Appendix H:
Noise Impact Analysis

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Noise Impact Analysis Report
Piercy Road Industrial Warehouse Project
City of San José, Santa Clara County, California

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ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
APN	Assessor's Parcel Number
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
DNL	day/night average sound level
du/acre	dwelling units per acre
EPA	United States Environmental Protection Agency
FCS	FirstCarbon Solutions
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
in/sec	inch per second
L_{eq}	equivalent sound level
L_{max}	maximum noise/sound level
PPV	peak particle velocity
rms	root mean square
TTM	Tentative Tract Map
VdB	velocity in decibels

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SECTION 1: INTRODUCTION

1.1 - Purpose of Analysis and Study Objectives

This Noise Impact Analysis Report has been prepared by FirstCarbon Solutions (FCS) to evaluate and disclose the potential off-site and on-site noise impacts associated with the proposed Piercy Road Industrial Warehouse Project (proposed project). The following is provided in this report:

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

1.2 - Project Summary

The project site is located at 455 Piercy Road in the Edenvale neighborhood in the southern portion of San José, California (Exhibit 1 and Exhibit 2). The approximately 14.26-acre project site includes one parcel (Assessor's Parcel Number [APN] 678-93-030). The project site is located within the New Edenvale Employment Area General Plan Planned Growth Area. It is located in the *San José East, California* United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle Map. U.S. Highway 101 (US-101) (El Camino Real) is located approximately 0.66 mile west of the project site and Interstate 280 (I-280) and Interstate 680 (I-680) is located approximately 6.5 miles to the northwest.

InSite Property Group (project applicant) proposes to remove existing shrubs and ground cover at the site to construct a light industrial building, including office space, totaling approximately 121,580 square feet (inclusive of the office space) and truck distribution infrastructure. The proposed structure would include 121,580 square feet, which would be comprised of approximately 116,580 square feet of warehouse space and approximately 5,000 square feet of a mezzanine office space (Exhibit 3). The maximum height of the proposed structure would be 48 feet. According to correspondence with the project applicant, the anticipated port of product origin for truck trips would be the Port of Oakland, approximately 49.2 miles from the project site.

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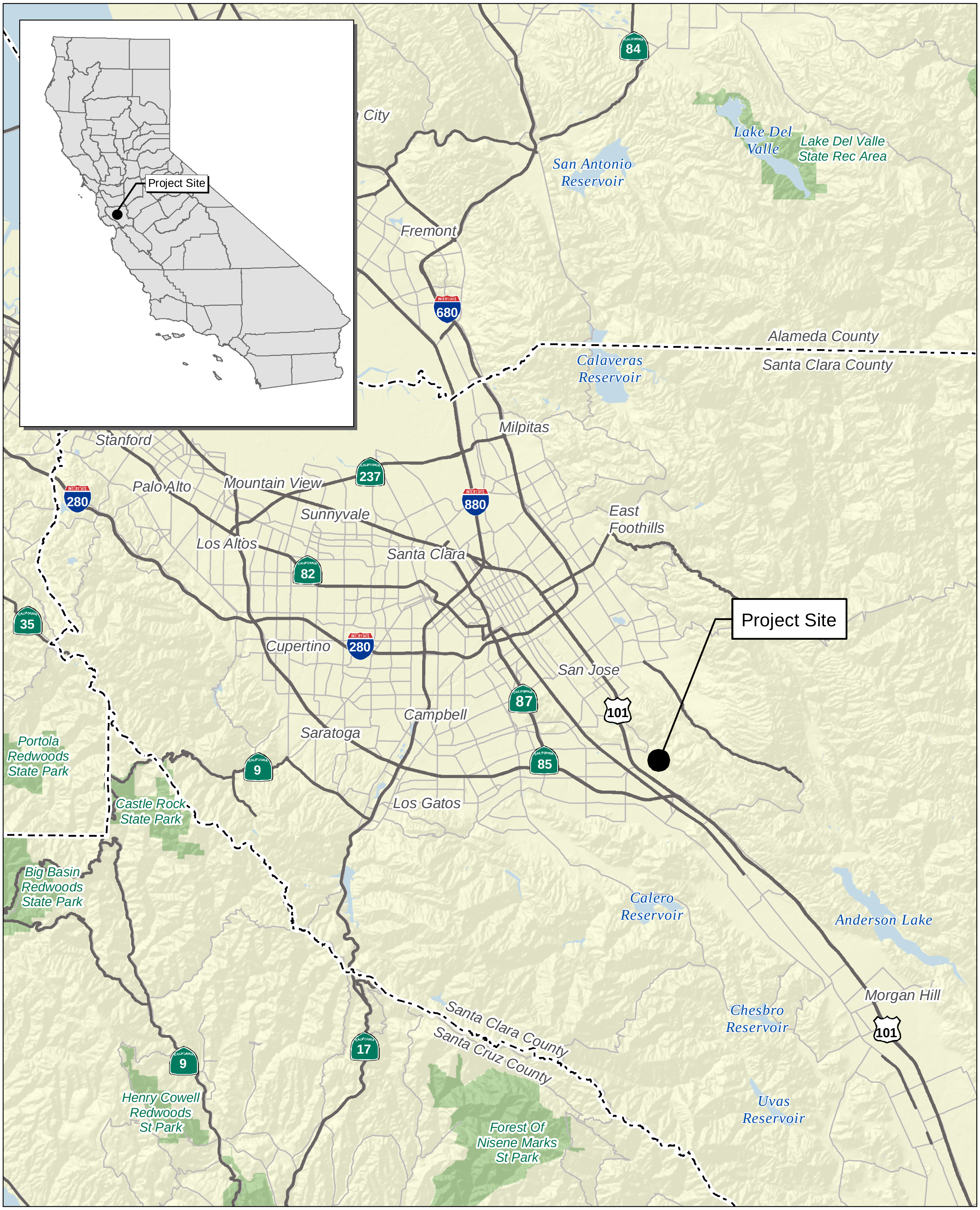

Source: Census 2000 Data, The California Spatial Information Library (CaSIL).

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Exhibit 1
Regional Location Map

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INSITE PROPERTY GROUP
455 PIERCY ROAD INDUSTRIAL WAREHOUSE
NOISE IMPACT ANALYSIS REPORT

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Source: ESRI Aerial Imagery. RGA, 07/27/2021.

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Exhibit 2
Local Vicinity Map

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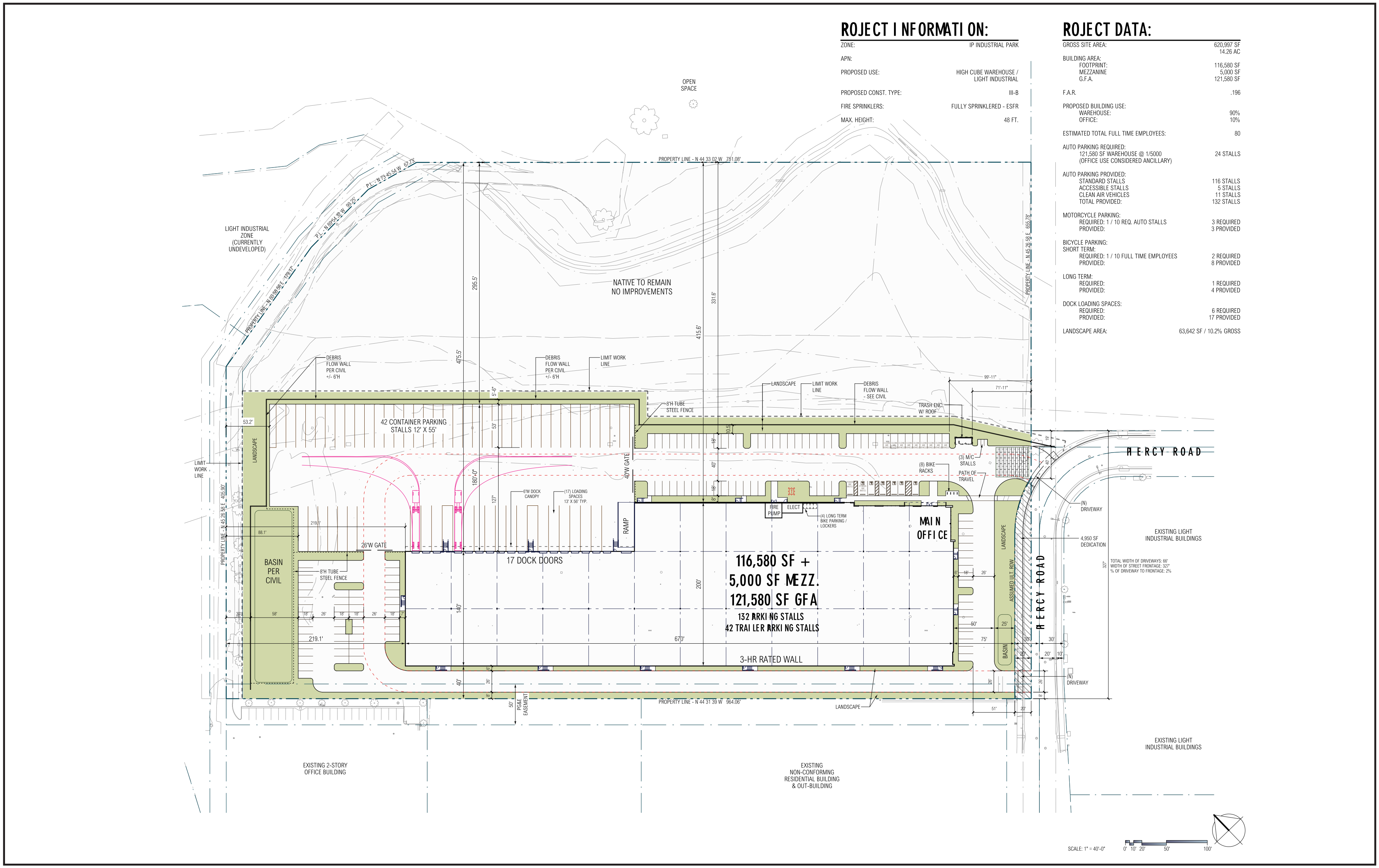

Source: RGA Office of Architectural Design, 7/27/21.

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Exhibit 3
Site Plan

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INSITE PROPERTY GROUP
455 PIERCY ROAD INDUSTRIAL WAREHOUSE
NOISE IMPACT ANALYSIS REPORT

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SECTION 2: NOISE AND VIBRATION FUNDAMENTALS

2.1 - Characteristics of Noise

Noise is generally defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

Several noise measurement scales exist which are used to describe noise in a particular location. A *decibel* (dB) is a unit of measurement that indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense. Each 10-dB increase in sound level is perceived as approximately a doubling of loudness. Sound intensity is normally measured through the A-weighted sound level (dBA). This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive.

Noise impacts can be described in three categories. The first is audible impacts, which refers to increases in noise levels noticeable to humans. An audible increase in noise levels generally refers to a change of 3 dB or greater since this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1 and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level would be. Geometric spreading causes the sound level to attenuate or be reduced, resulting in a 6-dB reduction in the noise level for each doubling of distance from a single point source of noise to the noise-sensitive receptor of concern. A long, closely spaced continuous line of vehicles along a roadway becomes a line source and produces a 3 dBA decrease in sound level for each doubling of distance. However, experimental evidence has shown that where sound from a highway propagates close to "soft" ground (e.g., plowed farmland, grass, crops, etc.), the most suitable drop-off rate to use is not 3 dBA but rather 4.5 dBA per distance doubling. There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The predominant rating scales for human communities in the State of California are the equivalent continuous sound level (L_{eq}) and Community Noise Equivalent Level (CNEL) or the day/night average level (DNL) based on dBA. L_{eq} is the total sound energy of time-varying noise over a sample period. CNEL is the time-varying noise over a 24-hour period, with a 5-dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10-dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). DNL is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and DNL are within one dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

Common sources of noise in urban environments include mobile sources, such as traffic, and stationary sources, such as mechanical equipment or construction operations.

Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on each construction site and, therefore, would change the noise levels as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 1 shows typical noise levels of construction equipment as measured at a distance of 50 feet from the operating equipment. Construction period noise levels are higher than background ambient noise levels, but they eventually cease once construction is complete.

Table 1: Typical Construction Equipment Maximum Noise Levels, L_{max}

Category	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Pickup Truck	No	55
Pumps	No	77
Air Compressors	No	80
Backhoe	No	80
Front-End Loaders	No	80
Portable Generators	No	82
Dump Truck	No	84
Tractors	No	84
Auger Drill Rig	No	85
Concrete Mixer Truck	No	85
Cranes	No	85
Bulldozers	No	85
Excavators	No	85
Graders	No	85

Category	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Jackhammers	Yes	85
Man Lift	No	85
Paver	No	85
Pneumatic Tools	No	85
Rollers	No	85
Scrapers	No	85
Concrete/Industrial Saws	No	90
Impact Pile Driver	Yes	95
Vibratory Pile Driver	No	95
Notes: dBA = A-weighted decibel Source: Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook. August.		

2.2 - Characteristics of Groundborne Vibration

Groundborne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings.

Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. When assessing annoyance from groundborne vibration, vibration is typically expressed as root mean square (rms) velocity in units of decibels of 1 micro-inch per second. To distinguish these vibration levels referenced in decibels from noise levels referenced in decibels, the unit is written as “VdB.”

In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Common sources of groundborne vibration include construction activities such as blasting, pile driving, and operating heavy earthmoving equipment. However, construction vibration impacts on building structures are generally assessed in terms of peak particle velocity (PPV). For purposes of this analysis, project-related impacts are expressed in terms of PPV. Typical vibration source levels from construction equipment are shown in Table 2.

Table 2: Vibration Levels of Construction Equipment

Construction Equipment	PPV at 25 Feet (inches/second)	rms Velocity in Decibels (VdB) at 25 Feet
Water Trucks	0.001	57
Scraper	0.002	58
Bulldozer (Small)	0.003	58
Jackhammer	0.035	79

Construction Equipment	PPV at 25 Feet (inches/second)	rms Velocity in Decibels (VdB) at 25 Feet
Concrete Mixer	0.046	81
Concrete Pump	0.046	81
Paver	0.046	81
Pickup Truck	0.046	81
Auger Drill Rig	0.051	82
Backhoe	0.051	82
Crane (Mobile)	0.051	82
Excavator	0.051	82
Grader	0.051	82
Loader	0.051	82
Loaded Trucks	0.076	86
Bulldozer (Large)	0.089	87
Caisson drilling	0.089	87
Vibratory Roller (Small)	0.101	88
Compactor	0.138	90
Clam shovel drop	0.202	94
Vibratory Roller (Large)	0.210	94
Pile Driver (Impact: typical)	0.644	104
Pile Driver (Impact: upper range)	1.518	112

Notes:
PPV = peak particle velocity
VdB = velocity in decibels
rms = root mean square
Source: Compilation of scientific and academic literature, generated by Federal Transit Administration (FTA) and Federal Highway Administration (FHWA).

The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform medium, while groundborne vibrations travel through the Earth, which may contain significant geological differences. Factors that influence groundborne vibration include:

- **Vibration source:** Type of activity or equipment, such as impact or mobile, and depth of vibration source.
- **Vibration path:** Soil type, rock layers, soil layering, depth to water table, and frost depth.
- **Vibration receiver:** Foundation type, building construction, and acoustical absorption.

Among these factors that influence groundborne vibration, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and shallow rock seems to concentrate the vibration energy close to the surface, and can result in groundborne vibration problems at large distance from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil type, but it has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests. The vibration level (calculated below as PPV) at a distance from a point source can generally be calculated using the vibration reference equation:

$$PPV = PPV_{ref} * (25/D)^n \text{ (in/sec)}$$

Where:

PPV_{ref} = reference measurement at 25 feet from vibration source
D = distance from equipment to property line
n = vibration attenuation rate through ground

According to Section 7 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, an "n" value of 1.5 is recommended to calculate vibration propagation through typical soil conditions.[1]

1 Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

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SECTION 3: REGULATORY SETTING

3.1 - Federal Regulations

3.1.1 - United States Environmental Protection Agency

In 1972, Congress enacted the Noise Control Act. This Act authorized the United States Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish levels of sound "requisite to protect the public welfare with an adequate margin of safety." These levels are separated into health (hearing loss levels) and welfare (annoyance levels) categories, as shown in Table 3. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

Table 3: Summary of EPA-Recommended Noise Levels to Protect Public Welfare

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.
Notes: L_{eq} = equivalent continuous sound level L_{dn} = day/night average sound level (24) = signifies an L_{eq} duration of 24 hours		

3.1.2 - Federal Transit Administration

The FTA has established industry accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment Manual.[2] The FTA Guidelines include thresholds for construction vibration impacts for various

2 Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

structural categories as shown in Table 4.

Table 4: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	PPV (in/sec)	Approximate VdB
I. Reinforced—Concrete, Steel or Timber (no plaster)	0.5	102
II. Engineered Concrete and Masonry (no plaster)	0.3	98
III. Non-Engineered Timber and Masonry Buildings	0.2	94
IV. Buildings Extremely Susceptible to Vibration Damage	0.12	90

Notes:
VdB = velocity in decibels
PPV = peak particle velocity
in/sec = inch per second
Source: Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September.

3.2 - State Regulations

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the "State Noise Insulation Standard," it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor-ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City of San José has adopted and modified those guidelines as described as follows.

3.3 - Local Regulations

The project site is located within the City of San José and this analysis was performed using the City's noise regulations. The City of San José addresses noise in the Noise Element of the San José General

Plan 2040[3] and in the City of San José Municipal Code.[4]

City of San José General Plan 2040

The land use compatibility guidelines for Community Noise in San José are laid out in the City's General Plan. For example, new residential land uses are considered "normally acceptable" with exterior noise exposures of up to 60 dBA DNL and "conditionally compatible" where the exterior noise exposure is between 60 and 75 dBA DNL, such that the specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features are included in the design.

The General Plan includes policies for the purpose of avoiding or mitigating impacts resulting from planned development projects within the City. The following policies are specific to noise and vibration and are applicable to the proposed project.

Policy EC-1.1 Locate new development in areas where noise levels are appropriate for the proposed uses. Consider federal, State and City noise standards and guidelines as a part of new development review. Applicable standards and guidelines for land uses in San José include:

Interior Noise Levels

- The City's standard for interior noise levels in residences, hotels, motels, residential care facilities, and hospitals is 45 dBA DNL. Include appropriate site and building design, building construction and noise attenuation techniques in new development to meet this standard. For sites with exterior noise levels of 60 dBA DNL or more, an acoustical analysis following protocols in the City-adopted California Building Code is required to demonstrate that development projects can meet this standard. The acoustical analysis shall base required noise attenuation techniques on expected *Envision General Plan* traffic volumes to ensure land use compatibility and General Plan consistency.

Exterior Noise Levels

- The City's acceptable exterior noise level objective is 60 dBA DNL or less for residential and most institutional land uses (Table EC-1 in the General Plan).
- For new multi-family residential projects and for the residential component of mixed-use development, use a standard of 60 dBA DNL in usable outdoor activity areas, excluding the balconies and residential stoops and porches facing existing roadways. Some common use areas that meet the 60 dBA DNL exterior standard will be available to all residents. Use noise attenuation techniques such as shielding buildings and structures for outdoor common use areas. On sites subject to aircraft overflights or adjacent to elevated roadways, use noise attenuation

3 City of San José. 2018. Envision San José General Plan 2040. Website: https://www.sanjoseca.gov/your-government/departments/planning-building-code-enforcement/planning-division/citywide-planning/envision-san-jos-2040-general-plan. Accessed June 16, 2021.

4 Code of Ordinance. 2021. San José Municipal Code. Website: https://library.municode.com/ca/san_jose/codes/code_of_ordinances. Accessed June 16, 2021.

techniques to achieve the 60 dBA DNL standard for noise for sources other than aircraft and elevated roadway segments.

Policy EC-1.2 Minimize the noise impacts of new development on land uses sensitive to increased noise levels (Land Use Categories 1, 2, 3 and 6 in Table EC-1 in the General Plan) by limiting noise generation and by requiring use of noise attenuation measures such as acoustical enclosures and sound barriers, where feasible. The City considers significant noise impacts to occur if a project would:

- Cause the DNL at noise-sensitive receptors to increase by five dBA DNL or more where the noise levels would remain "Normally Acceptable" or
- Cause the DNL at noise-sensitive receptors to increase by three dBA DNL or more where noise levels would equal or exceed the "Normally Acceptable" level.

Policy EC-1.3 Mitigate noise generation of new nonresidential land uses to 55 dBA DNL at the property line when located adjacent to existing or planned noise-sensitive residential and public/quasi-public land uses.

Policy EC-1.6 Regulate the effects of operational noise from existing and new industrial and commercial development on adjacent uses through noise standards in the City's Municipal Code.

Policy EC-1.7 Require construction operations within San José to use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would:

- Involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months.

  For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise, and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses.

Policy EC-2.3 Require new development to minimize vibration impacts to adjacent uses during demolition and construction. For sensitive historic structures, a vibration limit of 0.08 in/sec PPV [peak particle velocity] will be used to minimize the potential for cosmetic damage to a building. A vibration limit of 0.20 in/sec PPV will be used to minimize the potential for cosmetic damage at buildings of normal conventional construction. Equipment or activities typical of generating continuous vibration include but are not limited to excavation equipment; static compaction equipment;

vibratory pile drivers; pile-extraction equipment; and vibratory compaction equipment. Avoid use of impact pile drivers within 125 feet of any buildings, and within 300 feet of historical buildings, or buildings in poor condition. On a project-specific basis, this distance of 300 feet may be reduced where warranted by a technial [*sic*] study by a qualified professional that verifies that there will be virtually no risk of comsetic [*sic*] damage to sensitive buildings from the new development during demolition and construction. Transient vibration impacts may exceed a vibration limit of 0.08 in/sec PPV only when and where warranted by a technical study by a qualified professional that verifies that there will be virtually no risk of comsetic [*sic*] damage to sensitive buildings from the new development during demolition and construction.

San **José** *Municipal Code*

The Municipal Code restricts construction hours within 500 feet of a residential unit to occur only between 7:00 a.m. to 7:00 p.m. Monday through Friday, unless otherwise expressly allowed in a Development Permit or other planning approval. No construction activities are permitted on the weekends at sites within 500 feet of a residence.

The Zoning Ordinance limits noise levels to 55 dBA L_{max} at any residential property line and 60 dBA L_{max} at commercial property lines, unless otherwise expressly allowed in a Development Permit or other planning approval. The City further prohibits activity on any site that causes ground vibration that is perceptible without instruments at the property line of the site.

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SECTION 4: EXISTING NOISE CONDITIONS

The site is located within a larger Industrial Park designated area. The project site is bound to the southeast by Piercy Road, vacant land, and commercial uses; to the southwest is a residence; to the northwest is Silver Creek Valley Road, and to the northeast is vacant land. While additional residential uses exist across Hellyer Avenue, this analysis is limited to the land uses adjacent to the project site, evaluating reasonable worst-case construction and operational noise impacts to the closest receptors.

The dominant existing noise sources in the project vicinity include traffic on local roadways, primarily from traffic on Piercy Road, Hellyer Avenue, and Silver Creek Valley Road. The commercial and office land use located to the northwest, west, and south of the project site, all generate noise from parking lot activity and mechanical ventilation equipment operations.

Existing traffic noise levels along selected roadway segments in the project vicinity were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The daily traffic volumes were obtained from the traffic analysis prepared for the proposed project by Hexagon.[5] The traffic volumes described here correspond to the existing without project conditions traffic scenario as described in the transportation analysis. The model inputs and outputs—including the 60 dBA, 65 dBA, and 70 dBA DNL noise contour distances—are provided in Appendix A of this document. A summary of the modeling results is shown in Table 5. As is shown in Table 5, traffic noise levels range up to 66.4 dBA DNL at 50-feet from the outermost travel lane on roadway segments adjacent to the project site.

Table 5: Existing Traffic Noise Levels

Roadway Segment	Approximate ADT	Centerline to 70 DNL (feet)	Centerline to 65 DNL (feet)	Centerline to 60 DNL (feet)	DNL (dBA) 50 feet from Centerline of Outermost Lane
Silver Creek Valley Road–east of Hellyer Avenue	14,000	< 50	90	188	66.4
Hellyer Avenue–Silver Creek Valley Road to Piercy Road	7,100	< 50	< 50	82	60.8
Piercy Road–east of Hellyer Avenue	1,500	< 50	< 50	< 50	55.5

Notes:
ADT = Average Daily Traffic; this is based on the PM peak-hour turning volumes from the traffic study, multiplied by a factor of 10.
DNL = day/night average sound level
dBA = A-weighted decibel
[1] Modeling results do not take into account mitigating features such as topography, vegetative screening, fencing, building design, or structure screening. Rather, they assume a worst-case scenario of having a direct line of site on flat terrain.
Source: FirstCarbon Solutions (FCS) 2021.

[5] Hexagon Transportation Consultants, Inc.. 2022. 455 Piercy Road Warehouse Transportation Analysis. January 21.

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SECTION 5: THRESHOLDS OF SIGNIFICANCE AND IMPACT ANALYSIS

5.1 - Thresholds of Significance

According to the California Environmental Quality Act (CEQA) Guidelines updated Appendix G, to determine whether impacts related to noise and vibration are significant environmental effects, the following questions should be evaluated.

Would the proposed project:

a) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

b) Generate 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?

c) Generate excessive groundborne vibration or groundborne noise levels?

d) 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?

5.2 - Noise Levels That Would Conflict with Any Land Use Plan, Policy, or Regulation

A significant impact would occur if the proposed industrial land use development would be exposed to transportation noise levels in excess of applicable land use compatibility standards, as described in Policy EC-1.1 in the General Plan. The City considers environments with ambient noise levels of up to 70 dBA DNL to be “normally acceptable” for industrial land use development, as shown in Table EC-1 in the General Plan.

As previously discussed, the dominant existing noise source on the project site is traffic on local roadways, primarily from traffic on Piercy Road, Hellyer Avenue, and Silver Creek Valley Road. (Substantial increase impacts and analysis that demonstrates compliance with Policy ES-1.2 are addressed under Section 5.3 below).

AS shown in the existing traffic noise modeling results in Table 5, the highest traffic noise levels along roadway segments adjacent to the project site are 66.5 dBA DNL as measured at 50-feet from the centerline of the outermost travel lane. These noise levels are within the City’s normally acceptable range for new industrial land use development, as shown in Table EC-1 in the General Plan.

Therefore, the proposed project will not conflict with the City’s General Plan Policy EC-1.1, which provides the City’s exterior noise level normally acceptable land use compatibility standard for this type of land use development. Therefore, implementation of the proposed project would not result in a conflict with applicable land use plan, policy, or regulation, and this impact would be less than significant.

5.3 - Substantial Noise Increase in Excess of Standards

A significant impact would occur if the proposed project would generate a substantial temporary or permanent increase in ambient noise levels in the project vicinity in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

5.3.1 - Construction Noise Impacts

Short-Term Construction Impacts

For purposes of this analysis, a significant impact would occur if construction activities would result in a substantial temporary increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance. According to Policy EC-1.7 the City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would involve substantial noise-generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months. However, construction of the proposed project is expected to last approximately 10 months. The Municipal Code noise ordinances limit the permissible hours for construction activity to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. No construction is permitted on Saturdays, Sundays, or federal holidays.

Construction-related Traffic Noise

Noise impacts from construction activities associated with the proposed project would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. One type of short-term noise impacts that could occur during project construction would result from the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site.

The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from passing trucks would be similar to existing vehicle-generated noise on these local roadways. Typically, a doubling of the Average Daily Traffic (ADT) hourly volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels, which, as discussed in the characteristics of nose discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments. As shown in Table 15 above, existing ADT on Piercy Road adjacent to the project site is 1,500. According to the air quality modeling results, the highest daily project trip generation during project construction is calculated to be 198 ADT. Therefore, project-related construction trips would not be expected to double the hourly traffic volumes along any roadway segment in the project vicinity. For this reason, short-term intermittent noise from construction trips would be minor when averaged over a longer time period and would not result in a perceptible increase in hourly- or daily average traffic noise levels in the project vicinity. Therefore, short-term construction-related noise impacts associated with the transportation of workers and equipment to the project site would be less than significant.

Construction Equipment Operational Noise

The second type of short-term noise impact is related to noise generated during construction on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings. Impact equipment, such as impact pile drivers, are not expected to be used during construction of this project. This noise impact analysis focuses on analyzing the loudest phase of construction (see Section 4.3, Air Quality, Table 3 Preliminary Construction Schedule, for construction phases) and demonstrates that, with implementation of the City's Standard Permit Conditions (SPCs), impacts would be reduced to less than significant.

The loudest phase of construction is typically the site preparation and grading phase, as that is when the loudest pieces of heavy construction equipment would operate. For example, the maximum noise level generated by each scraper is assumed to be 85 dBA L_{max} at 50 feet from this equipment. Each bulldozer would also generate 85 dBA L_{max} at 50 feet. The maximum noise level generated by graders is approximately 85 dBA L_{max} at 50 feet.

A conservative but reasonable assumption is that this equipment would operate simultaneously and continuously over at least a 1-hour period in the vicinity of the closest existing residential receptors, but would move linearly over the project site as they perform their earth moving operations, spending a relatively short amount of time adjacent to any one receptor. A characteristic of sound is that each doubling of sound sources with equal strength increases a sound level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, a reasonable worst-case combined noise level during this phase of construction would be 90 dBA L_{max} at a distance of 50 feet from the acoustic center of a construction area. The acoustical center reference is used because construction equipment must operate at some distance from one another on a project site, and the combined noise level as measured at a point equidistant from the sources (acoustic center) would be the worst-case maximum noise level. These operations would be expected to result in a reasonable worst-case hourly average of 86 dBA L_{eq} at a distance of 50 feet from the acoustic center of a construction area. These worst-case construction noise levels would only occur during the site preparation phase of development.

The closest noise-sensitive receptors to the proposed project site is the single-family residence located along the southwestern border of the project site. This closest receptor would be located approximately 100 feet from the acoustic center of construction activity where multiple pieces of heavy construction equipment would potentially operate at the project site. At this distance, worst-case construction noise levels could range up to approximately 84 dBA L_{max}, intermittently, and could have an hourly average of up to 80 dBA L_{eq}, at the façade of the nearest single-family residential home.

The proposed project would be required to comply with the City of San José Municipal Code, which limits noise-generating construction activities to daytime hours on weekdays, and would also require mitigation to comply with General Plan Policy EC-1.7 if construction would last for more than 12 months. However, construction of the proposed project is expected to last approximately 10 months. Therefore, additional mitigation would not be required.

However, the project must comply with the requirement of Policy EC-1.7 which states that construction operations within San José must use best available noise suppression devices and techniques and limit construction hours near residential uses per the City's Municipal Code. The City of San José Municipal Code limits construction activities to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday. Therefore, the proposed project would be required to comply with the City's Standard Permit Condition listed below. With adherence to the City's Standard Permit Condition the proposed project would not result in substantial temporary increases at the off-site sensitive receptors above standards established in the Municipal Code and General Plan, and construction noise impacts on sensitive receptors in the project vicinity would be considered less than significant.

Standard Permit Condition

Construction-related Noise

Noise minimization measures include, but are not limited to, the following:

- Pile Driving is prohibited.
- Limit construction to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday for any on-site or off-site work within 500 feet of any residential unit. Construction outside of these hours may be approved through a Development Permit based on a site-specific "construction noise mitigation plan" and a finding by the Director of Planning, Building, and Code Enforcement that the construction noise mitigation plan is adequate to prevent noise disturbance of affected residential uses.
- Construct solid plywood fences around ground level construction sites adjacent to operational businesses, residences, or other noise-sensitive land uses.
- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Prohibit unnecessary idling of internal combustion engines.
- Locate stationary noise-generating equipment such as air compressors or portable power generators as far as possible from sensitive receptors. Construct temporary noise barriers to screen stationary noise-generating equipment when located near adjoining sensitive land uses.
- Utilize "quiet" air compressors and other stationary noise sources where technology exists.
- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- Notify all adjacent business, residences, and other noise-sensitive land uses of the construction schedule, in writing, and provide a written schedule of "noisy" construction activities to the adjacent land uses and nearby residences.
- If complaints are received or excessive noise levels cannot be reduced using the measures above, erect a temporary noise control blanket barrier along surrounding building facades that face the construction sites.
- Designate a "disturbance coordinator" who shall be responsible for responding to any complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., bad muffler, etc.) and shall require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.

5.3.2 - Mobile Source Operational Noise Impacts

A significant impact would occur if project-generated traffic would result in a substantial increase in ambient noise levels compared with those that would exist without the project. The City considers a significant noise impact to occur if a project would cause the DNL at noise-sensitive receptors to increase by 5 dBA DNL or more where the noise levels would remain "normally acceptable"; or where it would cause the DNL at noise-sensitive receptors to increase by 3 dBA DNL or more where noise levels would equal or exceed the "normally acceptable" level.

Traffic noise levels along selected roadway segments in the project vicinity were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). Site-specific information is entered, such as roadway traffic volumes, roadway active width, source-to-receiver distances, travel speed, noise source and receiver heights, and the percentages of automobiles, medium trucks, and heavy trucks that the traffic is made up of throughout the day, among other variables. The daily traffic volumes were obtained from the traffic analysis prepared for the proposed project by Hexagon.[6] The traffic volumes described here correspond to the background without and with project conditions traffic scenarios as described in the transportation analysis. The model inputs and outputs—including the 60 dBA, 65 dBA, and 70 dBA CNEL noise contour distances—are provided in Appendix A of this document. Table 6: shows the traffic noise model results and the resulting project increase in traffic noise levels.

Table 6: Traffic Noise Increase Summary

Roadway Segment	Background (without Project) (dBA) DNL	Background Plus Project (dBA) DNL	Increase over Background with Project (dBA)
Silver Creek Valley Road–east of Hellyer Avenue	68.4	68.4	0.0
Hellyer Avenue–Silver Creek Valley Road to Piercy Road	62.0	62.1	0.1

6 Hexagon Transportation Consultants, Inc.. 2022. 455 Piercy Road Warehouse Transportation Analysis. January 21.

Roadway Segment	Background (without Project) (dBA) DNL	Background Plus Project (dBA) DNL	Increase over Background with Project (dBA)
Piercy Road–east of Hellyer Avenue	56.5	57.2	0.7

Notes:
DNL = day/night average sound level
dBA = A-weighted decibel
[1] Modeling results do not take into account mitigating features such as topography, vegetative screening, fencing, building design, or structure screening. Rather, they assume a worst-case scenario of having a direct line of site on flat terrain.
Source: FirstCarbon Solutions (FCS) 2021.

As shown in Table 6: the highest traffic noise level increase with implementation of the project would be less than 1 dBA for every modeled roadway segment and traffic scenario. This is well below the 3 dBA increase that would be considered a substantial increase in traffic noise. Therefore, implementation of the proposed project would not result in a substantial increase in traffic noise levels compared with traffic noise levels existing without the project.

5.3.3 - Stationary Source Operational Noise Impacts

A significant impact would occur if operational noise levels generated by stationary noise sources at the proposed project site would result in a substantial permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. Policy EC-1.2 defines a substantial increase as one that would cause the DNL at noise-sensitive receptors to increase by 5 dBA or more where the noise levels would remain "Normally Acceptable" or cause the DNL at noise-sensitive receptors to increase by 3 dBA or more where noise levels would equal or exceed the "Normally Acceptable" level. Policy EC-1.3 of the General Plan restricts new nonresidential land uses operational noise levels to 55 dBA DNL at the site property lines when located adjacent to existing or planned noise sensitive residential and public/quasi-public land uses. In addition, the Zoning Ordinance limits noise levels to 55 dBA maximum sound level (L_{max}) at any residential property line and 60 dBA L_{max} at commercial property lines, unless otherwise expressly allowed in a Development Permit or other planning approval.

The primary new stationary noise sources associated with implementation of the project would be the new mechanical ventilation systems, truck loading and unloading activity, and parking lot activity. Potential impacts associated with these new noise sources are analyzed below.

Mechanical Equipment Operations

At the time of this analysis, details were not available pertaining to proposed rooftop mechanical ventilation systems for the project; therefore, a reference noise level for typical mechanical ventilation systems was used. Noise levels from typical current market available, commercial grade mechanical ventilation systems range from 40 dBA to 60 dBA L_{eq} at a distance of 25 feet.

Proposed mechanical ventilation systems could be located as close as approximately 90 feet from the nearest off-site residential property line, the single-family residence located along the southwest border of the project site. At this distance and minimal shielding assumed by the building parapet, noise generated by rooftop mechanical ventilation equipment would attenuate to below 43 dBA L_{max}

and 42 dBA L_{eq} at the nearest off-site residential receptor property line. As noted in the project description, operations would take place from 7:00 a.m. to 7:00 p.m., 7 days per week. Therefore, as a reasonable worst-case scenario, if these operations were to occur every hour over a 24-hour period, the resulting noise level would be 39 dBA DNL as measured at this nearest receptor. The calculation spreadsheet with the detailed modeling assumptions is included in Appendix A of this document.

Combined stationary source operational noise impacts in comparison to the City's substantial increase and 55 dBA DNL thresholds are discussed below. However, these results demonstrate that these operational noise levels would not exceed the City's Municipal Code operational noise performance thresholds of 55 dBA L_{max} as measured at the nearest residential property.

Truck Loading Activities

Noise would be also generated by truck loading and unloading activities at the loading docks along the northern side of the proposed building. Typical noise levels from truck loading and unloading activity range from 70 dBA to 80 dBA L_{max} as measured at 50 feet. These maximum noise level range includes noise from associated truck loading/unloading activity, including trucks maneuvering, truck trailer loading, truck trailer unloading, backup alarms or beepers, and truck docking noise.

The closest noise-sensitive receptor to the proposed project site is the single-family residence located along the southwestern border of the project site. This residence is approximately 350 feet from the nearest loading dock. The loading docks would be located on the opposite side of the proposed building from this receptor. Therefore, due to distance attenuation and shielding provided by the intervening structure, reasonable worst-case noise levels from truck loading and unloading activities would attenuate to below 51 dBA L_{max} and 31 dBA L_{eq} at the property line of the residence. As noted in the project description, operations would take place from 7:00 a.m. to 7:00 p.m., 7 days per week. Therefore, as a reasonable worst-case scenario, if these operations were to occur every hour over a 24-hour period, the resulting noise level would be 29 dBA DNL as measured at this nearest receptor. The calculation spreadsheet with the detailed modeling assumptions is included in Appendix A of this document.

Combined stationary source operational noise impacts in comparison to the City's substantial increase and 55 dBA DNL thresholds are discussed below. However, these results demonstrate that these operational noise levels would not exceed the City's Municipal Code operational noise performance thresholds of 55 dBA L_{max} as measured at the nearest residential property line.

Parking Lot Activities

Typical parking lot activities include people conversing, doors shutting, and vehicles idling which generate noise levels ranging from approximately 60 dBA to 70 dBA L_{max} at 50 feet. These activities are expected to occur sporadically throughout the day, as visitors and staff arrive and leave parking lot areas at the project site.

The closest noise-sensitive receptor to the proposed project site is the single-family residence located along the southwestern border of the project site. This receptor's property line would be located approximately 120 feet from the nearest acoustic center of the nearest proposed parking areas. Therefore, due to distance attenuation, noise levels from typical parking lot activity would attenuate to below 52 dBA L_{max} and 39 dBA L_{eq}. As noted in the project description, operations would take place from 7:00 a.m. to 7:00 p.m., 7 days per week. Therefore, as a reasonable worst-case scenario, if these operations were to occur every hour over a 24-hour period, the resulting noise level would be 36 dBA DNL as measured at this nearest receptor. The calculation spreadsheet with the detailed modeling assumptions is included in Appendix A of this document.

Combined stationary source operational noise impacts in comparison to the City's substantial increase and 55 dBA DNL thresholds are discussed below. However, these results demonstrate that these operational noise levels would not exceed the City's Municipal Code operational noise performance thresholds of 55 dBA L_{max} as measured at the nearest residential property line.

Combined Stationary Source Operational Noise Impact Conclusion

Table 7: provides a summary of the stationary source operational noise as well as what the combined stationary operational noise level would be from the simultaneous operation of all on-site stationary noise sources as measured at the nearest residential property line.

Table 7: Stationary Operational Noise Impact Summary

Source	24-hour Average Noise Levels dBA, DNL	City's Noise Performance Threshold dBA, DNL	Exceed Threshold? (Yes/No)
Mechanical Ventilation Equipment	39	55	No
Truck Loading and Unloading Activities	29	55	No
Parking Lot Activities	36	55	No
Combined Noise Levels	41	55	No

Notes:
dBA = A-weighted decibel
DNL = day/night average sound level
Sources: FirstCarbon Solutions (FCS) 2021.

Based on the modeled existing traffic noise levels shown in Table 5, the existing background ambient noise levels in the vicinity of the nearest off-site residential receptor are documented to be55.5 dBA DNL. The City considers these noise levels to be "normally acceptable" for residential land uses. As shown in Table 7, the combined stationary source operational noise levels as measured at the nearest residential property line would be 41 dBA DNL. These noise levels are 14 dBA below the existing background ambient noise levels. Therefore, combined stationary sources would not result in any measurable increase in ambient noise levels.

Therefore, project combined stationary source operational noise levels would not exceed the City's substantial increase threshold defined in General Policy EC-1.2 as measured at the property line. In addition, these operational noise levels would not exceed the noise performance standard in the City's Municipal Code of 55 dBA L_{max} as measured at the property line. Therefore, noise levels from combined stationary source operational noise levels would not generate a substantial temporary or permanent increase in ambient noise levels in the project vicinity in excess of standards established in the local general plan or noise ordinance, and the impact would be less than significant.

5.4 - Groundborne Vibration/Noise Levels

In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Common sources of groundborne vibration include construction activities such as blasting, pile driving, and operating heavy earthmoving equipment. In general, if groundborne vibration levels do not exceed levels considered to be perceptible, then groundborne noise levels would not be perceptible in most interior environments. Therefore, this analysis focuses on determining exceedances of groundborne vibration levels.

5.4.1 - Short-term Construction Vibration Impacts

A significant impact would occur if the proposed project would generate excessive groundborne vibration or groundborne noise levels. According to Policy EC-2.3 of the City's General Plan, a vibration limit of 0.08 in/sec PPV shall be used to minimize the potential for cosmetic damage to sensitive historical structures, and a vibration limit of 0.20 in/sec PPV shall be used to minimize damage at buildings of normal conventional construction.

Of the variety of equipment used during construction, the large vibratory rollers anticipated to be used in the site preparation phase of construction would produce the greatest groundborne vibration levels. Large vibratory rollers produce groundborne vibration levels ranging up to 0.201 inch per second (in/sec) PPV at 25 feet from the operating equipment.

The nearest off-site structure is a residential structure located along the southwestern border of the project site, approximately 75 feet from the nearest construction footprint where a large vibratory roller would potentially operate. At this distance, groundborne vibration levels could range up to 0.04 PPV from operation of a large vibratory roller. This is well below the City's standard of 0.2 in/sec PPV for structures of normal conventional construction.

Therefore, construction-related groundborne vibration would not continually disturb adjacent properties or impact the general public's health, comfort, and convenience, nor would these vibration levels exceed the City's construction vibration impact criteria as measured at the nearest receiving structures in the project vicinity. Project construction-related groundborne vibration impacts would be less than significant.

5.5 - Excessive Noise Levels from Airport Activity

A significant impact would occur if the proposed project would expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an Airport Land Use Compatibility Plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport.

The nearest airport to the project site is the Norman Y. Mineta San José Airport located 9.6 miles northwest of the project site. The project site is located well outside of the 65 dBA CNEL airport noise contours. While aircraft noise is occasionally audible on the project site from aircraft flyovers, aircraft noise associated with nearby airport activity would not expose people residing or working near the project site to excessive noise levels. Therefore, implementation of the proposed project would not expose persons residing or working in the project vicinity to noise levels from airport activity that would be in excess of normally acceptable standards for residential land use development, and there would be no project impact associated with airport noise.

Appendix A:
Noise Modeling Data

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Mechanical Equipment Noise Calculation

Receptor: Closest Residence - northwest of Project

		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
		Reference (dBA) 25 ft		Usage	Distance to	Ground	Shielding	Calculated (dBA)		
No.	Equipment Description	Lmax	Quantity	factor[1]	Receptor	Effect[2]	(dBA)[3]	Lmax	Leq	Energy
1	Commercial grade mechanical ventilation equipment	60	1	100	90	1	6	42.9	37.3	5383.844375
2	Commercial grade mechanical ventilation equipment	60	3	100	130	1	6	39.7	37.3	5359.338938
3	Commercial grade mechanical ventilation equipment	60	3	100	180	1	6	36.9	33.1	2018.941641
4	Commercial grade mechanical ventilation equipment	60	3	100	230	1	6	34.7	29.9	967.7379508
5	Commercial grade mechanical ventilation equipment	60	3	100	280	1	6	33.0	27.3	536.373344
6										
7										
8										
9										
10										
							Lmax[4]	43	Leq	42

Notes:
[1] Percentage of time activity occurs each hour
[2] Soft ground terrain between project site and receptor.
[3] Shielding due to terrain or structures
[4] Calculated Lmax is the Loudest value.

Ldn Calculations					
	Time	Hourly Leq	Leq'	0.1*Leq	antiLog
Night	12:00 AM	0.0	10.0	1	10
	1:00 AM	0.0	10.0	1	10
	2:00 AM	0.0	10.0	1	10
	3:00 AM	0.0	10.0	1	10
	4:00 AM	0.0	10.0	1	10
	5:00 AM	0.0	10.0	1	10
	6:00 AM	0.0	10.0	1	10
Day	7:00 AM	41.5	41.5	4.154309412	14266.23625
	8:00 AM	41.5	41.5	4.154309412	14266.23625
	9:00 AM	41.5	41.5	4.154309412	14266.23625
	10:00 AM	41.5	41.5	4.154309412	14266.23625
	11:00 AM	41.5	41.5	4.154309412	14266.23625
	12:00 PM	41.5	41.5	4.154309412	14266.23625
	1:00 PM	41.5	41.5	4.154309412	14266.23625
	2:00 PM	41.5	41.5	4.154309412	14266.23625
	3:00 PM	41.5	41.5	4.154309412	14266.23625
	4:00 PM	41.5	41.5	4.154309412	14266.23625
	5:00 PM	41.5	41.5	4.154309412	14266.23625
	6:00 PM	41.5	41.5	4.154309412	14266.23625
	7:00 PM	41.5	41.5	4.154309412	14266.23625
	8:00 PM	0.0	0.0	0	1
	9:00 PM	0.0	0.0	0	1
Night	10:00 PM	0.0	10.0	1	10
	11:00 PM	0.0	10.0	1	10
			Sum		185553.0712
			Sum/24		7731.377968
			Log10(Sum/24)		3.888256905
			10*Log10(Sum/24)		38.88256905
			24 Hour Ldn		39

Loading/Unloading

Receptor: Closest Residence - southwest of Project

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage factor[1]	Distance to Receptor	Ground Effect[2]	Shielding (dBA)[3]	Calculated (dBA) Lmax	Leq	Energy
1	Loading/Unloading	80	3	1	350	1	12	51.1	27.4	551.8577357
2	Loading/Unloading	80	3	1	400	1	12	49.9	25.7	369.701569
3	Loading/Unloading	80	3	1	450	1	12	48.9	24.1	259.6532282
4	Loading/Unloading	80	2	1	500	1	12	48.0	21.0	126.1914689
5										
6										
7										
8										
9										
10										
							Lmax[4]	51	Leq	31

Notes:
[1] Percentage of time activity occurs each hour
[2] Soft ground terrain between project site and receptor.
[3] Shielding due to terrain or structures
[4] Calculated Lmax is the Loudest value.

Ldn Calculations	Time	Hourly Leq	Leq'	0.1*Leq	antiLog
Night	12:00 AM	0.0	10.0	1	10
	1:00 AM	0.0	10.0	1	10
	2:00 AM	0.0	10.0	1	10
	3:00 AM	0.0	10.0	1	10
	4:00 AM	0.0	10.0	1	10
	5:00 AM	0.0	10.0	1	10
	6:00 AM	0.0	10.0	1	10
Day	7:00 AM	31.2	31.2	3.11640981	1307.404002
	8:00 AM	31.2	31.2	3.11640981	1307.404002
	9:00 AM	31.2	31.2	3.11640981	1307.404002
	10:00 AM	31.2	31.2	3.11640981	1307.404002
	11:00 AM	31.2	31.2	3.11640981	1307.404002
	12:00 PM	31.2	31.2	3.11640981	1307.404002
	1:00 PM	31.2	31.2	3.11640981	1307.404002
	2:00 PM	31.2	31.2	3.11640981	1307.404002
	3:00 PM	31.2	31.2	3.11640981	1307.404002
	4:00 PM	31.2	31.2	3.11640981	1307.404002
	5:00 PM	31.2	31.2	3.11640981	1307.404002
	6:00 PM	31.2	31.2	3.11640981	1307.404002
	7:00 PM	31.2	31.2	3.11640981	1307.404002
	8:00 PM	0.0	0.0	0	1
	9:00 PM	0.0	0.0	0	1
Night	10:00 PM	0.0	10.0	1	10
	11:00 PM	0.0	10.0	1	10
			Sum		17088.25202
			Sum/24		712.010501
			Log10(Sum/24)		2.852486399
			10*Log10(Sum/24)		28.52486399
			24 Hour Ldn		29

Parking Lot activity

Receptor: Closest Residence - southwest of Project

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage factor[1]	Distance to Receptor	Ground Effect[2]	Shielding (dBA)[3]	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
1	parking lot activity	60	5	1	120	1	0	52.4	35.6	3616.898148
2	parking lot activity	60	5	1	150	1	0	50.5	32.7	1851.851852
3	parking lot activity	60	5	1	180	1	0	48.9	30.3	1071.673525
4	parking lot activity	60	5	1	210	1	0	47.5	28.3	674.8731239
5										
6										
7										
8										
9										
10										
							Lmax[4]	**52**	**Leq**	**39**

Notes:
[1] Percentage of time activity occurs each hour
[2] Soft ground terrain between project site and receptor.
[3] Shielding due to terrain or structures
[4] Calculated Lmax is the Loudest value.

Ldn Calculations					
	Time	Hourly Leq	Leq'	0.1*Leq	antiLog
Night	12:00 AM	0.0	10.0	1	10
	1:00 AM	0.0	10.0	1	10
	2:00 AM	0.0	10.0	1	10
	3:00 AM	0.0	10.0	1	10
	4:00 AM	0.0	10.0	1	10
	5:00 AM	0.0	10.0	1	10
	6:00 AM	0.0	10.0	1	10
Day	7:00 AM	38.6	38.6	3.858254191	7215.296649
	8:00 AM	38.6	38.6	3.858254191	7215.296649
	9:00 AM	38.6	38.6	3.858254191	7215.296649
	10:00 AM	38.6	38.6	3.858254191	7215.296649
	11:00 AM	38.6	38.6	3.858254191	7215.296649
	12:00 PM	38.6	38.6	3.858254191	7215.296649
	1:00 PM	38.6	38.6	3.858254191	7215.296649
	2:00 PM	38.6	38.6	3.858254191	7215.296649
	3:00 PM	38.6	38.6	3.858254191	7215.296649
	4:00 PM	38.6	38.6	3.858254191	7215.296649
	5:00 PM	38.6	38.6	3.858254191	7215.296649
	6:00 PM	38.6	38.6	3.858254191	7215.296649
	7:00 PM	38.6	38.6	3.858254191	7215.296649
	8:00 PM	0.0	0.0	0	1
	9:00 PM	0.0	0.0	0	1
Night	10:00 PM	0.0	10.0	1	10
	11:00 PM	0.0	10.0	1	10
			Sum		93890.85644
			Sum/24		3912.119018
			Log10(Sum/24)		3.592412059
			10*Log10(Sum/24)		35.92412059
			24 Hour Ldn		36

TABLE Existing-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Silver Creek Valley Road - east of Hellyer Avenue
NOTES: Piercy Road Warehouse Project - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14000   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS		
	88.08	9.34
M-TRUCKS		
	1.65	0.19
H-TRUCKS		
	0.66	0.08

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.37

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	89.6	187.6	401.4

TABLE Existing-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Hellyer Avenue - Siver Creek Valley Road to Piercy Road
NOTES: Piercy Road Warehouse Project - Existing

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 7100   SPEED (MPH): 35   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.76

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	0.0	82.2	171.0

TABLE Existing-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Piercy Road - east of Hellyer Avenue
NOTES: Piercy Road Warehouse Project - Existing

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1500   SPEED (MPH): 35   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 55.51

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	0.0	0.0	60.5

TABLE Background-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Silver Creek Valley Road - east of Hellyer Avenue
NOTES: Piercy Road Warehouse Project - Background

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 22200   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.37

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
59.6	119.8	254.0	545.3

TABLE Background-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Hellyer Avenue - Siver Creek Valley Road to Piercy Road
NOTES: Piercy Road Warehouse Project - Background

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9500 SPEED (MPH): 35 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.02

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	0.0	98.4	207.0

TABLE Background-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Piercy Road - east of Hellyer Avenue
NOTES: Piercy Road Warehouse Project - Background

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1900   SPEED (MPH): 35   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 56.54

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	0.0	0.0	70.7

TABLE Background Plus Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021
ROADWAY SEGMENT: Silver Creek Valley Road - east of Hellyer Avenue
NOTES: Piercy Road Warehouse Project - Background Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 22300   SPEED (MPH): 45   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.39

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
59.7	120.2	254.8	546.9

TABLE Background Plus Project-02

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021

ROADWAY SEGMENT: Hellyer Avenue - Siver Creek Valley Road to Piercy Road

NOTES: Piercy Road Warehouse Project - Background Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9600   SPEED (MPH): 35   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 24   SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.07

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	0.0	99.1	208.4

TABLE Background Plus Project-03

FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/27/2021

ROADWAY SEGMENT: Piercy Road - east of Hellyer Avenue

NOTES: Piercy Road Warehouse Project - Background Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2200   SPEED (MPH): 35   GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	NIGHT
AUTOS	88.08	9.34
M-TRUCKS	1.65	0.19
H-TRUCKS	0.66	0.08

ACTIVE HALF-WIDTH (FT): 6   SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

Ldn AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 57.17

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO Ldn

70 Ldn	65 Ldn	60 Ldn	55 Ldn
0.0	0.0	0.0	77.9

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