MEMORANDUM

DATE: February 28, 2025

TO: Cherry Miao, Public Storage

FROM: J.T. Stephens, Executive Vice President
Moe Abushanab, Noise Engineer

SUBJECT: Draft Noise and Vibration Impact Analysis: Proposed Public Storage Moreno Valley Project in the City of Moreno Valley, California

INTRODUCTION AND PROJECT DESCRIPTION

This noise and vibration impact analysis has been prepared to evaluate the potential impacts associated with the proposed Public Storage Moreno Valley Project (project) in Moreno Valley, California. This report is intended to satisfy the City of Moreno Valley's (City) requirement for a project-specific noise and vibration impact analysis and examines the impacts of the proposed project to the existing noise-sensitive uses adjacent to the project site. To properly account for the impacts associated with the proposed project, existing noise levels are assessed based on noise measurement data gathered in the vicinity of the project site (from August 21 to August 22, 2024) and project-related noise and vibration levels generated are based on estimated construction equipment. Traffic volumes from the Transportation Analysis for the Public Storage Moreno Valley Project[1] and additional stationary sources on the project site were also evaluated.

Location and Description

The 3-acre project site (Assessor Parcel Number 482-190-022) is located along Indian Street, north of Alessandro Boulevard in the City of Moreno Valley. The project site is currently undeveloped and generally flat. Vehicular access to the project site is provided via an existing driveway along Indian Street that is shared with commercial uses to the south of the site.

The project site is bounded by self-storage uses to the north, residential uses to the east, commercial uses (gasoline station and auto parts store) to the south, and Indian Street and commercial/retail uses to the west. Regional access to the project site is provided by Indian Street and Alessandro Boulevard, which are located to the west and south of the project site, respectively. State Route 60 (SR-60) is located approximately 1.5 miles north of the project site, and Interstate 215 (I-215) is located approximately 3 miles west of the project site. As described above, local access to the project site is provided via Indian Street.

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[1] LSA. 2024. *Trip Generation and Vehicle Miles Traveled Analysis for the Public Storage Moreno Valley Project.* October 30.

The proposed project includes development of a 132,003 square-foot, three-story, self-storage building, twelve passenger vehicle parking spaces, six bicycle parking spaces, and 52 recreational vehicle (RV) parking spaces. The proposed project includes up to two employees per shift to operate the facility.[2] Office hours would be 9:00 a.m. to 6:00 p.m. Customer access hours would be 6:00 a.m.- 9:00 p.m. Figure 1 shows the project location, and Figure 2 provides an overview of the proposed site plan (all figures are provided in Attachment A).

Construction hours would conform to City standards. Grading activities would be limited to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between the hours of 8:00 a.m. and 4:00 p.m. on Saturday in accordance with Moreno Valley Municipal Code Section 8.21.050(O). The operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work, would be limited to between the hours of 7:00 a.m. and 8:00 p.m. every day in accordance with Moreno Valley Municipal Code Section 11.80.030(D)(7)[3].

Sensitive Land Uses in the Project Vicinity

Certain land uses are considered more sensitive to noise than others are. Examples of these include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. Land uses adjacent to the project site include the following:

- **North:** Existing self-storage uses.
- **East:** Existing residential uses.
- **South:** Existing commercial uses (gasoline station and auto parts store).
- **West:** Existing commercial/retail uses opposite Indian Street.

The nearest sensitive receptors are:

- **East:** Existing single-family residences adjacent to project site.

METHODOLOGY

The evaluation of noise impacts associated with the proposed project includes the following:

- A determination of the short-term construction noise and vibration levels at off-site noise-sensitive uses and comparison to the City's General Plan and Municipal Code Ordinance requirements;

- A determination of the long-term noise levels at off-site noise-sensitive uses and comparison of those levels to the City's pertinent noise standards; and

- If necessary, a determination of required mitigation measures, such as noise barriers, to reduce long-term noise impacts from all sources.

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2 Assumes up to two shifts per day.
3 City of Moreno Valley. 2024. *Municipal Code*.

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 wave, resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and 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 refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. 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 through the A-weighted 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. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) is 10 times more intense than 1 dB, 20 dB is 100 times more intense than 1 dB, and 30 dB is 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 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 loudness of the sound. 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 dissipates exponentially with distance from the noise source. 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. Similarly, line sources with intervening absorptive vegetation or line sources that are located at a great distance to the receptor would decrease 4.5 dB for each doubling of distance.

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 (dBA). 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 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 evening hours. 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 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 exponential time-averaged 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. L_{max} 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 (i.e., 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 is audible impacts, which refers to 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 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 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 noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise 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 noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160–165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying, less developed areas.

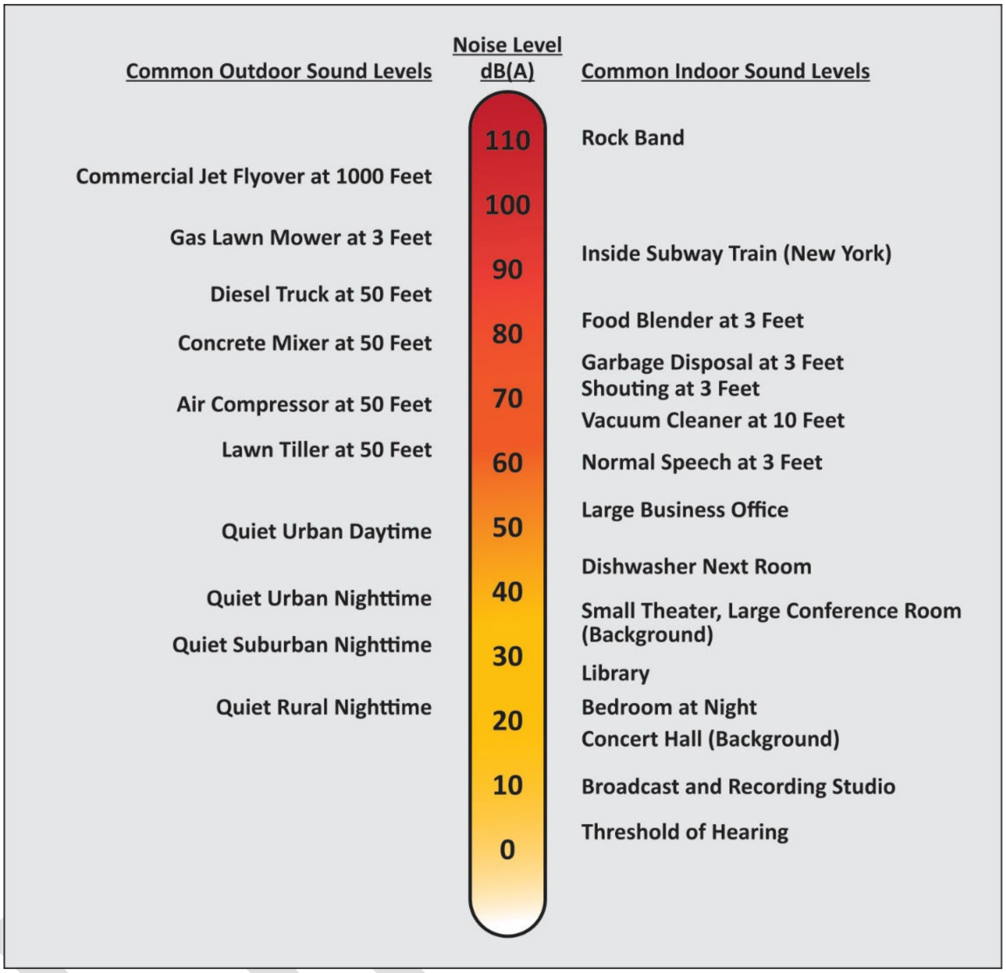
Table A lists full definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities 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., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter deemphasizes 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 assessment are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
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 dB to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB 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 dB 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 at 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, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.

Sources: *Technical Noise Supplement* (Caltrans 2013) and *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
Caltrans = California Department of Transportation
FTA = Federal Transit Administration

Table B: Common Sound Levels and Noise Sources



Source: LSA (2016).

CHARACTERISTICS 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. Typically, there is more adverse reaction to effects associated with the shaking of a building. 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 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.

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) of the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (FTA 2018).[2] 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, the construction of the project could result in ground-borne vibration that may be perceptible.

Ground-borne vibration has the potential to damage buildings. Although it is very rare for typical construction activities 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).[3] Ground-borne vibration that may resulting in damage is usually measured in terms of peak particle velocity (PPV).

APPLICABLE NOISE STANDARDS

The applicable noise standards governing the project site include the criteria in the City's Noise Element of the General Plan (Safety Element[4]) and the City of Moreno Valley Municipal Code.

City of Moreno Valley

Noise Element of the General Plan

The objectives and associated policies in the City's General Plan Safety Element are designed to provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes and minimize noise impacts from significant noise generators. The following objectives and policies are applicable to the proposed project:

Objective 6.4: Review noise issues during the planning process and require noise attenuation measures to minimize acoustic impacts to existing and future surrounding land uses.

- **Policy 6.4.1:** Site, landscape and architectural design features shall be encouraged to mitigate noise impacts for new developments, with a preference for noise barriers that avoid freeway sound barrier walls

Objective 6.5: Minimize noise impacts from significant noise generators such as, but not limited to, motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities.

- **Policy 6.5.1:** New commercial and industrial activities (including the placement of mechanical equipment) shall be evaluated and designed to mitigate noise impacts on adjacent uses.

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3 Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual – FTA Report No. .0123*. September.

4 City of Moreno Valley. 2006. *General Plan Safety Element*. July.

- **Policy 6.5.2:** Construction activities shall be operated in a manner that limits noise impacts on surrounding uses.

City of Moreno Valley Municipal Code

Section 8.14.040(E) states that grading and equipment operations shall only be completed between the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday, excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturday.

Section 11.80.030(C) of the City's Municipal Code establishes limits on non-impulsive noise where no person shall maintain, create, operate, or cause noise on private property to not exceed the noise standards shown in Table C for the source land use category when measured at a distance of 200 ft from the property line of the source of the noise, if the noise occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Noise levels that exceed the noise standards in Table C shall be deemed to be a noise disturbance.

Table C: Maximum Sound Levels for Source Land Uses

Residential		Commercial	
Daytime[1]	**Nighttime[2]**	**Daytime[1]**	**Nighttime[2]**
60 dBA[3]	55 dBA[3]	65 dBA[3]	60 dBA[3]

Source: Section 11.80.030(C) of the City of Moreno Valley *Municipal Code.*

[1] Daytime means 8:00 a.m. to 10:00 p.m.

[2] Nighttime means 10:01 p.m. to 7:59 a.m.

[3] Noise level standard when measured at a distance of 200 ft from the property line of the source of the noise.

dBA = A-weighted decibels

Section 11.80.030(D)(7) of the City's Municipal Code limits construction and demolition activities to between the hours of 7:00 a.m. and 8:00 p.m. every day. No person shall operate or allow the operation of any tools or equipment used in construction, drilling, repair, or alteration or demolition work outside of these hours to prevent noise disturbances.

Section 9.10.170 of the Municipal Code prohibits vibration that can be felt at or beyond the property line. However, construction activity is exempt from Section 9.10.170 pursuant to Section 9.10.030, which states temporary construction, maintenance, or demolition activities between the hours of 7:00 a.m. and 7:00 p.m. are exempt from the provisions of Chapter 9.10 (Performance Standards) of the City Municipal Code.

Federal Transit Administration

Although the City does not have daytime construction noise level limits for activities that occur within the specified hours of Section 11.80.030(D)(7), to determine potential CEQA noise impacts, construction noise was assessed using criteria from the Federal Transit Administration's (FTA)

Transit Noise and Vibration Impact Assessment Manual (FTA 2018) (FTA Manual).[3] Table F shows the FTA's Detailed Assessment Construction Noise Criteria based on the composite noise levels per construction phase.

Table D: Detailed Assessment Daytime Construction Noise Criteria

Land Use	Daytime 1-hour L_{eq} (dBA)
Residential	80
Commercial	85
Industrial	90

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

APPLICABLE VIBRATION STANDARDS

The following information provides standards to which potential vibration impacts will be compared.

Federal Transit Administration

Vibration standards included in the FTA's *Transit Noise and Vibration Impact Assessment Manual* (2018) (FTA Manual) are used in this analysis for ground-borne vibration impacts on human annoyance. Table E provides the criteria for assessing the potential for interference or annoyance from vibration levels in a building.

Table E: Criteria for Potential Vibration Annoyance

Land Use	Max L_v (VdB)[1]	Description of Use
Workshop	90	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas.
Office	84	Feelable vibration. Appropriate to offices and non-sensitive areas.
Residential Day	78	Feelable vibration. Appropriate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night and Operating Rooms	72	Vibration not feelable, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power microscopes (100X) 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 Hz.
FTA = Federal Transit Administration
Hz = hertz
L_V = velocity in decibels
Max = maximum
VdB = vibration velocity decibels

The criteria for environmental impacts resulting from ground-borne vibration are based on the maximum levels for a single event. The City's Municipal Code does not include specific criteria for assessing vibration impacts associated with damage. Therefore, for the purpose of determining the

[3] Federal Transit Administration (FTA). 2018. *Transit Noise and Vibration Impact Assessment Manual – FTA Report No. .0123.* September.

significance of vibration impacts experienced at sensitive uses surrounding the project site, the guidelines within the FTA Manual have been used to determine vibration impacts (refer to Table F, below).

Table F: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
Reinforced concrete, steel, or timber (no plaster)	0.50
Engineered concrete and masonry (no plaster)	0.30
Non-engineered timber and masonry buildings	0.20
Buildings extremely susceptible to vibration damage	0.12

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
in/sec = inches per second PPV = peak particle velocity

The FTA Manual guidelines show that a vibration level of up to 0.2 inches per second (in/sec) in PPV is considered safe for non-engineered timber and masonry buildings, which are the types of buildings located on properties adjacent to the project site. Accordingly, the 0.2 in/sec PPV threshold was used to evaluate vibration impacts at the nearest structures to the site.

THRESHOLDS OF SIGNIFICANCE

Based on *Guidelines for the Implementation of the California Environmental Quality Act* (CEQA), Appendix G, Public Resources Code, Sections 15000–15387, a project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and the goals of the community in which it is located.

The *State CEQA Guidelines* indicate that a project would have a significant impact on noise if it would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generation of excessive ground-borne vibration or ground-borne noise levels; or
- 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 2 miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the vicinity of the project site are transportation facilities, including Indian Street and Alessandro Boulevard. In addition, periodic noise from nearby commercial uses such as the Food 4 Less Gas Station and Auto Zone is audible at the project site.

In order to assess the existing noise conditions in the area, long-term noise measurements were conducted in the vicinity of the project site. Two long-term, 24-hour measurements were taken from August 21 to August 22, 2024. The locations of the noise measurements are shown on Figure 3, and the results are summarized in Table G. Noise measurement data are provided in Attachment B of this analysis.

AIRCRAFT NOISE

Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The closest airport to the project site is March Air Reserve Base located approximately 2 miles southwest of the project site. Based on the Riverside County Airport Land Use Compatibility Plan (Riverside County, November 2014) the project site is located outside of the 60 dBA CNEL noise contour of the airport. Because the project site is not located within the 60 dBA CNEL noise contour, no further analysis associated with aircraft noise impacts is necessary. Additionally, there are no helipads or private airstrips within 2 miles of the project site.

Table G: Existing Noise Level Measurements

Location Number	Location Description	Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Average Daily Noise Levels (dBA CNEL)	Primary Noise Sources
LT-1	Southeastern corner of the project site, behind Auto Zone, approximately 275 ft away from the Alessandro Boulevard centerline and 390 ft away from the Indian Street centerline.	49.8-58.4	50.9-55.0	42.1-51.8	56.8	Traffic noise from Alessandro Boulevard. Operational noise from Auto Zone.
LT-2	Eastern side of the Food 4 Less Gas Station parking lot, approximately 200 ft away from the Indian Street centerline and 235 ft away from the Alessandro Boulevard centerline.	59.3-63.6	57.3-60.3	49.2-57.9	63.4	Traffic noise from Indian Street and Alessandro Boulevard. Operational noise from Food 4 Less Gas Station and Auto Zone.

Source: Compiled by LSA (2024).

[1] Daytime Noise Levels = noise levels during the hours of 7:00 a.m. to 7:00 p.m.

[2] Evening Noise Levels = noise levels during the hours of 7:00 p.m. to 10:00 p.m.

[3] Nighttime Noise Levels = noise levels during the hours of 10:00 p.m. to 7:00 a.m.

CNEL = Community Noise Equivalent Level

dBA = A-weighted decibel(s)

ft = foot/feet

L_{eq} = equivalent continuous sound level

PROJECT IMPACT ANALYSIS

The proposed project would result in short-term construction noise and vibration impacts and long-term mobile-source noise and vibration impacts as described below.

Short-Term Construction-Related Impact Analysis

Project construction would result in short-term noise and vibration. Maximum construction noise would be short-term, generally intermittent depending on the construction phase, and variable depending on receiver distance from the active construction zone. The duration of various types of construction noise and vibration would vary from 1 day to several weeks, depending on the phase of construction. The levels and types of impacts that may occur during construction are described below.

Construction Noise Analysis

Two types of short-term noise would occur during project construction, including: (1) equipment delivery and construction worker commutes; and (2) project construction operations.

The first type of short-term construction noise would result from the transport of construction equipment and materials to the project site and construction worker commutes. These transportation activities would incrementally raise noise levels on access roads leading to the site. It is expected that larger trucks used in equipment delivery would generate higher noise impacts than trucks associated with worker commutes. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance, the effect on longer-term ambient noise levels would be small when compared to the existing average daily traffic (ADT) volume of approximately 7,400 on Indian Street (City of Moreno Valley Traffic Counts). During the overlap of the site preparation phase and grading phase, approximately 1,361 acoustically equivalent trips would occur during an average day from worker and delivery activities resulting in a traffic noise increase of approximately 0.7 dBA as shown in Appendix B. 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 commutes 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 site preparation, grading, building construction, architectural coating, and paving on the project site. Construction is undertaken 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 project site. Therefore, the noise levels would vary 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 the maximum noise levels recommended for noise impact assessments for typical construction equipment based on a distance of 50 ft between the construction equipment and a noise receptor. Typical operating cycles for these types of construction equipment may involve 1–2 minutes of full-power operation followed by 3–4 minutes at lower power settings.

Table H: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Maximum Noise Level (L_{max}) at 50 ft
Compressor	100	81
Concrete Mixer	40	85
Concrete Pump	40	85
Crane	16	83
Dozer	40	80
Forklift	20	75
Front [End] Loader	40	79
Generator	100	78
Grader	8	85
Scraper	40	88
Welder	40	74

Sources: *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances* (USEPA 1971); Roadway Construction Noise Model (FHWA 2006).
ft = foot/feet
L_{max} = maximum instantaneous sound level

In addition to the reference maximum noise level, the usage factor provided in Table H is utilized 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

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

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

Table I shows the composite noise levels of one piece of equipment type for each construction phase at a distance of 50 ft from the construction area. 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.

As presented below, Table I shows the construction phases, the expected duration of each phase, the equipment expected to be used during each phase, the composite noise levels of the equipment at 50 ft, the distance of the nearest sensitive receptor (single-family residence east of project site) from the average location of construction activities (a distance of 200 ft from the center of the project site to the façade of the home), and noise levels expected during each phase of construction. These noise level projections do not take into account intervening topography or barriers. Attachment C provides construction noise calculations.

Table I: Construction Noise Levels by Phase

Phase	Duration (days)	Equipment	Composite Noise Level at 50 ft (dBA L_{eq})	Distance to Nearest Sensitive Receptor (ft)[1]	Noise Level at Nearest Receptor (dBA L_{eq})
Site Preparation	15	1 grader, 1 scraper, 3 dozers, and 1 tractor	87	200	75
Grading	25	1 grader, 1 dozer, and 2 tractors, and 1 excavator	86	200	74
Building Construction	200	1 crane, 2 forklifts, 1 generator set, 1 tractor, and 3 welders	84	200	72
Paving	15	1 cement and mortar mixer, 1 paver, 1 paving equipment, 2 rollers, and 1 tractor	86	200	74
Architectural Coating	100	1 air compressor	74	200	62

Source: Compiled by LSA (2024).

[1] Distances are from the average location of construction activity for each phase, assumed to be the center of the project site. Residential uses to the east are 200 feet from the center of construction activity. Other buildings within the same development are further away and would be exposed to less noise.

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

ft = foot/feet

It is expected that average noise levels during construction at the nearest sensitive receptor, the single-family residence to the east, would approach 75 dBA L_{eq} during the site preparation phase, which would occur for a duration of approximately 15 days. Average noise levels during other construction phases would range from 62 dBA L_{eq} to 74 dBA L_{eq}. These predicted noise levels would only occur when all construction equipment is operating simultaneously; therefore, these noise levels are assumed to be conservative in nature.

Although the project construction-related short-term noise levels have the potential to be higher than the ambient noise in the vicinity of the project site, construction noise would cease to occur once the project construction is completed. Furthermore, the construction-related noise levels would be below the 80 dBA L_{eq} criteria established by FTA for residential uses. The project would be constructed in compliance with the requirements of the City's Noise Ordinance, which states that construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. In addition to compliance with appropriate construction times, the following Standard Condition NOI-1 would implement measures during construction to reduce noise impacts to the greatest extent feasible and reduce project construction impacts to a less than significant impact.

Standard Condition NOI-1 **Construction Noise.** Prior to issuance of grading and building permits, the Project Applicant shall submit grading plans and building plans for review and approval by the Director the City of Moreno Valley Public Works Department, or designee. These plans shall include the following requirements for construction activities:

- Construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. No construction shall be permitted outside of these hours or on federal holidays.
- Construction contracts must specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained noise mufflers consistent with manufacturers' standards.
- In order to maximize the distance between construction equipment staging areas and the sensitive noise receivers in the area, all equipment staging areas and material storage areas shall be placed as far from these receivers as possible.
- During construction, stationary construction equipment shall be placed so that emitted noise is directed away from sensitive receptors nearest the proposed project site.

Construction Vibration Human Annoyance Potential

As stated above, the existing single-family residence, located approximately 200 ft to the east from the center of the project site, is the nearest sensitive receptor and would experience vibration levels approaching 60 VdB based on the following equation:

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

Based on the standards provided in Table E, this level of ground-borne vibration is below the threshold of being distinctly perceptible, which is approximately 72 VdB for frequent events at uses where people sleep and would not exceed the FTA vibration threshold for human annoyance at the nearest sensitive use. Therefore, this level of ground-borne vibration would be less than significant for human annoyance. No mitigation is required.

Construction Vibration Building Damage Potential

Ground-borne noise and vibration from construction activity would be low. Table J provides reference PPV values and vibration levels (in terms of VdB) from typical construction vibration sources at 25 ft. While there is currently limited information regarding vibration source levels specific to the equipment that would be used for the project, to provide a comparison of vibration levels expected for a project of this size, a large bulldozer would generate 0.089 PPV (in/sec) of ground-borne vibration when measured at 25 ft, based on the FTA Manual. As shown previously in Table F, it would take a minimum of 0.2 PPV (in/sec) to cause any potential building damage to non-engineered timber and masonry buildings.

Table J: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 ft	
	PPV (in/sec)	L_V (VdB)[1]
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

[1] RMS VdB re 1 µin/sec.

µin/sec = micro-inches per second
ft = foot/feet
FTA = Federal Transit Administration
in/sec = inches per second
L_V = velocity in decibels
PPV = peak particle velocity
RMS = root-mean-square
VdB = vibration velocity in decibels

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 only be used at or near the project setback line). The formula for vibration transmission is provided below:

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

The closest structures, which are associated with the self-storage uses to the north are approximately 5 ft from the project construction boundary. With the use of smaller equipment, such as a small bulldozer with a reference level of 0.003 PPV (in/sec), the structures at 5 ft could experience vibration levels of up to 0.034 PPV (in/sec) and not exceed the 0.2 in/sec threshold.

In the case of using larger equipment, such as a large bulldozer, the structures at 5 ft could result in vibration levels that exceed the 0.2 in/sec threshold and experience vibration levels of up to 0.995 PPV (in/sec). This vibration level exceeds the 0.2 in/sec PPV threshold, which could result in a potentially significant impact. The distance from large construction equipment with a reference vibration level of 0.089 in/sec PPV at 25 ft for which the 0.2 in/sec threshold would no longer be exceeded is 15 ft. Vibration levels at all other buildings would be lower. Therefore, construction would not result in any vibration damage, and impacts would be less than significant with the incorporation of Mitigation Measure NOI-1, as detailed below.

Mitigation Measure NOI-1 **Construction Vibration Assessment**. Due to the close proximity to surrounding structures, the City of Moreno Valley (City) Director of Community Development, or designee, shall verify prior to issuance of grading permits that the approved plans require that the construction contractor shall implement the following reduction measures during project construction activities to ensure that damage does not occur at surrounding structures:

- The first step in the Vibration Assessment should be a determination if any structures are within 15 feet of potential heavy construction activities. If is determined that no structures meet this criteria, no further effort is necessary.

- If heavy construction equipment is necessary, structures that are located within 15 feet of heavy construction activities and that have the potential to be affected by ground-borne vibration should be identified. This task shall be conducted by a qualified structural engineer as approved by the City's Director of Community Development, or designee.

- Once the construction equipment list finalized, a comparison of the proposed equipment to be used and the assumed equipment vibration levels presented in Table 7-4 of the Federal Transit Administration's (FTA) Noise and Vibration Impact Assessment Manual (FTA Report No. 0123) shall be completed. If it is determined that the proposed equipment would generate lower vibration levels than assumed, further vibration assessment would not be necessary. However, if levels would potentially exceed the City's standard of 0.2 inch per second peak particle velocity (PPV), the Project Applicant shall develop a vibration monitoring and construction contingency plan for approval by the City Director of Community Development, or designee, to identify structures where monitoring would be conducted; set up a vibration monitoring schedule; define structure-specific vibration limits; and address the need to conduct photo, elevation, and crack surveys to document before and after construction conditions. Construction contingencies would be identified for when vibration levels approached the limits.

- If a vibration monitoring and construction contingency plan is deemed necessary, monitoring of vibration during initial construction activities would be required. Monitoring results may indicate the need for more or less intensive measurements.

- When vibration levels approach limits, suspend construction and implement contingencies as identified in the approved vibration monitoring and construction contingency plan to either lower vibration levels or secure the affected structures.

Long-Term Off-Site Traffic Noise Impact Analysis

In order to assess the potential traffic impacts related to the proposed project, LSA estimates that the proposed project would generate 216 daily trips. Based on the ADT data provided by the City of Moreno Valley (*Traffic Counts*[5]), the ADT along Alessandro Boulevard and Indian Street in the vicinity of the project site is approximately 22,100 and 7,400, respectively, based on projections for the year 2005. While the existing ADT is likely higher, using 22,100 and 7,400 ADT as the existing traffic volume would be a conservative approach. The following equation was used to determine the potential impacts of the project:

$$\text{Change in CNEL} = 10 \log_{10} [V_{e+p}/V_{existing}]$$

Where: $V_{existing}$ = the existing daily volume

V_{e+p} = existing daily volumes plus project

Change in CNEL = the increase in noise level due to the project

The results of the calculations show that an increase of less than 0.1 dBA CNEL is expected along Alessandro Boulevard and Indian Street. A noise level increase of less than 3 dBA would not be perceptible to the human ear; therefore, the traffic noise increases along Alessandro Boulevard and Indian Street resulting from the proposed project would be less than significant. No mitigation is required.

Long-Term Operational Noise Impact Analysis

Adjacent off-site land uses would be potentially exposed to stationary-source noise impacts from rooftop heating, ventilation, and air conditioning (HVAC) equipment and proposed truck loading and unloading activities. The potential noise impacts to off-site sensitive land uses from the proposed operations are discussed below. To provide a conservative analysis, it is assumed that within any given peak hour, 11 vehicles (assumed to be a mix of personal automobiles and pick-up trucks and an occasional heavy trucks) would maneuver to park near the loading area south of the proposed building. During non-peak hours, it is assumed 4 vehicles would unload per hour.

[5] City of Moreno Valley. 2017. *Traffic Counts*.

Truck Loading and Unloading Activities

Noise levels generated by 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.[6] During this process, noise levels are associated with the truck engine noise, air brakes, and backup alarms. These noise levels would occur for a period of approximately 5 minutes for each truck.

Heating, Ventilation, and Air Conditioning Equipment

The proposed project would include rooftop HVAC units atop the proposed building. The HVAC equipment could operate 24 hours per day and would generate sound power levels (L_w) of up to 87 dBA L_w or 72 dBA L_{eq} at 5 ft, based on manufacturer data (Trane[7]). It is assumed that nine HVAC units would be installed.

Operational Noise Impact Results

Tables K and L below show the results of the peak-hour daytime and off-peak hour nighttime operational noise assessment. The results indicated that operational noise levels would be below the daytime and nighttime hourly noise level standards or 60 dBA L_{eq} and 55 dBA L_{eq}, respectively, for residential uses. Additionally, the proposed 6 ft high wall along the eastern boundary of the project site and intervening RVs parked to the east of the loading area would further reduce project-generated noise levels. Therefore, operations of the proposed project would be less than significant. No mitigation is required. Attachment D presents the operational noise source calculations.

Table K: Peak Hour 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]
Single-family residence	East	49.8	56.0	No

Source: Compiled by LSA (2024).

[1] A potential operational noise impact would occur if (1) the quietest daytime ambient hour is less than 60 dBA L_{eq} and project noise impacts are greater than 60 dBA L_{eq}, OR (2) the quietest daytime ambient hour is greater than 60 dBA L_{eq} and project noise impacts are 5 dBA greater than the quietest daytime ambient hour.

dBA = A-weighted decibels
L_{eq} = equivalent noise level

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6 LSA. 2016. *Operational Noise Impact Analysis for Richmond Wholesale Meat Distribution Center.*

7 Trane. n.d. Fan Performance - *Product Specifications RT-PRC023AU-EN*.

Table L: Off-Peak Hour 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]
Single-family residence	East	42.1	52.4	No

Source: Compiled by LSA (2024).

[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 5 dBA greater than the quietest daytime ambient hour.

dBA = A-weighted decibels
L_{eq} = equivalent noise level

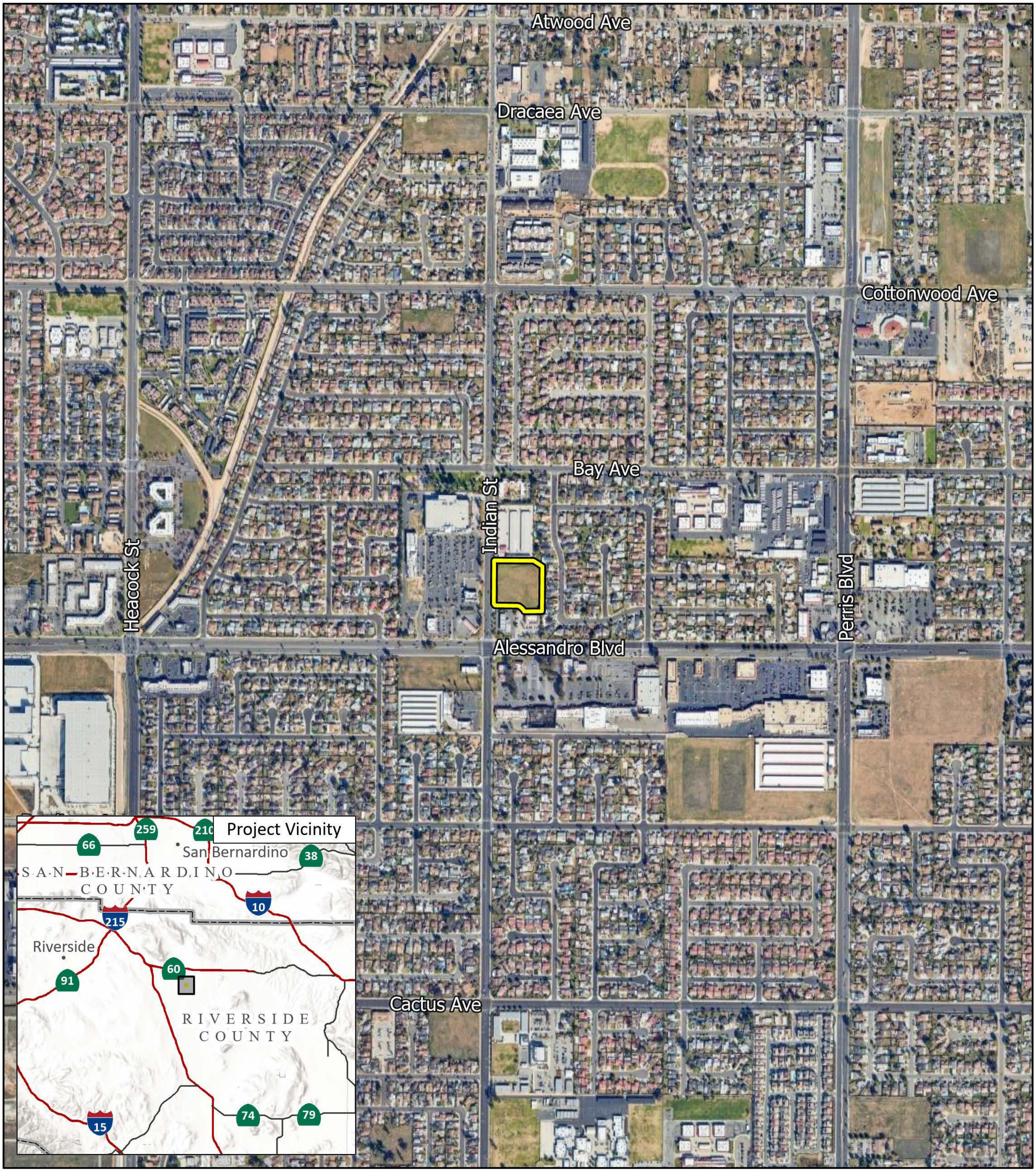
Long-Term Ground-Borne Noise and Vibration from Vehicular Traffic

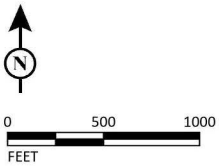
The proposed project would not generate vibration levels related to on-site operations. In addition, vibration levels generated from project-related traffic on the adjacent roadways are unusual for on-road vehicles because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Based on a reference vibration level of 0.076 in/sec PPV, structures more 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.

Attachments:
A: Figures
B: Noise Measurement Data
C: Construction Noise Calculations
D: Operational Noise Calculations

ATTACHMENT A

FIGURES





LSA

Project Location

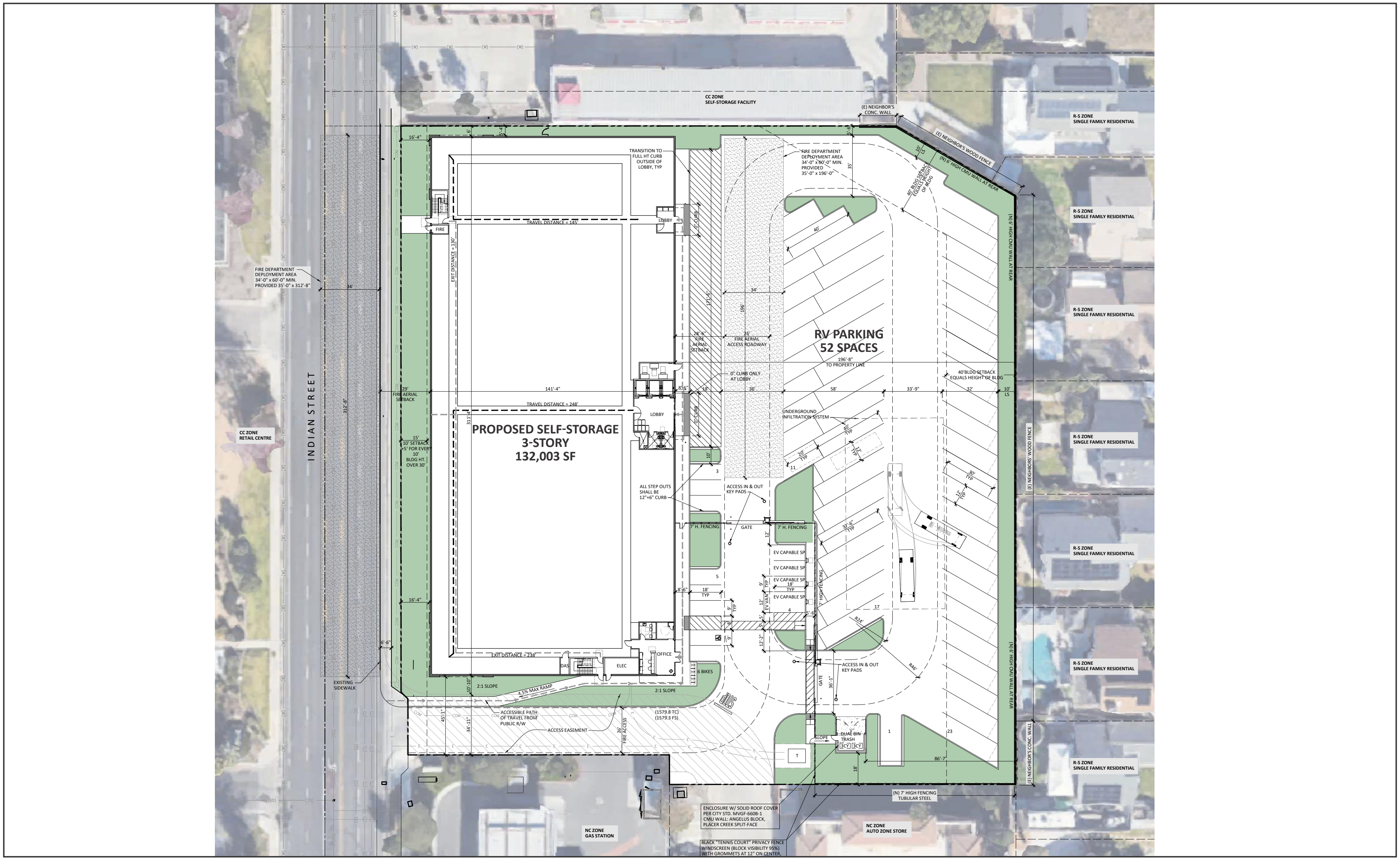
FIGURE 1

SOURCE: Google Maps (2024)

Public Storage Moreno Valley Project

Regional and Project Location

I:\2024\20241908\GIS\Pro\Moreno Valley Public Storage\Public Storage Moreno Valley Project.aprx (1/12/2025)



LSA

FIGURE 2

0 40 80
FEET

SOURCE: KSP Studios

Public Storage Moreno Valley
Site Plan

I:\2024\20241908\G\Site_Plan.ai (1/29/2025)

ATTACHMENT B

NOISE MEASUREMENT DATA

Noise Measurement Survey – 24 HR

Project Number: 20241908
Project Name: Moreno Valley Public Storage

Test Personnel: Ämber Hazelrigg
Equipment: Spark 706RC (SN: 18571)

Site Number: LT-1 Date: 08/21/2024

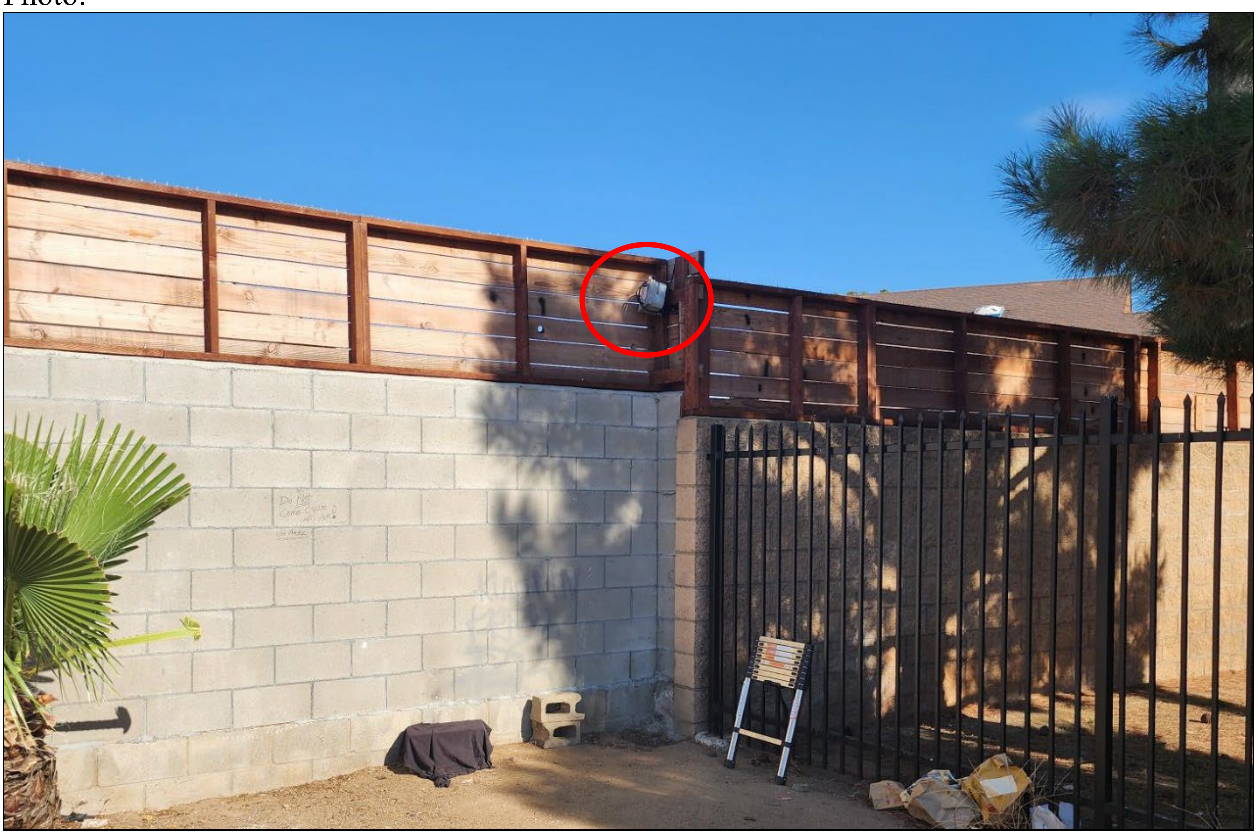
Time: From 11am To 10am

Site Location: Project site is located off Indian Street near Alessandro Boulevard in Moreno Valley; the monitor was hung on a residential fence near Auto Zone which is adjacent to the Food 4 Less Gas Station lot.

Primary Noise Sources: The primary noise source was residential as well as commercial from Auto Zone.

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}
11:00 AM	7/30/2024	47.9	63.5	38.3
12:00 PM	7/30/2024	48.3	69.7	38.0
1:00 PM	7/30/2024	46.6	62.0	37.9
2:00 PM	7/30/2024	51.4	70.8	37.3
3:00 PM	7/30/2024	57.1	74.9	37.4
4:00 PM	7/30/2024	65.1	80.9	38.2
5:00 PM	7/30/2024	64.3	80.0	40.3
6:00 PM	7/30/2024	67.6	81.0	42.6
7:00 PM	7/30/2024	69.8	82.6	43.1
8:00 PM	7/30/2024	75.6	88.6	52.8
9:00 PM	7/30/2024	78.0	93.2	54.1
10:00 PM	7/30/2024	77.8	89.8	56.5
11:00 PM	7/30/2024	77.8	91.7	57.7
12:00 AM	7/31/2024	78.4	90.1	59.8
1:00 AM	7/31/2024	74.1	86.4	49.7
2:00 AM	7/31/2024	71.3	87.3	46.7
3:00 AM	7/31/2024	64.6	80.4	41.9
4:00 AM	7/31/2024	59.7	76.4	42.4
5:00 AM	7/31/2024	57.2	78.5	41.6
6:00 AM	7/31/2024	51.9	70.7	42.5
7:00 AM	7/31/2024	58.6	70.5	44.6
8:00 AM	7/31/2024	55.8	73.3	40.4
9:00 AM	7/31/2024	52.2	71.4	38.1
10:00 AM	7/31/2024	43.7	66.7	37.1

Source: Compiled by LSA Associates, Inc. (2024).

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: 20241908

Project Name: Moreno Valley Public Storage

Test Personnel: Ämber Hazelrigg

Equipment: Spark 706RC (SN: 17206)

Site Number: LT-2 Date: 08/20/2024

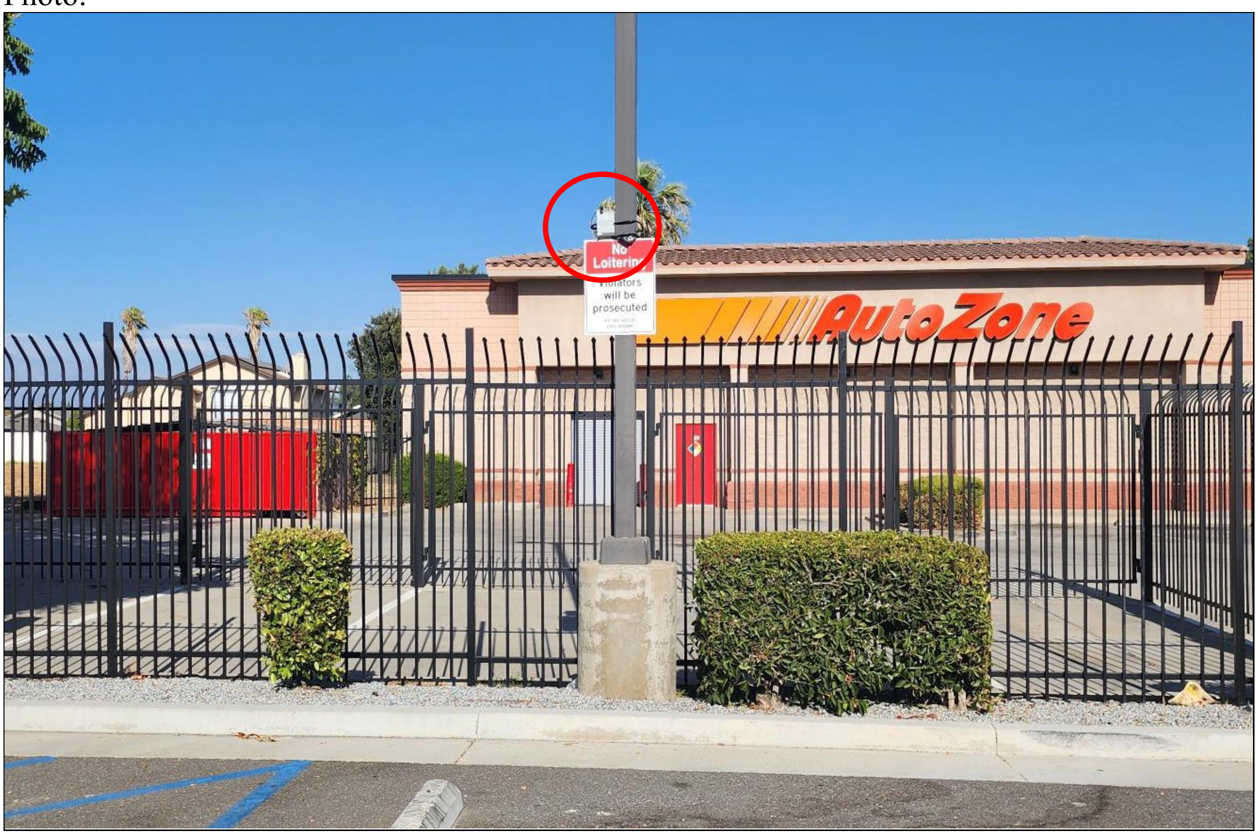
Time: From 11am To 10am

Site Location: Project site is located off Indian Street near Alessandro Boulevard in Moreno Valley; the monitor was hung on a light pole on the Food 4 Less Gas Station lot.

Primary Noise Sources: The primary noise source was traffic on Indian Street and Alessandro Boulevard as well as commercial use from the Gas Station and neighboring Auto Zone.

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}
11:00 AM	7/30/2024	47.9	63.5	38.3
12:00 PM	7/30/2024	48.3	69.7	38.0
1:00 PM	7/30/2024	46.6	62.0	37.9
2:00 PM	7/30/2024	51.4	70.8	37.3
3:00 PM	7/30/2024	57.1	74.9	37.4
4:00 PM	7/30/2024	65.1	80.9	38.2
5:00 PM	7/30/2024	64.3	80.0	40.3
6:00 PM	7/30/2024	67.6	81.0	42.6
7:00 PM	7/30/2024	69.8	82.6	43.1
8:00 PM	7/30/2024	75.6	88.6	52.8
9:00 PM	7/30/2024	78.0	93.2	54.1
10:00 PM	7/30/2024	77.8	89.8	56.5
11:00 PM	7/30/2024	77.8	91.7	57.7
12:00 AM	7/31/2024	78.4	90.1	59.8
1:00 AM	7/31/2024	74.1	86.4	49.7
2:00 AM	7/31/2024	71.3	87.3	46.7
3:00 AM	7/31/2024	64.6	80.4	41.9
4:00 AM	7/31/2024	59.7	76.4	42.4
5:00 AM	7/31/2024	57.2	78.5	41.6
6:00 AM	7/31/2024	51.9	70.7	42.5
7:00 AM	7/31/2024	58.6	70.5	44.6
8:00 AM	7/31/2024	55.8	73.3	40.4
9:00 AM	7/31/2024	52.2	71.4	38.1
10:00 AM	7/31/2024	43.7	66.7	37.1

Source: Compiled by LSA Associates, Inc. (2024).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum measured sound level

ATTACHMENT C

CONSTRUCTION NOISE CALCULATIONS

Construction Calculations

Phase: Site Preparation

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
Scraper	1	84	40	50	0.5	84	80
Tractor	1	84	40	50	0.5	84	80
Dozer	3	82	40	50	0.5	82	83
					Combined at 50 feet	**90**	**87**
					Combined at Receptor 200 feet	**78**	**75**

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	2	84	40	50	0.5	84	83
Excavator	1	81	40	50	0.5	81	77
					Combined at 50 feet	**89**	**86**
					Combined at Receptor 200 feet	**77**	**74**

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	2	75	20	50	0.5	75	71
Tractor	1	84	40	50	0.5	84	80
Generator	1	81	50	50	0.5	81	78
Welder / Torch	3	74	40	50	0.5	74	75
					Combined at 50 feet	**87**	**84**
					Combined at Receptor 200 feet	**75**	**72**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Drum Mixer	1	80	50	50	0.5	80	77
Paver	1	77	50	50	0.5	77	74
Tractor	1	84	40	50	0.5	84	80
Roller	2	80	20	50	0.5	80	76
All Other Equipment > 5 hp	1	85	50	50	0.5	85	82
					Combined at 50 feet	**89**	**86**
					Combined at Receptor 200 feet	**77**	**74**

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 200 feet	**66**	**62**

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

Construction Traffic Noise Calculator

Construction Phase	One-Way Worker Trip/Day	One Way Vendor Trip/Day	One Way Hauling Trip Number	Total
Site Preparation	15	0	0	15
Grading	12.5	0	25	37.5
Building Construction	55.4	21.6	0	77
Paving	15	0	0	15
Architectural Coating	11.1	0	0	11.1
Maximum				**77**

Phase Number	Phase Name	Number of Days
1	Site Preparation	15
2	Grading	25
3	Building Construction	200
4	Paving	15
5	Architectural Coating	100

Speed	MT Factor	HT Factor
25	16	83.3
30	15	65
35	14	53.3
40	13.2	45
45	12.6	38
50	12	33
55	11.5	29
60	11.1	26
65	10.8	23

Roadway	Speed	Existing Volume	MT Factor	HT Factor
Indian Street	35	7400	14	53.3

	Worker Trip/Day	Vendor Trip/Day	Hauling Trip Number	Total	Overlap?
Site Preparation	**15**	**0**	**0**	15	x
Grading	**13**	**0**	**1,333**	1346	x
Building Construction	**56**	**727**	**0**	783	
Paving	**15**	**0**	**0**	15	
Architectural Coating	**11**	**0**	**0**	12	
					2

Total Equivalent Vehicles **1,361**

Noise Increase (dBA) **0.73**

ATTACHMENT D

OPERATIONAL NOISE CALCULATIONS

Stationary Noise

	Land Use	Direction	Noise Source	Peak Hour Daytime Reference Noise Level (dBA Leq)	Off-Peak Nighttime Reference Noise Level (dBA Leq)	Reference Distance (ft)	Distance (ft)	Distance Attenuation (dBA)	Peak Hour Daytime Reference Noise Level at Receptor (dBA Leq)	Off-Peak Nighttime Reference Noise Level at Receptor (dBA Leq)
1	Residential	South	Truck Load/Unload Activity	74.6	70.2	20	180	19.1	55.5	51.1
			HVAC 1	72.0	72.0	5	280	35.0	37.0	37.0
			HVAC 2	72.0	72.0	5	280	35.0	37.0	37.0
			HVAC 3	72.0	72.0	5	280	35.0	37.0	37.0
			HVAC 4	72.0	72.0	5	290	35.3	36.7	36.7
			HVAC 5	72.0	72.0	5	290	35.3	36.7	36.7
			HVAC 6	72.0	72.0	5	290	35.3	36.7	36.7
			HVAC 7	72.0	72.0	5	290	35.3	36.7	36.7
			HVAC 8	72.0	72.0	5	290	35.3	36.7	36.7
			HVAC 9	72.0	72.0	5	290	35.3	36.7	36.7
								Combined	**56.0**	**52.4**
								Combined + Shielding from wall	**51.0**	**47.4**

*Assuming 4 heavy truck during off-peak hour and 11 trucks during peak hour