	0.1	No
R2	34.8	L2	50.7	50.8	0.1	No
R3	36.8	L2	50.7	50.9	0.2	No
R4	42.4	L3	65.6	65.6	0.1	No
R5	40.4	L5	52.1	52.4	0.3	No
R6	41.1	L5	52.1	52.4	0.3	No
R7	51.8	L4	55.6	57.1	1.5	No
R8	52.4	L4	55.6	57.3	1.7	No

[1] See Exhibit 8-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 9-1.
[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] Cumulative Significant Impacts as defined in Section 4.2.

9.6 OPERATIONAL NOISE ABATEMENT MEASURES

The normal operation of the Project will not exceed the City of San Bernardino and County of San Bernardino standards for stationary-source noise impacts. To further reduce potential operational noise levels at noise receiver locations, it is recommended that the Lead Agency require the following as Project Conditions of Approval:

- All trucks, tractors, and forklifts shall be operated with proper operating and well maintained mufflers.
- Maintain quality pavement conditions that are free of bumps to minimize truck noise.
- The truck access gates and loading docks within the truck court on the project site shall be posted with signs which state:
    - Truck drivers shall turn off engines when not in use;
    - Diesel trucks servicing the Project shall not idle for more than five (5) minutes; and
    - Post telephone numbers of the building facilities manager to report violations.

9.7 OPERATIONAL 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 on normal traffic speeds do not exceed 65 VdB. Truck deliveries transiting on site will be travelling at very low speeds so it is expected that delivery truck vibration impacts nearby homes will be less than significant.

10 CONSTRUCTION IMPACTS

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

10.1 CONSTRUCTION NOISE STANDARDS

The City of San Bernardino has set restrictions to control noise impacts associated with the construction of the proposed project. Section 8.54.070 of the City's Noise Control Ordinance states: *No person shall be engaged or employed, or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and 8:00 p.m.*(12) While the City establishes limits to the hours during which construction activity may take place, it does not identify specific noise level limits for construction noise levels. In effect, if Project construction only occurs during the permitted hours of the Noise Control Ordinance, then the construction noise levels are considered exempt from the provisions of the ordinance.

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 the following six stages:

- Demolition
- Site Preparation
- Grading
- Building Construction
- Architectural Coatings
- Paving

This construction noise analysis was prepared using the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model (RCNM) that includes a national database of construction equipment reference noise emission levels.(18) The RCNM equipment database, as shown in Appendix 10.1, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation. The usage factor is a key input variable of the RCNM noise prediction model that is used to calculate the average Leq noise levels using the Lmax noise levels measured at a distance of 50 feet.

Noise levels generated by heavy construction equipment can range from approximately 70 dBA to in excess of 100 dBA when measured at 50 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 78 dBA measured at 50 feet from the noise source to the receiver would be reduced to 72 dBA at 100 feet from the source to the receiver, and would be further reduced to 66 dBA at 200 feet from the source to the receiver. The construction noise levels including the number and mix of construction equipment by construction phase are consistent with the data used to support the construction emissions in the *Waterman Avenue High Cube Warehouse Air Quality Impact Analysis* prepared by Urban Crossroads Inc. in September 2014.(19)

10.3 CONSTRUCTION NOISE ANALYSIS

Using the stationary-source RCNM noise prediction model, calculations of the Project construction noise level impacts at the eight noise receiver locations were completed. Tables 10-1 to 10-6 present the short-term construction noise levels for each stage of construction at the eight receiver locations. Table 10-7 provides a summary of the construction noise levels by phase at the eight noise receiver locations. Exhibit 10-A shows the eight noise receiver locations and their respective distances to the Project site boundary. Based on the six stages of construction, the noise impacts associated with the proposed Project are expected to create temporary high-level noise impacts at receiver locations surrounding the Project site when certain activities occur near the Project property line. To assess the worst-case construction noise levels at each receiver location, this analysis shows the noise impacts when heavy equipment is operating adjacent to the Project site perimeter. When a noise barrier separates the Project site boundary from nearby receiver locations, the noise source is placed ten feet behind the barrier. The construction noise level calculations are provided in Appendix 10.2.

EXHIBIT 10-A: CONSTRUCTION NOISE SOURCE LOCATION

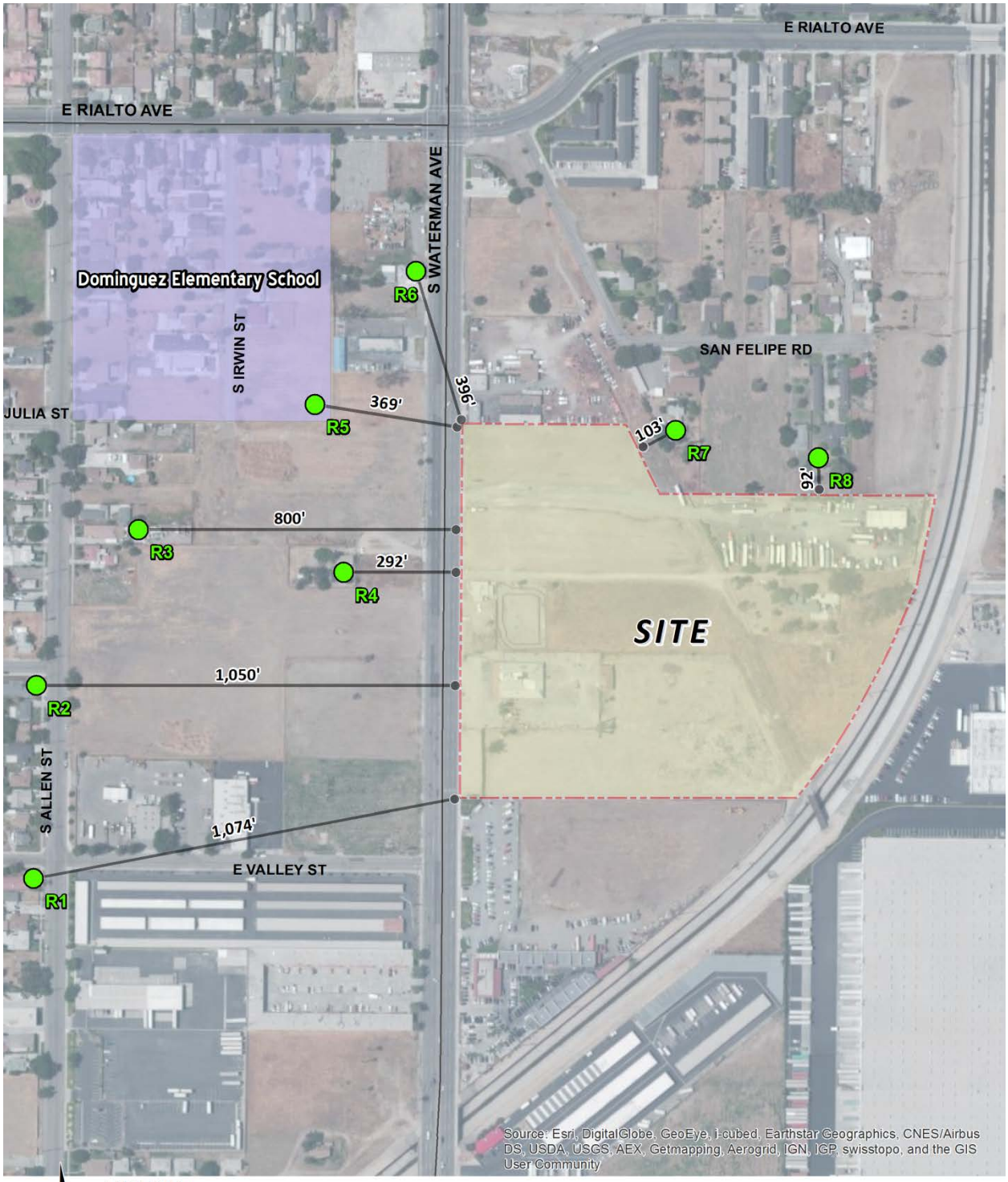


TABLE 10-1: DEMOLITION CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (Lmax dBA)	Cumulative Level @ 50 Feet (Leq dBA)
Concrete/Industrial Saws	1	20%	1.6	90.0	83.0
Other Equipment	1	50%	4.0	85.0	82.0
Excavators	2	40%	3.2	81.0	80.0
Rubber Tired Dozers	2	40%	3.2	79.0	78.0
Cumulative Hourly Noise Levels 50 Feet (Leq dBA)					87.2

Construction Noise Reference Distance	Distance To Property Line (In Feet)[4]	Distance Attenuation (Leq dBA)[5]	Estimated Noise Barrier Attenuation (Leq dBA)	Construction Noise Level (Leq dBA)
R1	1,074'	-26.6	0.0	60.6
R2	1,050'	-26.4	0.0	60.8
R3	800'	-24.1	0.0	63.1
R4	292'	-15.3	0.0	71.9
R5	369'	-17.4	0.0	69.8
R6	396'	-18.0	0.0	69.2
R7	103'	-6.3	0.0	80.9
R8	92'	-5.3	0.0	81.9

[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.

TABLE 10-2: SITE PREPARATION CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (Lmax dBA)	Cumulative Level @ 50 Feet (Leq dBA)
Water Trucks	2	40%	3.2	76.0	75.0
Rubber Tired Dozers	4	40%	3.2	79.0	81.0
Tractors/Loaders/Backhoes	2	40%	3.2	78.0	77.0
Excavators	4	40%	3.2	81.0	83.0
Cumulative Hourly Noise Levels 50 Feet (Leq dBA)					86.1

Construction Noise Reference Distance	Distance To Property Line (In Feet)[4]	Distance Attenuation (Leq dBA)[5]	Estimated Noise Barrier Attenuation (Leq dBA)	Construction Noise Level (Leq dBA)
R1	1,074'	-26.6	0.0	59.5
R2	1,050'	-26.4	0.0	59.7
R3	800'	-24.1	0.0	62.0
R4	292'	-15.3	0.0	70.8
R5	369'	-17.4	0.0	68.7
R6	396'	-18.0	0.0	68.1
R7	103'	-6.3	0.0	79.8
R8	92'	-5.3	0.0	80.8

[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.

TABLE 10-3: GRADING CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (Lmax dBA)	Cumulative Level @ 50 Feet (Leq dBA)
Water Trucks	3	40%	3.2	76.0	76.8
Scrapers	2	40%	3.2	84.0	83.0
Graders	4	40%	3.2	85.0	87.0
Rubber Tired Dozers	2	40%	3.2	79.0	78.0
Tractors/Loaders/Backhoes	2	40%	3.2	78.0	77.0
Excavators	1	40%	3.2	81.0	77.0
Cumulative Hourly Noise Levels 50 Feet (Leq dBA)					89.4

Construction Noise Reference Distance	Distance To Property Line (In Feet)[4]	Distance Attenuation (Leq dBA)[5]	Estimated Noise Barrier Attenuation (Leq dBA)	Construction Noise Level (Leq dBA)
R1	1,074'	-26.6	0.0	62.8
R2	1,050'	-26.4	0.0	63.0
R3	800'	-24.1	0.0	65.3
R4	292'	-15.3	0.0	74.1
R5	369'	-17.4	0.0	72.0
R6	396'	-18.0	0.0	71.4
R7	103'	-6.3	0.0	83.1
R8	92'	-5.3	0.0	84.1

[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.

TABLE 10-4: BUILDING CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (Lmax dBA)	Cumulative Level @ 50 Feet (Leq dBA)
Tractors/Loaders/Backhoes	4	40%	3.2	78.0	80.0
Forklifts	3	20%	1.6	75.0	72.8
Generator Sets	2	50%	4.0	81.0	81.0
Cranes	1	16%	1.3	81.0	73.0
Welders	2	40%	3.2	74.0	73.0
Cumulative Hourly Noise Levels 50 Feet (Leq dBA)					84.6

Construction Noise Reference Distance	Distance To Property Line (In Feet)[4]	Distance Attenuation (Leq dBA)[5]	Estimated Noise Barrier Attenuation (Leq dBA)	Construction Noise Level (Leq dBA)
R1	1,074'	-26.6	0.0	58.0
R2	1,050'	-26.4	0.0	58.2
R3	800'	-24.1	0.0	60.5
R4	292'	-15.3	0.0	69.3
R5	369'	-17.4	0.0	67.2
R6	396'	-18.0	0.0	66.6
R7	103'	-6.3	0.0	78.3
R8	92'	-5.3	0.0	79.3

[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.

TABLE 10-5: ARCHITECTURAL COATINGS CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (Lmax dBA)	Cumulative Level @ 50 Feet (Leq dBA)
Air Compressors	4	40%	3.2	78.0	80.0
Cumulative Hourly Noise Levels 50 Feet (Leq dBA)					80.0

Construction Noise Reference Distance	Distance To Property Line (In Feet)[4]	Distance Attenuation (Leq dBA)[5]	Estimated Noise Barrier Attenuation (Leq dBA)	Construction Noise Level (Leq dBA)
R1	1,074'	-26.6	0.0	53.4
R2	1,050'	-26.4	0.0	53.6
R3	800'	-24.1	0.0	55.9
R4	292'	-15.3	0.0	64.7
R5	369'	-17.4	0.0	62.6
R6	396'	-18.0	0.0	62.0
R7	103'	-6.3	0.0	73.7
R8	92'	-5.3	0.0	74.7

[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.

TABLE 10-6: PAVING CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (Lmax dBA)	Cumulative Level @ 50 Feet (Leq dBA)
Pavers	2	50%	4.0	77.0	77.0
Paving Equipment	2	40%	3.2	76.0	75.0
Rollers	2	20%	1.6	80.0	76.0
Cumulative Hourly Noise Levels 50 Feet (Leq dBA)					80.9

Construction Noise Reference Distance	Distance To Property Line (In Feet)[4]	Distance Attenuation (Leq dBA)[5]	Estimated Noise Barrier Attenuation (Leq dBA)	Construction Noise Level (Leq dBA)
R1	1,074'	-26.6	0.0	54.3
R2	1,050'	-26.4	0.0	54.5
R3	800'	-24.1	0.0	56.8
R4	292'	-15.3	0.0	65.6
R5	369'	-17.4	0.0	63.5
R6	396'	-18.0	0.0	62.9
R7	103'	-6.3	0.0	74.6
R8	92'	-5.3	0.0	75.6

[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.

TABLE 10-7: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[1]	Distance To Property Line (In Feet)	Construction Phase Hourly Noise Level (dBA Leq)						
		Demo.	Site Prep.	Grading	Building Const.	Arch. Coating	Paving	Peak[2]
R1	1,074'	60.6	59.5	62.8	58.0	53.4	54.3	62.8
R2	1,050'	60.8	59.7	63.0	58.2	53.6	54.5	63.0
R3	800'	63.1	62.0	65.3	60.5	55.9	56.8	65.3
R4	292'	71.9	70.8	74.1	69.3	64.7	65.6	74.1
R5	369'	69.8	68.7	72.0	67.2	62.6	63.5	72.0
R6	396'	69.2	68.1	71.4	66.6	62.0	62.9	71.4
R7	103'	80.9	79.8	83.1	78.3	73.7	74.6	83.1
R8	92'	81.9	80.8	84.1	79.3	74.7	75.6	84.1

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Estimated construction noise levels during peak operating conditions.

10.4 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur during grading construction activities at the edge of the Project site. As shown on Table 10-7, the unmitigated peak construction noise levels are expected to range from 53.4 to 84.1 dBA Leq. To control noise impacts associated with the construction of the proposed Project, the City of San Bernardino has established limits to the hours of operation. The City's Municipal Code indicates that construction activities are considered exempt from the noise standards if activity is limited to the hours of 7:00 a.m. to 8:00 p.m. Therefore, if the Project construction activity is restricted to the permitted hours of the City's Municipal Code, the Project-related construction noise impacts will be less than significant.

10.5 CONSTRUCTION NOISE ABATEMENT MEASURES

Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following practices would reduce any noise level increases produced by the construction equipment to the nearby noise-sensitive residential land uses:

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise sensitive receivers nearest the Project site (i.e., to the south) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m.). The Project Applicant shall prepare a haul route exhibit for review and approval by the City of San Bernardino Planning Division prior to commencement of construction activities. The haul route exhibit shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

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 building, 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 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 occur within the Project site are expected to include grading, which would have the potential to generate low levels of ground-borne vibration. Using the vibration source level 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 10-9 presents the expected Project related vibration levels at each of the eight sensitive receiver locations.

TABLE 10-9: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Noise Receiver[1]	Distance To Property Line (In Feet)	Receiver Vibration Levels (VdB)[2]					Potential Significant Impact[3?]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
R1	1,074'	9.0	30.0	37.0	38.0	38.0	No
R2	1,050'	9.3	30.3	37.3	38.3	38.3	No
R3	800'	12.8	33.8	40.8	41.8	41.8	No
R4	292'	26.0	47.0	54.0	55.0	55.0	No
R5	369'	22.9	43.9	50.9	51.9	51.9	No
R6	396'	22.0	43.0	50.0	51.0	51.0	No
R7	103'	39.6	60.6	67.6	68.6	68.6	No
R8	92'	41.0	62.0	69.0	70.0	70.0	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)?

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 92 to 1,074 feet from the Project site, construction vibration levels are expected to range from 9.0 to 70.0 VdB. Using the construction vibration assessment methods provided by the Federal Transit Administration (FTA) the proposed Project site will not include nor require equipment, facilities, or activities that would result in a perceptible human response (annoyance).

The Project construction is not expected to generate vibration levels exceeding the FTA maximum acceptable vibration standard of 80 (VdB). Further, impacts at the site of the closest sensitive receiver 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. Moreover, 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. On this basis the potential for the Project to result in exposure of persons to, or generation of, excessive ground-borne vibration is determined to be less than significant.

11 REFERENCES

1. **Urban Crossroads, Inc.** *Waterman Avenue High Cube Warehouse Traffic Impact Analysis.* September 2014.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., October 1998.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March, 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **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.
7. **U.S. Department of Transportation, Federal Transit Administration.** *Transit noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
8. **Office of Planning and Research.** *State of California General Plan Guidlines 2003.* October 2003.
9. **State of California.** *2013 California Green Building Standards Code.* January 2014.
10. **City of San Bernardino.** *General Plan, Noise Element.* November 2005.
11. —. *Municipal Code, Title 19, Article III, Chapter 19.20 - Property Development Standards.*
12. —. *Municipal Code, Title 8, Section 8.54 - Noise Control.*
13. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
14. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-1983 (R2006)/ANSI S1.4a-1985 (R2006).*
15. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
16. **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.
17. **U.S. Environmental Protection Agency, Office of Federal Activities.** *Consideration of Cumultive Impacts.* May 1999. EPA 315-R-99-002.
18. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January, 2006.
19. **Urban Crossroads, Inc.** *Waterman Avenue High Cube Warehouse Air Quality Impact Analysis.* September 2014.
20. **County of San Bernardino.** *Development Code, General Performance Standards, Section 83.01.080 - Noise.*

This page intentionally left blank

12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Waterman Avenue High Cube Warehouse 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) 660-1994 ext. 203.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
41 Corporate Park, Suite 300
Irvine, CA 92606
(949) 660-1994 x203
blawson@urbanxroads.com

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

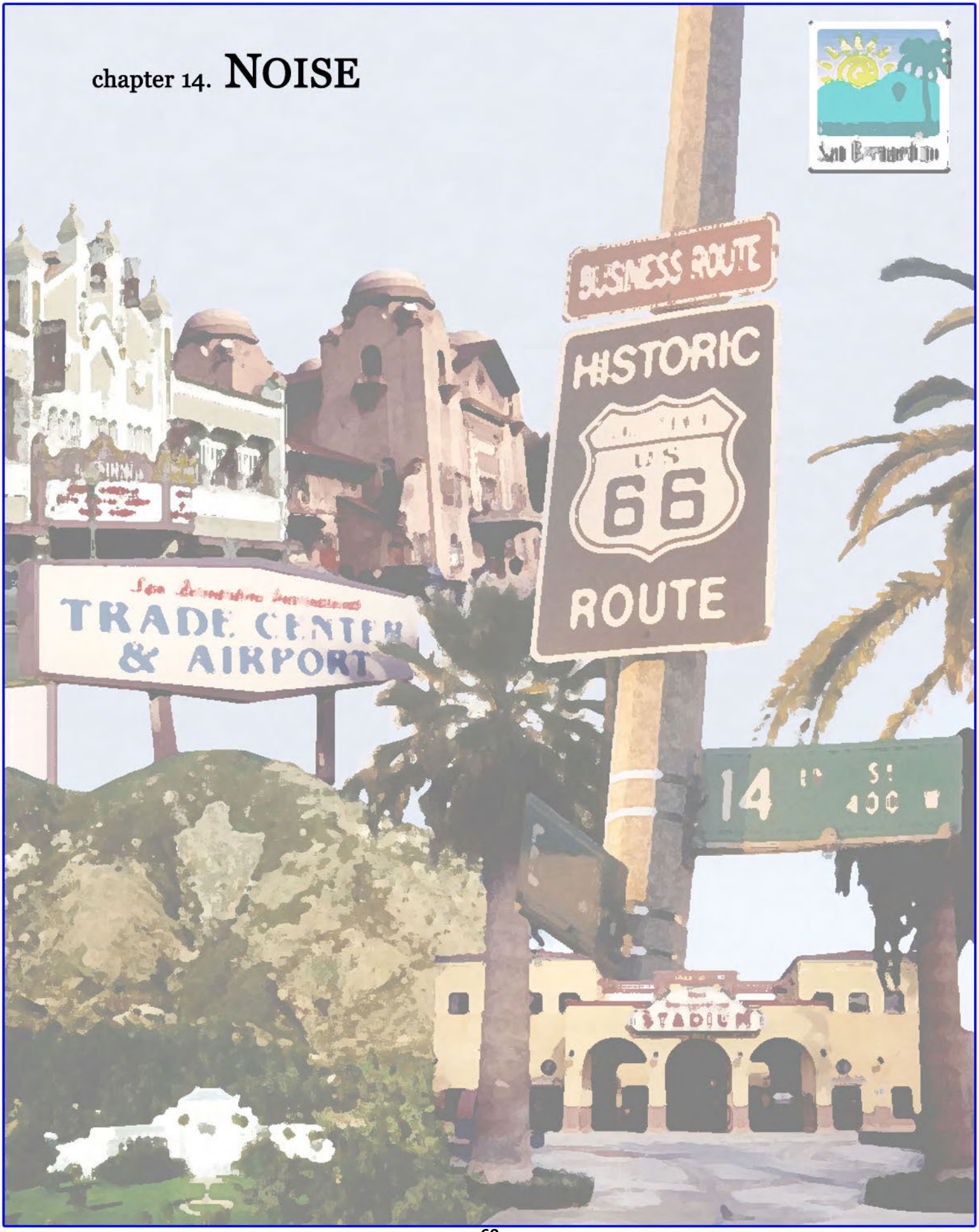
This page intentionally left blank

APPENDIX 3.1:

CITY OF SAN BERNARDINO NOISE ELEMENT

This page intentionally left blank

chapter 14. NOISE



Chapter 14. Noise

INTRODUCTION

San Bernardino is affected by several different sources of noise, including automobile, rail, and air traffic, sports events, commercial and industrial activity, and periodic nuisances such as construction. Excessive levels of noise can damage our physical health, psychological stability, social cohesion, property values, and economic productivity. The control of noise, therefore, is an essential component in creating a safe, compatible, and productive environment.

Purpose

The Noise Element provides policy guidance that addresses the generation, mitigation, avoidance, and the control of excessive noise. Specifically, this Element addresses the following issues:

- Land use;
- Transportation related noise generated from roadways, passenger and freight railroad operations, and air flights; and
- Spill over noise from activities such as construction, leaf blowers, and commercial/industrial operations.

Relationship to Other Elements

The Noise Element is closely linked with the Land Use and Circulation Elements as well as the Development Code, which contains the City's noise standards. Together, these guidelines and standards provide for the citywide regulation of excessive noise.

It should be recognized that the City does not have the authority to regulate all sources of noise within the City and various other agencies may supercede City authority. A discussion of these agencies and their roles with respect to regulating noise is provided below. Furthermore, various types of project funding (e.g., State Highway projects, HUD

redevelopment, etc.) could be subject to standards that differ from the City's.

1. Federal Highway Administration

Several major transportation routes traverse the City of San Bernardino: State Routes 18, 30, 330, and 66, as well as Interstates 10 and 215. These routes are subject to federal funding and, as such, are under the purview of the Federal Highway Administration (FHWA), which has its own noise standards. These noise standards are based on Leq and L_{10} values. The FHWA design noise levels are included in Table N-1, FHWA Design Noise Levels.

Table N-1
FHWA Design Noise Levels

Activity Category	*Design Noise Levels* [1]		*Description of Activity Category*
	L_{eq} (dBA)	*L_{10} (dBA)*	
A	57 (exterior)	60 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	70 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	75 (exterior)	Developed lands, properties, or activities not included in Categories A or B, above
D	---	---	Undeveloped lands.
E	52 (interior)	55 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

[1] Either L_{eq} or L_{10} (but not both) design noise levels may be used on a project.

2. U.S. Department of Housing and Urban Development

The Department of Housing and Urban Development (HUD) issues formal requirements related specifically to standards for exterior noise levels along with policies for approving HUD-supported or assisted housing projects in high noise areas. In general, these requirements established three zones. These include:

- 65 dBA L_{dn} or less - an acceptable zone where all projects could be approved,

- Exceeding 65 dBA L_{dn} but not exceeding 75 dBA L_{dn} - a normally unacceptable zone where mitigation measures would be required and each project would have to be individually evaluated for approval or denial. These measures must provide 5 dBA of attenuation above the attenuation provided by standard construction required in a 65 to 70 dBA L_{dn} area and 10 dBA of attenuation in a 70 to 75 dBA L_{dn} area, and
- Exceeding 75 dBA L_{dn} - an unacceptable zone in which projects would not, as a rule, be approved.

HUD's regulations do not include interior noise standards. Rather, a goal of 45 dBA L_{dn} is set forth and attenuation requirements are geared towards achieving that goal. HUD assumes that, using standard construction, any building will provide sufficient attenuation so that if the exterior level is 65 dBA L_{dn} or less, the interior level will be 45 dBA L_{dn} or less. It should be noted, however, that HUD regulations were created solely for residential development requiring government funding and are not related to the operation of other sensitive land uses such as schools or churches.

3. Federal Railroad Administration

The Environmental Protection Agency (EPA) is charged with the regulation of railroad noise under the Noise Control Act. No federal regulations specify absolute levels of acceptable noise that apply directly to railroad noise and compatible land uses along rail lines. While these regulations remain in full force, the EPA Office of Noise Abatement and Control was closed in 1982, leaving the enforcement of EPA regulations to the Federal Railroad Administration (FRA). Table N-2, Summary of EPA/FRA Railroad Noise Standards, summarizes the EPA railroad noise standards that set operating noise standards for railroad equipment and set noise limit standards for new equipment.

Table N-2
Summary of EPA/FRA Railroad Noise Standards

Noise Sources	*Operating Conditions*	*Noise Metric*[1, 2]	*Measured Distance (feet)*	*Standard (dBA)*
Non-Switcher Locomotives built on or before 12/31/79	Stationary	L_{max} (Slow)	100	73
	Idle Stationary	L_{max} (Slow)	100	93
	Non-Idle Moving	L_{ma}x (Fast)	100	95
Switcher Locomotives plus Non-Switcher Locomotives built after 12/31/79	Stationary	L_{max} (Slow)	100	70
	Idle Stationary	L_{max} (Slow)	100	87
	Non-Idle Moving	L_{max} (Fast)	100	90
Rail Cars	Speed $\leq$ 45 mph	L_{max} (Fast)	100	88
	Speed > 45 mph	L_{max} (Fast)	100	93
	Coupling	Adj. Avg. Max.	50	92

[1] Slow and fast exponential-time-weighting is used.
[2] Note that these values are in terms of the Lmax, and can be considerably greater than the Leq typically used in the measurement of obtrusive noise.
Source: United States Environmental Protection Agency Railroad Noise Emission Standard (40 Code of Federal Regulations Part 201).

4. California Department of Health Services

The California Department of Health Services (DHS) Office of Noise Control studied the correlation of noise levels and their effects on various land uses. As a result, the DHS established four categories for judging the severity of noise intrusion on specified land uses.

Figure N-1, Land Use Compatibility for Community Noise Exposure, presents a land use compatibility chart for community noise prepared by the California Office of Noise Control. It identifies “normally acceptable,” “conditionally acceptable,” “normally unacceptable,” and “clearly unacceptable” exterior noise levels for various land uses. A “conditionally acceptable” designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a “normally acceptable” designation indicates that standard construction can occur with no special noise reduction requirements.

Figure N-1 Land Use Compatibility for Community Noise Exposure

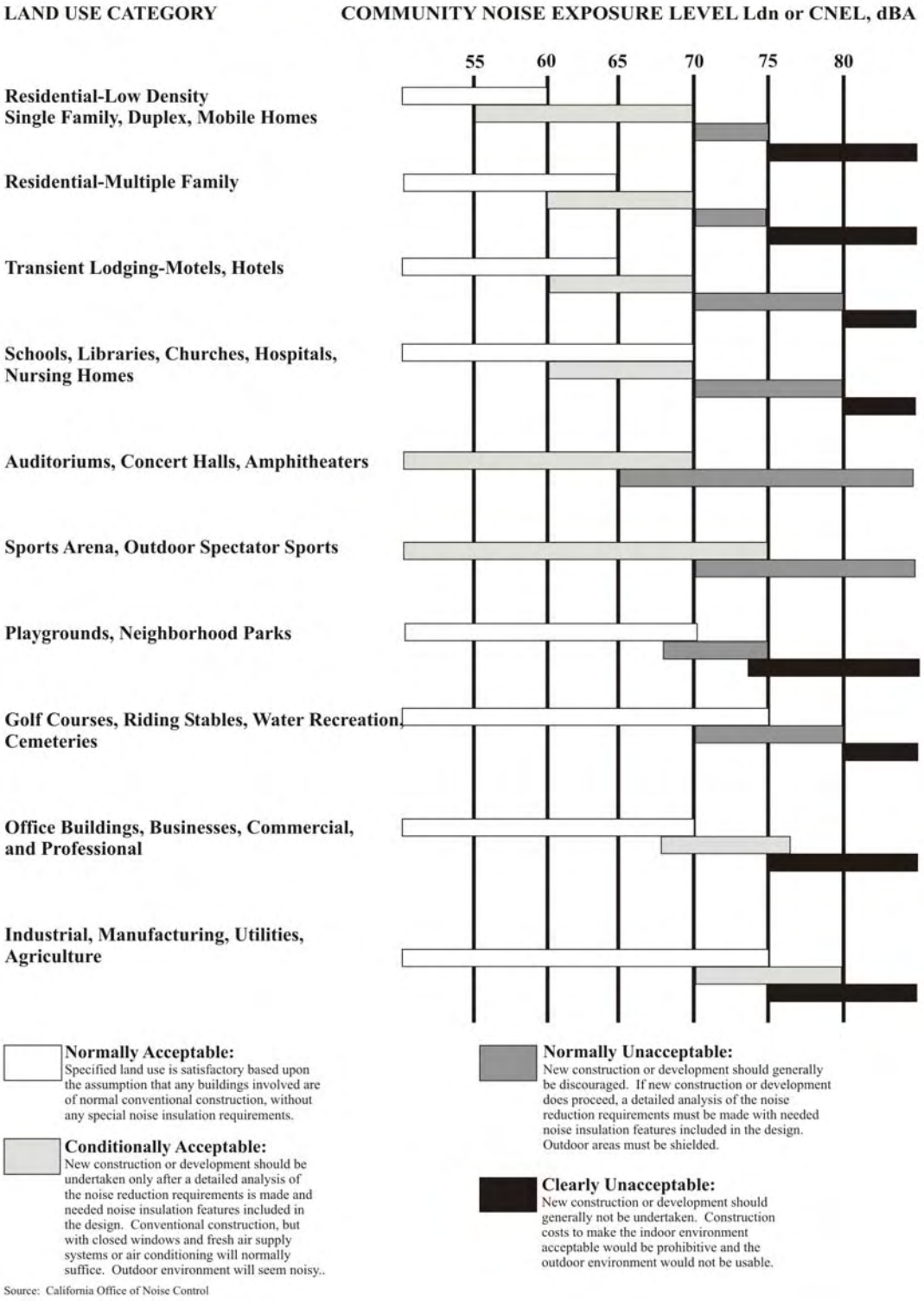


Table N-3, State of California Interior and Exterior Noise Standards, includes the State interior and exterior noise standards for varying land uses. It is important to note that the exterior noise levels are to be attained in "habitable" exterior areas and need not encompass the entirety of a property.

Table N-3
State of California Interior and Exterior Noise Standards

Land Use		*CNEL (dBA)*	
Categories	***Uses***	***Interior*** [1]	***Exterior*** [2]
Residential	Single and multi-family, duplex	45[3]	65
	Mobile homes	----	65[4]
Commercial	Hotel, motel, transient housing	45	---
	Commercial retail, bank, restaurant	55	---
	Office building, research and development, professional offices	50	---
	Amphitheater, concert hall, auditorium, movie theater	45	---
	Gymnasium (Multipurpose)	50	---
	Sports Club	55	---
	Manufacturing, warehousing, wholesale, utilities	65	---
	Movie Theaters	45	---
Institutional/ Public	Hospital, school classrooms/playgrounds	45	65
	Church, library	45	---
Open Space	Parks	---	65

[1] Indoor environment excluding: bathrooms, kitchens, toilets, closets, and corridors
[2] Outdoor environment limited to:

- Private yard of single-family dwellings
- Multi-family private patios or balconies accessed from within the dwelling (Balconies 6 feet deep or less are exempt)
- Mobile home parks
- Park picnic areas
- School playgrounds
- Hospital patios

[3] Noise level requirement with closed windows, mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code.
[4] Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

5. City of San Bernardino Noise Ordinance

The City of San Bernardino Noise Ordinance (Section 19.20.030.15 of the Development Code) specifies the maximum acceptable levels of noise for residential uses in the City. These standards indicate that exterior noise

levels at residential locations should not exceed a CNEL of 65 dB while interior levels shall not exceed an annual CNEL of 45 dB in any habitable room. Chapter 12, Airport Overlay District, of the Development Code provides additional noise standards related to the flight operations of the San Bernardino International Airport and Trade Center within the 65 dB noise contours.

Definitions

The following is a list of commonly used terms and abbreviations that may be found within this element or when discussing the topic of noise. It is important to become familiar with the definitions listed in order to better understand the importance of the Noise Element within the City of San Bernardino General Plan.

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

- **Intrusive Noise** – That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence, and tonal or informational content as well as the prevailing noise level.

- **dB (Decibel)** – The unit of measure that denotes the ratio between two quantities that are proportional to power; the number of decibels corresponding to the ratio of the two amounts of power is based on a logarithmic scale.

- **dBA (A-weighted decibel)** – The A-weighted decibel scale discriminates against upper and lower frequencies in a manner approximating the sensitivity of the human ear. The scale is based on a reference pressure level of 20 micropascals (zero dBA). The scale ranges from zero for the average least perceptible sound to about 130 for the average pain level.

- **L_{50}** – The A-weighted sound level that is exceeded 50% of the sample time. Alternatively, the A-weighted sound level that is exceeded 30 minutes in a 60-minute period (similarly, L_{10}, L_{25}, etc.). These values are typically used to demonstrate compliance with noise restrictions included in the City noise ordinance.

- **L_{eq} (Equivalent Energy Level)** – The average acoustic energy content of noise during the time it lasts. The L_{eq} of a time-varying

noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure, no matter what time of day they occur.

- **L_{dn} (Day-Night Average Level)** – The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of 10 decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m. Note: CNEL and Ldn represent daily levels of noise exposure averaged on an annual or daily basis, while Leq represents the equivalent energy noise exposure for a shorter time period, typically one hour.

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

- **Noise Contours** – Lines drawn around a noise source indicating equal levels of noise exposure. CNEL and L_{dn} are the metrics used in this document to describe annoyance due to noise and to establish land use planning criteria for noise.

- **Vibration** – Another community annoyance related to noise is vibration. As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized by displacement, velocity, and/or acceleration. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration.

  Vibration can be felt outdoors, but the perceived intensity of vibration impacts are much greater indoors, due to the shaking of the structure. Some of the most common sources of vibration come from trains and/or transit vehicles, construction equipment, airplanes, and large vehicles. Several land uses are especially sensitive to vibration, and therefore have a lower vibration threshold. These uses include, but are not limited to, concert halls, hospitals, libraries, vibration-sensitive research operations, residential areas, schools, and offices.

ACHIEVING THE VISION

As San Bernardino has developed and expanded its boundaries over time, there are numerous areas of the City that are impacted by noise. For instance, many residences are located near industrial areas or adjacent to busy streets or rail lines. The Citizens of San Bernardino are concerned about the effects of noise on their health and serenity and of the need to provide the range of uses needed to maintain a high quality of life.

There are several techniques to deal with noise impacts: applying noise attenuation techniques, limiting certain kinds of development near noise-producing land uses, implementing design and building techniques in site layouts and construction, and setting and enforcing standards for noise-producing land uses.

The Noise Element is responsive to our Vision because it represents our stated desires to:

- Manage and mitigate the impacts from truck traffic to decrease congestion and noise pollution;
- Locate future residential uses and other sensitive receptors away from existing noise sources; and
- Develop and employ measures to decrease the impacts associated with air and rail operations on sensitive receptors such as residences and schools.

GOALS AND POLICIES

The following presents the goals and policies for noise related issues in the City of San Bernardino planning area.

Land Use Planning and Design

As San Bernardino grows, the increases in population, employment, and tourist activity may generate more traffic and attract additional noise producing uses. Additionally, some undeveloped and underdeveloped areas are designated for land uses that may be noise-sensitive and are located in proximity to roadways, railroads, and transit facilities. As a result, land use compatibility in relation to noise is an important consideration in the planning and design process.

To identify potential mitigation to address noise abatement strategies, noise evaluations should be conducted when a proposed project places sensitive land uses and major noise generators within close proximity to each other. The City currently uses the project review process to identify potential noise issues and works with developers or landowners to apply site planning and other strategies to reduce noise impacts. A developer, for example, could take advantage of the natural shape and contours of a site to arrange buildings and other uses in a manner that would reduce, and possibly eliminate, noise impacts. Examples of other site and architectural techniques could include:

- Increasing the distance between noise source and receiver.
- Placing non-noise sensitive land uses such as parking lots, maintenance facilities and utility areas between the noise source and receiver.
- Using non-noise sensitive structures such as garages to shield noise-sensitive areas.
- Orienting buildings to shield outdoor spaces from a noise source.
- Locating bedrooms in residential developments on the side of the house facing away from major roads.

Goal 14.1	Ensure that residents are protected from excessive noise through careful land planning.

Policies:

14.1.1 Minimize, reduce, or prohibit, as may be required, the new development of housing, health care facilities, schools, libraries, religious facilities, and other noise sensitive uses in areas where existing or future noise levels exceed an Ldn of 65 dB(A) exterior and an Ldn of 45 dB(A) interior if the noise cannot be reduced to these levels. (LU-1)

14.1.2 Require that automobile and truck access to commercial properties abutting residential parcels be located at the maximum practical distance from the residential parcel. (LU-1)

14.1.3 Require that all parking for commercial uses abutting residential areas be enclosed within a structure, buffered by walls, and/or limited hours of operation. (LU-1)

14.1.4 Prohibit the development of new or expansion of existing industrial, commercial, or other uses that generate noise impacts on housing, schools, health care facilities or other sensitive uses above a Ldn of 65 dB(A). (LU-1)

Transportation Related Noise Sources

San Bernardino has long been a hub of transportation and includes several major highways (such as State Routes 18, 30, 330, and 66, as well as Interstates 10 and 215), major arterials, railways, and the San Bernardino International Airport and Trade Center. These transportation facilities, while important components to mobility and economic vitality, are the major contributors of noise in San Bernardino. Cost effective strategies to reduce their influence on the community noise environment are an essential part of the Noise Element.

Local government has little direct control of some of the transportation related noise at the source. These levels are set by state and federal agencies. However, the City does have some control over transportation noise that exceeds State and/or federal standards through the enforcement of the Municipal Code.

The most effective method the City has to mitigate transportation noise is through the application of noise barriers and site design review. The effect of a noise barrier is critically dependent on the distance between the noise source and the receiver. A noise barrier effect occurs when the barrier penetrates the "line of sight" between the source and receiver: the greater the penetration or height of the barrier, the greater the noise reduction. Additional attenuation can be achieved depending upon the source of transportation related noise.

1. Roadways

Roadways are a significant source of noise in the City. Sound emanates from vehicle engines and from the tires rolling over the pavement. One way the City can control vehicle noise is through speed reduction. A change of just 5 miles per hour can change the resultant noise by approximately one to two dBA. The difference in noise associated with a reduction of 10 miles per hour reduction could be roughly equivalent to reducing the traffic volume by one-half.

The City also has some control over traffic-generated noise through weight limitations and the designation of truck routes. Medium trucks, (i.e., those with a gross vehicle weight between 5 and 13.25 tons) produce as much acoustical energy as approximately 5 to 16 automobiles depending on the speed, with slower speeds demonstrating greater differential. Similarly, heavy trucks (i.e., those with a gross vehicle weight in excess of 13.25 tons) produce as much acoustical energy as 10 to 60 automobiles.

The City can further reduce traffic-generated noise by ensuring that street paving is maintained and bumps and dips are eliminated. Poor paving causes vehicles to bounce and this bouncing exacerbates the noise due to the rattling of the vehicle. Noise contours for the City's roadways and freeways are presented in Figure N-2, *Future Roadway Noise Contours*.

2. Aircraft

The San Bernardino International Airport (SBIA) accommodates cargo, airlines, and general aviation with the capacity to provide regional air traffic for domestic and international service, both commercial and cargo along with the necessary support facilities for major and smaller airlines.

Airport operations generate noise nuisances that could negatively impact nearby residences and businesses. The number of people exposed to airport noise should be minimized by limiting the development of sensitive land uses, such as residences, hospitals, and schools, within

Airport Noise Contours

As of the writing of this General Plan, the Airport Master Plan and the Comprehensive Land Use Plan (CLUP) for SBIA were in the process of being prepared. As a consequence, the precise noise contours were not available to include in this Plan. However, relative policies have been included in the General Plan. Upon adoption of the Airport Master Plan and CLUP, the new noise contours will be incorporated into Figure LU-4 of this General Plan.

specified noise contours. For planning purposes, federal and state laws have established well-defined regulations for acceptable noise levels with the basic criterion set at a maximum 65 decibel (dB) Community Noise Equivalent Level (CNEL) value. The noise contours for the San Bernardino International Airport are defined in the Comprehensive Land Use Plan (CLUP) for the SBIA and shown in Figure LU-4, San Bernardino International Airport Planning Boundaries. While there are some acceptable mitigation within the noise contours, avoidance by noise sensitive uses is often the best remedy. Conversely, those land uses with the fewest people or those that generate significant noise levels themselves (e.g. industrial uses), are ideally suited to locate within these noise contours.

Overflight creates another noise concern. An overflight is a distinctly visible and audible passage of an aircraft, not necessarily one that is directly overhead. Overflight often extends past the boundary of the defined CNEL contour and creates an annoyance. The SBIA has limited control of overflight impacts but provide policy guidance for minimizing these impacts in the CLUP.

Airport Related Policies in our General Plan

The San Bernardino International Airport (SBIA) influences many aspects of our community: from land use and economics, to circulation, noise, and safety. Accordingly, see related discussions/policies in the Land Use (Chapter 2) and Noise (Chapter 14) Chapters.

In addition, local helicopter air traffic is commonplace throughout the City. News and other helicopters (e.g., freeway traffic report helicopters) fly through the area. Helicopter use for fire and police and at hospitals is considered as an emergency activity and is addressed by FAA regulations. There are currently five heliports in San Bernardino (National Orange Show, Red Dog Properties, San Bernardino Community Hospital, SCE Eastern Division, and in the Tri-City area).

3. Railways

Another prevalent source of noise in the City is from railroad operations. Within the San Bernardino planning area, trains travel on three different rail lines that include: (1) The Cajon Pass Line; (2) The Main Line-Redlands, which extends eastward to the City of Redlands; and, (3) The Main Line-Colton, which extends westward to the City of Colton.

Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) also operate rail lines within the City. These rail lines include: (1) The Santa Fe Subdivision Two Line; (2) The Santa Fe Subdivision Three Line; and, (3) The Santa Fe Cajon Pass Line. Each route contributes a different level of noise to the City resulting from the different volumes of train traffic that occur on each line.

Railroad noise is dependant on a number of factors including the number of operations per day, the times these operations occur, the numbers of

engines and railcars, the speed, the type of rail (i.e., continuous or bolted), and whether at-grade rail crossings exist that require engineers to sound a warning horn. Noise contours for railway operations are presented in Figure N-2, *Future Roadway Noise Contours*.

Future Roadway Noise Contours

60 CNEL
65 CNEL
70 CNEL

City Boundary
Sphere of Influence Boundary

0' 7,000'

The City of
SAN BERNARDINO
General Plan

Figure N-2

Goal 14.2	Encourage the reduction of noise from transportation-related noise sources such as motor vehicles, aircraft operations, and railroad movements.

Policies:

14.2.1 Work with Caltrans to landscape or install mitigation elements along freeways and highways adjacent to existing residential subdivisions or noise-sensitive uses to reduce noise impacts. (N-1)

14.2.2 Employ noise mitigation practices when designing future streets and highways, and when improvements occur along existing road segments. Mitigation measures should emphasize the establishment of natural buffers or setbacks between the arterial roadways and adjoining noise-sensitive areas. (N-1)

14.2.3 Require that development that increases the ambient noise level adjacent to noise-sensitive land uses provide appropriate mitigation measures. (LU-1)

14.2.4 Maintain roadways so that the paving is in good condition and free of cracks, bumps, and potholes. (A-2)

14.2.5 Require sound walls, berms, and landscaping along existing and future highways and railroad right-of-ways to beautify the landscape and reduce noise. (N-1)

14.2.6 Buffer residential neighborhoods from noise caused by train operations and increasing high traffic volumes along major arterials and freeways. (N-1)

14.2.7 Require heliports/helistops to comply with Federal Aviation Administration standards.

14.2.8 Minimize noise attributable to vehicular travel in residential neighborhoods by inhibiting through trips by the use of cul-de-sacs, one-way streets, and other traffic controls.

14.2.9 Enforce sections of the California Vehicle Code related to mufflers and modified exhaust systems.

14.2.10 Provide for the development of alternate transportation modes such as bicycle paths and pedestrian walkways to minimize the number of automobile trips. (LU-1)

14.2.11 Require that new equipment and vehicles purchased by the City comply with noise performance standards consistent with the best available noise reduction technology. (A-3)

14.2.12 Require that commercial and industrial uses implement transportation demand management programs consistent with the Air Quality Management Plan that provide incentives for car pooling, van pools, and the use of public transit to reduce traffic and associated noise levels in the City. (LU-1)

14.2.13 Work with local agencies and businesses to provide public transit services that reduce traffic and associated noise.

14.2.14 Work with public transit agencies to ensure that the buses, vans, and other vehicles used do not generate excessive noise levels.

14.2.15 Work with all railroad operators in the City to properly maintain lines and establish operational restrictions during the early morning and late evening hours to reduce impacts in residential areas and other noise sensitive areas.

14.2.16 Work with all railroad operators to install noise mitigation features where operations impact existing adjacent residential or other noise-sensitive uses.

14.2.17 Ensure that new development is compatible with the noise compatibility criteria and noise contours as defined in the Comprehensive Land Use Plan for the SBIA and depicted in Figure LU-4.

14.2.18 Limit the development of sensitive land uses located within the 65 decibel (dB) Community Noise Equivalent Level (CNEL) contour, as defined in the Comprehensive Land Use Plan for the SBIA and depicted in Figure LU-4.

14.2.19 As may be necessary, require acoustical analysis and ensure the provision of effective noise mitigation measures for sensitive land uses, especially residential uses, in areas significantly impacted by noise.

Non-Transportation Related Noise Sources

The City currently has a diverse collection of land uses, most of which generate their own noise. Industrial facilities generate noise through various processes that involve the use of heavy equipment and machinery. Commercial facilities and residential units can generate noise from the use of heating, ventilating, air conditioning (HVAC) units, pool and spa pumps, as well as landscape maintenance equipment. Additionally, schoolyard activities, barking dogs, and residential parties can also be sources of nuisance noise.

Mixed-use areas that place more sensitive residential uses alongside or above commercial uses can present their own problems. Requiring that the commercial aspect meet a residential standard could make commercial operations difficult and offer an unfair competitive advantage to a similar operation placed in a dedicated commercial zone. Alternatively, applying a commercial standard to a mixed-use project could result in unacceptable noise levels at the residential portion of the structure/site. Still, mixed-use projects offer several advantages from both an air quality and transportation perspective, and should be encouraged.

Another source of noise comes from the operations of trucks and trains within the City. As previously mentioned, the operation of railroad trains and heavy trucks is preempted from local noise regulation while operating on public roads and dedicated right-of-ways. However, noise is also generated by operations (e.g., idling, loading, and unloading) that occur at facilities. Once on private property, these sources are no longer considered preempted and the City has authority to regulate this noise if it "spills" into adjacent areas.

Finally, construction in all land use zones can temporarily elevate noise. The City recognizes that construction is a necessity; still, various measures are available to reduce this nuisance (and potentially hazardous) noise when necessary.

Goal 14.3 Protect residents from the negative effects of "spill over" or nuisance noise.

Policies:

14.3.1 Require that construction activities adjacent to residential units be limited as necessary to prevent adverse noise impacts. (LU-1)

14.3.2 Require that construction activities employ feasible and practical techniques that minimize the noise impacts on adjacent uses. (LU-1)

14.3.3 Adopt and enforce a standard for exterior noise levels for all commercial uses that prevents adverse levels of discernible noise on adjoining residential properties. (A-1)

14.3.4 Adopt and enforce a standard for exterior noise levels from the use of leaf blowers, motorized lawn mowers, parking lot sweepers, or other high-noise equipment on commercial properties if their activity will result in noise that adversely affects abutting residential parcels. (A-1)

14.3.5 Require that the hours of truck deliveries to commercial properties abutting residential uses be limited unless there is no feasible alternative or there are overriding transportation benefits by scheduling deliveries at another hour. (LU-1)

14.3.6 Ensure that buildings are constructed soundly to prevent adverse noise transmission between differing uses located in the same structure and individual residences in multi-family buildings. (LU-1)

14.3.7 Require that commercial uses in structures containing residences on upper floors not be noise intensive. (LU-1)

14.3.8 Require common walls and floors between commercial and residential uses be constructed to minimize the transmission of noise and vibration. (LU-1)

APPENDIX 3.2:

CITY OF SAN BERNARDINO MUNICIPAL CODE

This page intentionally left blank

Title 8[1]
HEALTH AND SAFETY

Chapters:

8.01 Environmental Health Code (EHC).
8.02 Inspection Grading of Food Establishments.
8.03 Apiaries.
8.05 Collection of Rent for Buildings Ordered Vacated.
8.06 Distribution of Medicine, Pills or Drugs.
8.07 (Repealed by MC-460, 1985).
8.09 Treatment of Wounded Persons.
8.12 (Repealed by MC-460, 1985).
8.15 Litter.
8.18 Accumulation of Combustible and Noncombustible Materials.
8.21 (Repealed by MC-1232, 10-02-06)
8.24 Refuse and Solid Waste.
8.25 Scrap Tires.
8.27 Nuisances.
8.30 Public Nuisances.
8.33 (Repealed by MC-807, 1991).
8.35 (Repealed by MC-1260, 12-03-07)
8.36 Abandoned Vehicles.
8.38 Signs on Vacant Properties.
8.39 Seizure and Forfeiture of Nuisance Vehicles
8.42 (Repealed by MC-613, 12-7-87).
8.45 (Repealed by MC-613, 12-7-87).
8.48 Hotels and Lodging Houses.
8.50 Venereal Diseases.
8.51 Mufflers.
8.54 Noise Control.
8.57 Sound Vehicles.
8.60 Fireworks.
8.61 Prohibited Fireworks.
8.63 Explosives and Fires.
8.65 Destruction of weapons.
8.66 Moving of Buildings and Oversize Loads.
8.68 Etching Cream, Aerosol Containers and Certain Marker Pens.
8.69 Graffiti.
8.72 (Repealed by MC-1121, 3-18-02).
8.73 Smoking
8.75 (Repealed by MC-511, 4-21-86).
8.78 Automatic Dialing and Taped Message Alarm Systems.
8.80 Storm Water Drainage System.
8.81 Security Alarm Systems.
8.82 Establishment of Extraordinary Law Enforcement Services.
8.84 Castor Bean Plants.
8.87 Railroad Companies.
8.90 Mobile Home Rents.
8.93 Bicycles Prohibited in Certain Public Buildings.

---

[1]For charter provisions authorizing the Common Council to make and enforce all such local, police, sanitary and regulations as pertain to municipal affairs, see Charter §40(b).

any stationary engine driven by means of internal combustion of gases therein, within the City of San Bernardino without placing upon the exhaust thereof a muffler or other device so as to silence the noise or report caused by the escaping of such gases from and through such exhaust. (Ord. 465 §1, 9-5-11.)

8.51.020 Violation - Penalty.

Any person, firm or corporation violating any provision of this chapter is guilty of an infraction, which upon conviction thereof is punishable in accordance with the provisions of §1.12.010 of this Code. (Ord. MC-460, 5-13-85; Ord. 465 §2, 9-5-11.)

Chapter 8.54
NOISE CONTROL

Sections:

8.54.010 Purpose and Intent.
8.54.020 Prohibited Acts.
8.54.030 Issuance of Written Notice and Impoundment.
8.54.040 Cost Recovery for Second Response.
8.54.050 Controlled Hours of Operation.
8.54.060 Exemptions.
8.54.070 Disturbances From Construction Activity.
8.54.080 Violation - Penalty
8.54.090 Severability.

8.54.010 Purpose and Intent.

A. It is the purpose and intent of these regulations to establish community-wide noise standards. It is further the purpose of these regulations to recognize that the existence of excessive noise within the City is a condition which is detrimental to the health, safety, welfare, and quality of life of the citizens and shall be regulated in the public interest.

B. In furtherance of the foregoing purpose, it is found and declared as follows:

1. The making, creation, or maintenance of such loud, unnecessary, unnatural, or unusual noises that are prolonged, unusual, annoying, disturbing and unnatural in their time, place, and use are a detriment to public health, comfort, convenience, safety, general welfare, and the peace and quiet of the City and its inhabitants; and

2. The public interest and necessity of 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, comfort, convenience, safety, general welfare and property, and the peace and quiet of the City and its inhabitants.

(Ord. MC-1246, 5-21-07; Ord. 1925 §1, 11-5-51.)

8.54.020 Prohibited Acts.

It shall be unlawful for any person to engage in the following activities:

A. Sounding any horn or signal device on any automobile, motorcycle, bus, or other motor vehicle in any other manner or circumstances or for any other purpose than required or permitted by the California Vehicle Code, or other laws, for an unnecessary or unreasonable period of time;

B. Racing the engine of any motor vehicle while the vehicle is not in motion, except when necessary to do so in the course of repairing, adjusting, or testing the same.

C. Operating or permitting the use of any motor vehicle on any public right-of-way or public place or on private property within a residential zone for which the exhaust muffler, intake muffler, or any other noise abatement device has been modified or changed in a manner such that the noise emitted by the motor vehicle is increased above that emitted by the vehicle as originally manufactured.

D. Using, operating, or permitting to be played, used or operated any radio receiving set, musical instrument, phonograph, or other sound amplification or production equipment for producing or reproducing sound in such a manner as to disturb the peace, quiet, or comfort of neighboring persons, or at any time with louder volume than is necessary for the convenient hearing of the person or persons who are in the room, vehicle, or other enclosure in which such machine or device is operated, and who are voluntary listeners thereto and that is:

1. Plainly audible across property boundaries;

2. Plainly audible through partitions common to two residences within a building;

3. Plainly audible at a distance of 50 feet in any direction from the source of the music or sound between the hours of 8:00 a.m. and 10:00 p.m.; or

4. Plainly audible at a distance of 25 feet in any direction from the source of the music or sound between the hours of 10:00 p.m. and 8:00 a.m.

E. The intentional sounding or permitting the sounding outdoors of any fire, burglar, or civil defense alarm, siren, whistle, or any motor vehicle burglar alarm, except for emergency purposes or for testing, unless such alarm is terminated within fifteen minutes of activation.

F. Yelling, shouting, whistling, or singing in a loud and boisterous manner on the public streets so as to disturb the quiet, comfort, or repose of persons in any office, dwelling, hotel, or other type of residence, or neighborhood.

G. The keeping of any animal, fowl, or bird which by causing frequent or long continued noise disturbs the comfort, quiet, or repose of any person or neighborhood.

H. The unnecessary or excessive blowing of whistles, sounding of horns, ringing of bells, or use of signaling devices by operators of trains, motor trucks, and other transportation equipment.

I. The creation of loud and excessive noise in connection with the loading or unloading of motor trucks and other vehicles.

J. The shouting and crying of peddlers, hawkers, and vendors which disturbs the peace and quiet of any considerable number of persons or neighborhood.

K. The doing of automobile, automotive body or fender repair work, or other work on metal objects and metal parts in a residential district so as to cause loud and excessive noise which disturbs the peace, quiet, and repose of any person occupying adjoining or closely situated property or neighborhood.

L. The operation or use between the hours of 10:00 p.m. and 8:00 a.m. of any pile driver, steam shovel, pneumatic hammers, derrick, steam or electric hoist, power driven saw, or any other tool or apparatus, the use of which is attended by loud and excessive noise, except with the approval of the City.

M. Creating excessive noise adjacent to any school, church, court, or library while the same is in use, or adjacent to any hospital or care facility, which unreasonably interferes with the workings of such institution, or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets indicating the presence of a school, institution of learning, church, court, or hospital.

N. Making or knowingly and unreasonably permitting to be made any unreasonably loud, unnecessary, or unusual noise that disturbs the comfort, repose, health, peace and quiet, or which causes discomfort or annoyance to any reasonable person of normal sensitivity. The characteristics and conditions that may be considered in determining whether this section has been violated include, but are not limited to, the following:

1. The level of noise;

2. The level of background noise;

3. The proximity of the noise to sleeping facilities;

4. The nature and zoning of the areas within which the noise emanates;

5. The density of the inhabitation of the area within which the noise emanates;

6. The time of day or night the noise occurs;

7. The duration of the noise;

8. Whether the noise is recurrent, intermittent, or constant; and

9. Whether the noise is produced by a commercial or noncommercial activity.

(Ord. MC-1246, 5-21-07; Ord. 2102, 1956; Ord. 1925 §2, 1951.)

8.54.030 Issuance of Written Notice and Impoundment.

A. Any officer who encounters a violation of this section may issue a written notice to the Responsible Person demanding immediate abatement of the violation. The written notice shall inform the recipient that a second violation of the same provision within a seventy two (72) hour period may result in the issuance of a criminal citation, the imposition of criminal and civil penalties, and confiscation and impoundment, as evidence, of the components that are amplifying or transmitting the prohibited noise.

1. Responsible Person means (a) any person who owns, leases, or is lawfully in charge of the property or motor vehicle where the noise violation takes place, or (b) any person who owns or controls the source of the noise or violation. If the Responsible Person is a minor, then the parent or guardian who has custody of the child at the time of the violation shall be the Responsible Person who is liable under this chapter.

B. Any officer who encounters a second violation of this chapter within a seventy two (72) hour period following the issuance of a written notice is empowered to confiscate and impound, as evidence, any or all of the components amplifying or transmitting the sound. The immediate confiscation of a motor vehicle to which a component is attached may be made if the same may not be removed without causing harm to the vehicle or component.

C. Any person claiming legal ownership of the items confiscated and impounded under this chapter may request the return of the item by filing a written request with the police department within seven (7) calendar days of the confiscation. Such requests shall be processed in accordance with the procedures adopted by the department.

(Ord. MC-1246, 5-21-07; Ord. MC-649, 1-3-89; Ord. 1925 §3, 1951.)

8.54.040 Cost Recovery for Second Response.

A. Whenever any officer issues a written notice to a responsible person to discontinue a noise violation, the Responsible Person shall be liable for the actual cost of each subsequent response required to abate the violation within seventy two (72) hours of the issuance of the written warning.

B. The bill for the response charge shall be served upon the Responsible Person within thirty (30) days after the violation. If the Responsible Person has no last known business or residence address, the location of the violation shall be deemed to be the proper address for service. The bill shall include a notice of the right of the person being charged to request a hearing to dispute the imposition of the response charge or the amount of the charge.

C. The response charge shall be deemed to be a civil debt to the City.
(Ord. MC-1246, 5-21-07; Ord. MC-460, 5-13-85; Ord. 1925 §5, 1951.)

8.54.050 Controlled Hours of Operation.

It shall be unlawful for any person to engage in the following activities other than between the hours of 8:00 a.m. and 8:00 p.m. in residential zones and other than between the hours of 7:00 a.m. and 8:00 p.m. in all other zones:

A. Operate or permit the use of powered model vehicles and planes.

B. Load or unload any vehicle, or operate or permit the use of dollies, carts, forklifts, or other wheeled equipment that causes any impulsive sound, raucous, or unnecessary noise within one thousand (1,000) feet of a residence.

C. Operate or permit the use of domestic power tools, or machinery or any other equipment or tool in any garage, workshop, house, or any other structure.

D. Operate or permit the use of gasoline or electric powered leaf blowers, such as commonly used by gardeners and other persons for cleaning lawns, yards, driveways, gutters, and other property.

E. Operate or permit the use of privately operated street/parking lot sweepers or vacuums, except that emergency work and/or work necessitated by unusual conditions may be performed with the written consent of the City Manager.

F. Operate or permit the use of electrically operated compressor, fan, and other similar devices.

G. Operate or permit the use of any motor vehicle with a gross vehicle weight rating in excess of ten thousand (10,000) pounds, or of any auxiliary equipment attached to such a vehicle, including, but not limited to, refrigerated truck compressors for a period longer than fifteen (15) minutes in any hour while the vehicle is stationary and on a public right-of-way or public space except when movement of said vehicle is restricted by other traffic.

H. Repair, rebuild, reconstruct, or dismantle any motor vehicle or other mechanical equipment or devices in a manner so as to be plainly audible across property lines.
(Ord. MC-1246, 5-21-07)

8.54.060 Exemptions.

The following activities and noise sources shall be exempt from the provisions of this chapter:

A. The use of horns, sirens, or other signaling or warning devices by persons vested with legal authority to use the same, and in pursuit of their lawful duties, such as on ambulances, fire, police, or other governmental or official equipment.

B. Such noises as are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose, except where there is evidence that such noise is a nuisance and that such a nuisance is a result of the employment of unnecessary and injurious methods of operation.

C. Activities conducted on the grounds of any public or private school during regular hours of operation.

D. Outdoor gatherings, public dances, shows, and sporting and entertainment events provided said events are authorized by the City.

E. Activities conducted at public spaces during regular hours of operation.

F. Any mechanical devices, apparatus, or equipment used, related to, or connected with emergency machinery, vehicle, or work.

G. Construction, repair, or excavation necessary for the immediate preservation of life or property.

H. Construction, operation, maintenance, and repairs of equipment, apparatus, or facilities of park and recreation departments, public work projects, or essential public services and facilities, including, but not limited to, trash collection and those of public utilities subject to the regulatory jurisdiction of the California Public Utilities Commission.

I. Construction, repair, or excavation work performed pursuant to a valid written agreement with the City, or any of its political subdivisions, which provides for noise mitigation measures.

J. Any activity to the extent that regulation thereof has been preempted by State or Federal law.

K. Sounds generated in connection with speech or communication protected by the United States Constitution or the California Constitution, except to the extent such sounds are subject to permissible time, place, and manner restrictions.

(Ord. MC-1246, 5-21-07)

8.54.070 Disturbances from Construction Activity.

No person shall be engaged or employed, or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and 8:00 p.m. (Ord. MC-1246, 5-21-07)

8.54.080 Violation - Penalty.

Any person violating any of the provisions of this Chapter is guilty of an infraction or a misdemeanor, which upon conviction thereof is punishable in accordance with the provisions of Section 1.12.010 of this code. (Ord. MC-1246, 5-21-07)

8.54.090 Severability.

The provisions of this Chapter are severable, and, if any sentence, section or other part of this Chapter should be found to be invalid, such invalidity shall not affect the remaining provisions, and the remaining provisions shall continue in full force and effect. (Ord. MC-1246, 5-21-07)

Chapter 8.57
SOUND VEHICLES

Sections:

8.57.010 Definitions.
8.57.020 Exclusions and exceptions.
8.57.030 Sound vehicles prohibited in certain places.
8.57.040 Registration required.
8.57.050 Filing changes in application.
8.57.060 Registration and identification.
8.57.070 Regulation for use.
8.57.080 Commercial advertising by sound truck prohibited.
8.57.090 Violation-Penalty.

8.57.010 Definitions.

A. "Person" as used in this Chapter includes the singular and the plural and also means and includes any person, firm, corporation, association, club, partnership, society or any other form of association or organization.

B. "Sound vehicle" means any vehicle which carries or is equipped with any instrument or device for the production or reproduction of music, spoken words or other sounds, or any loudspeaker, or other sound-amplifying device designed to enlarge the volume of sound produced by any instrument or by the human voice, which instrument or device is used or intended to be used for the purpose of advertising or calling attention to any article, thing or event, or for the purpose of addressing the public or of attracting the attention of the public, along or upon the public streets or ways along which such vehicle travels.

(Ord. 2096 §1, 1956.)

8.57.020 Exclusions and exceptions.

The definition set forth in Section 8.57.010 shall not be deemed to include:

A. Vehicles used only in a parade conducted pursuant to a permit issued by the Common Council;

B. A vehicle equipped with a siren or horn designed and used for the purpose of warning traffic because of such equipment or use, nor any vehicle operated

ARTICLE III - GENERAL

CHAPTER 19.20
PROPERTY DEVELOPMENT STANDARDS

Section | Page

19.20.010 Purpose III-19.20-1
19.20.020 Applicability III-19.20-1
19.20.030 General Standards III-19.20-1

Tables

20.01 Fences, Walls, Hedges Height and Type Limits III-19.20-8

19.20.010 PURPOSE

These standards shall ensure that new or modified uses and development will produce an urban environment of stable, desirable character which is harmonious with the existing and future development, consistent with the General Plan.

19.20.020 APPLICABILITY

Any permit which authorizes new construction or modifications to an existing structure in excess of 25% of the structure floor area shall be subject to the standards set forth in this Chapter.

19.20.030 GENERAL STANDARDS

No permit shall be approved unless it conforms to all of the following standards set forth in this Chapter:

1. Access
2. Additional Height Restrictions
3. Antennae, Satellite Dish and Telecommunications Facilities
4. Design Considerations
5. Dust and Dirt
6. Environmental Resources/Constraints
7. Exterior Building Walls
8. Fences and Walls
9. Fire Protection
10. Fumes, Vapor and Gases
11. Glare
12. Hazardous Materials
13. Height Determination (Buildings and Structures)
14. Lighting
15. Noise
16. Odor
17. Projections into Setbacks
18. Public Street Improvements
19. Radioactivity
20. Refuse Storage/Disposal
21. Screening
22. Signs, Off-Street Parking, Off-Street Loading, and Landscaping
23. Solar Energy
24. Storage
25. Toxic Substances
26. Transportation Control Measures (TCM)
27. Underground Utilities
28. Vibration

MC 890 1/20/94, MC 1056 10/8/99

15. NOISE

No loudspeaker, bells, gongs, buzzers, mechanical equipment or other sounds, attention-attracting, or communication device associated with any use shall be discernible beyond any boundary line of the parcel, except fire protection devices, burglar alarms and church bells. The following provisions shall apply:

A. In residential areas, no exterior noise level shall exceed 65dBA and no interior noise level shall exceed 45dBA.

B. All residential developments shall incorporate the following standards to mitigate noise levels:

1. Increase the distance between the noise source and receiver.

2. Locate land uses not sensitive to noise (i.e., parking lots, garages, maintenance facilities, utility areas, etc.) between the noise source and the receiver.

3. Bedrooms should be located on the side of the structure away from major rights-of-way.

4. Quiet outdoor spaces may be provided next to a noisy right-of-way by creating a U-shaped development which faces away from the right-of-way.

C. The minimum acceptable surface weight for a noise barrier is four pounds per square foot (equivalent to ¾-inch plywood). The barrier shall be of a continuous material which is resistant to sound including:

1. Masonry block
2. Precast concrete
3. Earth berm or a combination of earth berm with block concrete.

D. Noise barriers shall interrupt the line-of-sight between noise source and receiver.

16. ODOR

No use shall emit any obnoxious odor or fumes.

17. PROJECTIONS/CONSTRUCTION AND EQUIPMENT PERMITTED INTO SETBACKS

The following list represents the only projections, construction, or equipment that shall be permitted within the required setbacks:

A. Front Setback: Roof overhangs, fireplace chimney, awnings & canopies

APPENDIX 5.1:

STUDY AREA PHOTOS

This page intentionally left blank

L1
34, 5' 44.033000", 117, 16' 54.495000"

L1_N
34, 5' 44.033000", 117, 16' 54.495000"

L1_S
34, 5' 44.033000", 117, 16' 54.495000"

L1_W
34, 5' 44.033000", 117, 16' 54.495000"

L2
34, 5' 50.241000", 117, 16' 53.900000"

L2_E
34, 5' 50.241000", 117, 16' 53.900000"

L2_N
34, 5' 50.241000", 117, 16' 53.900000"

L2_S
34, 5' 50.241000", 117, 16' 53.900000"

L2_SE
34, 5' 50.241000", 117, 16' 53.900000"

L2_W
34, 5' 50.241000", 117, 16' 53.900000"

L3
34, 5' 49.877000", 117, 16' 44.311000"

L3_N
34, 5' 49.877000", 117, 16' 44.311000"

L3_NE
34, 5' 49.877000", 117, 16' 44.311000"

L3_NE2
34, 5' 49.877000", 117, 16' 44.311000"

L3_NW
34, 5' 49.877000", 117, 16' 44.311000"

L3_S
34, 5' 49.877000", 117, 16' 44.311000"

L3_SE
34, 5' 49.877000", 117, 16' 44.311000"

L3_W
34, 5' 49.877000", 117, 16' 44.311000"

L4
34, 5' 57.483000", 117, 16' 33.856000"

L4_N
34, 5' 57.483000", 117, 16' 33.856000"

L4_S
34, 5' 57.483000", 117, 16' 33.856000"

L4_SE
34, 5' 57.483000", 117, 16' 33.856000"

L4_W
34, 5' 57.483000", 117, 16' 33.856000"

L5
34, 6' 0.046000", 117, 16' 40.042000"

L5_SW
34, 6' 0.046000", 117, 16' 40.042000"

L5_W
34, 6' 0.046000", 117, 16' 40.042000"

This page intentionally left blank

APPENDIX 5.2:

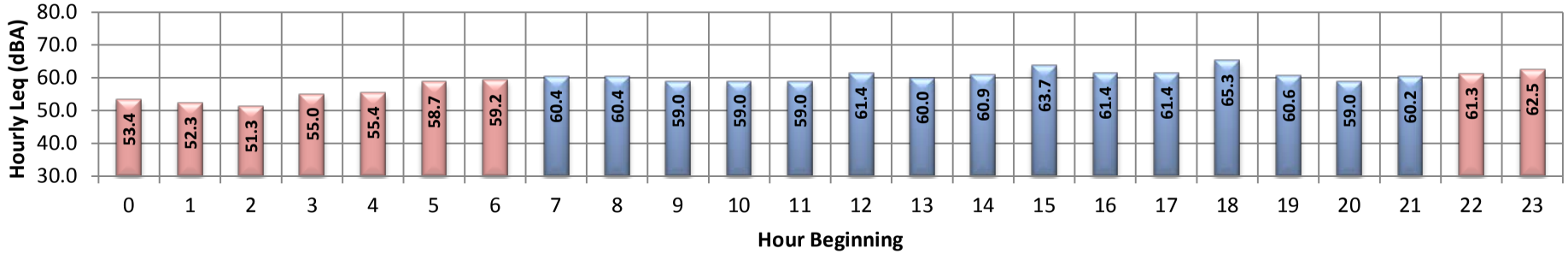
NOISE LEVEL MEASUREMENT WORKSHEETS

This page intentionally left blank

24-Hour Noise Level Measurement Summary

Project Name:	Waterman Avenue High Cube Warehouse	*JN:*	9178	*Energy Average Leq*		*24-Hour*
Location:	L1 - Located on Allen Street south of Valley Street near existing residential dwellings.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/6/2014	61.2	58.2	65.5

Hourly Leq dBA Readings (unadjusted)



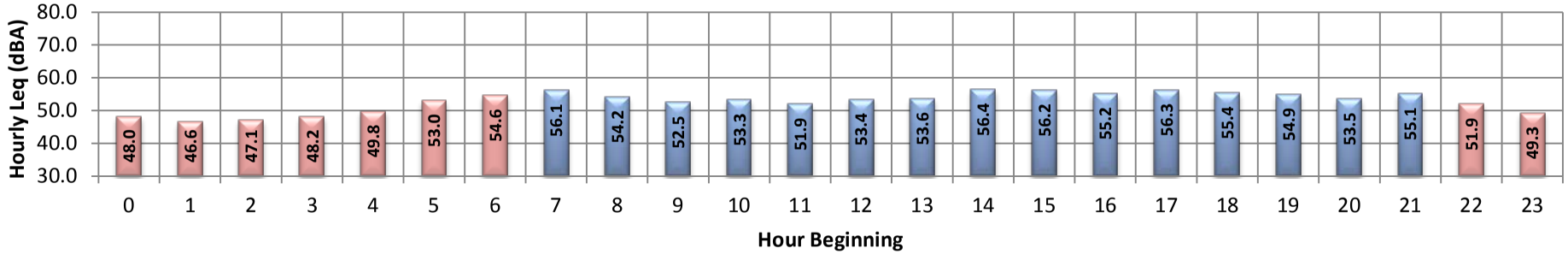
Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	59.0	78.6	42.3	72.0	69.5	64.0	59.5	49.5	46.5	44.0	43.5	43.0
	Max	65.3	91.3	47.3	75.0	72.0	68.5	66.0	55.5	52.0	49.0	48.5	48.0
Night	Min	51.3	73.7	42.5	56.5	51.5	50.0	49.5	48.0	46.0	44.0	43.5	43.0
	Max	62.5	90.4	47.1	74.5	71.0	66.5	63.5	54.0	51.5	49.5	48.5	48.0
Hourly Summary													
Night	0	53.4	76.7	46.4	64.5	57.5	51.5	50.0	49.0	48.5	47.5	47.5	47.0
	1	52.3	73.7	45.1	63.0	55.5	51.5	51.0	50.0	49.5	47.0	46.5	46.0
	2	51.3	78.1	44.9	56.5	51.5	50.0	49.5	48.5	48.0	46.5	46.0	45.5
	3	55.0	78.8	44.3	68.0	61.5	52.5	50.0	48.0	47.5	45.5	45.5	45.0
	4	55.4	76.4	44.4	69.0	65.5	57.5	53.5	49.0	48.5	45.5	45.5	45.0
	5	58.7	84.1	43.6	71.5	68.0	62.0	58.5	49.5	48.0	45.5	45.0	44.5
	6	59.2	80.8	42.5	73.0	70.5	64.0	61.0	49.5	46.0	44.0	43.5	43.0
Day	7	60.4	79.5	42.3	73.0	71.5	67.5	63.5	51.0	46.5	44.0	43.5	43.0
	8	60.4	80.8	42.4	73.5	71.0	67.0	63.5	51.5	47.0	44.0	43.5	43.0
	9	59.0	80.5	42.9	72.5	70.5	64.0	59.5	49.5	46.5	44.5	44.5	43.5
	10	59.0	78.6	42.4	72.0	69.5	65.0	61.5	51.0	47.5	44.0	43.5	43.0
	11	59.0	80.9	43.6	72.5	69.5	64.5	60.5	50.5	47.0	45.0	44.5	44.0
	12	61.4	80.6	44.1	74.0	72.0	68.5	65.5	54.0	49.5	46.0	45.5	45.0
	13	60.0	79.2	43.5	73.0	70.5	66.5	63.0	53.5	49.0	45.5	45.0	44.5
	14	60.9	80.3	43.5	73.5	71.5	68.0	65.0	53.0	48.0	45.0	44.0	43.5
	15	63.7	90.5	44.3	74.0	72.0	68.5	66.0	55.0	49.5	46.5	46.0	45.0
	16	61.4	83.9	45.3	73.5	72.0	68.5	66.0	55.0	49.5	47.0	46.5	45.5
	17	61.4	79.9	47.0	73.5	72.0	68.5	66.0	55.5	51.0	48.5	48.0	47.5
	18	65.3	91.3	47.3	75.0	71.5	66.5	63.0	53.5	51.0	49.0	48.5	48.0
	19	60.6	80.9	46.3	73.5	70.5	66.0	62.5	55.0	52.0	48.5	48.0	47.0
	20	59.0	79.4	45.9	72.0	69.5	64.0	60.0	51.5	49.5	47.5	47.0	46.5
	21	60.2	80.4	46.7	72.5	70.5	66.5	63.0	53.0	50.5	48.5	48.0	47.5
Night	22	61.3	82.0	46.9	74.5	71.0	66.5	63.5	54.0	51.5	49.5	48.5	48.0
	23	62.5	90.4	47.1	72.0	69.5	64.0	59.0	52.0	51.0	48.5	48.0	47.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Waterman Avenue High Cube Warehouse	*JN:*	9178	*Energy Average Leq*		*24-Hour*
Location:	L2 - Located west of the Project site on Allen Street in a vacant lot near existing residential dwellings.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/6/2014	54.8	50.7	58.5

Hourly Leq dBA Readings (unadjusted)



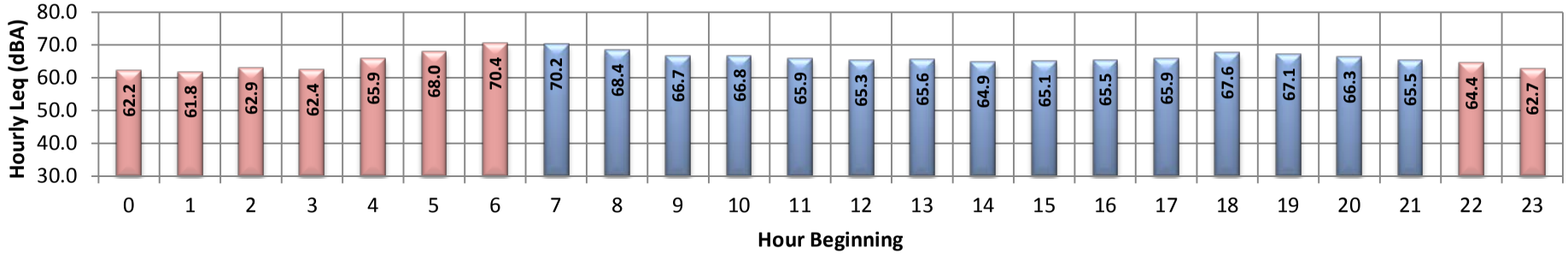
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	51.9	71.8	39.7	65.0	62.5	56.5	53.0	46.5	44.0	42.0	41.5	40.5
	Max	56.4	81.7	45.4	68.0	66.0	62.5	60.5	53.0	50.0	47.5	47.0	46.0
Night	Min	46.6	68.8	39.7	54.0	50.5	48.5	47.0	43.5	42.0	40.5	40.5	40.0
	Max	54.6	78.4	42.3	67.5	65.5	59.0	55.5	49.0	46.5	44.0	43.5	43.0
Hourly Summary													
Night	0	48.0	69.4	39.7	57.5	53.0	48.5	47.0	45.0	44.0	42.5	42.0	41.0
	1	46.6	68.8	40.3	54.0	50.5	48.5	47.5	45.5	43.5	41.5	41.0	40.5
	2	47.1	71.3	40.3	54.0	52.5	48.5	47.0	44.5	43.5	41.5	41.5	41.0
	3	48.2	71.9	39.7	60.0	55.0	50.0	47.5	43.5	42.0	40.5	40.5	40.0
	4	49.8	70.2	39.8	63.5	59.5	53.5	49.5	44.5	43.0	41.0	41.0	40.5
	5	53.0	78.4	41.7	63.5	59.5	54.0	52.0	48.0	46.5	44.0	43.5	42.5
	6	54.6	75.6	42.3	67.5	65.5	59.0	55.5	49.0	46.0	44.0	43.5	43.0
Day	7	56.1	81.7	41.8	67.5	64.5	59.5	56.0	50.5	47.5	43.5	43.0	42.5
	8	54.2	72.7	41.3	66.5	64.5	60.5	57.5	49.5	46.0	43.0	42.5	42.0
	9	52.5	73.3	41.7	65.0	63.0	58.0	54.5	47.5	45.0	43.0	42.5	42.0
	10	53.3	73.7	39.7	65.5	63.0	59.0	55.5	48.0	44.5	42.0	41.5	40.5
	11	51.9	71.8	40.5	65.0	62.5	56.5	53.0	46.5	44.0	42.0	41.5	41.0
	12	53.4	73.4	40.4	65.5	63.5	60.5	57.5	48.5	45.5	42.5	42.0	41.0
	13	53.6	72.7	40.9	65.5	64.0	60.0	57.0	50.0	46.5	43.0	42.0	41.0
	14	56.4	80.4	41.6	67.0	65.0	61.0	58.0	49.5	46.5	43.5	43.0	42.0
	15	56.2	79.2	42.9	67.5	65.5	62.0	60.0	52.0	48.0	45.0	44.5	43.5
	16	55.2	73.9	43.7	66.5	65.0	61.5	59.0	52.0	48.5	45.5	45.0	44.0
	17	56.3	74.0	45.4	67.5	66.0	62.5	60.5	53.0	50.0	47.5	47.0	46.0
	18	55.4	72.5	45.1	67.5	65.0	61.5	59.0	52.0	49.0	47.0	46.5	46.0
	19	54.9	73.8	44.2	66.5	64.5	61.0	58.5	52.0	49.0	46.0	45.5	45.0
	20	53.5	72.9	42.2	65.5	63.5	59.5	56.5	48.5	46.0	44.0	44.0	43.0
	21	55.1	77.0	43.2	68.0	65.0	60.0	57.0	49.5	46.5	45.0	44.5	44.0
Night	22	51.9	71.5	39.8	64.5	61.5	56.5	54.0	47.5	45.0	41.5	41.0	40.5
	23	49.3	71.3	39.7	62.0	57.5	51.5	49.5	45.0	43.0	41.0	41.0	40.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Waterman Avenue High Cube Warehouse	*JN:*	9178	*Energy Average Leq*		*24-Hour*
Location:	L3 - Located across Waterman Avenue from the western Project site boundary in a vacant lot with one existing residential dwelling to the north.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/6/2014	66.7	65.6	72.5

Hourly Leq dBA Readings (unadjusted)



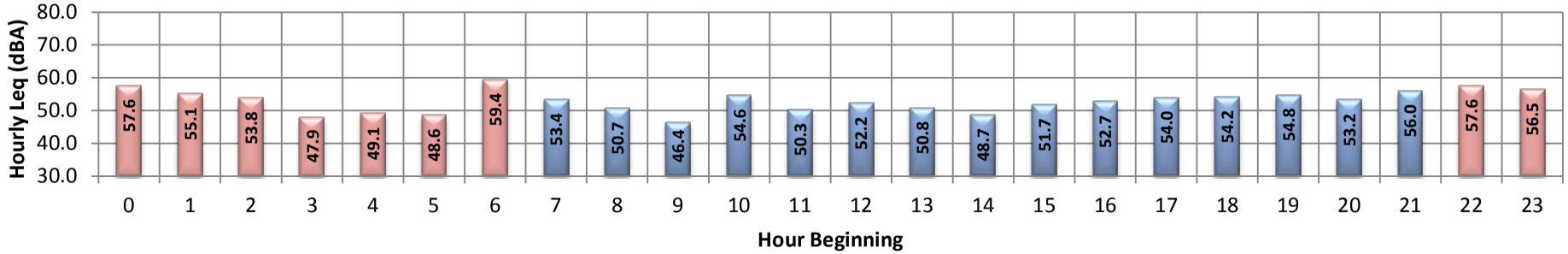
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	64.9	79.5	44.7	73.5	72.0	70.0	69.0	65.5	60.5	50.0	48.5	46.5
	Max	70.2	93.0	49.7	79.0	77.5	75.5	74.5	71.0	66.5	55.5	53.5	51.0
Night	Min	61.8	79.3	43.3	73.0	70.5	67.5	65.5	57.0	50.0	46.0	45.5	44.5
	Max	70.4	87.4	49.5	79.5	78.0	76.0	74.5	71.0	66.0	54.5	52.0	50.5
Hourly Summary													
Night	0	62.2	79.8	45.9	73.0	71.0	68.5	67.0	60.5	53.0	48.0	47.0	46.0
	1	61.8	85.2	44.2	74.0	70.5	67.5	65.5	57.0	50.0	46.5	45.5	45.0
	2	62.9	86.0	44.7	73.0	71.5	69.0	67.0	59.0	52.0	47.0	46.5	45.5
	3	62.4	79.3	44.1	73.5	72.0	69.5	67.5	59.5	51.0	46.0	45.5	44.5
	4	65.9	87.4	44.7	76.0	74.5	72.0	70.5	65.0	56.5	48.0	47.0	46.0
	5	68.0	86.0	47.9	77.5	76.0	74.0	73.0	68.0	61.5	52.0	50.5	49.0
	6	70.4	86.2	49.5	79.5	78.0	76.0	74.5	71.0	66.0	54.5	52.0	50.5
Day	7	70.2	85.9	49.7	79.0	77.5	75.5	74.5	71.0	66.5	55.5	53.5	51.0
	8	68.4	91.0	48.9	76.5	75.0	73.5	72.5	69.0	64.0	53.5	52.0	50.0
	9	66.7	79.5	46.5	75.0	73.5	72.0	71.0	67.5	63.0	50.5	49.0	47.0
	10	66.8	84.2	47.3	76.0	74.0	71.5	70.5	67.5	63.5	52.0	50.0	48.5
	11	65.9	85.4	45.5	74.0	72.5	71.0	70.0	66.5	62.5	50.5	48.5	46.5
	12	65.3	86.3	44.7	73.5	72.0	70.0	69.0	66.0	61.5	51.0	48.5	46.5
	13	65.6	85.3	45.3	75.0	73.0	70.5	69.5	65.5	61.5	50.5	48.5	46.5
	14	64.9	81.9	46.3	74.0	72.0	70.0	69.0	65.5	61.5	50.0	48.5	47.0
	15	65.1	81.8	46.0	74.0	72.0	70.5	69.0	65.5	61.5	50.5	49.0	47.5
	16	65.5	82.6	47.7	74.5	72.0	70.5	69.5	66.0	62.0	52.5	50.5	49.0
	17	65.9	84.4	48.5	74.5	73.0	71.0	70.0	66.0	61.5	53.0	51.5	50.5
	18	67.6	93.0	48.8	78.0	74.0	71.5	70.0	66.5	62.0	54.0	52.5	50.5
	19	67.1	89.9	49.7	76.0	73.5	71.5	70.5	66.5	62.5	54.5	52.5	50.5
	20	66.3	90.4	47.7	74.5	73.5	71.0	70.0	66.0	61.0	52.0	50.5	49.0
	21	65.5	84.6	47.2	75.5	73.0	70.5	69.5	65.5	60.5	51.0	50.0	48.5
Night	22	64.4	84.4	44.5	74.5	72.5	70.0	69.0	64.0	58.0	49.0	47.5	45.5
	23	62.7	80.5	43.3	73.0	71.5	68.5	67.0	62.5	55.0	46.5	45.5	44.5

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Waterman Avenue High Cube Warehouse	*JN:*	9178	*Energy Average Leq*		*24-Hour*
		Analyst:	A. Wolfe	*Day*	*Night*	*CNEL*
Location:	L4 - Located north of the Project site on San Felipe Road in a vacant lot adjacent to existing single and multi-family residential dwellings.	*Date:*	8/6/2014	52.9	55.6	61.9

Hourly Leq dBA Readings (unadjusted)



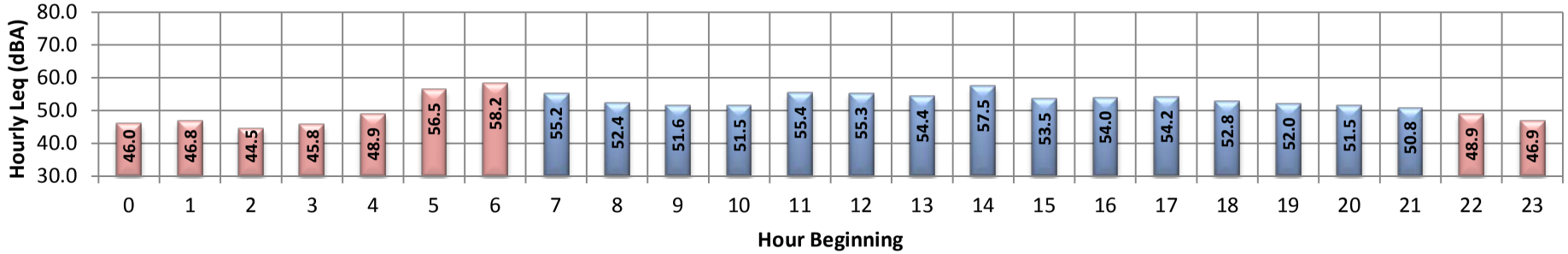
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	46.4	64.7	42.4	51.0	50.0	48.5	48.0	46.5	45.5	43.5	43.5	43.0
	Max	56.0	84.6	48.1	68.0	63.5	57.0	55.5	53.0	52.0	50.5	50.0	49.0
Night	Min	47.9	69.5	41.0	51.0	49.0	48.0	46.0	44.0	43.0	42.0	41.5	41.0
	Max	59.4	83.9	43.2	73.0	70.0	62.0	56.5	49.0	47.5	44.5	44.0	43.5
Hourly Summary													
Night	0	57.6	83.0	41.9	71.5	67.5	56.0	50.5	45.5	44.0	42.5	42.5	42.0
	1	55.1	83.4	41.0	64.5	58.0	48.0	46.0	44.0	43.0	42.0	41.5	41.0
	2	53.8	74.5	41.1	68.0	65.0	58.5	49.5	44.5	43.5	42.5	42.0	41.5
	3	47.9	69.5	41.9	59.5	55.5	50.0	48.0	45.5	44.5	43.0	42.5	42.5
	4	49.1	76.0	43.2	51.0	49.0	48.0	47.5	46.5	45.5	44.5	44.0	43.5
	5	48.6	71.7	42.8	54.5	51.5	50.0	49.0	47.5	46.0	44.0	44.0	43.5
	6	59.4	82.9	43.1	73.0	70.0	62.0	55.5	49.0	47.5	44.5	44.0	43.5
Day	7	53.4	77.8	43.1	63.0	59.5	55.0	53.5	49.5	47.0	44.5	44.0	43.5
	8	50.7	77.1	43.4	60.5	56.0	53.0	51.5	48.0	46.5	45.0	44.5	44.0
	9	46.4	64.7	42.4	51.0	50.0	48.5	48.0	46.5	45.5	43.5	43.5	43.0
	10	54.6	78.6	43.1	66.5	61.5	53.5	51.5	48.0	46.5	45.0	44.5	43.5
	11	50.3	72.1	43.6	60.0	56.5	52.5	50.5	47.5	46.5	45.0	44.5	44.0
	12	52.2	69.5	43.9	63.5	60.5	57.0	55.0	51.0	48.0	45.5	45.0	44.0
	13	50.8	73.2	43.4	61.0	58.5	53.5	51.5	48.0	46.5	45.0	45.0	44.0
	14	48.7	64.9	44.4	55.5	52.5	51.0	50.0	48.5	47.5	46.0	45.5	45.0
	15	51.7	71.0	45.0	62.0	58.5	54.5	52.5	50.0	48.5	46.5	46.0	45.5
	16	52.7	72.3	46.3	60.5	58.5	55.5	54.5	52.0	50.5	48.0	47.5	46.5
	17	54.0	73.6	48.1	62.5	59.5	57.0	55.5	53.0	52.0	50.5	50.0	49.0
	18	54.2	77.8	47.5	63.5	60.5	57.0	55.5	53.0	51.5	50.0	49.5	48.5
	19	54.8	76.4	46.1	67.5	61.5	56.0	54.0	51.0	50.0	48.0	47.5	47.0
	20	53.2	73.7	45.1	64.5	62.0	57.0	55.0	50.0	48.5	46.5	46.0	45.5
	21	56.0	84.6	43.0	68.0	63.5	56.5	54.0	49.0	47.0	45.0	44.5	43.5
Night	22	57.6	83.9	41.7	70.5	67.0	60.0	56.5	47.5	45.0	43.0	42.5	42.0
	23	56.5	78.4	41.2	72.5	58.5	49.5	48.0	45.5	44.0	42.5	42.5	42.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Waterman Avenue High Cube Warehouse	*JN:*	9178	*Energy Average Leq*		*24-Hour*
Location:	L5 - Located northwest of the Project site adjacent to Dominguez Elementary School.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/6/2014	53.9	52.1	59.0

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	50.8	67.8	40.6	60.5	58.5	56.0	54.5	49.0	46.0	42.5	42.0	41.0
	Max	57.5	82.6	44.7	68.5	65.5	61.0	59.0	54.0	51.0	47.5	47.0	45.5
Night	Min	44.5	62.3	38.6	53.0	51.0	48.5	47.5	44.0	42.0	39.5	39.5	39.5
	Max	58.2	80.3	44.7	69.5	65.5	61.5	60.0	57.0	53.5	48.0	47.0	46.0
Hourly Summary													
Night	0	46.0	63.2	39.3	57.0	53.5	49.5	47.5	45.0	43.5	40.5	40.0	39.5
	1	46.8	64.7	39.4	57.0	54.5	51.0	49.0	45.5	43.0	40.5	40.5	39.5
	2	44.5	62.3	39.1	53.0	51.0	48.5	47.5	44.5	42.0	40.0	39.5	39.5
	3	45.8	66.3	39.3	55.0	53.5	50.0	48.0	44.0	42.0	40.0	39.5	39.5
	4	48.9	69.4	40.0	59.5	57.0	54.0	51.5	47.0	44.5	41.5	40.5	40.5
	5	56.5	80.3	41.4	64.5	62.5	60.5	59.0	55.5	49.5	44.5	43.0	42.0
	6	58.2	78.4	44.7	69.5	65.5	61.5	60.0	57.0	53.5	48.0	47.0	46.0
Day	7	55.2	72.3	42.4	66.0	64.5	61.0	58.5	53.5	50.5	46.5	45.5	44.0
	8	52.4	68.8	40.6	62.5	60.5	58.0	56.0	51.5	48.5	44.5	43.5	42.5
	9	51.6	69.6	40.7	61.5	60.0	57.0	55.0	50.5	48.0	43.5	43.0	41.5
	10	51.5	68.2	40.9	60.5	58.5	56.0	54.5	51.0	48.5	45.0	44.0	43.0
	11	55.4	82.2	41.8	62.5	61.0	59.5	57.0	52.0	49.0	45.0	44.5	43.0
	12	55.3	79.4	42.2	64.0	62.0	60.5	58.5	53.0	49.5	45.5	44.5	43.5
	13	54.4	79.7	41.4	63.5	61.0	58.0	56.5	52.0	49.0	45.5	44.5	43.0
	14	57.5	82.6	42.0	68.5	65.5	61.0	59.0	54.0	51.0	46.5	45.5	43.5
	15	53.5	69.8	42.7	63.5	61.5	58.5	57.5	52.5	49.5	46.0	45.0	44.0
	16	54.0	69.5	43.6	63.5	62.0	59.0	57.5	53.0	50.5	47.0	46.0	45.0
	17	54.2	72.6	44.7	62.5	61.0	59.0	58.0	54.0	51.0	47.5	47.0	45.5
	18	52.8	67.8	43.7	62.5	61.0	58.5	56.5	51.5	49.5	46.5	46.0	45.0
	19	52.0	73.9	42.5	60.5	59.0	56.5	55.0	50.5	48.0	45.0	44.5	43.0
	20	51.5	70.8	41.8	61.0	59.5	57.0	55.5	50.5	47.0	44.0	43.5	42.5
	21	50.8	71.9	40.6	60.5	59.0	56.0	54.5	49.0	46.0	42.5	42.0	41.0
Night	22	48.9	64.3	39.1	59.0	57.5	55.0	53.0	47.5	44.0	40.5	40.0	39.5
	23	46.9	65.9	38.6	57.0	55.5	52.0	50.0	45.5	43.0	39.5	39.5	39.5

URBAN CROSSROADS

This page intentionally left blank

APPENDIX 7.1:

TRAFFIC NOISE CONTOURS

This page intentionally left blank

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Waterman Av.
Road Segment: n/o Driveway 1

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,210	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.15	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-12.10	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-10.82	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.7	67.9	63.6	61.6	69.5	69.8
Medium Trucks:	67.5	66.0	58.9	58.4	66.7	66.9
Heavy Trucks:	73.6	71.0	68.4	67.8	74.7	75.0
Vehicle Noise:	75.8	73.6	70.0	69.1	76.3	76.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	132	285	615	1,325
CNEL:	138	297	640	1,380

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Waterman Av.
Road Segment: n/o Driveway 2

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,210	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.15	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-12.10	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-10.82	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.7	67.9	63.6	61.6	69.5	69.8
Medium Trucks:	67.5	66.0	58.9	58.4	66.7	66.9
Heavy Trucks:	73.6	71.0	68.4	67.8	74.7	75.0
Vehicle Noise:	75.8	73.6	70.0	69.1	76.3	76.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	132	285	615	1,325
CNEL:	138	297	640	1,380

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Waterman Av.
Road Segment: s/o Driveway 2

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,210	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.15	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-12.10	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-10.82	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.7	67.9	63.6	61.6	69.5	69.8
Medium Trucks:	67.5	66.0	58.9	58.4	66.7	66.9
Heavy Trucks:	73.6	71.0	68.4	67.8	74.7	75.0
Vehicle Noise:	75.8	73.6	70.0	69.1	76.3	76.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	132	285	615	1,325
CNEL:	138	297	640	1,380

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Waterman Av.
Road Segment: n/o Mill St.

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,200	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.13	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-12.12	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-10.84	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.7	67.9	63.6	61.6	69.4	69.7
Medium Trucks:	67.5	66.0	58.9	58.4	66.7	66.9
Heavy Trucks:	73.5	71.0	68.4	67.7	74.7	75.0
Vehicle Noise:	75.7	73.6	70.0	69.1	76.3	76.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	132	285	613	1,321
CNEL:	138	296	638	1,375

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Waterman Av.
Road Segment: s/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,600	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,260	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.25	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-12.00	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-10.73	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.8	68.0	63.7	61.7	69.6	69.8
Medium Trucks:	67.6	66.1	59.0	58.5	66.8	67.0
Heavy Trucks:	73.7	71.1	68.5	67.9	74.8	75.1
Vehicle Noise:	75.9	73.7	70.1	69.2	76.4	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	134	290	624	1,345
CNEL:	140	302	650	1,400

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Mill St.
Road Segment: w/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,650	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	0.97	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	75.75	-12.27	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-11.00	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	65.4	63.5	59.3	57.3	65.1	65.4
Medium Trucks:	63.6	62.1	55.1	54.5	62.8	63.0
Heavy Trucks:	70.7	68.2	65.5	64.9	71.9	72.1
Vehicle Noise:	72.4	70.2	66.8	65.9	73.1	73.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	81	174	374	807
CNEL:	84	181	390	840

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing
Road Name: Mill St.
Road Segment: e/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,530	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	0.06	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	77.72	-13.18	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-11.91	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.7	64.8	60.6	58.6	66.4	66.7
Medium Trucks:	64.7	63.2	56.1	55.6	63.9	64.1
Heavy Trucks:	71.2	68.7	66.1	65.4	72.4	72.6
Vehicle Noise:	73.2	71.0	67.5	66.6	73.8	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	90	194	417	899
CNEL:	94	202	434	936

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 1
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,405	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,241	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.14%
Medium Trucks:	84.8%	4.2%	11.0%	4.21%
Heavy Trucks:	67.1%	9.1%	23.7%	5.65%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.21	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	79.45	-12.09	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-10.81	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.8	67.9	63.7	61.7	69.5	69.8
Medium Trucks:	67.5	66.0	58.9	58.4	66.7	66.9
Heavy Trucks:	73.6	71.1	68.4	67.8	74.7	75.0
Vehicle Noise:	75.8	73.6	70.0	69.1	76.4	76.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	133	286	617	1,330
CNEL:	138	298	643	1,385

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,649	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,265	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.05%
Medium Trucks:	84.8%	4.2%	11.0%	4.20%
Heavy Trucks:	67.1%	9.1%	23.7%	5.76%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.26	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.06	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.69	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	68.0	63.7	61.8	69.6	69.9
Medium Trucks:	67.5	66.0	59.0	58.4	66.7	66.9
Heavy Trucks:	73.7	71.2	68.5	67.9	74.9	75.1
Vehicle Noise:	75.9	73.7	70.1	69.2	76.5	76.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	135	291	627	1,350
CNEL:	141	303	652	1,406

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Waterman Av.
Road Segment: s/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,795	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,280	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.91%
Medium Trucks:	84.8%	4.2%	11.0%	4.20%
Heavy Trucks:	67.1%	9.1%	23.7%	5.89%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.28	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.02	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.56	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	68.0	63.7	61.8	69.6	69.9
Medium Trucks:	67.6	66.1	59.0	58.5	66.8	66.9
Heavy Trucks:	73.8	71.3	68.7	68.0	75.0	75.2
Vehicle Noise:	76.0	73.8	70.2	69.3	76.6	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	137	295	636	1,370
CNEL:	143	307	662	1,426

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Waterman Av.
Road Segment: n/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,695	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,270	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.91%
Medium Trucks:	84.8%	4.2%	11.0%	4.20%
Heavy Trucks:	67.1%	9.1%	23.7%	5.89%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.26	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.04	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.58	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	68.0	63.7	61.8	69.6	69.9
Medium Trucks:	67.5	66.0	59.0	58.4	66.7	66.9
Heavy Trucks:	73.8	71.3	68.6	68.0	75.0	75.2
Vehicle Noise:	75.9	73.8	70.2	69.3	76.5	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	137	294	634	1,366
CNEL:	142	306	660	1,422

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Waterman Av.
Road Segment: s/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,840	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,284	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.95%
Medium Trucks:	84.8%	4.2%	11.0%	4.25%
Heavy Trucks:	67.1%	9.1%	23.7%	5.80%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.29	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.97	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.62	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.0	63.7	61.8	69.6	69.9
Medium Trucks:	67.6	66.1	59.1	58.5	66.8	67.0
Heavy Trucks:	73.8	71.2	68.6	68.0	74.9	75.2
Vehicle Noise:	75.9	73.8	70.2	69.3	76.5	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	136	294	633	1,363
CNEL:	142	306	659	1,419

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Mill St.
Road Segment: w/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,855	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,686	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.91%
Medium Trucks:	84.8%	4.2%	11.0%	4.23%
Heavy Trucks:	67.1%	9.1%	23.7%	5.87%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	1.06	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	75.75	-12.22	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-10.79	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	59.3	57.4	65.2	65.5
Medium Trucks:	63.7	62.2	55.1	54.6	62.9	63.1
Heavy Trucks:	70.9	68.4	65.7	65.1	72.1	72.3
Vehicle Noise:	72.6	70.3	66.9	66.1	73.3	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	83	179	385	829
CNEL:	86	186	401	863

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Plus Project
Road Name: Mill St.
Road Segment: e/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,540	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.09%
Medium Trucks:	84.8%	4.2%	11.0%	4.24%
Heavy Trucks:	67.1%	9.1%	23.7%	5.68%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.10	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	77.72	-13.18	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-11.91	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.7	64.9	60.6	58.6	66.5	66.7
Medium Trucks:	64.7	63.2	56.1	55.6	63.9	64.1
Heavy Trucks:	71.2	68.7	66.1	65.4	72.4	72.6
Vehicle Noise:	73.2	71.0	67.5	66.6	73.8	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	90	194	418	900
CNEL:	94	202	435	937

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 1
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,330	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.38	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.87	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.59	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.1	63.8	61.9	69.7	70.0
Medium Trucks:	67.7	66.2	59.2	58.6	66.9	67.1
Heavy Trucks:	73.8	71.3	68.6	68.0	74.9	75.2
Vehicle Noise:	76.0	73.8	70.2	69.3	76.6	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	137	296	637	1,372
CNEL:	143	308	663	1,429

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,330	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.38	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.87	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.59	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.1	63.8	61.9	69.7	70.0
Medium Trucks:	67.7	66.2	59.2	58.6	66.9	67.1
Heavy Trucks:	73.8	71.3	68.6	68.0	74.9	75.2
Vehicle Noise:	76.0	73.8	70.2	69.3	76.6	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	137	296	637	1,372
CNEL:	143	308	663	1,429

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Waterman Av.
Road Segment: s/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,300	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,330	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.38	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.87	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.59	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.1	63.8	61.9	69.7	70.0
Medium Trucks:	67.7	66.2	59.2	58.6	66.9	67.1
Heavy Trucks:	73.8	71.3	68.6	68.0	74.9	75.2
Vehicle Noise:	76.0	73.8	70.2	69.3	76.6	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	137	296	637	1,372
CNEL:	143	308	663	1,429

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Waterman Av.
Road Segment: n/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,310	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.34	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.90	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.63	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.1	63.8	61.8	69.7	69.9
Medium Trucks:	67.7	66.2	59.1	58.6	66.9	67.1
Heavy Trucks:	73.8	71.2	68.6	68.0	74.9	75.2
Vehicle Noise:	76.0	73.8	70.2	69.3	76.5	76.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	136	294	633	1,365
CNEL:	142	306	660	1,421

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Waterman Av.
Road Segment: s/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,800	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,380	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.47	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.77	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.50	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.2	63.9	62.0	69.8	70.1
Medium Trucks:	67.8	66.3	59.2	58.7	67.0	67.2
Heavy Trucks:	73.9	71.4	68.7	68.1	75.0	75.3
Vehicle Noise:	76.1	73.9	70.3	69.4	76.7	76.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	139	300	646	1,392
CNEL:	145	312	673	1,449

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Mill St.
Road Segment: w/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,500	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,750	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	1.23	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	75.75	-12.02	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-10.75	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.8	59.5	57.6	65.4	65.7
Medium Trucks:	63.9	62.4	55.3	54.8	63.1	63.3
Heavy Trucks:	71.0	68.4	65.8	65.2	72.1	72.4
Vehicle Noise:	72.7	70.4	67.0	66.2	73.4	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	181	389	839
CNEL:	87	188	406	874

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 Without Project
Road Name: Mill St.
Road Segment: e/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,100	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,610	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.29	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	77.72	-12.96	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-11.69	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.1	60.8	58.8	66.6	66.9
Medium Trucks:	64.9	63.4	56.3	55.8	64.1	64.3
Heavy Trucks:	71.4	68.9	66.3	65.6	72.6	72.9
Vehicle Noise:	73.4	71.2	67.7	66.8	74.0	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	200	432	930
CNEL:	97	209	449	968

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 1
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,605	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,361	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.13%
Medium Trucks:	84.8%	4.2%	11.0%	4.21%
Heavy Trucks:	67.1%	9.1%	23.7%	5.66%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.44	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.86	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.58	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.2	63.9	61.9	69.7	70.0
Medium Trucks:	67.7	66.2	59.2	58.6	66.9	67.1
Heavy Trucks:	73.8	71.3	68.6	68.0	75.0	75.2
Vehicle Noise:	76.0	73.8	70.2	69.4	76.6	76.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	138	297	639	1,377
CNEL:	143	309	666	1,434

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,849	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,385	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.05%
Medium Trucks:	84.8%	4.2%	11.0%	4.20%
Heavy Trucks:	67.1%	9.1%	23.7%	5.75%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.48	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.83	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.46	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.2	63.9	62.0	69.8	70.1
Medium Trucks:	67.8	66.2	59.2	58.6	66.9	67.1
Heavy Trucks:	73.9	71.4	68.8	68.1	75.1	75.3
Vehicle Noise:	76.1	73.9	70.3	69.4	76.7	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	140	301	648	1,397
CNEL:	145	313	675	1,455

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Waterman Av.
Road Segment: s/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,995	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,400	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.92%
Medium Trucks:	84.8%	4.2%	11.0%	4.21%
Heavy Trucks:	67.1%	9.1%	23.7%	5.88%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.50	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.80	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.34	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	63.9	62.0	69.8	70.1
Medium Trucks:	67.8	66.3	59.2	58.7	67.0	67.2
Heavy Trucks:	74.0	71.5	68.9	68.2	75.2	75.5
Vehicle Noise:	76.2	74.0	70.4	69.5	76.8	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	142	305	657	1,416
CNEL:	147	318	685	1,475

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Waterman Av.
Road Segment: n/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,795	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,380	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.92%
Medium Trucks:	84.8%	4.2%	11.0%	4.21%
Heavy Trucks:	67.1%	9.1%	23.7%	5.88%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.47	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.83	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.38	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.2	63.9	62.0	69.8	70.1
Medium Trucks:	67.8	66.2	59.2	58.6	66.9	67.1
Heavy Trucks:	74.0	71.5	68.8	68.2	75.2	75.4
Vehicle Noise:	76.1	74.0	70.4	69.5	76.7	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	141	303	654	1,409
CNEL:	147	316	681	1,467

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Waterman Av.
Road Segment: s/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,040	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,404	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.96%
Medium Trucks:	84.8%	4.2%	11.0%	4.25%
Heavy Trucks:	67.1%	9.1%	23.7%	5.79%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.51	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.74	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.40	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	64.0	62.0	69.8	70.1
Medium Trucks:	67.8	66.3	59.3	58.7	67.0	67.2
Heavy Trucks:	74.0	71.5	68.8	68.2	75.1	75.4
Vehicle Noise:	76.2	74.0	70.4	69.5	76.8	77.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	141	304	654	1,410
CNEL:	147	316	681	1,468

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Mill St.
Road Segment: w/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,855	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,786	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.91%
Medium Trucks:	84.8%	4.2%	11.0%	4.23%
Heavy Trucks:	67.1%	9.1%	23.7%	5.86%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	1.31	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	75.75	-11.97	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-10.55	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.9	59.6	57.6	65.5	65.8
Medium Trucks:	63.9	62.4	55.4	54.8	63.1	63.3
Heavy Trucks:	71.1	68.6	66.0	65.4	72.3	72.6
Vehicle Noise:	72.8	70.6	67.2	66.4	73.5	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	185	399	861
CNEL:	90	193	416	896

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2015 With Project
Road Name: Mill St.
Road Segment: e/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,200	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	1,620	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.08%
Medium Trucks:	84.8%	4.2%	11.0%	4.24%
Heavy Trucks:	67.1%	9.1%	23.7%	5.68%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	0.32	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	77.72	-12.96	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-11.69	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.1	60.8	58.9	66.7	67.0
Medium Trucks:	64.9	63.4	56.3	55.8	64.1	64.3
Heavy Trucks:	71.4	68.9	66.3	65.6	72.6	72.9
Vehicle Noise:	73.4	71.2	67.7	66.8	74.0	74.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	93	201	432	931
CNEL:	97	209	450	969

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 1

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,500	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.69	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.56	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.29	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.4	64.1	62.2	70.0	70.3
Medium Trucks:	68.0	66.5	59.5	58.9	67.2	67.4
Heavy Trucks:	74.1	71.6	68.9	68.3	75.3	75.5
Vehicle Noise:	76.3	74.1	70.5	69.6	76.9	77.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	144	310	668	1,438
CNEL:	150	323	695	1,498

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 2

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,500	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.69	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.56	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.29	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.4	64.1	62.2	70.0	70.3
Medium Trucks:	68.0	66.5	59.5	58.9	67.2	67.4
Heavy Trucks:	74.1	71.6	68.9	68.3	75.3	75.5
Vehicle Noise:	76.3	74.1	70.5	69.6	76.9	77.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	144	310	668	1,438
CNEL:	150	323	695	1,498

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Waterman Av.
Road Segment: s/o Driveway 2

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,600	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.86	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.39	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.12	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.6	64.3	62.4	70.2	70.5
Medium Trucks:	68.2	66.7	59.6	59.1	67.4	67.6
Heavy Trucks:	74.3	71.7	69.1	68.5	75.4	75.7
Vehicle Noise:	76.5	74.3	70.7	69.8	77.1	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	148	318	685	1,477
CNEL:	154	331	714	1,537

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Waterman Av.
Road Segment: n/o Mill St.

Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,600	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.86	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.39	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.12	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.6	64.3	62.4	70.2	70.5
Medium Trucks:	68.2	66.7	59.6	59.1	67.4	67.6
Heavy Trucks:	74.3	71.7	69.1	68.5	75.4	75.7
Vehicle Noise:	76.5	74.3	70.7	69.8	77.1	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	148	318	685	1,477
CNEL:	154	331	714	1,537

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Waterman Av.
Road Segment: s/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,670	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.97	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.28	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.00	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.7	64.4	62.5	70.3	70.6
Medium Trucks:	68.3	66.8	59.7	59.2	67.5	67.7
Heavy Trucks:	74.4	71.9	69.2	68.6	75.5	75.8
Vehicle Noise:	76.6	74.4	70.8	69.9	77.2	77.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	150	324	698	1,503
CNEL:	156	337	726	1,565

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Mill St.
Road Segment: w/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,000	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,900	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	3.42	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	75.75	-9.82	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-8.55	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.8	66.0	61.7	59.8	67.6	67.9
Medium Trucks:	66.1	64.6	57.5	56.9	65.3	65.4
Heavy Trucks:	73.1	70.6	68.0	67.4	74.3	74.6
Vehicle Noise:	74.9	72.6	69.2	68.4	75.6	75.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	118	253	545	1,175
CNEL:	122	264	568	1,223

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Mill St.
Road Segment: e/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,600	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,160	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.02%
Medium Trucks:	84.8%	4.2%	11.0%	4.26%
Heavy Trucks:	67.1%	9.1%	23.7%	5.71%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	66.51	1.56	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	77.72	-11.68	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	82.99	-10.41	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.2	66.3	62.1	60.1	67.9	68.2
Medium Trucks:	66.2	64.7	57.6	57.1	65.4	65.6
Heavy Trucks:	72.7	70.2	67.5	66.9	73.9	74.1
Vehicle Noise:	74.7	72.5	69.0	68.1	75.3	75.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	113	244	525	1,131
CNEL:	118	254	547	1,178

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 1
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,305	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,531	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.12%
Medium Trucks:	84.8%	4.2%	11.0%	4.22%
Heavy Trucks:	67.1%	9.1%	23.7%	5.66%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.74	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.56	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.28	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.3	68.5	64.2	62.2	70.1	70.3
Medium Trucks:	68.0	66.5	59.5	58.9	67.2	67.4
Heavy Trucks:	74.1	71.6	68.9	68.3	75.3	75.5
Vehicle Noise:	76.3	74.1	70.5	69.7	76.9	77.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	144	311	670	1,443
CNEL:	150	324	697	1,503

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Waterman Av.
Road Segment: n/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,549	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,555	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	90.05%
Medium Trucks:	84.8%	4.2%	11.0%	4.20%
Heavy Trucks:	67.1%	9.1%	23.7%	5.75%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.78	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.53	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-10.17	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.3	68.5	64.2	62.3	70.1	70.4
Medium Trucks:	68.1	66.5	59.5	58.9	67.3	67.4
Heavy Trucks:	74.2	71.7	69.1	68.4	75.4	75.6
Vehicle Noise:	76.4	74.2	70.6	69.7	77.0	77.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	146	315	679	1,462
CNEL:	152	328	707	1,523

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Waterman Av.
Road Segment: s/o Driveway 2
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,695	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,670	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.93%
Medium Trucks:	84.8%	4.2%	11.0%	4.21%
Heavy Trucks:	67.1%	9.1%	23.7%	5.86%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.97	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.33	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-9.89	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.7	64.4	62.5	70.3	70.6
Medium Trucks:	68.3	66.7	59.7	59.1	67.5	67.6
Heavy Trucks:	74.5	72.0	69.3	68.7	75.7	75.9
Vehicle Noise:	76.6	74.5	70.9	70.0	77.2	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	152	327	705	1,519
CNEL:	158	341	734	1,582

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Waterman Av.
Road Segment: n/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,695	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,670	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.93%
Medium Trucks:	84.8%	4.2%	11.0%	4.21%
Heavy Trucks:	67.1%	9.1%	23.7%	5.86%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.97	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.33	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-9.89	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.7	64.4	62.5	70.3	70.6
Medium Trucks:	68.3	66.7	59.7	59.1	67.5	67.6
Heavy Trucks:	74.5	72.0	69.3	68.7	75.7	75.9
Vehicle Noise:	76.6	74.5	70.9	70.0	77.2	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	152	327	705	1,519
CNEL:	158	341	734	1,582

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Waterman Av.
Road Segment: s/o Mill St.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,940	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,694	vehicles
Vehicle Speed:	45	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	78.6%	7.3%	14.1%	89.96%
Medium Trucks:	84.8%	4.2%	11.0%	4.25%
Heavy Trucks:	67.1%	9.1%	23.7%	5.79%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.01	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-11.25	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-9.91	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	64.5	62.5	70.3	70.6
Medium Trucks:	68.3	66.8	59.8	59.2	67.5	67.7
Heavy Trucks:	74.5	72.0	69.3	68.7	75.6	75.9
Vehicle Noise:	76.6	74.5	70.9	70.0	77.2	77.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	152	328	706	1,520
CNEL:	158	341	735	1,583

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Mill St.
Road Segment: w/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,355	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,936	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	89.96%
Medium Trucks:	84.8%	4.2%	11.0%	4.24%
Heavy Trucks:	67.1%	9.1%	23.7%	5.80%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	64.30	3.47	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	75.75	-9.79	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	81.57	-8.43	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.9	66.0	61.8	59.8	67.6	67.9
Medium Trucks:	66.1	64.6	57.5	57.0	65.3	65.5
Heavy Trucks:	73.3	70.7	68.1	67.5	74.4	74.7
Vehicle Noise:	75.0	72.7	69.3	68.5	75.7	75.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	119	257	554	1,193
CNEL:	124	268	577	1,242

Monday, September 08, 2014

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Mill St.
Road Segment: e/o Waterman Av.
Project Name: Waterman Avenue High C
Job Number: 9178

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,700	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	2,170	vehicles
Vehicle Speed:	40	mph
Near/Far Lane Distance:	60	feet

Site Data

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

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

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

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	78.6%	7.3%	14.1%	90.07%
Medium Trucks:	84.8%	4.2%	11.0%	4.24%
Heavy Trucks:	67.1%	9.1%	23.7%	5.69%

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:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	66.51	1.58	1.30	-1.20	*-4.65*	0.000	0.000
Medium Trucks:	77.72	-11.68	1.34	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	82.99	-10.41	1.33	-1.20	*-5.43*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	68.2	66.4	62.1	60.1	67.9	68.2
Medium Trucks:	66.2	64.7	57.6	57.1	65.4	65.6
Heavy Trucks:	72.7	70.2	67.5	66.9	73.9	74.1
Vehicle Noise:	74.7	72.5	69.0	68.1	75.3	75.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	113	244	525	1,132
CNEL:	118	254	547	1,179

Monday, September 08, 2014

This page intentionally left blank

APPENDIX 9.1:

REFERENCE NOISE SOURCE PHOTOS

This page intentionally left blank

Reference Noise Source Photos

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"

This page intentionally left blank

APPENDIX 9.2:

STATIONARY SOURCE OPERATIONAL NOISE CALCULATIONS

This page intentionally left blank

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R1

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,332.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,322.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0	feet		
Noise Height:	8.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,021.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,024.0	feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	1,332.0	-34.5	-34.5	-34.5	-34.5	-34.5	-34.5
Shielding (Barrier Attenuation)	1,332.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		34.6	32.2	35.4	38.8	41.4	45.7
60 Minute Hourly Adjustment		**34.6**	**32.2**	**35.4**	**38.8**	**41.4**	**45.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R2

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,303.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,293.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0	feet		
Noise Height:	8.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,024.0	feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	1,303.0	-34.3	-34.3	-34.3	-34.3	-34.3	-34.3
Shielding (Barrier Attenuation)	1,303.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		34.8	32.4	35.6	39.0	41.6	45.9
60 Minute Hourly Adjustment		**34.8**	**32.4**	**35.6**	**39.0**	**41.6**	**45.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R3

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,030.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,020.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0	feet		
Noise Height:	8.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,023.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,027.0	feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	1,030.0	-32.3	-32.3	-32.3	-32.3	-32.3	-32.3
Shielding (Barrier Attenuation)	1,030.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		36.8	34.4	37.6	41.0	43.6	47.9
60 Minute Hourly Adjustment		**36.8**	**34.4**	**37.6**	**41.0**	**43.6**	**47.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R4

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	538.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	528.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0	feet		
Noise Height:	8.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,024.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,027.0	feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	538.0	-26.7	-26.7	-26.7	-26.7	-26.7	-26.7
Shielding (Barrier Attenuation)	538.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		42.4	40.0	43.2	46.6	49.2	53.5
60 Minute Hourly Adjustment		**42.4**	**40.0**	**43.2**	**46.6**	**49.2**	**53.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R5

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	684.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	674.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0 feet		
Noise Height:	8.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,029.0 feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	684.0	-28.7	-28.7	-28.7	-28.7	-28.7	-28.7
Shielding (Barrier Attenuation)	684.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		40.4	38.0	41.2	44.6	47.2	51.5
60 Minute Hourly Adjustment		**40.4**	**38.0**	**41.2**	**44.6**	**47.2**	**51.5**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R6

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	625.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	615.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0	feet		
Noise Height:	8.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,029.0	feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	625.0	-28.0	-28.0	-28.0	-28.0	-28.0	-28.0
Shielding (Barrier Attenuation)	625.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		41.1	38.7	41.9	45.3	47.9	52.2
60 Minute Hourly Adjustment		**41.1**	**38.7**	**41.9**	**45.3**	**47.9**	**52.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R7

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	183.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	183.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	8.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,027.0 feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	183.0	-17.3	-17.3	-17.3	-17.3	-17.3	-17.3
Shielding (Barrier Attenuation)	183.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		51.8	49.4	52.6	56.0	58.6	62.9
60 Minute Hourly Adjustment		**51.8**	**49.4**	**52.6**	**56.0**	**58.6**	**62.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

Source: Typical Distribution/Warehouse Activities
Observer Location: R8

Project Name: Waterman Ave. High Cube Wareh
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	170.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	160.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	10.0 feet		
Noise Height:	8.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,027.0 feet		

Drop Off Coefficient: 20.0 (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)	25.0	69.1	66.7	69.9	73.3	75.9	80.2
Distance Attenuation	170.0	-16.7	-16.7	-16.7	-16.7	-16.7	-16.7
Shielding (Barrier Attenuation)	170.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		52.4	50.0	53.2	56.6	59.2	63.5
60 Minute Hourly Adjustment		**52.4**	**50.0**	**53.2**	**56.6**	**59.2**	**63.5**

APPENDIX 10.1:

RCNM EQUIPMENT DATABASE

This page intentionally left blank

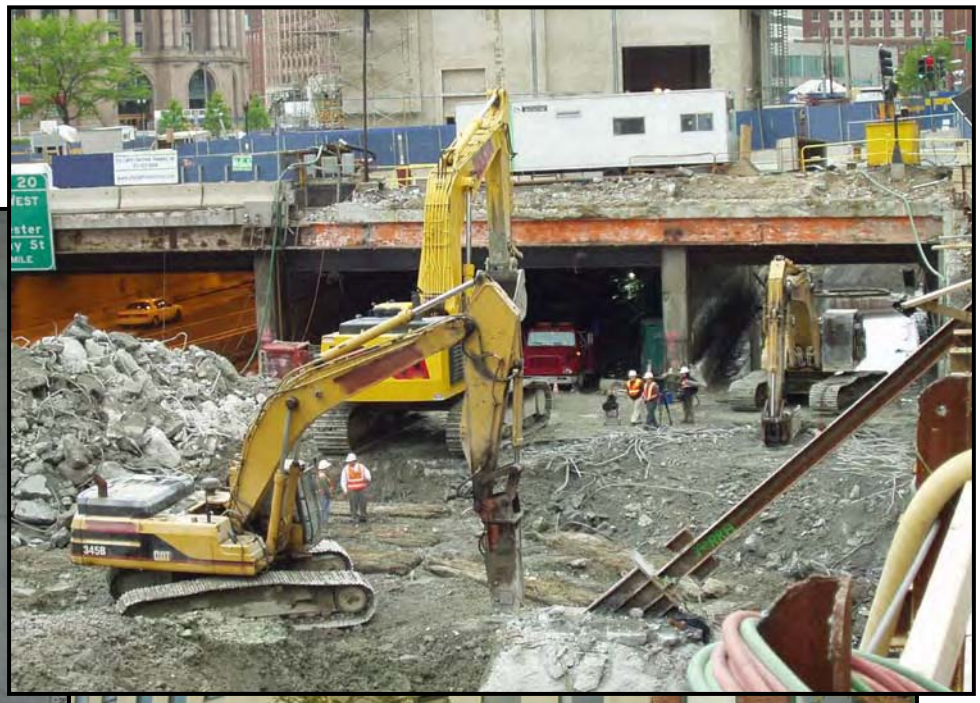
U.S. Department
of Transportation

**Federal Highway
Administration**

FHWA
Roadway Construction Noise Model
User's Guide

FHWA-HEP-05-054
DOT-VNTSC-FHWA-05-01

Final Report
January 2006



Prepared for
U.S. Department of Transportation
Federal Highway Administration
Office of Natural and Human Environment
Washington, DC 20590

Prepared by
U.S. Department of Transportation
Research and Innovative Technology Administration
John A. Volpe National Transportation Systems Center
Acoustics Facility
Cambridge, MA 02142

Table 1. CA/T equipment noise emissions and acoustical usage factors database.

CA/T Noise Emission Reference Levels and Usage Factors					
filename: EQUIPLST.xls					
revised: 7/26/05		Acoustical	Spec 721.560	Actual Measured	No. of Actual
	Impact	Use Factor	Lmax @ 50ft	Lmax @ 50ft	Data Samples
Equipment Description	Device ?	(%)	(dBA, slow)	(dBA, slow)	(Count)
				(samples averaged)	
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-- N/A --	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-- N/A --	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-- N/A --	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-- N/A --	0
Tractor	No	40	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

APPENDIX 10.2:

CONSTRUCTION NOISE LEVEL CALCULATIONS

This page intentionally left blank

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R1

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,074.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,074.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,021.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,074.0	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Shielding (Barrier Attenuation)	1,074.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		60.6	-26.6	-26.6	-26.6	-26.6	-26.6
60 Minute Hourly Adjustment		**60.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R1

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,074.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,074.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,021.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,074.0	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Shielding (Barrier Attenuation)	1,074.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		59.5	-26.6	-26.6	-26.6	-26.6	-26.6
60 Minute Hourly Adjustment		**59.5**	**-26.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R1

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,074.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,074.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,021.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,074.0	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Shielding (Barrier Attenuation)	1,074.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		62.8	-26.6	-26.6	-26.6	-26.6	-26.6
60 Minute Hourly Adjustment		**62.8**	**-26.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R1

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,074.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,074.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,021.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,074.0	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Shielding (Barrier Attenuation)	1,074.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		58.0	-26.6	-26.6	-26.6	-26.6	-26.6
60 Minute Hourly Adjustment		**58.0**	**-26.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R1

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,074.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,074.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,021.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,074.0	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Shielding (Barrier Attenuation)	1,074.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		53.4	-26.6	-26.6	-26.6	-26.6	-26.6
60 Minute Hourly Adjustment		**53.4**	**-26.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R1

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,074.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,074.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,021.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,074.0	-26.6	-26.6	-26.6	-26.6	-26.6	-26.6
Shielding (Barrier Attenuation)	1,074.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		54.3	-26.6	-26.6	-26.6	-26.6	-26.6
60 Minute Hourly Adjustment		**54.3**	**-26.6**	**-26.6**	**-26.6**	**-26.6**	**-26.6**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R2

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,050.0	-26.4	-26.4	-26.4	-26.4	-26.4	-26.4
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		60.8	-26.4	-26.4	-26.4	-26.4	-26.4
60 Minute Hourly Adjustment		**60.8**	**-26.4**	**-26.4**	**-26.4**	**-26.4**	**-26.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R2

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,050.0	-26.4	-26.4	-26.4	-26.4	-26.4	-26.4
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		59.7	-26.4	-26.4	-26.4	-26.4	-26.4
60 Minute Hourly Adjustment		**59.7**	**-26.4**	**-26.4**	**-26.4**	**-26.4**	**-26.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R2

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,050.0	-26.4	-26.4	-26.4	-26.4	-26.4	-26.4
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		63.0	-26.4	-26.4	-26.4	-26.4	-26.4
60 Minute Hourly Adjustment		**63.0**	**-26.4**	**-26.4**	**-26.4**	**-26.4**	**-26.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R2

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,050.0	-26.4	-26.4	-26.4	-26.4	-26.4	-26.4
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		58.2	-26.4	-26.4	-26.4	-26.4	-26.4
60 Minute Hourly Adjustment		**58.2**	**-26.4**	**-26.4**	**-26.4**	**-26.4**	**-26.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R2

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,050.0	-26.4	-26.4	-26.4	-26.4	-26.4	-26.4
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		53.6	-26.4	-26.4	-26.4	-26.4	-26.4
60 Minute Hourly Adjustment		**53.6**	**-26.4**	**-26.4**	**-26.4**	**-26.4**	**-26.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R2

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,050.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	1,050.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,017.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	1,050.0	-26.4	-26.4	-26.4	-26.4	-26.4	-26.4
Shielding (Barrier Attenuation)	1,050.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		54.5	-26.4	-26.4	-26.4	-26.4	-26.4
60 Minute Hourly Adjustment		**54.5**	**-26.4**	**-26.4**	**-26.4**	**-26.4**	**-26.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R3

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	800.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	800.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,023.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	800.0	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1
Shielding (Barrier Attenuation)	800.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		63.1	-24.1	-24.1	-24.1	-24.1	-24.1
60 Minute Hourly Adjustment		**63.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R3

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	800.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	800.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,023.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	800.0	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1
Shielding (Barrier Attenuation)	800.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		62.0	-24.1	-24.1	-24.1	-24.1	-24.1
60 Minute Hourly Adjustment		**62.0**	**-24.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R3

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	800.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	800.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,023.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	800.0	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1
Shielding (Barrier Attenuation)	800.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		65.3	-24.1	-24.1	-24.1	-24.1	-24.1
60 Minute Hourly Adjustment		**65.3**	**-24.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R3

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	800.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	800.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,023.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	800.0	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1
Shielding (Barrier Attenuation)	800.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		60.5	-24.1	-24.1	-24.1	-24.1	-24.1
60 Minute Hourly Adjustment		**60.5**	**-24.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R3
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	800.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	800.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,023.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	800.0	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1
Shielding (Barrier Attenuation)	800.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		55.9	-24.1	-24.1	-24.1	-24.1	-24.1
60 Minute Hourly Adjustment		**55.9**	**-24.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R3
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	800.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	800.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,023.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	800.0	-24.1	-24.1	-24.1	-24.1	-24.1	-24.1
Shielding (Barrier Attenuation)	800.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		56.8	-24.1	-24.1	-24.1	-24.1	-24.1
60 Minute Hourly Adjustment		**56.8**	**-24.1**	**-24.1**	**-24.1**	**-24.1**	**-24.1**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R4
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	292.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	292.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,024.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	292.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Shielding (Barrier Attenuation)	292.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		71.9	-15.3	-15.3	-15.3	-15.3	-15.3
60 Minute Hourly Adjustment		**71.9**	**-15.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R4
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	292.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	292.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,024.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	292.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Shielding (Barrier Attenuation)	292.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		70.8	-15.3	-15.3	-15.3	-15.3	-15.3
60 Minute Hourly Adjustment		**70.8**	**-15.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R4

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	292.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	292.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0	feet		
Noise Height:	5.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,024.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0	feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	292.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Shielding (Barrier Attenuation)	292.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		74.1	-15.3	-15.3	-15.3	-15.3	-15.3
60 Minute Hourly Adjustment		**74.1**	**-15.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R4

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	292.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	292.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0	feet		
Noise Height:	5.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,024.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0	feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	292.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Shielding (Barrier Attenuation)	292.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		69.3	-15.3	-15.3	-15.3	-15.3	-15.3
60 Minute Hourly Adjustment		**69.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R4

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	292.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	292.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0	feet		
Noise Height:	5.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,024.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0	feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	292.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Shielding (Barrier Attenuation)	292.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		64.7	-15.3	-15.3	-15.3	-15.3	-15.3
60 Minute Hourly Adjustment		**64.7**	**-15.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R4

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	292.0	feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	292.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0	feet		
Noise Height:	5.0	feet		
Observer Height (Above Pad):	5.0	feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,024.0	feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0	feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	292.0	-15.3	-15.3	-15.3	-15.3	-15.3	-15.3
Shielding (Barrier Attenuation)	292.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		65.6	-15.3	-15.3	-15.3	-15.3	-15.3
60 Minute Hourly Adjustment		**65.6**	**-15.3**	**-15.3**	**-15.3**	**-15.3**	**-15.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R5

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	369.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	369.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	369.0	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
Shielding (Barrier Attenuation)	369.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		69.8	-17.4	-17.4	-17.4	-17.4	-17.4
60 Minute Hourly Adjustment		**69.8**	**-17.4**	**-17.4**	**-17.4**	**-17.4**	**-17.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R5

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	369.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	369.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	369.0	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
Shielding (Barrier Attenuation)	369.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		68.7	-17.4	-17.4	-17.4	-17.4	-17.4
60 Minute Hourly Adjustment		**68.7**	**-17.4**	**-17.4**	**-17.4**	**-17.4**	**-17.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R5

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	369.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	369.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	369.0	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
Shielding (Barrier Attenuation)	369.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		72.0	-17.4	-17.4	-17.4	-17.4	-17.4
60 Minute Hourly Adjustment		**72.0**	**-17.4**	**-17.4**	**-17.4**	**-17.4**	**-17.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R5

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	369.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	369.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	369.0	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
Shielding (Barrier Attenuation)	369.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		67.2	-17.4	-17.4	-17.4	-17.4	-17.4
60 Minute Hourly Adjustment		**67.2**	**-17.4**	**-17.4**	**-17.4**	**-17.4**	**-17.4**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R5
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	369.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	369.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	369.0	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
Shielding (Barrier Attenuation)	369.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		62.6	-17.4	-17.4	-17.4	-17.4	-17.4
60 Minute Hourly Adjustment		**62.6**	**-17.4**	**-17.4**	**-17.4**	**-17.4**	**-17.4**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R5
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	369.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	369.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	Yes
Observer Elevation:	1,022.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	369.0	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4
Shielding (Barrier Attenuation)	369.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		63.5	-17.4	-17.4	-17.4	-17.4	-17.4
60 Minute Hourly Adjustment		**63.5**	**-17.4**	**-17.4**	**-17.4**	**-17.4**	**-17.4**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R6
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	396.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	396.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	396.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0
Shielding (Barrier Attenuation)	396.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		69.2	-18.0	-18.0	-18.0	-18.0	-18.0
60 Minute Hourly Adjustment		**69.2**	**-18.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R6
Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	396.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	396.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	396.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0
Shielding (Barrier Attenuation)	396.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		68.1	-18.0	-18.0	-18.0	-18.0	-18.0
60 Minute Hourly Adjustment		**68.1**	**-18.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R6

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	396.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	396.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	396.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0
Shielding (Barrier Attenuation)	396.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		71.4	-18.0	-18.0	-18.0	-18.0	-18.0
60 Minute Hourly Adjustment		**71.4**	**-18.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R6

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	396.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	396.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	396.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0
Shielding (Barrier Attenuation)	396.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		66.6	-18.0	-18.0	-18.0	-18.0	-18.0
60 Minute Hourly Adjustment		**66.6**	**-18.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R6

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	396.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	396.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	396.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0
Shielding (Barrier Attenuation)	396.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		62.0	-18.0	-18.0	-18.0	-18.0	-18.0
60 Minute Hourly Adjustment		**62.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R6

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	396.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	396.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,028.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	396.0	-18.0	-18.0	-18.0	-18.0	-18.0	-18.0
Shielding (Barrier Attenuation)	396.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		62.9	-18.0	-18.0	-18.0	-18.0	-18.0
60 Minute Hourly Adjustment		**62.9**	**-18.0**	**-18.0**	**-18.0**	**-18.0**	**-18.0**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R7

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	103.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	103.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	103.0	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
Shielding (Barrier Attenuation)	103.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		80.9	-6.3	-6.3	-6.3	-6.3	-6.3
60 Minute Hourly Adjustment		**80.9**	**-6.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R7

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	103.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	103.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	103.0	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
Shielding (Barrier Attenuation)	103.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		79.8	-6.3	-6.3	-6.3	-6.3	-6.3
60 Minute Hourly Adjustment		**79.8**	**-6.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R7

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	103.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	103.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	103.0	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
Shielding (Barrier Attenuation)	103.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		83.1	-6.3	-6.3	-6.3	-6.3	-6.3
60 Minute Hourly Adjustment		**83.1**	**-6.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R7

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	103.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	103.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	103.0	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
Shielding (Barrier Attenuation)	103.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		78.3	-6.3	-6.3	-6.3	-6.3	-6.3
60 Minute Hourly Adjustment		**78.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R7

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	103.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	103.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	103.0	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
Shielding (Barrier Attenuation)	103.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		73.7	-6.3	-6.3	-6.3	-6.3	-6.3
60 Minute Hourly Adjustment		**73.7**	**-6.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R7

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	103.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	103.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,035.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	103.0	-6.3	-6.3	-6.3	-6.3	-6.3	-6.3
Shielding (Barrier Attenuation)	103.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		74.6	-6.3	-6.3	-6.3	-6.3	-6.3
60 Minute Hourly Adjustment		**74.6**	**-6.3**	**-6.3**	**-6.3**	**-6.3**	**-6.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Demolition
Observer Location: R8

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	92.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	92.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	87.2	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	92.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Shielding (Barrier Attenuation)	92.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		81.9	-5.3	-5.3	-5.3	-5.3	-5.3
60 Minute Hourly Adjustment		**81.9**	**-5.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Site Preparation
Observer Location: R8

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	92.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	92.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	86.1	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	92.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Shielding (Barrier Attenuation)	92.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		80.8	-5.3	-5.3	-5.3	-5.3	-5.3
60 Minute Hourly Adjustment		**80.8**	**-5.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**

CONSTRUCTION NOISE PREDICTION MODEL

Source: Grading
Observer Location: R8

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	92.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	92.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	89.4	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	92.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Shielding (Barrier Attenuation)	92.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		84.1	-5.3	-5.3	-5.3	-5.3	-5.3
60 Minute Hourly Adjustment		**84.1**	**-5.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Building Construction
Observer Location: R8

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	92.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	92.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	84.6	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	92.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Shielding (Barrier Attenuation)	92.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		79.3	-5.3	-5.3	-5.3	-5.3	-5.3
60 Minute Hourly Adjustment		**79.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Architectural Coating
Observer Location: R8

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	92.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	92.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.0	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	92.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Shielding (Barrier Attenuation)	92.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		74.7	-5.3	-5.3	-5.3	-5.3	-5.3
60 Minute Hourly Adjustment		**74.7**	**-5.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**

Tuesday, October 14, 2014

CONSTRUCTION NOISE PREDICTION MODEL

Source: Paving
Observer Location: R8

Project Name: Waterman Ave. High Cube Ware
Job Number: 9178
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	92.0 feet	***Barrier Height:***	**0.0 feet**
Noise Distance to Barrier:	92.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0.0
Barrier Distance to Observer:	0.0 feet		
Noise Height:	5.0 feet		
Observer Height (Above Pad):	5.0 feet	*Barrier Breaks Line of Sight:*	No
Observer Elevation:	1,036.0 feet	*Wall Located at Noise Source Elevation:*	No
Noise Source Elevation:	1,030.0 feet		

Drop Off Coefficient: 20.0 (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)	50.0	80.9	0.0	0.0	0.0	0.0	0.0
Distance Attenuation	92.0	-5.3	-5.3	-5.3	-5.3	-5.3	-5.3
Shielding (Barrier Attenuation)	92.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		75.6	-5.3	-5.3	-5.3	-5.3	-5.3
60 Minute Hourly Adjustment		**75.6**	**-5.3**	**-5.3**	**-5.3**	**-5.3**	**-5.3**

Tuesday, October 14, 2014