

NORTH TUSTIN STREET PROJECT

NOISE AND VIBRATION ANALYSIS

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LIST OF ABBREVIATED TERMS

(1)	Reference
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EIR	Environmental Impact Report
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
mph	Miles per hour
PPV	Peak Particle Velocity
Project	North Tustin Street Project
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed North Tustin Street Project (Project) in the City of Orange. The Project consists of 71 residences, a recreation area, and utility improvements. This noise study has been prepared to satisfy applicable City of Orange noise standards and significance criteria based on Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1)

The results of this Noise and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report, consistent with Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) Table ES-1 shows the findings of significance for each potential noise and/or vibration impact before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Airport Noise	4	<i>Less Than Significant</i>	-
On-Site Traffic Noise ¹	7	-	-
Off-Site Traffic Noise	8	<i>Less Than Significant</i>	-
Operational Noise	10	<i>Less Than Significant</i>	-
Project Construction Noise	11	<i>Less Than Significant</i>	-
Construction Vibration	11	<i>Significant</i>	<i>Less Than Significant</i>
Concrete Crushing Noise	11	<i>Less Than Significant</i>	-
Concrete Crushing Vibration	11	<i>Less Than Significant</i>	-

¹ The effects of the environment on a Project are not an impact under CEQA and are provided for informational purposes.

Exterior Noise Abatement

The exterior analysis shows that the common outdoor use areas (e.g., Recreation Area) will experience exterior noise levels up to 55.8 dBA CNEL and will not exceed the City of Orange 65 dBA CNEL exterior noise standards. This exterior noise analysis shows that the Project will satisfy the City of Orange 65 dBA CNEL exterior noise level standards for common outdoor use areas, and no further abatement measures are needed.

Interior Noise Abatement

The interior noise level assessment demonstrates that the project can satisfy the City of Orange 45 dBA CNEL interior noise standard, with upgraded construction using windows with a minimum sound transmission class STC rating of 31, and a “windows closed” condition for Building 54 third-floor locations. For all other locations and residences, standard construction using windows with a minimum STC rating of 27, and a “windows closed” condition, can satisfy the City of Orange 45 dBA

CNEL interior noise standard. Therefore, the following best practices are recommended to meet the City of Orange 45 dBA CNEL interior noise standards for residential land uses:

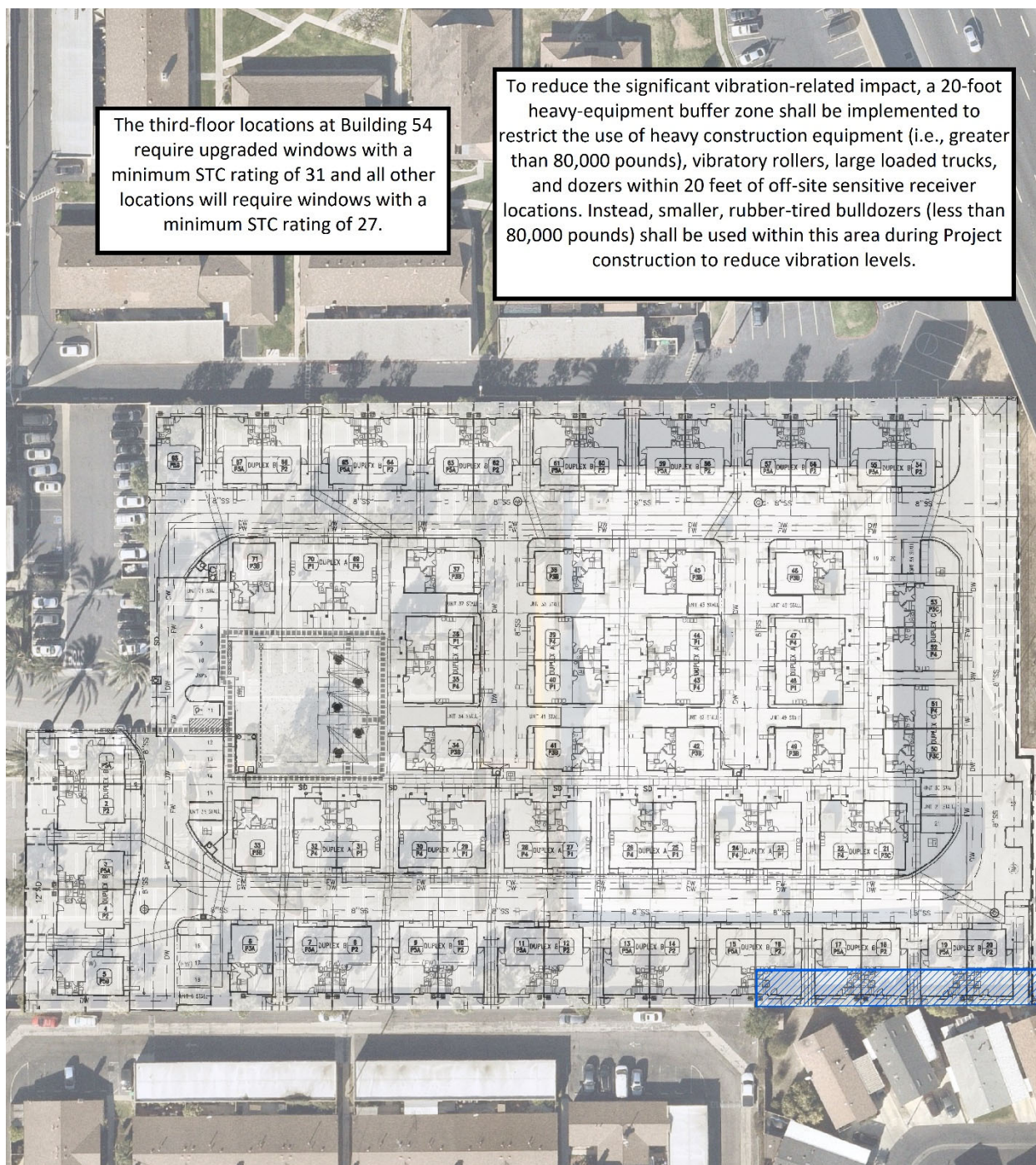
- Windows/Sliding Glass Doors: All windows and sliding glass doors should be well-fitted and weather-stripped assemblies with a minimum sound transmission class (STC) rating of 31 for the building 54 third-floor locations and windows with an STC rating of 27 for all other locations and residences on the site.
- Doors (Non-Glass): All doors for all residences should be well-fitted and weather-stripped and have minimum STC ratings of 26. Well-sealed perimeter gaps around the doors are essential to achieve the optimal STC rating. (2)
- Walls: At any penetrations of all exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked or filled with mortar to form an airtight seal.
- Roof: Roof sheathing of wood construction for all residences shall be per the manufacturer's specification or caulked plywood of at least one-half inch thick. Ceilings shall be per the manufacturer's specification or well-sealed gypsum board of at least one-half inch thick. Insulation with at least a rating of R-19 shall be used in the attic space.

As shown in Section 5, the Project is expected to satisfy the City of Orange 45 dBA CNEL interior noise level standards for residential development. Construction Vibration Mitigation

Construction Vibration Mitigation

NOI-1: To reduce the *significant* vibration-related impact, a 20-foot heavy-equipment buffer zone shall be implemented to restrict the use of heavy construction equipment (i.e., greater than 80,000 pounds), vibratory rollers, large loaded trucks, and dozers within 20 feet of off-site sensitive receiver locations. Instead, smaller, rubber-tired bulldozers (less than 80,000 pounds) shall be used within this area during Project construction to reduce vibration levels. With the recommended vibration measure identified in this analysis and shown in ES-1, the vibration-related impacts will be reduced to *less than significant*.

EXHIBIT ES-1: SUMMARY OF RECOMMENDATIONS



LEGEND:

20-Foot Construction Equipment Buffer Zone

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1 INTRODUCTION

This Noise and Vibration Analysis has been completed to determine the noise impacts associated with the development of the proposed North Tustin Street Project ("Project"). This noise and vibration analysis briefly describes the Project, provides information regarding noise fundamentals, sets out the local regulatory setting, presents the study methods and procedures for noise analysis, evaluates the future exterior noise environment, potential off-site traffic impacts, the Project-related long-term stationary-source operational noise, and Project-related short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The Project site is located at 2375 North Tustin Street in the northern portion of the City of Orange. The Project is bound by residential uses to the north and south, CA 55 to the east, and commercial uses to the west, as shown in Exhibit 1-1. The nearest existing noise-sensitive residential uses are located south of the Project site.

1.2 PROJECT DESCRIPTION

The applicant for the Project is requesting approval from the City of Orange to demolish the existing structure and improvements on the Project site and construct 71 paired and detached residences, along with open space/recreation and parking. The residential structures would be three stories high. Each residential unit would have three or four bedrooms, ranging in size from approximately 2,008 to 2,117 SF, and would be developed above two-car garages. The 71 residences on the 4.235-acre site would result in a density of 16.76 units per acre. The Project would include parking, open space, ornamental landscaping, and associated infrastructure. Along the northern edge of the site, there is an approximately 6-foot-high barrier, and along the southern edge of the site is a 6- to 8-foot-high barrier. A preliminary site plan for the proposed Project is shown in Exhibit 1-2. The Project site currently contains Best Buy.

The Project requests the approval of a General Plan Amendment to change the land use from General Commercial (GC) to Medium Density Residential (MDR), which allows residential densities between 15 and 24 dwelling units per acre. The Project also includes a zone change to change the site zoning from Limited Business Tustin Redevelopment Project Area (C-TR) to Multiple-Family Residential (R3).

EXHIBIT 1-1: PROJECT LOCATION

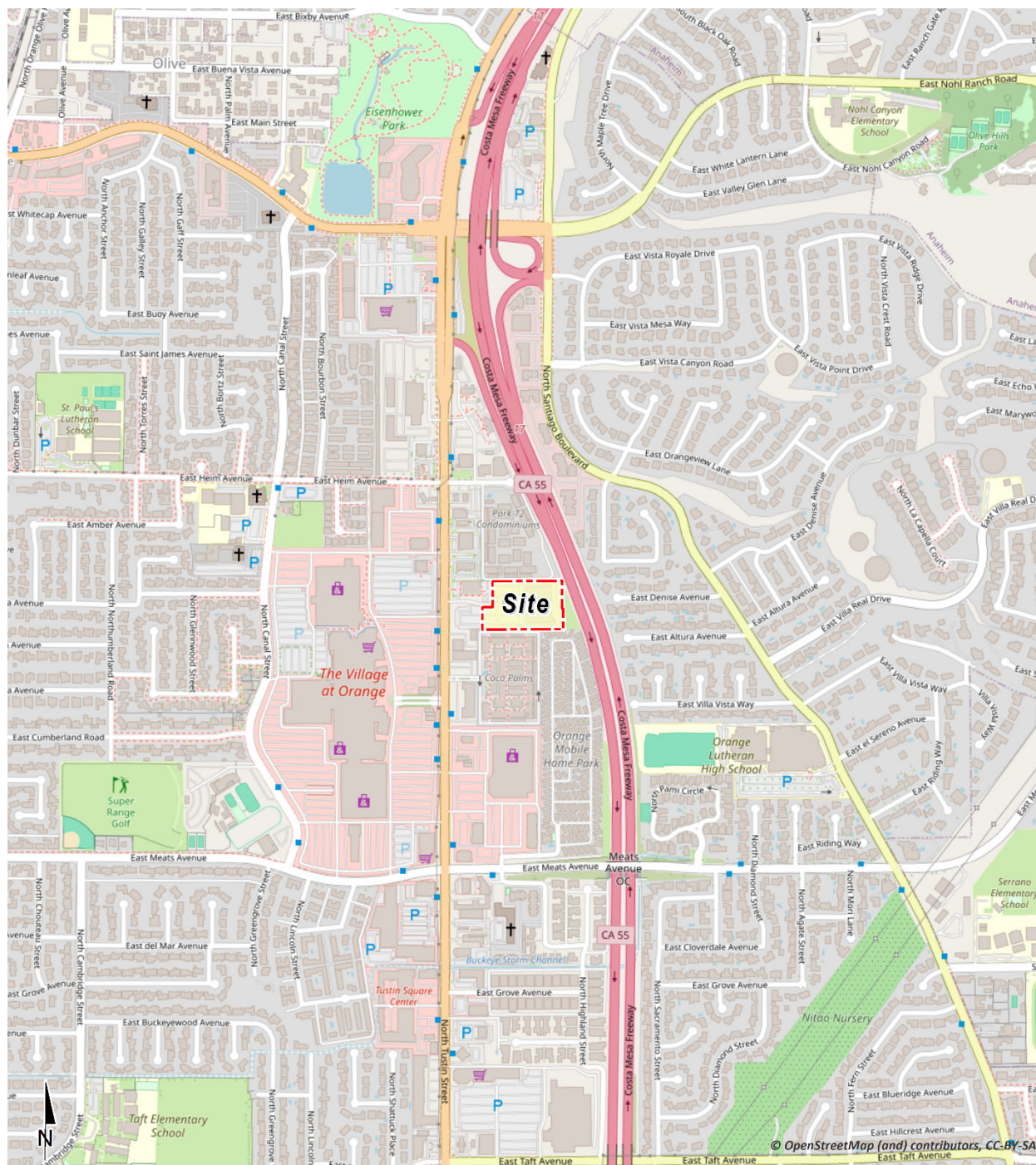
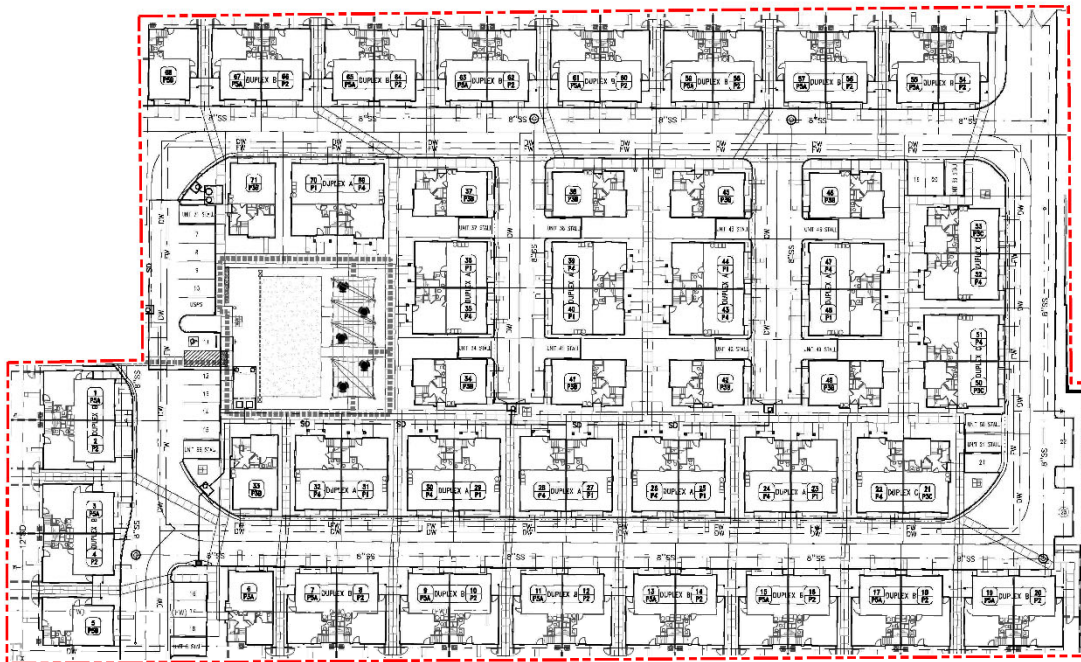


EXHIBIT 1-2: SITE PLAN



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2 FUNDAMENTALS

Noise is simply defined as “unwanted sound.” Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm, or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-1 presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-1: 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	VERY NOISY	SPEECH INTERFERENCE
LOUD AUTO HORN		100		
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	LOUD	SLEEP DISTURBANCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70		
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	NO EFFECT
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30		
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20	FAINT	NO EFFECT
	BROADCAST/RECORDING STUDIO	10		
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

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

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (3) The most common sounds vary between 40 dBA (very quiet) and 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA at approximately

1,000 feet, which can cause serious discomfort. (4) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than on instantaneous noise levels. The most used metric is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the “average” noise levels within the environment.

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

2.3 SOUND PROPAGATION

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

2.3.1 Geometric Spreading

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

2.3.2 Ground Absorption

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

in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (5)

2.3.3 Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (3)

2.3.4 Shielding

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide, and dense enough to completely obstruct the line-of-sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (6)

2.4 NOISE CONTROL

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

2.5 NOISE BARRIER ATTENUATION

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

2.6 LAND USE COMPATIBILITY WITH NOISE

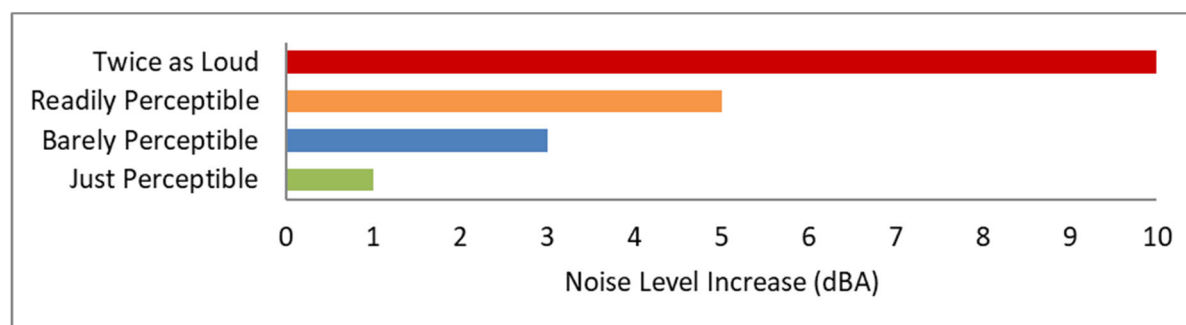
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, 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 governments 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. (7)

2.7 COMMUNITY RESPONSE TO NOISE

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

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises, averaging from 10 dB below existing to 25 dB above existing. (9) According to research originally published in the Noise Effects Handbook (8), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels, as shown in Exhibit 2-2. A change of 3 dBA is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (5)

EXHIBIT 2-2: NOISE LEVEL INCREASE PERCEPTION



2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual*, 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.

Additionally, in contrast to airborne noise, ground-borne vibration outdoors is not a common environmental problem, and annoyance from ground-borne vibration is almost exclusively an indoor phenomenon (9). Therefore, the effects of vibrations should only be evaluated at a structure, and the effects of the building structure on the vibration should be considered. Wood-frame buildings, such as typical residential structures, are more easily excited by ground vibration than heavier buildings. In contrast, large masonry buildings with spread footings have a low response to ground vibration (9). In general, the heavier a building is, the lower the response will be to the incident vibration energy. However, all structures reduce vibration levels due to the coupling of the building to the soil.

There are several methods used to quantify vibration levels. Peak Particle Velocity (PPV (in/sec)) is defined as the maximum instantaneous peak of a vibration signal and is most commonly used to evaluate the impact of vibration on buildings (10) (9). However, PPV (in/sec) is not always suitable for assessing human response (e.g., annoyance), as the human body does not respond instantly to vibration signals. Instead, it responds to the average amplitude, more accurately represented by the Root Mean Square (RMS) value of the vibration (9).

RMS is defined as the square root of the average of the squared signal amplitude and is commonly used to evaluate human exposure to vibration. RMS and PPV (in/sec) are mathematically related—RMS is typically about 70% of the PPV (in/sec) for certain waveforms (11) (12). However, deriving RMS from PPV (in/sec) requires knowing the full waveform or making assumptions (e.g., sinusoidal or steady-state signals). Without this information, converting PPV (in/sec) to RMS introduces uncertainty and provides limited insight, especially in cases involving transient or impact vibrations (13).

This distinction is important because human annoyance to vibration is often triggered by abrupt, intermittent events, rather than sustained energy levels. Construction-related vibrations are typically impulsive and broadband, in contrast to the continuous, tonal vibrations associated with transit systems. The FTA's RMS-based criteria were developed with train activity in mind and are not well-suited for construction vibration, where perception is driven by factors like suddenness, impact, and repetition (9).

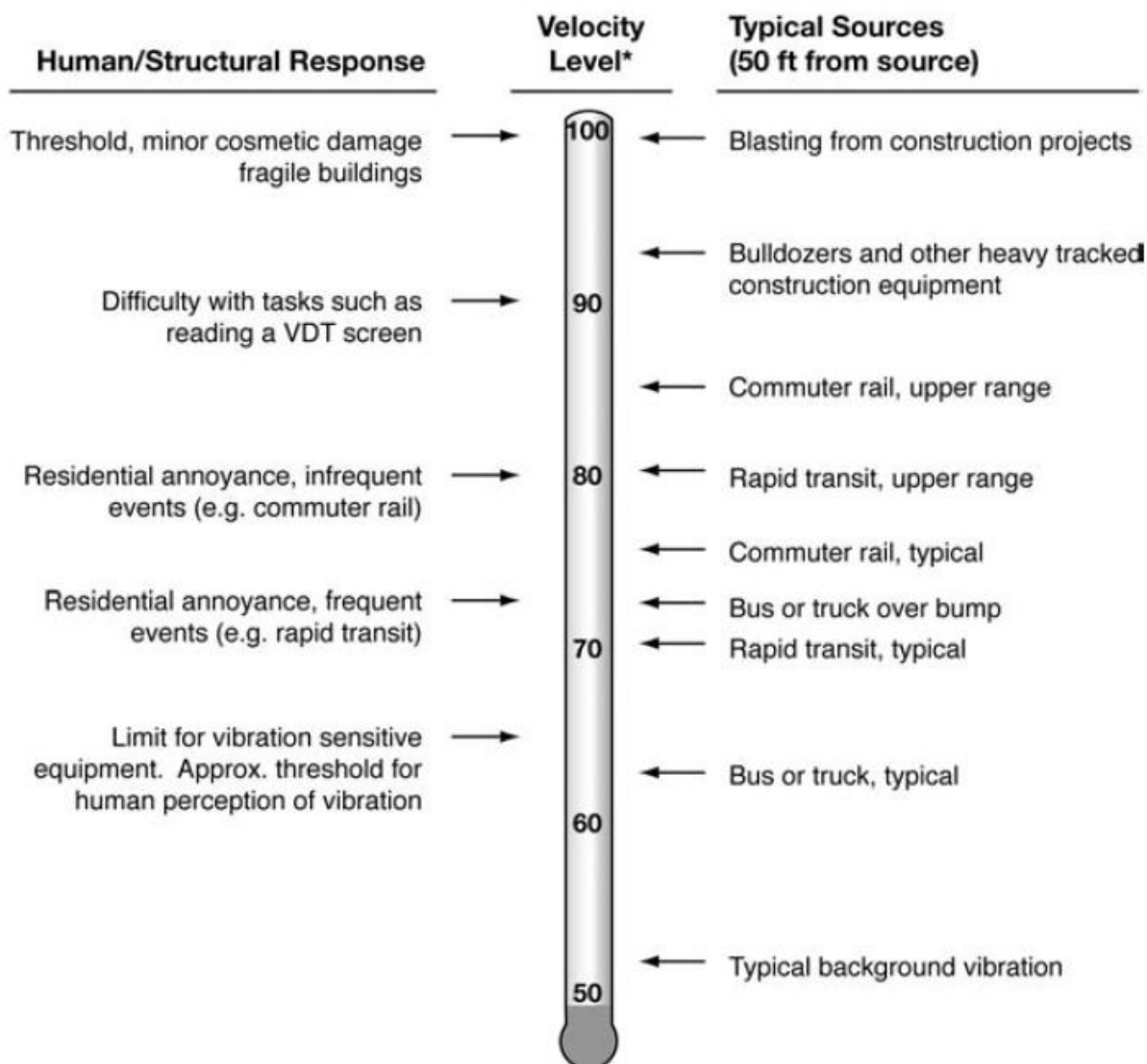
In essence, RMS tends to average out short-duration, high-intensity events—the very events that people find most disturbing. Therefore, for construction activities, PPV (in/sec)-based thresholds,

such as those recommended by Caltrans, are more appropriate for assessing potential human annoyance and structural impact (12).

While not universally accepted, vibration decibel notation (VdB) is another RMS-based vibration notation developed and used by the FTA in their guidance manual to describe vibration levels and provide a background of common vibration levels and set vibration limits (9). Decibel notation (VdB) serves to reduce the range of numbers used to describe vibration levels and is used in this report to describe vibration levels.

As stated in the FTA guidance manual, the background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-3 illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-3: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



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

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

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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 constant with time. Air and rail traffic, and commercial and industrial activities, are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element, which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (14) 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 BUILDING CODE

Residential Building Code

California's noise insulation standards for all residential units are codified in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Chapter 12, Section 1206.4, Allowable interior noise level. These noise standards are applied to new construction that contains dwelling units or sleeping units, such as residential and hotel or motel uses, in California, to control interior noise levels resulting from exterior noise sources. For new buildings, the acceptable interior noise limit is 45 dBA CNEL in habitable rooms. (15)

3.3 CITY OF ORANGE GENERAL PLAN NOISE ELEMENT

The City of Orange has adopted a Noise Element of the General Plan to control and abate environmental noise, and to protect the citizens of the City of Orange from excessive exposure to noise. (16) The Noise Element specifies the maximum allowable exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports and railroads. In addition, the Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To protect City of Orange residents from excessive noise, the Noise Element contains the following policies related to the Project:

- Policy 1.3: Incorporate design features into residential and mixed-use projects that can be used to shield residents from excessive noise.
- Policy 1.4: Ensure that acceptable noise level are maintained near noise-sensitive uses.
- Policy 3.1: Encourage noise-compatible land uses and incorporate noise-reducing design features within transit oriented, mixed-use development near rail corridors.
- Policy 7.2: Require developers and contractors to employ noise minimizing techniques during construction and maintenance operations.
- Policy 7.3: Limit the hours of construction and maintenance operations located adjacent to noise-sensitive land uses.

3.3.1 Land Use Compatibility

To ensure noise-sensitive land uses are protected from high levels of noise, the City of Orange has developed its own land use compatibility standards, based on recommended parameters from the Governor's Office of Planning and Research (OPR).

The City's Land Use Compatibility standards use the CNEL noise descriptor, are intended to be applicable for land use designations exposed to noise levels generated by transportation related sources. Land use compatibility noise exposure limits are generally established as 65 dBA CNEL for a majority of land use designations throughout the City. Higher exterior noise levels are permitted for multiple-family housing and housing in mixed-use contexts than for single-family houses. This is because multiple-family complexes are generally located in transitional areas between single-family and commercial districts or in proximity to major arterials served by transit, and a more integrated mix of residential and commercial activity (accompanied by higher noise levels) is often desired in mixed-use areas close to transit routes. These standards establish maximum interior noise levels for new residential development, requiring that sufficient insulation be provided to reduce interior ambient noise levels to 45 dBA CNEL.

3.3.2 Noise Standards

To control transportation-related noise sources such as arterial roads, freeways, airports, and railroads, the City of Orange has established the standards provided in Exhibit 3-1 (Table N-3 of the

Noise Element) for acceptable community noise levels. The City of Orange Noise Element provides specific noise level standards for all land use categories that are used to regulate traffic-related noise level impacts for noise-sensitive uses; both exterior and interior noise level standards are defined. Within the Medium Density Residential Land Use designation, as proposed by the Project, the exterior noise standards of 65 dBA CNEL only apply to common outdoor recreation areas, as detailed in footnote 4 of the Noise Element Table N-3, included below as Table 3-1. Additionally, interior noise levels are not to exceed 45 dBA CNEL. Based on the City of Orange land use compatibility guidelines and state interior noise standards, this noise study has been prepared to satisfy an exterior noise level of 65 dBA CNEL in common outdoor recreation areas and an interior noise level of less than 45 dBA CNEL. This approach is consistent with Table N-3 of the General Plan Noise Element.

EXHIBIT 3-1: INTERIOR AND EXTERIOR NOISE STANDARDS

Table N-3 Maximum Allowable Noise Exposure—Transportation Sources			
Land Use		CNEL (dBA)	
Designations (as shown on Figure LU-5)	Uses	Interior ^{1,3}	Exterior ²
Estate Low Density Residential Low Density Residential Low Medium Density Residential	Single-family, duplex, and multiple-family	45	65
	Mobile home park	N/A	65
Medium Density Residential Neighborhood Mixed-use Neighborhood Office Professional Old Towne Mixed-use General Commercial Yorba Commercial Overlay Urban Mixed-use Urban Office Professional	Single-family	45	65
	Mobile home park	N/A	65
	Multiple-family, mixed-use	45	65 ^{4,5}
	Transient lodging—motels, hotels	45	65
	Sports arenas, outdoor spectator sports	N/A	N/A
	Auditoriums, concert halls, amphitheaters	45	N/A
	Office buildings, business, commercial and professional	50	N/A
Light Industrial Industrial	Manufacturing, utilities, agriculture	N/A	N/A
Public Facilities and Institutions	Schools, nursing homes, day care facilities, hospitals, convalescent facilities, dormitories	45	65
	Government Facilities—offices, fire stations, community buildings	45	N/A
	Places of Worship, Churches	45	N/A
	Libraries	45	N/A
	Utilities	N/A	N/A
	Cemeteries	N/A	N/A
Recreation Commercial Open Space Open Space—Park Open Space—Ridgeline Resource Area	Playgrounds, neighborhood parks	N/A	70
	Golf courses, riding stables, water recreation, cemeteries	N/A	N/A
Notes: (1) Interior habitable environment excludes bathrooms, closets and corridors. (2) Exterior noise level standard to be applied at outdoor activity areas; such as private yards, private patio or balcony of a multi-family residence. Where the location of an outdoor activity area is unknown or not applicable, the noise standard shall be applied inside the property line of the receiving land use. (3) Interior noise standards shall be satisfied with windows in the closed position. Mechanical ventilation shall be provided per Uniform Building Code (UBC) requirements. (4) Within the Urban Mixed-Use, Neighborhood Mixed-Use, Old Towne Mixed-use, and Medium Density Residential land use designations, exterior space standards apply only to common outdoor recreational areas. (5) Within Urban Mixed-Use and Medium Density Residential land use designations, exterior noise levels on private patios or balconies located within 250 feet of freeways (I-5, SR-57, SR-55, SR-22, or SR-241) and Smart Streets and Principal Arterials identified in the Circulation & Mobility Element that exceed 70 dB should provide additional common open space. N/A=Not Applicable to specified land use category or designation Source: Alliance Acoustical Consultants, modified by EDAW, 2008			

Source: City of Orange General Plan Noise Element, Table N-3.

3.3.3 Stationary Noise Standards

The City of Orange has set stationary-source hourly average L_{eq} exterior limits to control operational stationary source noise levels associated with the development of the proposed North Tustin Street Project. These hourly and maximum performance standards (expressed in L_{eq}) for non-transportation or stationary noise sources are designed to protect noise-sensitive land uses adjacent to stationary sources from excessive noise. According to Table N-4 of the City of Orange General Plan Noise Element, acceptable exterior noise levels at the sensitive receiver are 55 dBA L_{eq} during daytime (7:00 a.m. to 10:00 p.m.) hours and 45 dBA L_{eq} during nighttime (10:00 p.m. to 7:00 a.m.) hours.

3.4 CITY OF ORANGE MUNICIPAL CODE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property, such as the North Tustin Street Project Project, stationary-source (operational) noise levels and noise from construction activities are typically evaluated against standards established under the City's Municipal Code.

3.4.1 Operational Noise Standards

For noise-sensitive residential property, the City of Orange Municipal Code, Section 8.24.040, identifies exterior noise levels standards of 55 dBA L_{eq} for the daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{eq} during the nighttime (10:00 p.m. to 7:00 a.m.) hours. The City of Orange Municipal Code Noise Standards are included in Appendix 3.1. The daytime Municipal Code requirements are consistent with the noise levels identified in the City of Orange General Plan Noise Element, however, the 50 dBA L_{eq} nighttime noise levels are 5 dBA higher than the 45 dBA L_{eq} thresholds identified in the Noise Element. For the purpose of this analysis, the more restrictive 45 dBA L_{eq} nighttime noise level standards identified in the Noise Element are relied upon.

Per Section 8.24.040(B) For multi-family residential or mixed use developments located within the City's Urban Mixed Use, Neighborhood Mixed Use, Old Towne Mixed Use or Medium Density Residential General Plan land use districts, exterior noise standards shall apply to common recreation areas only and shall not apply to private exterior space (such as a private yard, patio, or balcony).

3.4.2 Construction Noise Standards

The City of Orange has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 8.24.50 of the City's Municipal Code states: *Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday.* (17) However, neither the City of Orange General Plan nor the Municipal Code establishes numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified

determination of what CEQA constitutes a *substantial temporary or permanent increase in ambient noise levels*.

According to Caltrans guidance, construction noise impacts shall not exceed 86 dBA L_{max} at 50 feet from the job site activities between the hours of 9:00 p.m. and 6:00 a.m. (18) Equipment and operations are usually at or less than that level, except for blasting, pile drivers (impact or vibratory), hoe rams, pavement breakers for crack-and-seat operations, and other impact equipment. (3) The Caltrans guidance also suggests that detailed discussions of typical construction equipment noise levels are probably not necessary unless the project involves unusually sensitive receptors or nighttime work or if the project is controversial. (3) Since this limitation is only associated with nighttime activities and does not address the noise level at the point of concern, e.g., a residence, Caltrans construction criteria were similarly not considered as the appropriate threshold for environmental review.

Further research indicated the U.S. Department of Transportation guidance for construction published by the Federal Transit Administration (FTA) is appropriate and based on well-documented studies of the effects of construction noise. According to the FTA *Transit Noise and Vibration Impact Assessment Manual*, local noise ordinances are typically not very useful in evaluating construction noise impacts. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. (9 p. 172)

Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessments. The FTA identifies two types of construction noise assessment criteria: general and detailed. For general construction noise assessments, the analysis is limited to the two noisiest pieces of equipment with an hourly daytime exterior noise level threshold for residential land use of 90 dBA $L_{eq(1hr)}$. (9 p. 179) However, for long-term construction projects that would expose sensitive receivers to noise for extended periods of time, the FTA considers a daytime 8-hour average exterior construction noise level of 80 dBA $L_{eq(8hr)}$. The absolute FTA thresholds are intended to account for reasonable expectations regarding construction noise during the daytime hours and are intended to protect human health.

Therefore, to evaluate whether the Project will generate potentially significant short-term noise levels at nearby noise-sensitive residential receiver locations, a daytime exterior construction noise level of 80 dBA L_{eq} is used as a reasonable threshold to assess construction noise level impacts based on the FTA detailed analysis of construction noise criteria with a nighttime exterior construction noise level of 70 dBA L_{eq} . (9 p. 179).

3.5 CONSTRUCTION VIBRATION STANDARDS

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures, and soil type. Construction

vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. (9) To analyze vibration impacts originating from the operation and construction of the North Tustin Street Project, vibration-generating activities are appropriately evaluated against standards established under the Municipal Code if such standards exist. However, the City of Orange does not identify specific construction vibration level limits. Therefore, for analysis purposes, the Caltrans *Transportation and Construction Vibration Guidance Manual*, (12 p. 38) Table 19, vibration damage is used in this noise study to assess potential temporary construction-related impacts at adjacent building locations. The nearest noise-sensitive buildings adjacent to the Project site can best be described as “older residential structures” with a maximum acceptable continuous vibration threshold of 0.3 PPV (in/sec).

3.6 AIRPORT LAND USE COMPATIBILITY

Fullerton Municipal Airport (FMA) is located approximately 8.5 miles northwest of the Project site. The Airport Environs Land Use Plan (AELUP) for FMA (19) prepared by the Orange County Airport Land Use Commission (ALUC), identifies noise compatibility policies to safeguard the general welfare of the inhabitants within the vicinity of the airport and to ensure the continued operation of the airport. Specifically, the AELUP plan seeks to protect the public from the adverse effects of aircraft noise, to ensure that people and facilities are not concentrated in areas susceptible to aircraft accidents, and to ensure that no structures or activities adversely affect navigable airspace.

The basic function of the AELUP is to promote compatibility between the airport and the land uses that surround it. As required by State law, the AELUP provides guidance to affected local jurisdictions regarding airport land use compatibility. The main objective of the AELUP is to avoid future compatibility conflicts rather than to remedy existing incompatibilities. Also, the AELUP is aimed at addressing future land uses and development, not airport activity. The AELUP does not place any restrictions on the present and future role, configuration, or use of the airport. The AELUP establishes aircraft noise exposure exterior noise level compatibility thresholds for new developments by land use category. According to the exterior noise thresholds outlined in Exhibit 3-3, Residential development is considered normally consistent with exterior noise levels of less than 65 dBA CNEL, and conditionally consistent with exterior noise levels greater than 65 dBA CNEL and less than 70 dBA CNEL. As shown in Exhibit 3-4, the Project Site is located beyond the 60 dBA CNEL aircraft noise level contours. Thus, the Project site is exposed to Normally Consistent noise levels from airport operations.

EXHIBIT 3-3: AIRPORT COMPATIBILITY NOISE LEVELS BY LAND USE

AIRPORT LAND USE COMMISSION FOR ORANGE COUNTY
AIRPORT ENVIRONS LAND USE PLAN
LIMITATIONS ON LAND USE DUE TO NOISE
(Applicable to Aircraft Noise Sources)

LAND USE CATEGORY	COMMUNITY NOISE EQUIVALENT LEVEL dB						
	55	60	65	70	75	80	
Residential (all types): Single and Multi-Family Residences							
Community Facilities: Churches, Libraries, Schools, Preschools, Day-Care Centers, Hospitals, Nursing/Convalescent Homes, & Other noise sensitive uses							
Commercial: Retail, Office							
Industrial:							



NORMALLY CONSISTENT

Conventional construction methods used. No special noise reduction requirements.



CONDITIONALLY CONSISTENT

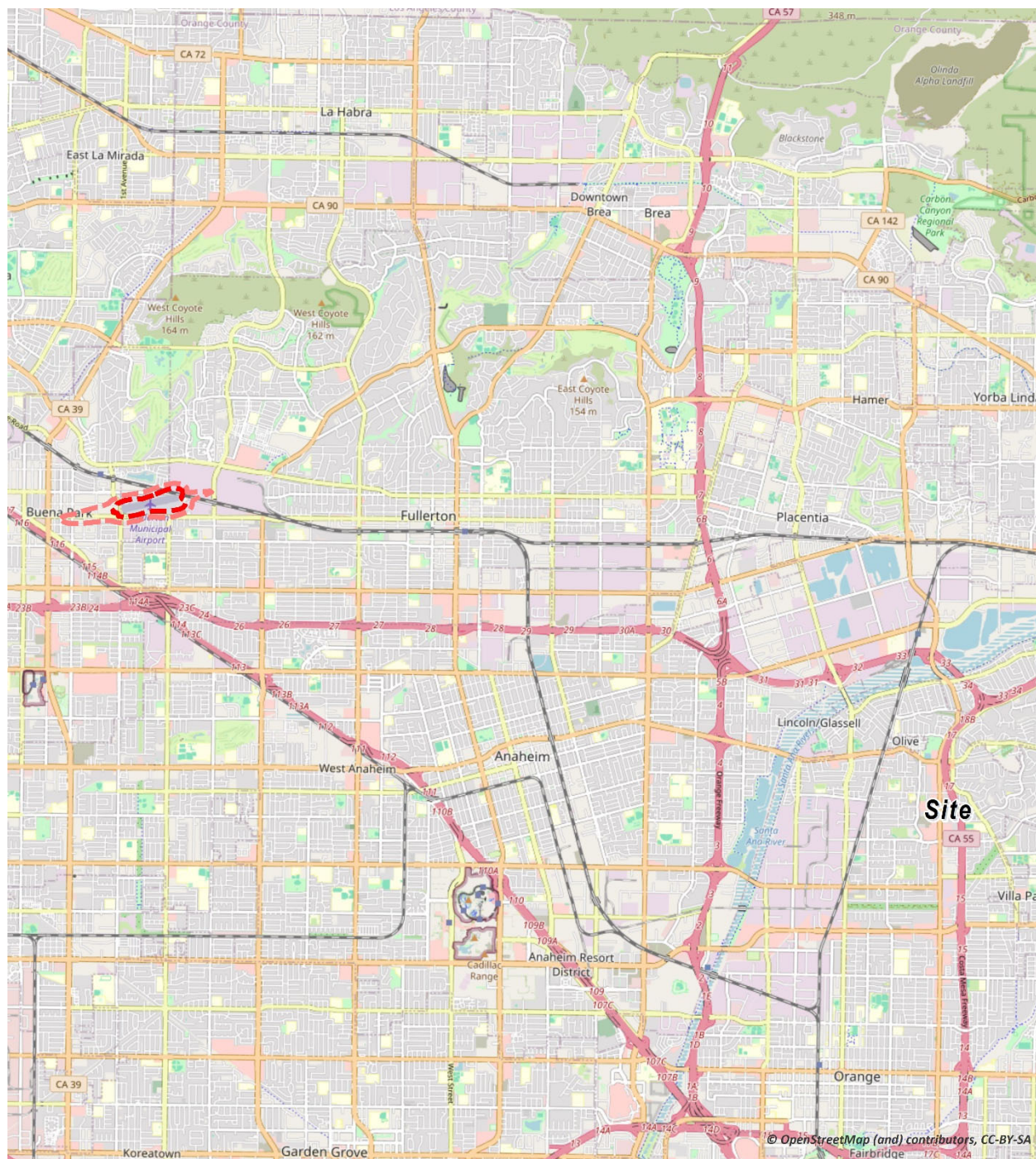
Must use sound attenuation as required by the California Noise Insulation Standards, Title 25, California Code of Regulations. Residential use sound attenuation required to ensure that the interior CNEL does not exceed 45 dB. Commercial and industrial structures shall be sound attenuated to meet Noise Impact Zone "1" criteria (refer to Section 3.2.3).



NORMALLY INCONSISTENT

All residential units are inconsistent unless are sound attenuated to ensure that the interior CNEL does not exceed 45 dB, and that all units are indoor oriented so as to preclude noise impingement on outdoor living areas.

EXHIBIT 3-4: FULLERTON MUNICIPAL AIRPORT NOISE LEVEL CONTOUR BOUNDARIES



LEGEND:

 60 dBA CNEL Noise Level Contour  65 dBA CNEL Noise Level Contour

4 SIGNIFICANCE CRITERIA

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

- A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- B. Generation of excessive ground-borne vibration or ground-borne noise levels?
- C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

4.1 NOISE LEVEL INCREASES (THRESHOLD A)

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines. Under CEQA, consideration must be given to the magnitude of the increase, the existing baseline ambient noise levels, and the location of receivers to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes that there is no single noise increase that renders the noise impact significant. (20) 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.

4.1.1 Noise Sensitive Receivers (Substantial Permanent Noise Level Increase)

The Federal Interagency Committee on Noise (FICON) (21) developed guidance to be used for the assessment of project-generated increases in noise levels that considers the ambient noise level. The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (CNEL) and equivalent continuous noise level (L_{eq}). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will typically be judged.

As previously stated, the approach used in this noise study recognizes that there is no single noise increase that renders a noise impact significant, based on a 2008 California Court of Appeals ruling on *Gray v. County of Madera*. (20) For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur if the noise criteria may be exceeded. Therefore, for this analysis, a readily perceptible 5 dBA or greater project-related noise level increase is considered a significant impact when the without-project noise levels are

below 60 dBA. Per the FICON, in areas where the without-project noise levels range from 60 to 65 dBA, a 3 dBA barely perceptible noise level increase appears to be appropriate for most people. When the without-project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance.

The FICON guidance provides an established source of criteria to assess the impacts of a substantial temporary or permanent increase in baseline ambient noise levels. Based on the FICON criteria, the amount to which a given noise level increase is considered acceptable is reduced when the baseline (without-project) noise levels are already shown to exceed certain land-use specific exterior noise level criteria. The specific levels are based on typical responses to noise level increases of 5 dBA or readily perceptible, 3 dBA or barely perceptible, and 1.5 dBA, depending on the underlying noise levels for noise-sensitive uses. These levels of increase and their perceived acceptance are consistent with guidance provided by both the Federal Highway Administration (5 p. 9) and Caltrans (22 p. 2_48).

4.1.2 Construction Noise (Substantial Temporary Noise Level Increase)

To control the noise-generating construction activities, the temporary noise level increases over the existing ambient conditions must be considered under CEQA Significance Threshold A. Although noise ordinances vary across jurisdictions, many cities and counties in California, including Los Angeles, San Diego, and San Francisco, set construction noise limits between 75 and 80 dBA L_{eq} and typically restrict construction activities to the daytime hours. In contrast, everyday operational noise regulations are more stringent because they apply to continuous, long-term noise sources that can significantly impact the quality of life. As a result, many jurisdictions establish daytime residential noise limits around 50-55 dBA L_{eq} [County of Los Angeles (50 dBA L_{eq}), Glendora (55 dBA L_{eq}), Covina (50 dBA L_{eq}), and Azusa (50 dBA L_{eq})]. This suggests that 20 to 30 dBA increase over the daytime noise limit can be reasonably tolerated without significant adverse effects. This is also illustrated in the adoption of many CEQA documents statewide that use the FTA's construction noise threshold of 80 dBA L_{eq} for assessing construction impacts while using everyday noise level limits of local noise ordinances in assessing on-site operational impacts.

While this analysis relies on the 20 dBA L_{eq} *substantial* noise increase threshold, it is important to recognize that jurisdictions within the State, such as the City of Los Angeles, have adopted thresholds that state any daytime noise increase is acceptable during construction as long as they stay below 80 dBA L_{eq} . While the updated City of Los Angeles CEQA Thresholds Guide no longer maintains a numerical threshold above ambient noise levels for daytime construction activities, they do identify a 5 dBA L_{eq} nighttime construction noise increase threshold. Therefore, if the Project-related construction noise levels generate a temporary noise level increase over the existing daytime ambient noise levels more than 20 dBA L_{eq} or 5 dBA L_{eq} over the existing nighttime ambient noise levels, then the Project construction noise increases will be considered a *significant* impact.

4.2 VIBRATION (THRESHOLD B)

As described in Section 3.4, vibration impacts originating from the construction of the Project are appropriately evaluated using the standards established by the Caltrans *Transportation and Construction Vibration Guidance Manual*, Table 19. The Caltrans' vibration thresholds for building damage are used in this noise study to assess potential operational and temporary construction-related impacts at adjacent building locations. A maximum acceptable continuous vibration threshold of 0.30 PPV (in/sec) is used to describe the nearest residential buildings adjacent to the Project site.

4.3 CEQA GUIDELINES NOT FURTHER ANALYZED (THRESHOLD C)

CEQA Noise Threshold C applies when there are nearby public and private airports and/or airstrips and focuses on land use compatibility of the Project to nearby airports and airstrips. The closest major airport is the Fullerton Municipal Airport, located over 8.5 miles northwest of the Project site. As discussed in Section 3.6, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered less than significant, and no further noise analysis is conducted in relation to Appendix G to the CEQA Guidelines, Noise Threshold C.

4.4 SIGNIFICANCE CRITERIA SUMMARY

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

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Receiving Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
On-Site	Noise Sensitive	Common Outdoor Recreation Area ⁴ Interior Noise Level Standard ³	65 dBA CNEL 45 dBA CNEL	
Operational	Noise-Sensitive	Residential Exterior Noise Level ⁴ If ambient is < 60 dBA L _{eq} ¹	55 dBA L _{eq}	45 dBA L _{eq}
		If ambient is 60 – 65 dBA L _{eq} ¹	≥ 5 dBA L _{eq} Project increase	
		If ambient is > 65 dBA L _{eq} ¹	≥ 3 dBA L _{eq} Project increase	
Construction	Noise-Sensitive	Noise Level Threshold ⁵	80 dBA L _{eq}	70 dBA L _{eq}
		Exterior Noise Level Increase ⁶	20 dBA L _{eq}	5 dBA L _{eq}
		Vibration Level Threshold ⁷	0.30 PPV (in/sec) (in/sec)	

¹ FICON, 1992.

² OPR Land use/noise compatibility standards

³ California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2

⁴ City of Orange Municipal Code, Section 8.24.040.

⁵ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.

⁶ Caltrans Traffic Noise Analysis Protocol, April 2020.

⁷ Caltrans Transportation and Construction Vibration Manual, April 2020 Table 19

"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, 24-hour noise level measurements were taken at four locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-1 provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, long-term noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, March 19, 2025. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in “slow” mode to record noise levels in “A” weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (23)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing equivalent hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines, which indicate that sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources. (3) Further, FTA guidance states that it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community. (9)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (9) 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.

EXHIBIT 5-1: NOISE MEASUREMENT LOCATIONS



LEGEND:

 Site Boundary  Measurement Locations

Collecting noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential noise increase due to the Project's contribution to the ambient noise levels. This approach is necessary to calculate the temporary or permanent increase in ambient noise levels as required by the CEQA Guidelines Environmental Checklist.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the equivalent or the hourly energy average sound levels (L_{eq}) to describe the existing ambient conditions. Table 5-1 provides the (energy average) noise levels used to describe the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time-varying signal over a given sample period. The daytime and nighttime equivalent noise levels represent the average of all hourly noise levels observed during these time periods, expressed as a single number.

TABLE 5-1: AMBIENT NOISE LEVEL MEASUREMENTS

Location ¹	Description	Energy Average Noise Level (dBA L_{eq}) ²	
		Daytime	Nighttime
L1	Located at the site's northern boundary near the residence at 1800 E Heim Ave.	58.2	56.3
L2	Located at the site's eastern boundary near the residence at 2025 E. Denise Ave.	63.4	65.3
L3	Located at the site's southern boundary near the residence at 1931 E. Meats Ave.	57.5	58.6
L4	Located at the site's southern boundary near the residence at 2295 N. Tustin St.	55.3	57.1

¹ See Exhibit 5-1 for the noise level measurement locations.

² Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.

"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Table 5-1 provides the equivalent noise levels used to describe the daytime and nighttime ambient conditions for each of the measurements. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L1, L2, L5, L8, L25, L50, L90, L95, and L99 percentile noise levels observed during the daytime and nighttime periods.

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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. (24) 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. (25) 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 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters, including the average daily traffic (ADT) volumes used for this study, presented in Table 4-1, are based on the City of Orange General Plan Circulation and Mobility Element, (26) and data from Caltrans Truck Traffic Counts, Traffic Census. To predict the future on-site noise environment at the Project site, parameters including roadway classification and vehicle speeds were obtained from the City of Orange Circulation and Mobility Element, Figure CM-2 (26) , and from posted speed limits for each roadway. The traffic volumes shown in Table 4-1 reflect future long-range traffic conditions used to assess the on-site traffic noise environment and to identify the appropriate noise mitigation measures that address the worst-case future conditions. Soft site conditions were used to analyze the traffic noise impacts within the Project study area, which account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. Research conducted by Caltrans shows that the use of soft site conditions is appropriate for the application of the FHWA traffic noise prediction model used in this analysis. (27)

TABLE 6-1: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification ¹	ADT ²	Design Speed (MPH) ³	Site Conditions
Tustin St.	6	Major Arterial	39,400	40	Soft
SR-55	11	Freeway	211,000	60	Soft

¹ Source: City of Orange, General Plan Circulation and Mobility Element, Figure CM-2

² Source: City of Orange, General Plan Circulation and Mobility Element/Caltrans Truck Traffic Counts, Traffic Census

³ Source: Posted speed limits.

Tables 6-2 and 6-3 present the time-of-day vehicle splits by vehicle type, and the total traffic flow distributions (vehicle mixes) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobiles, medium trucks, and heavy trucks for input into the FHWA Model based on roadway types.

TABLE 6-2: TUSTIN STREET TIME OF DAY VEHICLE SPLITS

Time of Day	Vehicle Mix ¹			Time of Day Split ¹
	Autos ²	Medium Trucks ³	Heavy Trucks ⁴	
Daytime	72.75%	1.50%	0.75%	75.00%
Evening	7.76%	0.16%	0.08%	8.00%
Nighttime	16.49%	0.34%	0.17%	17.00%
Daily	97.00%	2.00%	1.00%	100.00%

¹ Typical Southern California Mix

² All vehicles with two axles and four wheels designed primarily for the transportation of nine or fewer passengers (automobiles) or the transportation of cargo (light trucks).

³ All vehicles with two axles and six wheels are designed for the transportation of cargo.

⁴ All vehicles with three or more axles designed for the transportation of cargo.

TABLE 6-3: SR-55 TIME OF DAY VEHICLE SPLITS

Time of Day	Vehicle Mix ¹			Time of Day Split ¹
	Autos ²	Medium Trucks ³	Heavy Trucks ⁴	
Daytime	31.78%	29.82%	20.61%	82.21%
Evening	5.29%	1.72%	0.64%	7.66%
Nighttime	3.94%	3.62%	2.57%	10.13%
Daily	41.00%	35.17%	23.83%	100.00%

¹ Based on the Caltrans Truck Traffic Counts, Traffic Census; Typical Southern California Mix

² All vehicles with two axles and four wheels designed primarily for the transportation of nine or fewer passengers (automobiles) or the transportation of cargo (light trucks).

³ All vehicles with two axles and six wheels are designed for the transportation of cargo.

⁴ All vehicles with three or more axles designed for the transportation of cargo.

To predict the future noise environment at the Project site, coordinate information was collected to identify the noise transmission path between the noise source and receiver. The coordinate information is based on the Project site plan and its relationship to the adjacent roadways, as shown in Appendix 6.1. The site plan is used to identify the relationship between the roadway centerline

elevation, the pad elevation, the centerline distance to potential noise barriers, and the building façade. The backyard locations use a receiver height of five feet above the pad elevation, located ten feet away from potential barrier locations. First-floor receivers are similarly modeled 5 feet above the pad elevation. Second-floor receivers are modeled at a receiver height of 14 feet above pad elevation. Third-floor receivers were located at 23 feet above pad elevation. The rooftop receivers were located 32 feet above the pad elevation. All first-, second-, and third-floor receivers were located at the building façade.

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7 ON-SITE TRAFFIC NOISE IMPACTS

An on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potentially necessary noise abatement measures for the Project. It is expected that the primary source of noise impacts on the Project site will be traffic noise from Tustin Street and SR-55. The Project will also experience some background traffic noise impacts from other local roads; however, due to low traffic volume/speeds, traffic noise from these roads will not make a significant contribution to the noise environment.

7.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the parameters outlined in Tables 6-1 through 6-3, the expected future exterior noise levels at the Project site were calculated. According to the City of Orange Noise Element and Municipal Code, noise-sensitive exterior areas within the Project are limited to the common outdoor use areas for medium-density residential land uses. As shown in Table 7-1, the unabated exterior noise levels are estimated to range from 55.8 to 73.9 dBA CNEL throughout the Project site, including the private roof decks.

The common outdoor use areas (e.g., Recreation Area) will experience exterior noise levels up to 55.8 dBA CNEL and will not exceed the City of Orange 65 dBA CNEL exterior noise standards for medium-density residential land uses. All other common outdoor use areas are shielded by buildings on-site and are expected to experience lower exterior noise levels. The future long-range exterior traffic noise analysis calculations are included in Appendix 7.1.

This noise analysis shows that the Project will satisfy the City of Orange 65 dBA CNEL exterior noise level standards for common outdoor use areas, and no further abatement measures are needed.

TABLE 7-1: FUTURE EXTERIOR NOISE LEVELS

Building	Roadway	Unabated Exterior Noise Level (dBA CNEL) ¹			
		1st Floor	2nd Floor	3rd Floor	Rooftop
Bldg. 1-2	Tustin St.	57.5	60.5	60.5	-
Bldg. 20, 50-51	SR-55	68.1	69.7	71.8	73.8
Bldg. 21	SR-55	67.4	68.9	70.7	-
Bldg. 46, 52-53	SR-55	69.1	71.3	73.9	72.0
Bldg. 54	SR-55	70.3	73.2	77.0	-
Bldg. 71	Tustin St.	55.8	58.7	58.7	-
Rec. Area	Tustin St.	55.8	-	-	-

¹ Outdoor environment is limited to the common outdoor use areas (Rec. Area)

7.2 ON-SITE INTERIOR NOISE ANALYSIS

To verify that the interior noise levels will comply with the City of Orange 45 dBA CNEL interior noise standard, future exterior noise levels were calculated at the first-, second-, and third-floor building

façade locations. Based on the site plans provided, the Project will provide air conditioning, so a “windows closed” condition was assumed for the purposes of this analysis.

7.2.1 Noise Reduction Methodology

The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical building construction will provide a noise reduction of approximately 12 dBA with “windows open” and a minimum 25 dBA noise reduction with “windows closed.” However, sound leaks, cracks, and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including (1) weather-stripped solid core exterior doors; (2) upgraded dual-glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assemblies free of cutouts or openings.

7.2.2 Interior Noise Reduction Calculations

Noise reduction calculations are based on a sample of the interior rooms detailed in the architectural floor plans for the Project. The floor plans for the Project were used to estimate the “windows closed” interior noise levels. The calculations were completed using standard windows with a minimum Sound Transmission Class (STC) rating of 27 and identify a noise reduction that ranges from 30.4 to 33.0 dBA CNEL. In addition, due to exceedance of 45 dBA, the interior third-floor of the proposed Building 54 was evaluated with upgraded windows with a minimum STC rating of 31. The floor plan for Building 54 is based on Plan 2; therefore, only Plan 2 was evaluated with upgraded windows. The calculations completed for Plan 2 with upgraded windows will range from 32.0 to 32.7. The interior noise reduction calculations are included in Appendix 7.2 for each floor plan.

TABLE 7-2: NOISE REDUCTION CALCULATIONS (CNEL)

Plan	Sample Rooms ¹	Calculated Floor Plan Noise Reduction ²	
		STC 27	STC 31 ³
Plan 2	Den	31.5	32.1
	Living	32.1	32.7
	Bdrm. 1	31.3	32.0
Plan 3	Bdrm. 4	30.9	-
	Kitchen	33.0	-
	Bdrm. 3	31.9	-
Plan 4	Den	30.4	-
	Kitchen	31.8	-
	Bdrm. 2	31.0	-
Plan 5	Den	32.2	-
	Living	31.3	-
	Bdrm. 1	31.7	-
Minimum Noise Reduction:		30.4	32.0

¹ Sample is based on the floor plans of lots adjacent to the roadways and interior habitable room(s) with a high number of exterior walls and openings (windows, doors, etc.).

² Interior noise reduction calculations are included in Appendix 5.2.

³ Only Plan 2 was evaluated with upgraded windows as Building 54, which uses floorplan 2, is the only building with recommended upgraded windows.

7.2.3 Interior Noise Level Assessment

Table 7-3 shows the estimated interior noise levels using windows with a minimum STC rating of 27. Table 7-3 shows that the future noise levels at the first-floor building façade locations are expected to range from 55.8 to 70.3 dBA CNEL. The interior noise level analysis shows that the interior noise levels will range from 25.4 to 39.9 dBA CNEL with standard construction and windows in the closed position.

Table 7-4 shows the estimated interior noise levels using windows with a minimum STC rating of 27. Table 7-4 shows that the future noise levels at the second-floor building façade locations are expected to range from 58.7 to 73.2 dBA CNEL. The interior noise level analysis shows that the interior noise levels will range from 28.3 to 42.8 dBA CNEL with standard construction and windows in the closed position.

Table 7-5 shows that the future noise levels at the third-floor building façade locations are expected to range from 58.7 to 77.0 dBA CNEL. The interior noise level analysis shows that the interior noise levels will range up to 45.0 dBA CNEL for Building 54 with upgraded construction using windows with a minimum STC rating of 31, and windows in the closed position. The interior noise level analysis shows that the interior noise levels for all other interior locations will range from 28.3 to 43.5 dBA with standard construction and windows in the closed position.

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TABLE 7-3: FIRST FLOOR INTERIOR NOISE IMPACTS

Building	Roadway	Noise Level at Façade	Required Interior Noise Reduction ¹	Calculated Noise Reduction ²	Upgraded Windows ³	Recommended STC	Interior Noise Level ⁴	Threshold	Threshold Exceeded?
Bldg. 1-2	Tustin St.	57.5	12.5	30.4	No	27	27.1	45	No
Bldg. 20, 50-51	SR-55	68.1	23.1	30.4	No	27	37.7	45	No
Bldg. 21	SR-55	67.4	22.4	30.4	No	27	37.0	45	No
Bldg. 46, 52-53	SR-55	69.1	24.1	30.4	No	27	38.7	45	No
Bldg. 54	SR-55	70.3	25.3	30.4	No	27	39.9	45	No
Bldg. 71	Tustin St.	55.8	10.8	30.4	No	27	25.4	45	No

¹ Noise level reduction required to satisfy the 45 dBA CNEL interior noise standards.

² Calculated exterior to interior noise level reduction as shown in Table 5-2 and "windows closed".

³ Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?

⁴ Estimated interior noise level with standard building construction with a windows closed condition and an STC rating of 27 for all windows.

TABLE 7-4: SECOND FLOOR INTERIOR NOISE IMPACTS

Lot	Roadway	Noise Level at Façade	Required Interior Noise Reduction ¹	Calculated Noise Reduction ²	Upgraded Windows ³	Recommended STC	Interior Noise Level ⁴	Threshold	Threshold Exceeded?
Bldg. 1-2	Tustin St.	60.5	15.5	30.4	No	27	30.1	45	No
Bldg. 20, 50-51	SR-55	69.7	24.7	30.4	No	27	39.3	45	No
Bldg. 21	SR-55	68.9	23.9	30.4	No	27	38.5	45	No
Bldg. 46, 52-53	SR-55	71.3	26.3	30.4	No	27	40.9	45	No
Bldg. 54	SR-55	73.2	28.2	30.4	No	27	42.8	45	No
Bldg. 71	Tustin St.	58.7	13.7	30.4	No	27	28.3	45	No

¹ Noise level reduction required to satisfy the 45 dBA CNEL interior noise standards.

² Calculated exterior to interior noise level reduction as shown in Table 5-2 and "windows closed".

³ Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?

⁴ Estimated interior noise level with standard building construction with a windows closed condition and an STC rating of 27 for all windows.

TABLE 7-5: THIRD FLOOR INTERIOR NOISE IMPACTS

Lot	Roadway	Noise Level at Façade	Required Interior Noise Reduction ¹	Calculated Noise Reduction ²	Upgraded Windows ³	Recommended STC	Interior Noise Level ⁴	Threshold	Threshold Exceeded?
Bldg. 1-2	Tustin St.	60.5	15.5	30.4	No	27	30.1	45	No
Bldg. 20, 50-51	SR-55	71.8	26.8	30.4	No	27	41.4	45	No
Bldg. 21	SR-55	70.7	25.7	30.4	No	27	40.3	45	No
Bldg. 46, 52-53	SR-55	73.9	28.9	30.4	No	27	43.5	45	No
Bldg. 54	SR-55	77.0	32.0	32.0	Yes	31	45.0	45	No
Bldg. 71	Tustin St.	58.7	13.7	30.4	No	27	28.3	45	No

¹ Noise level reduction required to satisfy the 45 dBA CNEL interior noise standards

² Calculated exterior to interior noise level reduction as shown in Table 5-2 and "windows closed".

³ Does the required interior noise reduction trigger upgraded windows with a minimum STC rating of greater than 27?

⁴ Estimated interior noise level with standard building construction with a windows closed condition and an STC rating of 27 for all windows.

The interior noise level assessment demonstrates that with upgraded windows with a minimum STC rating of 31 for third-floor building façade locations of Building 54 and windows in the closed position, the City of Orange 45 dBA CNEL interior noise standard can be satisfied. For all other building façade locations, standard construction using windows with a minimum STC rating of 27 can satisfy the City of Orange 45 dBA CNEL interior noise standard

8 OFF-SITE TRANSPORTATION NOISE IMPACTS

The Project is anticipated to generate a maximum of 511 trips per day. The existing volumes on North Tustin Street are 33,600 trips per day. (28) This represents a 1.5 percent increase in existing traffic volumes and a 0.1 dBA CNEL noise level increase at sensitive receivers along North Tustin Street. Therefore, it is not expected to generate a perceptible noise level increase (i.e., less than 3 dBA CNEL) at sensitive land uses adjacent to study area roadways. Due to low traffic volumes caused by the Project, the off-site traffic noise levels generated by the Project are considered *less than significant*.

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9 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following receiver locations, as shown on Exhibit 9-1, were identified as representative locations for analysis. The selection of receiver locations is based on FHWA guidelines and is consistent with additional guidance provided by Caltrans and the FTA, as previously described in Section 5.2. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

To describe the potential off-site Project noise levels, four receiver locations in the vicinity of the Project site were identified. Other sensitive land uses in the Project study area that are located at greater distances than those identified in this noise study will experience lower noise levels than those presented in this report due to the additional attenuation from distance and the shielding of intervening structures. Distance is measured in a straight line from the Project boundary to each receiver location.

- R1: Location R1 represents the existing residence at 1800 E Heim Avenue, approximately 52 feet north of the Project site. Receiver R1 is placed at the building façade facing the Project site. A 24-hour noise measurement was taken near this location, L1, to describe the existing ambient noise environment.
- R2: Location R2 represents the existing residence at 2025 East Denise Avenue, approximately 236 feet east of the Project site. Receiver R3 is placed in the private outdoor living area (backyard) facing the Project site. A 24-hour noise measurement was taken near this location, L2, to describe the existing ambient noise environment.
- R3: Location R4 represents the existing residence at 1931 East Meats Avenue, approximately 5 feet south of the Project site. Receiver R3 is placed at the building façade facing the Project site. A 24-hour noise measurement was taken near this location, L3, to describe the existing ambient noise environment.
- R4: Location R4 represents the existing residence at 2295 North Tustin Street, approximately 56 feet south of the Project site. Receiver R4 is placed at the building façade facing the Project site. A 24-hour noise measurement was taken near this location, L4, to describe the existing ambient noise environment.

EXHIBIT 9-1: RECEIVER LOCATIONS



LEGEND:

Site Boundary
 Receiver Locations
 —●— Distance from receiver to Project site boundary (in feet)

10 OPERATIONAL NOISE ANALYSIS

The Project is considered a noise-sensitive receiving land use and is not expected to include any specific type of operational noise levels beyond those typically associated with residential land uses in the Project study area. Section 21085 of the California Public Resources Code states in part, "...for residential projects, the effects of noise generated by project occupants and their guests on human beings is not a significant effect on the environment." (29) A review of the legislative record indicates the author's intent for Section 21085 was to "remove the potential for litigants to challenge residential development based on the speculation that the new residents will create unwanted noises. It would also reestablish the existing precedent that minor and intermittent noise nuisances, such as from unamplified human voices, be addressed through local nuisance ordinances and not via CEQA. Consequently, activities solely associated with occupants and guests, such as the swimming pool/spa activities, dog park activities, and outdoor activities in common spaces, are not considered part of this operational noise analysis for CEQA." Based on the intent of the author of Section 21085, the operational noise sources are limited to the mechanical and non-verbal noise sources that occur onsite.

Therefore, this section analyzes the potential operational noise impacts at the nearby receiver locations, identified in Section 9, resulting from the operation of air conditioning units, and parking lot vehicle movements. Exhibit 10-1 identifies the noise source locations used to assess the operational noise levels.

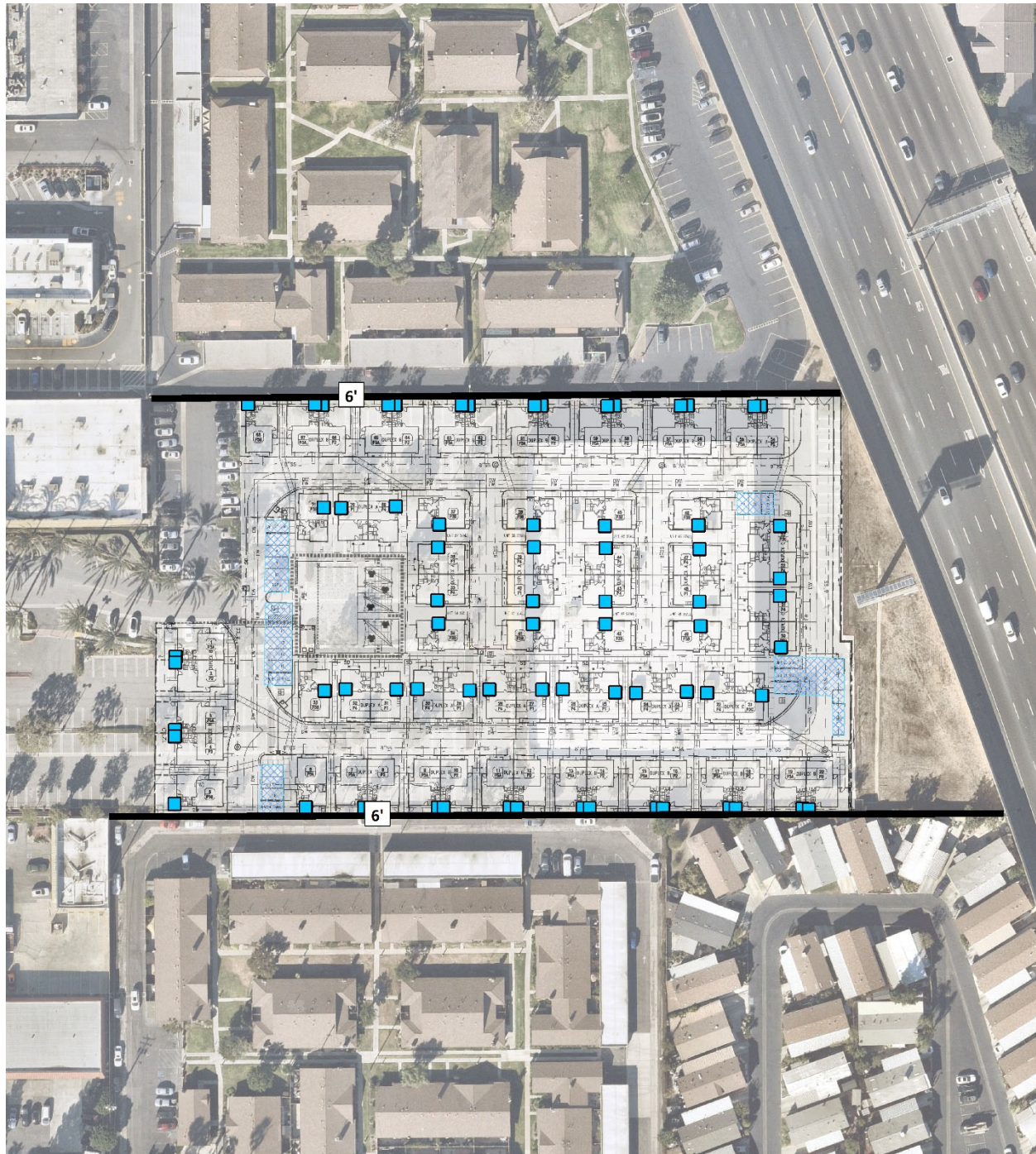
10.1 OPERATIONAL NOISE SOURCES

This operational noise analysis is intended to describe noise level impacts associated with typical daytime and nighttime activities at the Project site. To present the potential worst-case noise conditions, this analysis assumes the Project would be operational 24 hours per day, seven days per week. Consistent with similar residential uses, the on-site Project-related noise sources are expected to include: air conditioning units, and parking lot vehicle movements.

10.2 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown in Table 10-1 used to estimate the Project's operational noise impacts.

EXHIBIT 10-1: OPERATIONAL NOISE SOURCE LOCATIONS



LEGEND:

- Air Conditioning Unit
- Parking Lot Vehicle Movements
- Existing 6-Foot-High Barrier

TABLE 10-1: REFERENCE NOISE LEVEL MEASUREMENTS

Reference Noise Source	Noise Source Height (Feet)	Min./ Hour ¹		Reference Noise Level (dBA L _{eq}) @ 50 Feet	Sound Power Level (dBA) ²
		Day	Night		
Air Conditioning Units	5'	45	30	44.4	76.0
Parking Lot Vehicle Movements	5'	60	30	31.4	63.0

¹ Anticipated duration (minutes within the hour) of noise activity during typical hourly conditions expected at the Project site. "Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.

² Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings. Sound power levels calculated using the CadnaA noise model at the reference distance to the noise source. Numbers may vary due to size differences between point and area noise sources.

10.2.1 Air Conditioning Units

To assess the noise levels created by the air conditioning units, reference noise levels were taken from equipment specifications for a 1.5-to 5-ton residential packaged air conditioning unit (Carrier 24SCA4). The manufacturer's specifications are included in Appendix 10.1. At a uniform reference distance of 50 feet, the units would generate a reference noise level of 44.4 dBA L_{eq}. The air conditioning units were modeled 3 feet above the ground level and 5 feet above the roof top, operating 45 minutes per hour during the daytime and 30 minutes at nighttime, which represents the typical maximum operating time for properly sized AC systems.

10.2.2 Parking Lot Vehicle Movements

Parking activities are based on the area of the parking spaces. The Project includes approximately 23 new spaces, which are assumed to have up to 2 movements per hour for a total of 46 events in an hour. Based on studies conducted in Europe and Australia, the average parking procedure, which included movement associated with either entering or exiting the parking area, parking the vehicles, and opening and closing doors, resulted in a sound power level of approximately 63 dBA Lw/square meter per event (29) (30).

10.3 CADNAA NOISE PREDICTION MODEL

To fully describe the exterior operational noise levels from the Project, Urban Crossroads, Inc. developed a noise prediction model using the CadnaA (Computer Aided Noise Abatement) computer program. CadnaA can analyze multiple types of noise sources using the spatially accurate Project site plan, georeferenced Nearmap aerial imagery, topography, buildings, and barriers in its calculations to predict outdoor noise levels. Using the ISO 9613-2 protocol, CadnaA will calculate the distance from each noise source to the noise receiver locations, using the ground absorption, distance, and barrier/building attenuation inputs to provide a summary of noise level at each receiver and the partial noise level contributions by noise source. Consistent with the ISO 9613-2 protocol, the CadnaA noise prediction model relies on the reference sound power level (Lw) to describe individual noise sources. While sound pressure levels (e.g., L_{eq}) quantify in decibels the intensity of given sound sources at a reference distance, sound power levels (Lw) are connected to the sound

source and are independent of distance. Sound pressure levels vary substantially with distance from the source and diminish because of intervening obstacles and barriers, air absorption, wind, and other factors. Sound power is the acoustical energy emitted by the sound source and is an absolute value that is not affected by the environment. The operational noise level calculations provided in this noise study account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. A default ground attenuation factor of 0.5 was used in the noise analysis to account for mixed ground representing a combination of hard and soft surfaces. Appendix 10.1 includes the detailed noise dBA L_{eq} model inputs used to estimate the Project operational noise levels presented in this section.

10.4 PROJECT OPERATIONAL NOISE LEVELS

Using the reference noise levels to represent the Project operations that include air conditioning units, and parking lot vehicle movements Urban Crossroads, Inc. calculated the operational source noise levels that are expected to be generated at the Project site and the Project-related noise level increases that would be experienced at each of the sensitive receiver locations. Table 10-2 shows the Project operational noise levels during the daytime hours of 7:00 a.m. to 10:00 p.m. The daytime hourly noise levels at the off-site receiver locations are expected to range from 33.6 to 47.6 dBA L_{eq} .

TABLE 10-2: DAYTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source ¹	Operational Noise Levels by Receiver Location (dBA L_{eq})			
	R1	R2	R3	R4
Air Conditioning Units	41.2	47.6	43.3	33.4
Parking Lot Vehicle Movements	7.7	15.7	25.9	20.6
Total (All Noise Sources)	41.2	47.6	43.4	33.6

¹ See Exhibit 10-1 for the noise source locations. CadnaA noise model calculations are included in Appendix 10.2.

Table 10-3 shows the Project operational noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. The nighttime hourly noise levels at the existing off-site receiver locations are expected to range from 30.9 to 44.9 dBA L_{eq} . The differences between the daytime and nighttime noise levels are largely related to the estimated duration of noise activity as outlined in Table 10-1. Appendix 10.1 includes the detailed noise model inputs.

TABLE 10-3: NIGHTTIME PROJECT OPERATIONAL NOISE LEVELS

Noise Source ¹	Operational Noise Levels by Receiver Location (dBA L_{eq})			
	R1	R2	R3	R4
Air Conditioning Units	38.5	44.9	40.6	30.7
Parking Lot Vehicle Movements	3.8	11.7	21.9	16.6
Total (All Noise Sources)	38.5	44.9	40.7	30.9

¹ See Exhibit 10-1 for the noise source locations. CadnaA noise model calculations are included in Appendix 10.2.

10.5 PROJECT OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise regulations, the unmitigated Project-only operational noise levels are evaluated against exterior noise level thresholds based on the City of Orange exterior noise level standards at nearby receiver locations. Table 10-4 shows that the operational noise levels associated with the Project will not exceed the City of Orange daytime and nighttime exterior noise level standards at the existing nearby noise-sensitive receiver locations.

TABLE 10-4: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location ¹	Project Operational Noise Levels (dBA Leq) ²		Noise Level Standards (dBA Leq) ³		Noise Level Standards Exceeded? ⁴	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R1	41.2	38.5	55.0	45.0	No	No
R2	47.6	44.9	55.0	45.0	No	No
R3	43.4	40.7	55.0	45.0	No	No
R4	33.6	30.9	55.0	45.0	No	No

¹ See Exhibit 9-1 for the receiver locations.

² Proposed Project unmitigated operational noise levels as shown in Tables 10-2 and 10-3.

³ Exterior noise level standards, as shown in Table 4-1.

⁴ Do the estimated Project operational noise source activities exceed the noise level standards?

"Daytime" = 7:00 a.m. - 10:00 p.m.; "Nighttime" = 10:00 p.m. - 7:00 a.m.

10.6 PROJECT OPERATIONAL NOISE LEVEL INCREASES

To describe the Project operational noise level increases, the Project operational noise levels are combined with the existing ambient noise levels measurements for the nearby receiver locations that may be potentially impacted by Project operational noise sources. Since the units used to measure noise, decibels (dB), are logarithmic units, the Project-operational and existing ambient noise levels cannot be combined using standard arithmetic equations. (3) Instead, they must be logarithmically added using the following base equation:

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

where "SPL1," "SPL2," etc. are equal to the sound pressure levels being combined, or in this case, the Project-operational and existing ambient noise levels. The difference between the combined Project and ambient noise levels describes the Project noise level increases to the existing ambient noise environment. Noise levels that would be experienced at receiver locations when Project-source noise is added to the daytime and nighttime ambient conditions are presented in Tables 10-5 and 10-6, respectively. As indicated in Table 10-5, the Project will generate daytime operational noise increases ranging from less than 0.1 to 0.2 dBA L_{eq} at the nearest receiver locations. Table 10-6 shows that the Project will generate nighttime operational noise level increases ranging from less than 0.1 to 0.1 dBA L_{eq} at the nearest receiver locations. Project-related operational noise level

increases would not exceed the operational noise level increase significance criteria presented in Table 4-1. Therefore, Project-related operational noise level increases at the sensitive receiver locations will be *less than significant*.

TABLE 10-5: DAYTIME PROJECT OPERATIONAL NOISE LEVEL INCREASES

Receiver Location ¹	Total Project Operational Noise Level ²	Measurement Location ³	Reference Ambient Noise Levels ⁴	Combined Project and Ambient ⁵	Project Increase ⁶	Increase Criteria ⁷	Increase Criteria Exceeded?
R1	41.2	L1	58.2	58.3	0.1	5.0	No
R2	47.6	L2	63.4	63.5	0.1	5.0	No
R3	43.4	L3	57.5	57.7	0.2	5.0	No
R4	33.6	L4	55.3	55.3	0.0	5.0	No

¹ See Exhibit 9-1 for the receiver locations.

² Total Project daytime operational noise levels as shown in Table 10-2.

³ Reference noise level measurement locations as shown in Exhibit 5-1.

⁴ Observed daytime ambient noise levels as shown in Table 5-1.

⁵ Represents the combined ambient conditions plus the Project activities.

⁶ The noise level increase expected with the addition of the proposed Project activities.

⁷ Significance increase criteria as shown in Table 4-1.

TABLE 10-6: NIGHTTIME OPERATIONAL NOISE LEVEL INCREASES

Receiver Location ¹	Total Project Operational Noise Level ²	Measurement Location ³	Reference Ambient Noise Levels ⁴	Combined Project and Ambient ⁵	Project Increase ⁶	Increase Criteria ⁷	Increase Criteria Exceeded?
R1	38.5	L1	56.3	56.4	0.1	5.0	No
R2	44.9	L2	65.3	65.3	0.0	1.5	No
R3	40.7	L3	58.6	58.7	0.1	5.0	No
R4	30.9	L4	57.1	57.1	0.0	5.0	No

¹ See Exhibit 9-1 for the receiver locations.

² Total Project nighttime operational noise levels as shown in Table 10-3.

³ Reference noise level measurement locations as shown in Exhibit 5-1.

⁴ Observed nighttime ambient noise levels as shown in Table 5-1.

⁵ Represents the combined ambient conditions plus the Project activities.

⁶ The noise level increase expected with the addition of the proposed Project activities.

⁷ Significance increase criteria as shown in Table 4-1.

11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. Exhibit 11-1 shows the on-site construction noise source activity, including the off-site roadway and utility improvements in relation to the nearest sensitive receiver locations previously described in Section 8. As part of the construction noise analysis, the preexisting 6- to 8-foot-high barrier along the southern site boundary was modeled. The City of Orange has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 8.24.50 of the City's Municipal Code states: *Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday.* (17)

11.1 CONSTRUCTION NOISE LEVELS

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

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

11.2 CONSTRUCTION REFERENCE NOISE LEVELS

To describe construction noise activities, this construction noise analysis was prepared using reference construction equipment noise levels from the Federal Highway Administration (FHWA), which published the Roadway Construction Noise Model (RCNM), which includes a national database of construction equipment reference noise emission levels. (31) The RCNM equipment database provides a comprehensive list of the noise-generating characteristics of 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. According to the EPA, FTA, and FHWA, the overall construction noise level is governed primarily by the noisiest pieces of equipment. The quieter pieces do not affect the overall level, but they do reduce the magnitude of the fluctuations in the noise level. Therefore, a rough estimate of the noise level need only include the noisiest pieces of equipment expected at the site. (32) (9) (33) Consistent with FHWA and FTA guidance for detailed construction

noise assessment, Table 11-1 presents the combined noise levels for the loudest construction activities expected for each stage, assuming all equipment operates simultaneously.

EXHIBIT 11-1: CONSTRUCTION NOISE SOURCE LOCATIONS



TABLE 11-1: CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Equipment ¹	Reference Noise Level @ 50 Feet (dBA L _{eq})	Composite Reference Noise Level (dBA L _{eq}) ²	Reference Power Level (dBA L _w) ³
Demolition	Concrete Saw	83	86.1	117.7
	Excavator	77		
	Jack Hammer	82		
Site Preparation	Tractor	80	82.9	114.5
	Front End Loader	75		
	Dozer	78		
Grading	Tractor	80	84.2	115.9
	Grader	81		
	Compactor (ground)	76		
Building Construction	Crane	73	82.1	113.7
	Generator	78		
	Gradall	79		
Paving	Paver	74	77.8	109.5
	Dump Truck	72		
	Roller	73		
Architectural Coating	Man Lift	68	76.2	107.8
	Compressor (air)	74		
	Generator (<25kVA)	70		

¹ FHWA Road Construction Noise Model.

² Represents the combined noise level for all equipment, assuming they operate at the same time, consistent with FTA Transit Noise and Vibration Impact Assessment guidance.

³ Sound power level represents the total amount of acoustical energy (noise level) produced by a sound source independent of distance or surroundings.

11.3 CONSTRUCTION NOISE ANALYSIS

Construction projects involve various stages, and activities frequently shift from one location to another. For example, during site preparation and grading, noise-generating activities may concentrate in an area for a short period to remove an obstruction, while the majority of the grading involves the equipment moving back and forth in a predictable pattern throughout the site; building construction and foundation work generally concentrate near the building footprint, while paving generally involves a predictable pattern of movement throughout the site. Therefore, construction activities are best evaluated as multiple moving point sources within the construction area since the speed and power of the equipment vary and the equipment constantly changes position in terms of distance and direction relative to the receivers. (9) (34) Using the reference construction equipment noise levels and the CadnaA noise prediction model, calculations of the Project construction noise level impacts by phase at the nearby sensitive receiver locations were completed. To account for the dynamic nature of construction activities, the CadnaA construction noise analysis evaluates the noise source activities as multiple moving point sources, or construction crews, within the limits of construction. Construction impacts are based on the loudest activity and the highest noise level

calculated at each receiver location. As shown in Table 11-2, the construction noise levels are expected to range from 67.5 to 75.2 dBA L_{eq} at the nearby receiver locations. Appendix 11.1 includes the detailed CadnaA construction noise model inputs.

TABLE 11-2: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location ¹	Construction Noise Levels (dBA L_{eq})						
	Demolition	Site Preparation	Grading	Building Construction	Paving	Architectural Coating	Highest Levels ²
R1	75.2	72.0	73.3	71.2	66.9	65.3	75.2
R2	67.5	64.3	65.6	63.5	59.2	57.6	67.5
R3	71.9	68.7	70.0	67.9	63.6	62.0	71.9
R4	71.3	68.1	69.4	67.3	63.0	61.4	71.3

¹ Construction noise source and receiver locations are shown on Exhibit 11-1.

² Construction noise level calculations based on distance from the construction activity, which is measured from the Project site boundary to the nearest receiver locations. CadnaA construction noise model inputs are included in Appendix 11.1.

11.4 PROJECT SITE CONSTRUCTION NOISE LEVEL COMPLIANCE

To evaluate whether the Project will generate potentially significant short-term noise levels at the nearest receiver locations, a construction-related daytime noise level threshold of 80 dBA L_{eq} is used as a reasonable threshold to assess the daytime construction noise level impacts. The construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold during Project construction activities, as shown in Table 11-3. Therefore, the noise impacts due to Project construction noise are considered *less than significant* at all receiver locations.

TABLE 11-3: CONSTRUCTION NOISE LEVEL COMPLIANCE

Receiver Location ¹	Construction Noise Levels (dBA L_{eq})		
	Highest Construction Noise Levels ²	Threshold ³	Threshold Exceeded? ⁴
R1	75.2	80	No
R2	67.5	80	No
R3	71.9	80	No
R4	71.3	80	No

¹ Construction noise source and receiver locations are shown on Exhibit 11-1.

² Highest construction noise level calculations based on distance from the construction noise source activity to the nearest receiver locations as shown in Table 11-2.

³ Construction noise level thresholds as shown in Table 4-1.

⁴ Do the estimated Project construction noise levels exceed the construction noise level threshold?

11.5 TEMPORARY CONSTRUCTION NOISE LEVEL INCREASES

To describe the temporary Project construction noise level contributions to the existing ambient noise environment, the Project construction noise levels were combined with the existing ambient noise levels measurements at the nearest off-site receiver locations. The difference between the

combined Project-construction and ambient noise levels is used to describe the construction noise level contributions. Temporary noise level increases that would be experienced at sensitive receiver locations when the Project construction-source noise is added to the ambient daytime conditions are presented in Table 11-4. A temporary noise level increase of 20 dBA is considered a *potentially significant* impact based on the Caltrans substantial noise level increase criteria, which is used to assess the Project-construction noise level increases. (35)

As indicated in Table 11-4, the Project will contribute to construction noise increases ranging from 5.5 to 17.1 dBA L_{eq} during the daytime hours at the nearest receiver locations. The unmitigated construction noise analysis shows that the nearest receiver locations will not exceed the 20 dBA L_{eq} substantial noise level increase significance threshold during Project construction activities. The temporary construction noise level increase analysis shows that the noise impacts due to the Project construction noise are considered *less than significant*.

TABLE 11-4: DAYTIME CONSTRUCTION NOISE LEVEL INCREASES

Receiver Location ¹	Typical Project Construction Noise Level ²	Measurement Location ³	Reference Ambient Noise Levels ⁴	Combined Project and Ambient ⁵	Project Increase ⁶	Increase Criteria ⁷	Increase Criteria Exceeded?
R1	75.2	L1	58.2	75.3	17.1	20	No
R2	67.5	L2	63.4	68.9	5.5	20	No
R3	71.9	L3	57.5	72.1	14.6	20	No
R4	71.3	L4	55.3	71.4	16.1	20	No

¹ Construction noise source and receiver locations are shown on Exhibit 11-1.

² Typical Project daytime construction noise levels as shown in Table 11-3.

³ Reference noise level measurement locations as shown in Exhibit 5-1.

⁴ Observed daytime ambient noise levels as shown in Table 5-1.

⁵ Represents the combined ambient conditions plus the Project construction activities.

⁶ The noise level increase expected with the addition of the proposed Project construction activities.

⁷ Caltrans Traffic Noise Analysis Protocol.

11.6 CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. The operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibration levels associated with various types of construction equipment are summarized in Table 10-6. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential for human response (annoyance) and building damage using the following vibration assessment methods defined by Caltrans. To describe the vibration impacts, Caltrans provides the following equation: $PPV (in/sec)_{equip} = PPV (in/sec)_{ref} \times (25/D)^{1.1}$

TABLE 11-5: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089
Hoe Ram	0.089
Vibratory Roller	0.210

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Using the vibration source level of construction equipment provided in Table 11-5 and the construction vibration assessment methodology published by the FTA and Caltrans, it is possible to estimate the Project vibration impacts. Table 11-6 presents the expected Project-related vibration levels at the nearby receiver locations. At distances ranging from 5 to 236 feet from Project construction activities, construction vibration velocity levels are estimated to range from 0.01 to 2.35 PPV (in/sec). Based on the maximum acceptable vibration threshold of 0.30 PPV (in/sec), the typical Project construction vibration levels will exceed the vibration thresholds at sensitive uses represented by receiver R3. Therefore, the Project-related vibration impacts are considered *significant* during typical construction activities at the Project site and will require mitigation.

It should be noted that vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but will occur 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 the daytime hours, consistent with City of Orange requirements, eliminating potential vibration impacts during the sensitive evening and nighttime hours.

TABLE 11-6: PROJECT CONSTRUCTION VIBRATION LEVELS – UNMITIGATED

Location ¹	Distance to Const. Activity (Feet) ²	Typical Construction Vibration Levels PPV (in/sec) ³						Thresholds PPV (in/sec) ⁴	Thresholds Exceeded? ⁵
		Small bulldozer	Jack- hammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	52'	0.00	0.01	0.03	0.03	0.07	0.07	0.30	No
R2	236'	0.00	0.00	0.00	0.00	0.01	0.01	0.30	No
R3	5'	0.03	0.39	0.85	1.00	2.35	2.35	0.30	Yes
R4	56'	0.00	0.01	0.02	0.03	0.06	0.06	0.30	No

- ¹ Construction noise source and receiver locations are shown on Exhibit 11-1.
² Distance from receiver building facade to Project construction boundary (Project site boundary).
³ Based on the Vibration Source Levels of Construction Equipment (Table 11-5).
⁴ Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.
⁵ Does the peak vibration exceed the acceptable vibration thresholds?
 "PPV" = Peak Particle Velocity

11.7 CONSTRUCTION VIBRATION IMPACTS MITIGATION

A 20-foot equipment buffer zone is required to restrict the use of heavy construction equipment (greater than 80,000 pounds), vibratory rollers, large loaded trucks, and large bulldozers within 20 feet of sensitive receivers. With the mitigation measure identified in this analysis and shown in Exhibit ES-1, and as demonstrated in Table 11-7, the mitigated vibration levels with the 20-foot equipment buffer zone will be reduced to 0.29 PPV (in/sec) and will satisfy the 0.30 PPV (in/sec) threshold. Therefore, with the construction vibration mitigation measure identified in this study, vibration impacts will be *less than significant*.

NOI-1 Vibratory rollers, large loaded trucks, and dozers (equipment weighing 80,000 pounds or more) shall not be allowed within 20 feet of any off-site receiver location at the time of Project construction. Instead, smaller, rubber-tired bulldozers (less than 80,000 pounds) shall be used within this area during Project construction to reduce vibration levels.

TABLE 11-7: PROJECT CONSTRUCTION VIBRATION LEVELS – MITIGATED

Location ¹	Distance to Const. Activity (Feet) ²	Typical Construction Vibration Levels PPV (in/sec) ³						Thresholds PPV (in/sec) ⁴	Thresholds Exceeded? ⁵
		Small bulldozer	Jack- hammer	Loaded Trucks	Large bulldozer	Vibratory Roller	Highest Vibration Level		
R1	52'	0.00	0.01	0.03	0.03	0.07	0.07	0.30	No
R2	236'	0.00	0.00	0.00	0.00	0.01	0.01	0.30	No
R3	20'	0.00	0.05	0.11	0.12	0.29	0.29	0.30	No
R4	56'	0.00	0.01	0.02	0.03	0.06	0.06	0.30	No

- ¹ Construction noise source and receiver locations are shown on Exhibit 11-1.
² Distance from receiver building facade to Project construction boundary (Project site boundary).
³ Based on the Vibration Source Levels of Construction Equipment (Table 11-5).
⁴ Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.
⁵ Does the peak vibration exceed the acceptable vibration thresholds?
 "PPV" = Peak Particle Velocity

11.8 CONCRETE CRUSHING NOISE AND VIBRATION

Concrete crushing would be used during demolition to breakdown building material. There are various phases in concrete crushing, also known as stations. These various stages exist because passing material through one stage alone may not be enough to crush the rock down to a desired shape and size.

It is common to use multiple crusher types within a project and set them up as stations in a circuit format to perform the necessary material reduction work. In many cases, primary, secondary, tertiary, and quaternary stations are installed to reduce the rock to the desired size, shape, and

consistency. Unlike typical construction activity, the concrete crushing activity is assessed using the stationary source construction noise level limit.

11.8.1 Concrete Crushing Construction Reference Noise Levels

This analysis was completed to assess potential noise level impacts due to concrete crushing activities. Exhibit 11-2 shows the anticipated location of the crushing activity area in relation to the nearest receiver locations. Table 11-8 provides a summary of the reference average L_{eq} noise levels used to describe concrete crushing construction activities. The reference noise level summary describes construction activity noise levels with multiple pieces of construction equipment operating simultaneously, and includes source noise levels for a hoe-ram or pavement breaker, which is a percussion hammer fitted to an excavator for breaking rock, and a concrete crushing activity including an impact hammer (hoe ram), front-end loader, and dump truck. (36).

TABLE 11-8: CONCRETE CRUSHING CONSTRUCTION REFERENCE NOISE LEVELS

Construction Stage	Reference Construction Activity ¹	Reference Noise Level @ 50 Feet (dBA L_{eq}) ¹	Combined Noise Level (dBA L_{eq}) ²
Concrete Crushing	Impact Hammer (hoe ram)	83	84
	Front End Loader	75	
	Dump Truck	72	

¹ FHWA's Roadway Construction Noise Model

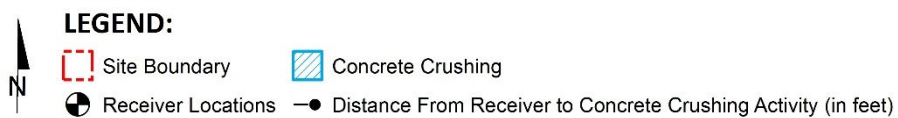
² Represents the combined noise level for all equipment assuming they operate at the same time consistent with FTA Transit Noise and Vibration Impact Assessment guidance for general construction noise assessment.

11.8.2 Concrete Crushing Construction Noise Analysis and Compliance

Using the reference crushing construction equipment noise levels, calculations of the Project construction noise level impacts at the nearest sensitive receiver locations were completed. To assess the worst-case construction noise levels, the Project construction noise analysis relies on the highest noise level impacts when multiple pieces of equipment with the highest reference noise level are operating at the closest point from the edge of primary construction activity (as shown on Exhibit 11-2) to each receiver location.

The concrete crushing construction noise levels are estimated to range from 63.0 to 73.2 dBA L_{eq} at the nearest receiver locations. The Concrete crushing construction noise analysis shows that the nearest receiver locations will satisfy the reasonable daytime 80 dBA L_{eq} significance threshold. Therefore, the noise impacts due to the Project Concrete crushing noise are considered *less than significant* at all receiver locations.

EXHIBIT 11-2: CONCRETE CRUSHING ACTIVITIES AND RECEIVER LOCATIONS



11.8.3 Concrete Crushing Construction Vibration Analysis and Compliance

Using the vibration source level of the construction equipment list provided in Table 11-5, which includes source levels for a hoe ram or breaker representing a percussion hammer fitted to an excavator for breaking rock. Table 11-9 presents the expected concrete crushing construction equipment vibration levels when the equipment with the highest reference vibration activity is operating at the closest point from the edge of the concrete crushing activity to each receiver location.

At distances ranging from 187 to 563 feet from the concrete crushing activities, as shown on Exhibit 11-2, construction vibration levels are estimated to be less than 0.01 PPV (in/sec) and will remain below the City of Orange 0.30 PPV (in/sec) threshold for vibration at all receiver locations. Therefore, the Project-related vibration impacts are considered *less than significant* during the Project concrete crushing construction activities at the Project site.

TABLE 11-9: CONCRETE CRUSHING EQUIPMENT VIBRATION LEVELS

Location ¹	Distance to Const. Activity (Feet) ²	Typical Construction Vibration Levels PPV (in/sec) ³						Thresholds PPV (in/sec) ⁴	Thresholds Exceeded? ⁵
		Small bulldozer	Jack- hammer	Loaded Trucks	Large bulldozer	Hoe Ram	Highest Vibration Level		
R1	187'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R2	563'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R3	292'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No
R4	174'	0.00	0.00	0.00	0.00	0.00	0.00	0.30	No

¹ Construction noise source and receiver locations are shown on Exhibit 11-1.

² Distance from receiver building facade to Project construction boundary (Project site boundary).

³ Based on the Vibration Source Levels of Construction Equipment (Table 11-5).

⁴ Caltrans Transportation and Construction Vibration Guidance Manual, April 2020, Table 19, p. 38.

⁵ Does the peak vibration exceed the acceptable vibration thresholds?

"PPV" = Peak Particle Velocity

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12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the North Tustin Street 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 (619) 788-1971.

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EDUCATION

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California Polytechnic State University, Pomona • June 2000

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
INCE – Institute of Noise Control Engineers

PROFESSIONAL CERTIFICATIONS

Approved Acoustical Consultant • County of San Diego
FHWA Traffic Noise Model of Training • November 2004
CadnaA Basic and Advanced Training Certificate • October 2008

APPENDIX 3.1:

CITY OF ORANGE MUNICIPAL CODE

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Chapter 8.24 - NOISE CONTROL^[2]

Sections:

Footnotes:

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Editor's note— Ord. No. 1-14, § I, adopted August 12, 2014, repealed the former Ch. 8.24, §§ 8.24.010—8.24.110 and enacted a new Ch. 8.24 as set out herein. The former Ch. 8.24 pertained to similar subject matter and derived from Prior Code 9500.1—9500.16; Ord. Nos. 49-74, 17-74, 1-80, and 26-96.

8.24.010 - Policy.

- A. In order to control unnecessary, excessive and annoying sounds emanating from the City, it is the policy of the City to regulate such sounds generated from all sources as specified in this chapter. The intent of this chapter is to protect residential land uses from unnecessary, excessive and annoying sounds.
- B. It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest.

(Ord. No. 1-14, § I, 8-12-14)

8.24.020 - Definitions.

The following words, phrases and terms as used in this chapter shall have the meaning as indicated below:

- A. "Ambient noise level" means the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.
- B. "Adjusted ambient noise level" means the measured ambient noise level plus 3 dB (A). Three (3) dB (A) is the industry-accepted threshold of human perceptibility for a change in the noise environment.
- C. "Decibel (dB)" means a unit which denotes the ratio between two quantities which are proportional to power: the number of decibels corresponding to the ratio of two amounts of power is ten times the logarithm to the base ten of this ratio.
- D. "Emergency machinery, vehicle or work" means any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.
- E. "Fixed noise source" means a stationary noise source which creates sounds while fixed or motionless, including but not limited to construction equipment, industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.
- F. "Grading" means any excavating or filling of earth material or any combination thereof conducted to prepare a site for construction or other improvements thereon.
- G. "Hourly Average" (L_{eq}) means the energy mean or average sound level over a one (1) hour period of time.
- H. "Impact noise" means the noise produced by the collision of one mass in motion with a second mass which may be either in motion or at rest.

- I. "Mobile noise source" means any noise source other than a fixed noise source.
- J. "Noise level" means the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) microneutons per square meter. The unit of measurement shall be designated as dB(A).
- K. "Person" means a person, firm, association, co-partnership, joint venture, corporation or any entity, public or private in nature.
- L. "Recurring impulsive noise" means a noise of short duration, usually less than one (1) second, with an abrupt onset and rapid decay, which occurs repeatedly or in a cyclical manner. Examples include jack hammering, pile driving, or operational noise from a generator or other mechanical equipment that is cyclical in nature.
- M. "Residential property" means a parcel of real property which is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and motels.
- N. "Simple tone noise" means a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.
- O. "Sound level meter" means an instrument meeting American National Standard Institute's Standard SL4- 1983 for Type 1 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.
- P. "Sound pressure level" of a sound, in decibels, means twenty times the logarithm to the base ten of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated.

(Ord. No. 1-14, § I, 8-12-14)

8.24.030 - Noise Level Measurement Criteria.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 8.24.020P.

(Ord. No. 1-14, § I, 8-12-14)

8.24.040 - Exterior Standards.

- A. The following noise standards for fixed noise sources, unless otherwise specifically indicated, shall apply to all residential property:

Table 8.24.040 Exterior Noise Standards

	Noise Level	Time Period
Hourly Average (L_{eq})	55 dB (A)	7:00 a.m.—10:00 p.m.
	50 dB (A)	10:00 p.m.—7:00 a.m.
Maximum Level	70 dB (A)	7:00 a.m.—10:00 p.m.
	65 dB (A)	10:00 p.m.—7:00 a.m.

- B. It is unlawful for any person at any location within the City to create any noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other residential property to exceed the noise standards identified in Table 8.24.040. For multi-family residential or mixed use developments located within the City's Urban Mixed Use, Neighborhood Mixed Use, Old Towne Mixed Use or Medium Density Residential General Plan land use districts, exterior noise standards shall apply to common recreation areas only and shall not apply to private exterior space (such as a private yard, patio, or balcony).
- C. In the event the ambient noise level exceeds the noise standards identified in Table 8.24.040 of this section, the "adjusted ambient noise level" shall be applied as the noise standard. In cases where the noise standard is adjusted due to a high ambient noise level, the noise standard shall not exceed the "adjusted ambient noise level", or 70 dB (A), whichever is less. In cases where the ambient noise level is already greater than 70 dB (A), the ambient noise level shall be applied as the noise standard.
- D. Each of the noise limits specified in Table 8.24.040 shall be reduced by 5 dB(A) for impact or simple tone noises, recurring impulsive noises, or for noises consisting of speech or music.

(Ord. No. 1-14, § I, 8-12-14)

8.24.050 - Exemptions from Chapter Provisions.

The following activities shall be exempted from the provisions of this chapter:

- A. School bands, school athletic and school entertainment events;
- B. Outdoor gatherings, public dances, shows, and sporting and entertainment events provided such events are conducted pursuant to any permit requirements established by the City;
- C. Activities conducted on public parks, public playgrounds, and public or private school grounds;
- D. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work;
- E. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except for Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday. Noise generated outside of the hours specified are subject to the noise standards identified in Table 8.24.040;
- F. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions;
- G. Noise sources associated with agricultural operations provided such operations take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday;
- H. Noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural Commissioner;
- I. Noise sources associated with the maintenance of real property, provided such activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday. Operation of leaf blowers are regulated under OMC Chapter 8.26;

- J. Industrial or commercial noise affecting residential units, when the residential unit is associated with said industrial or commercial use (e.g. caretaker's dwellings);
- K. Any maintenance or construction activity undertaken by a public agency or utility within street right of way;
- L. Mobile noise sources including but not limited to operational noise from trains, or automobiles or trucks traveling on roadways. **Transportation noise as related to noise/land use compatibility is subject to the City's General Plan Noise Element;**
- M. Any activity to the extent regulation thereof has been preempted by State or Federal Law.

(Ord. No. 1-14, § I, 8-12-14)

8.24.060 - Special Provisions for Schools, Hospitals and Churches.

It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church, while the same is in use, to exceed the noise limits as specified in Section 8.24.040, or which noise level unreasonably interferes with the use of such institutions.

(Ord. No. 1-14, § I, 8-12-14)

8.24.070 - Measurement of Noise Levels.

The location selected for measuring exterior noise levels shall be the point closest to the noise source along the perimeter of the outdoor activity area (such as a private yard, patio, balcony, or common recreation area, as applicable pursuant to Section 8.24.040B. of this chapter) of the affected residential receiving property. If the location of the outdoor activity area is unknown or unclear, the noise standard shall be applied at the point closest to the noise source along the property line of the affected residential receiving property.

(Ord. No. 1-14, § I, 8-12-14)

8.24.080 - Enforcement Authority.

- A. The Chief Building Official or his/her designee are directed to enforce the provisions of this chapter. The Chief Building Official or his/her designee are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.
- B. No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duty.

(Ord. No. 1-14, § I, 8-12-14)

8.24.090 - Violation—Public Nuisance.

Any violation of this chapter is a public nuisance and may be abated in accordance with law. The expense of such abatement may, by resolution of the City Council, be declared to be a lien against the property on which such nuisance is maintained, and such lien shall be made a personal obligation of the property owner.

(Ord. No. 1-14, § I, 8-12-14)

8.24.100 - Alternative Noise Prohibition.

Notwithstanding any other provisions of this chapter and in addition thereto, it is unlawful for any person to willfully make, continue, maintain, permit or cause to be made, continued, maintained, or permitted, any loud, unnecessary and unusual noise which disturbs the peace or quiet of any residential property or which causes discomfort or annoyance to any reasonable person of normal sensitivity residing in the area. It shall be a prima facie violation of this section if any power tool, radio, receiving set, television, music amplifier, tape player, record player, compact disc player, musical instrument or similar device is played, used or permitted to be played or used between the hours of 10:00 p.m. and 7:00 a.m. when audible from a distance of one hundred (100) feet from the property line of the noise source or from a distance of one hundred fifty (150) feet from any non-stationary noise source. For the purpose of this chapter, these prohibitions shall also be applied to stationary vehicles parked on the street or on private property. The determination may be made by a peace officer or may be proven by the testimony of any other person. Furthermore, and in addition to the provisions of this chapter, noise prohibitions pursuant to Penal Code Section 415 and Orange Municipal Code Chapter 9.39 may also be applied.

(Ord. No. 1-14, § I, 8-12-14)

8.24.110 - Violation—Misdemeanor.

Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such. The provisions of this chapter shall not be construed as permitting conduct not prescribed herein and shall not affect the enforceability of any other applicable provisions of law.

(Ord. No. 1-14, § I, 8-12-14)

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APPENDIX 5.1:

STUDY AREA PHOTOS

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16438 - Best Buy Orange

16438_L1_B_East

33, 49' 42.160000", 117, 50' 4.020000"



16438_L1_B_North

33, 49' 42.180000", 117, 50' 4.020000"



16438_L1_B_South

33, 49' 42.160000", 117, 50' 4.050000"



16438_L1_B_West

33, 49' 42.140000", 117, 50' 4.050000"



16438 - Best Buy Orange

16438_L2_V_East

33, 49' 42.290000", 117, 50' 0.860000"



16438_L2_V_North

33, 49' 42.310000", 117, 50' 0.810000"



16438_L2_V_South

33, 49' 42.290000", 117, 50' 0.780000"



16438_L2_V_West

33, 49' 42.270000", 117, 50' 0.810000"



16438 - Best Buy Orange

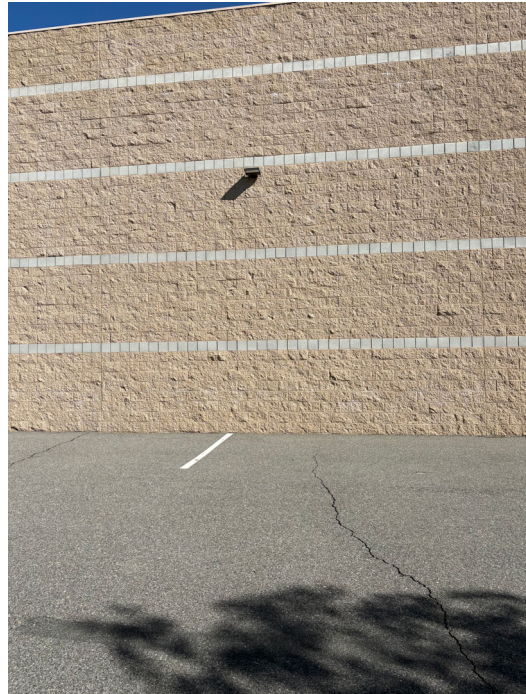
16438_L3_C_East

33, 49' 39.180000", 117, 50' 2.210000"



16438_L3_C_North

33, 49' 39.010000", 117, 50' 2.150000"



16438_L3_C_South

33, 49' 39.220000", 117, 50' 2.180000"



16438_L3_C_West

33, 49' 39.230000", 117, 50' 2.210000"



16438 - Best Buy Orange

16438_L4_D_East

33, 49' 39.160000", 117, 50' 5.610000"



16438_L4_D_North

33, 49' 39.310000", 117, 50' 5.750000"



16438_L4_D_South

33, 49' 39.190000", 117, 50' 5.640000"



16438_L4_D_West

33, 49' 39.160000", 117, 50' 5.640000"



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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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24-Hour Noise Level Measurement Summary

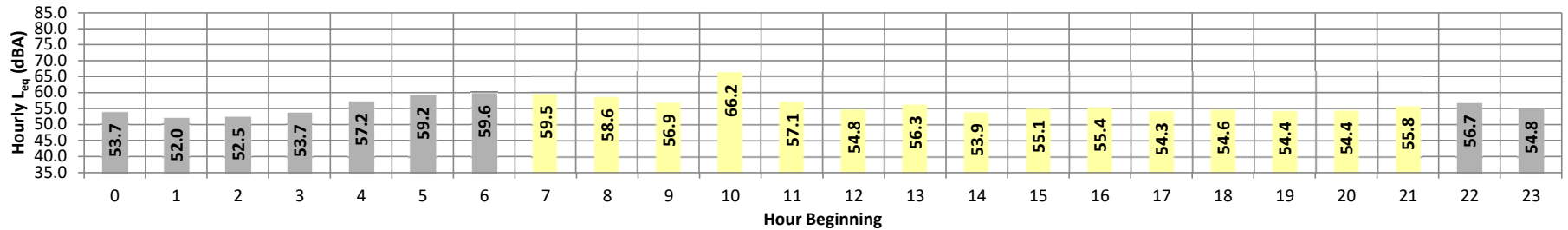
Date: Wednesday, March 19, 2025
Project: Best Buy Orange

Location: L1 - Located at the site's northern boundary near the residence
Source: at 1800 E Heim Ave.

Meter: Piccolo II

JN: 16438
Analyst: N. Johnson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}
Night	0	53.7	57.4	50.8	57.2	56.9	56.2	55.7	54.3	53.4	51.7	51.3	50.9	53.7	10.0	63.7
	1	52.0	56.5	48.6	56.2	56.0	55.1	54.5	52.7	51.4	49.5	49.1	48.7	52.0	10.0	62.0
	2	52.5	56.2	49.6	56.0	55.7	55.0	54.5	53.2	52.1	50.4	50.1	49.7	52.5	10.0	62.5
	3	53.7	56.8	51.2	56.6	56.3	55.7	55.4	54.3	53.4	51.9	51.5	51.2	53.7	10.0	63.7
	4	57.2	59.5	55.2	59.3	59.1	58.8	58.5	57.8	57.1	55.8	55.6	55.3	57.2	10.0	67.2
	5	59.2	61.2	57.7	61.0	60.8	60.3	60.1	59.5	59.0	58.2	58.0	57.8	59.2	10.0	69.2
	6	59.6	62.2	58.3	61.9	61.6	60.9	60.6	60.0	59.5	58.7	58.6	58.4	59.6	10.0	69.6
Day	7	59.5	64.7	57.6	64.4	64.0	62.4	61.1	59.4	58.9	58.1	57.9	57.7	59.5	0.0	59.5
	8	58.6	61.1	57.2	60.9	60.6	60.0	59.7	58.9	58.4	57.7	57.5	57.3	58.6	0.0	58.6
	9	56.9	62.4	54.3	61.9	61.4	60.2	59.4	57.1	56.0	55.0	54.7	54.4	56.9	0.0	56.9
	10	66.2	70.9	56.8	70.6	70.4	69.7	69.2	67.5	65.3	62.0	59.1	57.1	66.2	0.0	66.2
	11	57.1	62.6	53.4	62.0	61.6	60.7	60.1	57.9	55.9	54.3	53.9	53.6	57.1	0.0	57.1
	12	54.8	59.5	52.4	58.6	58.1	57.2	56.7	55.3	54.2	53.1	52.8	52.5	54.8	0.0	54.8
	13	56.3	62.2	52.6	61.6	61.1	59.6	58.9	56.9	55.3	53.5	53.2	52.8	56.3	0.0	56.3
	14	53.9	59.9	50.8	59.4	58.9	57.6	56.4	54.2	52.9	51.6	51.3	50.9	53.9	0.0	53.9
	15	55.1	60.8	51.6	60.2	59.7	58.7	57.9	55.6	54.0	52.5	52.1	51.7	55.1	0.0	55.1
	16	55.4	60.5	52.6	60.1	59.6	58.6	57.7	55.9	54.5	53.3	53.0	52.7	55.4	0.0	55.4
	17	54.3	57.9	52.3	57.6	57.2	56.3	55.8	54.6	53.9	52.9	52.7	52.4	54.3	0.0	54.3
	18	54.6	58.5	52.4	58.2	57.8	56.9	56.3	55.1	54.3	53.1	52.8	52.5	54.6	0.0	54.6
	19	54.4	58.7	51.4	58.4	58.1	57.3	56.7	55.4	53.3	52.1	51.8	51.5	54.4	5.0	59.4
	20	54.4	60.2	51.8	59.7	59.2	57.4	56.2	54.6	53.8	52.5	52.2	51.9	54.4	5.0	59.4
21	55.8	60.7	53.2	60.4	60.0	58.7	57.8	56.3	55.2	53.9	53.6	53.3	55.8	5.0	60.8	
Night	22	56.7	60.3	54.5	60.0	59.6	59.0	58.5	57.2	56.2	55.1	54.9	54.6	56.7	10.0	66.7
	23	54.8	58.8	52.4	58.5	58.2	57.2	56.6	55.2	54.3	53.0	52.8	52.5	54.8	10.0	64.8
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL	Leq (dBA)	
Day	Min	53.9	57.9	50.8	57.6	57.2	56.3	55.8	54.2	52.9	51.6	51.3	50.9		Daytime (7am-10pm)	Nighttime (10pm-7am)
	Max	66.2	70.9	57.6	70.6	70.4	69.7	69.2	67.5	65.3	62.0	59.1	57.7			
Energy Average		58.2	Average:		60.9	60.5	59.4	58.7	57.0	55.7	54.4	53.9	53.5	63.2	58.2	56.3
Night	Min	52.0	56.2	48.6	56.0	55.7	55.0	54.5	52.7	51.4	49.5	49.1	48.7			
	Max	59.6	62.2	58.3	61.9	61.6	60.9	60.6	60.0	59.5	58.7	58.6	58.4			
Energy Average		56.3	Average:		58.5	58.3	57.6	57.2	56.0	55.2	53.8	53.5	53.2			

24-Hour Noise Level Measurement Summary

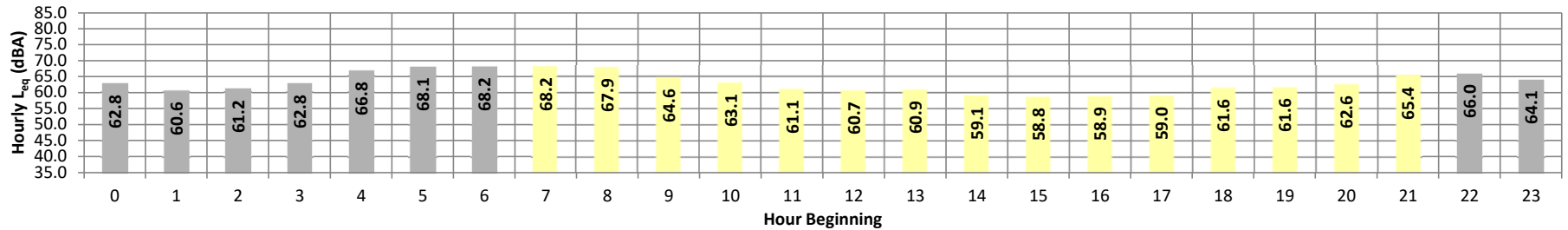
Date: Wednesday, March 19, 2025
Project: Best Buy Orange

Location: L2 - Located at the site's eastern boundary near the residence
Source: at 2025 E. Denise Ave.

Meter: Piccolo II

JN: 16438
Analyst: N. Johnson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}
Night	0	62.8	65.9	59.9	65.7	65.5	65.2	64.8	63.5	62.5	60.8	60.4	60.0	62.8	10.0	72.8
	1	60.6	64.1	56.7	63.9	63.7	63.2	62.8	61.5	60.2	57.9	57.4	56.8	60.6	10.0	70.6
	2	61.2	64.4	57.3	64.3	64.1	63.7	63.4	62.1	60.9	58.4	57.8	57.4	61.2	10.0	71.2
	3	62.8	65.6	59.7	65.4	65.3	64.9	64.6	63.5	62.5	60.7	60.3	59.8	62.8	10.0	72.8
	4	66.8	69.1	64.4	68.9	68.8	68.5	68.3	67.4	66.7	65.2	64.9	64.6	66.8	10.0	76.8
	5	68.1	69.7	66.7	69.6	69.5	69.3	69.1	68.6	68.0	67.2	67.0	66.8	68.1	10.0	78.1
	6	68.2	70.0	66.8	69.8	69.7	69.5	69.3	68.6	68.1	67.3	67.1	66.8	68.2	10.0	78.2
Day	7	68.2	70.2	66.8	70.0	69.9	69.5	69.2	68.5	68.1	67.3	67.1	66.9	68.2	0.0	68.2
	8	67.9	70.0	66.5	69.9	69.7	69.3	69.0	68.2	67.7	67.0	66.8	66.6	67.9	0.0	67.9
	9	64.6	66.4	63.1	66.3	66.2	65.9	65.7	65.0	64.5	63.6	63.4	63.2	64.6	0.0	64.6
	10	63.1	65.5	61.5	65.3	65.2	64.7	64.3	63.5	63.0	62.0	61.8	61.6	63.1	0.0	63.1
	11	61.1	63.8	59.1	63.6	63.5	63.1	62.7	61.7	60.8	59.8	59.5	59.2	61.1	0.0	61.1
	12	60.7	63.4	58.9	63.2	63.0	62.5	62.2	61.2	60.5	59.5	59.2	58.9	60.7	0.0	60.7
	13	60.9	63.9	58.9	63.6	63.4	62.7	62.3	61.4	60.7	59.5	59.3	59.0	60.9	0.0	60.9
	14	59.1	63.0	57.1	62.7	62.3	61.3	60.7	59.5	58.8	57.7	57.4	57.1	59.1	0.0	59.1
	15	58.8	62.5	56.7	62.1	61.8	60.7	60.3	59.3	58.4	57.3	57.0	56.8	58.8	0.0	58.8
	16	58.9	62.6	56.9	62.3	61.9	61.1	60.4	59.4	58.6	57.5	57.3	57.0	58.9	0.0	58.9
	17	59.0	61.3	57.2	61.1	60.9	60.4	60.1	59.4	58.9	57.9	57.6	57.3	59.0	0.0	59.0
	18	61.6	63.6	59.9	63.4	63.3	62.9	62.7	62.0	61.4	60.4	60.2	60.0	61.6	0.0	61.6
	19	61.6	64.7	59.5	64.5	64.2	63.7	63.2	62.3	61.3	60.1	59.9	59.6	61.6	5.0	66.6
	20	62.6	65.8	60.6	65.5	65.3	64.7	64.2	63.0	62.3	61.2	60.9	60.7	62.6	5.0	67.6
21	65.4	68.3	63.2	68.1	67.9	67.4	67.1	65.8	65.2	63.9	63.6	63.3	65.4	5.0	70.4	
Night	22	66.0	68.5	63.9	68.2	68.0	67.7	67.4	66.5	65.8	64.6	64.3	64.0	66.0	10.0	76.0
	23	64.1	68.0	61.1	67.8	67.6	67.0	66.4	64.6	63.6	61.9	61.5	61.2	64.1	10.0	74.1
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL	Leq (dBA)	
Day	Min	58.8	61.3	56.7	61.1	60.9	60.4	60.1	59.3	58.4	57.3	57.0	56.8		Daytime (7am-10pm)	Nighttime (10pm-7am)
	Max	68.2	70.2	66.8	70.0	69.9	69.5	69.2	68.5	68.1	67.3	67.1	66.9			
Energy Average		63.4	Average:		64.8	64.6	64.0	63.6	62.7	62.0	61.0	60.7	60.5	71.7	63.4	65.3
Night	Min	60.6	64.1	56.7	63.9	63.7	63.2	62.8	61.5	60.2	57.9	57.4	56.8			
	Max	68.2	70.0	66.8	69.8	69.7	69.5	69.3	68.6	68.1	67.3	67.1	66.8			
Energy Average		65.3	Average:		67.1	66.9	66.5	66.2	65.2	64.3	62.7	62.3	61.9			

24-Hour Noise Level Measurement Summary

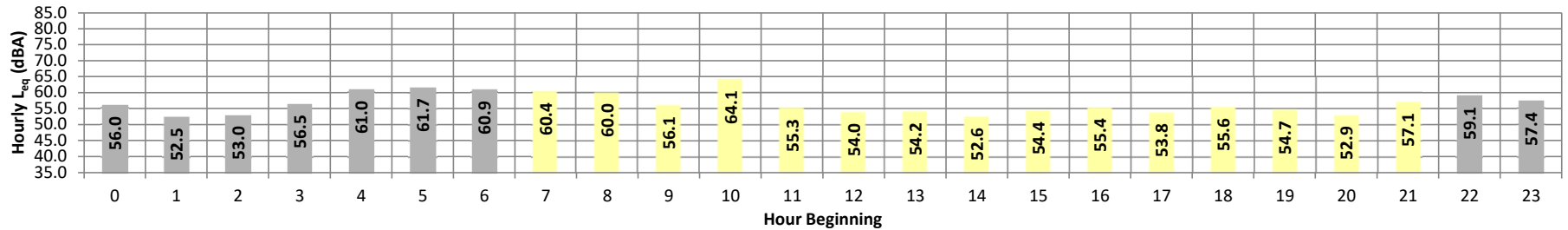
Date: Wednesday, March 19, 2025
Project: Best Buy Orange

Location: L3 - Located at the site's southern boundary near the residence
Source: at 1931 E. Meats Ave.

Meter: Piccolo II

JN: 16438
Analyst: N. Johnson

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}
Night	0	56.0	59.2	53.2	59.0	58.6	58.0	57.6	56.6	55.7	54.2	53.8	53.4	56.0	10.0	66.0
	1	52.5	56.9	49.2	56.7	56.3	55.4	54.9	53.3	51.9	50.1	49.7	49.3	52.5	10.0	62.5
	2	53.0	56.7	49.9	56.4	56.1	55.5	55.0	53.7	52.6	50.8	50.5	50.0	53.0	10.0	63.0
	3	56.5	59.9	53.4	59.6	59.3	58.6	58.3	57.2	56.2	54.4	53.9	53.5	56.5	10.0	66.5
	4	61.0	63.1	59.0	62.9	62.7	62.4	62.2	61.5	60.8	59.7	59.4	59.1	61.0	10.0	71.0
	5	61.7	63.5	60.3	63.3	63.2	62.9	62.7	62.1	61.6	60.8	60.6	60.4	61.7	10.0	71.7
	6	60.9	62.9	59.4	62.7	62.5	62.2	62.0	61.3	60.7	59.9	59.7	59.5	60.9	10.0	70.9
Day	7	60.4	63.6	58.9	63.2	63.0	62.2	61.8	60.6	60.1	59.4	59.2	59.0	60.4	0.0	60.4
	8	60.0	62.5	58.6	62.3	62.0	61.4	61.1	60.3	59.8	59.1	58.9	58.7	60.0	0.0	60.0
	9	56.1	59.1	54.5	58.8	58.5	57.9	57.6	56.5	55.8	54.9	54.8	54.5	56.1	0.0	56.1
	10	64.1	71.0	56.3	70.7	70.3	69.5	68.3	65.1	62.2	57.6	57.2	56.5	64.1	0.0	64.1
	11	55.3	61.5	51.6	60.9	60.3	58.9	58.3	55.9	53.9	52.4	52.1	51.7	55.3	0.0	55.3
	12	54.0	59.4	51.1	58.7	58.3	57.2	56.5	54.5	53.2	51.8	51.5	51.2	54.0	0.0	54.0
	13	54.2	60.8	50.7	60.2	59.3	57.6	56.7	54.8	53.1	51.5	51.2	50.8	54.2	0.0	54.2
	14	52.6	58.1	49.7	57.7	57.2	55.6	54.5	52.9	52.0	50.5	50.2	49.9	52.6	0.0	52.6
	15	54.4	61.0	51.0	60.5	60.0	58.8	57.3	54.5	53.2	51.8	51.5	51.1	54.4	0.0	54.4
	16	55.4	61.7	51.8	61.2	60.6	59.2	58.4	55.8	54.2	52.6	52.3	51.9	55.4	0.0	55.4
	17	53.8	58.1	51.4	57.7	57.3	56.3	55.7	54.2	53.3	52.1	51.9	51.5	53.8	0.0	53.8
	18	55.6	58.6	53.8	58.4	58.1	57.3	56.9	55.9	55.3	54.3	54.1	53.9	55.6	0.0	55.6
	19	54.7	59.3	52.2	58.9	58.5	57.3	56.9	55.3	53.9	52.8	52.6	52.3	54.7	5.0	59.7
	20	52.9	59.1	49.9	58.2	57.7	56.3	55.2	53.3	52.2	50.7	50.4	50.0	52.9	5.0	57.9
	21	57.1	61.2	54.6	60.8	60.4	59.5	59.0	57.6	56.6	55.3	55.1	54.8	57.1	5.0	62.1
Night	22	59.1	62.1	57.1	61.8	61.5	60.9	60.6	59.7	58.8	57.7	57.5	57.2	59.1	10.0	69.1
	23	57.4	60.9	55.0	60.6	60.2	59.4	59.0	58.0	57.1	55.8	55.5	55.1	57.4	10.0	67.4
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL	Leq (dBA)	
Day	Min	52.6	58.1	49.7	57.7	57.2	55.6	54.5	52.9	52.0	50.5	50.2	49.9		Daytime (7am-10pm)	Nighttime (10pm-7am)
	Max	64.1	71.0	58.9	70.7	70.3	69.5	68.3	65.1	62.2	59.4	59.2	59.0			
Energy Average		57.5	Average:		60.6	60.1	59.0	58.3	56.5	55.3	53.8	53.5	53.2	65.0	57.5	58.6
Night	Min	52.5	56.7	49.2	56.4	56.1	55.4	54.9	53.3	51.9	50.1	49.7	49.3			
	Max	61.7	63.5	60.3	63.3	63.2	62.9	62.7	62.1	61.6	60.8	60.6	60.4			
Energy Average		58.6	Average:		60.3	60.1	59.5	59.1	58.2	57.3	55.9	55.6	55.3			

24-Hour Noise Level Measurement Summary

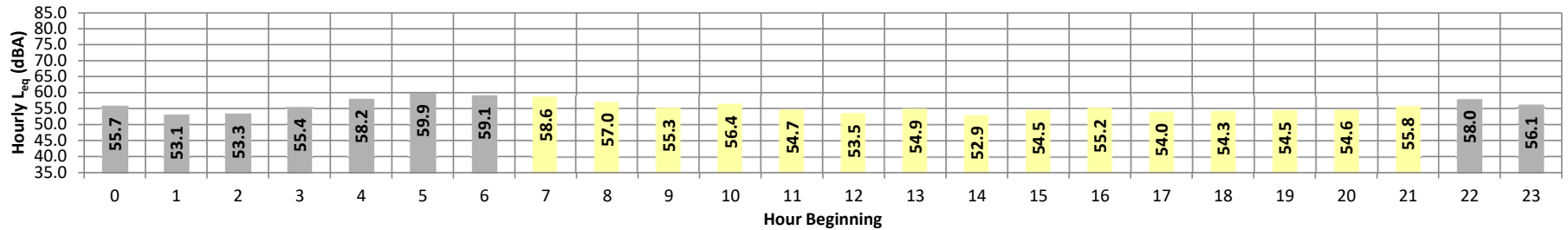
Date: Wednesday, March 19, 2025
Project: Best Buy Orange

Location: L4 - Located at the site's southern boundary near the residence
Source: at 2295 N. Tustin St.

Meter: Piccolo II

JN: 16438
Analyst: N. Johnson

Hourly L_{eq} dBA Readings (unadjusted)



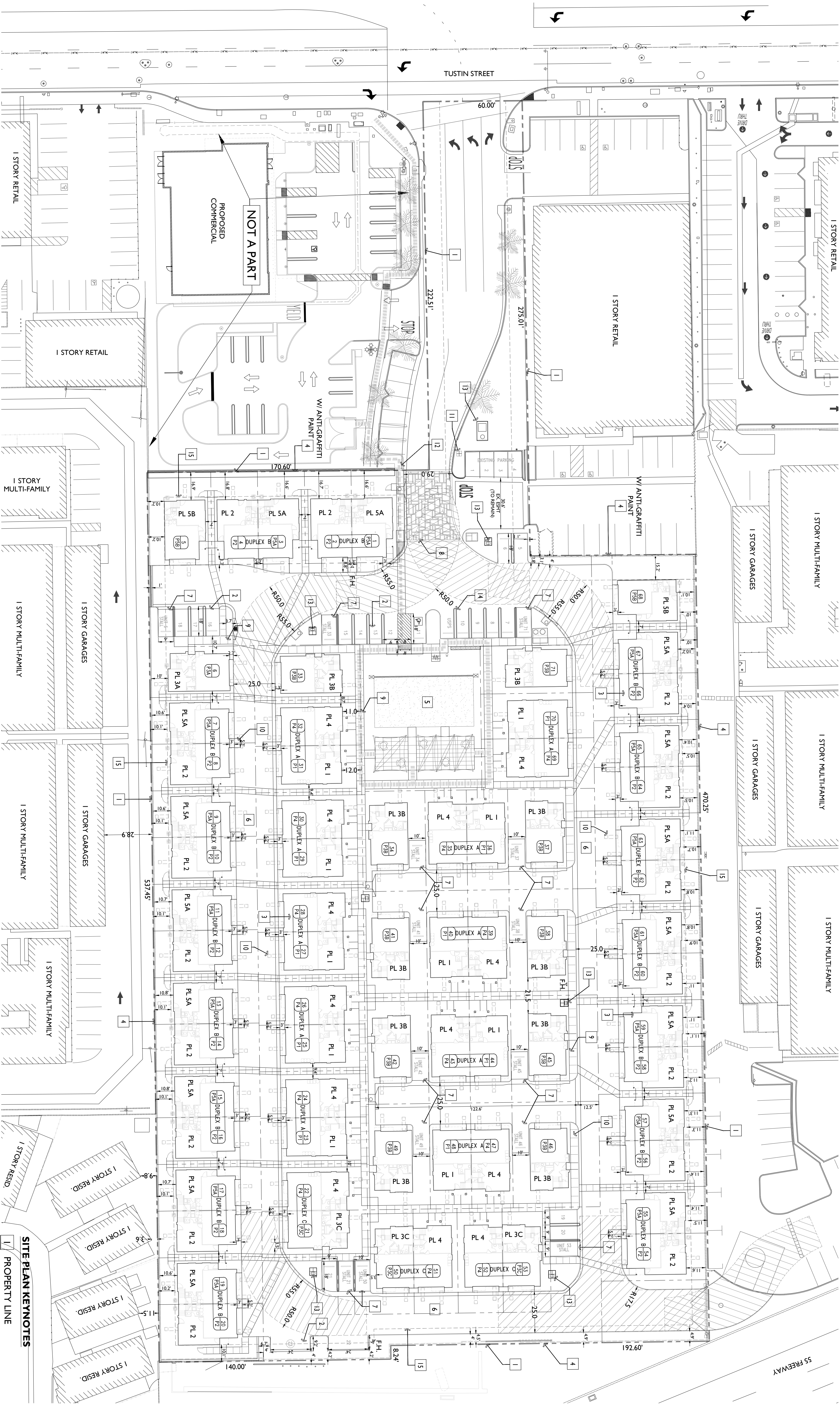
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}	
Night	0	55.7	59.4	52.8	59.2	59.0	58.2	57.8	56.3	55.3	53.7	53.4	52.9	55.7	10.0	65.7	
	1	53.1	57.1	49.9	56.8	56.5	55.8	55.3	53.8	52.5	50.8	50.4	50.0	53.1	10.0	63.1	
	2	53.3	57.2	50.4	57.1	56.8	56.2	55.5	53.8	52.8	51.3	51.0	50.5	53.3	10.0	63.3	
	3	55.4	58.8	53.1	58.5	58.2	57.5	57.2	56.0	55.1	53.9	53.6	53.2	55.4	10.0	65.4	
	4	58.2	60.1	56.5	60.0	59.8	59.5	59.3	58.6	58.1	57.2	56.9	56.7	58.2	10.0	68.2	
	5	59.9	61.7	58.6	61.6	61.4	61.1	60.9	60.2	59.8	59.1	58.9	58.7	59.9	10.0	69.9	
	6	59.1	61.6	57.7	61.3	61.1	60.7	60.4	59.5	58.9	58.1	57.9	57.7	59.1	10.0	69.1	
Day	7	58.6	62.6	56.8	62.1	61.7	60.9	60.3	59.0	58.2	57.2	57.0	56.8	58.6	0.0	58.6	
	8	57.0	60.0	55.3	59.7	59.5	58.8	58.4	57.4	56.8	55.8	55.6	55.3	57.0	0.0	57.0	
	9	55.3	61.8	51.0	61.4	60.9	59.6	58.8	55.9	53.7	51.7	51.4	51.1	55.3	0.0	55.3	
	10	56.4	62.8	51.1	62.4	62.1	60.9	60.1	57.1	54.9	52.3	51.7	51.2	56.4	0.0	56.4	
	11	54.7	62.1	49.7	61.3	60.4	58.9	58.2	55.3	53.2	50.7	50.2	49.8	54.7	0.0	54.7	
	12	53.5	60.1	49.0	59.6	59.0	57.8	56.7	54.2	52.2	49.9	49.5	49.1	53.5	0.0	53.5	
	13	54.9	63.2	50.1	62.6	62.2	59.6	57.9	55.3	53.0	51.0	50.6	50.2	54.9	0.0	54.9	
	14	52.9	60.2	48.9	59.6	59.3	57.1	55.5	53.1	51.8	49.8	49.4	49.0	52.9	0.0	52.9	
	15	54.5	64.0	49.0	63.4	62.8	60.3	58.1	53.7	52.3	50.1	49.6	49.2	54.5	0.0	54.5	
	16	55.2	63.2	50.1	62.7	62.1	60.7	58.3	55.5	53.3	51.0	50.6	50.3	55.2	0.0	55.2	
	17	54.0	60.7	49.6	60.2	59.6	58.0	57.0	54.5	53.0	50.5	50.1	49.7	54.0	0.0	54.0	
	18	54.3	60.3	50.6	59.8	59.2	57.9	57.0	54.9	53.5	51.5	51.1	50.8	54.3	0.0	54.3	
19	54.5	61.5	49.5	61.0	60.5	59.1	57.9	55.3	53.2	50.4	50.0	49.6	54.5	5.0	59.5		
20	54.6	63.7	50.6	63.1	62.3	59.1	57.1	54.2	53.0	51.3	51.0	50.7	54.6	5.0	59.6		
21	55.8	62.7	52.9	62.3	61.6	59.7	58.2	55.9	54.7	53.5	53.3	53.0	55.8	5.0	60.8		
Night	22	58.0	63.2	55.7	62.7	62.3	61.1	60.0	58.3	57.4	56.3	56.1	55.8	58.0	10.0	68.0	
	23	56.1	60.1	53.8	59.7	59.3	58.5	57.9	56.5	55.7	54.5	54.2	53.9	56.1	10.0	66.1	
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL	Leq (dBA)		
Day	Min	52.9	60.0	48.9	59.6	59.0	57.1	55.5	53.1	51.8	49.8	49.4	49.0		63.5	55.3	57.1
	Max	58.6	64.0	56.8	63.4	62.8	60.9	60.3	59.0	58.2	57.2	57.0	56.8				
Energy Average		55.3	Average:		61.4	60.9	59.2	58.0	55.4	53.8	51.8	51.4	51.1				
Night	Min	53.1	57.1	49.9	56.8	56.5	55.8	55.3	53.8	52.5	50.8	50.4	50.0				
	Max	59.9	63.2	58.6	62.7	62.3	61.1	60.9	60.2	59.8	59.1	58.9	58.7				
Energy Average		57.1	Average:		59.7	59.4	58.7	58.2	57.0	56.2	55.0	54.7	54.4				

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APPENDIX 6.1:

SITE PLAN

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PRODUCT TYPE: 71 UNITS
3 STORY DETACHED/DUPLEXES
372-642-31
A.P.N.: 4.235 AC
SITE AREA: 16.76 DU/AC
DENSITY: GENERAL COMMERCIAL (GC)
EXISTING LAND USE: MEDIUM DENSITY RESID. (MDR)
PROPOSED LAND USE: C-1R LIMITED BUSINESS
EXISTING ZONING: TUSTIN REDEVELOPMENT PROJECT AREA
PROPOSED ZONING: MULTIPLE-FAMILY RESIDENTIAL (R-3) W/ APPLICATION OF SMALL LOT SUBDIVISION DEVELOPMENT STANDARDS (OMC 17.14.270)

BLDG. STORIES: 3 STORY
BLDG HEIGHT: 35' (35' ALLOWED)
FRONT SETBACK: 15.1' (15' ALLOWED)
SIDE SETBACK: 10.1' (5' ALLOWED)
REAR SETBACK: 10.1' (10' ALLOWED)

PRODUCT SUMMARY (ALL 3 STORY HOMES)
PLAN LIVABLE AREA ROOF GARAGE # OF DECK AREA BD/BA
10 PL 1 2,008 S.F. 300 S.F. 472 S.F. 3BD/DEN/2BA/2PWD
16 PL 2 2,014 S.F. 0 S.F. 446 S.F. 3BD/DEN/2BA/2PWD
1 PL 3A 2,026 S.F. 0 S.F. 477 S.F. 4 BD/3BA/1PWD
13 PL 3B/3C 2,026 S.F. 269 S.F. 477 S.F. 4 BD/3BA/1PWD
13 PL 4 2,086 S.F. 235 S.F. 473 S.F. 3BD/DEN/2BA/2PWD
18 PL 5A/5B 2,117 S.F. 0 S.F. 446 S.F. 3BD/DEN/2BA/2PWD
NOTE: ALL PLANS PROVIDE 120 C.F. STORAGE IN OVERHEAD RACK OR SHELVING

BUILDING CODE SUMMARY
OCCUP. TYPE: R3/J (CRC)
CONST. TYPE: TYPE VB
FIRE SPRINKLER: NFPA 13D (CRC R313.1)

2022 CALIFORNIA RESIDENTIAL CODE (CRC)
2022 CALIFORNIA ELECTRICAL CODE (CEC)
2022 CALIFORNIA MECHANICAL CODE (CMC)
2022 CALIFORNIA PLUMBING CODE (CPC)
2022 CALIFORNIA FIRE CODE (CFC)
2022 CALIFORNIA GREEN BLDG STDS CODE (CGBC)
2022 CALIFORNIA ENERGY EFFICIENCY STDS (CEES)

PARKING SUMMARY
REQUIRED:
3BD = 3.0 STU X 57
4BD = 3.0 STU X 14
71 U X 0.25 STU GUEST
174 STALLS
PROVIDED:
142 STALLS
14 STALLS
23 STALLS
179 STALLS
USPS PARKING
1 STALL

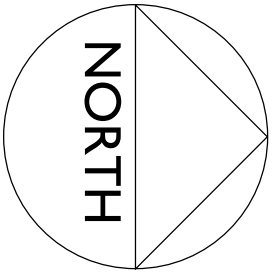
OPEN SPACE SUMMARY (SEE SHT. OS FOR LOCATIONS)
REQUIRED OPEN SPACE PER UNIT = 150 S.F.

PRIVATE YARD AREA
(UNITS 1-20, 54-68)
10,360 S.F. PROVIDED
(240 S.F. MIN., 10'X24')
ROOF DECK AREA
(UNITS 21-53, 69-71)
9,552 S.F. PROVIDED
(235 S.F. MIN., 13'3" X 18'8")

TOTAL PRIVATE OPEN SPACE 19,912 S.F. (280 S.F./UNIT)
COMMON OPEN SPACE
12,472 S.F. (175 S.F./UNIT)
(20' MIN. DIMENSION)

NOTE: REFER TO CIVIL PLANS FOR UTILITY IMPROVEMENTS
(SEWER/WATERS/TORM DRAIN/FIRE LINE)
SEE FLOOR PLAN SHEETS A2 & A5-47 FOR AC
CONDENSERS LOCATED ON ROOF DECKS AND
SCREENED FROM VIEW BY SOLID PARADET WALLS
AT PLANS 1, 3B, 3C AND 4 (LOTS 21-53 AND 69-71)

- SITE PLAN KEYNOTES**
- PROPERTY LINE
 - STANDARD PARKING STALL - 9' X 18'
 - PARALLEL PARKING STALL - 9' X 24'
 - 3-STORY DWELLING, TYP.
 - CMU PERIMETER WALL - SEE WALL PLAN
 - AMENITY AREA - SEE LANDSCAPE PLAN
 - FIRE LANE
 - OPEN STALL W/IN PRIVATE LOT (4 BDRM)
 - ENHANCED PAVING (SEE LANDSCAPE PLAN)
 - CONCRETE WALKWAY
 - FIRE LADDER PAD (TYPICAL)
 - ENTRY MONUMENT - SEE LANDSCAPE PLAN
 - PEDESTRIAN PATH OF TRAVEL FROM TUSTIN ST.
 - ELECTRICAL TRANSFORMER OR SWITCH
 - DOUBLE STRIPING AT PARKING STALLS PER CITY STANDARD, SEE DETAIL SHEET SL
 - SETBACK LINE
 - SETBACK LINE



SITE PLAN

ORANGE

VESTING TTM 19392

2375 N. TUSTIN ST. - DETACHED/DUPLEX HOMES

MELIA HOMES

9860 Irvine Center Dr.
Irvine, CA 92618
(949) 759-4367

0 30 60 90

SEPT. 2, 2025

SUMMIT ARCHITECTURE
5256 S. Mission Road, Ste. 404
Bonsall, CA 92003
www.summarch.com p.760.724.1198

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APPENDIX 7.1:

ON-SITE TRAFFIC NOISE LEVEL CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 268.0 feet Centerline Dist. to Observer: 278.0 feet Barrier Distance to Observer: 10.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 262.0 feet Road Elevation: 258.0 feet Barrier Elevation: 262.0 feet Road Grade: 1.0%		Autos: 75.0%		8.0%	17.0%	97.00%
		Medium Trucks: 75.0%		8.0%	17.0%	2.00%
		Heavy Trucks: 75.0%		8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 260.30				
		Heavy Trucks: 266.00		Grade Adjustment: 0.0		
		Lane Equivalent Distance (in feet)				
		Autos: 361.580				
		Medium Trucks: 242.860				
		Heavy Trucks: 242.769				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-12.99	-1.20	0.74	-9.460	-12.460
Medium Trucks:	76.31	-12.36	-10.40	-1.20	-1.07	0.000	0.000
Heavy Trucks:	81.16	-15.37	-10.40	-1.20	-1.19	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:	57.7	55.6	51.9	50.4	57.9	58.2
Medium Trucks:	52.4	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.2	48.5	47.0	54.4	54.7
Vehicle Noise:	60.1	58.0	54.3	52.8	60.3	60.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	48.2	46.2	42.5	41.0	48.4	48.7
Medium Trucks:	52.4	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.2	48.5	47.0	54.4	54.7
Vehicle Noise:	57.0	55.0	51.3	49.8	57.2	57.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 268.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 278.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 260.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 266.00 Grade Adjustment: 0.0				
Pad Elevation: 262.0 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 258.0 feet		Autos: 361.580				
Barrier Elevation: 262.0 feet		Medium Trucks: 242.860				
Road Grade: 1.0%		Heavy Trucks: 242.769				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-12.99	-1.20	0.74	-9.460	-12.460
Medium Trucks:	76.31	-12.36	-10.40	-1.20	-1.07	0.000	0.000
Heavy Trucks:	81.16	-15.37	-10.40	-1.20	-1.19	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:	57.7	55.6	51.9	50.4	57.9	58.2
Medium Trucks:	52.4	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.2	48.5	47.0	54.4	54.7
Vehicle Noise:	60.1	58.0	54.3	52.8	60.3	60.6

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	48.2	46.2	42.5	41.0	48.4	48.7
Medium Trucks:	52.4	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.2	48.5	47.0	54.4	54.7
Vehicle Noise:	57.0	55.0	51.3	49.8	57.2	57.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 268.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 278.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 260.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 266.00 Grade Adjustment: 0.0				
Pad Elevation: 262.0 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 258.0 feet		Autos: 361.580				
Barrier Elevation: 262.0 feet		Medium Trucks: 242.860				
Road Grade: 1.0%		Heavy Trucks: 242.769				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-12.99	-1.20	0.74	-9.460	-12.460
Medium Trucks:	76.31	-12.36	-10.40	-1.20	-1.07	0.000	0.000
Heavy Trucks:	81.16	-15.37	-10.40	-1.20	-1.19	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:	57.7	55.6	51.9	50.4	57.9	58.2
Medium Trucks:	52.4	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.2	48.5	47.0	54.4	54.7
Vehicle Noise:	60.1	58.0	54.3	52.8	60.3	60.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	48.2	46.2	42.5	41.0	48.4	48.7
Medium Trucks:	52.4	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.2	48.5	47.0	54.4	54.7
Vehicle Noise:	57.0	55.0	51.3	49.8	57.2	57.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 268.0 feet Centerline Dist. to Observer: 278.0 feet Barrier Distance to Observer: 10.0 feet Observer Height (Above Pad): 14.0 feet Pad Elevation: 262.0 feet Road Elevation: 258.0 feet Barrier Elevation: 262.0 feet Road Grade: 1.0%		Autos:	75.0%	8.0%	17.0%	97.00%
		Medium Trucks:	75.0%	8.0%	17.0%	2.00%
		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	260.30					
Heavy Trucks:	266.00	Grade Adjustment: 0.0				
Lane Equivalent Distance (in feet)						
Autos:			367.576			
Medium Trucks:			243.275			
Heavy Trucks:			242.973			

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-13.10	-1.20	-0.10	0.000	0.000
Medium Trucks:	76.31	-12.36	-10.41	-1.20	-6.56	0.000	0.000
Heavy Trucks:	81.16	-15.37	-10.40	-1.20	-6.88	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:	57.6	55.5	51.8	50.3	57.8	58.1
Medium Trucks:	52.3	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.1	48.4	46.9	54.4	54.7
Vehicle Noise:	60.0	58.0	54.3	52.8	60.2	60.5

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.6	55.5	51.8	50.3	57.8	58.1
Medium Trucks:	52.3	50.3	46.6	45.1	52.6	52.9
Heavy Trucks:	54.2	52.1	48.4	46.9	54.4	54.7
Vehicle Noise:	60.0	58.0	54.3	52.8	60.2	60.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 268.0 feet Centerline Dist. to Observer: 278.0 feet Barrier Distance to Observer: 10.0 feet Observer Height (Above Pad): 23.0 feet Pad Elevation: 262.0 feet Road Elevation: 258.0 feet Barrier Elevation: 262.0 feet Road Grade: 1.0%		Autos:	75.0%	8.0%	17.0%	97.00%
		Medium Trucks:	75.0%	8.0%	17.0%	2.00%
		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	260.30					
Heavy Trucks:	266.00 Grade Adjustment: 0.0					
Lane Equivalent Distance (in feet)						
Autos: 374.381						
Medium Trucks: 244.021						
Heavy Trucks: 243.509						

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-13.22	-1.20	-1.17	0.000	0.000
Medium Trucks:	76.31	-12.36	-10.43	-1.20	-13.54	0.000	0.000
Heavy Trucks:	81.16	-15.37	-10.42	-1.20	-14.07	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:	57.4	55.4	51.7	50.2	57.7	58.0
Medium Trucks:	52.3	50.3	46.6	45.1	52.6	52.8
Heavy Trucks:	54.2	52.1	48.4	46.9	54.4	54.7
Vehicle Noise:	59.9	57.9	54.2	52.7	60.2	60.5

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.4	55.4	51.7	50.2	57.7	58.0
Medium Trucks:	52.3	50.3	46.6	45.1	52.6	52.8
Heavy Trucks:	54.2	52.1	48.4	46.9	54.4	54.7
Vehicle Noise:	59.9	57.9	54.2	52.7	60.2	60.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS					
Highway Data		Site Conditions (Hard = 10, Soft = 15)					
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15					
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15					
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15					
Vehicle Speed: 40 mph		Vehicle Mix					
Near/Far Lane Distance: 66 feet							
Site Data		VehicleType	Day	Evening	Night	Daily	
Barrier Height: 0.0 feet		Autos:	75.0%	8.0%	17.0%	97.00%	
Barrier Type (0-Wall, 1-Berm): 0.0		Medium Trucks:	75.0%	8.0%	17.0%	2.00%	
Centerline Dist. to Barrier: 268.0 feet		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%	
Centerline Dist. to Observer: 278.0 feet		Noise Source Elevations (in feet)					
Barrier Distance to Observer: 10.0 feet		Autos:	0.00				
Observer Height (Above Pad): 32.0 feet		Medium Trucks:	260.30				
Pad Elevation: 262.0 feet		Heavy Trucks:	266.00	Grade Adjustment:			0.0
Road Elevation: 258.0 feet		Lane Equivalent Distance (in feet)					
Barrier Elevation: 262.0 feet		Autos:	381.277				
Road Grade: 1.0%		Medium Trucks:	245.096				
		Heavy Trucks:	244.376				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-13.34	-1.20	-2.71	0.000	0.000
Medium Trucks:	76.31	-12.36	-10.46	-1.20	-20.77	0.000	0.000
Heavy Trucks:	81.16	-15.37	-10.44	-1.20	-21.49	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:	57.3	55.3	51.6	50.1	57.5	57.8
Medium Trucks:	52.3	50.3	46.6	45.1	52.5	52.8
Heavy Trucks:	54.1	52.1	48.4	46.9	54.4	54.7
Vehicle Noise:	59.9	57.8	54.1	52.6	60.1	60.4

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.3	51.6	50.1	57.5	57.8
Medium Trucks:	52.3	50.3	46.6	45.1	52.5	52.8
Heavy Trucks:	54.1	52.1	48.4	46.9	54.4	54.7
Vehicle Noise:	59.9	57.8	54.1	52.6	60.1	60.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 208.0 feet Barrier Distance to Observer: 113.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 266.4 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 387.203				
		Medium Trucks: 154.065				
		Heavy Trucks: 154.352				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.44	-1.20	74.01	-19.300	-22.300
Medium Trucks:	80.82	5.62	-7.43	-1.20	-0.01	0.000	0.000
Heavy Trucks:	84.54	3.93	-7.45	-1.20	-0.34	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.2	56.1	64.7	65.3
Medium Trucks:	77.8	76.3	69.9	68.4	76.9	77.1
Heavy Trucks:	79.8	78.4	69.4	70.6	79.0	79.1
Vehicle Noise:	82.0	80.6	73.0	72.7	81.1	81.3

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	46.5	44.6	42.9	36.8	45.4	46.0
Medium Trucks:	77.8	76.3	69.9	68.4	76.9	77.1
Heavy Trucks:	79.8	78.4	69.4	70.6	79.0	79.1
Vehicle Noise:	81.9	80.5	72.7	72.7	81.0	81.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 208.0 feet Barrier Distance to Observer: 113.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 266.4 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 402.378				
		Medium Trucks: 129.443				
		Heavy Trucks: 125.656				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.69	-1.20	88.67	-19.400	-22.400
Medium Trucks:	80.82	5.62	-6.30	-1.20	2.49	-12.937	-15.937
Heavy Trucks:	84.54	3.93	-6.11	-1.20	1.21	-10.720	-13.720

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	78.9	77.4	71.1	69.5	78.0	78.2
Heavy Trucks:	81.2	79.7	70.7	72.0	80.3	80.4
Vehicle Noise:	83.3	81.8	74.2	74.0	82.4	82.6

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.2	41.3	39.5	33.5	42.1	42.7
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	67.4	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	68.8	67.3	59.2	59.5	67.9	68.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 208.0 feet		Autos: 0.00				
Barrier Distance to Observer: 113.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 266.4 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 402.378				
Barrier Elevation: 274.0 feet		Medium Trucks: 129.443				
Road Grade: 1.0%		Heavy Trucks: 125.656				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.69	-1.20	88.67	-19.400	-22.400
Medium Trucks:	80.82	5.62	-6.30	-1.20	2.49	-12.937	-15.937
Heavy Trucks:	84.54	3.93	-6.11	-1.20	1.21	-10.720	-13.720

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	78.9	77.4	71.1	69.5	78.0	78.2
Heavy Trucks:	81.2	79.7	70.7	72.0	80.3	80.4
Vehicle Noise:	83.3	81.8	74.2	74.0	82.4	82.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.2	41.3	39.5	33.5	42.1	42.7
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	67.4	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	68.8	67.3	59.2	59.5	67.9	68.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 208.0 feet		Autos: 0.00				
Barrier Distance to Observer: 113.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 266.4 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 401.420				
Barrier Elevation: 274.0 feet		Medium Trucks: 128.486				
Road Grade: 1.0%		Heavy Trucks: 124.699				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.67	-1.20	80.13	-19.400	-22.400
Medium Trucks:	80.82	5.62	-6.25	-1.20	1.57	-11.440	-14.440
Heavy Trucks:	84.54	3.93	-6.06	-1.20	0.61	-9.030	-12.030

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	79.0	77.5	71.1	69.6	78.0	78.3
Heavy Trucks:	81.2	79.8	70.8	72.0	80.4	80.5
Vehicle Noise:	83.3	81.9	74.2	74.0	82.4	82.6

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.2	41.3	39.5	33.5	42.1	42.7
Medium Trucks:	64.5	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	69.2	67.8	58.7	60.0	68.3	68.5
Vehicle Noise:	70.5	69.0	60.9	61.2	69.6	69.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 208.0 feet Barrier Distance to Observer: 113.0 feet Observer Height (Above Pad): 23.0 feet Pad Elevation: 266.4 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 401.174				
		Medium Trucks: 128.239				
		Heavy Trucks: 124.452				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.67	-1.20	72.22	-19.300	-22.300
Medium Trucks:	80.82	5.62	-6.24	-1.20	0.86	-9.880	-12.880
Heavy Trucks:	84.54	3.93	-6.04	-1.20	0.21	-6.870	-9.870

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	79.0	77.5	71.1	69.6	78.0	78.3
Heavy Trucks:	81.2	79.8	70.8	72.0	80.4	80.5
Vehicle Noise:	83.3	81.9	74.2	74.0	82.4	82.6

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.3	41.4	39.6	33.6	42.2	42.8
Medium Trucks:	66.1	64.6	58.2	56.7	65.2	65.4
Heavy Trucks:	71.4	69.9	60.9	62.1	70.5	70.6
Vehicle Noise:	72.5	71.1	62.8	63.2	71.6	71.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 208.0 feet		Autos: 0.00				
Barrier Distance to Observer: 113.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 32.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 266.4 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 401.642				
Barrier Elevation: 274.0 feet		Medium Trucks: 128.708				
Road Grade: 1.0%		Heavy Trucks: 124.921				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.68	-1.20	64.95	-19.249	-22.249
Medium Trucks:	80.82	5.62	-6.26	-1.20	0.37	-7.850	-10.850
Heavy Trucks:	84.54	3.93	-6.07	-1.20	0.02	-5.200	-8.200

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	79.0	77.5	71.1	69.6	78.0	78.3
Heavy Trucks:	81.2	79.8	70.7	72.0	80.3	80.5
Vehicle Noise:	83.3	81.9	74.2	74.0	82.4	82.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.4	41.5	39.7	33.6	42.3	42.9
Medium Trucks:	68.1	66.6	60.3	58.7	67.2	67.4
Heavy Trucks:	73.0	71.6	62.5	63.8	72.1	72.3
Vehicle Noise:	74.2	72.8	64.6	65.0	73.3	73.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 0.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 226.0 feet		Autos: 0.00				
Barrier Distance to Observer: 131.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 265.7 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 405.215				
Barrier Elevation: 274.0 feet		Medium Trucks: 172.810				
Road Grade: 1.0%		Heavy Trucks: 173.089				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.73	-1.20	82.86	-19.400	-22.400
Medium Trucks:	80.82	5.62	-8.18	-1.20	-0.01	0.000	0.000
Heavy Trucks:	84.54	3.93	-8.19	-1.20	-0.34	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	61.9	55.8	64.4	65.0
Medium Trucks:	77.1	75.5	69.2	67.6	76.1	76.3
Heavy Trucks:	79.1	77.7	68.6	69.9	78.2	78.3
Vehicle Noise:	81.3	79.8	72.3	72.0	80.4	80.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	46.1	44.2	42.5	36.4	45.0	45.6
Medium Trucks:	77.1	75.5	69.2	67.6	76.1	76.3
Heavy Trucks:	79.1	77.7	68.6	69.9	78.2	78.3
Vehicle Noise:	81.2	79.7	71.9	71.9	80.3	80.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 226.0 feet		Autos: 0.00				
Barrier Distance to Observer: 131.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 265.7 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 420.302				
Barrier Elevation: 274.0 feet		Medium Trucks: 147.368				
Road Grade: 1.0%		Heavy Trucks: 143.581				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.97	-1.20	97.43	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.14	-1.20	2.40	-12.820	-15.820
Heavy Trucks:	84.54	3.93	-6.98	-1.20	1.13	-10.560	-13.560

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.6	55.6	64.2	64.8
Medium Trucks:	78.1	76.6	70.2	68.7	77.1	77.4
Heavy Trucks:	80.3	78.9	69.8	71.1	79.4	79.6
Vehicle Noise:	82.4	81.0	73.3	73.1	81.5	81.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.9	41.0	39.2	33.2	41.8	42.4
Medium Trucks:	62.3	60.8	54.4	52.9	61.3	61.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	68.1	66.6	58.5	58.8	67.2	67.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 226.0 feet Barrier Distance to Observer: 131.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 265.7 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 420.302				
		Medium Trucks: 147.368				
		Heavy Trucks: 143.581				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.97	-1.20	97.43	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.14	-1.20	2.40	-12.820	-15.820
Heavy Trucks:	84.54	3.93	-6.98	-1.20	1.13	-10.560	-13.560

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.6	55.6	64.2	64.8
Medium Trucks:	78.1	76.6	70.2	68.7	77.1	77.4
Heavy Trucks:	80.3	78.9	69.8	71.1	79.4	79.6
Vehicle Noise:	82.4	81.0	73.3	73.1	81.5	81.7

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.9	41.0	39.2	33.2	41.8	42.4
Medium Trucks:	62.3	60.8	54.4	52.9	61.3	61.6
Heavy Trucks:	66.7	65.3	56.3	57.5	65.9	66.0
Vehicle Noise:	68.1	66.6	58.5	58.8	67.2	67.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 226.0 feet		Autos: 0.00				
Barrier Distance to Observer: 131.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 265.7 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 419.428				
Barrier Elevation: 274.0 feet		Medium Trucks: 146.493				
Road Grade: 1.0%		Heavy Trucks: 142.706				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.96	-1.20	89.19	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.11	-1.20	1.60	-11.500	-14.500
Heavy Trucks:	84.54	3.93	-6.94	-1.20	0.61	-9.030	-12.030

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.7	55.6	64.2	64.8
Medium Trucks:	78.1	76.6	70.3	68.7	77.2	77.4
Heavy Trucks:	80.3	78.9	69.9	71.1	79.5	79.6
Vehicle Noise:	82.5	81.0	73.4	73.2	81.6	81.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.9	41.0	39.3	33.2	41.8	42.4
Medium Trucks:	63.6	62.1	55.8	54.2	62.7	62.9
Heavy Trucks:	68.3	66.9	57.8	59.1	67.4	67.6
Vehicle Noise:	69.6	68.1	60.0	60.3	68.7	68.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 226.0 feet Barrier Distance to Observer: 131.0 feet Observer Height (Above Pad): 23.0 feet Pad Elevation: 265.7 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 419.167				
		Medium Trucks: 146.232				
		Heavy Trucks: 142.445				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.95	-1.20	81.49	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.09	-1.20	0.96	-10.180	-13.180
Heavy Trucks:	84.54	3.93	-6.92	-1.20	0.24	-7.080	-10.080

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.7	55.6	64.2	64.8
Medium Trucks:	78.1	76.6	70.3	68.7	77.2	77.4
Heavy Trucks:	80.3	78.9	69.9	71.1	79.5	79.6
Vehicle Noise:	82.5	81.0	73.4	73.2	81.6	81.8

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.9	41.0	39.3	33.2	41.8	42.4
Medium Trucks:	65.0	63.5	57.1	55.5	64.0	64.2
Heavy Trucks:	70.3	68.8	59.8	61.1	69.4	69.5
Vehicle Noise:	71.4	70.0	61.7	62.1	70.5	70.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 226.0 feet Barrier Distance to Observer: 131.0 feet Observer Height (Above Pad): 32.0 feet Pad Elevation: 265.7 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 419.524				
		Medium Trucks: 146.589				
		Heavy Trucks: 142.802				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.96	-1.20	74.32	-19.300	-22.300
Medium Trucks:	80.82	5.62	-7.11	-1.20	0.48	-8.400	-11.400
Heavy Trucks:	84.54	3.93	-6.94	-1.20	0.04	-5.400	-8.400

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.7	55.6	64.2	64.8
Medium Trucks:	78.1	76.6	70.3	68.7	77.2	77.4
Heavy Trucks:	80.3	78.9	69.9	71.1	79.5	79.6
Vehicle Noise:	82.5	81.0	73.4	73.2	81.6	81.7

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.0	41.1	39.4	33.3	41.9	42.5
Medium Trucks:	66.7	65.2	58.9	57.3	65.8	66.0
Heavy Trucks:	71.9	70.5	61.5	62.7	71.1	71.2
Vehicle Noise:	73.1	71.6	63.4	63.8	72.2	72.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 177.0 feet Barrier Distance to Observer: 82.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 277.30				
		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 357.224				
		Medium Trucks: 121.318				
		Heavy Trucks: 121.696				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.91	-1.20	58.36	-19.200	-22.200
Medium Trucks:	80.82	5.62	-5.88	-1.20	0.00	0.000	0.000
Heavy Trucks:	84.54	3.93	-5.90	-1.20	-0.25	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:	66.4	64.5	62.7	56.6	65.3	65.9
Medium Trucks:	79.4	77.9	71.5	69.9	78.4	78.6
Heavy Trucks:	81.4	79.9	70.9	72.2	80.5	80.6
Vehicle Noise:	83.6	82.1	74.5	74.3	82.7	82.9

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	47.2	45.3	43.5	37.4	46.1	46.7
Medium Trucks:	79.4	77.9	71.5	69.9	78.4	78.6
Heavy Trucks:	81.4	79.9	70.9	72.2	80.5	80.6
Vehicle Noise:	83.5	82.0	74.2	74.2	82.6	82.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 177.0 feet Barrier Distance to Observer: 82.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 277.30				
		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 372.888				
		Medium Trucks: 98.954				
		Heavy Trucks: 95.167				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.19	-1.20	73.50	-19.300	-22.300
Medium Trucks:	80.82	5.62	-4.55	-1.20	2.96	-13.548	-16.548
Heavy Trucks:	84.54	3.93	-4.30	-1.20	1.60	-11.500	-14.500

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	80.7	79.2	72.8	71.3	79.7	80.0
Heavy Trucks:	83.0	81.5	72.5	73.8	82.1	82.2
Vehicle Noise:	85.0	83.6	75.9	75.8	84.2	84.3

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.8	41.9	40.1	34.1	42.7	43.3
Medium Trucks:	64.1	62.6	56.3	54.7	63.2	63.4
Heavy Trucks:	68.5	67.0	58.0	59.3	67.6	67.7
Vehicle Noise:	69.8	68.4	60.3	60.6	69.0	69.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 177.0 feet Barrier Distance to Observer: 82.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos:	77.5%	12.9%	9.6%	41.00%
		Medium Trucks:	84.8%	4.9%	10.3%	35.17%
		Heavy Trucks:	86.5%	2.7%	10.8%	23.83%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	277.30					
Heavy Trucks:	283.00	Grade Adjustment: 0.0				
Lane Equivalent Distance (in feet)						
Autos:			372.888			
Medium Trucks:			98.954			
Heavy Trucks:			95.167			

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.19	-1.20	73.50	-19.300	-22.300
Medium Trucks:	80.82	5.62	-4.55	-1.20	2.96	-13.548	-16.548
Heavy Trucks:	84.54	3.93	-4.30	-1.20	1.60	-11.500	-14.500

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	80.7	79.2	72.8	71.3	79.7	80.0
Heavy Trucks:	83.0	81.5	72.5	73.8	82.1	82.2
Vehicle Noise:	85.0	83.6	75.9	75.8	84.2	84.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.8	41.9	40.1	34.1	42.7	43.3
Medium Trucks:	64.1	62.6	56.3	54.7	63.2	63.4
Heavy Trucks:	68.5	67.0	58.0	59.3	67.6	67.7
Vehicle Noise:	69.8	68.4	60.3	60.6	69.0	69.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 177.0 feet		Autos: 0.00				
Barrier Distance to Observer: 82.0 feet		Medium Trucks: 277.30				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
Pad Elevation: 267.1 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 275.0 feet		Autos: 371.544				
Barrier Elevation: 275.0 feet		Medium Trucks: 97.610				
Road Grade: 1.0%		Heavy Trucks: 93.823				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.17	-1.20	64.22	-19.242	-22.242
Medium Trucks:	80.82	5.62	-4.46	-1.20	1.69	-11.680	-14.680
Heavy Trucks:	84.54	3.93	-4.20	-1.20	0.72	-9.380	-12.380

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	80.8	79.3	72.9	71.4	79.8	80.1
Heavy Trucks:	83.1	81.6	72.6	73.9	82.2	82.3
Vehicle Noise:	85.1	83.7	76.0	75.8	84.2	84.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.9	42.0	40.2	34.1	42.8	43.4
Medium Trucks:	66.1	64.6	58.2	56.7	65.1	65.4
Heavy Trucks:	70.7	69.3	60.2	61.5	69.8	70.0
Vehicle Noise:	72.0	70.5	62.4	62.7	71.1	71.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 177.0 feet		Autos: 0.00				
Barrier Distance to Observer: 82.0 feet		Medium Trucks: 277.30				
Observer Height (Above Pad): 23.0 feet		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
Pad Elevation: 267.1 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 275.0 feet		Autos: 371.172				
Barrier Elevation: 275.0 feet		Medium Trucks: 97.238				
Road Grade: 1.0%		Heavy Trucks: 93.451				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.16	-1.20	55.84	-19.200	-22.200
Medium Trucks:	80.82	5.62	-4.44	-1.20	0.77	-9.580	-12.580
Heavy Trucks:	84.54	3.93	-4.18	-1.20	0.18	-6.640	-9.640

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	80.8	79.3	72.9	71.4	79.8	80.1
Heavy Trucks:	83.1	81.7	72.6	73.9	82.2	82.4
Vehicle Noise:	85.2	83.7	76.0	75.9	84.3	84.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.9	42.0	40.2	34.2	42.8	43.4
Medium Trucks:	68.2	66.7	60.4	58.8	67.3	67.5
Heavy Trucks:	73.5	72.0	63.0	64.2	72.6	72.7
Vehicle Noise:	74.6	73.2	64.9	65.3	73.7	73.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 177.0 feet Barrier Distance to Observer: 82.0 feet Observer Height (Above Pad): 32.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 277.30				
		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 371.784				
		Medium Trucks: 97.850				
		Heavy Trucks: 94.063				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.17	-1.20	48.38	-19.168	-22.168
Medium Trucks:	80.82	5.62	-4.48	-1.20	0.21	-6.870	-9.870
Heavy Trucks:	84.54	3.93	-4.22	-1.20	0.00	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	80.8	79.3	72.9	71.3	79.8	80.0
Heavy Trucks:	83.0	81.6	72.6	73.8	82.2	82.3
Vehicle Noise:	85.1	83.7	76.0	75.8	84.2	84.4

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.9	42.0	40.3	34.2	42.8	43.4
Medium Trucks:	70.9	69.4	63.0	61.5	69.9	70.2
Heavy Trucks:	75.1	73.7	64.7	65.9	74.3	74.4
Vehicle Noise:	76.5	75.1	67.0	67.3	75.7	75.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 145.0 feet Barrier Distance to Observer: 50.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 268.1 feet Road Elevation: 276.0 feet Barrier Elevation: 276.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 278.30				
		Heavy Trucks: 284.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 326.256				
		Medium Trucks: 60.098				
		Heavy Trucks: 86.683				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.32	-1.20	39.21	-18.984	-21.984
Medium Trucks:	80.82	5.62	-1.30	-1.20	0.00	-4.900	-7.900
Heavy Trucks:	84.54	3.93	-3.69	-1.20	-0.14	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:	67.0	65.1	63.3	57.2	65.9	66.5
Medium Trucks:	83.9	82.4	76.1	74.5	83.0	83.2
Heavy Trucks:	83.6	82.2	73.1	74.4	82.7	82.9
Vehicle Noise:	86.8	85.3	78.0	77.5	85.9	86.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	48.0	46.1	44.3	38.3	46.9	47.5
Medium Trucks:	79.0	77.5	71.2	69.6	78.1	78.3
Heavy Trucks:	83.6	82.2	73.1	74.4	82.7	82.9
Vehicle Noise:	84.9	83.4	75.3	75.6	84.0	84.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 145.0 feet Barrier Distance to Observer: 50.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 268.1 feet Road Elevation: 276.0 feet Barrier Elevation: 276.0 feet Road Grade: 1.0%		Autos:	77.5%	12.9%	9.6%	41.00%
		Medium Trucks:	84.8%	4.9%	10.3%	35.17%
		Heavy Trucks:	86.5%	2.7%	10.8%	23.83%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	278.30					
Heavy Trucks:	284.00 Grade Adjustment: 0.0					
Lane Equivalent Distance (in feet)						
Autos: 342.943						
Medium Trucks: 68.009						
Heavy Trucks: 64.222						

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.65	-1.20	55.35	-19.200	-22.200
Medium Trucks:	80.82	5.62	-2.11	-1.20	3.96	-14.560	-17.560
Heavy Trucks:	84.54	3.93	-1.73	-1.20	2.49	-12.937	-15.937

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	83.1	81.6	75.3	73.7	82.2	82.4
Heavy Trucks:	85.5	84.1	75.1	76.3	84.7	84.8
Vehicle Noise:	87.5	86.1	78.3	78.3	86.7	86.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.4	42.5	40.8	34.7	43.3	43.9
Medium Trucks:	65.6	64.1	57.7	56.2	64.6	64.9
Heavy Trucks:	69.6	68.2	59.1	60.4	68.7	68.9
Vehicle Noise:	71.1	69.6	61.5	61.8	70.2	70.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 145.0 feet Barrier Distance to Observer: 50.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 268.1 feet Road Elevation: 276.0 feet Barrier Elevation: 276.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 278.30				
		Heavy Trucks: 284.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 342.943				
		Medium Trucks: 68.009				
		Heavy Trucks: 64.222				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.65	-1.20	55.35	-19.200	-22.200
Medium Trucks:	80.82	5.62	-2.11	-1.20	3.96	-14.560	-17.560
Heavy Trucks:	84.54	3.93	-1.73	-1.20	2.49	-12.937	-15.937

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	83.1	81.6	75.3	73.7	82.2	82.4
Heavy Trucks:	85.5	84.1	75.1	76.3	84.7	84.8
Vehicle Noise:	87.5	86.1	78.3	78.3	86.7	86.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.4	42.5	40.8	34.7	43.3	43.9
Medium Trucks:	65.6	64.1	57.7	56.2	64.6	64.9
Heavy Trucks:	69.6	68.2	59.1	60.4	68.7	68.9
Vehicle Noise:	71.1	69.6	61.5	61.8	70.2	70.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 145.0 feet		Autos: 0.00				
Barrier Distance to Observer: 50.0 feet		Medium Trucks: 278.30				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks: 284.00 Grade Adjustment: 0.0				
Pad Elevation: 268.1 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 276.0 feet		Autos: 340.784				
Barrier Elevation: 276.0 feet		Medium Trucks: 65.850				
Road Grade: 1.0%		Heavy Trucks: 62.064				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.61	-1.20	44.94	-19.099	-22.099
Medium Trucks:	80.82	5.62	-1.90	-1.20	1.91	-12.120	-15.120
Heavy Trucks:	84.54	3.93	-1.51	-1.20	0.95	-10.150	-13.150

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	63.0	57.0	65.6	66.2
Medium Trucks:	83.3	81.8	75.5	73.9	82.4	82.6
Heavy Trucks:	85.8	84.3	75.3	76.5	84.9	85.0
Vehicle Noise:	87.8	86.3	78.5	78.5	86.9	87.0

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.6	42.7	40.9	34.9	43.5	44.1
Medium Trucks:	68.2	66.7	60.4	58.8	67.3	67.5
Heavy Trucks:	72.6	71.2	62.1	63.4	71.8	71.9
Vehicle Noise:	74.0	72.5	64.4	64.7	73.1	73.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 145.0 feet Barrier Distance to Observer: 50.0 feet Observer Height (Above Pad): 23.0 feet Pad Elevation: 268.1 feet Road Elevation: 276.0 feet Barrier Elevation: 276.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 278.30				
		Heavy Trucks: 284.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 340.176				
		Medium Trucks: 65.242				
		Heavy Trucks: 61.456				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.59	-1.20	36.01	-18.920	-21.920
Medium Trucks:	80.82	5.62	-1.84	-1.20	0.57	-8.850	-11.850
Heavy Trucks:	84.54	3.93	-1.45	-1.20	0.13	-6.240	-9.240

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	63.0	57.0	65.6	66.2
Medium Trucks:	83.4	81.9	75.5	74.0	82.4	82.7
Heavy Trucks:	85.8	84.4	75.4	76.6	85.0	85.1
Vehicle Noise:	87.8	86.4	78.6	78.5	86.9	87.1

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.8	42.9	41.1	35.0	43.7	44.3
Medium Trucks:	71.6	70.0	63.7	62.1	70.6	70.8
Heavy Trucks:	76.6	75.2	66.1	67.4	75.7	75.9
Vehicle Noise:	77.8	76.3	68.1	68.5	76.9	77.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 145.0 feet Barrier Distance to Observer: 50.0 feet Observer Height (Above Pad): 32.0 feet Pad Elevation: 268.1 feet Road Elevation: 276.0 feet Barrier Elevation: 276.0 feet Road Grade: 1.0%		Autos:	77.5%	12.9%	9.6%	41.00%
		Medium Trucks:	84.8%	4.9%	10.3%	35.17%
		Heavy Trucks:	86.5%	2.7%	10.8%	23.83%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
		Medium Trucks:	278.30			
		Heavy Trucks:	284.00	Grade Adjustment:	0.0	
		Lane Equivalent Distance (in feet)				
		Autos:	341.174			
		Medium Trucks:	66.240			
		Heavy Trucks:	87.488			

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-12.61	-1.20	28.63	-18.731	-21.731
Medium Trucks:	80.82	5.62	-1.94	-1.20	0.02	-5.200	-8.200
Heavy Trucks:	84.54	3.93	-3.75	-1.20	-0.07	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	63.0	56.9	65.6	66.2
Medium Trucks:	83.3	81.8	75.4	73.9	82.3	82.6
Heavy Trucks:	83.5	82.1	73.1	74.3	82.7	82.8
Vehicle Noise:	86.5	85.0	77.6	77.2	85.6	85.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.9	43.0	41.3	35.2	43.8	44.4
Medium Trucks:	75.1	73.6	67.2	65.7	74.1	74.4
Heavy Trucks:	83.5	82.1	73.1	74.3	82.7	82.8
Vehicle Noise:	84.1	82.7	74.1	74.9	83.2	83.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 391.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 446.617				
Barrier Elevation: 263.8 feet		Medium Trucks: 356.555				
Road Grade: 1.0%		Heavy Trucks: 356.480				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.37	-1.20	0.18	-6.640	-9.640
Medium Trucks:	76.31	-12.36	-12.90	-1.20	-1.09	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.90	-1.20	-1.16	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:	56.3	54.2	50.5	49.1	56.5	56.8
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	58.3	56.2	52.5	51.0	58.5	58.8

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	49.6	47.6	43.9	42.4	49.9	50.2
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	55.3	53.2	49.5	48.0	55.5	55.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 391.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 446.617				
Barrier Elevation: 263.8 feet		Medium Trucks: 356.555				
Road Grade: 1.0%		Heavy Trucks: 356.480				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.37	-1.20	0.18	-6.640	-9.640
Medium Trucks:	76.31	-12.36	-12.90	-1.20	-1.09	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.90	-1.20	-1.16	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:	56.3	54.2	50.5	49.1	56.5	56.8
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	58.3	56.2	52.5	51.0	58.5	58.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	49.6	47.6	43.9	42.4	49.9	50.2
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	55.3	53.2	49.5	48.0	55.5	55.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 391.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 446.617				
Barrier Elevation: 263.8 feet		Medium Trucks: 356.555				
Road Grade: 1.0%		Heavy Trucks: 356.480				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.37	-1.20	0.18	-6.640	-9.640
Medium Trucks:	76.31	-12.36	-12.90	-1.20	-1.09	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.90	-1.20	-1.16	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:	56.3	54.2	50.5	49.1	56.5	56.8
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	58.3	56.2	52.5	51.0	58.5	58.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	49.6	47.6	43.9	42.4	49.9	50.2
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	55.3	53.2	49.5	48.0	55.5	55.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 381.0 feet Centerline Dist. to Observer: 391.0 feet Barrier Distance to Observer: 10.0 feet Observer Height (Above Pad): 14.0 feet Pad Elevation: 263.8 feet Road Elevation: 259.0 feet Barrier Elevation: 263.8 feet Road Grade: 1.0%		Autos:	75.0%	8.0%	17.0%	97.00%
		Medium Trucks:	75.0%	8.0%	17.0%	2.00%
		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	261.30					
Heavy Trucks:	267.00 Grade Adjustment: 0.0					
Lane Equivalent Distance (in feet)						
Autos: 451.938						
Medium Trucks: 356.858						
Heavy Trucks: 356.639						

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.45	-1.20	-0.73	0.000	0.000
Medium Trucks:	76.31	-12.36	-12.91	-1.20	-6.69	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.90	-1.20	-6.90	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:	56.2	54.2	50.5	49.0	56.4	56.7
Medium Trucks:	49.8	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.4	51.9	52.2
Vehicle Noise:	58.2	56.2	52.5	51.0	58.4	58.7

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.2	54.2	50.5	49.0	56.4	56.7
Medium Trucks:	49.8	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.4	51.9	52.2
Vehicle Noise:	58.2	56.2	52.5	51.0	58.4	58.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 391.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 23.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 457.525				
Barrier Elevation: 263.8 feet		Medium Trucks: 357.387				
Road Grade: 1.0%		Heavy Trucks: 357.025				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.53	-1.20	-2.99	0.000	0.000
Medium Trucks:	76.31	-12.36	-12.92	-1.20	-13.88	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.91	-1.20	-14.23	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:	56.1	54.1	50.4	48.9	56.4	56.6
Medium Trucks:	49.8	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.4	51.9	52.2
Vehicle Noise:	58.2	56.1	52.4	50.9	58.4	58.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.1	54.1	50.4	48.9	56.4	56.6
Medium Trucks:	49.8	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.4	51.9	52.2
Vehicle Noise:	58.2	56.1	52.4	50.9	58.4	58.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 391.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 32.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 463.220				
Barrier Elevation: 263.8 feet		Medium Trucks: 358.142				
Road Grade: 1.0%		Heavy Trucks: 357.637				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.61	-1.20	-5.69	0.000	0.000
Medium Trucks:	76.31	-12.36	-12.93	-1.20	-21.40	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.92	-1.20	-21.90	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:	56.1	54.0	50.3	48.8	56.3	56.6
Medium Trucks:	49.8	47.8	44.1	42.6	50.1	50.3
Heavy Trucks:	51.7	49.6	45.9	44.4	51.9	52.2
Vehicle Noise:	58.1	56.1	52.4	50.9	58.3	58.6

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.1	54.0	50.3	48.8	56.3	56.6
Medium Trucks:	49.8	47.8	44.1	42.6	50.1	50.3
Heavy Trucks:	51.7	49.6	45.9	44.4	51.9	52.2
Vehicle Noise:	58.1	56.1	52.4	50.9	58.3	58.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 391.0 feet		Autos: 0.00				
Barrier Distance to Observer: 10.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 446.617				
Barrier Elevation: 263.8 feet		Medium Trucks: 356.555				
Road Grade: 1.0%		Heavy Trucks: 356.480				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.37	-1.20	0.18	-6.640	-9.640
Medium Trucks:	76.31	-12.36	-12.90	-1.20	-1.09	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.90	-1.20	-1.16	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:	56.3	54.2	50.5	49.1	56.5	56.8
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	58.3	56.2	52.5	51.0	58.5	58.8

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	49.6	47.6	43.9	42.4	49.9	50.2
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	55.3	53.2	49.5	48.0	55.5	55.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 381.0 feet Centerline Dist. to Observer: 391.0 feet Barrier Distance to Observer: 10.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 263.8 feet Road Elevation: 259.0 feet Barrier Elevation: 263.8 feet Road Grade: 1.0%		Autos:	75.0%	8.0%	17.0%	97.00%
		Medium Trucks:	75.0%	8.0%	17.0%	2.00%
		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
		Medium Trucks:	261.30			
		Heavy Trucks:	267.00	Grade Adjustment:	0.0	
		Lane Equivalent Distance (in feet)				
		Autos:	446.617			
		Medium Trucks:	356.555			
Heavy Trucks:	356.480					

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.37	-1.20	0.18	-6.640	-9.640
Medium Trucks:	76.31	-12.36	-12.90	-1.20	-1.09	0.000	0.000
Heavy Trucks:	81.16	-15.37	-12.90	-1.20	-1.16	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:	56.3	54.2	50.5	49.1	56.5	56.8
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	58.3	56.2	52.5	51.0	58.5	58.8

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	49.6	47.6	43.9	42.4	49.9	50.2
Medium Trucks:	49.9	47.8	44.1	42.6	50.1	50.4
Heavy Trucks:	51.7	49.6	45.9	44.5	51.9	52.2
Vehicle Noise:	55.3	53.2	49.5	48.0	55.5	55.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 381.0 feet Centerline Dist. to Observer: 401.0 feet Barrier Distance to Observer: 20.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 263.8 feet Road Elevation: 259.0 feet Barrier Elevation: 263.8 feet Road Grade: 1.0%		Autos:	75.0%	8.0%	17.0%	97.00%
		Medium Trucks:	75.0%	8.0%	17.0%	2.00%
		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
		Medium Trucks:	261.30			
		Heavy Trucks:	267.00	Grade Adjustment:	0.0	
		Lane Equivalent Distance (in feet)				
		Autos:	456.053			
		Medium Trucks:	366.594			
Heavy Trucks:	366.522					

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.50	-1.20	1.55	-11.400	-14.400
Medium Trucks:	76.31	-12.36	-13.08	-1.20	-0.54	0.000	0.000
Heavy Trucks:	81.16	-15.37	-13.08	-1.20	-0.61	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.2	54.1	50.4	48.9	56.4	56.7
Medium Trucks:	49.7	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.5	45.8	44.3	51.7	52.0
Vehicle Noise:	58.1	56.1	52.4	50.9	58.3	58.6

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	44.8	42.7	39.0	37.5	45.0	45.3
Medium Trucks:	49.7	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.5	45.8	44.3	51.7	52.0
Vehicle Noise:	54.2	52.2	48.5	47.0	54.4	54.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 381.0 feet Centerline Dist. to Observer: 401.0 feet Barrier Distance to Observer: 20.0 feet Observer Height (Above Pad): 14.0 feet Pad Elevation: 263.8 feet Road Elevation: 259.0 feet Barrier Elevation: 263.8 feet Road Grade: 1.0%		Autos:	75.0%	8.0%	17.0%	97.00%
		Medium Trucks:	75.0%	8.0%	17.0%	2.00%
		Heavy Trucks:	75.0%	8.0%	17.0%	1.00%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	261.30					
Heavy Trucks:	267.00 Grade Adjustment: 0.0					
Lane Equivalent Distance (in feet)						
Autos: 459.850						
Medium Trucks: 366.889						
Heavy Trucks: 366.676						

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.56	-1.20	0.02	-5.200	-8.200
Medium Trucks:	76.31	-12.36	-13.09	-1.20	-3.96	0.000	0.000
Heavy Trucks:	81.16	-15.37	-13.08	-1.20	-4.18	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:	56.1	54.1	50.4	48.9	56.3	56.6
Medium Trucks:	49.7	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.5	45.8	44.3	51.7	52.0
Vehicle Noise:	58.1	56.0	52.3	50.8	58.3	58.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	50.9	48.9	45.2	43.7	51.1	51.4
Medium Trucks:	49.7	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.5	45.8	44.3	51.7	52.0
Vehicle Noise:	55.5	53.5	49.8	48.3	55.8	56.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 401.0 feet		Autos: 0.00				
Barrier Distance to Observer: 20.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 23.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 465.391				
Barrier Elevation: 263.8 feet		Medium Trucks: 367.404				
Road Grade: 1.0%		Heavy Trucks: 367.052				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.64	-1.20	-0.59	0.000	0.000
Medium Trucks:	76.31	-12.36	-13.10	-1.20	-9.40	0.000	0.000
Heavy Trucks:	81.16	-15.37	-13.09	-1.20	-9.75	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:	56.0	54.0	50.3	48.8	56.2	56.5
Medium Trucks:	49.7	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.5	45.8	44.3	51.7	52.0
Vehicle Noise:	58.0	56.0	52.3	50.8	58.2	58.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.0	50.3	48.8	56.2	56.5
Medium Trucks:	49.7	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.5	45.8	44.3	51.7	52.0
Vehicle Noise:	58.0	56.0	52.3	50.8	58.2	58.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: Tustin Ave.

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 39,400 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 3,940 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 40 mph		Vehicle Mix				
Near/Far Lane Distance: 66 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 75.0% 8.0% 17.0% 97.00%				
Barrier Height: 0.0 feet		Medium Trucks: 75.0% 8.0% 17.0% 2.00%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 75.0% 8.0% 17.0% 1.00%				
Centerline Dist. to Barrier: 381.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 401.0 feet		Autos: 0.00				
Barrier Distance to Observer: 20.0 feet		Medium Trucks: 261.30				
Observer Height (Above Pad): 32.0 feet		Heavy Trucks: 267.00 Grade Adjustment: 0.0				
Pad Elevation: 263.8 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 259.0 feet		Autos: 470.991				
Barrier Elevation: 263.8 feet		Medium Trucks: 368.138				
Road Grade: 1.0%		Heavy Trucks: 367.647				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	67.36	4.50	-14.71	-1.20	-2.23	0.000	0.000
Medium Trucks:	76.31	-12.36	-13.11	-1.20	-15.78	0.000	0.000
Heavy Trucks:	81.16	-15.37	-13.10	-1.20	-16.27	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:	55.9	53.9	50.2	48.7	56.2	56.5
Medium Trucks:	49.6	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.4	45.7	44.3	51.7	52.0
Vehicle Noise:	58.0	55.9	52.2	50.7	58.2	58.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.9	53.9	50.2	48.7	56.2	56.5
Medium Trucks:	49.6	47.6	43.9	42.4	49.9	50.2
Heavy Trucks:	51.5	49.4	45.7	44.3	51.7	52.0
Vehicle Noise:	58.0	55.9	52.2	50.7	58.2	58.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 0.0 feet Barrier Type (0-Wall, 1-Berm): 0.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 203.0 feet Barrier Distance to Observer: 108.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 277.30				
		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 383.212				
		Medium Trucks: 148.842				
		Heavy Trucks: 149.151				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.37	-1.20	71.96	-19.300	-22.300
Medium Trucks:	80.82	5.62	-7.21	-1.20	-0.01	0.000	0.000
Heavy Trucks:	84.54	3.93	-7.22	-1.20	-0.31	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:	65.9	64.0	62.2	56.2	64.8	65.4
Medium Trucks:	78.0	76.5	70.2	68.6	77.1	77.3
Heavy Trucks:	80.0	78.6	69.6	70.8	79.2	79.3
Vehicle Noise:	82.3	80.8	73.3	73.0	81.4	81.5

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	46.6	44.7	42.9	36.9	45.5	46.1
Medium Trucks:	78.0	76.5	70.2	68.6	77.1	77.3
Heavy Trucks:	80.0	78.6	69.6	70.8	79.2	79.3
Vehicle Noise:	82.2	80.7	72.9	72.9	81.3	81.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 203.0 feet		Autos: 0.00				
Barrier Distance to Observer: 108.0 feet		Medium Trucks: 277.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
Pad Elevation: 267.1 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 275.0 feet		Autos: 398.479				
Barrier Elevation: 275.0 feet		Medium Trucks: 124.545				
Road Grade: 1.0%		Heavy Trucks: 120.758				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.62	-1.20	86.71	-19.400	-22.400
Medium Trucks:	80.82	5.62	-6.05	-1.20	2.58	-13.054	-16.054
Heavy Trucks:	84.54	3.93	-5.85	-1.20	1.28	-10.860	-13.860

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	55.9	64.6	65.2
Medium Trucks:	79.2	77.7	71.3	69.8	78.2	78.5
Heavy Trucks:	81.4	80.0	71.0	72.2	80.6	80.7
Vehicle Noise:	83.5	82.1	74.4	74.2	82.6	82.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.3	41.4	39.6	33.5	42.2	42.8
Medium Trucks:	63.1	61.6	55.3	53.7	62.2	62.4
Heavy Trucks:	67.6	66.1	57.1	58.4	66.7	66.8
Vehicle Noise:	68.9	67.5	59.3	59.6	68.0	68.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 203.0 feet Barrier Distance to Observer: 108.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 277.30				
		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 398.479				
		Medium Trucks: 124.545				
		Heavy Trucks: 120.758				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.62	-1.20	86.71	-19.400	-22.400
Medium Trucks:	80.82	5.62	-6.05	-1.20	2.58	-13.054	-16.054
Heavy Trucks:	84.54	3.93	-5.85	-1.20	1.28	-10.860	-13.860

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	55.9	64.6	65.2
Medium Trucks:	79.2	77.7	71.3	69.8	78.2	78.5
Heavy Trucks:	81.4	80.0	71.0	72.2	80.6	80.7
Vehicle Noise:	83.5	82.1	74.4	74.2	82.6	82.8

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.3	41.4	39.6	33.5	42.2	42.8
Medium Trucks:	63.1	61.6	55.3	53.7	62.2	62.4
Heavy Trucks:	67.6	66.1	57.1	58.4	66.7	66.8
Vehicle Noise:	68.9	67.5	59.3	59.6	68.0	68.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 203.0 feet		Autos: 0.00				
Barrier Distance to Observer: 108.0 feet		Medium Trucks: 277.30				
Observer Height (Above Pad): 14.0 feet		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
Pad Elevation: 267.1 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 275.0 feet		Autos: 397.453				
Barrier Elevation: 275.0 feet		Medium Trucks: 123.519				
Road Grade: 1.0%		Heavy Trucks: 119.732				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.61	-1.20	78.04	-19.350	-22.350
Medium Trucks:	80.82	5.62	-5.99	-1.20	1.61	-11.520	-14.520
Heavy Trucks:	84.54	3.93	-5.79	-1.20	0.64	-9.120	-12.120

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	55.9	64.6	65.2
Medium Trucks:	79.2	77.7	71.4	69.8	78.3	78.5
Heavy Trucks:	81.5	80.1	71.0	72.3	80.6	80.7
Vehicle Noise:	83.6	82.1	74.5	74.3	82.7	82.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.3	41.4	39.7	33.6	42.2	42.8
Medium Trucks:	64.7	63.2	56.9	55.3	63.8	64.0
Heavy Trucks:	69.4	67.9	58.9	60.1	68.5	68.6
Vehicle Noise:	70.6	69.2	61.0	61.4	69.8	69.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 203.0 feet		Autos: 0.00				
Barrier Distance to Observer: 108.0 feet		Medium Trucks: 277.30				
Observer Height (Above Pad): 23.0 feet		Heavy Trucks: 283.00 Grade Adjustment: 0.0				
Pad Elevation: 267.1 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 275.0 feet		Autos: 397.170				
Barrier Elevation: 275.0 feet		Medium Trucks: 123.236				
Road Grade: 1.0%		Heavy Trucks: 119.449				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.60	-1.20	70.03	-19.300	-22.300
Medium Trucks:	80.82	5.62	-5.98	-1.20	0.87	-9.910	-12.910
Heavy Trucks:	84.54	3.93	-5.78	-1.20	0.21	-6.870	-9.870

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	56.0	64.6	65.2
Medium Trucks:	79.3	77.8	71.4	69.8	78.3	78.5
Heavy Trucks:	81.5	80.1	71.0	72.3	80.6	80.8
Vehicle Noise:	83.6	82.1	74.5	74.3	82.7	82.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.4	41.5	39.7	33.7	42.3	42.9
Medium Trucks:	66.3	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	71.6	70.2	61.2	62.4	70.8	70.9
Vehicle Noise:	72.8	71.3	63.1	63.5	71.9	72.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 203.0 feet Barrier Distance to Observer: 108.0 feet Observer Height (Above Pad): 32.0 feet Pad Elevation: 267.1 feet Road Elevation: 275.0 feet Barrier Elevation: 275.0 feet Road Grade: 1.0%		Autos:	77.5%	12.9%	9.6%	41.00%
		Medium Trucks:	84.8%	4.9%	10.3%	35.17%
		Heavy Trucks:	86.5%	2.7%	10.8%	23.83%
		Noise Source Elevations (in feet)				
		Autos:	0.00			
Medium Trucks:	277.30					
Heavy Trucks:	283.00	Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos:	397.636			
		Medium Trucks:	123.701			
		Heavy Trucks:	119.915			

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.61	-1.20	62.71	-19.227	-22.227
Medium Trucks:	80.82	5.62	-6.00	-1.20	0.35	-7.750	-10.750
Heavy Trucks:	84.54	3.93	-5.80	-1.20	0.02	-5.200	-8.200

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	55.9	64.6	65.2
Medium Trucks:	79.2	77.7	71.4	69.8	78.3	78.5
Heavy Trucks:	81.5	80.0	71.0	72.3	80.6	80.7
Vehicle Noise:	83.6	82.1	74.5	74.3	82.7	82.9

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	43.4	41.5	39.8	33.7	42.3	42.9
Medium Trucks:	68.5	67.0	60.6	59.1	67.5	67.8
Heavy Trucks:	73.3	71.8	62.8	64.1	72.4	72.5
Vehicle Noise:	74.5	73.1	64.9	65.3	73.6	73.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 0.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 0.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 233.0 feet		Autos: 0.00				
Barrier Distance to Observer: 138.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 266.4 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 412.198				
Barrier Elevation: 274.0 feet		Medium Trucks: 180.030				
Road Grade: 1.0%		Heavy Trucks: 180.276				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-13.85	-1.20	85.30	-19.400	-22.400
Medium Trucks:	80.82	5.62	-8.45	-1.20	-0.01	0.000	0.000
Heavy Trucks:	84.54	3.93	-8.46	-1.20	-0.38	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.8	55.7	64.3	64.9
Medium Trucks:	76.8	75.3	68.9	67.4	75.8	76.1
Heavy Trucks:	78.8	77.4	68.4	69.6	78.0	78.1
Vehicle Noise:	81.0	79.6	72.1	71.7	80.2	80.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	46.0	44.1	42.4	36.3	44.9	45.5
Medium Trucks:	76.8	75.3	68.9	67.4	75.8	76.1
Heavy Trucks:	78.8	77.4	68.4	69.6	78.0	78.1
Vehicle Noise:	80.9	79.5	71.7	71.6	80.0	80.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Backyard With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 233.0 feet Barrier Distance to Observer: 138.0 feet Observer Height (Above Pad): 5.0 feet Pad Elevation: 266.4 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 427.160				
		Medium Trucks: 154.225				
		Heavy Trucks: 150.438				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-14.08	-1.20	99.75	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.44	-1.20	2.29	-12.677	-15.677
Heavy Trucks:	84.54	3.93	-7.28	-1.20	1.04	-10.380	-13.380

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.5	64.1	64.7
Medium Trucks:	77.8	76.3	69.9	68.4	76.8	77.1
Heavy Trucks:	80.0	78.6	69.5	70.8	79.1	79.3
Vehicle Noise:	82.1	80.7	73.1	72.8	81.2	81.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.8	40.9	39.1	33.1	41.7	42.3
Medium Trucks:	62.1	60.6	54.3	52.7	61.2	61.4
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	67.9	66.5	58.4	58.7	67.1	67.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: First Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 233.0 feet		Autos: 0.00				
Barrier Distance to Observer: 138.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 5.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 266.4 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 427.160				
Barrier Elevation: 274.0 feet		Medium Trucks: 154.225				
Road Grade: 1.0%		Heavy Trucks: 150.438				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-14.08	-1.20	99.75	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.44	-1.20	2.29	-12.677	-15.677
Heavy Trucks:	84.54	3.93	-7.28	-1.20	1.04	-10.380	-13.380

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.5	64.1	64.7
Medium Trucks:	77.8	76.3	69.9	68.4	76.8	77.1
Heavy Trucks:	80.0	78.6	69.5	70.8	79.1	79.3
Vehicle Noise:	82.1	80.7	73.1	72.8	81.2	81.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.8	40.9	39.1	33.1	41.7	42.3
Medium Trucks:	62.1	60.6	54.3	52.7	61.2	61.4
Heavy Trucks:	66.6	65.2	56.2	57.4	65.8	65.9
Vehicle Noise:	67.9	66.5	58.4	58.7	67.1	67.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Second Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet						
Site Data		VehicleType	Day	Evening	Night	Daily
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 233.0 feet Barrier Distance to Observer: 138.0 feet Observer Height (Above Pad): 14.0 feet Pad Elevation: 266.4 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Autos: 77.5% 12.9% 9.6% 41.00%				
		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 426.374				
		Medium Trucks: 153.439				
		Heavy Trucks: 149.653				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-14.07	-1.20	91.68	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.41	-1.20	1.54	-11.380	-14.380
Heavy Trucks:	84.54	3.93	-7.25	-1.20	0.56	-8.800	-11.800

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.5	64.1	64.7
Medium Trucks:	77.8	76.3	70.0	68.4	76.9	77.1
Heavy Trucks:	80.0	78.6	69.6	70.8	79.2	79.3
Vehicle Noise:	82.2	80.7	73.1	72.9	81.3	81.4

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.8	40.9	39.1	33.1	41.7	42.3
Medium Trucks:	63.5	61.9	55.6	54.0	62.5	62.7
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	69.5	68.0	59.9	60.2	68.6	68.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Third Floor With Wall
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
Barrier Type (0-Wall, 1-Berm): 14.0		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
Centerline Dist. to Barrier: 95.0 feet		Noise Source Elevations (in feet)				
Centerline Dist. to Observer: 233.0 feet		Autos: 0.00				
Barrier Distance to Observer: 138.0 feet		Medium Trucks: 276.30				
Observer Height (Above Pad): 23.0 feet		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
Pad Elevation: 266.4 feet		Lane Equivalent Distance (in feet)				
Road Elevation: 274.0 feet		Autos: 426.172				
Barrier Elevation: 274.0 feet		Medium Trucks: 153.237				
Road Grade: 1.0%		Heavy Trucks: 149.451				

FHWA Noise Model Calculations							
VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-14.06	-1.20	84.11	-19.400	-22.400
Medium Trucks:	80.82	5.62	-7.40	-1.20	0.93	-10.090	-13.090
Heavy Trucks:	84.54	3.93	-7.24	-1.20	0.23	-7.010	-10.010

Unmitigated Noise Levels (without Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.5	64.1	64.7
Medium Trucks:	77.8	76.3	70.0	68.4	76.9	77.1
Heavy Trucks:	80.0	78.6	69.6	70.8	79.2	79.3
Vehicle Noise:	82.2	80.7	73.1	72.9	81.3	81.5

Mitigated Noise Levels (with Topo and barrier attenuation)						
VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.8	40.9	39.1	33.1	41.7	42.3
Medium Trucks:	64.7	63.2	56.9	55.3	63.8	64.0
Heavy Trucks:	70.0	68.6	59.6	60.8	69.2	69.3
Vehicle Noise:	71.2	69.7	61.5	61.9	70.3	70.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - v5/13/24

Scenario: Rooftop Balconies
Road Name: SR-55

Project Name: Best Buy Orange
Job Number: 16438
Analyst: N. Johnson

SITE SPECIFIC INPUT DATA		NOISE MODEL INPUTS				
Highway Data		Site Conditions (Hard = 10, Soft = 15)				
Average Daily Traffic (Adt): 211,000 vehicles		Autos: 15				
Peak Hour Percentage: 10.00%		Medium Trucks (2 Axles): 15				
Peak Hour Volume: 21,100 vehicles		Heavy Trucks (3+ Axles): 15				
Vehicle Speed: 60 mph		Vehicle Mix				
Near/Far Lane Distance: 94 feet		VehicleType	Day	Evening	Night	Daily
Site Data		Autos: 77.5% 12.9% 9.6% 41.00%				
Barrier Height: 14.0 feet Barrier Type (0-Wall, 1-Berm): 14.0 Centerline Dist. to Barrier: 95.0 feet Centerline Dist. to Observer: 233.0 feet Barrier Distance to Observer: 138.0 feet Observer Height (Above Pad): 32.0 feet Pad Elevation: 266.4 feet Road Elevation: 274.0 feet Barrier Elevation: 274.0 feet Road Grade: 1.0%		Medium Trucks: 84.8% 4.9% 10.3% 35.17%				
		Heavy Trucks: 86.5% 2.7% 10.8% 23.83%				
		Noise Source Elevations (in feet)				
		Autos: 0.00				
		Medium Trucks: 276.30				
		Heavy Trucks: 282.00 Grade Adjustment: 0.0				
		Lane Equivalent Distance (in feet)				
		Autos: 426.556				
		Medium Trucks: 153.622				
		Heavy Trucks: 149.835				

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	74.19	6.28	-14.07	-1.20	77.04	-19.350	-22.350
Medium Trucks:	80.82	5.62	-7.42	-1.20	0.48	-8.400	-11.400
Heavy Trucks:	84.54	3.93	-7.25	-1.20	0.04	-5.400	-8.400

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.5	64.1	64.7
Medium Trucks:	77.8	76.3	70.0	68.4	76.9	77.1
Heavy Trucks:	80.0	78.6	69.6	70.8	79.2	79.3
Vehicle Noise:	82.2	80.7	73.1	72.9	81.3	81.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	42.9	41.0	39.2	33.1	41.8	42.4
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	71.6	70.2	61.2	62.4	70.8	70.9
Vehicle Noise:	72.8	71.3	63.1	63.5	71.9	72.0

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APPENDIX 7.2:

INTERIOR NOISE LEVEL REDUCTION CALCULATIONS

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INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 2

Analyst: N. Johnson

Room: Den

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	266.0	44	25	42	44	46	49	54	0.8412	0.0168	0.0106	0.0067	0.0033	0.0011
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	40.0	33	23	24	29	34	37	37	0.2005	0.1592	0.0504	0.0159	0.0080	0.0080
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		306								0.0034	0.0006	0.0002	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										24.68	32.40	37.01	41.31	44.31	45.30

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	288.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	43.20	48.96	34.56	92.2	149.8	86.4
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	288.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	28.80	23.04	14.40	8.64	8.64	8.64
Walls - Drywall	David Harris p. 348	612.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	61.20	48.96	30.60	18.36	18.36	18.36
Totals		1188								133.2	120.96	79.56	119.16	176.76	113.4
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.61	-4.03	-5.85	-4.10	-2.38	-4.31

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.07	22.37	25.16	31.22	35.93	34.98
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.17	30.97	28.36	31.22	34.73	33.98
Noise Reduction (dBA)	31.04	30.85	28.23	31.09	34.61	33.86

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 2

Analyst: N. Johnson

Room: Living

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	284.0	46	27	42	44	46	49	54	0.5667	0.0179	0.0113	0.0071	0.0036	0.0011
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	40.0	33	23	24	29	34	37	37	0.2005	0.1592	0.0504	0.0159	0.0080	0.0080
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		324								0.0024	0.0005	0.0002	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										26.26	32.62	37.21	41.48	44.48	45.51

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	323.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	48.45	54.91	38.76	103.36	168.0	96.90
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	323.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	32.30	25.84	16.15	9.69	9.69	9.69
Walls - Drywall	David Harris p. 348	648.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	64.80	51.84	32.40	19.44	19.44	19.44
Totals		1294								145.55	132.59	87.31	132.49	197.09	126.03
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.48	-3.88	-5.69	-3.88	-2.16	-4.10

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	16.78	22.74	25.51	31.59	36.32	35.41
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	32.88	31.34	28.71	31.59	35.12	34.41
Noise Reduction (dBA)	32.76	31.22	28.59	31.47	34.99	34.28

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 2

Analyst: N. Johnson

Room: Bdrm. 1

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	222.0	46	27	42	44	46	49	54	0.4429	0.0140	0.0088	0.0056	0.0028	0.0009
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	30.0	33	23	24	29	34	37	37	0.1504	0.1194	0.0378	0.0119	0.0060	0.0060
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		252								0.0024	0.0005	0.0002	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										26.28	32.76	37.33	41.58	44.58	45.64

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	195.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	29.3	33.2	23.4	62.4	101.4	58.5
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	195.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	19.50	15.60	9.75	5.85	5.85	5.85
Walls - Drywall	David Harris p. 348	504.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	50.40	40.32	25.20	15.12	15.12	15.12
Totals		894								99.15	89.07	58.35	83.37	122.37	79.47
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.05	-4.52	-6.35	-4.80	-3.14	-5.01

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	16.23	22.24	24.98	30.77	35.44	34.63
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	32.33	30.84	28.18	30.77	34.24	33.63
Noise Reduction (dBA)	32.21	30.72	28.05	30.65	34.12	33.51

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 4

Analyst: N. Johnson

Room: Bdrm. 2

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	192.0	46	27	42	44	46	49	54	0.3831	0.0121	0.0076	0.0048	0.0024	0.0008
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	Harris pg.5.66	24.0	38	29	33	36	37	41	51	0.0302	0.0120	0.0060	0.0048	0.0019	0.0002
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		216								0.0019	0.0001	0.0001	0.0000	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										27.18	39.52	41.99	43.52	46.99	53.54

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	143.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	21.45	24.31	17.16	45.76	74.36	42.90
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	143.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	14.30	11.44	7.15	4.29	4.29	4.29
Walls - Drywall	David Harris p. 348	432.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	43.20	34.56	21.60	12.96	12.96	12.96
Totals		718								78.95	70.31	45.91	63.01	91.61	60.15
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.37	-4.87	-6.73	-5.35	-3.73	-5.55

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	16.81	28.64	29.26	32.17	37.26	41.99
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	32.91	37.24	32.46	32.17	36.06	40.99
Noise Reduction (dBA)	32.79	37.12	32.34	32.04	35.94	40.87

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 2

Analyst: N. Johnson

Room: Den

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	266.0	44	25	42	44	46	49	54	0.8412	0.0168	0.0106	0.0067	0.0033	0.0011
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	40.0	27	21	17	25	32	37	38	0.3177	0.7981	0.1265	0.0252	0.0080	0.0063
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		306								0.0038	0.0027	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										24.22	25.75	33.49	39.82	44.31	46.17

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	288.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	43.20	48.96	34.56	92.2	149.8	86.4
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	288.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	28.80	23.04	14.40	8.64	8.64	8.64
Walls - Drywall	David Harris p. 348	612.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	61.20	48.96	30.60	18.36	18.36	18.36
Totals		1188								133.2	120.96	79.56	119.16	176.76	113.4
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.61	-4.03	-5.85	-4.10	-2.38	-4.31

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	14.60	15.72	21.64	29.72	35.93	35.85
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	30.70	24.32	24.84	29.72	34.73	34.85
Noise Reduction (dBA)	30.58	24.19	24.71	29.60	34.61	34.73

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 2

Analyst: N. Johnson

Room: Living

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	284.0	46	27	42	44	46	49	54	0.5667	0.0179	0.0113	0.0071	0.0036	0.0011
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	40.0	27	21	17	25	32	37	38	0.3177	0.7981	0.1265	0.0252	0.0080	0.0063
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		324								0.0027	0.0025	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.64	25.99	33.71	40.00	44.48	46.37

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	323.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	48.45	54.91	38.76	103.36	168.0	96.90
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	323.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	32.30	25.84	16.15	9.69	9.69	9.69
Walls - Drywall	David Harris p. 348	648.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	64.80	51.84	32.40	19.44	19.44	19.44
Totals		1294								145.55	132.59	87.31	132.49	197.09	126.03
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.48	-3.88	-5.69	-3.88	-2.16	-4.10

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	16.16	16.11	22.02	30.12	36.32	36.27
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	32.26	24.71	25.22	30.12	35.12	35.27
Noise Reduction (dBA)	32.14	24.58	25.09	30.00	34.99	35.15

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 2

Analyst: N. Johnson

Room: Bdrm. 1

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	222.0	46	27	42	44	46	49	54	0.4429	0.0140	0.0088	0.0056	0.0028	0.0009
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	30.0	27	21	17	25	32	37	38	0.2383	0.5986	0.0949	0.0189	0.0060	0.0048
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		252								0.0027	0.0024	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.68	26.14	33.86	40.12	44.58	46.50

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	195.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	29.3	33.2	23.4	62.4	101.4	58.5
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	195.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	19.50	15.60	9.75	5.85	5.85	5.85
Walls - Drywall	David Harris p. 348	504.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	50.40	40.32	25.20	15.12	15.12	15.12
Totals		894								99.15	89.07	58.35	83.37	122.37	79.47
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.05	-4.52	-6.35	-4.80	-3.14	-5.01

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.63	15.63	21.50	29.32	35.44	35.49
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.73	24.23	24.70	29.32	34.24	34.49
Noise Reduction (dBA)	31.60	24.10	24.58	29.19	34.12	34.37

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 3

Analyst: N. Johnson

Room: Bdrm. 4

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	192.0	46	27	42	44	46	49	54	0.3831	0.0121	0.0076	0.0048	0.0024	0.0008
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	24.0	27	21	17	25	32	37	38	0.1906	0.4789	0.0759	0.0151	0.0048	0.0038
Glass Doors	Milgard	0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		216								0.0027	0.0023	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.76	26.43	34.13	40.34	44.77	46.75

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	140.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	21.00	23.80	16.80	44.80	72.80	42.00
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	140.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	14.00	11.20	7.00	4.20	4.20	4.20
Walls - Drywall	David Harris p. 348	432.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	43.20	34.56	21.60	12.96	12.96	12.96
Totals		712								78.2	69.56	45.4	61.96	89.96	59.16
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.41	-4.92	-6.77	-5.42	-3.80	-5.62

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.34	15.51	21.35	28.92	34.96	35.12
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.44	24.11	24.55	28.92	33.76	34.12
Noise Reduction (dBA)	31.32	23.99	24.43	28.79	33.64	34.00

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 3

Analyst: N. Johnson

Room: Kitchen

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	245.0	46	27	42	44	46	49	54	0.4888	0.0155	0.0098	0.0062	0.0031	0.0010
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	16.0	27	21	17	25	32	37	38	0.1271	0.3192	0.0506	0.0101	0.0032	0.0025
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		261								0.0024	0.0013	0.0002	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										26.27	28.92	36.36	42.06	46.19	48.71

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	198.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	29.70	33.66	23.76	63.36	102.96	59.40
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	198.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	19.80	15.84	9.90	5.94	5.94	5.94
Walls - Drywall	David Harris p. 348	522.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	52.20	41.76	26.10	15.66	15.66	15.66
Totals		918								101.7	91.26	59.76	84.96	124.56	81
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.09	-4.56	-6.40	-4.87	-3.21	-5.08

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	16.18	18.36	23.96	31.18	36.98	37.63
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	32.28	26.96	27.16	31.18	35.78	36.63
Noise Reduction (dBA)	32.15	26.83	27.03	31.06	35.65	36.51

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 3

Analyst: N. Johnson

Room: Bdrm. 3

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	191.0	46	27	42	44	46	49	54	0.3811	0.0121	0.0076	0.0048	0.0024	0.0008
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	16.0	27	21	17	25	32	37	38	0.1271	0.3192	0.0506	0.0101	0.0032	0.0025
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		207								0.0025	0.0016	0.0003	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										26.10	27.96	35.51	41.43	45.68	47.98

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	132.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	19.80	22.44	15.84	42.24	68.64	39.60
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	132.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	13.20	10.56	6.60	3.96	3.96	3.96
Walls - Drywall	David Harris p. 348	414.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	41.40	33.12	20.70	12.42	12.42	12.42
Totals		678								74.4	66.12	43.14	58.62	85.02	55.98
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.44	-4.96	-6.81	-5.48	-3.86	-5.68

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.66	17.00	22.70	29.95	35.82	36.30
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.76	25.60	25.90	29.95	34.62	35.30
Noise Reduction (dBA)	31.63	25.48	25.77	29.83	34.49	35.18

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 4

Analyst: N. Johnson

Room: Den

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	218.0	46	27	42	44	46	49	54	0.4350	0.0138	0.0087	0.0055	0.0027	0.0009
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	35.0	27	21	17	25	32	37	38	0.2780	0.6983	0.1107	0.0221	0.0070	0.0055
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows	Milgard	35.0	27	21	15	25	35	41	28	0.2780	1.1068	0.1107	0.0111	0.0028	0.0028
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		288								0.0034	0.0063	0.0008	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										24.63	22.00	30.98	38.72	43.62	44.96

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	255.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	38.25	43.35	30.60	81.60	132.60	76.50
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	255.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	25.50	20.40	12.75	7.65	7.65	7.65
Walls - Drywall	David Harris p. 348	576.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	57.60	46.08	28.80	17.28	17.28	17.28
Totals		1086								121.35	109.83	72.15	106.53	157.53	101.43
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.75	-4.19	-6.01	-4.32	-2.62	-4.53

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	14.88	11.81	18.96	28.41	35.00	34.43
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	30.98	20.41	22.16	28.41	33.80	33.43
Noise Reduction (dBA)	30.85	20.28	22.04	28.28	33.68	33.30

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 4

Analyst: N. Johnson

Room: Kitchen

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	191.0	46	27	42	44	46	49	54	0.3811	0.0121	0.0076	0.0048	0.0024	0.0008
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	16.0	27	21	17	25	32	37	38	0.1271	0.3192	0.0506	0.0101	0.0032	0.0025
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		207								0.0025	0.0016	0.0003	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										26.10	27.96	35.51	41.43	45.68	47.98

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	130.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	19.50	22.10	15.60	41.60	67.60	39.00
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	130.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	13.00	10.40	6.50	3.90	3.90	3.90
Walls - Drywall	David Harris p. 348	414.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	41.40	33.12	20.70	12.42	12.42	12.42
Totals		674								73.9	65.62	42.8	57.92	83.92	55.32
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.47	-4.99	-6.85	-5.53	-3.92	-5.73

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.63	16.97	22.67	29.90	35.76	36.25
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.73	25.57	25.87	29.90	34.56	35.25
Noise Reduction (dBA)	31.60	25.44	25.74	29.77	34.43	35.12

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 4

Analyst: N. Johnson

Room: Bdrm. 2

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	192.0	46	27	42	44	46	49	54	0.3831	0.0121	0.0076	0.0048	0.0024	0.0008
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	24.0	27	21	17	25	32	37	38	0.1906	0.4789	0.0759	0.0151	0.0048	0.0038
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		216								0.0027	0.0023	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.76	26.43	34.13	40.34	44.77	46.75

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	143.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	21.45	24.31	17.16	45.76	74.36	42.90
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	143.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	14.30	11.44	7.15	4.29	4.29	4.29
Walls - Drywall	David Harris p. 348	432.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	43.20	34.56	21.60	12.96	12.96	12.96
Totals		718								78.95	70.31	45.91	63.01	91.61	60.15
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-4.37	-4.87	-6.73	-5.35	-3.73	-5.55

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.39	15.56	21.40	28.99	35.04	35.19
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.49	24.16	24.60	28.99	33.84	34.19
Noise Reduction (dBA)	31.36	24.03	24.48	28.87	33.72	34.07

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 5

Analyst: N. Johnson

Room: Den

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	258.0	46	27	42	44	46	49	54	0.5148	0.0163	0.0103	0.0065	0.0032	0.0010
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	30.0	27	21	17	25	32	37	38	0.2383	0.5986	0.0949	0.0189	0.0060	0.0048
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		288								0.0026	0.0021	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.83	26.71	34.38	40.54	44.94	46.97

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	255.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	38.25	43.35	30.60	81.60	132.60	76.50
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	255.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	25.50	20.40	12.75	7.65	7.65	7.65
Walls - Drywall	David Harris p. 348	576.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	57.60	46.08	28.80	17.28	17.28	17.28
Totals		1086								121.35	109.83	72.15	106.53	157.53	101.43
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.75	-4.19	-6.01	-4.32	-2.62	-4.53

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	16.07	16.52	22.36	30.22	36.32	36.44
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	32.17	25.12	25.56	30.22	35.12	35.44
Noise Reduction (dBA)	32.05	24.99	25.44	30.10	34.99	35.32

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 5

Analyst: N. Johnson

Room: Living

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	248.0	46	27	42	44	46	49	54	0.4948	0.0156	0.0099	0.0062	0.0031	0.0010
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	40.0	27	21	17	25	32	37	38	0.3177	0.7981	0.1265	0.0252	0.0080	0.0063
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		288								0.0028	0.0028	0.0005	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.50	25.49	33.25	39.62	44.14	45.94

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	255.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	38.25	43.35	30.60	81.60	132.60	76.50
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	255.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	25.50	20.40	12.75	7.65	7.65	7.65
Walls - Drywall	David Harris p. 348	576.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	57.60	46.08	28.80	17.28	17.28	17.28
Totals		1086								121.35	109.83	72.15	106.53	157.53	101.43
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.75	-4.19	-6.01	-4.32	-2.62	-4.53

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.74	15.30	21.24	29.30	35.52	35.41
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.84	23.90	24.44	29.30	34.32	34.41
Noise Reduction (dBA)	31.72	23.78	24.31	29.17	34.19	34.29

INTERIOR NOISE REDUCTIONS

Project Name: Best Buy Orange

Job Number: 16438

Floor Plan: Plan 5

Analyst: N. Johnson

Room: Bdrm. 1

(1) Transmission Loss Calculations (Exterior Wall)

Exterior Wall Assembly	Source	Wall Area	STC	Transmission Loss (dB) by Frequency (Hz)						Fractional Area S/(10^(TL/10))					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Standard	David Harris p. 371	240.0	46	27	42	44	46	49	54	0.4789	0.0151	0.0096	0.0060	0.0030	0.0010
Slider Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hung Windows	ABC	30.0	27	21	17	25	32	37	38	0.2383	0.5986	0.0949	0.0189	0.0060	0.0048
Glass Doors		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fixed Windows		0.0	0	0	0	0	0	0	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
										0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Totals		270								0.0027	0.0023	0.0004	0.0001	0.0000	0.0000
Composite Exterior Wall Sound Transmission Loss 10*LOG(1/t)										25.76	26.43	34.13	40.34	44.77	46.75

(2) Room Effects (Absorption)

Room Surface/ Material	Source	Area	NRC	Absorption Coefficients by Frequency (Hz)						Absorption (Sabins)					
				125	250	500	1000	2000	4000	125	250	500	1000	2000	4000
Floor - Carpet	David Harris p. 347	221.0	0.30	0.15	0.17	0.12	0.32	0.52	0.30	33.15	37.57	26.52	70.72	114.92	66.30
Floor - Vinyl	David Harris p. 347	0.0	0.05	0.02	0.03	0.05	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Ceiling - Drywall	David Harris p. 348	221.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	22.10	17.68	11.05	6.63	6.63	6.63
Walls - Drywall	David Harris p. 348	540.0	0.50	0.10	0.08	0.05	0.03	0.03	0.03	54.00	43.20	27.00	16.20	16.20	16.20
Totals		982								109.25	98.45	64.57	93.55	137.75	89.13
Room Effect	10*log (Room Absorption in Sabins)/(Exterior Wall Area)									-3.93	-4.38	-6.21	-4.60	-2.92	-4.81

(3) Adjustment Factor

Sound Source Adjustment Factor	-6.00	-6.00	-6.00	-6.00	-6.00	-6.00
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(4) Calculated Interior Noise Reduction (dBA)

	125	250	500	1000	2000	4000
(Transmission Loss + Room Effects + Adjustment Factor)	15.83	16.05	21.91	29.74	35.85	35.93
Octave Band Frequency Correction Factors for A-Weighted Sound Levels	16.10	8.60	3.20	0.00	-1.20	-1.00
A-Weighted Sound Levels	31.93	24.65	25.11	29.74	34.65	34.93
Noise Reduction (dBA)	31.80	24.53	24.99	29.61	34.52	34.81

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APPENDIX 9.1:

HVAC

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24SCA4
Comfort™ Series Single-Stage Air Conditioner
with Puron® Refrigerant
1-1/2 To 5 Tons



Turn to the experts

Product Data



This unit has been designed utilizing Carrier's Puron refrigerant. The environmentally sound refrigerant allows you to make a responsible decision in the protection of the earth's ozone layer.

NOTE: Ratings contained in this document are subject to change at any time. Always refer to the AHRI directory (www.ahridirectory.org) for the most up-to-date ratings information.

Industry leading Features / Benefits

Efficiency

- 13.4 - 16.0 SEER2 (13.5 - 16.5 SEER) / 11.0 - 13.5 EER2 (11.0 - 14.5 EER)
- Microtube Technology refrigeration system
- Indoor air quality accessories available

Reliability

- Puron refrigerant - environmentally sound, won't deplete the ozone layer and low lifetime service cost.
- Scroll compressor
- Internal pressure relief valve
- Internal thermal overload
- Filter drier

Durability

WeatherArmor™ Protection Package:

- Solid, durable sheet metal construction
- Dense wire coil guard

Applications

- Long-line – up to 250 feet (76.20 m) total equivalent length, up to 200 feet (60.96 m) condenser above evaporator, or up to 80 ft. (24.4 m) evaporator above condenser (See Long Line Guide for more information.)
- Low ambient cooling (down to 0°F / -18°C) with approved low ambient accessory kits.

STANDARD FEATURES

Features	18	24	30	36	42	48	60
Puron Refrigerant	X	X	X	X	X	X	X
SEER2 (Range depending on indoor combination)	13.4 - 16.0	13.4 - 16.0	13.4 - 16.0	13.4 - 15.0	13.4 - 15.5	13.4 - 15.2	13.4 - 14.0
Scroll Compressor	X	X	X	X	X	X	X
Field Installed Filter Drier	X	X	X	X	X	X	X
Front Seating Service Valves	X	X	X	X	X	X	X
Internal Pressure Relief Valve	X	X	X	X	X	X	X
Internal Thermal Overload	X	X	X	X	X	X	X
Long Line Capability	X	X	X	X	X	X	X
Low Ambient Capability with Kit	X	X	X	X	X	X	X

Model Number Nomenclature

1	2	3	4	5	6	7	8	9	10	11	12
N	N	A	A	A/N	N	N	N	A/N	A/N	A/N	N
2	4	S	C	A	4	1	8	N	0	0	3
Product Series	Design Type	Tier	Major Series	SEER2	Cooling Capacity	Region	Feature	Special Feature	Voltage		
24 = R-410A AC	S = Single Stage AC	C = Comfort Series	A=Initial	4 = 13.4 SEER2	1,000 Btuh (nominal)	N = Standard North AC	0=Standard	0=Standard	3=208/230-1		

CATALOG ORDERING NUMBERS

Size	Model Number
18	24SCA418N003
24	24SCA424N003
30	24SCA430N003
36	24SCA436N003
42	24SCA442N003
48	24SCA448N003
60	24SCA460N003



Physical Data

UNIT SIZE	18	24	30	36	42	48	60
Compressor Type	Scroll						
REFRIGERANT	Puron® (R-410A)						
Control	TXV (Puron Hard Shutoff)						
Factory Charge lb (kg)*	5.5 (2.49)	4.40 (2.00)	6.00 (2.72)	5.20 (2.36)	7.90 (3.58)	8.90 (4.04)	9.10 (4.13)
COND FAN	Propeller Type, Direct Drive						
Air Discharge	Vertical						
Air Qty (CFM)	1600	1800	2500	2750	4100	3850	4000
Motor HP	1/12	1/12	1/10	1/5	1/4	1/4	1/4
Motor RPM	1100	1100	1100	1100	1100	1100	1100
COND COIL							
Face Area (Sq ft)	8.4	9.8	17.1	12.9	23.6	15.0	19.3
Fins per In.	25	25	25	20	25	20	20
Rows	1	1	1	1	1	2	2
Circuits	3	5	4	5	7	6	9
VALVE CONNECT. (In. ID)							
Vapor	3/4	3/4	3/4	7/8	7/8	7/8	7/8
Liquid	3/8"						
REFRIGERANT TUBES* (In. OD)							
Rated Vapor†	3/4	3/4	3/4	7/8	7/8	7/8	1-1/8
Rated Liquid Line‡	3/8"						

*.For 15 ft. lineset

†.Units are rated with 25 ft (7.6 m) of lineset length. See Vapor Line Sizing and Cooling Capacity Loss table when using other sizes and lengths of lineset.

‡.See Liquid Line Sizing For Cooling Only Systems with Puron Refrigerant tables.

Note: See unit Installation Instruction for proper installation.

REFRIGERANT PIPING LENGTH LIMITATIONS

Liquid Line Sizing and Maximum Total Equivalent Lengths for Cooling Only Systems with Puron® Refrigerant:

The maximum allowable length of a residential split system depends on the liquid line diameter and vertical separation between indoor and outdoor units.

See Table below for liquid line sizing and maximum lengths :

Table 1 – Maximum Total Equivalent Length *
Outdoor Unit BELOW Indoor Unit

Size	Liquid Line Connection	Liquid Line Diam. w/ TXV	AC with Puron Refrigerant Maximum Total Equivalent Length†: Outdoor unit BELOW Indoor Vertical Separation ft (m)								
			0-5 (0-1.5)	6-10 (1.8-3.0)	11-20 (3.4-6.1)	21-30 (6.4-9.1)	31-40 (9.4-12.2)	41-50 (12.5-15.2)	51-60 (15.5-18.3)	61-70 (18.6-21.3)	71-80 (21.6-24.4)
18000	3/8	1/4	150	150	125	100	100	75	--	--	--
		5/16	250*	250*	250*	250*	250*	250*	250*	225*	150
		3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
24000	3/8	1/4	75	75	75	50	50	--	--	--	--
		5/16	250*	250*	250*	250*	250*	225*	175	125	100
		3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
30000	3/8	1/4	30	--	--	--	--	--	--	--	--
		5/16	175	225*	200	175	125	100	75	--	--
		3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
36000	3/8	5/16	175	150	150	100	100	100	75	--	--
		3/8	250*	250*	250*	250*	250*	250*	250*	250*	250*
42000	3/8	5/16	125	100	100	75	75	50	--	--	--
		3/8	250*	250*	250*	250*	250*	250*	250*	250*	150
48000	3/8	3/8	250*	250*	250*	250*	250*	250*	230	160	--
60000	3/8	3/8	250*	250*	250*	225*	190	150	110	--	--

*.Maximum actual length not to exceed 200 ft (61 m)

†.Total equivalent length accounts for losses due to elbows or fitting. See the Long Line Guideline for details.

-- = outside acceptable range

Table 2 – Maximum * Total Equivalent Length
Outdoor Unit ABOVE Indoor Unit

Size	Liquid Line Connection	Liquid Line Diam. w/ TXV	AC with Puron Refrigerant Maximum Total Equivalent Length†: Outdoor unit ABOVE Indoor Vertical Separation ft (m)							
			25 (7.6)	26-50 (7.9-15.2)	51-75 (15.5-22.9)	76-100 (23.2-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-53.3)	176-200 (53.6-61.0)
18000	3/8	1/4	175	250*	250*	250*	250*	250*	250*	250*
		5/16	250*	250*	250*	250*	250*	250*	250*	250*
		3/8	250*	250*	250*	250*	250*	250*	250*	250*
24000	3/8	1/4	100	125	175	200	225*	250*	250*	250*
		5/16	250*	250*	250*	250*	250*	250*	250*	250*
		3/8	250*	250*	250*	250*	250*	250*	250*	250*
30000	3/8	1/4	30	--	--	--	--	--	--	--
		5/16	250*	250*	250*	250*	250*	250*	250*	250*
		3/8	250*	250*	250*	250*	250*	250*	250*	250*
36000	3/8	5/16	225*	250*	250*	250*	250*	250*	250*	250*
		3/8	250*	250*	250*	250*	250*	250*	250*	250*
42000	3/8	5/16	175	200	250*	250*	250*	250*	250*	250*
		3/8	250*	250*	250*	250*	250*	250*	250*	250*
48000	3/8	3/8	250*	250*	250*	250*	250*	250*	250*	250*
60000	3/8	3/8	250*	250*	250*	250*	250*	250*	250*	250*

*.Maximum actual length not to exceed 200 ft (61 m)

†.Total equivalent length accounts for losses due to elbows or fitting. See the Long Line Guideline for details.

-- = Outside acceptable range

Table 3 – Refrigerant Charge Adjustments

Liquid Line Size	Puron Charge oz/ft (g/m)
3/8	0.60 (17.74) (Factory charge for lineset = 9 oz / 266.16 g)
5/16	0.40 (11.83)
1/4	0.27 (7.98)

Units are factory charged for 15 ft (4.6 m) of 3/8" liquid line. The factory charge for 3/8" lineset 9 oz.(266.16 g). When using other length or diameter liquid lines, charge adjustments are required per the chart above.

Charging Formula:

$[(\text{Lineset oz/ft} \times \text{total length}) - (\text{factory charge for lineset})] = \text{charge adjustment}$

Example 1: System has 15 ft of lineset* using existing 1/4" liquid line. What charge adjustment is required?

Formula: $(.27 \text{ oz/ft} \times 15 \text{ ft}) - (9 \text{ oz}) = (-4.95) \text{ oz.}$

Net result is to remove 4.95 oz of refrigerant from the system

Example 2: System has 45 ft of existing 5/16" liquid line. What is the charge adjustment?

Formula: $(.40 \text{ oz/ft} \times 45 \text{ ft}) - (9 \text{ oz.}) = 9 \text{ oz.}$

Net result is to add 9 oz of refrigerant to the system

NOTE: Conditions must be favorable for charging by subcooling method. Indoor temperature must be 70°F to 80°F (21°C to 27°C), and outdoor temperature must be 70°F to 100°F (21°C to 38°C). If outside these conditions, adjust charge for long linesets by weigh-in method.

* When applicable. Refer to Physical Data Table in this PD and to the Installation Instructions for more information.

Long Line Applications

An application is considered Long Line, when the refrigerant level in the system requires the use of accessories to maintain acceptable refrigerant management for systems reliability. See Accessory Usage Guideline table for required accessories. Defining a system as long line depends on the liquid line diameter, actual length of the tubing, and vertical separation between the indoor and outdoor units.

For Air Conditioner systems, the chart below shows when an application is considered Long Line.

Table 4 – AC with Puron® Refrigerant Long Line Description ft (m) Beyond these lengths, a TXV is required

Total Length	Outdoor Unit Above or Below Indoor Unit
TXV required beyond 50 ft. (15.2 m)	TXV required beyond 20 ft. (6.1 m)

Table 5 – AC with Puron® Refrigerant Long Line Description ft (m) (Beyond these lengths, long line accessories are required)

Liquid Line Size	Units On Same Level	Outdoor Below Indoor	Outdoor Above Indoor
1/4 + TXV	No accessories needed within allowed lengths	No accessories needed within allowed lengths	175 (53.3)
5/16 + TXV	120 (36.6)	50 (15.2) vertical or 120 (36.6) total	120 (36.6)
3/8 + TXV	80 (24.4)	35 (10.7) vertical or 80 (24.4) total	80 (24.4)

Note: See Residential Piping and Long Line Guideline for details

VAPOR LINE SIZING AND COOLING CAPACITY LOSS

Acceptable vapor line diameters provide adequate oil return to the compressor while avoiding excessive capacity loss. The suction line diameters shown in the chart below are acceptable for AC systems with **Puron®** refrigerant:

Table 6 – Vapor Line Sizing and Cooling Capacity Losses — Puron® Refrigerant 1-Stage Air Conditioner Applications

Unit Nominal Size (Btuh)	Maximum Liquid Line Diameters (In. OD)	Vapor Line Diameters (In. OD)	Cooling Capacity Loss (%) Total Equivalent Line Length ft. (m) 1-Stage AC with Puron®								
			26-50 (7.9-15.2)	51-80 (15.5-24.4)	81-100 (24.7-30.5)	101-125 (30.8-38.1)	126-150 (38.4-45.7)	151-175 (46.0-53.3)	176-200 (53.6-61.0)	201-225 (61.3-68.6)	226-250 (68.9-76.2)
18	3/8	1/2	1	2	3	5	6	7	8	9	11
		5/8	0	1	1	1	2	2	2	3	3
		3/4	0	0	0	0	1	1	1	1	1
24	3/8	5/8	0	1	2	2	3	3	4	5	5
		3/4	0	0	1	1	1	1	1	2	2
		7/8	0	0	0	0	0	1	1	1	1
30	3/8	5/8	1	2	3	3	4	5	6	7	8
		3/4	0	0	1	1	1	2	2	2	3
		7/8	0	0	0	0	1	1	1	1	1
36	3/8	5/8	1	2	4	5	6	8	9	10	12
		3/4	0	1	1	2	2	3	3	4	4
		7/8	0	0	0	1	1	1	1	2	2
42	3/8	3/4	0	1	2	2	3	4	4	5	6
		7/8	0	0	1	1	1	2	2	2	3
		1 1/8	0	0	0	0	0	0	0	0	0
48	3/8	3/4	0	1	2	3	4	5	5	6	7
		7/8	0	0	1	1	2	2	2	3	3
		1 1/8	0	0	0	0	0	0	0	1	1
60	3/8	3/4	1	2	4	5	6	7	9	10	11
		7/8	0	1	2	2	3	4	4	5	5
		1 1/8	0	0	0	1	1	1	1	1	1

Applications in this area may be long line and may have height restrictions. See the Residential Piping and Long Line Guideline.

ACCESSORIES

KIT NUMBER	KIT NAME	18	24	30	36	42	48	60
KSAFT0101AAA	FRZ THERM KIT	X	X	X	X	X	X	X
KAATD0101TDR	TIME DELAY KIT (90 second TDR)	X	X	X	X	X	X	X
KAATD0201TDR	TIME DELAY KIT (30 second TDR)	X	X	X	X	X	X	X
KSALA0301410	LOW AMBIENT COOLING KIT	X	X	X	X	X	X	X
KSALA1001AAA	MOTORMASTER KIT	X	X	X	X	X	X	X
KSAHS2501AAA	HARD START KIT	X	X	X	X	X	X	X
KSACY0101AAA	CYCLE PROTR KIT	X	X	X	X	X	X	X
KSASF0201AAA	SPRT FEET KIT	X	X	X	X	X	X	X
KAALS0201LLS*	SOL VALVE KIT	X	X	X	X	X	X	X
KAAWS0101AAA	WINTER ST KIT	X	X	X	X	X	X	X
KAALP0401PUR	LOW PRESSURE SW KIT	X	X	X	X	X	X	X
KAAHI0501PUR	HIGH PRESSURE SW KIT	X	X	X	X	X	X	X
KAACH1701AAA	CRKC HTR KIT	X	X	X	X			
KAACH1601AAA	CRKC HTR KIT					X	X	X
KSATX0201PUR	TXV KIT (For use with copper coils)	X	X	X				
KSATX0301PUR	TXV KIT (For use with copper coils)				X	X		
KSATX0401PUR	TXV KIT (For use with copper coils)						X	X
KSBTX0201PUR	TXV KIT (For use with aluminum coils)	X	X	X				
KSBTX0301PUR	TXV KIT (For use with aluminum coils)				X	X		
KSBTX0401PUR	TXV KIT (For use with aluminum coils)						X	X
KSASH2301COP	SOUND BLKT KIT	X	X	X	X			
KSASH2401COP	SOUND BLKT KIT					X	X	X

X = Accessory

ACCESSORY USAGE GUIDELINE

ACCESSORY	REQUIRED FOR LOW-AMBIENT COOLING APPLICATIONS (Below 55°F/12.8°C)	REQUIRED FOR LONG LINE APPLICATIONS*	REQUIRED FOR SEA COAST APPLICATIONS (Within 2 miles/3.22 km)
Ball Bearing Fan Motor	Standard	Standard	Standard
Compressor Start Assist Capacitor and Relay	Yes	Yes	No
Crankcase Heater	Yes	Yes	No
Evaporator Freeze Thermostat	Yes	No	No
Hard Shut-Off TXV	Yes	Yes	No
Liquid Line Solenoid Valve	No	See Long Line Guideline	No
MotorMaster® Control or Low-ambient Pressure Switch	Yes	No	No
Support Feet	Recommended	No	Recommended
Winter Start Control	Yes†	No	No

*.For tubing set lengths between 80 and 200 ft. (24 and 61 m) horizontal or 35 ft. (10.7 m) vertical differential (total equivalent length), refer to the Residential Split-System Long Line Application Guideline.

†.Required if Low Pressure Switch is factory or field installed.

Accessory Description and Usage (Listed Alphabetically)

1. Ball-Bearing Fan Motor

A fan motor with ball bearings which permits speed reduction while maintaining bearing lubrication.

Usage Guideline:

Required on all units when MotorMaster® is used.

2. Compressor Start Assist - Capacitor and Relay

Start capacitor and relay gives a "hard" boost to compressor motor at each start up.

Usage Guideline:

Required for single-phase scroll compressors in the following applications:

Long line

Low ambient cooling

Suggested for all compressors in areas with a history of low voltage problems.

3. Crankcase Heater

An electric resistance heater which mounts to the base of the compressor to keep the lubricant warm during off cycles. Improves compressor lubrication on restart and minimizes the chance of liquid slugging.

Usage Guideline:

Required in low ambient cooling applications.

Required in long line applications.

Suggested in all commercial applications.

4. Cycle Protector

The cycle protector is designed to prevent compressor short cycling. This control provides an approximate 5-minute delay after power to the compressor has been interrupted for any reason, including power outage, protector control trip, thermostat jiggling, or normal cycling.

5. Evaporator Freeze Thermostat

An SPST temperature-actuated switch that stops unit operation when evaporator reaches freeze-up conditions.

Usage Guideline:

Required when low ambient kit has been added.

6. Low-Ambient Pressure Switch Kit

A long life pressure switch which is mounted to outdoor unit service valve. It is designed to cycle the outdoor fan motor in order to maintain head pressure within normal operating limits (approximately 100 psig to 225 psig). The control will maintain working head pressure at low-ambient temperatures down to 0°F (-18°C) when properly installed and also using wind baffles. Instructions provided in accessory kit.

Usage Guideline:

A Low-Ambient Pressure Switch or MotorMaster® Low-Ambient Controller must be used when cooling operation is used at outdoor temperatures below 55°F (12.8°C).

7. MotorMaster® Low-Ambient Controller

A fan-speed control device activated by a temperature sensor, designed to control condenser fan motor speed in response to the saturated, condensing temperature during operation in cooling mode only. For outdoor temperatures down to -10°F/-23.3°C, it maintains condensing temperature at 100°F ±10°F (37.8°C ±5.5°C).

Usage Guideline:

A MotorMaster® Low Ambient Controller or Low-Ambient Pressure Switch must be used when cooling operation is used at outdoor temperatures below 55°F (12.8°C).

Suggested for all commercial applications.

8. Outdoor Air Temperature Sensor

This device enables the thermostat to display the outdoor temperature. This device is also required to enable special thermostat features such as auxiliary heat lock out.

Usage Guideline:

Suggested for use with compatible Carrier thermostats.

9. Sound Hood

Wraparound sound reducing cover for the compressor. Reduces the sound level of the compressor.

Usage Guideline:

Suggested when unit is installed closer than 15 ft (4.57 m) to quiet areas, bedrooms, etc.

Suggested when unit is installed between two houses less than 10 ft (3 m) apart.

Accessory Description and Usage (Listed Alphabetically) Continued

10. Support Feet

Four or five stick-on plastic feet that raise the unit 4 in. (101.6 mm) above the mounting pad. This allows sand, dirt, and other debris to be flushed from the unit base, minimizing corrosion.

Usage Guideline:

Suggested in the following applications:

- Coastal installations.
- Windy areas or where debris is normally circulating.
- Rooftop installations.
- For improved sound ratings.

11. Thermostatic Expansion Valve (TXV)

A modulating flow-control valve which meters refrigerant liquid flow rate into the evaporator in response to the superheat of the refrigerant gas leaving the evaporator.

Kit includes valve, adapter tubes, and external equalizer tube. Hard shut off types are available.

Usage Guideline:

- Required to achieve AHRI ratings in certain equipment combinations. Refer to combination ratings.
- Hard shut off TXV or LLS required in air conditioner long line applications.
- Required for use on all zoning systems.

12. Time-Delay Relay

An SPST delay relay which briefly continues operation of indoor blower motor to provide additional cooling after the compressor cycles off.

NOTE: Most indoor unit controls include this feature. For those that do not, use the guideline below.

Usage Guideline:

For improved efficiency ratings for certain combinations of indoor and outdoor units. Refer to AHRI Directory of Certified Product Performance (AHRI Directory).

When a Time-Delay Relay (TDR) is called for in the AHRI Directory, use a 30 second TDR for MicroChannel Indoor units and use a 90 second TDR for Round Tube Plate Fin Indoor units.

13. Winter Start Control

This control is designed to alleviate nuisance opening of the low-pressure switch by bypassing it for the first 3 minutes of operation.

AHRI RATINGS

For AHRI ratings certificates, please refer to the AHRI directory www.ahridirectory.org

Additional ratings and system combinations can be accessed via the Ratings Database here: www.MyCarrierRatings.com

Electrical Data

UNIT SIZE	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE† or CKT BRK AMPS
		MAX	MIN	LRA	RLA	FLA		
18	208-230/1	253	197	48.0	8.00	0.40	10.4	15
24				59.5	11.70	0.50	15.1	25
30				64.3	11.80	0.75	15.6	25
36				80.1	12.20	1.05	16.4	25
42				110.2	17.70	1.40	23.5	40
48				124.0	18.50	1.40	24.5	40
60				150.0	25.60	1.52	33.5	50

*.Permissible limits of the voltage range at which the unit will operate satisfactorily

†.Time-Delay fuse.

FLA- Full Load Amps

LRA - Locked Rotor Amps

MCA- Minimum Circuit Amps

RLA- Rated Load Amps

NOTE:Control circuit is 24V on all units and requires external power source. Copper wire must be used from service disconnect to unit.

All motors/compressors contain internal overload protection.

Complies with requirements of ASHRAE Standards 90.1

Sound Power Level without sound shield

UNIT SIZE	STANDARD RATING (dBA)	TYPICAL OCTAVE BAND SPECTRUM (without tone adjustment) (dB)						
		125	250	500	1000	2000	4000	8000
18	75	68.9	65.3	65.6	71.4	68.4	63.8	61.2
24	74	66.9	72.6	70.0	70.7	66.6	62.7	59.2
30	73	69.5	68.9	68.9	68.5	62.8	60.0	57.4
36	75	70.8	73.6	71.5	69.5	66.1	63.6	58.1
42	73	73.9	72.6	70.3	68.2	64.3	61.2	57.3
48	76	72.3	74.1	71.2	70.6	63.8	61.6	55.9
60	76	70.0	75.0	71.9	73.7	66.0	61.7	56.3

NOTE: Tested in compliance with AHRI 270 but not listed with AHRI.

Sound Power Level with Accessory sound shield

UNIT SIZE	STANDARD RATING (dBA)	TYPICAL OCTAVE BAND SPECTRUM (without tone adjustment) (dB)						
		125	250	500	1000	2000	4000	8000
18	75	66.4	67.0	66.1	71.5	66.6	62.5	61.1
24	74	68.4	72.2	70.4	70.2	66.0	62.3	58.5
30	72	69.3	69.7	68.8	68.0	62.4	59.5	55.7
36	75	71.0	73.7	71.2	69.0	65.4	63.0	57.7
42	73	75.3	71.7	70.0	68.1	63.9	60.2	55.3
48	74	73.3	74.2	71.6	69.9	63.8	60.4	54.7
60	75	70.2	73.9	71.8	72.4	64.2	60.4	54.6

NOTE: Tested in compliance with AHRI 270 but not listed with AHRI.

Charging Subcooling (TXV-Type Expansion Device)

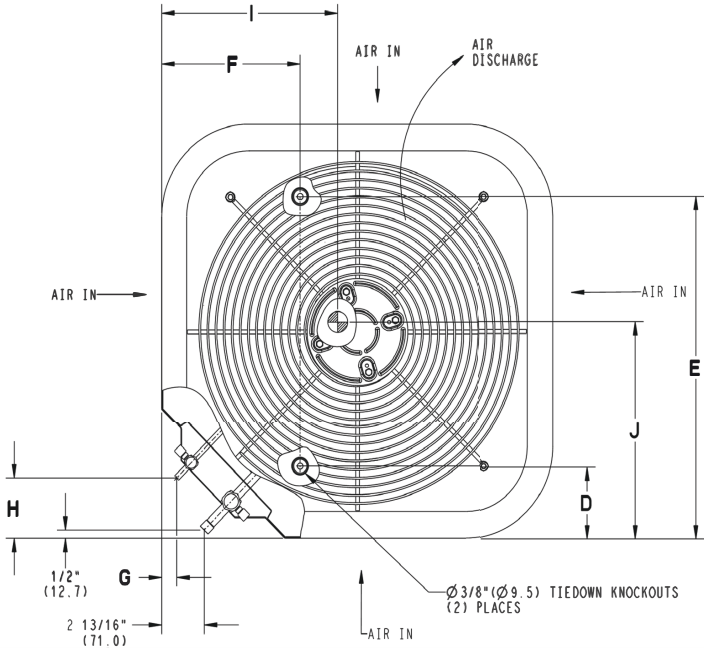
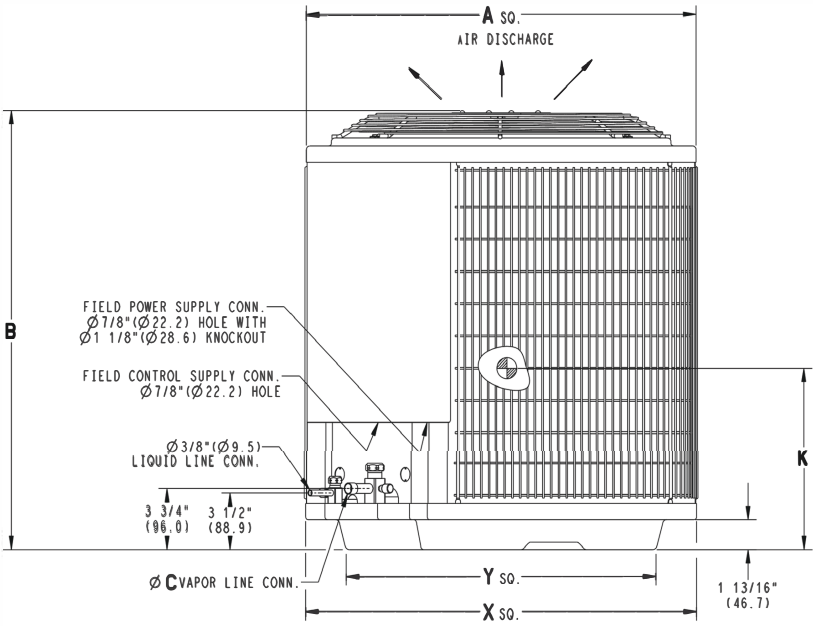
UNIT SIZE	REQUIRED SUBCOOLING (F)	Indoor
18	14	TXV
24	10	
30	10	
36	10	
42	11	
48	12	
60	12	

DIMENSIONS

UNIT	SERIES	ELECTRICAL CHARACTERISTICS					A		B		C		D		E		F		G		H		I		J		K		OPERATING WEIGHT		SHIPPING WEIGHT		SHIPPING LENGTH / WIDTH (Sq.)		SHIPPING HEIGHT	
							INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	Lbs	Kgs	Lbs	Kgs	INCH	MM	INCH	MM
24SCA418N*0	0	Y	N	N	N	N	23 1/8	587.3	25 5/16	642.9	3/4	19.1	4 7/16	113.0	18 1/16	459.0	7 13/16	197.9	5/16	7.9	3	76.2	11	279.4	10 1/2	266.7	10 1/4	260.4	100	45.4	109	49.4	26	660.0	30 9/16	775.7
24SCA424N*0	0	Y	N	N	N	N	25 3/4	654.0	25 5/16	642.4	3/4	19.1	4 7/16	113.0	21 1/4	539.9	9 1/8	231.3	5/16	7.9	3	76.2	13 1/2	342.9	13	330.2	12 1/2	317.5	111	50.3	121	54.9	28 3/4	730.0	30 9/16	775.7
24SCA430N*0	0	Y	N	N	N	N	31 3/16	792.5	32 1/16	815.1	3/4	19.1	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	5/16	7.9	3	76.2	15	381.0	15 3/4	400.1	16	406.4	139	63.0	161	73.0	34 1/4	870.0	37 5/16	947.9
24SCA436N*0	0	Y	N	N	N	N	31 3/16	792.5	25 5/16	642.4	7/8	22.2	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	5/16	7.9	3	76.2	14 1/2	368.3	15	381.0	11 1/2	292.1	132	59.9	146	66.2	34 1/4	870.0	30 1/2	775.2
24SCA442N*0	0	Y	N	N	N	N	31 3/16	792.5	42 5/16	1074.2	7/8	22.2	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	5/16	7.9	3	76.2	17	431.8	15 1/2	393.7	22 1/2	571.5	181	82.1	203	92.1	34 1/4	870.0	47 1/2	1207.1
24SCA448N*0	0	Y	N	N	N	N	31 3/16	792.5	28 11/16	728.7	7/8	22.2	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	5/16	7.9	3	76.2	14 1/2	368.3	14 1/2	368.3	12 1/2	317.5	171	77.6	190	86.2	34 1/4	870.0	33 15/16	861.6
24SCA460N*0	0	Y	N	N	N	N	31 3/16	792.5	35 1/2	901.4	7/8	22.2	6 9/16	166.1	24 11/16	626.3	9 1/8	231.3	5/16	7.9	3	76.2	15 1/2	393.7	16	406.4	18 1/2	469.9	190	86.2	206	93.4	34 1/4	870.0	40 3/4	1034.3

208-230-1-60	Y=YES N=NO
208/230-3-60	
460-3-60	
575-3-60	

NOTES:
1. CENTER OF GRAVITY



NOTE: ALL DIMENSIONS IN INCH (MM) U.S. ECCN: Not Subject to Regulation (N.S.R.)

SD5750-4 REV. A

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

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APPENDIX 9.2:

CADNAA OPERATIONAL NOISE CALCULATIONS

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14638 - Best Buy - Orange

CadnaA Noise Prediction Model: 16438-02_Operation.cna

Date: 21.10.25

Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	Value
General	
Max. Error (dB)	0.00
Max. Search Radius (ft)	6561.70
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (ft)	3280.80
Min. Length of Section (ft)	3.30
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	328.08
Search Radius Rcvr	328.08
Max. Distance Source - Rcvr	3280.84 3280.84
Min. Distance Rcvr - Reflector	3.28 3.28
Min. Distance Source - Reflector	0.33
Industrial (ISO 9613 (1996))	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°F)	50
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (mph)	6.7
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height	Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type		X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)	(ft)	(ft)	(ft)
R1		R1	41.2	38.5	45.2	0.0	0.0	0.0		x	Total	5.00	r 6080468.98	2248762.73	5.00
R2		R2	47.6	44.9	51.6	0.0	0.0	0.0		x	Total	5.00	r 6080706.13	2248376.27	5.00
R3		R3	43.4	40.6	47.4	0.0	0.0	0.0		x	Total	5.00	r 6080399.12	2248347.66	5.00
R4		R4	33.6	30.9	37.6	0.0	0.0	0.0		x	Total	5.00	r 6081006.30	2248678.53	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height	Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night		X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	(ft)	(ft)	(ft)	(ft)
AC01		AC01	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080244.08	2248504.94	5.00
AC02		AC02	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080243.73	2248500.25	5.00
AC03		AC03	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080243.56	2248447.13	5.00
AC04		AC04	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080243.38	2248442.09	5.00
AC05		AC05	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080243.21	2248388.62	5.00
AC06		AC06	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080346.73	2248386.15	5.00
AC07		AC07	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080392.95	2248385.71	5.00
AC08		AC08	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080397.94	2248385.71	5.00
AC09		AC09	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080451.11	2248385.71	5.00
AC10		AC10	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080455.67	2248385.71	5.00
AC11		AC11	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080507.97	2248385.71	5.00
AC12		AC12	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080513.39	2248385.50	5.00
AC13		AC13	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080565.69	2248385.28	5.00
AC14		AC14	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080570.90	2248385.28	5.00
AC15		AC15	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080623.85	2248385.28	5.00
AC16		AC16	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g 6080628.84	2248385.06	5.00

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night			X	Y	Z
			(dBA)	(dBA)	(dBA)				(min)	(min)	(min)			(ft)	(ft)	(ft)
AC17		AC17	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080681.36	2248385.28	5.00
AC18		AC18	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080686.14	2248385.06	5.00
AC19		AC19	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080738.87	2248384.85	5.00
AC20		AC20	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080744.08	2248384.41	5.00
AC21		AC21	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080705.88	2248702.77	5.00
AC22		AC22	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080700.89	2248702.55	5.00
AC23		AC23	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080648.16	2248703.20	5.00
AC24		AC24	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080642.95	2248702.99	5.00
AC25		AC25	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080590.65	2248703.20	5.00
AC26		AC26	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080585.01	2248702.77	5.00
AC27		AC27	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080532.92	2248703.20	5.00
AC28		AC28	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080527.50	2248702.99	5.00
AC29		AC29	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080475.20	2248703.20	5.00
AC30		AC30	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080469.99	2248703.42	5.00
AC31		AC31	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080417.47	2248703.64	5.00
AC32		AC32	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080412.05	2248703.64	5.00
AC33		AC33	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080359.96	2248703.64	5.00
AC34		AC34	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080354.10	2248704.07	5.00
AC35		AC35	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080301.37	2248704.29	5.00
AC36		AC36	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080359.25	2248617.17	37.00
AC37		AC37	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080376.52	2248619.30	37.00
AC38		AC38	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080415.27	2248616.34	37.00
AC39		AC39	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080451.98	2248608.98	37.00
AC40		AC40	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080450.87	2248591.97	37.00
AC41		AC41	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080450.24	2248547.72	37.00
AC42		AC42	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080450.71	2248531.99	37.00
AC43		AC43	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080525.94	2248608.30	37.00
AC44		AC44	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080526.85	2248586.83	37.00
AC45		AC45	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080526.20	2248547.10	37.00
AC46		AC46	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080525.79	2248530.25	37.00
AC47		AC47	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080583.52	2248606.87	37.00
AC48		AC48	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080583.04	2248589.61	37.00
AC49		AC49	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080583.61	2248547.76	37.00
AC50		AC50	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080583.46	2248530.16	37.00
AC51		AC51	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080656.57	2248607.36	37.00
AC52		AC52	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080657.89	2248589.84	37.00
AC53		AC53	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080658.23	2248548.13	37.00
AC54		AC54	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080658.98	2248530.04	37.00
AC55		AC55	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080720.49	2248604.26	37.00
AC56		AC56	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080722.38	2248565.12	37.00
AC57		AC57	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080722.38	2248553.91	37.00
AC58		AC58	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080721.69	2248510.98	37.00
AC59		AC59	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080366.91	2248480.33	5.00
AC60		AC60	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080373.20	2248479.90	5.00
AC61		AC61	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080422.68	2248480.55	5.00
AC62		AC62	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080430.49	2248480.55	5.00
AC63		AC63	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080480.84	2248479.68	5.00
AC64		AC64	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080487.79	2248479.68	5.00
AC65		AC65	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080537.70	2248480.11	5.00
AC66		AC66	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080545.29	2248480.11	5.00
AC67		AC67	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080595.64	2248479.25	5.00
AC68		AC68	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080602.59	2248479.03	5.00
AC69		AC69	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080652.93	2248478.16	5.00
AC70		AC70	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080659.66	2248478.38	5.00
AC71		AC71	76.0	76.0	76.0	Lw	76		675.00	0.00	270.00	5.00	g	6080710.66	2248474.04	5.00

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number		Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)

Name	ID	Height			Coordinates			
		Begin	End		x	y	z	Ground
		(ft)	(ft)		(ft)	(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(min)	(min)	(min)		
PARK1		PARK1	74.0	74.0	74.0	54.1	54.1	54.1	Lw	74		900.00	0.00	270.00	5	r
PARK2		PARK2	76.0	76.0	76.0	54.9	54.9	54.9	Lw	76		900.00	0.00	270.00	5	r
PARK3		PARK3	77.0	77.0	77.0	54.4	54.4	54.4	Lw	77		900.00	0.00	270.00	5	r
PARK4		PARK4	71.0	71.0	71.0	54.2	54.2	54.2	Lw	71		900.00	0.00	270.00	5	r
PARK5		PARK5	73.0	73.0	73.0	54.9	54.9	54.9	Lw	73		900.00	0.00	270.00	5	r

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
PARK1	PARK1	5.00	r	6080315.35	2248612.43	5.00	0.00
				6080333.45	2248611.91	5.00	0.00
				6080333.19	2248555.66	5.00	0.00
				6080313.92	2248556.18	5.00	0.00
PARK2	PARK2	5.00	r	6080314.70	2248547.20	5.00	0.00
				6080335.93	2248546.94	5.00	0.00
				6080335.41	2248482.61	5.00	0.00
				6080313.79	2248482.48	5.00	0.00
PARK3	PARK3	5.00	r	6080716.53	2248505.40	5.00	0.00
				6080771.47	2248503.58	5.00	0.00
				6080772.00	2248442.77	5.00	0.00
				6080762.62	2248442.77	5.00	0.00
				6080762.23	2248473.76	5.00	0.00
				6080716.66	2248475.32	5.00	0.00
PARK4	PARK4	5.00	r	6080687.23	2248634.31	5.00	0.00
				6080716.53	2248635.22	5.00	0.00
				6080716.14	2248616.73	5.00	0.00
				6080687.23	2248617.12	5.00	0.00
PARK5	PARK5	5.00	r	6080310.88	2248419.64	5.00	0.00
				6080329.24	2248419.12	5.00	0.00
				6080328.85	2248381.62	5.00	0.00
				6080310.62	2248381.36	5.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
				left	right		horz.	vert.	Begin	End	x	y	z	Ground
							(ft)	(ft)	(ft)		(ft)	(ft)	(ft)	(ft)
BAR1			BAR1	0.99	0.99				6.00	r	6080294.67	2248708.32	6.00	0.00
											6080768.94	2248713.25	6.00	0.00
											6080770.62	2248521.02	6.00	0.00
											6080778.82	2248521.21	6.00	0.00
											6080779.94	2248381.75	6.00	0.00
											6080229.37	2248378.02	6.00	0.00
											6080229.00	2248531.65	6.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates					
								Begin	x	y	z	Ground	
								(ft)	(ft)	(ft)	(ft)	(ft)	
BLDG01			BLDG01	x	0		32.00	r	6080678.06	2248675.67	32.00	0.00	
									6080678.32	2248700.84	32.00	0.00	
									6080728.50	2248700.67	32.00	0.00	
									6080728.41	2248675.14	32.00	0.00	
									6080724.50	2248675.32	32.00	0.00	
									6080724.33	2248664.29	32.00	0.00	
									6080682.14	2248664.55	32.00	0.00	
									6080681.97	2248675.49	32.00	0.00	
BLDG02			BLDG02	x	0		32.00	r	6080670.51	2248675.32	32.00	0.00	
									6080666.69	2248675.58	32.00	0.00	
									6080666.86	2248664.29	32.00	0.00	
									6080624.24	2248664.38	32.00	0.00	
									6080624.24	2248675.93	32.00	0.00	
									6080620.25	2248675.84	32.00	0.00	
									6080620.51	2248701.19	32.00	0.00	
									6080670.94	2248701.10	32.00	0.00	
BLDG03			BLDG03	x	0		32.00	r	6080562.79	2248701.62	32.00	0.00	
									6080612.96	2248701.19	32.00	0.00	
									6080613.13	2248675.84	32.00	0.00	
									6080608.97	2248675.67	32.00	0.00	
									6080608.88	2248664.81	32.00	0.00	
									6080566.52	2248664.90	32.00	0.00	
									6080566.60	2248676.36	32.00	0.00	
									6080562.52	2248676.01	32.00	0.00	
BLDG04			BLDG04	x	0		32.00	r	6080555.23	2248701.62	32.00	0.00	
									6080555.32	2248675.93	32.00	0.00	
									6080550.98	2248675.84	32.00	0.00	
									6080551.07	2248664.90	32.00	0.00	
									6080508.71	2248665.08	32.00	0.00	
									6080508.71	2248676.36	32.00	0.00	
									6080504.97	2248676.45	32.00	0.00	
									6080505.32	2248701.71	32.00	0.00	
BLDG05			BLDG05	x	0		32.00	r	6080497.68	2248701.79	32.00	0.00	
									6080497.68	2248676.10	32.00	0.00	
									6080493.60	2248675.93	32.00	0.00	
									6080493.69	2248665.16	32.00	0.00	

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates			
							Begin	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)
								6080450.98	2248665.16	32.00	0.00
								6080451.24	2248676.97	32.00	0.00
								6080447.16	2248676.88	32.00	0.00
								6080447.42	2248702.05	32.00	0.00
BLDG06			BLDG06	x	0		32.00 r	6080389.52	2248702.14	32.00	0.00
								6080439.52	2248702.05	32.00	0.00
								6080439.78	2248676.71	32.00	0.00
								6080435.79	2248676.45	32.00	0.00
								6080435.70	2248665.42	32.00	0.00
								6080393.60	2248665.51	32.00	0.00
								6080393.43	2248676.97	32.00	0.00
								6080389.35	2248676.97	32.00	0.00
BLDG07			BLDG07	x	0		32.00 r	6080331.97	2248702.49	32.00	0.00
								6080381.97	2248702.31	32.00	0.00
								6080382.32	2248676.79	32.00	0.00
								6080378.15	2248676.62	32.00	0.00
								6080378.24	2248666.20	32.00	0.00
								6080335.88	2248666.03	32.00	0.00
								6080335.79	2248676.97	32.00	0.00
								6080331.71	2248677.05	32.00	0.00
BLDG08			BLDG08	x	0		32.00 r	6080324.59	2248702.40	32.00	0.00
								6080324.33	2248676.97	32.00	0.00
								6080320.51	2248677.14	32.00	0.00
								6080320.42	2248666.03	32.00	0.00
								6080299.07	2248666.12	32.00	0.00
								6080299.42	2248702.31	32.00	0.00
BLDG09			BLDG09	x	0		32.00 r	6080697.55	2248611.28	32.00	0.00
								6080734.23	2248610.41	32.00	0.00
								6080734.12	2248563.64	32.00	0.00
								6080695.71	2248563.75	32.00	0.00
								6080696.03	2248578.94	32.00	0.00
								6080697.55	2248578.94	32.00	0.00
								6080697.55	2248587.84	32.00	0.00
								6080696.36	2248587.51	32.00	0.00
								6080696.03	2248601.19	32.00	0.00
								6080697.66	2248601.62	32.00	0.00
BLDG10			BLDG10	x	0		32.00 r	6080695.81	2248556.16	32.00	0.00
								6080734.12	2248556.05	32.00	0.00
								6080734.12	2248509.28	32.00	0.00
								6080717.95	2248509.50	32.00	0.00
								6080718.06	2248507.98	32.00	0.00
								6080697.01	2248508.63	32.00	0.00
								6080696.90	2248518.61	32.00	0.00
								6080695.71	2248518.61	32.00	0.00
								6080695.81	2248532.18	32.00	0.00
								6080697.44	2248532.50	32.00	0.00
								6080697.01	2248540.86	32.00	0.00
								6080695.60	2248541.07	32.00	0.00
BLDG11			BLDG11	x	0		32.00 r	6080720.23	2248423.02	32.00	0.00
								6080763.20	2248423.02	32.00	0.00
								6080762.87	2248411.30	32.00	0.00
								6080766.78	2248411.52	32.00	0.00
								6080766.78	2248386.02	32.00	0.00
								6080716.43	2248386.34	32.00	0.00
								6080716.54	2248411.19	32.00	0.00
								6080720.45	2248411.52	32.00	0.00
BLDG12			BLDG12	x	0		32.00 r	6080662.94	2248423.13	32.00	0.00
								6080705.04	2248423.13	32.00	0.00
								6080705.25	2248411.84	32.00	0.00
								6080708.94	2248411.84	32.00	0.00
								6080708.94	2248386.13	32.00	0.00
								6080658.60	2248386.78	32.00	0.00
								6080658.71	2248411.73	32.00	0.00
								6080662.61	2248411.84	32.00	0.00
BLDG13			BLDG13	x	0		32.00 r	6080604.99	2248423.56	32.00	0.00
								6080647.53	2248423.34	32.00	0.00
								6080647.42	2248412.17	32.00	0.00
								6080651.22	2248412.17	32.00	0.00
								6080651.22	2248386.56	32.00	0.00
								6080600.98	2248386.78	32.00	0.00
								6080601.31	2248412.17	32.00	0.00
								6080605.21	2248412.17	32.00	0.00
BLDG14			BLDG14	x	0		32.00 r	6080547.59	2248423.67	32.00	0.00
								6080589.59	2248423.67	32.00	0.00
								6080589.91	2248412.38	32.00	0.00
								6080593.93	2248412.28	32.00	0.00
								6080593.60	2248386.89	32.00	0.00

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates			
							Begin	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)
								6080543.36	2248386.89	32.00	0.00
								6080543.36	2248411.95	32.00	0.00
								6080547.49	2248412.49	32.00	0.00
BLDG15			BLDG15	x	0		32.00 r	6080489.76	2248423.78	32.00	0.00
								6080532.08	2248423.89	32.00	0.00
								6080532.08	2248412.82	32.00	0.00
								6080535.77	2248412.71	32.00	0.00
								6080535.98	2248387.32	32.00	0.00
								6080485.85	2248387.43	32.00	0.00
								6080485.75	2248412.71	32.00	0.00
								6080489.65	2248412.71	32.00	0.00
BLDG16			BLDG16	x	0		32.00 r	6080432.03	2248424.32	32.00	0.00
								6080474.35	2248423.99	32.00	0.00
								6080474.35	2248413.04	32.00	0.00
								6080478.48	2248413.04	32.00	0.00
								6080478.37	2248387.32	32.00	0.00
								6080428.02	2248387.75	32.00	0.00
								6080428.24	2248412.71	32.00	0.00
								6080431.93	2248412.82	32.00	0.00
BLDG17			BLDG17	x	0		32.00 r	6080374.42	2248424.10	32.00	0.00
								6080416.30	2248424.32	32.00	0.00
								6080416.73	2248413.36	32.00	0.00
								6080420.75	2248413.14	32.00	0.00
								6080420.53	2248387.43	32.00	0.00
								6080370.29	2248387.86	32.00	0.00
								6080370.29	2248413.04	32.00	0.00
								6080374.31	2248413.14	32.00	0.00
BLDG18			BLDG18	x	0		32.00 r	6080340.13	2248425.62	32.00	0.00
								6080362.92	2248425.41	32.00	0.00
								6080363.24	2248387.10	32.00	0.00
								6080349.03	2248387.10	32.00	0.00
								6080348.81	2248388.51	32.00	0.00
								6080339.26	2248388.95	32.00	0.00
								6080339.48	2248398.06	32.00	0.00
								6080338.39	2248398.28	32.00	0.00
								6080338.50	2248410.00	32.00	0.00
								6080339.91	2248409.78	32.00	0.00
BLDG19			BLDG19	x	0		32.00 r	6080244.97	2248411.84	32.00	0.00
								6080270.03	2248411.84	32.00	0.00
								6080270.36	2248407.72	32.00	0.00
								6080281.64	2248407.39	32.00	0.00
								6080281.54	2248386.78	32.00	0.00
								6080245.29	2248386.78	32.00	0.00
BLDG20			BLDG20	x	0		32.00 r	6080245.40	2248469.68	32.00	0.00
								6080270.14	2248469.46	32.00	0.00
								6080270.90	2248465.23	32.00	0.00
								6080281.43	2248465.23	32.00	0.00
								6080281.75	2248423.67	32.00	0.00
								6080270.90	2248423.13	32.00	0.00
								6080271.01	2248419.22	32.00	0.00
								6080244.97	2248419.44	32.00	0.00
BLDG21			BLDG21	x	0		32.00 r	6080245.84	2248527.51	32.00	0.00
								6080271.12	2248527.51	32.00	0.00
								6080271.34	2248523.60	32.00	0.00
								6080282.08	2248523.17	32.00	0.00
								6080282.19	2248480.85	32.00	0.00
								6080271.12	2248481.07	32.00	0.00
								6080271.01	2248476.84	32.00	0.00
								6080245.62	2248477.05	32.00	0.00
BLDG22			BLDG22	x	0		32.00 r	6080342.08	2248493.44	32.00	0.00
								6080351.41	2248493.33	32.00	0.00
								6080351.52	2248494.85	32.00	0.00
								6080365.30	2248494.85	32.00	0.00
								6080365.41	2248456.55	32.00	0.00
								6080342.19	2248456.44	32.00	0.00
								6080342.52	2248472.61	32.00	0.00
								6080340.89	2248472.82	32.00	0.00
								6080341.11	2248484.11	32.00	0.00
								6080341.97	2248484.00	32.00	0.00
BLDG23			BLDG23	x	0		32.00 r	6080374.42	2248494.52	32.00	0.00
								6080389.50	2248494.63	32.00	0.00
								6080389.50	2248493.11	32.00	0.00
								6080421.62	2248493.33	32.00	0.00
								6080421.18	2248455.68	32.00	0.00
								6080374.20	2248456.00	32.00	0.00
BLDG24			BLDG24	x	0		32.00 r	6080431.82	2248494.52	32.00	0.00
								6080446.68	2248494.42	32.00	0.00

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates			
							Begin	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)
								6080446.90	2248492.68	32.00	0.00
								6080479.23	2248493.00	32.00	0.00
								6080478.80	2248455.79	32.00	0.00
								6080431.49	2248456.11	32.00	0.00
BLDG25			BLDG25	x	0		32.00 r	6080489.43	2248493.76	32.00	0.00
								6080504.30	2248493.98	32.00	0.00
								6080504.19	2248492.57	32.00	0.00
								6080536.42	2248492.79	32.00	0.00
								6080536.31	2248455.57	32.00	0.00
								6080489.22	2248455.79	32.00	0.00
BLDG26			BLDG26	x	0		32.00 r	6080546.83	2248493.76	32.00	0.00
								6080561.70	2248493.66	32.00	0.00
								6080561.59	2248492.57	32.00	0.00
								6080593.60	2248492.46	32.00	0.00
								6080593.82	2248455.14	32.00	0.00
								6080546.62	2248455.79	32.00	0.00
BLDG27			BLDG27	x	0		32.00 r	6080604.34	2248493.66	32.00	0.00
								6080619.32	2248493.66	32.00	0.00
								6080619.32	2248492.03	32.00	0.00
								6080651.33	2248492.25	32.00	0.00
								6080651.11	2248455.14	32.00	0.00
								6080603.91	2248455.24	32.00	0.00
BLDG28			BLDG28	x	0		32.00 r	6080661.85	2248493.33	32.00	0.00
								6080676.72	2248493.44	32.00	0.00
								6080676.72	2248491.92	32.00	0.00
								6080685.51	2248491.59	32.00	0.00
								6080685.29	2248493.11	32.00	0.00
								6080698.96	2248493.11	32.00	0.00
								6080699.18	2248491.92	32.00	0.00
								6080708.94	2248491.59	32.00	0.00
								6080709.49	2248470.54	32.00	0.00
								6080708.18	2248470.44	32.00	0.00
								6080707.97	2248454.81	32.00	0.00
								6080661.53	2248455.14	32.00	0.00
BLDG29			BLDG29	x	0		32.00 r	6080434.01	2248533.93	32.00	0.00
								6080471.38	2248533.80	32.00	0.00
								6080472.42	2248510.37	32.00	0.00
								6080456.40	2248510.37	32.00	0.00
								6080456.40	2248509.06	32.00	0.00
								6080435.18	2248510.37	32.00	0.00
								6080435.31	2248519.61	32.00	0.00
								6080434.14	2248519.61	32.00	0.00
BLDG30			BLDG30	x	0		32.00 r	6080505.10	2248532.76	32.00	0.00
								6080543.64	2248533.02	32.00	0.00
								6080543.38	2248519.35	32.00	0.00
								6080541.95	2248519.22	32.00	0.00
								6080541.82	2248509.32	32.00	0.00
								6080520.86	2248509.06	32.00	0.00
								6080520.47	2248510.89	32.00	0.00
								6080505.23	2248510.37	32.00	0.00
BLDG31			BLDG31	x	0		32.00 r	6080565.65	2248533.02	32.00	0.00
								6080603.41	2248532.89	32.00	0.00
								6080603.67	2248509.98	32.00	0.00
								6080587.92	2248509.98	32.00	0.00
								6080587.65	2248508.41	32.00	0.00
								6080566.95	2248509.19	32.00	0.00
								6080566.95	2248519.09	32.00	0.00
								6080565.52	2248519.09	32.00	0.00
BLDG32			BLDG32	x	0		32.00 r	6080636.87	2248532.24	32.00	0.00
								6080674.50	2248532.76	32.00	0.00
								6080674.89	2248518.57	32.00	0.00
								6080673.07	2248518.70	32.00	0.00
								6080673.33	2248508.93	32.00	0.00
								6080652.37	2248508.28	32.00	0.00
								6080652.24	2248509.71	32.00	0.00
								6080636.74	2248509.85	32.00	0.00
BLDG33			BLDG33	x	0		32.00 r	6080636.87	2248592.79	32.00	0.00
								6080675.15	2248592.53	32.00	0.00
								6080675.42	2248577.42	32.00	0.00
								6080673.72	2248577.81	32.00	0.00
								6080674.11	2248545.91	32.00	0.00
								6080636.74	2248545.78	32.00	0.00
BLDG34			BLDG34	x	0		32.00 r	6080566.95	2248593.05	32.00	0.00
								6080603.54	2248592.79	32.00	0.00
								6080603.67	2248545.39	32.00	0.00
								6080566.04	2248546.17	32.00	0.00
								6080565.78	2248561.28	32.00	0.00

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates				
							Begin	x	y	z	Ground	
							(ft)	(ft)	(ft)	(ft)	(ft)	
BLDG35			BLDG35	x	0		32.00	r	6080567.34	2248561.15	32.00	0.00
								6080505.75	2248593.44	32.00	0.00	
								6080543.12	2248593.18	32.00	0.00	
								6080543.77	2248577.94	32.00	0.00	
								6080542.08	2248578.20	32.00	0.00	
								6080542.86	2248545.78	32.00	0.00	
BLDG36			BLDG36	x	0		32.00	r	6080505.36	2248546.04	32.00	0.00
								6080435.31	2248593.44	32.00	0.00	
								6080472.55	2248593.31	32.00	0.00	
								6080472.55	2248546.30	32.00	0.00	
								6080434.27	2248546.43	32.00	0.00	
								6080434.40	2248561.41	32.00	0.00	
BLDG37			BLDG37	x	0		32.00	r	6080435.57	2248561.28	32.00	0.00
								6080341.30	2248633.54	32.00	0.00	
								6080364.35	2248633.54	32.00	0.00	
								6080363.96	2248595.65	32.00	0.00	
								6080349.76	2248595.39	32.00	0.00	
								6080349.63	2248596.56	32.00	0.00	
BLDG38			BLDG38	x	0		32.00	r	6080340.52	2248597.08	32.00	0.00
								6080340.00	2248617.79	32.00	0.00	
								6080341.17	2248618.05	32.00	0.00	
								6080372.68	2248633.41	32.00	0.00	
								6080419.30	2248633.67	32.00	0.00	
								6080419.30	2248595.39	32.00	0.00	
BLDG39			BLDG39	x	0		32.00	r	6080404.58	2248595.00	32.00	0.00
								6080404.58	2248597.08	32.00	0.00	
								6080372.42	2248596.69	32.00	0.00	
								6080435.96	2248629.77	32.00	0.00	
								6080451.46	2248630.16	32.00	0.00	
								6080451.46	2248630.81	32.00	0.00	
BLDG40			BLDG40	x	0		32.00	r	6080456.93	2248630.68	32.00	0.00
								6080456.93	2248629.51	32.00	0.00	
								6080472.68	2248629.12	32.00	0.00	
								6080472.42	2248605.81	32.00	0.00	
								6080434.27	2248606.20	32.00	0.00	
								6080434.66	2248620.65	32.00	0.00	
BLDG41			BLDG41	x	0		32.00	r	6080435.83	2248620.91	32.00	0.00
								6080505.41	2248629.12	32.00	0.00	
								6080521.30	2248629.12	32.00	0.00	
								6080521.30	2248630.16	32.00	0.00	
								6080541.87	2248629.77	32.00	0.00	
								6080541.74	2248620.00	32.00	0.00	
BLDG42			BLDG42	x	0		32.00	r	6080543.31	2248620.00	32.00	0.00
								6080543.17	2248605.94	32.00	0.00	
								6080505.28	2248606.20	32.00	0.00	
								6080567.60	2248629.25	32.00	0.00	
								6080576.98	2248629.25	32.00	0.00	
								6080576.98	2248630.03	32.00	0.00	
									6080588.44	2248630.03	32.00	0.00
								6080588.44	2248628.60	32.00	0.00	
								6080603.93	2248628.46	32.00	0.00	
								6080604.32	2248605.81	32.00	0.00	
								6080566.17	2248605.94	32.00	0.00	
								6080566.17	2248619.22	32.00	0.00	
									6080567.60	2248619.61	32.00	0.00
								6080637.26	2248628.86	32.00	0.00	
								6080653.15	2248628.46	32.00	0.00	
								6080653.15	2248629.51	32.00	0.00	
								6080663.96	2248629.77	32.00	0.00	
								6080664.48	2248628.99	32.00	0.00	
									6080673.46	2248628.73	32.00	0.00
								6080673.85	2248619.35	32.00	0.00	
								6080675.15	2248619.22	32.00	0.00	
								6080675.29	2248605.42	32.00	0.00	
								6080637.00	2248605.29	32.00	0.00	

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)

Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin	End	x	y	z
					(ft)	(ft)	(ft)	(ft)	(ft)

Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day	Night		Track	
				(dBA)	(dBA)		(dB)	(km(mph))

Sound Level Spectra

Name		ID	Type	Oktave Spectrum (dB)										Source	
				Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin

Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
				Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
				(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(mph)	(mph)		(dB)		(%)	(dB)	(ft)	(ft)

RoadsGeo

Name	Height		Coordinates				Dist	LSlope
	Begin	End	x	y	z	Ground	(ft)	(%)
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		

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APPENDIX 10.1:

CONSTRUCTION NOISE CALCULATIONS

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14638 - Best Buy - Orange

CadnaA Noise Prediction Model: 16438-02_Construction.cna

Date: 14.10.25

Analyst: B. Maddux

Calculation Configuration

Configuration	
Parameter	Value
General	
Max. Error (dB)	0.00
Max. Search Radius (ft)	6561.70
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (ft)	3280.80
Min. Length of Section (ft)	3.30
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	5.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	328.08
Search Radius Rcvr	328.08
Max. Distance Source - Rcvr	3280.84 3280.84
Min. Distance Rcvr - Reflector	3.28 3.28
Min. Distance Source - Reflector	0.33
Industrial (ISO 9613 (1996))	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Incl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°F)	50
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (mph)	6.7
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Receiver Noise Levels

Name	M.	ID	Level Lr			Limit. Value			Land Use			Height	Coordinates		
			Day	Night	CNEL	Day	Night	CNEL	Type	Auto	Noise Type		X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)				(ft)	(ft)	(ft)	(ft)
R1		R1	75.2	-29.6	72.1	0.0	0.0	0.0	x	Total		5.00	6080468.98	2248762.73	5.00
R2		R2	67.5	-37.3	64.5	0.0	0.0	0.0	x	Total		5.00	6081006.30	2248678.53	5.00
R3		R3	71.9	-32.9	68.9	0.0	0.0	0.0	x	Total		5.00	6080706.13	2248376.27	5.00
R4		R4	71.3	-33.5	68.3	0.0	0.0	0.0	x	Total		5.00	6080399.12	2248347.66	5.00

Point Source(s)

Name	M.	ID	Result. PWL			Lw / Li			Operating Time			Height	Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Special	Night		X	Y	Z
			(dBA)	(dBA)	(dBA)		dB(A)		(min)	(min)	(min)	(ft)	(ft)	(ft)	(ft)

Line Source(s)

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Operating Time			Moving Pt. Src			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	Number		Speed		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)	Day	Evening	Night	(mph)	(ft)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Area Source(s)

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Operating Time			Height	
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Special	Night	(ft)	
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	(min)	(min)	(min)		
CA1		CA1	122.5	17.7	17.7	80.5	-24.3	-24.3	PWL-Pt	117.7					8	r

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
CA1	CA1	8.00	r	6080294.43	2248708.77	8.00	0.00
				6080769.65	2248713.88	8.00	0.00
				6080771.00	2248521.30	8.00	0.00
				6080779.24	2248521.36	8.00	0.00
				6080780.23	2248381.36	8.00	0.00
				6080226.89	2248377.49	8.00	0.00
				6080227.57	2248531.69	8.00	0.00
				6080296.32	2248533.08	8.00	0.00

Barrier(s)

Name	Sel.	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
				left	right		horz.	vert.	Begin	End	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
									8.00	r	6080779.47	2248381.36	8.00	0.00
											6080227.71	2248375.44	8.00	0.00

Building(s)

Name	Sel.	M.	ID	RB	Residents	Absorption	Height	Coordinates				
								Begin	x	y	z	Ground
							(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Ground Absorption(s)

Name	Sel.	M.	ID	G	Coordinates	
					x	y
					(ft)	(ft)

Contour(s)

Name	Sel.	M.	ID	OnlyPts	Height		Coordinates		
					Begin	End	x	y	z
					(ft)	(ft)	(ft)	(ft)	(ft)

Vertical Area Source(s)

Name	ID	Height		Coordinates			
		Begin	End	x	y	z	Ground
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)

Rail

Name	Sel.	M.	ID	Lw'		Train Class	Correct.	Vmax
				Day	Night			
				(dBA)	(dBA)			(dB)(km(mph))

Sound Level Spectra

Name		ID	Type	Oktave Spectrum (dB)											Source	
				Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	

Roads

Name	Sel.	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
				Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
				(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(mph)	(mph)			(dB)		(%)	(dB)	(ft)

RoadsGeo

Name	Height		Coordinates				Dist	LSlope
	Begin	End	x	y	z	Ground	(ft)	(%)
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		