

MEMORANDUM

DATE: March 1, 2024

To: Rick Yee, PE, Deputy Director of Public Works, City of Yorba Linda

FROM: Jason Lui, Associate/Senior Noise Specialist, LSA

SUBJECT: Noise and Vibration Impact Analysis Memorandum for the Proposed Yorba Linda Boulevard Improvements Project (Imperial Highway to Lakeview Avenue), Yorba Linda, California (LSA Project No. 20231457)

INTRODUCTION

This Noise and Vibration Impact Analysis Memorandum has been prepared to evaluate the potential noise and vibration impacts associated with construction and operation of the proposed Yorba Linda Boulevard Improvements Project (Imperial Highway to Lakeview Avenue) in Yorba Linda, Orange County, California. This memorandum is intended to satisfy the City of Yorba Linda (City) and California Environmental Quality Act requirements for a project-specific noise and vibration impact analysis by examining the impacts of the proposed project and evaluating, if necessary, the mitigation measures to reduce potential impacts to less than significant. All references cited in this memorandum are included in Attachment A.

PROJECT LOCATION

The project is located from the intersection of Yorba Linda Boulevard and Imperial Highway to the intersection of Yorba Linda Boulevard and Lakeview Avenue in Yorba Linda in Orange County, California. The project limits measure approximately 0.28 mile along Yorba Linda Boulevard east of Park Avenue and west of Avocado Avenue. The project location is shown on Figure 1 (all figures are provided in Attachment B).

PROJECT DESCRIPTION

The City is proposing roadway improvements at the intersections of Yorba Linda Boulevard and Imperial Highway and Yorba Linda Boulevard and Lakeview Avenue that would address the existing and future congestion and operation at these intersections. Figure 2 shows the project improvements.

Yorba Linda Boulevard and Imperial Highway Intersection

The project improvements for the intersection widening at the intersection of Yorba Linda Boulevard and Imperial Highway include the following:

- Convert the eastbound single left turn lane on Yorba Linda Boulevard at the intersection with Imperial Highway to dual left turn lanes.

- Add an eastbound right turn lane on Yorba Linda Boulevard at the intersection with Imperial Highway.
- Convert the single left turn lane on Yorba Linda Boulevard at the intersection with Imperial Highway to dual left turn lanes. These lanes will also be extended.
- Modify the northerly and southerly curb lines and curb returns and the median on the west leg of Yorba Linda Boulevard at the intersection with Imperial Highway to accommodate two additional lanes.
- Modify the southerly curb line and curb return and the median on the east leg of Yorba Linda Boulevard at the intersection with Imperial Highway to accommodate an additional lane.
- Modify the traffic signals.
- Utility relocations will be necessary due to the road widening and potentially for the foundations for the traffic signal modifications.
- Restripe Yorba Linda Boulevard to modify lane designations.
- Construct retaining wall on eastbound Yorba Linda Boulevard, near the Imperial Highway intersection, due to the presence of an underground parking garage along the southerly portion of the roadway. In the existing condition, an embankment with a short retaining wall is in place to separate the difference in grade between the back of the sidewalk and the floor of the underground parking garage. The proposed retaining wall would be located 6.5 feet (ft) from the existing face of the parking structure.

Yorba Linda Boulevard and Lakeview Avenue Intersection

The project improvements for the intersection widening at the intersection of Yorba Linda Boulevard and Lakeview Avenue include the following:

- Convert the eastbound single left turn lane on Yorba Linda Boulevard at the intersection with Lakeview Avenue to dual left turn lanes.
- Convert the westbound single left turn lane on Yorba Linda Boulevard at the intersection with Lakeview Avenue to dual left turn lanes.
- Modify the southerly curb line and curb return and the median on the east leg of Yorba Linda Boulevard at the intersection with Lakeview Avenue to accommodate an additional lane.
- Modify the southerly curb line and curb return and the median on the west leg of Yorba Linda Boulevard at the intersection with Lakeview Avenue to accommodate an additional lane.
- Remove the gap in the median on the east leg of Yorba Linda Boulevard at the intersection with Lakeview Avenue which was used to enter the Firestone Village shopping center.

- Modify the traffic signals.
- Utility relocations will be necessary due to the road widening and potentially for the foundations for the traffic signal modifications.
- Restripe Yorba Linda Boulevard to modify lane designations.

Utility Relocations

Utility relocations will be necessary due to the road widening. Additional utilities may need to be relocated for the proposed traffic signal pole foundations. The utilities that may need to be relocated include, but are not limited to, the following:

- The transformer on the north side of Yorba Linda Boulevard west of Imperial Highway in the grassy area south of Mimi's Café
- Street lights along Yorba Linda Boulevard
- Irrigation controllers and irrigation lines along Yorba Linda Boulevard
- The catch basin on the north side of Yorba Linda Boulevard west of Imperial Highway in front of the Chili's Restaurant
- The traffic signal poles and their associated pull boxes, cabinets, and lines at the northwest, southwest, and southeast corners of the intersection of Yorba Linda Boulevard and Imperial Highway and at the southwest and southeast corners of the intersection of Yorba Linda Boulevard and Lakeview Avenue
- The fire hydrant, water valves, and water meters on the south side of Yorba Linda Boulevard west of Imperial Highway in front of the Chili's Restaurant
- The underground backflow preventer on the south side of Yorba Linda Boulevard west of Imperial Highway in the grassy area in front of the Chili's Restaurant
- The junction box on the south side of Yorba Linda Boulevard east of Imperial Highway in front of the El Pollo Loco drive through
- The Southern California Edison (SCE) vault on the south side of Yorba Linda Boulevard east of Imperial Highway in front of the Galleria de Yorba sign
- The fire hydrant on the south side of Yorba Linda Boulevard in between Imperial Highway and Lakeview Avenue on the west side of the driveway into the Galleria de Yorba shopping center
- The electrical vault on the south side of Yorba Linda Boulevard west of Lakeview Avenue in front of the T-Mobile store

- The SCE vault on the south side of Yorba Linda Boulevard east of Lakeview Avenue and west of the driveway into the Firestone Village shopping center
- The Yorba Linda Water District (YLWD) water enclosure and valve on the south side of Yorba Linda Boulevard east of the driveway to the Firestone Village shopping center
- The SCE cabinet on the south side of Yorba Linda Boulevard east of the driveway to the Firestone Village shopping center
- Two SCE transformers on the south side of Yorba Linda Boulevard east of Lakeview Avenue in front of the Yorba Linda Palms Apartments
- The fire hydrant and the water meter on the south side of Yorba Linda Boulevard east of Lakeview Avenue in front of the Yorba Linda Palms Apartments
- The SCE enclosures on the south side of Yorba Linda Boulevard east of Lakeview Avenue in front of the Yorba Linda Palms Apartments

Retaining Wall and Bridge

In order to add the right turn lane on eastbound Yorba Linda Boulevard at the intersection with Imperial Highway, a retaining wall will be needed due to the existence of an underground parking garage along the southerly portion of the roadway. In the existing condition, an embankment with a short retaining wall is in place to separate the difference in grade between the back of the sidewalk and the floor of the underground parking garage. The proposed retaining wall would be located 6.5 ft from the existing face of the parking structure. The intent would be not to impact the existing retaining wall located at the bottom of the embankment. Cast-in-drilled hole piles or spread footings may be used. The bridge connecting the driveway to the upper deck of the parking structure will need to be dismantled; this includes the two retaining walls that are on each side of the bridge. A new bridge would be needed from the existing structure to the new soil.

Firestone Village Shopping Center Access

The Firestone Village shopping center will no longer be accessible from the westbound Yorba Linda Boulevard due to the proposed removal in the gap of the median. Westbound cars are unable to U-turn at Lakeview Avenue and therefore would have to either continue on Yorba Linda Boulevard and U-turn at Imperial Highway or turn left onto Lakeview and U-turn. Traffic counts did not support allowing westbound vehicles to U-turn at Lakeview Avenue and removing the protected right turn from northbound Lakeview Avenue onto eastbound Yorba Linda Boulevard.

Property Acquisition

Several property acquisitions would be necessary due to the road widening. Properties that would need to be partially acquired include the following:

- Assessor's Parcel Number (APN) 334-391-05
- APN 343-281-01
- APN 343-281-18
- APN 343-281-10
- APN 348-161-01
- APN 348-161-12
- APN 348-161-13
- APN 348-162-15
- APN 348-162-16

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 deemphasis 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 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 loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dB for each doubling of distance in a hard site environment; 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. The City uses the CNEL noise scale for long-term noise impact assessment.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max} , which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. L_{max} is often used together with another noise scale, or noise standards in terms of percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. 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 that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1 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 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 (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 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.

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. When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible (FTA 2018). 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, both construction of the project and the freight train operations could result in ground-borne vibration that may be perceptible and annoying.

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 (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 velocity 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. The vibration velocity level in decibels is defined as the following:

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

where “ L_v ” is the vibration velocity decibel (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

State Guidelines

California Department of Transportation (Caltrans)

Vibration standards included in the Caltrans Transportation and Construction Vibration Guidance Manual (2020) were used to evaluate vibration impacts because the City does not have vibration standards. Table C provides the criteria for assessing the annoyance potential, while Table D provides the criteria for assessing damage potential associated with construction activities.

Table C: Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: Transportation and Construction Vibration Guidance Manual (Caltrans 2020).

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

in/sec = inches per second

PPV = peak particle velocity

Table D: Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Transportation and Construction Vibration Guidance Manual (Caltrans 2020).

Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

in/sec = inches per second

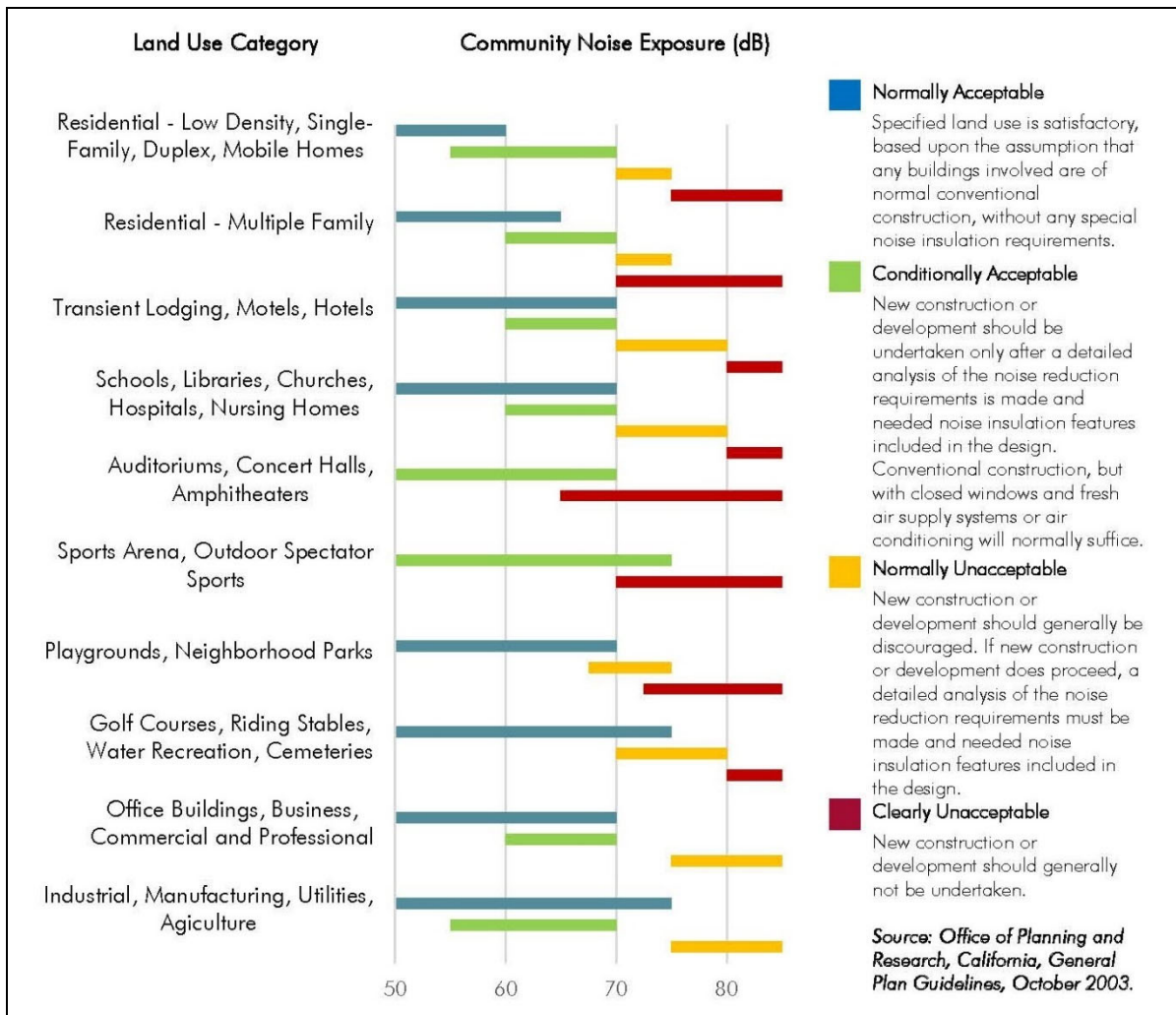
PPV = peak particle velocity

Local Regulations

City of Yorba Linda

General Plan Noise Element. The City's General Plan Noise Element (City of Yorba Linda 2016) has established criteria for noise compatible land uses and has goals and policies to meet the City's noise-related goals. The noise criteria for land use compatibility are summarized in Table E. As shown in Table E, office and commercial land uses exposed to noise levels of 50 dBA CNEL to 70 dBA CNEL are considered "Normally Acceptable" and noise levels of 60 dBA CNEL to 70 dBA CNEL are considered "Conditionally Acceptable." Applicable goals and policies for the development project are listed below:

Table E: Land Use Compatibility for Community Noise Environments



Source: General Plan Noise Element (City of Yorba Linda 2016).

Goal N-1: Indoor and outdoor living areas that are adequately protected from excessive transportation noise impacts.

- **Policy N-1.1:** Ensure existing transportation noise sources comply with the City's noise ordinance.
- **Policy N-1.2:** Consider appropriate technologies to mitigate excessive noise levels where necessary or where feasible.
- **Policy N-1.3:** Ensure noise mitigation measures are clearly articulated and implemented prior to the approval of new roadway projects.

- **Policy N-1.4:** Ensure potentially excessive noise generators provide for the highest feasible level of noise mitigation and compliance with local, state, and federal noise standards.

Goal N-2: Noise and land use compatibility.

- **Policy N-2.1:** Ensure compliance with the City's established noise thresholds for various land uses.
- **Policy N-2.2:** Ensure compliance with the City's established noise thresholds for noise sensitive receptors, land uses, and activities.

Municipal Code. Section 8.32.090(D) of the City's Municipal Code (City of Yorba Linda 2023) prohibits noise sources associated with construction, repair, remodeling, or grading of any real property between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday.

EXISTING SETTING

The primary existing noise sources in the project area are transportation facilities. Traffic on Yorba Linda Boulevard, Imperial Highway, and Lakeview Avenue are a steady source of ambient noise in the project vicinity. Land uses located adjacent to the intersections of Yorba Linda Boulevard and Imperial Highway and Yorba Linda Boulevard and Lakeview Avenue include commercial uses.

Ambient Noise Measurements

Two long-term (24-hour) noise level measurements (LT-1 and LT-2) were conducted on January 10, 2024, using Larson Davis Spark 706RC dosimeters to document the existing noise environment within the project limits. Table F summarizes the results of the long-term noise level measurements along with a description of the measurement locations and noise sources that occurred during the measurements. As shown in Table F, the calculated CNEL levels at LT-1 and LT-2 were 68.5 dBA and 68.8 dBA, respectively. In addition, the daytime noise levels ranged from 65.0 to 68.3 dBA L_{eq} , evening noise levels ranged from 62.7 to 64.8 dBA L_{eq} , and nighttime average noise levels ranged from 49.4 to 66.8 L_{eq} . Also, the daytime maximum instantaneous noise levels ranged from 78.2 to 96.0 dBA, evening maximum instantaneous noise levels ranged from 78.2 to 83.7 dBA, and the nighttime maximum instantaneous noise levels ranged from 67.4 to 89.7 dBA. The long-term noise level measurement survey sheets along with the hourly L_{eq} , L_{max} , and L_{min} results are provided in Attachment C. Figure 3 shows the long-term monitoring locations.

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 project limits are Fullerton Municipal Airport (FMA), which is 9.2 miles to the west. The project limits are outside the 60 dBA CNEL noise contour of FMA based on the FMA Airport Impact Zones and Noise Contours map in the Airport Environs Land Use Plan for Fullerton Municipal Airport (OCALUC 2019). In addition, the project limits are not located in the vicinity of a private airstrip. The proposed project is a transportation project and would not involve the introduction of residential or employment uses in the project area. Therefore, the project would not expose people residing or

working in the project vicinity to aviation-related excessive noise levels, and this topic is not further discussed.

Table F: Long-Term Ambient Noise Level Measurements

Monitoring No.	Location Description	Noise Levels (dBA)							Noise Sources
		Daytime ¹		Evening ²		Nighttime ³		CNEL	
		L _{eq}	L _{max}	L _{eq}	L _{max}	L _{eq}	L _{max}		
LT-1	18461 Yorba Linda Boulevard, Yorba Linda, CA. Center of a parking lot on a light pole just west of a vacant lot.	66.5–68.3	79.2–93.2	63.6–64.8	78.7–83.7	49.6–64.6	68.2–80.0	68.5	Traffic on Yorba Linda Boulevard, Lakeview Avenue, and Imperial Highway
LT-2	18452 Yorba Linda Boulevard, Yorba Linda, CA. Center of a parking lot on a tree just west of a tutoring center.	65.0–67.6	78.2–96.0	62.7–63.9	78.2–83.7	49.4–66.8	67.4–89.7	68.8	Traffic on Yorba Linda Boulevard, Lakeview Avenue, and Imperial Highway

Source: Compiled by LSA (2024).

¹ Daytime = Hours between 7:00 a.m. and 7:00 p.m.

² Evening = Hours between 7:00 p.m. and 10:00 p.m.

³ Nighttime = Hours between 10:00 p.m. and 7:00 a.m.

CNEL = Community Noise Equivalent Level

dBA = A-weighted decibel(s)

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

Existing Traffic Noise

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used to evaluate existing traffic-related noise conditions in the vicinity of the project limits. 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 were obtained from the *Yorba Linda Widening Traffic Impact Study* (WGZE 2024). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Table G shows the existing traffic noise levels along Yorba Linda Boulevard in the project vicinity. These noise levels represent worst-case scenarios, which assume that no shielding is provided between the traffic and the location where the noise contours are drawn. The specific assumptions used in developing these noise levels and the model printouts are provided in Attachment D.

Table G: Existing Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Roadway Centerline
Yorba Linda Boulevard West of Imperial Highway	20,080	< 50	103	212	69.7
Yorba Linda Boulevard Between Imperial Highway and Lakeview Avenue	26,640	71	126	256	72.3
Yorba Linda Boulevard East of Lakeview Avenue	28,170	65	126	264	71.7

Source: Compiled by LSA (2024).

Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.

ADT = average daily traffic

dBA = A-weighted decibels

CNEL = Community Noise Equivalent Level

ft = feet

IMPACT ANALYSIS

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 limits and would incrementally raise noise levels on roadways 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 ft would generate up to a maximum of 84 dBA), the effect on longer-term ambient noise levels would be small because the daily construction-related vehicle trips are small when compared to the existing daily traffic volume on Yorba Linda Boulevard. The grubbing and land clearing phase would generate the most trips out of all of the construction phases, at 777 trips per day based on the California Emissions Estimator Model (CalEEMod, Version 2022.1) in Attachment B of the *Air Quality Technical Memorandum for the Yorba Linda Boulevard Improvements Project* (LSA 2024). Based on the *Yorba Linda Widening Traffic Impact Study* (WGZE 2024), Yorba Linda Boulevard has an estimated existing ADT volume of 20,080 near the project limits. Based on the information above, construction-related traffic would increase noise 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 short-term construction-related impacts associated with worker commutes and transport of construction equipment and material to the project limits 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 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 H lists the L_{max} recommended for noise impact assessments for typical construction equipment included in the

FHWA Highway Construction Noise Handbook (2006), based on a distance of 50 ft between the equipment and a noise receptor.

Table H: 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
Man Lift (Forklift)	20	85
Front-End Loader	40	80
Generator	50	82
Generator (<25KVA, VMS signs)	50	70
Grader	40	85
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/Torch	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

FHWA = Federal Highway Administration

L_{max} = maximum instantaneous noise level

The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery, such as backfillers, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation, followed by 3 or 4 minutes at lower power settings.

Construction of the proposed project is expected to require on-site use of bulldozers, front-end loaders, and water/pickup trucks. Noise associated with the use of construction equipment is estimated to be between 55 and 85 dBA L_{max} at a distance of 50 ft from the active construction area during grading/excavation. As shown in Table H, the maximum noise level generated by each

bulldozer is assumed to be approximately 85 dBA L_{max} at 50 ft from the bulldozer. Each front-end loader would generate approximately 80 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks/pickup trucks is approximately 55 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound source 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 86 dBA L_{max} at a distance of 50 ft 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 82 dBA L_{eq} at a distance of 50 ft from the active construction area.

The closest residence is located within 50 ft of the project construction area. Therefore, these receptor locations may be subject to short-term noise reaching 86 dBA L_{max} (82 dBA L_{eq}) or higher generated by construction activities in the project area. Although the noise generated by project construction activities would be higher than the ambient noise levels and would result in a temporary increase in the ambient noise levels, construction noise would stop once project construction is completed. Construction activities shall be limited to between the hours of 7:00 a.m. and 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday pursuant to Section 8.32.090(d) of the City's Municipal Code. The implementation of construction hour limits would minimize construction noise. Therefore, noise generated from project construction activities would be less than significant. No mitigation measures are required.

Short-Term Construction Vibration Impacts

Vibration generated by construction equipment can result in varying degrees of ground vibration, depending on the equipment. The operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings on soil near an active construction area respond to these vibrations, which range from imperceptible to low rumbling sounds with perceptible vibrations and slight damage at the highest vibration levels. Typically, construction-related vibration does not reach vibration levels that would result in damage to nearby structures.

The Caltrans Transportation and Construction Vibration Guidance Manual (Caltrans 2020) shows that the vibration damage threshold for continuous/frequent intermittent sources is 0.25 PPV (in/sec) for historic and old buildings. The manual shows the vibration annoyance potential criteria to be barely perceptible at 0.01 PPV (in/sec), distinctly perceptible at 0.04 PPV (in/sec), and strongly perceptible at 0.10 PPV (in/sec) for continuous/frequent intermittent sources. These thresholds were used to evaluate the potential for short-term construction-related ground-borne vibration during construction of the proposed project.

Table I shows the reference vibration levels at a distance of 25 ft for each type of standard construction equipment from the Transportation and Construction Vibration Guidance Manual (Caltrans 2020). Project construction is expected to require the use of large bulldozers and loaded trucks, which would generate ground-borne vibration levels of up to 0.089 PPV (in/sec) and 0.076 PPV (in/sec), respectively, when measured at 25 ft.

The formula for vibration transmission is provided below:

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

Table I: Vibration Source Amplitudes for Construction Equipment

Equipment	Reference PPV (in/sec) at 25 ft
Vibratory roller	0.210
Large bulldozer¹	0.089
Caisson drilling	0.089
Loaded trucks¹	0.076
Jackhammer	0.035
Small bulldozer	0.003

Source: Transportation and Construction Vibration Guidance Manual (Caltrans 2020).

¹ The equipment shown in **bold** is expected to be used on site.

ft = foot/feet

PPV = peak particle velocity

in/sec = inches per second

Bulldozers and trucks used for construction of the proposed project would generate the highest ground-borne vibration levels. Based on the Caltrans Transportation and Construction Vibration Guidance Manual, a large bulldozer and loaded trucks would generate vibration levels of 0.089 PPV (in/sec) and 0.076 PPV (in/sec), respectively, when measured at 25 ft. The closest building structure is a commercial building approximately 15 ft from the project construction boundary and would experience vibration levels of up to 0.191 PPV (in/sec). Although this vibration level would be strongly perceptible, vibration levels would not exceed the damage threshold of 0.3 PPV (in/sec) because the condition of the commercial building would be equivalent to or better than older residential structures. Therefore, short-term construction impacts related to ground-borne vibration or ground-borne noise would be less than significant. No mitigation measures are required.

Long-Term Traffic Noise Impacts

The FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77 108) (FHWA 1977) was used to evaluate traffic-related noise conditions along Yorba Linda Boulevard. 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 (2023) and future (2025) ADT volumes were obtained from the *Yorba Linda Widening Traffic Impact Study* (WGZE 2024). The standard vehicle mix for Southern California roadways was used for traffic on these roadway segments. Tables J and K show the existing (2023) and future (2025) traffic noise Selevels without and with the project, respectively. These noise levels represent the worst-case scenario, which assumes that no shielding is provided between traffic and the location where the noise contours are drawn. The specific assumptions used in developing these noise levels and the model printouts are provided in Attachment D.

As shown in Tables J and K, the project-related traffic noise on Yorba Linda Boulevard would increase by up to 0.4 dBA. Noise level increases below 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 mitigation measures are required.

Table J: Existing (2023) Traffic Noise Levels Without and With Project

Roadway Segment	Without Project Traffic Conditions					With Project Traffic Conditions					
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Roadway Centerline	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Roadway Centerline	Increase from Without Project Conditions
Yorba Linda Boulevard West of Imperial Highway	20,080	< 50	103	212	69.7	20,080	< 50	106	213	69.9	0.2
Yorba Linda Boulevard Between Imperial Highway and Lakeview Avenue	26,640	71	126	256	72.3	26,640	73	127	257	72.5	0.2
Yorba Linda Boulevard East of Lakeview Avenue	28,170	65	126	264	71.7	28,170	69	128	265	72.1	0.4

Source: Compiled by LSA (2024).

Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.

ADT = average daily traffic

CNEL = Community Noise Equivalent Level

dBA = A-weighted decibels

ft = foot/feet

Table K: Future (2025) Traffic Noise Levels Without and With Project

Roadway Segment	Without Project Traffic Conditions					With Project Traffic Conditions					
	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Roadway Centerline	ADT	Centerline to 70 dBA CNEL (ft)	Centerline to 65 dBA CNEL (ft)	Centerline to 60 dBA CNEL (ft)	CNEL (dBA) 50 ft from Roadway Centerline	Increase from Without Project Conditions
Yorba Linda Boulevard West of Imperial Highway	20,470	< 50	104	214	69.8	20,470	< 50	108	216	70.0	0.2
Yorba Linda Boulevard Between Imperial Highway and Lakeview Avenue	27,175	72	127	260	72.4	27,175	74	128	260	72.5	0.1
Yorba Linda Boulevard East of Lakeview Avenue	28,730	66	128	267	71.8	28,730	69	129	268	72.1	0.3

Source: Compiled by LSA (2024).

Note: Traffic noise within 50 ft of the roadway centerline should be evaluated with site-specific information.

ADT = average daily traffic

CNEL = Community Noise Equivalent Level

dBA = A-weighted decibels

ft = foot/feet

Long-Term Vibration Impacts

Roads with smooth surface are not typically major sources of ground-borne noise or vibration. Ground-borne vibration is mostly associated with passenger vehicles and trucks traveling on roads with poor conditions, such as potholes, bumps, expansion joints, or other discontinuities in the road surface. Passenger vehicles and trucks would cause effects such as rattling of windows, and the source is almost always airborne noise. The proposed project would include new asphalt pavement with proper maintenance. As a result, there would be no potholes, bumps, or other discontinuities in the road surface that would generate ground-borne vibration or noise impacts from vehicular traffic traveling on Yorba Linda Boulevard within the project limits. Therefore, ground-borne vibration and noise impacts generated by vehicles traveling on Yorba Linda Boulevard within the project limits would be less than significant. No mitigation measures are required.

Attachments: A: References
 B: Figures
 C: Noise Survey Sheets
 D: FHWA Traffic Noise Model Printouts

ATTACHMENT A

REFERENCES

- Caltrans. 2020. Transportation and Construction Vibration Guidance Manual. April. Website: <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf> (accessed February 2024).
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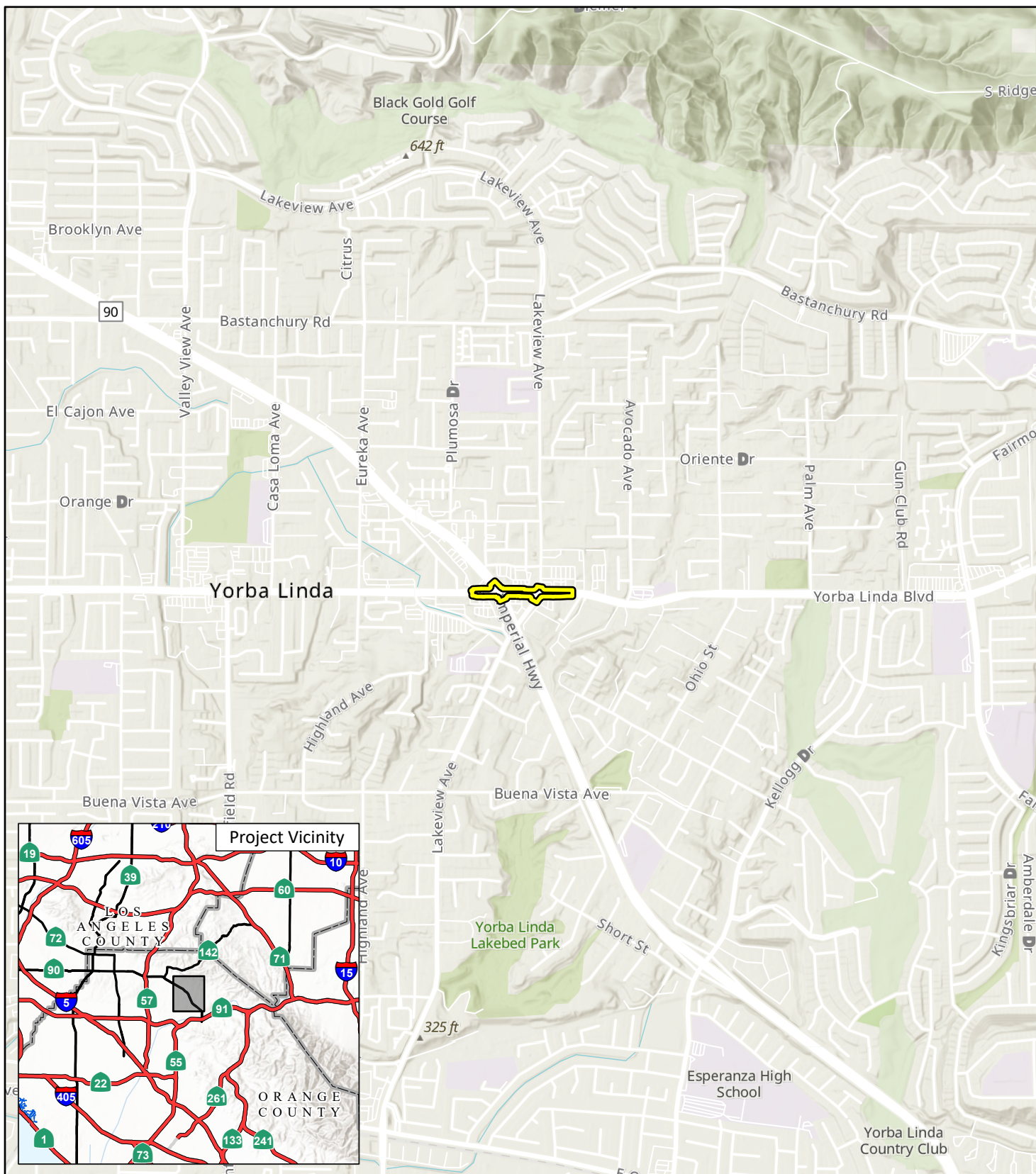
ATTACHMENT B

FIGURES

Figure 1: Project Location and Vicinity

Figure 2: Project Improvements

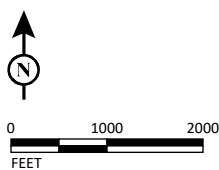
Figure 3: Noise Monitoring Locations



LSA

 Project Location

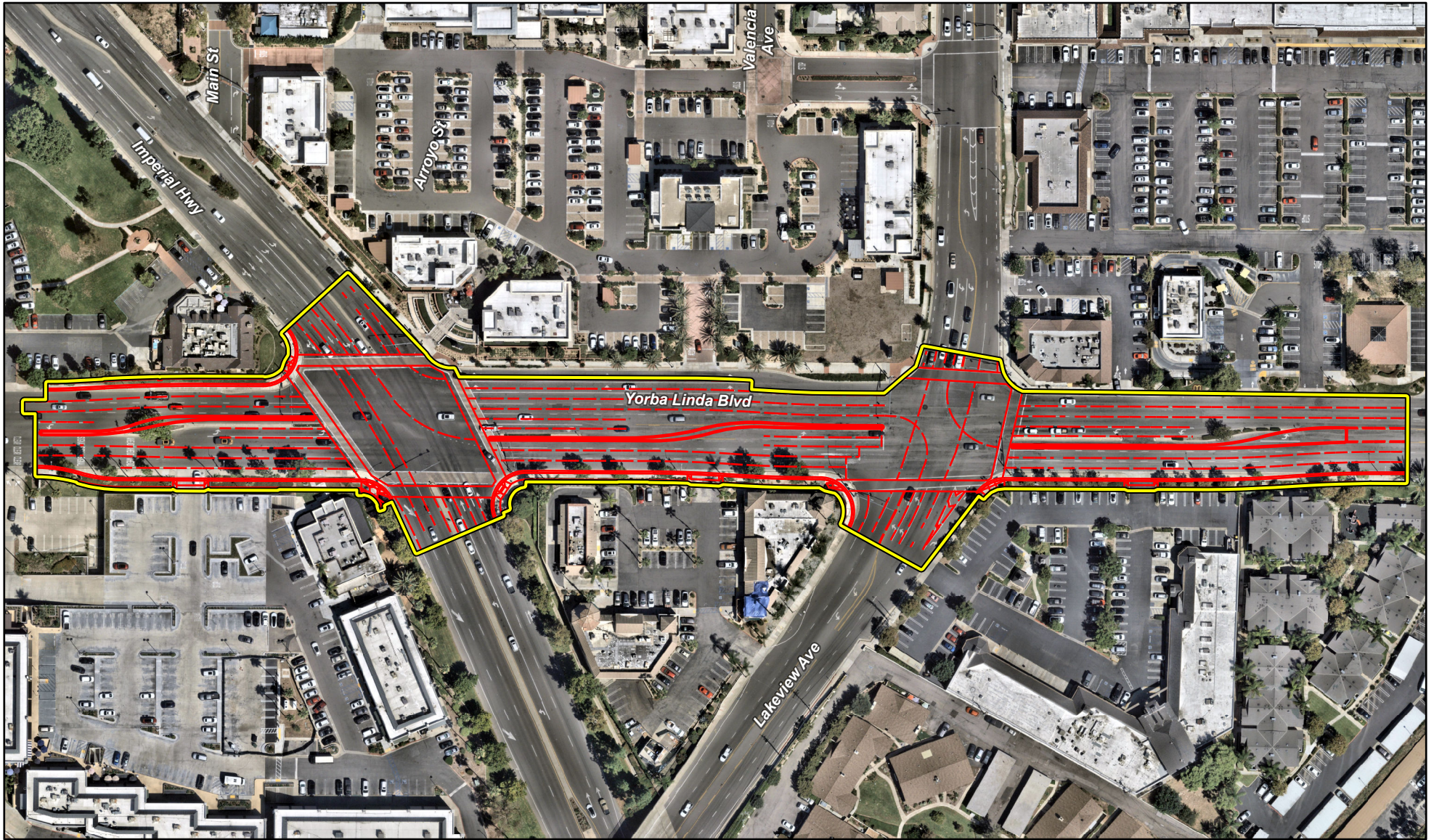
FIGURE 1



SOURCE: Esri Topographic 2024

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Yorba Linda Boulevard Improvements Project
Project Location and Vicinity



LSA

- Project Boundary
- Project Improvements



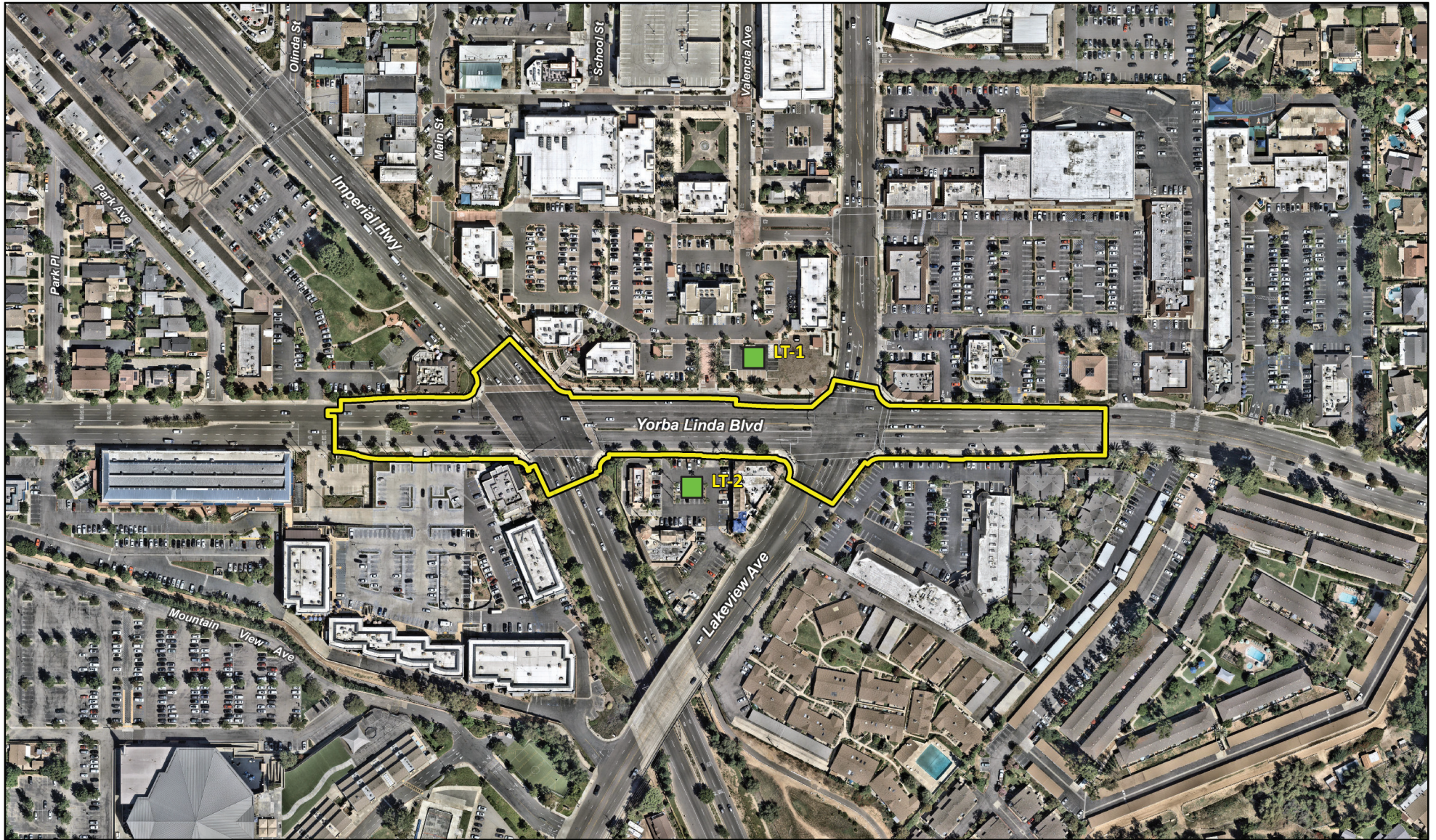
0 75 150
FEET

FIGURE 2

Yorba Linda Boulevard Improvements Project
Project Improvements

SOURCE: Nearmap Aerial Imagery (September 8, 2023); BKF (10/2023)

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LSA

LEGEND

- Project Location
- LT-1 Long-term Monitoring Locations



0 130 260
FEET

SOURCE: Nearmap Aerial Imagery (September 8, 2023)

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FIGURE 3

Yorba Linda Boulevard Improvements Project
Noise Monitoring Locations

ATTACHMENT C

NOISE SURVEY SHEETS

Noise Measurement Survey – 24 HR

Project Number: 20231457

Test Personnel: Kevin Nguyendo

Project Name: Yorba Linda Blvd

Equipment: Spark 706RC (SN:119)

Site Number: LT-1 Date: 1/10/24

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

Site Location: 18461 Yorba Linda Boulevard, Yorba Linda, CA. Center of a parking lot on a light pole.

Primary Noise Sources: Traffic on Lakeview Avenue, Yorba Linda Boulevard, and Imperial Highway.

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	1/10/24	68.3	85.8	57.1
1:00 PM	1/10/24	66.8	86.1	56.0
2:00 PM	1/10/24	67.5	91.6	56.6
3:00 PM	1/10/24	67.6	87.4	58.1
4:00 PM	1/10/24	67.1	81.3	59.0
5:00 PM	1/10/24	67.6	87.5	57.3
6:00 PM	1/10/24	66.9	87.8	55.9
7:00 PM	1/10/24	64.8	78.7	53.6
8:00 PM	1/10/24	64.5	83.7	54.4
9:00 PM	1/10/24	63.6	80.9	50.5
10:00 PM	1/10/24	60.7	78.3	45.8
11:00 PM	1/10/24	57.6	71.3	42.1
12:00 AM	1/11/24	55.7	71.6	40.6
1:00 AM	1/11/24	53.6	72.4	40.3
2:00 AM	1/11/24	49.6	68.2	40.3
3:00 AM	1/11/24	54.0	72.4	41.8
4:00 AM	1/11/24	58.0	73.4	44.4
5:00 AM	1/11/24	62.0	75.2	45.3
6:00 AM	1/11/24	64.6	80.0	52.4
7:00 AM	1/11/24	67.3	81.1	53.2
8:00 AM	1/11/24	67.3	79.2	56.2
9:00 AM	1/11/24	67.9	93.2	51.8
10:00 AM	1/11/24	66.7	88.7	54.3
11:00 AM	1/11/24	66.5	81.9	55.0

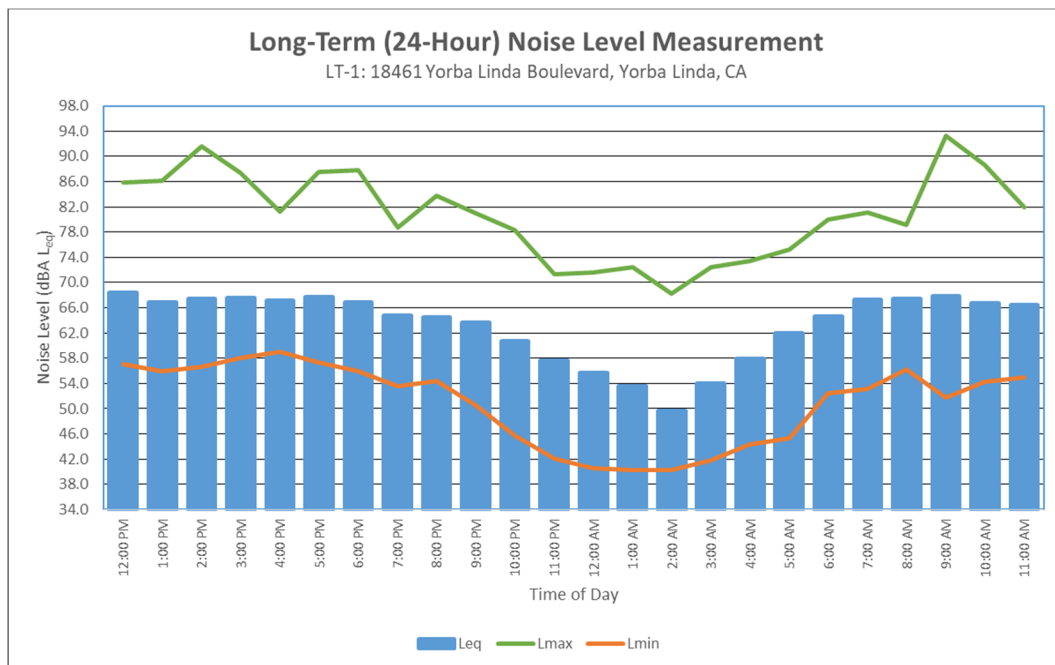
Source: Compiled by LSA. (2024).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



Noise Measurement Survey – 24 HR

Project Number: 20231457
Project Name: Yorba Linda

Test Personnel: Kevin Nguyendo
Equipment: Spark 706RC (SN:908)

Site Number: LT-2 Date: 1/10/24

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

Site Location: 18452 Yorba Linda Boulevard, Yorba Linda, CA. Center of a parking lot on a tree.

Primary Noise Sources: Traffic on Lakeview Avenue, Yorba Linda Boulevard, and Imperial Highway.

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	1/10/24	66.2	80.8	55.6
1:00 PM	1/10/24	65.0	80.6	54.8
2:00 PM	1/10/24	67.6	96.0	54.5
3:00 PM	1/10/24	66.5	82.5	57.7
4:00 PM	1/10/24	66.3	83.9	55.4
5:00 PM	1/10/24	67.6	92.4	56.7
6:00 PM	1/10/24	66.3	91.9	54.2
7:00 PM	1/10/24	63.9	83.7	53.6
8:00 PM	1/10/24	63.2	78.4	53.5
9:00 PM	1/10/24	62.7	78.2	50.2
10:00 PM	1/10/24	63.1	82.1	44.7
11:00 PM	1/10/24	57.1	74.9	41.3
12:00 AM	1/11/24	55.7	79.3	40.7
1:00 AM	1/11/24	52.7	69.8	41.0
2:00 AM	1/11/24	49.4	67.4	41.5
3:00 AM	1/11/24	53.5	75.1	42.3
4:00 AM	1/11/24	57.5	77.5	44.5
5:00 AM	1/11/24	62.5	79.5	45.2
6:00 AM	1/11/24	66.8	89.7	52.1
7:00 AM	1/11/24	66.3	80.2	51.9
8:00 AM	1/11/24	66.4	78.2	55.5
9:00 AM	1/11/24	66.8	91.1	53.0
10:00 AM	1/11/24	66.4	84.9	52.3
11:00 AM	1/11/24	66.3	82.7	54.1

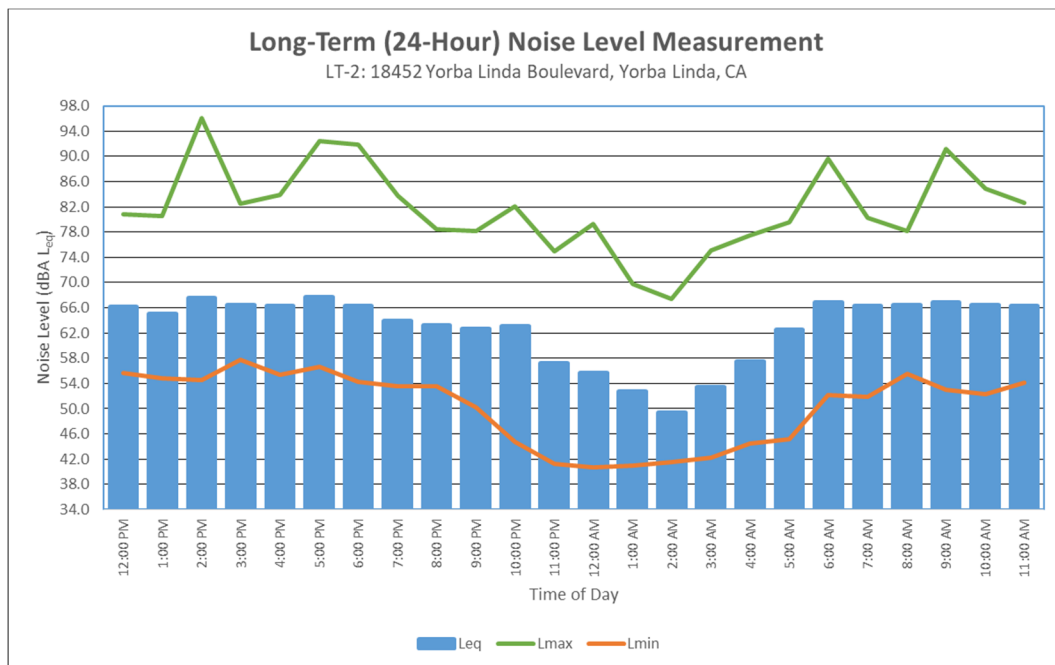
Source: Compiled by LSA Associates, Inc. (2024).

dBA = A-weighted decibel

L_{eq} = equivalent continuous sound level

L_{max} = maximum instantaneous noise level

L_{min} = minimum measured sound level



ATTACHMENT D

FHWA TRAFFIC NOISE MODEL PRINTOUTS

TABLE Existing-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard West of Imperial Highway

NOTES: Yorba Linda Boulevard Improvements - Existing

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20080 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): 34 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.53

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
0.0	102.8	211.8	451.7

TABLE Existing-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard Between Imperial Highway and
Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Existing

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 26640 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): 46 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.14

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
71.2	125.8	256.3	545.1

TABLE Existing-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard East of Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Existing

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 28170 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): 33 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.05

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
65.4	126.0	264.1	565.3

TABLE Existing Plus Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard West of Imperial Highway

NOTES: Yorba Linda Boulevard Improvements - Existing Plus Project

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20080 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): 44 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
0.0	106.5	213.5	452.2

TABLE Existing Plus Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard Between Imperial Highway and
Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Existing Plus Project

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 26640 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): 49 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
73.2	126.9	256.8	545.2

TABLE Existing Plus Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard East of Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Existing Plus Project

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 28170 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): 39 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.73

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
68.6	127.7	264.7	565.4

TABLE Future-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard West of Imperial Highway

NOTES: Yorba Linda Boulevard Improvements - Future

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20470 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): 34 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.61

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
0.0	104.0	214.5	457.5

TABLE Future-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard Between Imperial Highway and
Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Future

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 27175 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): 46 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.23

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
71.7	127.2	259.6	552.3

TABLE Future-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard East of Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Future

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 28730 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): 33 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.14

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
66.0	127.6	267.5	572.7

TABLE Future Plus Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard West of Imperial Highway

NOTES: Yorba Linda Boulevard Improvements - Future Plus Project

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20470 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): 44 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
0.0	107.6	216.1	457.9

TABLE Future Plus Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard Between Imperial Highway and
Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Future Plus Project

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 27175 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): 49 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
73.7	128.3	260.1	552.4

TABLE Future Plus Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 02/02/2024

ROADWAY SEGMENT: Yorba Linda Boulevard East of Lakeview Avenue

NOTES: Yorba Linda Boulevard Improvements - Future Plus Project

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 28730 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): 39 SITE CHARACTERISTICS: SOFT

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 67.81

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
-----	-----	-----	-----
69.2	129.2	268.2	572.8