NOISE AND VIBRATION IMPACT ANALYSIS

1210–1250 E 223RD STREET WAREHOUSE PROJECT

CARSON, CALIFORNIA

LSA

October 2023

EXHIBIT 4

NOISE AND VIBRATION IMPACT ANALYSIS

1210–1250 E 223RD STREET WAREHOUSE PROJECT

CARSON, CALIFORNIA

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LSA

October 2023

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LIST OF ABBREVIATIONS AND ACRONYMS

ALUC	Airport Land Use Compatibility
Caltrans	California Department of Transportation
Caltrans Manual	Caltrans) *Transportation and Construction Vibration Guidance Manual*
City	City of Carson
CMC	City of Carson Municipal Code
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
ft	foot/feet
FTA Manual	FTA *Transit Noise and Vibration Impact Assessment Manual*
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
in/sec	inches per second
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous sound level
Noise Element	City of Carson General Plan Noise Element
PPV	peak particle velocity
project	1210–1250 E 223rd Street Warehouse Project
RMS	root-mean-square
sf	square foot/feet
SPL	sound pressure level
VdB	vibration velocity decibels

INTRODUCTION

This noise and vibration impact analysis has been prepared to evaluate the potential noise and vibration impacts and reduction measures associated with 1210–1250 E 223rd Street Warehouse Project (project) in Carson, California. This report is intended to satisfy the City of Carson's (City) requirement for a project-specific noise impact analysis by examining the impacts of the project site and evaluating noise reduction measures that the project may require.

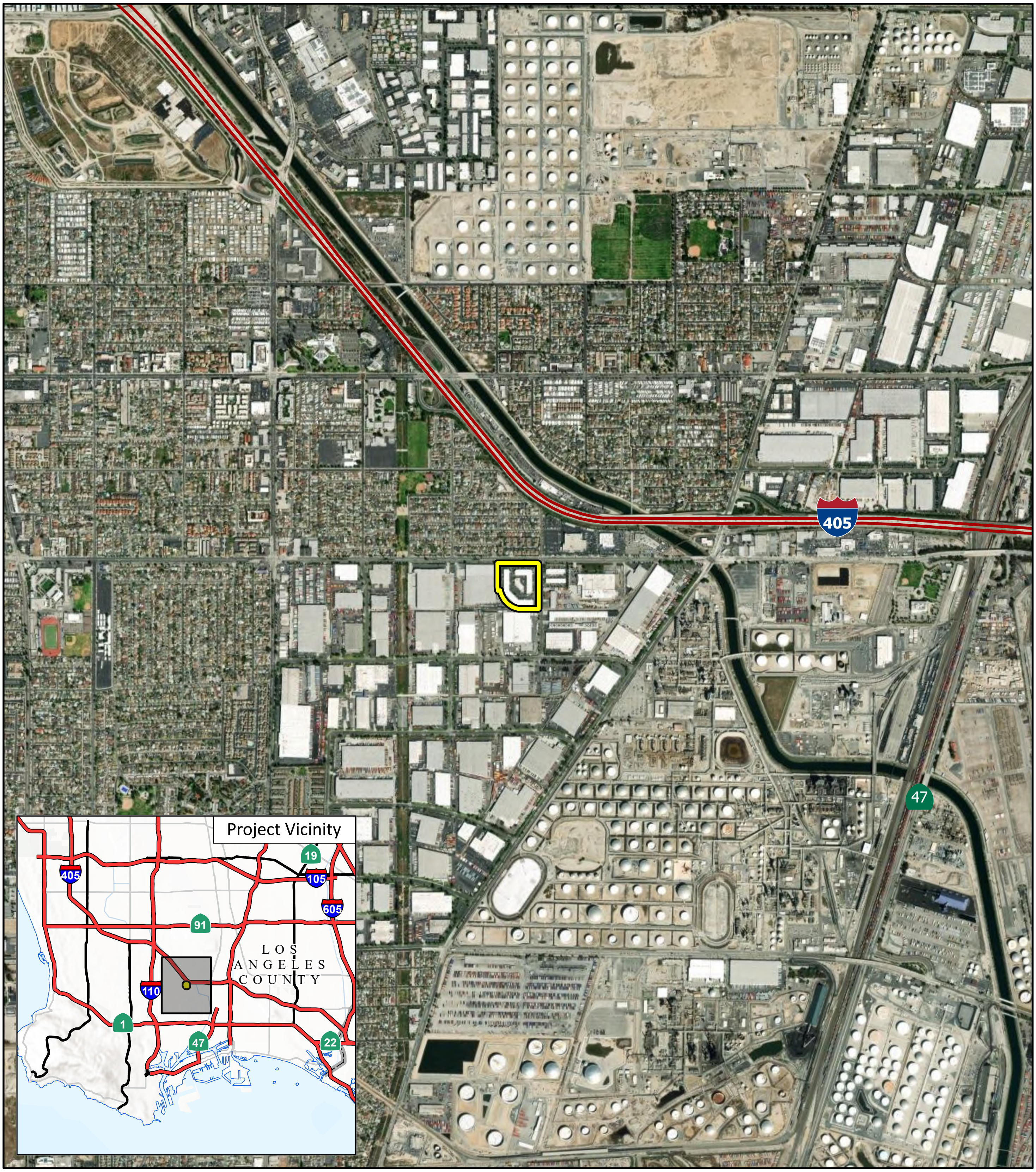
PROJECT LOCATION AND DESCRIPTION

The 9.085-acre project site is on 1210 and 1250 East 223rd Street in Carson, Los Angeles County, California. The project site is composed of Assessor's Parcel Number 7315-004-033. The project site is currently developed with the existing Coral Tree Business Center, which comprises three buildings that are currently occupied with uses such as trade contractors, warehouse/logistics, small offices, eatery, chapels, etc. The gross square area of the business center is 135,520 square feet (sf) (see Figure 1, Regional Project Location, and Figure 2, Site Plan).

The proposed project would demolish the existing buildings, surface parking, and related infrastructure to construct a 181,013 sf speculative warehouse building, including 10,000 sf of office space and 5,000 sf of mezzanine space. It is assumed that the proposed project would contain 20% cold storage warehousing and 85% general light industrial warehousing. The project would include 47,893 sf of landscape area. In addition, the project would include a total of 158 parking spaces, including 134 vehicle stalls, 6 accessible stalls, 64 trailer stalls, and 28 dock doors. The proposed project would not require a change to the City's General Plan land use designation or the current zoning and would be consistent with the City's General Plan and Zoning Ordinance.

The project is assumed to operate 24 hours per day, 7 days per week; however, this may shift depending on the tenant, as the hours of operation are unknown. The proposed project would generate approximately 1,141 average daily trips; however, the proposed project would result in the reduction of 545 average daily trips compared to existing conditions. As such, the proposed project would result in zero net trips. In addition, the proposed project would not include natural gas for either construction or operation.

Construction would begin in the second quarter of 2024 and would be anticipated to last for approximately 10 months, with project operation beginning in the first quarter of 2025. Construction activities for the project would take place over one phase and would include demolition, site preparation, grading, building construction, paving, and architectural coating activities. Construction equipment would use tier 3 engines.



LSA

Project Location

FIGURE 1

N

0 1000 2000
FEET

SOURCE: ESRI Imagery 2023

1210 – 1250 E 223rd Street Warehouse

Project Location

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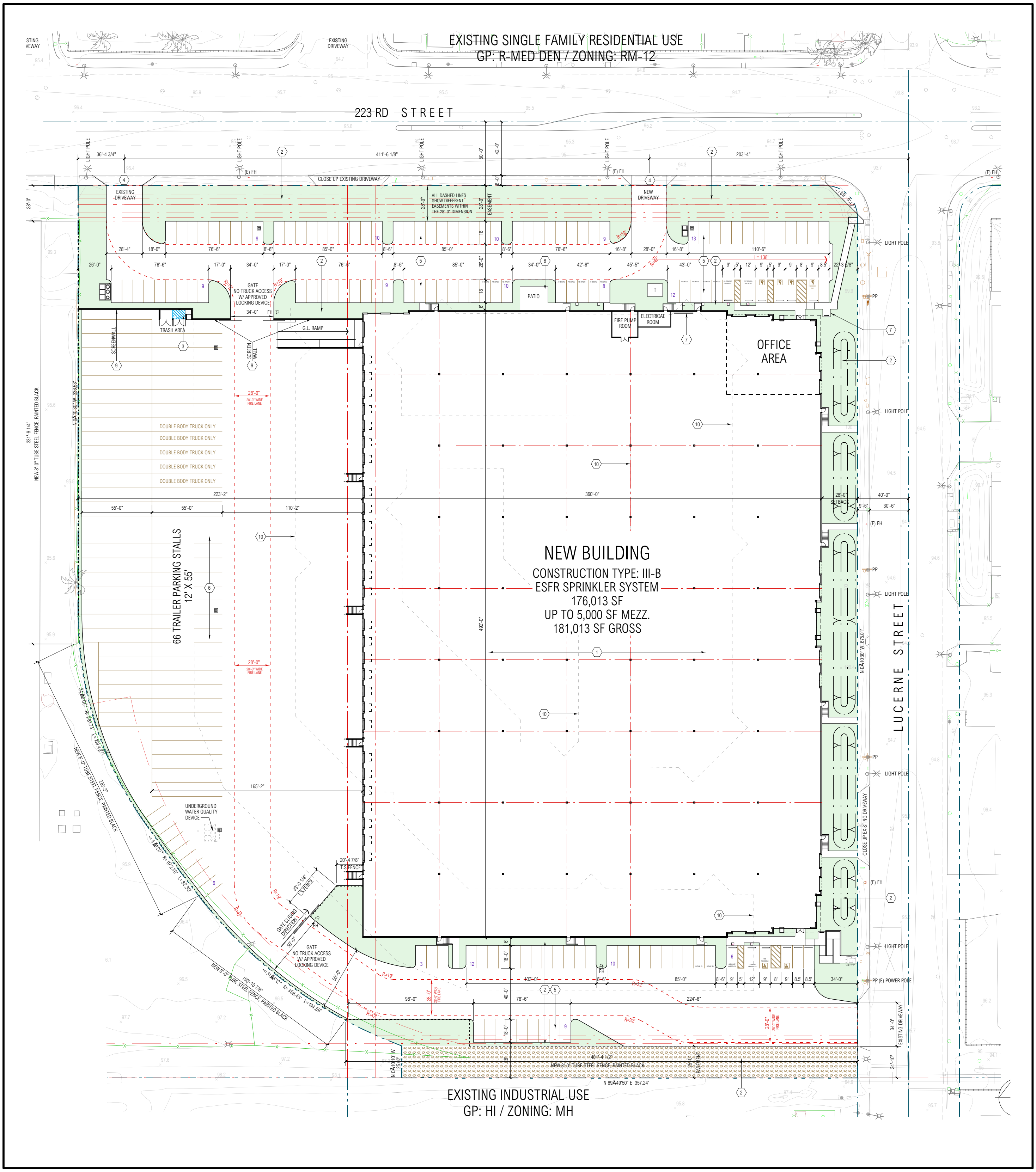

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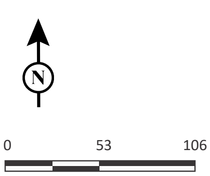
FIGURE 2



SOURCE: RGA

1210-1250 E 223rd Street Warehouse

Site Plan

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EXISTING LAND USES IN THE PROJECT AREA

The project site is surrounded primarily by industrial and residential uses. The areas adjacent to the project site include the following:

- **North:** Existing single and multi-family residential uses opposite East 223rd Street
- **East:** Existing industrial uses opposite Lucerne Street
- **South:** Existing industrial uses
- **West:** Existing industrial uses

The nearest sensitive receptors are:

- **North**: multi-family residential uses opposite East 223rd Street, approximately 100 feet away from the project boundary line
- **Northwest**: single-family residential uses opposite East 223rd Street, approximately 185 feet away from the project boundary line

NOISE AND VIBRATION FUNDAMENTALS

CHARACTERISTICS OF SOUND

Noise is usually 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.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a sound wave, which results in the tone's range from high to low. Loudness is the strength of a sound, and it describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity is the average rate of sound energy transmitted through a unit area perpendicular to the direction in which the sound waves are traveling. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

MEASUREMENT OF SOUND

Sound intensity is measured with the A-weighted decibel (dBA) scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound, similar to the human ear's de-emphasis of these frequencies. Decibels (dB), unlike the linear scale (e.g., inches or pounds), are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 dB is 10 times more intense than 0 dB, 20 dB is 100 times more intense than 0 dB, and 30 dB is 1,000 times more intense than 0 dB. Thirty decibels (30 dB) represents 1,000 times as much acoustic energy as 0 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the sound's loudness. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound levels dissipate exponentially with distance from their noise sources. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source sound levels decrease 4.5 dB for each doubling of distance in a relatively flat environment with absorptive vegetation.

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 equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels. CNEL is the time-weighted average 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 noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the relaxation. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The City uses the CNEL noise scale for long-term traffic noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum instantaneous noise level (L_{max}), which is the highest sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half the time the noise level exceeds this level, and half the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts, which are increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because 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 dB and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise levels 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.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to sound levels higher than 85 dBA. Exposure to high sound levels affects the entire system, with prolonged sound exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of sound exposure above 90 dBA would result in permanent cell damage. When the sound level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of sound is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by a feeling of pain in the ear (i.e., the threshold of pain). A sound level of 160–165 dBA will result in dizziness or a loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas.

Table A lists definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of sound measurement that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in 1 second (i.e., the number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted unless reported otherwise.)
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 1%, 10%, 50%, and 90% of a stated time period, respectively.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time. Usually a composite of sound from many sources from many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content, as well as the prevailing ambient noise level.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris, Cyril, ed. 1991).

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of Pain	64 times as loud
Hard Rock Band	120	Threshold of Feeling	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/ Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food Blender	95	Very Loud	—
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	—
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	—
Near Freeway Auto Traffic	70	Moderately Loud	Reference level
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	—
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	—
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	—
Rustling Leaves	20	Very Faint	—
Human Breathing	10	Very Faint	Threshold of Hearing
—	0	Very Faint	—

Source: Compiled by LSA (2022).

FUNDAMENTALS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may not be discernible, but without the effects associated with the shaking of a building there is less adverse reaction. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items sitting on shelves or hanging on walls, or a low-frequency rumbling noise. The rumbling noise is caused by the vibration of walls, floors, and ceilings that radiate sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile-driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 feet (ft) from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (FTA 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for most projects that the roadway surface will be smooth enough that ground-borne vibration from street traffic will not exceed the impact criteria; however, construction of the project could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne noise is not likely to be a problem, because noise arriving via the normal airborne path will usually be greater than ground-borne noise.

Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for train-induced ground-borne vibration to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile-driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS is best for characterizing human response to building vibration, and PPV is used to characterize the potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where "L_v" is the vibration velocity in decibels (VdB), "V" is the RMS velocity amplitude, and "V_{ref}" is the reference velocity amplitude, or 1×10^{-6} inches/second (in/sec) used in the United States.

REGULATORY SETTING

APPLICABLE NOISE STANDARDS

The applicable noise standards governing the project site include the criteria in the City of Carson's General Plan Noise Element (Noise Element) and the City of Carson Municipal Code (CMC).

City of Carson

Noise Element of the General Plan

The Noise Element provides the City's goals and policies related to noise, including the land use compatibility guidelines for community exterior noise environments. The City has identified the following goals and policies in the Noise Element which are applicable to the project.

Guiding Policies.

> ***NO-G-1****.* Maintain healthy sound environments and protect noise-sensitive uses from excessive noise exposure.
>
> ***NO-G-2****.* Continue efforts to incorporate noise considerations into land use planning decisions and guide the location and design of noise generating facilities, such as transportation and industrial facilities, to minimize the effects of noise on adjacent land uses.
>
> ***NO-G-3****.* Seek to reduce noise impacts along major freeways, roadways, and truck routes to improve the health of nearby inhabitants.

Implementing Policies.

> ***NO-P-2.*** Require applicants for projects with noise exposure levels that exceed the standards listed in Table 9-1 (Table C of this document) to provide a technical analysis by a professional acoustical engineer and incorporate noise-attenuating features into site planning and architecture. With mitigation, development should meet the allowable outdoor and indoor noise exposure standards in Table 9-2 (Table D of this document), or California Building Code, whichever is stricter. When a building's openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation should be provided.
>
> ***NO-P-3.*** Where site conditions permit, require noise buffering consistent with Policy NO-P-4 for all noise generators producing noise levels greater than the maximum allowed CNEL listed in Table 9-3 (Table E of this document), especially those located near noise-sensitive development.

Table C: Noise and Land Use Compatibility

Land Use Category
Residential - Low Density
Residential - Multifamily
Transient Lodging - Motels, Hotels
Schools, Libraries, Churches, Hospitals, Nursing Homes
Auditoriums, Concert Halls, Amphitheaters
Sports Arenas, Outdoor Spectator Sports
Playgrounds, Neighborhood Parks
Golf Courses, Riding Stables, Water Recreation, Cemeteries
Office Buildings, Business Commercial and Professional
Industrial, Manufacturing, Utilities, Agriculture

Interpretation

Normally Acceptable
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning features included in the design.

Normally Unacceptable
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable
New construction or development should generally not be undertaken.

Source: City of Carson General Plan 2040 (2023a).

Table D: Allowable Noise Exposure From Transportation Sources

Land Use	*Outdoor Activity Areas*[1] *(dBA CNEL)*	*Interior Spaces*[2] *(dBA CNEL)*
Residential		
Single family, Duplex, Multifamily	50 – 60	45 – 55
Mobile Home	65	45
Commercial/Industrial/Institutional		
Hotel, Model, Transient Lodging	-	45
Commercial Retail, Bank, Restaurant	-	55
Office Building, Research and Development, Professional Offices, City Office Building	-	50
Amphitheater, Concert Hall, Auditorium, Meeting Hall	-	45
Gymnasium (Multipurpose)	-	50
Sports Club	-	55
Manufacturing, Warehousing, Wholesale, Utilities	-	65
Movie Theaters	-	45
Institutional		
Hospital, School Classrooms	65	45
Church, Library	-	45
Open Space		
Parks	65	-

1. Outdoor environment limited to: (1) Private yard of single family; (2) Multifamily private patio or balcony served by a means of exit from inside the dwelling (Balconies 6 feet deep or less are exempt); (3) Mobile home park; (4) Park picnic area; and (5) School playground.
2. Indoor environment includes bedrooms, living areas, bathrooms, toilets, closets, and corridors.
3. Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as required by Building Code.
4. Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL. An exterior noise exposure level of 65 dBA CNEL is allowable for residential uses in a mixed-use project.

Source: City of Carson General Plan 2040 (2023a).

Table E: Noise Generation Performance Standards for Non-Transportation Sources

Noise Level Descriptor	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly Equivalent Level (L_{eq}), dBA	55	45
Maximum Level (L_{max}), dBA	75	65

Source: City of Carson General Plan 2040 (2023a).
Notes:
[1] Each of the noise levels specified above shall be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level

NO-P-4. For aesthetic reasons, discourage the use of sound walls for noise mitigation; rather, encourage the use of project design techniques such as increasing the distance between the noise source and the noise sensitive receiver, natural berms, and use non-noise sensitive structures (e.g., a garage) to shield noise sensitive areas. If a sound wall is determined necessary to mitigate noise, discourage exclusive use of walls in excess of six feet in height and encourage use of natural barriers such as site topography or constructed earthen berms. When walls are determined to be the only feasible solution to noise mitigation, then sound walls shall be designed to limit aesthetic impacts.

NO-P-5. Require control of new developments deemed to be noise generators through site design, building design, landscaping, hours of operation, and other techniques for such that noise at site edges do not exceed performance-based standards outlined in Table 9-3 (Table E of this document).

NO-P-7. Seek to mitigate noise impacts from loud noise generating uses—including industrial uses, construction activity, goods movement by train and trucking, and along freeways, major corridors, and truck routes—to surrounding non-industrial uses.

NO-P-8. Review the City of Carson Noise Ordinance for adequacy to meet noise requirements set forth in the General Plan and amend as needed to address future community needs and development patterns.

Operational Noise Standards. The City's performance standards set the limits for non-transportation or stationary noise sources, as summarized in Table E. These standards are designed to protect noise-sensitive land uses adjacent to stationary sources from excessive noise and represent the acceptable exterior noise levels at the sensitive receptor.

Municipal Code

Construction Noise Standards. The City addresses construction noise in Article IV - Section 4101, Unnecessary Noises, and Chapter 5, Noise Control Ordinance, of the CMC. Section 4101 (j) states that construction is limited to the hours between 7:00 a.m. and 6:00 p.m. on weekdays, except in case of urgent necessity in the interest of public health and safety.

Chapter 5 – Section 5502 (c) a) and b) of the CMC provide maximum noise levels for short-term operations of 20 days or less for construction equipment and for long-term operation of 21 days or more for construction equipment, as summarized in Table F, below.

Table F: Maximum Noise Levels for Construction

Time of Day	Single-family Residential (Short-term/Long-term)	Multi-family Residential (Short-term/Long-term)
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75 dBA/65 dBA	80 dBA/70 dBA
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays	60 dBA/55 dBA	64 dBA/60 dBA

Source: City of Carson Municipal Code (2023b).
Notes:
dBA = A-weighted decibels

State of California Green Building Standards Code

The State of California's Green Building Standards Code contains mandatory measures for non-residential building construction in Section 5.507 on Environmental Comfort. These noise standards are applied to new construction in California for controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when non-residential structures are developed in areas where the exterior noise levels exceed 65 dBA CNEL, such as within a noise contour of an airport, freeway, railroad, and other noise source. If the development falls within an airport or freeway 65 dBA CNEL noise contour, buildings shall be constructed to provide an interior noise level environment attributable to exterior sources that do not exceed an hourly equivalent level of 50 dBA L_{eq} in occupied areas during any hour of operation.

APPLICABLE VIBRATION STANDARDS

Federal Transit Administration

Vibration standards included in the FTA *Transit Noise and Vibration Impact Assessment Manual* (FTA Manual) are used in this analysis for ground-borne vibration impacts on human annoyance. The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table G provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table G: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Max L_v (VdB)[1]	Description of Use
Workshop	90	Vibration that is distinctly felt. Appropriate for workshops and similar areas not as sensitive to vibration.
Office	84	Vibration that can be felt. Appropriate for offices and similar areas not as sensitive to vibration.
Residential Day	78	Vibration that is barely felt. Adequate for computer equipment and low-power optical microscopes (up to 20×).
Residential Night and Operating Rooms	72	Vibration is not felt, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power microscopes (100×) and other equipment of low sensitivity.

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] As measured in 1/3-Octave bands of frequency over the frequency range 8 to 80 Hertz.
FTA = Federal Transit Administration
Max = maximum
L_V = velocity in decibels
VdB = vibration velocity decibels

California Department of Transportation

Table H lists the potential vibration building damage criteria associated with construction activities, as suggested in the California Department of Transportation (Caltrans) *Transportation and Construction Vibration Guidance Manual*. (Caltrans 2020) (Caltrans Manual). Caltrans guidelines show that a vibration level of up to 0.5 in/sec in PPV is considered safe for newer residential structures and modern industrial or commercial buildings and would not result in any construction vibration damage. For older residential structures, the construction building vibration damage criterion is 0.3 in/sec in PPV.

Table H: Construction Vibration Damage Criteria

Structure/Condition	PPV (in/sec)
Extremely fragile historic buildings, ruins, ancient monuments	0.08
Fragile buildings	0.10
Historic and some old buildings	0.25
Older residential structures	0.30
New residential structures	0.50
Modern industrial / commercial buildings	0.50

Source: Table 19-*Transportation and Construction Vibration Guidance Manual* (Caltrans 2020).
in/sec = inch/inches per second
PPV = peak particle velocity

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are traffic on East 223rd Street and Lucerne Street, industrial uses in the vicinity of the project site, and infrequent rail activity to the south.

AMBIENT NOISE MEASUREMENTS

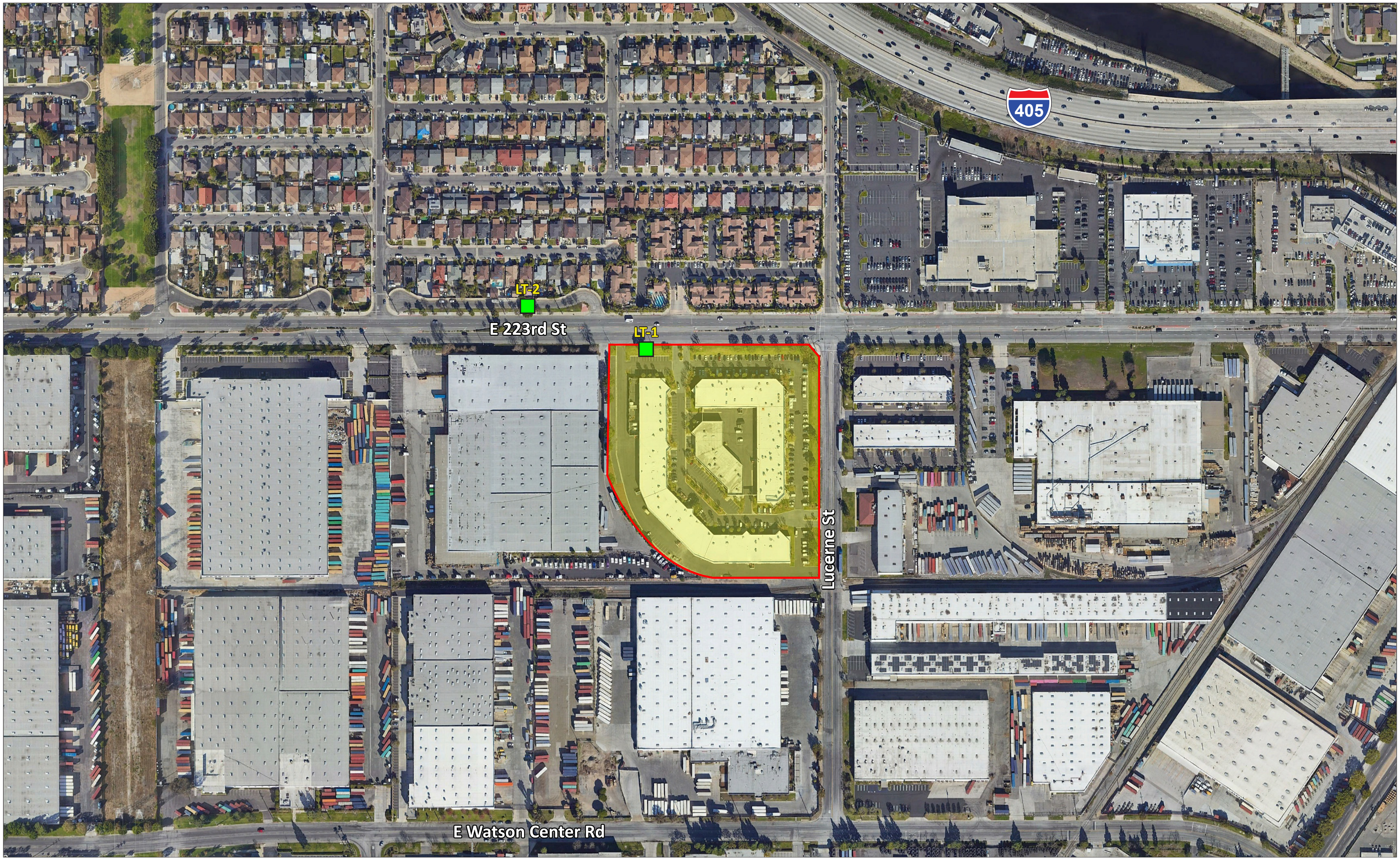
Long-Term Noise Measurements

To assess existing noise levels, LSA conducted two long-term noise measurements in the vicinity of the project site. The long-term (24-hour) noise level measurements were conducted on May 30 through May 31, 2023, using two Larson Davis Spark 706RC Dosimeters. Table I provides a summary of the measured hourly noise levels and calculated CNEL level from the long-term noise level measurements. As shown in Table I, the calculated CNEL levels range from 73.7 dBA CNEL to 77.1 dBA CNEL. Hourly noise levels at surrounding sensitive uses are as low as 62.0 dBA L_{eq} during nighttime hours and 67.6 dBA L_{eq} during the less-sensitive daytime and evening hours. Noise measurement sheets are provided in Appendix A. Figure 3 shows the long-term monitoring locations.

Table I: Long-Term 24-Hour Ambient Noise Monitoring Results

Location		Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Daily Noise Levels (dBA CNEL)
LT-1	Northwest corner of the project site, on a tree east of entrance, approximately 75 feet from 223rd Street centerline.	73.0 – 75.5	70.6 – 72.8	64.7 – 73.8	77.1
LT-2	South of single-family residence at 1138 Joel Street, opposite 223rd street, on a tree approximately 50 feet from 223rd Street centerline.	69.7 – 72.3	67.6 – 69.2	62.0 – 70.6	73.7

Source: Compiled by LSA (2023).
Note: Noise measurements were conducted from May 30 to May 31, 2023, starting at 1:00 p.m.
[1] Daytime Noise Levels = noise levels during the hours from 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = noise levels during the hours from 7:00 p.m. to 10:00 p.m.
[3] Nighttime Noise Levels = noise levels during the hours from 10:00 p.m. to 7:00 a.m.
dBA = A-weighted decibels
ft = foot/feet
CNEL = Community Noise Equivalent Level
L_{eq} = equivalent continuous sound level



LSA

LEGEND

Project Location

LT-1 Long-term Noise Monitor Location

0 215 430
FEET

SOURCE: Google Earth (2023)

FIGURE 3

1210-1250 E 223rd Street Warehouse

Noise Monitoring Locations

I:\ESL2201.64\G\Noise_Locs.ai (7/31/2023)

EXISTING AIRCRAFT NOISE

Aircraft flyovers may be audible on the project site due to aircraft activity in the vicinity. The nearest airports to the project include Long Beach Airport (LGB) and Torrance Municipal Airport, approximately 5 miles to the east and west of project site, respectively. The Los Angeles County Airport Land Use Plan (ALUC 2004) shows that the project site is well outside the 65 dBA CNEL noise contour for the airports. While aircraft operations may contribute to the noise in the project area from this airport, the project site is not expected to experience airport-related noise levels in excess of the City of Carson exterior standards. Therefore, no further analysis associated with aircraft noise impacts is necessary.

EXISTING RAIL ACTIVITY NOISE

Rail activity to the southeast and south of the project site would operate on existing rail line spurs. While rail activity may be sporadically audible in the project area, because the office use portion of the proposed buildings would be further to the north, noise impacts from rail line are expected to be below 65 dBA CNEL; Therefore, no further analysis associated with on-site rail noise impacts is necessary.

PROJECT IMPACTS

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to 84 dBA L_{max}), the effect on longer-term ambient noise levels would be small when compared to existing daily traffic volumes on East 223rd Street. The results of the California Emissions Estimator Model for the proposed project indicate that during construction, an additional 109 vehicles in passenger car equivalent volume, consisting of worker and hauling trips, would be added to the roadway adjacent to the project site. Because the existing traffic volume on East 223rd Street is considerably more than 109, construction-related vehicle trips would not approach existing daily traffic volumes and traffic noise would not increase by 3 dBA CNEL. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, short-term, construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during construction, which includes demolition of the existing structures and other site improvements, site preparation, grading, building construction, paving, and architectural coating 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. Table H lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor, taken from the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* (FHWA 2006).

In addition to the reference maximum noise level, the usage factor provided in Table J is used to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: *L_{eq} (equip)* = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period.

E.L. = noise emission level of the particular piece of equipment at a reference distance of 50 ft.

U.F. = usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time.

D = distance from the receiver to the piece of equipment.

Table J: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)[1]	Maximum Noise Level (L_{max}) at 50 Ft[2]
Auger Drill Rig	20	84
Backhoes	40	80
Compactor (ground)	20	80
Compressor	40	80
Cranes	16	85
Dozers	40	85
Dump Trucks	40	84
Excavators	40	85
Flat Bed Trucks	40	84
Forklift	20	85
Front-end Loaders	40	80
Graders	40	85
Impact Pile Drivers	20	95
Jackhammers	20	85
Paver	50	77
Pickup Truck	40	55
Pneumatic Tools	50	85
Pumps	50	77
Rock Drills	20	85
Rollers	20	85
Scrapers	40	85
Tractors	40	84
Trencher	50	80
Welder	40	73

Source: FHWA *Roadway Construction Noise Model User's Guide*, Table 1 (FHWA 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
[1] Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.
[2] Maximum noise levels were developed based on Specification 721.560 from the Central Artery/Tunnel program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
FHWA = Federal Highway Administration
ft = foot/feet
L_{max} = maximum instantaneous sound level

Each piece of construction equipment operates as an individual point source. Using the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Using the equations from the methodology above, the reference information in Table J, and the construction equipment list provided, the composite noise level of each construction phase was calculated. The project construction composite noise levels at a distance of 50 ft would range from 74 dBA L_{eq} to 88 dBA L_{eq}, with the highest noise levels occurring during the site preparation phase.

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA while halving the distance would increase noise levels by 6 dBA.

Tables K and L show the nearest sensitive uses to the project site, their distance from the center of construction activities, and composite noise levels expected during construction. Table K presents the phases of construction lasting 20 days or less while Table L presents the phases of construction lasting 21 days or more. These noise level projections do not consider intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

Table K: Potential Construction Noise Impacts at Nearest Receptor – Less Than 20 Days

Receptor (Location)	Composite Noise Level (dBA L_{eq}) at 50 Ft[1]	Distance (ft)	Composite Noise Level (dBA L_{eq})
Multi-family Residence (North)	88	450	69
Single-family Residence (Northwest)		590	66

Source: Compiled by LSA (2023).

1 The composite construction noise level represents the site preparation phase which is expected to result in the greatest noise level as compared to other phases lasting 20 days or less.

dBA L_{eq} = average A-weighted hourly noise level

ft = foot/feet

Table L: Potential Construction Noise Impacts at Nearest Receptor – 21 Days or More

Receptor (Location)	Composite Noise Level (dBA L_{eq}) at 50 Ft[1]	Distance (ft)	Composite Noise Level (dBA L_{eq})
Multi-family Residence (North)	85	450	66
Single-family Residence (Northwest)		590	63

Source: Compiled by LSA (2023).

1 The composite construction noise level represents the building construction phase which is expected to result in the greatest noise level as compared to other phases lasting 21 days or more.

dBA L_{eq} = average A-weighted hourly noise level

ft = foot/feet

While construction noise will vary, it is expected that composite noise levels at the nearest off-site multi-family residential uses to the north and single-family residential uses to the northwest would approach 69 dBA L_{eq} and 66 dBA L_{eq} for phases lasting 20 days or less during daytime hours, respectively. Furthermore, it is expected that composite noise levels at the nearest off-site multi-family residential uses to the north and single-family residential uses to the northwest would approach 66 dBA L_{eq} and 63 dBA L_{eq} for phases lasting 21 days or more during daytime hours, respectively. These predicted noise levels would only occur when all construction equipment is operating simultaneously and, therefore, are assumed to be rather conservative in nature.

As stated above, the City's Noise Ordinance regulates noise impacts associated with construction activities. The proposed project would comply with the construction hours specified in the City's Noise Ordinance, which states that construction activities are allowed between the hours of 7:00 a.m. to 6:00 p.m. on weekdays, except in case of urgent necessity in the interest of public health and safety. Construction would not take place during the more sensitive nighttime hours.

Although construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, based on ambient noise levels measurements, existing daytime hourly noise levels exceed 69 dBA L_{eq} at the residential uses to the north, therefore, a significant increase in noise over ambient levels would not occur. Additionally, the noise impacts would no longer occur once project construction is completed therefore, impacts would be considered less than significant.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

This construction vibration impact analysis discusses the level of human annoyance using vibration levels in RMS (VdB) and assesses the potential for building damages using vibration levels in PPV (in/sec). This is because vibration levels calculated in RMS are best for characterizing human response to building vibration, whereas vibration level in PPV is best for characterizing potential for damage.

Table M shows the PPV and VdB values at 25 ft from the construction vibration source. As shown in Table M, bulldozers, and other heavy-tracked construction equipment (expected to be used for this project) generate approximately 0.089 PPV in/sec or 87 VdB of ground-borne vibration when measured at 25 ft, based on the FTA Manual. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project construction boundary (assuming the construction equipment would be used at or near the project setback line).

Table M: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 Ft	
	PPV (in/sec)	L_V (VdB)[1]
Pile Driver (Impact), Typical	0.644	104
Pile Driver (Sonic), Typical	0.170	93
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer[2]	**0.089**	**87**
Caisson Drilling	0.089	87
Loaded Trucks[2]	**0.076**	**86**
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
[2] Equipment shown in **bold** is expected to be used on site.
µin/sec = microinches per second
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inch/inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity decibels

The formulae for vibration transmission are provided below, and Tables N and O, below, provide a summary of off-site construction vibration levels.

$$L_v dB\ (D) = L_v dB\ (25\ ft) - 30\ Log\ (D/25)$$

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

Table N: Potential Construction Vibration Annoyance Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (VdB) at 25 Ft[1]	Distance (ft)[2]	Vibration Level (VdB)
Industrial Uses (West)	87	340	53
Industrial Uses (South and East)		410	51
Multifamily Residence (North)		450	49
Single-family Residence (Northwest)		590	46

Source: Compiled by LSA (2023).
[1] The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.
[2] The reference distance is associated with the average condition, identified by the distance from the center of construction activities to surrounding uses.
ft = foot/feet
VdB = vibration velocity decibels

Table O: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 Ft[1]	Distance (ft)[2]	Vibration Level (PPV)
Industrial Uses (West)	0.089	30	0.068
Industrial Uses (South)		65	0.021
Industrial Uses (East)		100	0.011
Multifamily Residence (North)		100	0.011
Single-family Residence (Northwest)		185	0.004

Source: Compiled by LSA (2023).

1 The reference vibration level is associated with a large bulldozer, which is expected to be representative of the heavy equipment used during construction.

2 The reference distance is associated with the peak condition, identified by the distance from the perimeter of construction activities to surrounding structures.

ft = foot/feet

PPV = peak particle velocity

As shown in Table G, above, the threshold at which vibration levels would result in annoyance would be 90 VdB for workshop type uses and 78 VdB for daytime residential uses. As shown in Table H, the Caltrans Manual guidelines indicate that, for newer residential structures and modern industrial or commercial buildings, the construction vibration damage criterion is 0.5 in/sec in PPV.

Based on the information provided in Table N, vibration levels are expected to approach 53 VdB at the closest industrial uses to the west and 49 VdB at the closest residence to the north and would not exceed the annoyance thresholds.

Based on the information provided in Table O, vibration levels are expected to approach 0.068 in/sec PPV at the nearest surrounding structures to the west and would not exceed the Caltrans threshold of 0.5 in/sec PPV for building damage. Vibration levels at all other buildings would be lower. Although construction vibration levels at the nearest buildings would have the potential to result in annoyance, these vibration levels would no longer occur once construction of the project is completed. Therefore, construction would not result in any vibration damage, and impacts would be less than significant.

Because construction activities are regulated by the City's Municipal Code, which states that construction activities are allowed between the hours of 7:00 a.m. to 6:00 p.m., vibration impacts would not occur during the more sensitive nighttime hours.

LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS

As a result of the implementation of the proposed project, off-site traffic volumes on surrounding roadways have the potential to increase. The proposed project trips generated were obtained from the *Transportation Impact Analysis Screening* (EPD Solutions, Inc. 2023). The proposed project would generate a net decrease of 545 passenger equivalent daily trips. Due to the decrease in traffic volumes associated with the proposed project, there would be no increase in traffic noise impact from project-related traffic to off-site sensitive receptors. Therefore, impacts would be less than significant, and no noise reduction measures are required.

LONG-TERM TRAFFIC-RELATED VIBRATION IMPACTS

The proposed project would not generate vibration levels related to on-site operations. In addition, vibration levels generated from project-related traffic on the adjacent roadways are unusual for on-road vehicles, because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Based on a reference vibration level of 0.076 in/sec PPV, structures greater than 20 ft from the roadways that contain project trips would experience vibration levels below the most conservative standard of 0.12 in/sec PPV; therefore, vibration levels generated from project-related traffic on the adjacent roadways would be less than significant, and no mitigation measures are required.

LONG-TERM OFF-SITE STATIONARY NOISE IMPACTS

Adjacent off-site land uses would be potentially exposed to stationary-source noise impacts from the proposed on-site heating, ventilation, and air conditioning (HVAC) equipment, and truck deliveries and loading and unloading activities. The potential noise impacts to off-site sensitive land uses from the proposed HVAC equipment and truck delivery activities are discussed below. To provide a conservative analysis, it is assumed that operations would take place equally during all hours of the day and that half of the 28 loading docks would be active at all times. Additionally, the analysis assumed that within any given hour, 7 heavy trucks would maneuver to park near or back into one of the proposed loading docks. To determine the future noise impacts from project operations to the noise sensitive uses, a 3-D noise model, SoundPLAN, was used to incorporate the site topography as well as the shielding from the proposed building on site. A graphic representation of the operational noise impacts is presented in Appendix C.

Heating, Ventilation, and Air Conditioning Equipment

The project would have various rooftop mechanical equipment, including HVAC units, on the proposed building. The analysis assumed that the project could have four rooftop HVAC units. The HVAC equipment could operate 24 hours per day and would generate sound pressure levels (SPL) of up to 87 dBA SPL or 72 dBA L_{eq} at 5 ft, based on manufacturer data (Trane n.d.).

Trash Bin Emptying Activities

The project is estimated to have a trash dumpster near the western property line of the proposed project site. The trash emptying activities would take place for a period less than 1 minute and would generate SPLs of up to 118.6 dBA SPL or 84 dBA L_{eq} at 50 ft, based on reference information within SoundPLAN.

Cold Storage Fan Units

According to the project description, approximately 20 percent of the project site would be cold storage. Noise levels generated by cold storage fan units would be similar to noise readings from previously gathered reference noise level measurements, which generate a noise level of 57.5 dBA

L_{eq} at 60 ft based on measurements taken by LSA (*Operational Noise Impact Analysis for Richmond Wholesale Meat Distribution Center* [LSA 2016]).

Truck Deliveries and Truck Loading and Unloading Activities

Noise levels generated by delivery trucks would be similar to noise readings from truck loading and unloading activities, which generate a noise level of 75 dBA L_{eq} at 20 ft based on measurements taken by LSA (*Operational Noise Impact Analysis for Richmond Wholesale Meat Distribution Center* [LSA 2016]). Shorter term noise levels that occur during the docking process taken by LSA were measured to be 76.3 dBA L_8 at 20 ft. Delivery trucks would arrive on site and maneuver their trailers so that trailers would be parked within the loading docks. During this process, noise levels are associated with the truck engine noise, air brakes, and back-up alarms while the truck is backing into the dock. These noise levels would occur for a shorter period of time (less than 5 minutes). After a truck enters the loading dock, the doors would be closed, and the remainder of the truck loading activities would be enclosed and therefore much less perceptible. To present a conservative assessment, the analysis assumed that truck arrivals and departure activities could occur at 7 spaces for a period of less than 5 minutes each and unloading activities could occur at 14 docks simultaneously for a period of more than 30 minutes in a given hour.

Cumulative Operations Noise Assessment

Tables P and Q, below, show the combined hourly noise levels generated by HVAC equipment, trash bin emptying activities, cold storage fan units, and truck delivery activities at the closest off-site land uses.

Table P: Daytime Exterior Noise Level Impacts

Receptor	Direction	Existing Quietest Daytime Noise Level (dBA L_{eq})	Project Generated Noise Levels (dBA L_{eq})	Potential Operational Noise Impact?[1]
Multifamily Residence	North	69.7	54.5	No
Single-family Residence	Northwest	73.0	52.8	No

Source: Compiled by LSA (2023).

[1] A potential operational noise impact would occur if (1) the quietest daytime ambient hour is less than 55 dBA L_{eq} and project noise impacts are greater than 55 dBA L_{eq}, OR (2) the quietest daytime ambient hour is greater than 55 dBA L_{eq} and project noise impacts are 3 dBA greater than the quietest daytime ambient hour.

dBA = A-weighted decibels

L_{eq} = equivalent noise level

Table Q: Nighttime Exterior Noise Level Impacts

Receptor	Direction	Existing Quietest Nighttime Noise Level (dBA L_{eq})	Project Generated Noise Levels (dBA L_{eq})	Potential Operational Noise Impact?[1]
Multifamily Residence	North	64.7	54.5	No
Single-family Residence	Northwest	62.0	52.8	No

Source: Compiled by LSA (2023).

[1] A potential operational noise impact would occur if (1) the quietest nighttime ambient hour is less than 45 dBA L_{eq} and project noise impacts are greater than 45 dBA L_{eq}, OR (2) the quietest nighttime ambient hour is greater than 45 dBA L_{eq} and project noise impacts are 3 dBA greater than the quietest nighttime ambient hour.

dBA = A-weighted decibels

L_{eq} = equivalent noise level

The results in Tables P and Q show that project-generated noise levels would not exceed the residential use daytime noise standard of 55 dBA L_{eq} at either of nearest receptors. Project noise levels would exceed the residential nighttime noise standard of 45 dBA L_{eq} at the closest sensitive uses to the north and northwest. However, consistent with the Municipal Code, which states that if the existing ambient noise level exceeds the standards, then the ambient noise level becomes the exterior noise level standard. Under both daytime and nighttime conditions, project-generated noise levels would not generate a noise level over the quietest ambient noise levels at any receptor. Therefore, the impact would be less than significant, and no noise reduction measures are required.

Additionally, as shown in Appendix C, the 75 dBA L_{max} and 65 dBA L_{max} noise contours generated by the proposed project during daytime and nighttime hours, respectively, would remain outside the property lines of the closest sensitive receptors. Therefore, operations at the proposed project would not generate noise levels at surrounding sensitive properties that exceed the noise level standards of 75 dBA L_{max} or 65 dBA L_{max}.

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APPENDIX A

NOISE MONITORING DATA

Noise Measurement Survey – 24 HR

Project Number: ESL2201.64
Test Personnel: Kevin Nguyendo
Project Name: 1210 E 223rd Carson
Equipment: Spark 706RC (SN:119)

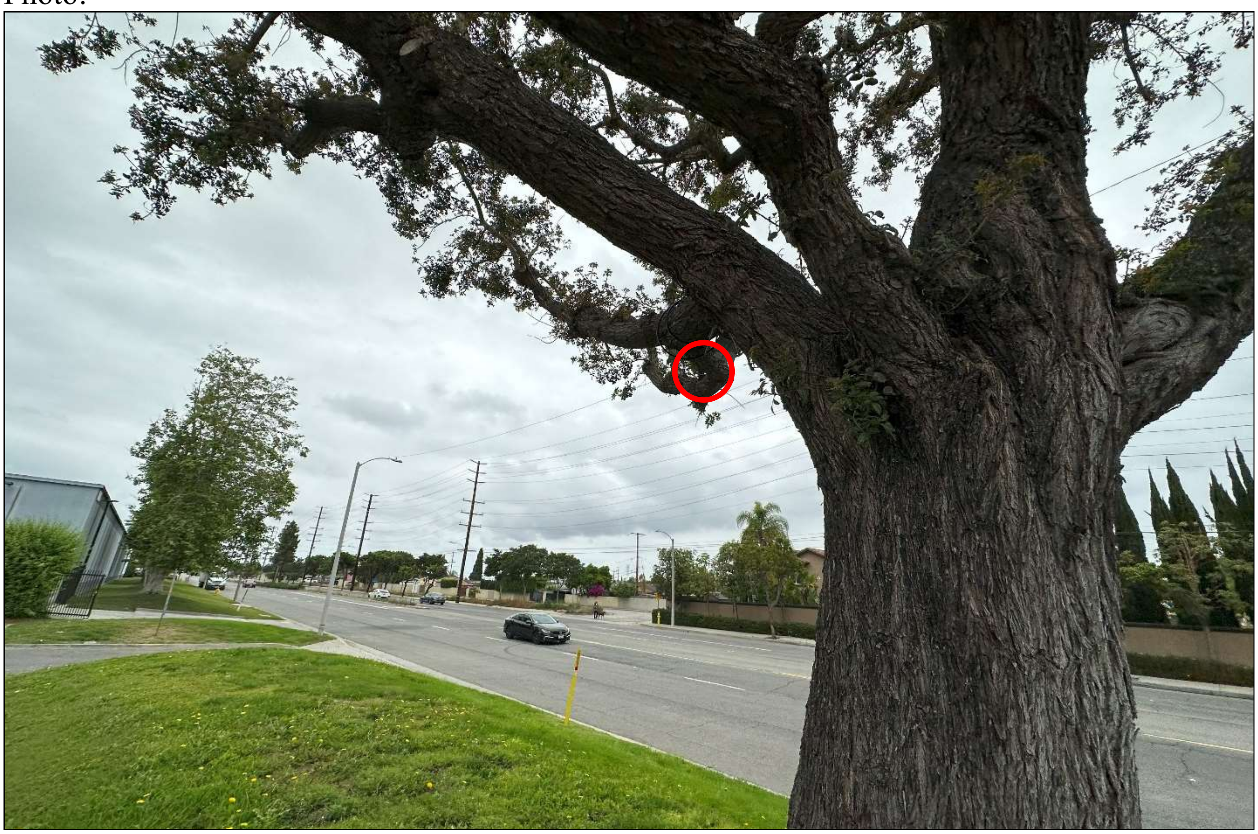
Site Number: LT-1 Date: 5/30/23
Time: From 1:00 p.m. To 1:00 p.m.

Site Location: Near northwest corner of project site. On a tree by entrance.

Primary Noise Sources: Vehicle traffic noise 223rd Street.

Comments:

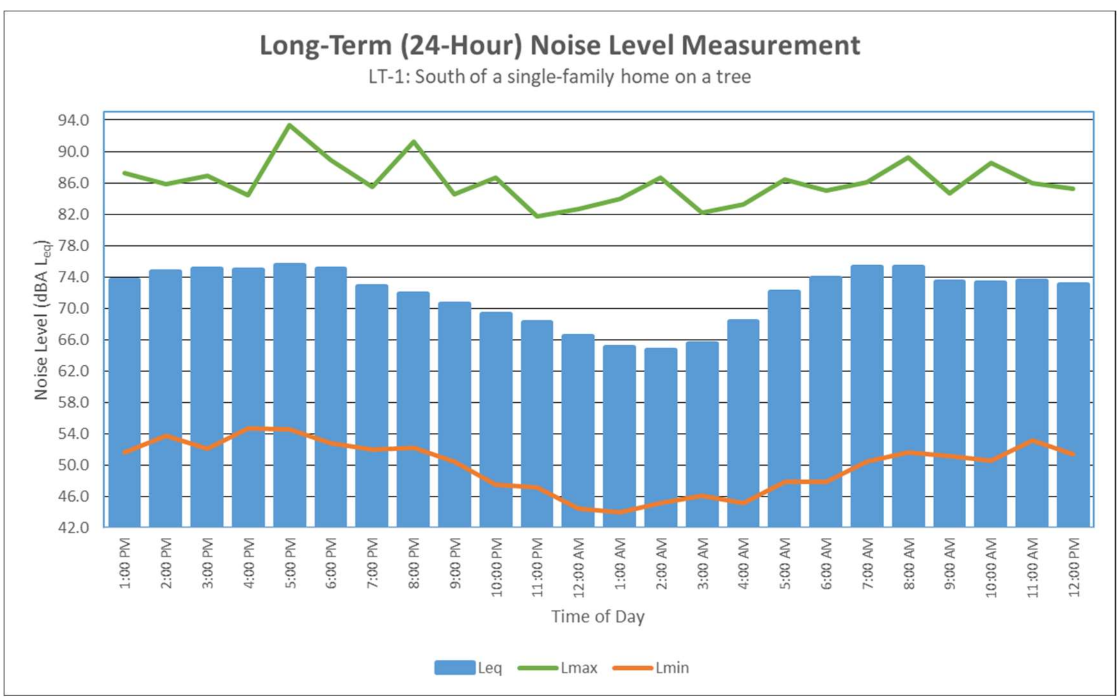
Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-1

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	5/30/23	73.6	87.2	51.6
2:00 PM	5/30/23	74.6	85.8	53.7
3:00 PM	5/30/23	75.0	86.9	52.1
4:00 PM	5/30/23	74.9	84.4	54.7
5:00 PM	5/30/23	75.5	93.3	54.6
6:00 PM	5/30/23	75.0	88.9	52.8
7:00 PM	5/30/23	72.8	85.5	52.0
8:00 PM	5/30/23	71.8	91.2	52.2
9:00 PM	5/30/23	70.6	84.5	50.4
10:00 PM	5/30/23	69.3	86.6	47.5
11:00 PM	5/30/23	68.2	81.7	47.2
12:00 AM	5/31/23	66.4	82.6	44.5
1:00 AM	5/31/23	65.0	83.9	44.0
2:00 AM	5/31/23	64.7	86.6	45.2
3:00 AM	5/31/23	65.5	82.2	46.1
4:00 AM	5/31/23	68.3	83.2	45.1
5:00 AM	5/31/23	72.1	86.4	47.9
6:00 AM	5/31/23	73.8	85.0	47.8
7:00 AM	5/31/23	75.3	86.1	50.4
8:00 AM	5/31/23	75.2	89.2	51.6
9:00 AM	5/31/23	73.3	84.7	51.1
10:00 AM	5/31/23	73.2	88.5	50.6
11:00 AM	5/31/23	73.5	86.0	53.2
12:00 PM	5/31/23	73.0	85.2	51.4

Source: Compiled by LSA Associates, Inc. (2023).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: ESL2201.64
Project Name: 1210 E 223rd Carson

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:905)

Site Number: LT-2 Date: 5/30/23

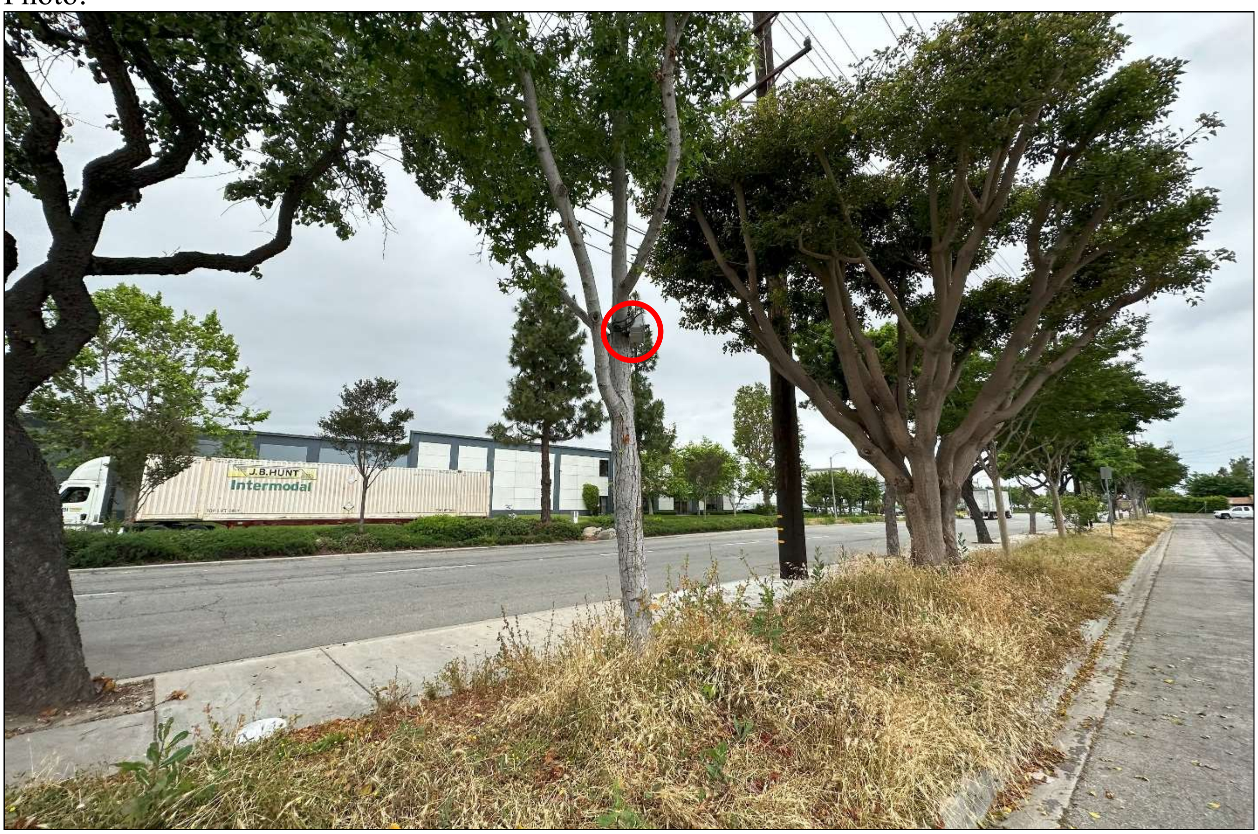
Time: From 1:00 p.m. To 1:00 p.m.

Site Location: South of a single-family home on 1138 E Joel St, Carson, CA 90745 opposite of 223rd Street on a tree.

Primary Noise Sources: Vehicle traffic noise 223rd Street.

Comments:

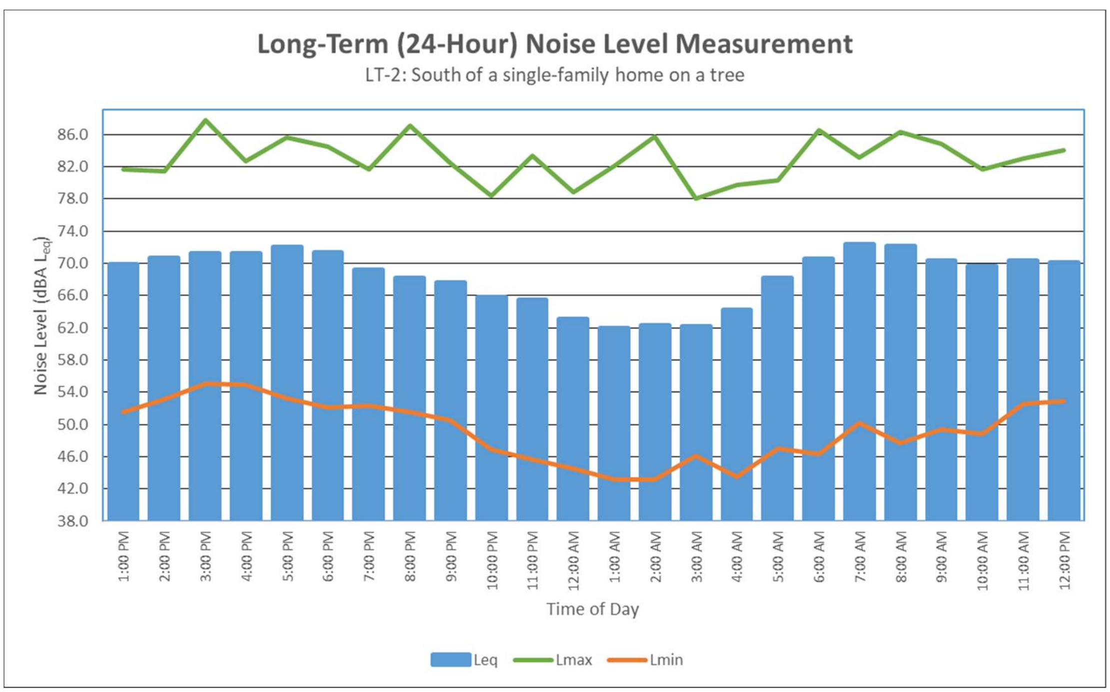
Photo:



Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
1:00 PM	5/30/23	69.9	81.6	51.5
2:00 PM	5/30/23	70.7	81.4	53.1
3:00 PM	5/30/23	71.3	87.7	55.1
4:00 PM	5/30/23	71.2	82.7	54.9
5:00 PM	5/30/23	72.0	85.6	53.3
6:00 PM	5/30/23	71.4	84.5	52.1
7:00 PM	5/30/23	69.2	81.6	52.3
8:00 PM	5/30/23	68.2	87.1	51.5
9:00 PM	5/30/23	67.6	82.4	50.5
10:00 PM	5/30/23	65.8	78.4	46.9
11:00 PM	5/30/23	65.5	83.3	45.7
12:00 AM	5/31/23	63.1	78.8	44.5
1:00 AM	5/31/23	62.0	82.1	43.2
2:00 AM	5/31/23	62.3	85.7	43.2
3:00 AM	5/31/23	62.2	78.0	46.1
4:00 AM	5/31/23	64.2	79.7	43.5
5:00 AM	5/31/23	68.2	80.3	47.0
6:00 AM	5/31/23	70.6	86.5	46.3
7:00 AM	5/31/23	72.3	83.1	50.2
8:00 AM	5/31/23	72.1	86.3	47.7
9:00 AM	5/31/23	70.3	84.8	49.4
10:00 AM	5/31/23	69.7	81.6	48.8
11:00 AM	5/31/23	70.3	83.0	52.6
12:00 PM	5/31/23	70.1	84.0	52.9

Source: Compiled by LSA Associates, Inc. (2023).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level



APPENDIX B

CONSTRUCTION NOISE LEVEL CALCULATIONS

Construction Calculations

Phase: Demolition

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Concrete Saw	1	90	20	50	0.5	90	83
Excavator	3	81	40	50	0.5	81	82
Dozer	2	82	40	50	0.5	82	81
					Combined at 50 feet	**91**	**87**
					Combined at Receptor 450 feet	**72**	**68**

Phase: Site Preparation

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Tractor	4	84	40	50	0.5	84	86
Dozer	3	82	40	50	0.5	82	83
					Combined at 50 feet	**86**	**88**
					Combined at Receptor 450 feet	**67**	**69**
					Combined at Receptor 590 feet	**65**	**66**

Phase: Grading

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Grader	1	85	40	50	0.5	85	81
Dozer	1	82	40	50	0.5	82	78
Tractor	3	84	40	50	0.5	84	85
Excavator	1	81	40	50	0.5	81	77
					Combined at 50 feet	**89**	**87**
					Combined at Receptor 450 feet	**73**	**71**

Phase:Building Construstion

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Crane	1	81	16	50	0.5	81	73
Man Lift	3	75	20	50	0.5	75	73
Generator	1	81	50	50	0.5	81	78
Tractor	3	84	40	50	0.5	84	85
Welder / Torch	1	74	40	50	0.5	74	70
					Combined at 50 feet	**84**	**85**
					Combined at Receptor 450 feet	**65**	**66**
					Combined at Receptor 590 feet	**63**	**63**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Paver	2	77	50	50	0.5	77	77
All Other Equipment > 5 HP	2	85	50	50	0.5	85	85
Roller	2	80	20	50	0.5	80	76
					Combined at 50 feet	**87**	**86**
					Combined at Receptor 450 feet	**68**	**67**

Phase:Architectural Coating

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Compressor (air)	1	78	40	50	0.5	78	74
					Combined at 50 feet	**78**	**74**
					Combined at Receptor 450 feet	**59**	**55**

Sources: RCNM

[1]- Percentage of time that a piece of equipment is operating at full power.
dBA – A-weighted Decibels
Lmax- Maximum Level
Leq- Equivalent Level

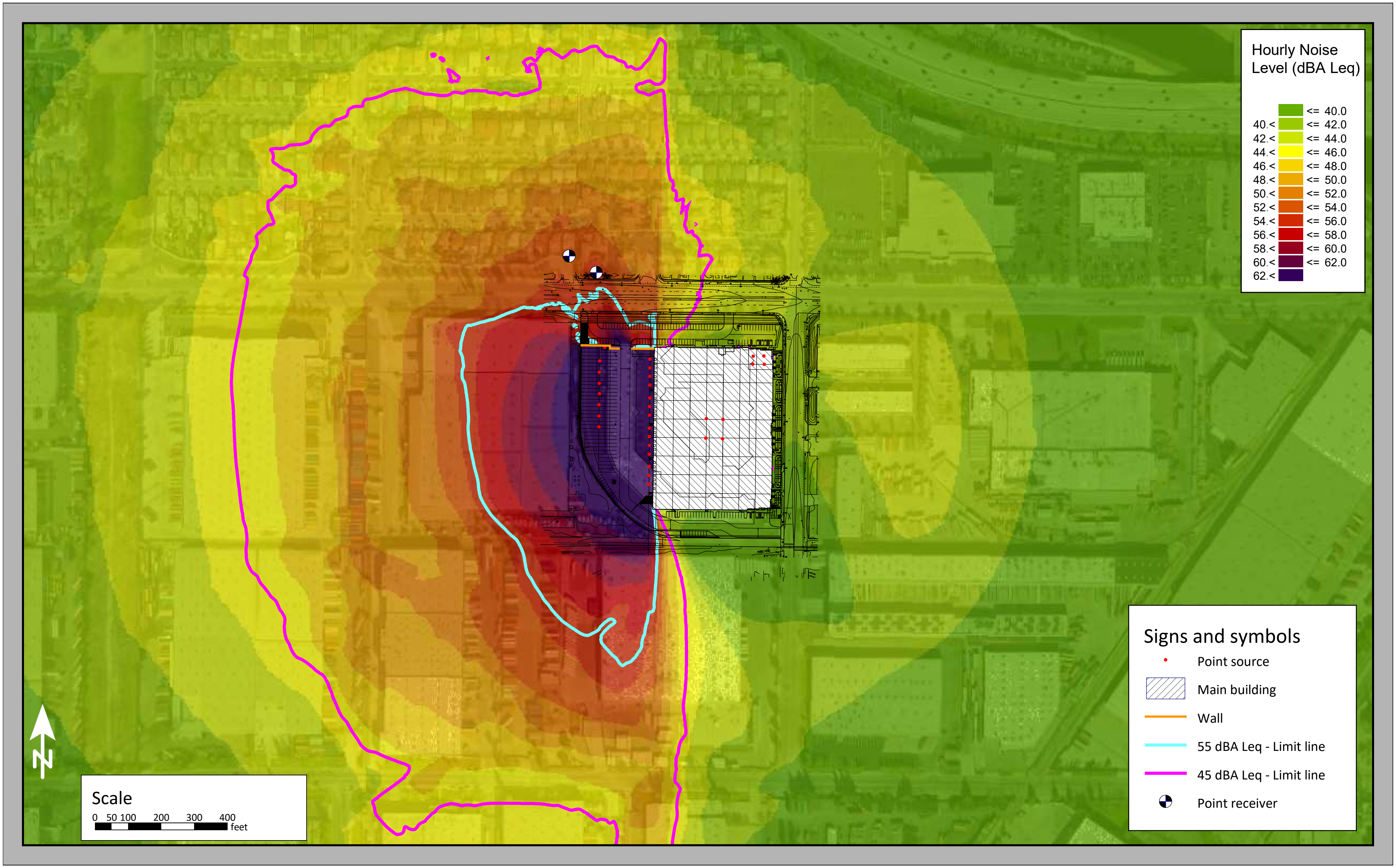
APPENDIX C

SOUNDPLAN NOISE MODEL PRINTOUTS

1210 - 1250 E 223rd Street Warehouse

Project No. ESL2201.64

Project Operational Noise Levels - Leq



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1210 - 1250 E 223rd Street Warehouse

Project No. ESL2201.64

Project Operational Noise Levels - Lmax