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MEMORANDUM

DATE: October 5, 2021

TO: Kevin Kent, TK Management Services, LLC

FROM: Jason Lui, Associate/Senior Noise Specialist

SUBJECT: Noise and Vibration Impact Analysis for the proposed TTM No. 38151 Madone Collections (MA 21143) Project in Jurupa Valley, California (LSA Project No. TKM2101)

INTRODUCTION

This noise and vibration impact analysis has been prepared to evaluate the potential noise and vibration impacts and reduction measures associated with the proposed TTM No. 38151 Madone Collections Project (project) in Jurupa Valley, California. This memorandum is intended to satisfy the City of Jurupa Valley's (City) requirements and the California Environmental Quality Act for a project-specific noise and vibration impact analysis by examining the impacts of the proposed uses on the project site and evaluating the reduction measures that the project requires. All references cited in this memorandum are included in Attachment A.

Project Location

The 6.88-acre project site (Assessor's Parcel Numbers 156-350-019 through 026 183-030-014-2) is at the southwest corner of the intersection of Jurupa Road and Camino Real. The site is bounded by railroad tracks to the north, Camino Real Elementary School to the south, Kirby Drive to the west, and Camino Real and Centennial Park to the east. The site is currently occupied by ruins of two structures, miscellaneous debris, and a number of trees. The balance of the site is vacant. Figure 1 shows the regional and project location (all figures are provided in Attachment B of this document).

Project Description

The project would develop a 36-unit single-family community of detached units. The project would provide a variety of one- and two-story homes ranging in size from 1,354 to 2,375 square feet, with up to five bedrooms and 3.5 bathrooms. Each home would include a two-car garage. Setbacks for individual lots range from 20 feet (ft) (front), 5–10 ft (side) and up to 23 ft (rear). Three architectural designs (Craftsman, Spanish, and Farmhouse) would be available for each floor plan. Decorative stamped concrete and mature landscaping would highlight community entrances, and the decorative block walls and/or wrought Iron fencing would encircle the community. An equestrian trail with a three-rail vinyl fence would be installed along the Kirby Drive frontage. The community would include a variety of amenities, including common community open space, parks, a dog park, community gardens, a tot lot, and sidewalks to connect to all open spaces. The proposed community includes 1.8 acres of landscaping. Project landscaping would consist of drought-tolerant plant

materials maintained with a with a drip irrigation system. Common areas would be maintained by a planned homeowners association. All homes would include feature solar collection systems and other fixtures/features required by the California Green Building Code. The tentative schedule calls for construction to begin in August 2022 and end in December of 2023, a duration of 15 months. Figure 2 shows the site plan.

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 deemphasizes 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, which is a scale based on powers of 10.

For example, 10 decibels 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 loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels generate 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; however, line source noise in a relatively flat environment with absorptive vegetation decreases 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.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis 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, audible impacts, refers to increases in noise levels noticeable to humans. Audible increases in noise levels generally involve a change of 3 dB or greater because that level has been found to be barely perceptible in exterior environments. The second category, potentially audible impacts, 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 involves changes in noise level of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

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 (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 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 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., 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 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.
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 PM to 10:00 PM and after the addition of 10 dBA to sound levels occurring in the night between 10:00 PM and 7:00 AM.
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 PM and 7:00 AM.
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.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris 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	—
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 Associates, Inc. (2015).

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 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 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 vibration velocity decibels (VdB) 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 earth-moving equipment), steel-wheeled trains, and occasional traffic on rough roads. Ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 ft from the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (see the Federal Transit Administration's [FTA] 2018 *Transit Noise and Vibration Impact Assessment Manual*). 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 a 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 cosmetic building damage, it is not uncommon for heavy-duty construction processes (e.g., 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 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 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

Noise Standards

City of Jurupa Valley

Noise Element of the General Plan. Below is a list of applicable policies from the Noise Element of the City's General Plan.

NE 1.3 **New or Modified Stationary Noise Sources.** Noise created by new stationary noise sources, or by existing stationary noise sources that undergo modifications that may increase noise levels, shall be mitigated so as not exceed the noise level standards of Figure 7-3 [shown in Table C]. This policy does not apply to noise levels associated with agricultural operations existing in 2017.

NE 1.6 **Protection of Noise-Sensitive Uses.** Protect noise-sensitive land uses from high levels of noise by restricting noise-producing land uses from these areas. If the

noise- producing land uses cannot be relocated, then measures such as building techniques, setbacks, landscaping, and noise walls should be considered.

NE 2.6 **Noise Contours.** Check all proposed development projects for possible location within roadway, railroad, and airport noise contours.

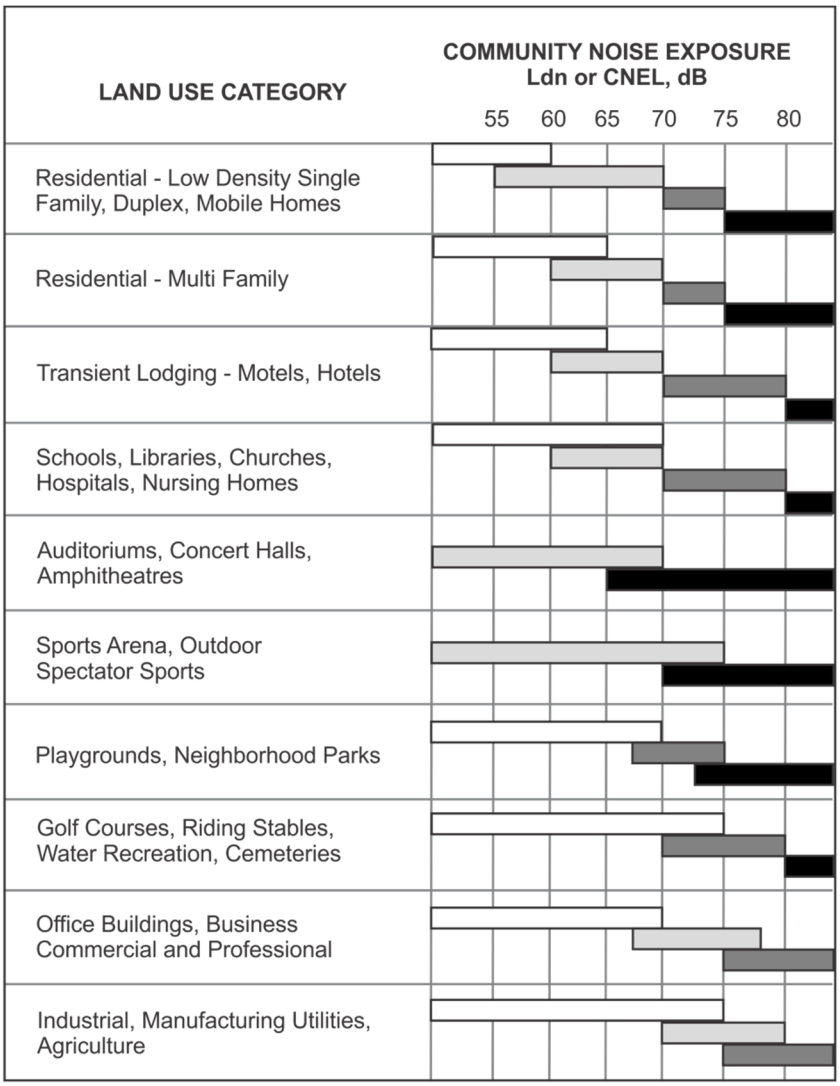
NE 3.3 **Noise Buffers.** Require major stationary noise-generating sources to install noise buffering or reduction mechanisms within their facilities to reduce noise generation levels to the lowest level practical as a condition of the approval or renewal of project entitlements.

NE 3.4 **Construction Equipment.** Require that all construction equipment utilize noise reduction features (i.e., mufflers and engine shrouds) that are at least as effective as those originally installed by the equipment's manufacturer.

NE 3.5 **Construction Noise.** Limit commercial construction activities adjacent to or within 200 ft of residential uses to weekdays, between 7:00 a.m. and 6:00 p.m., and limit high-noise-generating construction activities (e.g., grading, demolition, pile driving) near sensitive receptors to weekdays between 9:00 a.m. and 3:00 p.m.

Municipal Code. Section 11.05.020(9) of the City's Municipal Code exempts construction noise if it takes place between the hours of 6:00 a.m. and 6:00 p.m. during the months of June through September, and to 7:00 a.m. and 6:00 p.m. during the months of October through May, when the construction activities are within 0.25 mile from an inhabited dwelling. In addition, Section 11.05.020(12) of the City's Municipal Code exempts noise generated from heating, ventilation, and air conditioning (HVAC) equipment.

Table C: City of Jurupa Valley Land Use Compatibility Matrix



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 will normally suffice.

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 reduction features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: General Plan (City of Jurupa Valley 2017)
CNEL = Community Noise Equivalent Level L_{dn} = day-night average noise level
dB = decibels

Federal Transit Administration

The FTA construction noise criteria were used to evaluate construction noise impacts because Section of 11.05.020(9) of the City's Municipal Code limits construction noise to the permitted hours and does not specify construction noise standards. Table D shows the FTA construction criteria for daytime and nighttime at the residential, commercial and industrial land uses.

Table D: FTA Construction Noise Criteria

Land Use	Construction Noise Criteria (8-hour dBA L_{eq}[h])	
	Day[1]	Night[2]
Residential	80	70
Commercial	85	85[3]
Industrial	90	90[3]

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

[1] Daytime hours are from 7:00 a.m. to 10:00 p.m.

[2] Nighttime hours are from 10:00 p.m. to 7:00 a.m.

[3] Uses an average 24-hour L_{eq} instead of a 30-day average L_{dn}.

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{dn} = day-night average noise level

Vibration Standards

Federal Transit Administration

Vibration standards included in the Transit Noise and Vibration Impact Assessment Manual (FTA 2018) were 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: Interpretation of Vibration Criteria for Detailed Analysis

Land Use	Maximum 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 20X).
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 (100X) and other equipment of low sensitivity.

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

[1] As measured in ⅓-octave bands of frequency over the frequency range 8 to 80 Hertz.

FTA = Federal Transit Administration

L_V = velocity in decibels

VdB = vibration velocity decibels

The criteria for environmental impacts from ground-borne vibration and noise are based on the maximum levels for a single event. Table F lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). Federal Traffic Administration (FTA) guidelines show that a vibration level of up to 102 VdB (equivalent to 0.50 in/sec in PPV [FTA 2018]) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage. For non-engineered timber and masonry buildings, the construction building vibration damage criterion is 94 VdB (0.20 in/sec in PPV).

Table F: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate L_V (VdB)[1]
Reinforced concrete, steel, or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry buildings	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

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

[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.

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

EXISTING SETTING

Sensitive Land Uses in the Project Vicinity

Existing land uses within the project area include residential uses, two schools, and a park. Single-family residences are to the north and the northeast of the project site across Jurupa Road and southwest and west of the project site across Kirby Drive. Camino Real Elementary School is immediately south of the project site and Patriot High School is northwest across Jurupa Road. Centennial Park is east of the project across Camino Real.

Overview of the Existing Noise Environment

The primary existing noise sources in the project area are transportation facilities. Traffic on Jurupa Road, Camino Real, and other local streets contribute to the ambient noise levels in the project vicinity. Noise from motor vehicles is generated by engines, the interaction between the tires and the road, and the vehicles' exhaust systems. In addition, freight train operations on the Union Pacific Railroad, which runs parallel south of Jurupa Road and north of the project site, contributes to the ambient noise levels in the project area.

Ambient Noise Measurements

Short-Term Noise Measurements

One short-term (20-minute) noise level measurement was conducted on September 1, 2021, using a Larson Davis Model 831 Type 1 sound level meter. Table G shows the results of the short-term noise level measurement along with a description of the measurement location and noise sources that occurred during the measurement. As shown in Table G, the measured average noise at ST-1 is 61.1 dBA L_{eq} and the instantaneous maximum noise level is 74.7 dBA L_{max}. Figure 3 shows the short-term monitoring location.

Table G: Short-Term Ambient Noise Level Measurements

Monitor No.	Location	Start Time	Noise Level (dBA)			Noise Source(s)
			L_{eq}	L_{max}	L_{min}	
ST-1	Centennial Park, at the top of berm approximately 55 feet west of the Camino Real centerline and approximately 375 ft south of the Jurupa Road centerline	11:52 a.m.	61.1	74.7	48.3	Traffic on Camino Real and Jurupa Road. Faint and occasional landscaping noise. Bird noise.

Source: Compiled by LSA (2021).
Note: The short-term noise measurement was conducted for 20 minutes on September 1, 2021.

dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous noise level
L_{min} = minimum instantaneous noise level

Long-Term Noise Measurements

Three long-term (24-hour) noise level measurements were conducted from September 1 to September 2, 2021, using Larson Davis Spark 706RC dosimeters. Tables H, I, and J show the hourly L_{eq}, L_{max}, and L_{min} results from the long-term noise level measurements, and Table K summarizes the results of the long-term noise level measurement along with a description of the measurement locations and noise sources that occurred during the measurements. As shown in Table K, the calculated CNEL levels at LT-1, LT-2, and LT-3 were 55.3, 57.3, and 57.1 dBA, respectively. In addition, noise levels ranged from 42.9 to 54.4 dBA L_{eq} at LT-1, 43.7 to 55.1 dBA L_{eq} at LT-2, and 43.9 to 56.2 dBA L_{eq} at LT-3. Figure 3 shows the long-term monitoring locations.

Existing Aircraft Noise

Flabob Airport, Riverside Municipal Airport, and the Ontario International Airport are 2.3 miles (mi) southeast, 3.4 mi south, and 8.4 mi northwest of the project site, respectively. The future airport noise contours for the Flabob Airport and the Riverside Municipal Airport in the *Riverside County Airport Land Use Compatibility Plan* (Riverside County Airport Land Use Commission 2004) show that the project site is outside the 55 dBA CNEL noise contour. Also, the Compatibility Policy Map: Noise Impact Zones from the *LA/Ontario International Airport Land Use Compatibility Plan* (City of Ontario 2011) shows that the project site is outside the 60 to 65 dBA CNEL noise contour. In addition, there are no private airstrips or helipads within 2 mi of the project site.

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

Start Time		Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	12:00 PM	9/1/21	52.9	74.8	45.0
2	1:00 PM	9/1/21	52.2	70.7	44.6
3	2:00 PM	9/1/21	51.4	65.1	44.7
4	3:00 PM	9/1/21	51.3	66.0	45.1
5	4:00 PM	9/1/21	51.7	68.0	44.4
6	5:00 PM	9/1/21	52.1	68.0	45.2
7	6:00 PM	9/1/21	51.7	62.1	44.6
8	7:00 PM	9/1/21	53.2	70.2	45.0
9	8:00 PM	9/1/21	50.9	64.6	44.3
10	9:00 PM	9/1/21	49.7	64.4	43.5
11	10:00 PM	9/1/21	50.0	66.8	40.8
12	11:00 PM	9/1/21	46.6	59.5	40.3
13	12:00 AM	9/2/21	45.2	55.5	38.2
14	1:00 AM	9/2/21	47.0	68.6	36.4
15	2:00 AM	9/2/21	43.3	55.1	36.4
16	3:00 AM	9/2/21	42.9	55.2	35.8
17	4:00 AM	9/2/21	45.5	57.6	35.9
18	5:00 AM	9/2/21	48.5	67.5	36.9
19	6:00 AM	9/2/21	49.6	60.1	39.3
20	7:00 AM	9/2/21	52.8	67.7	41.6
21	8:00 AM	9/2/21	53.0	66.8	44.2
22	9:00 AM	9/2/21	52.9	63.3	43.0
23	10:00 AM	9/2/21	54.4	73.7	43.3
24	11:00 AM	9/2/21	51.9	71.4	42.8

Source: Compiled by LSA (2021).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum measured sound level

L_{min} = minimum measured sound level

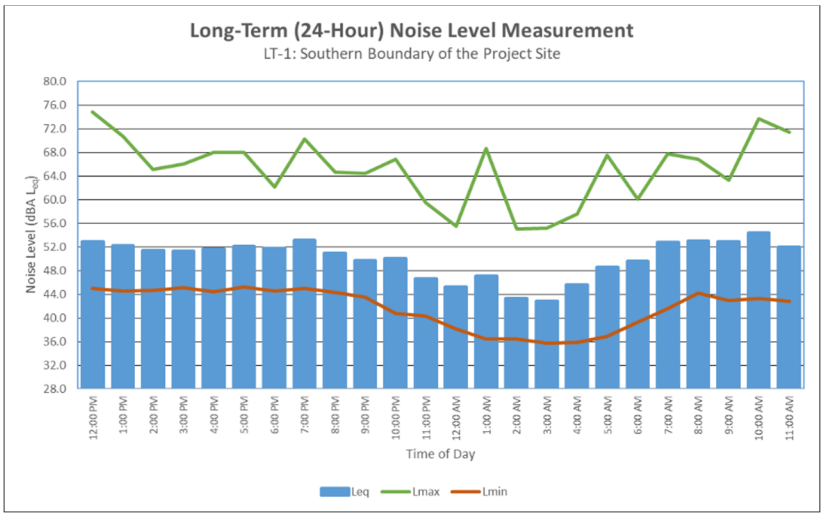


Table I: Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time		Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	12:00 PM	9/1/21	54.0	68.2	44.1
2	1:00 PM	9/1/21	53.2	70.4	42.6
3	2:00 PM	9/1/21	54.2	72.2	43.4
4	3:00 PM	9/1/21	54.1	72.7	43.3
5	4:00 PM	9/1/21	53.9	73.1	43.7
6	5:00 PM	9/1/21	54.1	69.6	44.5
7	6:00 PM	9/1/21	54.6	72.0	44.4
8	7:00 PM	9/1/21	55.1	78.7	43.6
9	8:00 PM	9/1/21	52.5	67.7	42.8
10	9:00 PM	9/1/21	52.0	67.2	41.1
11	10:00 PM	9/1/21	52.2	74.3	40.6
12	11:00 PM	9/1/21	48.1	69.2	39.1
13	12:00 AM	9/2/21	47.2	64.8	38.1
14	1:00 AM	9/2/21	46.0	62.2	36.2
15	2:00 AM	9/2/21	44.7	61.8	36.2
16	3:00 AM	9/2/21	43.7	59.4	35.7
17	4:00 AM	9/2/21	48.9	67.3	35.2
18	5:00 AM	9/2/21	50.3	68.1	36.1
19	6:00 AM	9/2/21	53.6	73.5	36.9
20	7:00 AM	9/2/21	54.6	71.8	39.6
21	8:00 AM	9/2/21	54.8	73.3	42.8
22	9:00 AM	9/2/21	53.3	65.0	41.6
23	10:00 AM	9/2/21	54.0	74.1	41.4
24	11:00 AM	9/2/21	53.2	71.0	41.4

Source: Compiled by LSA (2021).

dBA = A-weighted decibels

L_{eq} = equivalent continuous sound level

L_{max} = maximum measured sound level

L_{min} = minimum measured sound level

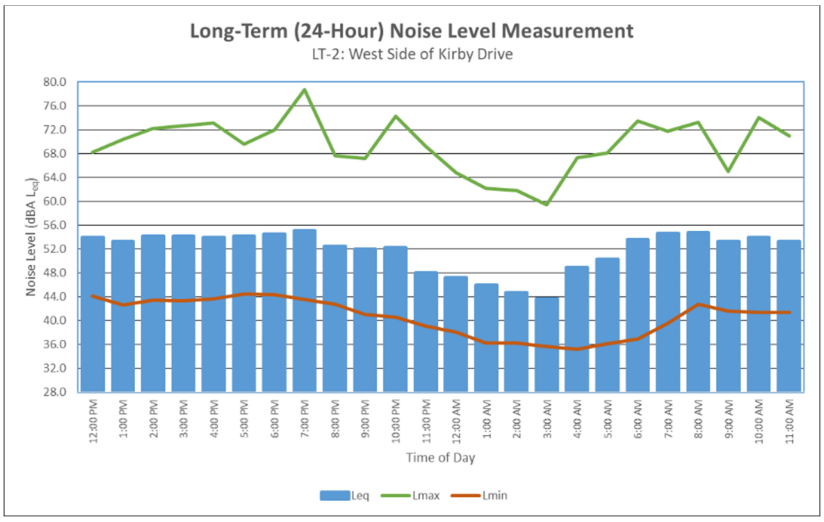


Table J: Long-Term (24-Hour) Noise Level Measurement Results at LT-3

Start Time		Date	Noise Level (dBA)		
			L_{eq}	L_{max}	L_{min}
1	12:00 PM	9/1/21	53.8	73.4	42.3
2	1:00 PM	9/1/21	54.5	75.4	41.7
3	2:00 PM	9/1/21	54.6	70.5	42.0
4	3:00 PM	9/1/21	54.9	72.2	40.2
5	4:00 PM	9/1/21	56.2	75.0	42.3
6	5:00 PM	9/1/21	54.8	73.2	43.0
7	6:00 PM	9/1/21	54.7	71.7	43.0
8	7:00 PM	9/1/21	54.6	77.8	41.8
9	8:00 PM	9/1/21	52.0	69.4	41.1
10	9:00 PM	9/1/21	50.9	65.7	40.7
11	10:00 PM	9/1/21	51.1	73.1	38.0
12	11:00 PM	9/1/21	47.8	73.0	38.1
13	12:00 AM	9/2/21	46.2	65.9	36.1
14	1:00 AM	9/2/21	45.1	62.7	35.9
15	2:00 AM	9/2/21	44.3	62.6	35.3
16	3:00 AM	9/2/21	43.9	59.2	35.2
17	4:00 AM	9/2/21	48.9	64.8	35.3
18	5:00 AM	9/2/21	51.3	67.5	36.2
19	6:00 AM	9/2/21	52.5	71.6	37.7
20	7:00 AM	9/2/21	55.1	75.8	41.4
21	8:00 AM	9/2/21	55.3	70.9	45.0
22	9:00 AM	9/2/21	54.6	68.0	42.2
23	10:00 AM	9/2/21	54.1	70.2	42.4
24	11:00 AM	9/2/21	53.7	71.9	41.8

Source: Compiled by LSA (2021).

dBA = A-weighted decibels

L_{eq} = equivalent continuous sound level

L_{max} = maximum measured sound level

L_{min} = minimum measured sound level

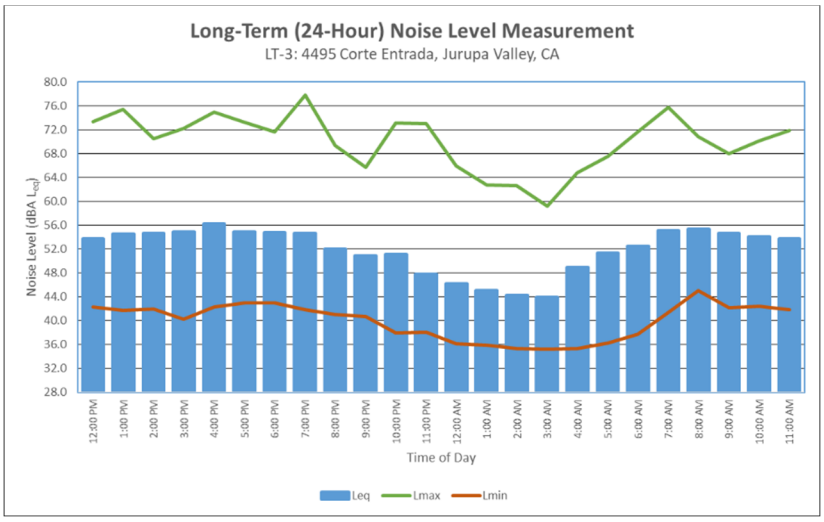


Table K: Long-Term Ambient Noise Monitoring Results

Monitoring No.	Location	Noise Level (dBA)				Noise Source(s)
		CNEL	L_{eq}	L_{max}	L_{min}	
LT-1	Southern edge of project site, near Camino Real Elementary School. Just north of cement pad.	55.3	42.9-54.4	55.1-74.8	35.8-45.2	Faint traffic on Jurupa Road and Camino Real, and an occasional train
LT-2	West side of Kirby Drive, on utility pole. Approximately 185 feet south of centerline of Jurupa Road.	57.3	43.7-55.1	59.4-78.7	35.2-44.5	Traffic on Jurupa Road, an occasional vehicle on Kirby Drive, and an occasional train
LT-3	4495 Corte Entrada, in the back yard. Approximately 60 feet north of centerline of Jurupa Road.	57.1	43.9-56.2	59.2-77.8	35.2-45.0	Traffic on Jurupa Road and an occasional train.

Source: Compiled by LSA (2021).
Note: The long-term measurements were conducted for 24 hours and began on September 1, 2021 at 12:00 p.m.

CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level
L_{max} = maximum measured sound level
L_{min} = minimum measured sound level

Existing Traffic Noise

The guidelines included in the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (1977; FHWA RD-77-108) were used to evaluate traffic-related noise conditions along roadway segments in the project vicinity. This model requires various parameters, including traffic volumes, vehicle mix, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The resultant noise levels are weighted and summed over 24-hour periods to determine the CNEL values. The existing average daily traffic (ADT) volumes along Camino Real and Jurupa Road in the project area were obtained from the City of Jurupa Valley General Plan Traffic Study (LSA 2016). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Table L provides the existing traffic noise levels in the project vicinity. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between the traffic and the location where the noise contours are drawn. Attachment C provides the specific assumptions used in developing these noise levels and model printouts.

Table L shows that traffic noise levels along Camino Real are moderate to moderately low, with the 70 dBA CNEL noise contour confined to the roadway right-of-way, and 65 and 60 dBA CNEL noise contours extending up to 54 and 115 ft, respectively, from the roadway centerline. Also, traffic noise levels along Jurupa Road are moderate, with the 70 dBA CNEL noise contour confined to the roadway right-of-way, and 65 and 60 dBA CNEL noise contours extending up to 74 and 157 ft, respectively, from the roadway centerline.

Table L: Existing Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 dBA CNEL (feet)	Centerline to 65 dBA CNEL (feet)	Centerline to 60 dBA CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Camino Real between Mission Boulevard and Jurupa Road	6,843	< 50	< 50	105	62.5
Camino Real between Jurupa Road and Limonite Avenue	8,114	< 50	54	115	64.7
Jurupa Road between Pedley Road and Camino Real	8,499	< 50	68	144	65.6
Jurupa Road between Camino Real and Valley Way	9,700	< 50	74	157	66.2

Source: Compiled by LSA (2021).
Note: Traffic noise within 50 feet of the roadway centerline should be evaluated with site-specific information.
ADT = average daily traffic dBA = A-weighted decibels
CNEL = Community Noise Equivalent Level

IMPACTS

Short-Term Construction Noise Impacts

Two types of short-term noise impacts would occur during project construction. The first type would be from construction crew commutes and the transport of construction equipment and materials to the project site and would incrementally raise noise levels on access roads leading to the site. The pieces of construction equipment for construction activities would move on site, would remain for the duration of each construction phase, and would not add to the daily traffic volume in the project vicinity. Although there would be a relatively high single-event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 feet would generate up to a maximum of 84 dBA), the effect on longer-term ambient noise levels would be small because the number of daily construction-related vehicle trips would be small compared to existing daily traffic volume on Camino Real and Jurupa Road. The building construction phase would generate the most trips out of all of the construction phases, at 212 trips per day based on the project's Air Quality and Greenhouse Gas Emission Estimate Tables Memorandum (LSA 2021a), which uses the California Emissions Estimator Model (Version 2020.4.0). Roadways that would be used to access the project site are Camino Real and Jurupa Road. Based on Table L, Camino Real and Jurupa Road have estimated existing daily traffic volumes of 6,843 and 8,499, respectively, near the project site. Based on the information above, construction-related traffic would increase noise by up to 0.1 dBA. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, no short-term, construction-related impacts associated with worker commutes and transport of construction equipment and material to the project site would occur and no noise reduction measures would be required.

The second type of short-term noise impact is related noise generated from construction activities. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. The proposed project anticipates demolition, site

preparation, grading, building construction, paving, and architectural coating phases of construction. These various sequential phases change the character of the noise generated on a project site. Therefore, the noise levels 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 M lists the L_{max} recommended for noise impact assessments for typical construction equipment included in the FHWA *Highway Construction Noise Handbook* (FHWA 2006), based on a distance of 50 feet between the equipment and a noise receptor.

Table M: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor[1] (%)	Maximum Noise Level (L_{max}) at 50 feet[2]
Backhoe	40	80
Compactor (ground)	20	80
Compressor	40	80
Crane	16	85
Dozer	40	85
Dump Truck	40	84
Excavator	40	85
Flatbed Truck	40	84
Forklift	20	85
Front-End Loader	40	80
Grader	40	85
Impact Pile Driver	20	95
Jackhammer	20	85
Pavement Scarifier	20	85
Paver	50	85
Pickup Truck	40	55
Pneumatic Tools	50	85
Pump	50	77
Rock Drill	20	85
Roller	20	85
Scraper	40	85
Tractor	40	84
Welder	40	73

Source: Table 9.1, *FHWA Highway Construction Noise Handbook* (FHWA 2006).

Note: The 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 CA/T program to be consistent with the City of Boston, Massachusetts, Noise Code for the "Big Dig" project.

CA/T = Central Artery/Tunnel
L_{max} = maximum instantaneous noise level
FHWA = Federal Highway Administration

Typical noise levels range up to 88 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation and grading phase tends to generate the highest noise levels because the noisiest construction equipment is earth-moving equipment. Earth-moving equipment includes excavating machinery such as backfillers, bulldozers, draglines, and front-end loaders. Earth-moving and compacting equipment includes compactors, scrapers, and graders.

Project construction is expected to require the use of graders, bulldozers, and water trucks/pickup trucks. Noise associated with the use of each type of construction equipment for the site preparation phase is estimated to be between 55 dBA L_{max} and 85 dBA L_{max} at a distance of 50 feet from the active construction area. As shown in Table M, the maximum noise level generated by each grader is assumed to be approximately 85 dBA L_{max} at 50 feet. Each bulldozer would generate approximately 85 dBA L_{max} at 50 feet. The maximum noise level generated by water trucks/pickup trucks is approximately 55 dBA L_{max} at 50 feet from these vehicles. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of construction would be 88 dBA L_{max} at a distance of 50 feet from the active construction area. Based on a usage factor of 40 percent, the worst-case combined noise level during this phase of construction would be 84 dBA L_{eq} at a distance of 50 feet from the active construction area.

Table N shows the closest property lines of adjacent land uses from the center area of the project site, where majority of the construction activities would occur. The FTA construction noise criteria of 80 dBA L_{eq} (8-hour) for daytime residences was used to evaluate potential construction noise impacts because the City does not have construction noise standards. The school and park adjacent to the project site was also evaluated using the same FTA construction noise criteria as residences, for a conservative analysis. As shown in Table N, construction noise levels would reach up to 81.6 dBA L_{max} (77.6 dBA L_{eq}) and noise levels would not exceed the FTA construction noise criteria of 80 dBA L_{eq} (8-hour) for residences, the school, and the park. Ambient noise levels in the project vicinity range between 42.9 and 56.2 dBA L_{eq} and 55.1 and 78.7 dBA L_{max} based on short-term and long-term noise level measurements shown in Tables G and K. Although the noise generated by project construction activities would be higher than the ambient noise levels and may result in a temporary increase in the ambient noise levels, construction noise would stop once project construction is completed. The proposed project would be required to comply with the construction hours specified in Section 11.05.020(9) of the City's Municipal Code, General Plan Noise Element Policies NE 3.4 and NE 3.5, and the best construction practices for construction listed below would minimize construction noise. Therefore, no noise impacts from construction activities would occur. No noise reduction measures are required.

- The construction contractor shall limit construction activities to between 6:00 a.m. and 6:00 p.m. during the months of June through September and to between 7:00 a.m. and 6:00 p.m. during the months of October through May.

- The construction contractor shall limit construction activities to weekdays from 7:00 a.m. to 6:00 p.m. and high-noise-generating construction activities (e.g., grading, demolition, pile driving) to between 9:00 a.m. to 3:00 p.m., Monday through Friday.

- The construction contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and most noise-sensitive receptors nearest the project site during all project construction.

- The construction contractor shall place all stationary construction equipment so that the emitted noise is directed away from the sensitive receptors nearest the project site.

Table N: Construction Noise Levels

Land Use	Direction	Reference Noise Level (dBA) at 50 ft		Distance (ft)	Distance Attenuation (dBA)	Noise Level (dBA)	
		L_{max}	L_{eq}			L_{max}	L_{eq}
School	Northwest	88	84	200	12.0	76.0	72.0
Residence	North	88	84	185	11.4	76.6	72.6
Residence	Northeast	88	84	310	15.8	72.2	68.2
Park	East	88	84	195	11.8	76.2	72.2
School	South	88	84	105	6.4	81.6	77.6
Residence	Southwest	88	84	185	11.4	76.6	72.6
Residence	West	88	84	140	8.9	79.1	75.1

Source: Compiled by LSA (2021).
dBA = A-weighted decibels
ft = feet
L_{eq} = equivalent continuous sound level
L_{max} = maximum instantaneous sound level

Short-Term Construction Vibration Impacts

This construction vibration impact analysis discusses the level of human annoyance using vibration levels in VdB and assesses the potential for building damage using vibration levels in PPV (in/sec). Vibration levels calculated in RMS (VdB) are best for characterizing human response to building vibration, whereas vibration levels in PPV are best for characterizing damage potential. As shown in Table F, the FTA guidelines indicate that a vibration level up to 0.5 PPV (in/sec) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage (FTA 2018). For a non-engineered timber and masonry building, the construction vibration damage criterion is 0.2 PPV (in/sec). For a fragile building, the construction vibration damage criterion is 0.12 PPV (in/sec).

Table O shows the reference vibration levels at a distance of 25 feet for each type of standard construction equipment from the FTA's *Transit Noise and Vibration Impact Assessment Manual* (2018). Outdoor site preparation and grading for the proposed project would require the use of a large bulldozer and loaded trucks, which would generate ground-borne vibration of up to 87 VdB (0.089 PPV [in/sec]) and 86 VdB (0.076 PPV [in/sec]), respectively, when measured at 25 feet.

The formulas for vibration transmission are provided below.

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

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

The greatest vibration levels are anticipated to occur during the site preparation and grading phases. All other phases are expected to result in lower vibration levels. The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary), because vibration impacts normally occur within the buildings.

Table O: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV/L_V at 25 feet	
	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

Sources: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018), Table 7-4.

[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
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 decibels

Table P lists the projected vibration levels from various construction equipment expected to be used on the project site to the closest buildings in the project vicinity. As shown in Table P, the residential building west of the project site and the school building south of the project site are the closest structures from the project construction boundary. These building structures are approximately 80 feet and 100 feet from the project construction boundary and would experience vibration levels of up to 72 VdB (0.0.016 PPV [in/sec]) and 69 VdB (0.011 PPV [in/sec]), respectively. These vibration levels would not result in community annoyance because they would not exceed the FTA

community annoyance threshold of 78 VdB for daytime residences and the school, which would have a vibration sensitivity similar to that of the daytime residences. Also, these vibration levels would not result in building damage because residential and school buildings would be constructed equivalent to non-engineered timber and masonry and because vibration levels would not exceed the FTA vibration damage threshold of 0.20 PPV (in/sec). Other residential buildings in the project vicinity are farther away from the project construction boundary and vibration levels would not result in community annoyance or building damage. Therefore, no construction vibration impacts would occur. No vibration reduction measures are required.

Table P: Summary of Construction Vibration Levels

Land Use	Direction	Equipment/Activity	Reference Vibration Level at 25 feet		Distance to Structure (feet)	Maximum Vibration Level	
			VdB	PPV (in/sec)		VdB	PPV (in/sec)
Residential	North	Large Bulldozer	87	0.089	155	63	0.006
		Loaded Truck	86	0.076	155	62	0.005
Residential	Northeast	Large Bulldozer	87	0.089	220	59	0.003
		Loaded Truck	86	0.076	220	58	0.003
School	South	Large Bulldozer	87	0.089	100	69	0.011
		Loaded Truck	86	0.076	100	68	0.010
Residential	Southwest	Large Bulldozer	87	0.089	125	66	0.008
		Loaded Truck	86	0.076	125	65	0.007
Residential	West	Large Bulldozer	87	0.089	80	72	0.016
		Loaded Truck	86	0.076	80	71	0.013

Source: Compiled by LSA (2021).
Note: The FTA-recommended building damage threshold is 94 VdB (0.2 PPV [in/sec]) at the receiving residential and commercial building structure.
FTA = Federal Transit Administration
in/sec = inches per second
PPV = peak particle velocity
VdB = vibration velocity decibels

Long-Term Aircraft Noise Impacts

As discussed above, Flabob Airport, Riverside Municipal Airport, and Ontario International Airport are 2.3 mi southeast, 3.4 mi south, and 8.4 mi northwest of the project site, respectively. The future airport noise contours for Flabob Airport and Riverside Municipal Airport based on the Riverside County Airport Land Use Compatibility Plan (Riverside County Airport Land Use Commission 2004) shows that the project site is outside the 55 dBA CNEL noise contour. Also, the airport noise contour for Ontario International Airport based on the Compatibility Policy Map: Noise Impact Zones from the LA/Ontario International Airport Land Use Compatibility Plan (City of Ontario 2011) shows that the project site is outside the 60 to 65 dBA CNEL noise contour. In addition, there are no private airstrips or helipads within 2 mi of the project site. Therefore, the project would not expose people residing or working in the project area to excessive noise levels from aircraft operations.

Long-Term Traffic Noise Impacts

The project would generate an ADT volume of 340 based on the project's trip generation memorandum (LSA 2021b). The existing ADT volumes along Camino Real and Jurupa Road in the project area obtained from the City of Jurupa Valley General Plan Traffic Study (LSA 2016) are 6,843 and 8,499, respectively. It takes a doubling of traffic to increase traffic noise levels by 3 dBA. Based

on the information above, project-related traffic would increase by up to 0.2 dBA. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, no traffic noise impacts from project-related traffic on off-site sensitive receptors would occur. No noise reduction measures are required.

Long-Term Stationary Noise Impacts

Heating, Ventilation, and Air Conditioning Equipment

The proposed project would include ground-floor HVAC units for each residential dwelling unit. The HVAC equipment could operate 24 hours per day. Although Section 11.05.020(12) of the City's Municipal Code exempts noise generated from HVAC equipment, noise generated from HVAC was evaluated to determine whether new stationary noise sources associated with the project would increase noise levels or exceed the noise level standards shown in Table C to comply with the City's General Plan Noise Element Policy NE 1.3. Each ground floor HVAC unit would generate a noise level of 44.4 dBA L_{eq} at a distance of 50 ft. For a conservative analysis, the property lines adjacent to project site would be exposed to three HVAC units, which would generate a noise level of 49.2 dBA L_{eq} at a distance of 50 ft. In addition, the school to the south and residences to the north and northeast would be shielded by the proposed block wall along the northern and southern boundaries of the project site, which would provide a minimum noise reduction of 5 dBA.

Table Q summarizes the noise levels at the closest residential, school, and park property lines surrounding the project site along with the distance from the property line to the ground floor HVAC units, distance attenuation, and shielding. As shown in Table Q, noise levels generated from on-site ground floor HVAC units would range from 13.0 dBA L_{eq} to 32.3 dBA L_{eq}. Measured ambient noise levels in the project area range from 55.3 dBA CNEL to 57.3 dBA CNEL, based on Table K. The residential, school, and park property lines are in noise areas that are considered "normally acceptable" based on the City's Land Use Compatibility Matrix shown in Table C. Noise levels generated from HVAC equipment would not increase the existing ambient noise level, and the noise environment at the closest residential, school, and park property lines would remain "normally acceptable." Therefore, no long-term stationary source noise impacts from on-site ground floor HVAC noise would occur. No noise reduction measures are required.

Long-Term Vibration Impacts

The proposed project would not generate vibration. In addition, vibration levels generated from project-related traffic on the adjacent roadways (Camino Real and Jurupa Road) are unusual for on-road vehicles because the rubber tires and suspension systems of on-road vehicles provide vibration isolation. Therefore, no vibration impacts from project-related operations would occur, and no vibration reduction measures are required.

Table Q: HVAC Noise Levels

Land Use	Direction	Reference Noise Level at 50 ft (dBA L_{eq})	Distance to Receptor Property Line (ft)	Distance Attenuation (dBA)	Shielding (dBA)	Noise Level (dBA L_{eq})
School	Northwest	49.2	180	31.1	0	18.0
Residential	North	49.2	115	27.2	5[1]	16.9
Residential	Northeast	49.2	180	31.1	5[1]	13.0
Park	East	49.2	95	25.6	0	23.6
School	South	49.2	70	22.9	5[1]	21.2
Residential	Southwest	49.2	75	23.5	0	25.6
Residential	West	49.2	35	16.9	0	32.3

Source: Compiled by LSA (2021).

[1] The proposed block wall along the northern and southern project boundary of the project site would provide a minimum noise reduction of 5 dBA.

dBA = A-weighted decibels
ft = feet
HVAC = heating, ventilation, and air conditioning
L_{eq} = equivalent continuous sound level

BEST CONSTRUCTION PRACTICES

The following best construction practices would minimize construction noise:

- The construction contractor shall limit construction activities to between 6:00 a.m. and 6:00 p.m. during the months of June through September and to between 7:00 a.m. and 6:00 p.m. during the months of October through May.
- The construction contractor shall limit construction activities to weekdays from 7:00 a.m. to 6:00 p.m. and high-noise-generating construction activities (e.g., grading, demolition, pile driving) to between 9:00 a.m. to 3:00 p.m., Monday through Friday.
- During all project site excavation and grading, the project contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and most noise-sensitive receptors nearest the project site during all project construction.
- The construction contractor shall place all stationary construction equipment so that the emitted noise is directed away from the sensitive receptors nearest the project site.

REDUCTION MEASURES

Short-Term Construction Noise Impacts

No noise reduction measures are required.

Short-Term Construction Vibration Impacts

No vibration reduction measures are required.

Aircraft Noise Impacts

No noise reduction measures are required.

Traffic Noise Impacts

No noise reduction measures are required.

Long-Term Stationary Noise Impacts

No noise reduction measures are required.

Long-Term Vibration Impacts

No vibration reduction measures are required.

ATTACHMENTS

A: References
B: Figures
C: FHWA Traffic Noise Model Printouts

ATTACHMENT A

REFERENCES

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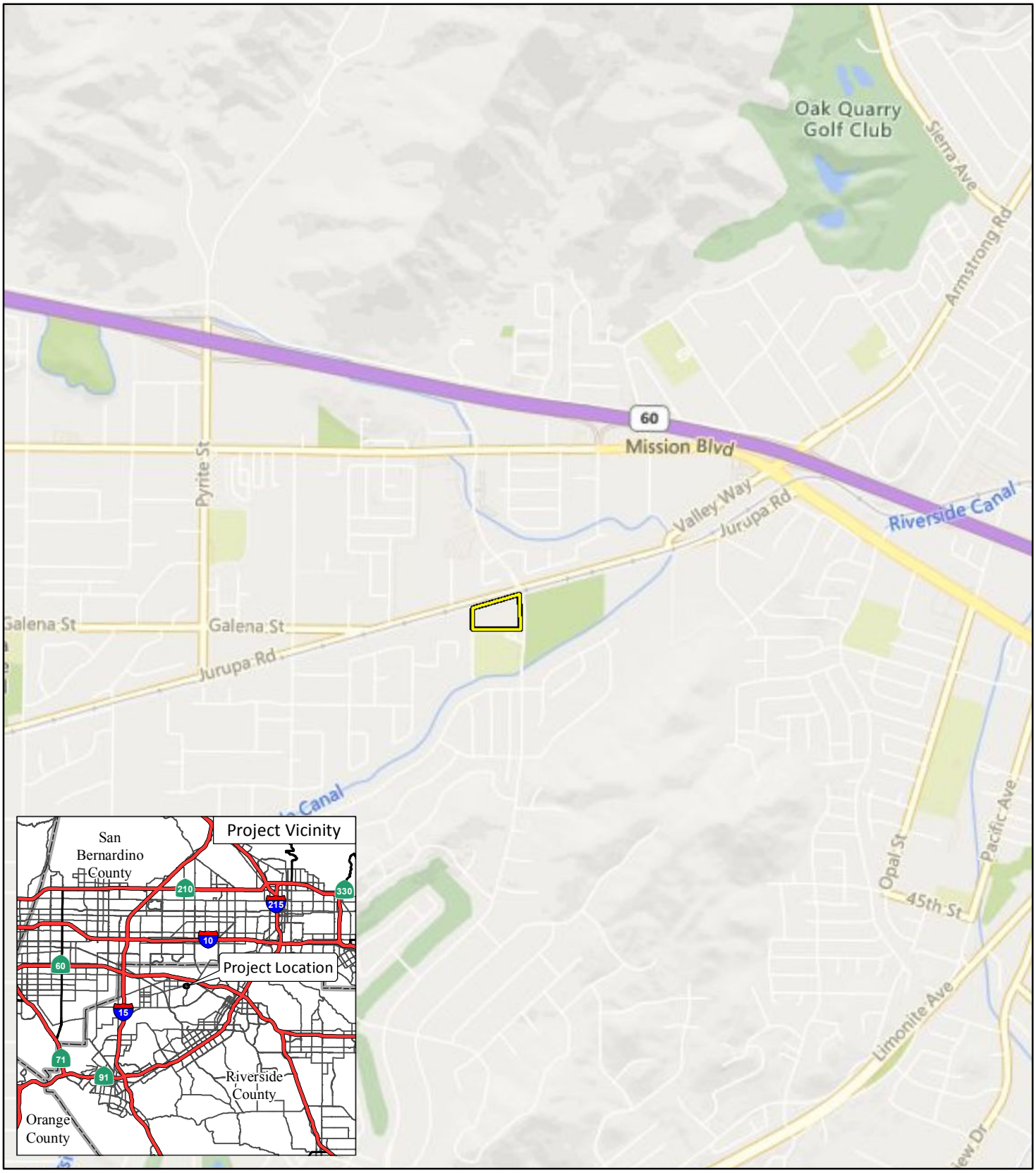
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ATTACHMENT B

FIGURES

Figure 1: Regional and Project Location
Figure 2: Site Plan
Figure 3: Noise Monitoring Locations



LSA

LEGEND

Project Location

FIGURE 1

N

0 1000 2000

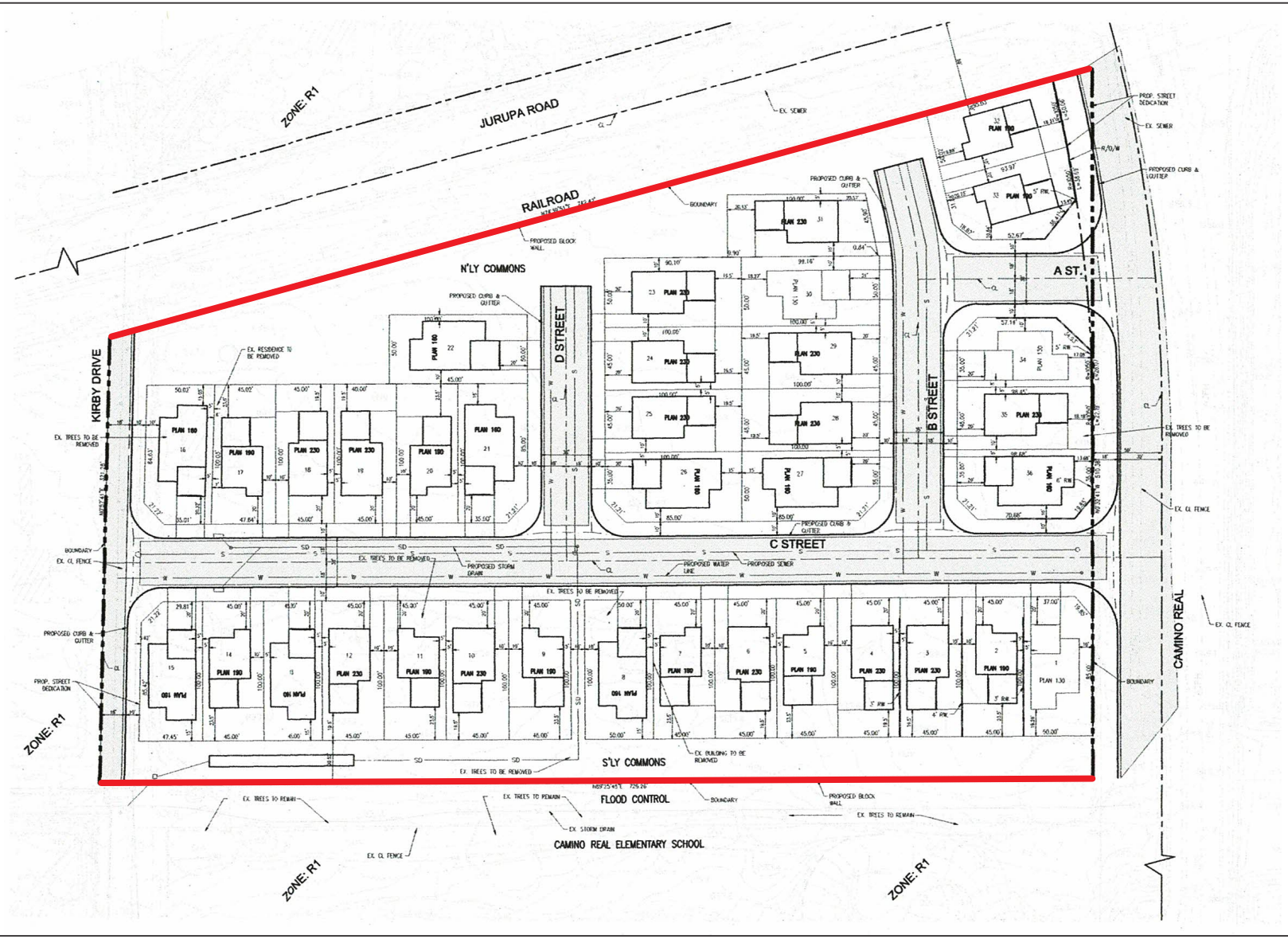
FEET

SOURCE: Bing (2020)

TTM No. 38151 Madone Collections

Regional and Project Location

I:\TKM2101\GIS\MXD\Noise\ProjectLocation_Noise.mxd (9/16/2021)



LSA

LEGEND

Proposed Block Wall

FIGURE 2

N

0 20 40

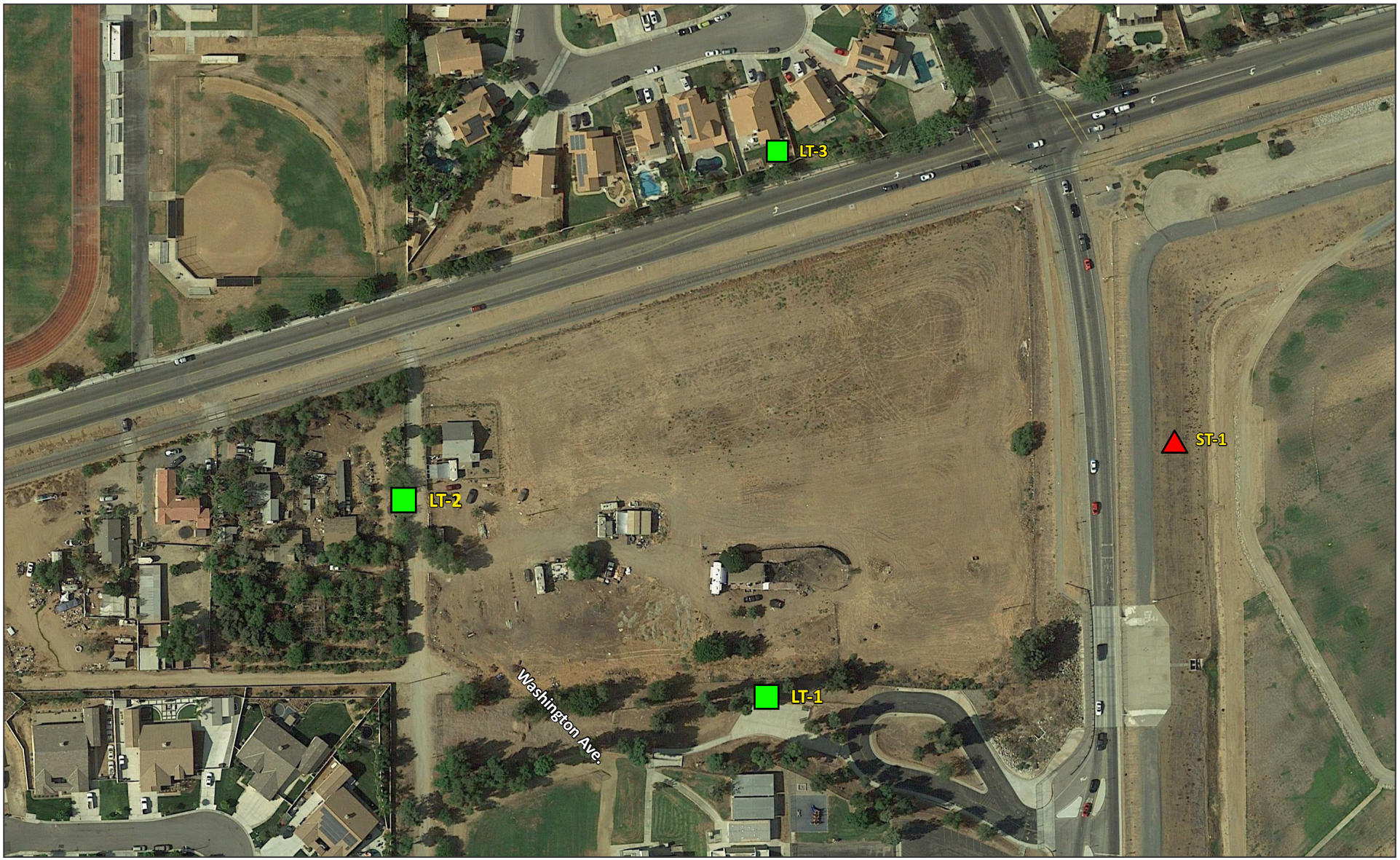
FEET

SOURCE: Encompass Associates

I:\TKM2101\G\Site Plan.ai (9/16/2021)

TTM No. 38151 Madone Collections

Site Plan



LSA

FIGURE 3

LEGEND

ST-1 Short-term Noise Monitoring Location

LT-1 Long-term Noise Monitoring Location

N

0 100 200

FEET

SOURCE: Google Earth 2021

TTM No. 38151 Madone Collections

Noise Monitoring Locations

I:\TKM2101\G\On-Site_Noise_Locs.ai (9/16/2021)

ATTACHMENT C

FHWA HIGHWAY TRAFFIC NOISE MODEL PRINTOUTS

TABLE Existing Without Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/23/2021
ROADWAY SEGMENT: Camino Real between Mission Boulevard and Jurupa Road
NOTES: TTM No. 38151 Madone Collections Project - Existing Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6843 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	104.9	221.3

TABLE Existing Without Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/23/2021
ROADWAY SEGMENT: Camino Real between Jurupa Road and Limonite Avenue
NOTES: TTM No. 38151 Madone Collections Project - Existing Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8114 SPEED (MPH): 40 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

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

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.71

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	53.5	114.8	246.9

TABLE Existing Without Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/23/2021
ROADWAY SEGMENT: Jurupa Road between Pedley Road and Camino Real
NOTES: TTM No. 38151 Madone Collections Project - Existing Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 8499 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 12 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.60

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	67.7	144.1	309.5

TABLE Existing Without Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 09/23/2021
ROADWAY SEGMENT: Jurupa Road between Camino Real and Valley Way
NOTES: TTM No. 38151 Madone Collections Project - Existing Without Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9700 SPEED (MPH): 45 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 12 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.17

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	73.8	157.2	337.9
