NOISE AND VIBRATION IMPACT ANALYSIS

OAKMONT SENIOR LIVING PROJECT

CORONA, CALIFORNIA

LSA

May 2023

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CORONA, CALIFORNIA

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LIST OF ABBREVIATIONS AND ACRONYMS

ADT	average daily trips
APN	Assessor's Parcel Number
CalEEMod	California Emissions Estimator Model
CEQA	California Environmental Quality Act
City	City of Corona
CNEL	Community Noise Equivalent Level
dB	decibel(s)
dBA	A-weighted decibel(s)
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
FTA Manual	FTA's *Transit Noise and Vibration Impact Assessment Manual*
HVAC	heating, ventilation, and air conditioning
I-15	Interstate 15
in/sec	inch/inches per second
L_{dn}	day-night average noise level
L_{eq}	equivalent continuous sound level
L_{max}	maximum instantaneous sound level
Noise Element	City of Corona General Plan Noise Element
PPV	peak particle velocity
project	Oakmont Senior Living Project
RMS	root-mean-square
sq ft	square foot/feet
SR-91	State Route 91
VdB	vibration velocity decibels

INTRODUCTION

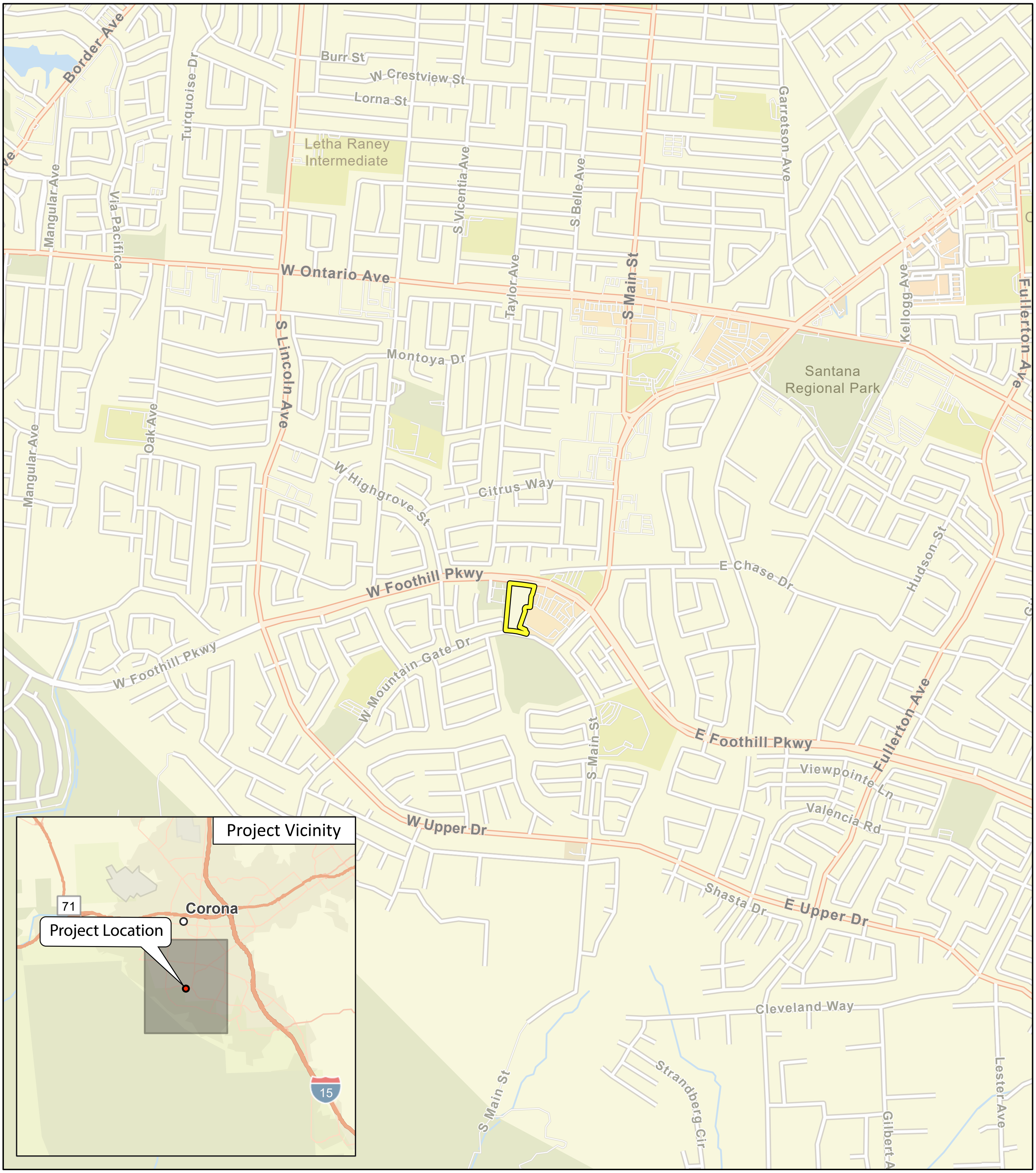
This noise and vibration impact analysis has been prepared to evaluate the potential noise and vibration impacts and reduction measures associated with the proposed Oakmont Senior Living Project (project) in Corona, California. This report is intended to satisfy the City of Corona's (City) requirement for a project-specific noise impact analysis by examining the impacts of the project site and evaluating noise reduction measures that the project may require.

PROJECT LOCATION AND DESCRIPTION

The 5.16-acre project site is located at 430 West Foothill Parkway in the City of Corona, Riverside County, California, and consists of Assessor's Parcel Numbers (APNs) 114-070-020, 114-070-021, and 114-070-022. Regional access to the project site is provided via Interstate 15 (I-15) and State Route 91 (SR-91). Local access to the project site is provided via West Foothill Parkway. The project site is currently undeveloped and does not include paved access on site. Figure 1, Project Location and Vicinity, and Figure 2, Project Site Plan, are presented below.

The proposed project would include the construction of a two-story, 109,551 square foot (sq ft) residential care facility building. The proposed residential care facility would consist of 107 units and would include 24-hour care assistance. In addition, the proposed project would provide approximately 35,000 sq ft of common recreational space, including a croquet field (1,500 sq ft), Bocce ball court (1,700 sq ft), pet park (1,020 sq ft) with a shade structure (150 sq ft), orchard with walkway (6,500 sq ft), pickleball court (880 sq ft), garden bed area (1,200 sq ft), memory care patio (4,600 sq ft), and other passive open space areas with paths and benches. The proposed project would provide a total of 72 parking spaces, of which 3 would be handicap parking stalls. The proposed project would also include the development of an internal roadway that would lead to the parking areas in the northwest and southwest corners of the project site. In addition, the proposed project would generate approximately 264 average daily trips (ADT), including 16 AM trips and 20 PM trips.

Construction would include site preparation, grading, building construction, paving, architectural coating, and the installation of landscaping and irrigation, lighting, storm drain facilities, and underground utilities. Construction of the proposed project is anticipated to commence in the fourth quarter of 2024 and occur for approximately 18 months. Site preparation, grading, and building activities would involve the use of standard earthmoving equipment such as large excavators, cranes, and other related equipment. In addition, the construction equipment would utilize Tier 2 engines. Based on the preliminary grading plans, the proposed project would require the net import of approximately 11,500 cubic yards of soil.



Project Location

FIGURE 1

LSA

N

0 1000 2000

FEET

SOURCE: ESRI StreetMap, 2023

Project Location

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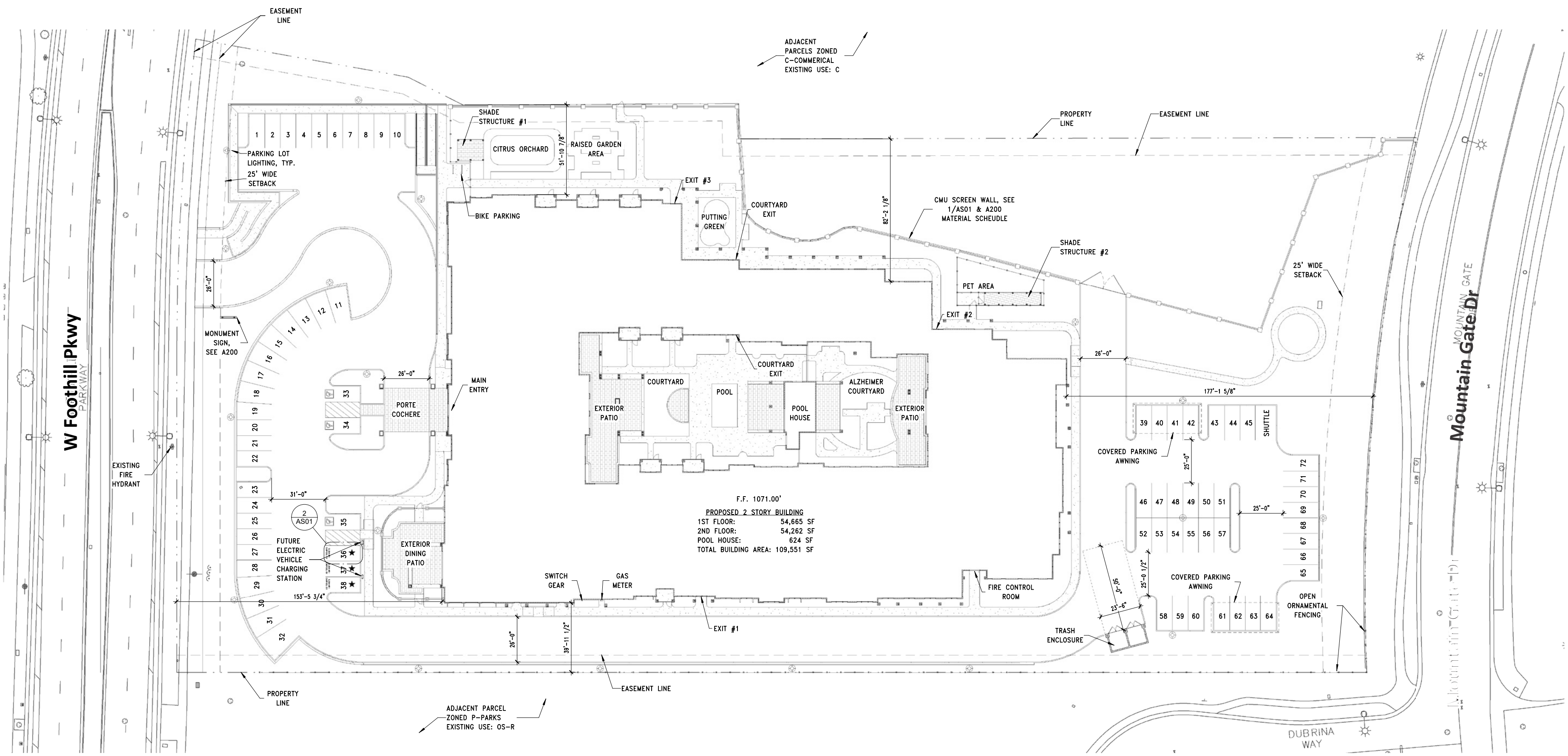
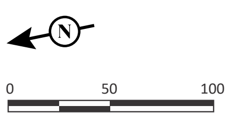


LSA

FIGURE 2



SOURCE: B Hills Architecture

Oakmont Senior Living Facility

Site Plan

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EXISTING LAND USES IN THE PROJECT AREA

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

- **North:** Existing single-family residences opposite West Foothill Parkway;
- **East:** Existing commercial uses;
- **South:** Existing parks and open space recreational uses opposite Mountain Gate Drive; and
- **West:** Existing Corona Heritage Park and Museum and single-family residences.

The closest sensitive receptors to the project site include the Corona Heritage Park and Museum approximately 40 feet (ft) to the west, and single-family homes located west and north of the project site boundary, approximately 80 ft and 160 ft away, respectively.

NOISE AND VIBRATION FUNDAMENTALS

CHARACTERISTICS OF SOUND

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

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

MEASUREMENT OF SOUND

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

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

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

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average noise level (L_{dn}) based on A-weighted decibels. CNEL is the time-weighted average noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noises occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during relaxation 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 traffic noise impact assessment.

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

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

Physiological Effects of Noise

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

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

Table A: Definitions of Acoustical Terms

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

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

Table B: Common Sound Levels and Their Noise Sources

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

Source: Compiled by LSA (2022).

FUNDAMENTALS OF VIBRATION

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

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

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

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

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

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

REGULATORY SETTING

APPLICABLE NOISE STANDARDS

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

California Code of Regulations

Interior noise levels for residential habitable rooms are regulated by Title 24 of the California Code of Regulations California Noise Insulation Standards. Title 24, Chapter 12, Section 1206.4, of the 2019 California Building Code requires that interior noise levels attributable to exterior sources not exceed 45 CNEL in any habitable room. A habitable room is a room used for living, sleeping, eating, or cooking. Bathrooms, closets, hallways, utility spaces, and similar areas are not considered habitable rooms for this regulation (Title 24 California Code of Regulations, Chapter 12, Section 1206.4).

City of Corona

Noise Element of the General Plan

The Noise Element provides the City's goals and policies related to noise, including the land use compatibility guidelines for community exterior noise environments. The City establishes planning criteria for determining a development's land use compatibility based on the community noise equivalent level (CNEL). Table N-1 of the Noise Element (Table C of this document) summarizes the City's Noise Levels and Land Use Compatibility guidelines. The City has identified the following goals and policies in the Noise Element which are applicable to the project:

- **Goal N-1: Protect residents, visitors, and noise-sensitive land uses from the adverse human health and environmental impacts created by excessive noise levels from transportation sources by requiring proactive mitigation.**
    - **N-1.1:** Reduce noise impacts from transportation noise sources through the design and daily operation of arterial road improvements, enforcement of state motor vehicle noise standards, and other measures consistent with funding capabilities.
        - Require site design features and structural building enhancements in the development of residential and other "noise sensitive" land uses that are to be located adjacent to major roads or railroads.
- **Goal N-2: Prevent and mitigate the adverse impacts of excessive ambient noise exposure, including vibration on residents, employees, visitors, and "noise sensitive" land uses.**
    - **N-2.1:** Consider noise and vibration levels in land use planning decisions to prevent future noise and vibration and land use incompatibilities. Considerations may include, but not necessarily be limited to, standards that specify acceptable noise limits for various land uses,

Table C: Noise Levels and Land Use Compatibility Guidelines

Land Use Categories		Community Noise Equivalent Level (CNEL)						
Categories	**Uses**	**<55**	**60**	**65**	**70**	**75**	**80>**	
Residential	Single Family, Duplex	A	A	B	B	D	D	D
	Multiple Family	A	A	B	B	C	D	D
	Hotel, Motel Lodging	A	A	B	C	C	D	D
Commercial Regional, District	Commercial Retail, Bank, Restaurant, Movie Theatre	A	A	B	B	C	C	D
Commercial Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theatre	A	A	A	A	B	B	C
Commercial Office, Institution	Office Building, R&D, Professional Offices, City Office Building	A	A	A	B	B	C	D
Rec. Institutional Civic Center	Amphitheatre, Concert Auditorium, Meeting Hall	B	B	C	C	D	D	D
Commercial Recreation	Amusement Park, Miniature Golf, Sports Club, Equestrian Center	A	A	A	B	B	D	D
Commercial, General, Special, Industrial, and Institutional	Auto Service Station, Auto Dealer, Manu-facturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
Institutional General	Hospital, Church, Library, Schools' Classroom	A	A	B	C	C	D	D
Open Space	Local, Community, and Regional Parks	A	A	A	B	C	D	D
Open Space	Golf Course, Cemetery, Nature Centers Wildlife Reserves and Habitat	A	A	A	A	B	C	C

Zone A: Clearly Compatible: Specified land use is satisfactory, based on the assumption that any buildings involved are of conventional construction without any special noise insulation requirements.
Zone B: Normally Compatible: New construction should be undertaken only after detailed analysis of the noise reduction requirements and needed noise insulation features are determined. Conventional construction, with closed windows and fresh air supply or air conditioning, will normally suffice.
Zone C: Normally Incompatible: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.
Zone D: Clearly Incompatible: New development should generally not be undertaken.

Source: City of Corona General Plan (2020).

noise reduction features, acoustical design in new construction, and enforcement of the California Standards Building Code provisions for indoor and outdoor noise levels.

- **N-2.2:** Require that in areas where existing or future ambient noise levels exceed an exterior noise level of 65 dBA CNEL, all development of new housing, health care facilities, schools, libraries, religious facilities, and other "noise sensitive" uses shall include site design, building enhancements, buffering, and/or mitigation to reduce noise exposure to within acceptable limits.
- **N-2.6:** Require development that generates increased traffic and substantial increases in ambient noise levels adjacent to noise sensitive land uses to provide appropriate mitigation measures in accordance with the acceptable limits of the City Noise Ordinance.
- **N-2.7:** Require construction activities that occur in close proximity to existing "noise sensitive" uses, including schools, libraries, health care facilities, and residential uses, to limit the hours and days of operation in accordance with the City Noise Ordinance.

- **Goal N-3: Discourage the spillover or encroachment of unacceptable noise levels from mixed use, commercial, and industrial land uses on to noise sensitive land uses.**
  - **N-3.3:** Require the design of residential and nonresidential parking structures used on-site and adjacent to noise sensitive land uses incorporate noise reducing features to minimize vehicular noise from encroaching outside the structure.

City of Corona Municipal Code

Noise Standards. The City's standards for noise impacts in neighboring residential areas are found in Chapter 17.84.040 of the City's Municipal Code, which sets forth exterior and interior noise limits of 65 dBA CNEL and 45 dBA CNEL, respectively, for transportation noise sources, such as roadway and airport, at residential and other sensitive land uses. Performance standards for stationary noise sources are summarized in Table D.

Table D: Stationary Noise Source Standards

Type of Land Use	Maximum Allowable Noise Levels			
	Exterior Noise Level (L_{eq})		Interior Noise Level (L_{eq})	
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
Single-, Double- and Multi-Family Residential	55 dBA	50 dBA	45 dBA	35 dBA
Other Sensitive Land Uses[1]	55 dBA	50 dBA	45 dBA	35 dBA
Commercial Uses	65 dBA	60 dBA	-	-
Industrial, Manufacturing or Agricultural	75 dBA	70 dBA	-	-

Source: City of Corona (2023).
[1] "Sensitive land uses." Those specific land uses which have associated human activities that may be subject to stress or significant interference from noise. Sensitive land uses include single family residential, multiple family residential, churches, hospitals and similar health care institutions, convalescent homes, libraries and school classroom areas.
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

Construction Noise Standards. The City has set restrictions to control noise impacts associated with the construction of the proposed project. According to Section 17.84.040(D)(2), *Construction noise,* construction noise is prohibited: *between the hours of 8:00 p.m. to 7:00 a.m., Monday through Saturday and 6:00 p.m. to 10:00 a.m. on Sundays and federal holidays. Construction noise is defined as noise which is disturbing, excessive or offensive and constitutes a nuisance involving discomfort or annoyance to persons of normal sensitivity residing in the area, which is generated by the use of any tools, machinery or equipment used in connection with construction operations.*

Federal Transit Administration

Although the City does not have daytime construction noise level limits for activities that occur within the specified hours in the City's Municipal Code to determine potential California Environmental Quality Act (CEQA) noise impacts, construction noise was assessed using criteria from the *Transit Noise and Vibration Impact Assessment Manual* (Federal Transit Administration [FTA] 2018) (FTA Manual). Table E shows the FTA's Detailed Assessment Construction Noise Criteria based on the composite noise levels per construction phase.

Table E: Detailed Assessment Daytime Construction Noise Criteria

Land Use	Daytime 8-hour L_{eq} (dBA)
Residential	80
Commercial	85
Industrial	90

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

APPLICABLE VIBRATION STANDARDS

Federal Transit Administration

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

Table G lists the potential vibration building damage criteria associated with construction activities, as suggested in the FTA Manual. FTA guidelines show that a vibration level of up to 0.5 in/sec in PPV 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 0.2 in/sec in PPV.

Table F: Interpretation of Vibration Criteria for Detailed Analysis

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

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

1 As measured in 1/3-octave bands of frequency over a frequency range of 8 to 80 Hertz.

FTA = Federal Transit Administration
Max = maximum
L_V = velocity in decibels
VdB = vibration velocity decibels

Table G: 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).

FTA = Federal Transit Administration
PPV = peak particle velocity
in/sec = inch/inches per second

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are transportation facilities. Local traffic on the roadways in the vicinity of the project (West Foothill Parkway and Mountain Gate Drive) is a steady source of ambient noise.

AMBIENT NOISE MEASUREMENTS

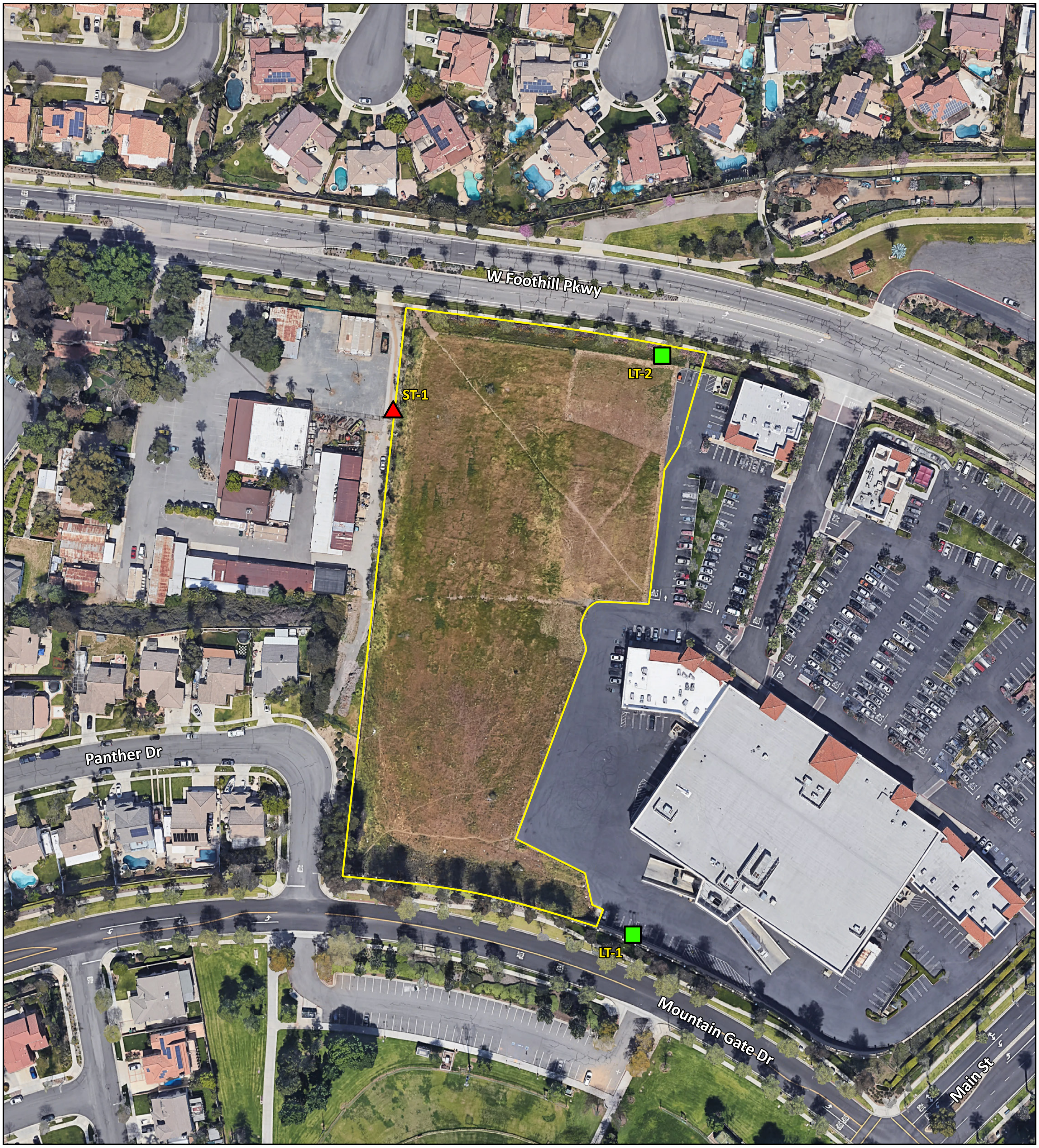
Long-Term Noise Measurements

Long-term (24-hour) noise level measurements were conducted on May 2 and 3, 2023, using two Larson Davis Spark 706RC Dosimeters. A short-term (20-minutes) noise level measurement was conducted on May 2, 2023, using a Larson Davis 824 Noise Level Meter. Table H provides a summary of the measured hourly noise levels from the noise level measurements. Hourly noise levels at surrounding sensitive uses are as low as 39.5 dBA L_{eq} during nighttime hours and 49.7 dBA L_{eq} during daytime hours. Noise monitoring data results are provided in Appendix A. Figure 3 shows the noise monitoring locations.

Table H: Long-Term Ambient Noise Level Measurements

Location		Daytime Noise Levels[1] (dBA L_{eq})	Evening Noise Levels[2] (dBA L_{eq})	Nighttime Noise Levels[3] (dBA L_{eq})	Daily Noise levels (dBA CNEL)
LT-1	Southwest Albertsons at 260 West Foothill Parkway, on a light pole bordering Mountain Gate Drive, approximately 65 ft away from Mountain Gate Drive centerline.	51.8 – 56.4	51.1 – 56.2	43.5 – 51.6	57.4
LT-2	Northeast of project site, west of Wells Fargo at 330 West Foothill Parkway, approximately 65 ft away from West Foothill Parkway centerline.	67.4 – 72.0	66.3 – 69.6	57.2 – 68.3	72.2
ST-1[4]	Eastern edge of the Corona Heritage Park and Museum, near a fence entrance, approximately 190 ft away from West Foothill Parkway centerline	49.7 – 54.3	48.6 – 51.9	39.5 – 50.6	54.5

Source: Compiled by LSA (2023).
Note: Noise measurements were conducted from May 2 to May 3, 2023, starting at 12:00 p.m.
[1] Daytime Noise Levels = Noise levels during the hours from 7:00 a.m. to 7:00 p.m.
[2] Evening Noise Levels = Noise levels during the hours from 7:00 p.m. to 10:00 p.m.
[2] Nighttime Noise Levels = Noise levels during the hours from 10:00 p.m. to 7:00 a.m.
[4] Short-term measurement data estimated based on corresponding long-term.
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibels
ft = foot/feet
L_{eq} = equivalent continuous sound level



LEGEND

- Project Site Boundary

ST-1 - Short-term Noise Monitoring Location

LT-1 - Long-term Noise Monitoring Location

EXISTING 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 proposed project site is Corona Municipal Airport located approximately 3.7 miles northwest of the project site. According to Figure N-1, Corona Municipal Airport Noise Contours, of the City's General Plan (City of Corona 2020), the project site is located well outside the 65 dBA CNEL airport noise impact zone. Therefore, the project would not be adversely affected by airport/airfield noise, nor would the project contribute to or result in adverse airport/airfield noise impacts.

PROJECT IMPACT ANALYSIS

SHORT-TERM CONSTRUCTION NOISE IMPACTS

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single-event noise-exposure potential causing intermittent noise nuisance (passing trucks at 50 ft would generate up to 84 dBA L_{max}), the effect on longer-term ambient noise levels would be small when compared to existing daily traffic volumes on West Foothill Boulevard. The results of the California Emissions Estimator Model (CalEEMod) for the proposed project indicate that during the grading phase, an additional 375 vehicles, consisting of worker and hauling trips, would be added to the roadway adjacent to the project site. Because the existing traffic volume on West Foothill Boulevard is considerably more than 375, construction-related vehicle trips would not approach existing daily traffic volumes and traffic noise would not increase by 3 dBA CNEL. A noise level increase of less than 3 dBA would not be perceptible to the human ear in an outdoor environment. Therefore, short-term, construction-related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during construction, which includes site preparation, grading, building construction, paving, and architectural coating on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table I lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor, taken from the Federal Highway Administration (FHWA) *Roadway Construction Noise Model* (FHWA 2006).

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

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

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

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

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

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

Table I: Typical Construction Equipment Noise Levels

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

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

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

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

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

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

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

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

Table J shows the nearest sensitive uses to the project site, their distance from the center of construction activities, and composite noise levels expected during construction. These noise level projections do not consider intervening topography or barriers. Construction equipment calculations are provided in Appendix B.

Table J: Potential Construction Noise Impacts at Nearest Receptor

Receptor (Location)	Composite Noise Level (dBA L_{eq}) at 50 ft[1]	Distance (ft)	Composite Noise Level (dBA L_{eq})
Commercial Uses (East)	88	145	78
Corona Heritage Park and Museum (West)		200	76
Residences (West)		250	74
Residences (North) and Park (South)		520	67

Source: Compiled by LSA (2023).

[1] The composite construction noise level represents the grading/site preparation phases, which are expected to result in the greatest noise level as compared to other phases.

dBA = A-weighted decibels

ft = foot/feet

L_{eq} = equivalent continuous sound level

While construction noise will vary, it is expected that composite noise levels during construction at the nearest commercial uses to the east would reach an average noise level of 78 dBA L_{eq} during daytime hours, while noise levels during construction at the nearest off-site sensitive uses (museum and residences to the west) would reach 76 dBA L_{eq} and 74 dBA L_{eq}, respectively. These predicted noise levels would only occur when all construction equipment is operating simultaneously and, therefore, are assumed to be rather conservative in nature. While construction-related short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed.

As stated above, noise impacts associated with construction activities are regulated by the City's noise ordinance. The proposed project would comply with the construction hours specified in the City's Noise Ordinance, which states that construction activities are allowed between the hours of 7:00 a.m. and 8:00 p.m., Monday through Saturday and between the hours of 10:00 a.m. and 6:00 p.m. on Sundays and federal holidays.

As it relates to off-site uses, construction-related noise impacts would remain below the 85 dBA L_{eq} and 80 dBA L_{eq} construction noise level criteria, as established by the FTA for commercial and residential land uses, respectively, for the average daily condition as modeled from the center of the project site and therefore would be considered less than significant. Best construction practices presented at the end of this analysis shall be implemented to minimize noise impacts to surrounding receptors.

SHORT-TERM CONSTRUCTION VIBRATION IMPACTS

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

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

Table K: Vibration Source Amplitudes for Construction Equipment

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

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

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

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

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

Table L: Potential Construction Vibration Annoyance Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (VdB) at 25 ft[1]	Distance (ft)[2]	Vibration Level (VdB)
Commercial Uses (East)	87	145	64
Corona Heritage Park and Museum (West)		200	60
Residences (West)		250	57
Residences (North)		520	47

Source: Compiled by LSA (2023).

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

[2] The reference distance is associated with the average condition, identified by the distance from the center of construction activities to surrounding uses.

ft = foot/feet

VdB = vibration velocity decibels

Table M: Potential Construction Vibration Damage Impacts at Nearest Receptor

Receptor (Location)	Reference Vibration Level (PPV) at 25 ft[1]	Distance (ft)[2]	Vibration Level (PPV)
Commercial Uses (East)	0.089	40	0.044
Corona Heritage Park and Museum (West)		40	0.044
Residences (West)		80	0.016
Residences (North)		200	0.004

Source: Compiled by LSA (2023).

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

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

ft = foot/feet

PPV = peak particle velocity

As shown in Table F, above, the threshold at which vibration levels would result in annoyance would be 78 VdB for daytime residential uses. As shown in Table G, the FTA guidelines indicate that for a non-engineered timber and masonry building, the construction vibration damage criterion is 0.2 in/sec in PPV.

Based on the information provided in Table L, vibration levels are expected to approach 64 VdB at the closest commercial uses to the east and 60 VdB at the sensitive uses located west of the project site, which is below the 78 VdB threshold for annoyance.

Based on the information provided in Table M, vibration levels are expected to approach 0.044 PPV in/sec at the nearest surrounding structures and would not exceed the 0.2 PPV in/sec damage threshold considered safe for non-engineered timber and masonry buildings. Vibration levels at all other buildings located further from the project site would be lower. Therefore, construction would not result in any vibration damage, and impacts would be less than significant.

Because construction activities are regulated by the City's Municipal Code, which states that temporary construction, maintenance, or demolition activities are allowed between the hours of 7:00 a.m. and 8:00 p.m., Monday through Saturday and between the hours of 10:00 a.m. and 6:00 p.m. on Sundays and federal holidays, vibration impacts would not occur during the more sensitive nighttime hours.

LONG-TERM OFF-SITE TRAFFIC NOISE IMPACTS

In order to assess the potential traffic impacts related to the proposed project, the proposed project is forecast to generate 264 daily trips based on the *Trip Generation Screening Analysis for the Oakmont Senior Living Facility* (EPD Solutions Inc. 2023). According to the Corona General Plan Technical Update Volume IIb (PlaceWorks 2019), the existing (2017) ADT on West Foothill Parkway east of Lincoln Avenue is 10,950 (assuming the ADT is 10 times the peak hour volumes). While the current traffic volume on Foothill Parkway is likely higher, using the 2017 volumes would be considered conservative. 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: $V_{existing}$ = existing daily volumes
V_{e+p} = existing daily volumes plus project
Change in CNEL = increase in noise level due to the project

The results of the calculations show that an increase of approximately 0.1 dBA CNEL is expected along West Foothill Parkway. A noise level increase of less than 1 dBA would not be perceptible to the human ear; therefore, the traffic noise increase in the vicinity of the project site resulting from the proposed project would be less than significant.

STATIONARY OPERATIONAL NOISE IMPACTS TO OFF-SITE RECEIVERS

The proposed building would have rooftop HVAC units. The HVAC equipment could operate 24 hours per day. Rooftop HVAC equipment would generate noise levels of 66.6 dBA L_{eq} at 5 ft per HVAC unit based on previous measurements conducted by LSA.

Table N presents the noise levels from HVAC equipment at the nearest noise-sensitive location. The closest off-site sensitive uses to the proposed location of on-site HVAC units would be located approximately 115 ft away west of the project site.

Table N: Summary of HVAC Noise Levels

Off-Site Land Use (Direction)	Distance from HVAC Units (ft)	Reference Noise Level for 1 Unit at 5 ft (dBA L_{eq})	Total Reference Noise for 13 Units at 5 ft (dBA L_{eq})[1]	Distance Attenuation (dBA)	Noise Level (dBA L_{eq})
Corona Heritage Park & Museum (West)	115	66.6	77.7	27	46
Residences (West)	155	66.6	77.7	30	43

Source: Compiled by LSA (2023).
[1] Includes a minimum reduction of 5 dBA provided by rooftop parapet walls.
dBA = A-weighted decibel(s)
ft = foot/feet
HVAC = heating, ventilation, and air conditioning
L_{eq} = equivalent continuous sound level

According to the rooftop plan of the proposed project, 67 HVAC units are proposed to be installed. Per the building plans, the building would have parapet walls to hide the mechanical equipment, which would reduce noise levels by a minimum of 5 dBA. After distance attenuation, noise generated from the 13 closest HVAC equipment units to the west would be up to 46.0 dBA L_{eq} at the nearest sensitive use. This noise level would not exceed the City's exterior daytime (7:00 a.m. to 11:00 p.m.) and nighttime (11:00 p.m. to 7:00 a.m.) noise standards of 55 dBA L_{eq} and 50 dBA L_{eq}, respectively. The other HVAC equipment units would be further away and would receive greater noise reduction due to additional rooftop parapet shielding and thus are not expected to contribute to the combined noise level. Therefore, noise associated with the on-site HVAC equipment would be less than significant, and no mitigation is required.

LONG-TERM TRAFFIC-RELATED VIBRATION IMPACTS

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

LAND USE COMPATIBILITY

The dominant source of noise in the project vicinity is traffic noise from roadways in the vicinity of the project.

EXTERIOR NOISE ASSESSMENT

Based on the monitoring results shown in Table H, the existing measured noise levels at the project site range from approximately 57 dBA CNEL to 72 dBA CNEL.

Based on the project site plan, the exterior dining patio located by the entrance of the proposed building and the recreational amenities located at the courtyard in the center of the project site are considered exterior sensitive uses. The proposed dining patio located approximately 165 ft from West Foothill Parkway centerline, would approach 64 dBA CNEL after distance attenuation. The noise levels at the central courtyard would be further reduced due to distance attenuation and shielding from the building. Noise levels at these locations would be below the City's 65 dBA CNEL exterior noise level standard. Therefore, no additional noise reduction features would be necessary to comply with land use compatibility standards.

INTERIOR NOISE ASSESSMENT

As described above, the project must demonstrate compliance with the interior noise standards of 45 dBA CNEL for residential uses.

Based on the expected exterior noise levels at the northern façades of the proposed building closest to West Foothill Parkway, noise levels would approach 62 dBA CNEL after distance attenuation and a minimum noise reduction of 17 dBA would be required. Based on the expected exterior noise levels at the southern façades of the proposed building closest to Mountain Gate Drive approaching 46 dBA CNEL after distance attenuation, a minimum noise reduction of 1 dBA would be required.

Because the project would include a form of mechanical ventilation, windows and doors could remain closed. Based on the United States Environmental Protection Agency's (EPA) Protective Noise Levels (EPA 1978), with a combination of exterior walls, doors, and windows, standard construction for Southern California (warm climate) buildings would provide a 24 dBA exterior-to-interior noise reduction with windows and doors closed. Using the EPA's standard reduction, with windows and doors closed, interior noise levels would be 38 dBA CNEL (i.e., 62 dBA - 24 dBA = 38 dBA), and this noise level would not exceed the City's interior noise standard of 45 dBA CNEL for residential uses. Other façades on the project site are farther from surrounding roadways and would be exposed to lower traffic noise levels. Therefore, no additional noise reduction features would be necessary to comply with land use compatibility standards.

Once final plans are available and a window manufacturer has been chosen, a final acoustic report would be required to confirm the reduction capability of the exterior façades and to identify any specific upgrades necessary to achieve an interior noise level of 45 dBA CNEL or below.

BEST CONSTRUCTION PRACTICES

In addition to compliance with the City's Municipal Code allowed hours between the hours of 7:00 a.m. and 8:00 p.m., Monday through Saturday and between the hours of 10:00 a.m. and 6:00 p.m. on Sundays and federal holidays., the following best construction practices would further minimize construction noise impacts:

- The project construction contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained noise mufflers consistent with manufacturers' standards.
- The project construction contractor shall locate staging areas away from off-site sensitive uses during the later phases of project development.
- The project construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site whenever feasible.

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APPENDIX A

NOISE MONITORING DATA

Noise Measurement Survey – 24 HR

Project Number: ESL2201.61
Project Name: Oakmont Senior Living

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:224)

Site Number: LT-1 Date: 5/2/23

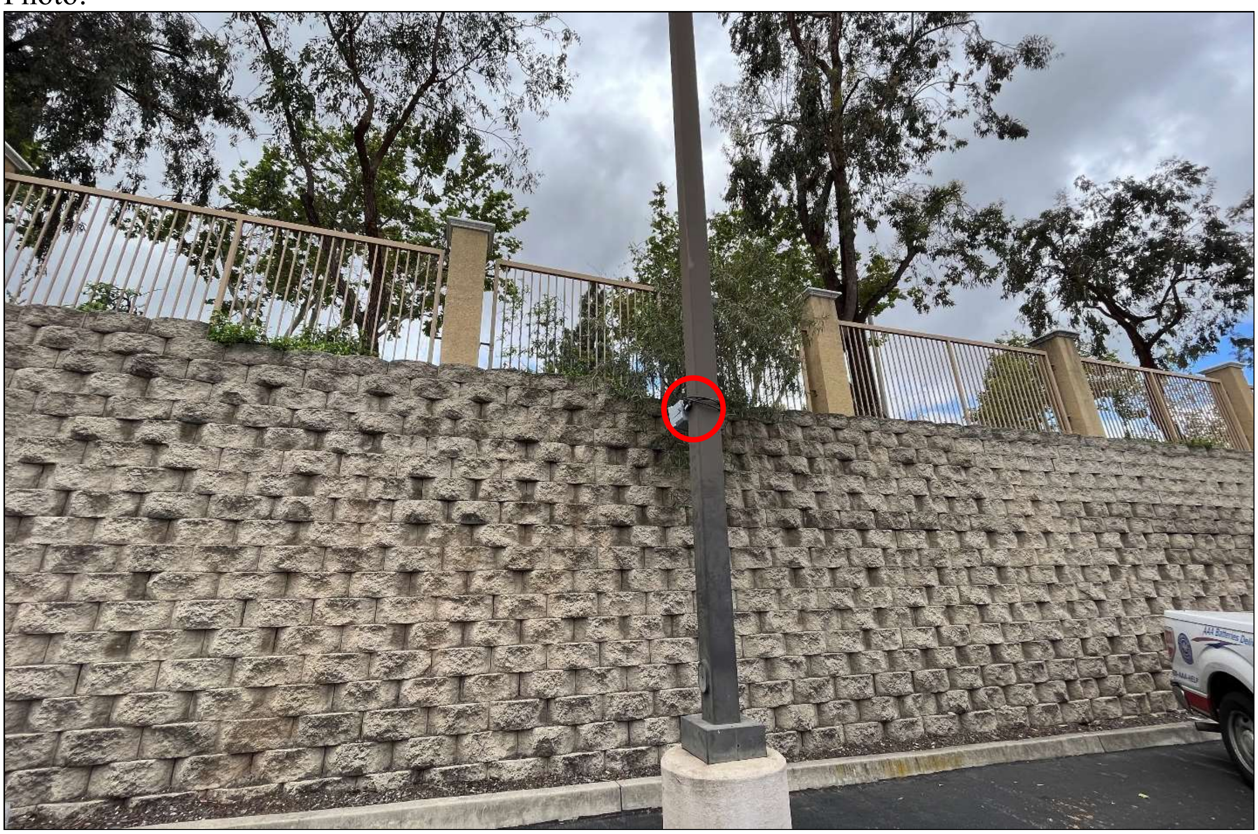
Time: From 12:00 p.m. To 12:00 p.m.

Site Location: Southwest of an Albertsons on 260 W Foothill Pkwy, Corona, CA 92882 on a Light pole bordering Mountain Gate Drive.

Primary Noise Sources: Vehicle traffic noise on Mountain Gate Drive.

Comments:

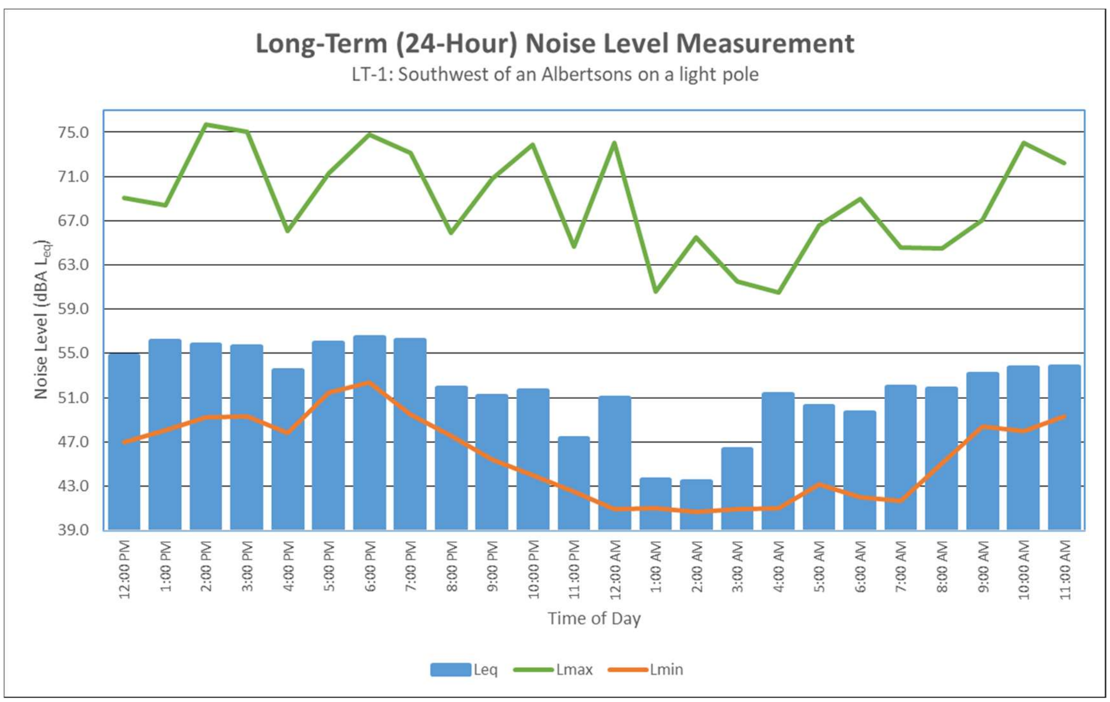
Photo:



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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
12:00 PM	5/2/23	54.8	69.1	47.0
1:00 PM	5/2/23	56.1	68.4	48.1
2:00 PM	5/2/23	55.8	75.7	49.2
3:00 PM	5/2/23	55.6	75.0	49.3
4:00 PM	5/2/23	53.4	66.1	47.8
5:00 PM	5/2/23	56.0	71.3	51.5
6:00 PM	5/2/23	56.4	74.8	52.4
7:00 PM	5/2/23	56.2	73.1	49.5
8:00 PM	5/2/23	51.9	65.9	47.6
9:00 PM	5/2/23	51.1	70.8	45.4
10:00 PM	5/2/23	51.6	73.9	44.0
11:00 PM	5/2/23	47.3	64.7	42.5
12:00 AM	5/3/23	51.0	74.0	40.9
1:00 AM	5/3/23	43.5	60.6	41.0
2:00 AM	5/3/23	43.5	65.5	40.7
3:00 AM	5/3/23	46.3	61.5	40.9
4:00 AM	5/3/23	51.3	60.5	41.0
5:00 AM	5/3/23	50.2	66.6	43.2
6:00 AM	5/3/23	49.6	69.0	42.0
7:00 AM	5/3/23	52.0	64.6	41.7
8:00 AM	5/3/23	51.8	64.5	45.1
9:00 AM	5/3/23	53.1	67.1	48.4
10:00 AM	5/3/23	53.7	74.0	48.0
11:00 AM	5/3/23	53.8	72.2	49.3

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



Noise Measurement Survey – 24 HR

Project Number: ESL2201.61
Test Personnel: Kevin Nguyendo
Project Name: Oakmont Senior Living
Equipment: Spark 706RC (SN:905)

Site Number: LT-2 Date: 5/2/23
Time: From 12:00 p.m. To 12:00 p.m.

Site Location: Northeast of the project site just west of a Wells Fargo on 330 W Foothill Pkwy, Corona, CA 92882 on a tree.

Primary Noise Sources: Vehicle traffic noise on Foothill Parkway.

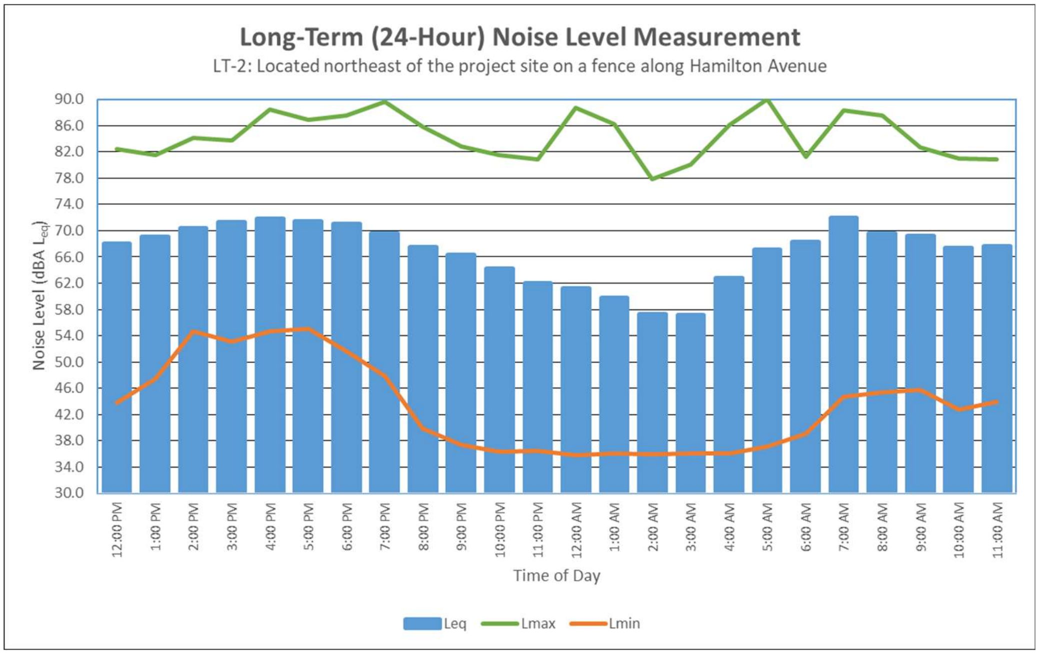
Comments:

Photo:

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

Start Time	Date	Noise Level (dBA)		
		L_{eq}	L_{max}	L_{min}
12:00 PM	5/2/23	68.1	82.4	43.8
1:00 PM	5/2/23	69.0	81.5	47.4
2:00 PM	5/2/23	70.4	84.1	54.7
3:00 PM	5/2/23	71.3	83.8	53.1
4:00 PM	5/2/23	71.9	88.5	54.7
5:00 PM	5/2/23	71.4	86.9	55.1
6:00 PM	5/2/23	71.0	87.5	51.7
7:00 PM	5/2/23	69.6	89.6	47.9
8:00 PM	5/2/23	67.5	85.9	39.9
9:00 PM	5/2/23	66.3	82.8	37.3
10:00 PM	5/2/23	64.3	81.5	36.3
11:00 PM	5/2/23	62.0	80.9	36.5
12:00 AM	5/3/23	61.2	88.8	35.8
1:00 AM	5/3/23	59.8	86.3	36.0
2:00 AM	5/3/23	57.2	77.9	35.9
3:00 AM	5/3/23	57.2	80.1	36.0
4:00 AM	5/3/23	62.8	86.1	36.1
5:00 AM	5/3/23	67.2	90.1	37.1
6:00 AM	5/3/23	68.3	81.3	39.0
7:00 AM	5/3/23	72.0	88.3	44.7
8:00 AM	5/3/23	69.6	87.6	45.3
9:00 AM	5/3/23	69.2	82.7	45.7
10:00 AM	5/3/23	67.4	81.0	42.7
11:00 AM	5/3/23	67.6	80.9	43.9

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



Noise Measurement Survey

Project Number: ESL2201.61 Test Personnel: Kevin Nguyendo
Project Name: Oakmont Senior Living Equipment: Larson Davis 824

Site Number: ST-1 Date: 5/2/23 Time: From 12:13 p.m. To 12:36 p.m.

Site Location: Eastern edge of the Corona Heritage Park and Museum near a fenced Entrance. Approximately 150 feet from Foothill Parkway.

Primary Noise Sources: Vehicle traffic noise on Foothill Parkway.

Measurement Results

	dBA
Leq	50.2
Lmax	63.8
Lmin	38.0
Lpeak	83.4
L2	57.3
L8	54.3
L25	50.8
L50	37.4
SEL	

Atmospheric Conditions:

Maximum Wind Velocity (mph)	4.8
Average Wind Velocity (mph)	1.8
Temperature (F)	70.2
Relative Humidity (%)	61.0
Comments:	

Comments:

Traffic Description:

Roadway	# Lanes	Speeds	NB/EB Counts			SB/WB Counts		
			Auto	MT	HT	Auto	MT	HT

Diagram:

Location Photo:

APPENDIX B

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
Dozer	3	82	40	50	0.5	82	83
Tractor	4	84	40	50	0.5	84	86
					Combined at 50 feet	**86**	**88**
					Combined at Receptor 145 feet	**77**	**78**
					Combined at Receptor 200 feet	**74**	**76**
					Combined at Receptor 250 feet	**72**	**74**
					Combined at Receptor 520 feet	**66**	**67**

Phase: Grading

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Excavator	1	81	40	50	0.5	81	77
Grader	1	85	40	50	0.5	85	81
Dozer	1	82	40	50	0.5	82	78
Tractor	3	84	40	50	0.5	84	85
					Combined at 50 feet	**89**	**87**
					Combined at Receptor 145 feet	**80**	**78**

Phase:Building Construstion

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Crane	1	81	16	50	0.5	81	73
Man Lift	3	75	20	50	0.5	75	73
Generator	1	81	50	50	0.5	81	78
Tractor	3	84	40	50	0.5	84	85
Welder / Torch	1	74	40	50	0.5	74	70
					Combined at 50 feet	**87**	**86**
					Combined at Receptor 145 feet	**78**	**77**

Phase:Paving

Equipment	Quantity	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
						Lmax	Leq
Paver	2	77	50	50	0.5	77	77
All Other Equipment > 5 HP	2	85	50	50	0.5	85	85
Roller	2	80	20	50	0.5	80	76
					Combined at 50 feet	**87**	**86**
					Combined at Receptor 145 feet	**77**	**77**

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 145 feet	**69**	**65**

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