Noise & Vibration Study
Towne Center Canyon Lake Specific Plan
City of Canyon Lake

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1.0 INTRODUCTION

The Town Center Specific Plan (project) is being proposed within Canyon Lake along Railroad Canyon Road across from Canyon Lake Drive. This project consists of eight (8) Planning Areas to support various land uses that will provide greater fiscal opportunities and improve the attributes of the existing center to generate more local interest. The project has the potential to generate changes in the existing noise environment. Under the California Environmental Quality Act (CEQA), projects of this type must undergo an environmental review to assess potential impacts. The following noise analysis has been prepared to support the project's environmental review process and demonstrate consistency with all applicable federal, state, and local noise regulations.

The following noise study describes the project, provides information regarding noise fundamentals, describes the applicable federal, state, and local noise guidelines, characterizes the existing noise environment, provides the study methods and procedures used to evaluate off-site traffic noise impacts, presents stationary-related noise impacts and construction noise impacts near sensitive residential communities.

1.1 Project Location and Site Description

The Towne Center Specific Plan ("TCSP" or "project") is located in the City of Canyon Lake, Riverside County, California, as reflected in **Figure 1.** Canyon Lake lies between two major north-south interstates, located approximately 2.5 miles east of Interstate-15 (I-15)and five miles west of Interstate 215 (I-215), linking Canyon Lake to northern Riverside County and San Diego County.

The Project is situated on the south side of Railroad Canyon Road, just off the main southern entrance gate and just north of the golf course. The City of Canyon Lake's General Plan identifies the site as having a general plan land use designation of Mixed Use (MXU) and a zoning designation of General Commercial (C-1).

The surrounding land uses include primarily residential land uses. The existing Towne Center is surrounded by a golf course on three sides and Railroad Canyon Road on the north side. Residential development then surrounds the golf course.

The existing site is fully developed with a shopping center. Existing Land uses include offices, retail, civic offices, a post office, and a hotel. **Figure 2** shows the general layout of the existing Towne Center shopping center with generally 17 separate stand-alone buildings. Each building has various property ownership.

1.2 Project Description

The Project is a Specific Plan. The proposed specific plan document would provide the basic framework, design, and implementing guidelines to allow residential mixed-use development within the City of Canyon Lake's existing Towne Center. The City is also seeking a distribution of land uses that will provide for greater fiscal opportunities and improve the attributes of the existing center to generate more local interest. The City owns a portion of the existing center along with as many as 40 other individual owners due to the existing subdivision pattern. As of early 2021, there are a total of 127 tenants using the shopping center. The Center is currently comprised of a variety of service, retail, restaurant, hotel office, and public facility uses.

The Towne Center Specific Plan (TCSP or Project) will direct future developers to meet City's vision and goals for the Center, including requirements related to City's housing element update. The TCSP will provide various land-use types allowing for residential, open space, business/service, and public facility-related uses.

With respect to residential land uses, the TCSP will provide guidelines for multi-family housing and mixed-use commercial design with opportunities to develop both affordable and age-restricted housing to help retain current Canyon Lake residents. Concerning non-residential land uses, the TCSP promotes the retention of the existing businesses, many of which will need to remain as allowable and provide opportunities for new uses.

Table 1-1 can be viewed in conjunction with Figure 3. This Table depicts how some of the existing buildings at the Towne Center may be re-developed and utilized under the Towne Center Specific Plan to accommodate mixed-use residential. As depicted in Figure 2, Residential Sites A through D are proposed to accommodate future residential uses. Not all of the buildings in the Towne Center are proposed to be affected by the Specific Plan. The following table helps to establish the baseline condition and represents anticipated future development assumptions for environmental analysis. It is expected that the current tenants/occupants and uses of the existing buildings will remain commercial/office in nature.

Table 1.1 Existing/Proposed Use Matrix

Planning Area	Existing Buildings	Existing Use	Proposed New Uses	Proposed Structure
1	Building 8	Hotel	**Residential Site D** *15 units (15 du/ac)*	Two Levels[1] – 2 Levels Residential
2	Building 7	Varies	**Residential Site B** *46 units (44.7 du/ac)* **Commercial Retail** *6,000 Square Feet*	Five Levels – 1 Level Commercial Retail – 4 Levels Residential
	Building 9	Varies	Per SP allowable uses	No Change
3	Buildings 10-13	Varies	Per SP allowable uses	No Change
	Buildings 14-15	Canyon Lake Market Building	**Additional Office** *44,000 Square Feet*	Three Levels – 1 Level Commercial Retail – 2 Levels Office
4	Building 1	Office Civic	**Residential Site A** *41 units (51.25 du/ac)* **Commercial Retail** *6,500 Square Feet*	Four Levels[2] – 1 Level Commercial Retail – 3 Levels Residential
5	Building 2	Civic Office	**Residential Site C** *86 units (60.6 du/ac)* **Commercial Retail** *18,000 Square Feet*	Five Levels – 3 Levels Residential – 2 Levels Parking and Commercial Retail
6	Building 16	Edward Jones Building	**Additional Office** *9,000 Square Feet*	Two Levels

Table 1.1 Existing/Proposed Use Matrix

Planning Area	Existing Buildings	Existing Use	Proposed New Uses	Proposed Structure
	Building 17	Varies	**Public Open Space**	Removal
7	Building 6	Can Do Plaza Building	**Additional Office** *22,000 Square Feet*	Two Levels
8	Building 3	Post Office/Dominoes	**Additional Office** *28,000 Square Feet*	Two Levels
	Buildings 4-5	Varies	Per SP allowable uses	No Change

Notes:
1. A third level may be permitted to achieve desired residential density.
2. Additional levels may be permitted to achieve desired residential density

To achieve the goals and objectives of this Specific Plan, the site is divided into eight separate "Planning Areas," all to be designated as Mixed Use (MXU) as reflected in **Figure 3.** The purpose of these Planning Areas is to provide conceptual land use distributions, and intensities as the intent of this Specific Plan is to provide general guidance for each Planning Area to help shape future re-development. **Table 1-1** identifies the uses and intensities allowable for the Specific Plan as a whole.

Although a conceptual site plan has been prepared for illustrative purposes to identify how each planning area may re-develop, the intended primary uses within each Planning Area may be interchanged, consistent with the objectives of this plan, allowing flexibility to future developers. Each Planning Area is described below by highlighting the conceptual primary land use(s).

Planning Area 1 – Housing
This Planning Area is currently developed with a Hotel (Building 8). Referred to as Residential Site D, this Planning Area can be re-developed per the TCSP as two levels of residential, perhaps townhomes. A third level may be permitted in order to achieve desired residential density. This Planning Area is also a preferred location to accommodate affordable housing units. It is adjacent to existing multi-family residential to the west. It includes pedestrian and enhanced pedestrian pathways, providing residents with pedestrian access to Railroad Canyon Road as well as walking paths providing connection to adjacent Planning Areas and a pedestrian node at the southwest corner of the Planning Area that provides an area for rest or other amenities while enjoying views of to the existing golf course.

Planning Area 2 – Commercial Retail and Housing
This Planning Area is currently developed (Buildings 7 and 9). Referred to as Residential Site B, this Planning Area contains one of the two vehicular access points into the Towne Center. It has the potential to re-develop Building 7 per the TCSP as a five-level structure providing one level of commercial retail and four levels of residential. This Planning Area is also a preferred location to accommodate affordable housing. It includes pedestrian and enhanced pedestrian pathways providing residents and visitors access to Railroad Canyon Road, adjacent Planning Areas, and pedestrian nodes at the southwestern portions of the Planning Area that may provide areas for rest or other amenities to enjoy the views of the existing golf course. This Planning Area

also affords the opportunity to provide for small patio and plaza areas.

Planning Area 3 – Commercial Retail and Office

This Planning Area is currently being developed (Buildings 10 – 15). It has the potential to re-develop Buildings 14 and 15 per the TCSP (referred to as the Canyon Lake Market Building) as a three-level structure providing one level of commercial retail and two levels of office. This Planning Area includes pedestrian and enhanced pedestrian pathways to promote pedestrian accessibility to adjacent Planning Areas and access to Railroad Canyon Road. This Planning Area contains one of the two vehicular access points into the Towne Center and could provide an enhanced golf cart along Railroad Canyon Road.

Planning Area 4 – Commercial Retail and Housing

This Planning Area is currently developed (Building 1), which houses the City's current civic center and office uses. Referred to as Residential Site A, this Planning Area provides one of the two vehicular access points into the Towne Center. It affords high visibility to the community from Railroad Canyon Road. This allows for the opportunity to re-develop the existing building per the TCSP as a vertical mixed-use four-level structure providing for one level of commercial retail and three levels of residential. Additional levels may be permitted to allow for desired residential density. Because this Planning Area is adjacent to the golf course, it provides the opportunity to capture views of the course and allows for the development of a plaza area. Pedestrian and enhanced pedestrian pathways provide residents and visitors access to Railroad Canyon Road, adjacent Planning Areas, and pedestrian nodes situated along the eastern perimeter of the Planning Area that may provide areas for rest or other amenities, to enjoy views of the existing golf course.

Planning Area 5 – Commercial Retail and Housing

This Planning Area is currently developed (Building 2); currently supporting both civic and office uses. Referred to as Residential Site C, this Planning Area has to the potential to re-develop per the TCSP as a five level structure providing two level of commercial-retail and parking along with three levels of residential. Because this Planning Area is adjacent to the golf course it provides the opportunity to capture views of the course, allowing for development of plazas and patios. Pedestrian and enhanced pedestrian pathways provide residents and visitors access to adjacent Planning Areas and pedestrian nodes situated along the eastern and southern perimeter of the Planning Area that may provide areas for rest or other amenities, to enjoy views of the existing golf course.

Planning Area 6 – Civic Uses and Public Plaza

This Planning Area is currently developed (Buildings16 and 17); currently supporting both civic and office uses and includes the Veteran's Memorial. This Planning Area has to the potential to re-develop Building 16 per the TCSP, known as the Edward Jones Building, as a two level structure giving the City's two levels of civic uses placed at the heart of the Towne Center. Building 17 may be removed allowing for a large open space public gathering area. Pedestrian and enhanced pedestrian pathways providing linkage to adjacent planning areas.

Planning Area 7 – Commercial Retail and Office

This Planning Area is currently developed (Building 6). This Building, known as the Can Do Plaza Building has the potential to re-develop per the TCSP as a two level structure providing two levels of retail and office uses and allows for development of small plazas and patios. Pedestrian and enhanced pedestrian pathways provide access to neighboring planning areas and pedestrian nodes situated along the eastern and southern perimeter of the Planning Area that may provide areas for rest or other amenities, to enjoy views of the existing golf course.

Planning Area 8 – Commercial Retail and Office

This Planning Area is currently developed (Buildings 3 thru 5); providing both commercial retail and office

uses. This Planning Area has to the potential to re-develop Building 3 per the TCSP as a two level structure providing two levels of office uses and allows for development of a small plaza. Enhanced pedestrian pathways providing access to neighboring planning areas.

FIGURE 1, REGIONAL MAP

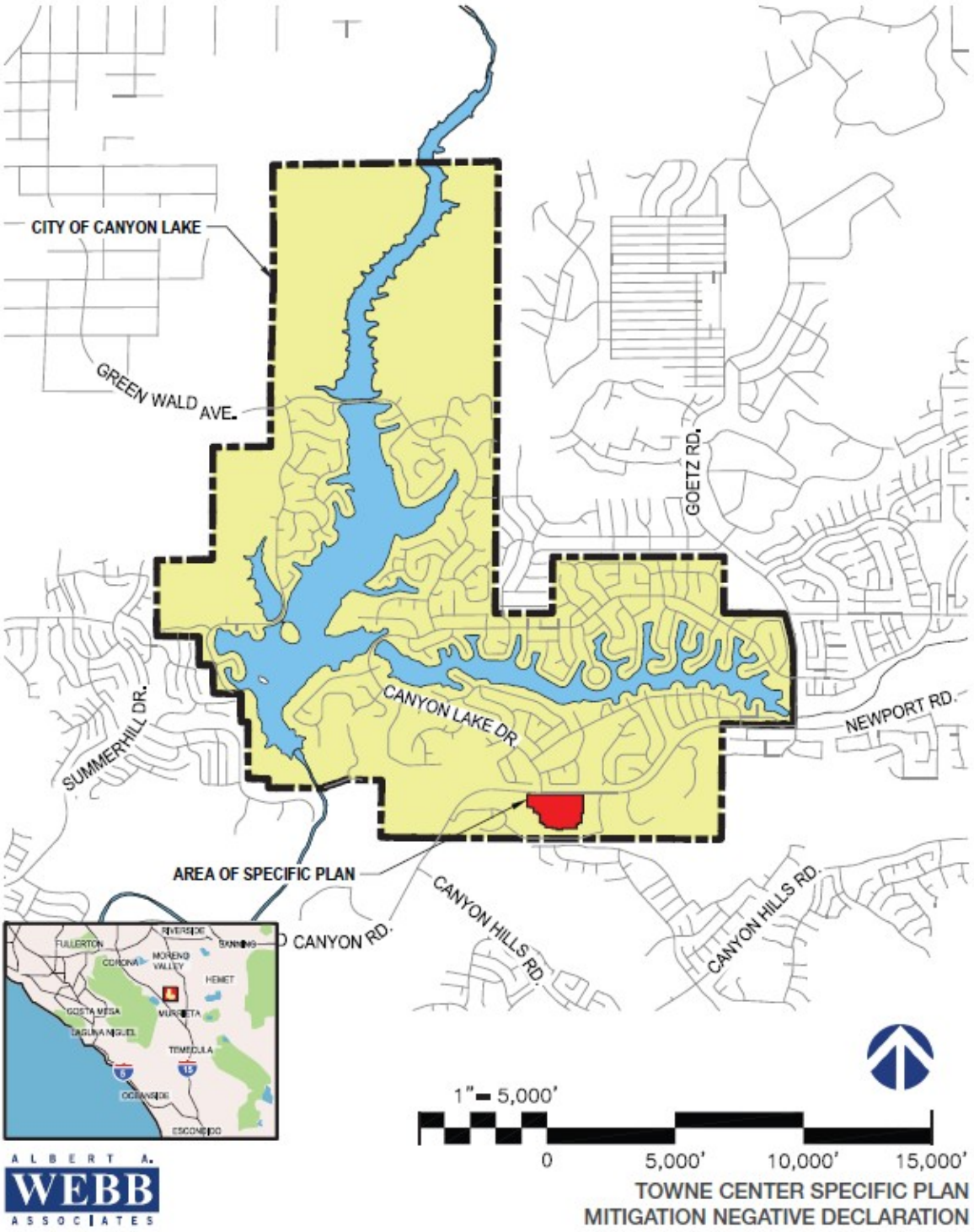

FIGURE 2, EXISTING SITE PLAN

FIGURE 3, LAND USE PLAN

LEGEND

- (#) PLANNING AREA NUMBER
- PROJECT AREA BOUNDARY
- PLANNING AREA BOUNDARY
- MIXED USE (MXU)

1" = 300'

300 0 300 600 900

ALBERT A. WEBB ASSOCIATES

TOWNE CENTER SPECIFIC PLAN
MITIGATION NEGATIVE DECLARATION

2.0 FUNDAMENTALS OF SOUND

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted or excessive sound, which can vary in intensity by over one million times within the range of human hearing; therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound intensity. Community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. As such, background noise level changes throughout a typical day, corresponding with the addition and subtraction of distant noise sources such as traffic and single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), are readily identifiable to the individual.

Because the noise environment is continually changing, average noise over a period of time is generally used to describe the community noise environment, which requires the measurement of noise over a period of time to accurately characterize a community noise environment. This time-varying characteristic of environmental noise is described using various noise descriptors, which are defined below:

L_{eq}: The L_{eq}, or equivalent sound level, is used to describe noise over a specified period of time in terms of a single numerical value; the L_{eq} of a time-varying signal and that of a steady signal are the same if they deliver the same acoustic energy over a given time. The L_{eq} may also be referred to as the average sound level.

L_{max}: The maximum instantaneous noise level experienced during a given period of time.

L_{min}: The minimum instantaneous noise level experienced during a given period of time.

L_x: The noise level exceeded a percentage of a specified time period. The "x" represents the percentage of time a noise level is exceeded. For instance, L_{50} and L_{90} represent the noise levels that are exceeded 50 percent and 90 percent of the time, respectively.

L_{dn}: Also termed the day-night average noise level (DNL), the L_{dn} is the average A-weighted noise level during a 24-hour day, obtained after the addition of 10 dBA to measured noise levels between the hours of 10:00 pm to 7:00 am to account for nighttime noise sensitivity.

CNEL: CNEL, or Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after the addition of 5 dBA to measured noise levels between the hours of 7:00 pm to 10:00 pm and after the addition of 10 dBA to noise levels between the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the evening and nighttime, respectively.

In addition, sound is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies.

To approximate the sensitivity of human hearing, the A-weighted decibel scale (dBA) is used. On this scale, the human range of hearing extends from approximately 3 dBA to around 140 dBA. **Table 2-1** includes examples of A-weighted noise levels from common indoor and outdoor activities.

Table 2-1. Typical A-Weighted Noise Levels

Common Outdoor Noise	Noise Level (dBA)	Common Indoor Noise
	— 110 —	Rock band (noise to some, music to others)
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	**— 70 —**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**— 60 —**	
		Large business office
Quiet urban daytime	**— 50 —**	Dishwasher in a neighboring room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing
SOURCE: Caltrans, 1998.		

Sound levels from two or more sources cannot be directly added together to determine the overall sound level using the decibel scale. Rather, the combination of two sounds at the same level yields an increase of 3 dBA. The slightest recognizable change in sound levels is approximately 1 dBA. A 3-dBA increase is generally considered perceptible, whereas a 5-dBA increase is readily perceptible. Most people judge a 10-dBA increase as an approximate doubling of the sound loudness.

Two of the primary factors that reduce levels of environmental sounds are increasing the distance between the sound source to the receiver and having intervening obstacles such as walls, buildings, or terrain features between the sound source and the receiver. Factors that act to increase the loudness of environmental sounds include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

2.1. Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance)
- Interference effects (e.g., communication, sleep, and learning interference)
- Physiological effects (e.g., startle response)
- Physical effects (e.g., hearing loss)

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects refer to interruption of daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can consist of both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse. They are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day, and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, a wide variation of tolerance to noise exists, based on an individual's past experiences with sound. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- A 3 dBA change in noise levels is considered a barely perceivable difference outside of the laboratory.
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference.
- A change in noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed.

Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

2.2. Noise Attenuation

Stationary point noise sources, including stationary, mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Noise from line sources (such as traffic noise from vehicles) attenuates at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans 2013).

Physical barriers between the noise source and the receiving property are also useful in reducing noise levels. Effective noise barriers can lower noise levels by 10 to 15dBA. Depending on site geometry, a noise barrier is more effective when placed closest to the noise source or receiver. However, there is a limitation on the effectiveness of a noise barrier. Noise barriers must block the line of sight between the receiving property and the noise source. When this occurs, a noise barrier can achieve a 5-dBA noise level reduction. This may require the noise barrier to be sufficiently long and high enough to block the view of a road to reduce traffic noise.

2.3. Fundamentals of Vibration

Vibration is energy transmitted in waves through the ground or man-made structures. These energy waves generally dissipate with distance from the vibration source. Familiar sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment. As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment (FTA 2006), ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard.

Several different methods are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure RMS. The relationship of PPV to RMS velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the RMS amplitude. Peak particle velocity is typically a factor of 1.7 to 6 times greater than RMS vibration velocity (FTA 2006). The decibel notation acts to compress the range of numbers required to describe vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive

receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and the sick), and vibration-sensitive equipment.

The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 in/sec PPV (FTA 2006).

The background vibration velocity level in residential areas is usually around 50 VdB (approximately 0.0013 in/sec PPV). This level is well below the vibration velocity threshold of perception for humans, which is approximately 65 VdB. A vibration velocity level of 75 VdB is considered the approximate dividing line between barely perceptible and distinctly perceptible levels for many people (FTA 2006).

3.0 REGULATORY FRAMEWORK

The project's governing regulatory framework within the City of Canyon Lake includes federal, state, and local noise and vibration standards. These standards are summarized below.

3.1 Federal Regulations and Standards

There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the project. With regard to noise exposure and workers, the Office of Safety and Health Administration (OSHA) regulations safeguard the hearing of workers exposed to occupational noise. Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters (approximately 50 feet) from the vehicle pathway centerline. These controls are implemented through regulatory restrictions on truck manufacturers.

3.2 Federal Transit Authority Vibration Standards

The FTA has adopted vibration standards to evaluate potential building damage impacts related to construction activities. The City of Canyon Lake does not have vibration standards for evaluating building damage. In lieu of specific vibration criteria, FTA vibration criteria will be utilized as a guide. The vibration damage criteria adopted by the FTA are shown in **Table 3-1**.

Table 3-1. Construction Vibration Damage Criteria

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12
SOURCE: FTA, 2006.	

The FTA has also adopted the following standards for ground-borne vibration impacts related to human annoyance: Vibration Category 1 – High Sensitivity, Vibration Category 2 – Residential, and Vibration Category 3 – Institutional. The FTA defines Category 1 as buildings where vibration would interfere with operations, such as vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and research operations. Category 2 refers to all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 refers to institutional land uses such as schools, churches, other institutions, and quiet offices that do not have

vibration-sensitive equipment but still have the potential for activity interference. The vibration thresholds associated with human annoyance for these three land-use categories are shown in **Table 3-2**. No thresholds have been adopted or recommended for industrial, commercial, and office uses.

Table 3-2. Ground-borne Vibration Impact Criteria for General Assessment

Land Use Category	Frequent Events [a]	Occasional Events [b]	Infrequent Events [c]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB[d]	65 VdB[d]	65 VdB[d]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB

[a] Frequent Events" is defined as more than 70 vibration events of the same source per day.

[b] Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.

[c] Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.

[d] This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

SOURCE: FTA, 2006

3.2 State Regulations and Standards

Noise Standards

The California Department of Health Services has established guidelines for land use and noise exposure compatibility that are listed in **Table 3-3**. In addition, the California Government Code (Section 65302(g)) requires a noise element to be included in general plans and requires that the noise element: (1) identify and appraise noise problems in the community; (2) recognize Office of Noise Control guidelines; and (3) analyze and quantify current and projected noise levels.

Table 3-3. California Community Noise Exposure (Ldn or CNEL)

Land Use	Normally Acceptable[a]	Conditionally Acceptable[b]	Normally Unacceptable[c]	Clearly Unacceptable[d]
Single-family, Duplex, Mobile Homes	50 - 60	55 – 70	70 - 75	above 75
Multi-Family Homes	50 - 65	60 – 70	70 - 75	above 75
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 – 70	70 - 80	above 80
Transient Lodging – Motels, Hotels	50 - 65	60 – 70	70 - 80	above 75
Auditoriums, Concert Halls, Amphitheaters	---	50 – 70	---	above 70
Sports Arena, Outdoor Spectator Sports	---	50 – 75	---	above 75
Playgrounds, Neighborhood Parks	50 - 70	---	67 - 75	above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 75	---	70 - 80	above 80
Office Buildings, Business, and Professional Commercial	50 - 70	67 – 77	above 75	---
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 – 80	above 75	---

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

b Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and the design includes necessary noise insulation features. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

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

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

SOURCE: FTA, 2006.

The State of California has noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state pass-by standard is consistent with the federal limit of 80 dBA. The state pass-by

standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters (50 feet) from the centerline. These standards are implemented through controls on vehicle manufacturers and by state and local law enforcement officials' legal sanctions.

3.3 Local Regulations and Standards

City of Canyon Lake Municipal Code

The City of Canyon Lake Municipal Code, Chapter 11.15 (Noise), provides exterior noise limits.

11.15.030 Sound amplification.

No person shall amplify sound contrary to any of the following:

(a) The only amplified sound permitted shall be either music or the human voice or both.

(b) Notwithstanding (a) above, the volume of amplified sound shall not exceed the noise levels set forth herein when measured outdoors at or beyond the property line of the property from which the sound emanates.

Table 3-4. City Of Canyon Lake Maximum Noise Level (Lmax)

Time Period	*Maximum Noise Level*
10 p.m. - 7 a.m.	60 dBA
7 a.m. - 10 p.m.	80 dBA

11.15.040 Unusual Noises or Sounds.

It is unlawful for any person to willfully make, cause or suffer or permit to be made, or caused, any loud, unnecessary noises or sounds which unreasonably disturb the peace and quiet of any residential neighborhood or which are physically annoying to persons of ordinary sensitivity or which are so harsh, prolonged or unnatural or unusual in their use, time or place as to occasion physical discomfort to the inhabitants of the City, or any number thereof. The Standards for the dBA noise level in Section (Sound Amplification) shall apply to this Section. To the extent that the noise created causes the noise level at the property line to exceed the ambient noise level by more than 1.0 decibels, it shall be presumed that the noise being created also violates this Section.

City of Canyon Lake General Plan

The City of Canyon Lake General Plan Noise Element includes Land Use/Noise Compatibility Guidelines, as shown in Figure 4 (on page 18), which generally establishes acceptable exterior noise levels for specified land uses. The 65 CNEL is generally considered the maximum exterior level acceptable for these uses. Sensitive land uses are permitted in areas with ambient noise levels in excess of 65 CNEL if mitigation is provided to reduce interior noise levels to 45 dB or less.

The City of Canyon Lake's General Plan- Noise Element provides the following goals, policies, and strategies.

Goals

NEG-1 **Create an environment that protects noise-sensitive land uses through siting and construction techniques.**

NEG-2 **Provide for identification, evaluation, and control of noise sources.**

Policies

NEP-1 All land uses shall be provided the maximum protection from intrusive and hazardous noise.

NEP-2 The City Planning Department shall serve as the Noise Control Coordinator.

NEP-3 Noise complaints shall be monitored consistent with established standards.

NEP-4 Noise complaints shall be monitored consistent with established standards.

NEP-5 Excessive noise beyond the established standards shall be considered a public nuisance.

Strategies

NES-1 Require all structures to comply with sound attenuation standards established by state and local law for residential, commercial, and recreational uses.

NES-2 If programs come available to assist property owners to retrofit structures to provide sound insulation improvements.

NES-3 Require that intensive uses and major highway projects provide sound barriers for the protection of abutting properties such that resulting noise levels shall not exceed those experienced prior to development.

NES-4 Establish a noise ordinance to set standards for acceptable noise levels and mitigation for them.

NES-6 Continue to administer California Noise Insulation Standards.

NES-7 When deemed necessary, require new development to submit noise evaluation reports prior to approval of plans for construction of facilities or structures.

NES-8 Monitor operational changes to March AFB, which could alter existing patterns or levels of noise, and work cooperatively with appropriate agencies to minimize impacts.

LAND USE CATEGORIES	COMMUNITY NOISE EQUIVALENT LEVEL CNEL						
	55	60	65	70	75	80	
Residential - Single Family, Multi-family, duplex	A	A	B	B	C		
Residential - Mobile homes	A	A	B	C	C		
Transient Lodging - Motels, Hotels	A	A	B	B	C	C	
Schools, Libraries, Churches, Hospitals, Nursing Homes	A	A	B	C	C		
Auditoriums, Concert Halls, Amphitheaters, Meeting Halls	B	B	C	C			
Sports Arenas, Outdoor Spectator Sport, Amusement Parks	A	A	A	B	B		
Playgrounds, Neighborhood Parks	A	A	A	B	C		
Golf Courses, Riding Stables, Cemeteries	A	A	A	A	B	C	C
Office and Professional Buildings	A	A	A	B	B	C	
Commercial Retail, Banks, Restaurants, Theaters	A	A	A	A	B	B	C
Industrial, Manufacturing, Utilities, Wholesale, Service Stations	A	A	A	A	B	B	B
Agriculture	A	A	A	A	A	A	A

Legend

Zone A - Clearly Compatible - Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Zone B - Conditionally Acceptable - New construction or development should be undertaken only after detailed analysis of the noise reduction requirement is made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems 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.

Note: Shaded areas indicate new construction or development should generally not be undertaken.

Source: J.J. Van Houten & Associates

Figure 4. City of Canyon Lake Land Use Compatibility Guidelines

4.0 THRESHOLDS OF SIGNIFICANCE

Appendix G of the 2020 California Environmental Quality Act (CEQA) Guidelines states that a project could have a noise impact if any of the following would occur:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies?

b) Generation of excessive ground-borne vibration or ground-borne noise levels?

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

4.1. Operational and Construction Thresholds

Noise levels exceed CEQA thresholds if any of the following occur as a direct result of the due to the proposed development.

OFF-SITE TRAFFIC NOISE

Traffic noise impacts exceed the CEQA thresholds when the resulting noise levels at noise-sensitive land uses (e.g., residential, etc.):

- are less than 60 dBA CNEL and the project creates a 5 dBA CNEL or greater project-related noise level increase: or
- exceed 60 dBA CNEL, and the project creates a 3 dBA CNEL or greater project-related noise level increase.

OPERATIONAL NOISE AND VIBRATION

The noise CEQA threshold is exceeded if one of the following occurs:

- Project-related operational noise levels resulting from stationary sources, such as on-site noise such as air conditioning units and parking lot vehicle movements, exceed the 80 dBA Lmax daytime or 60 dBA Lmax nighttime noise level standards at the nearby sensitive receiver locations in the City of Canyon Lake (City of Canyon Lake Municipal Code, Section 11.15.030); or
- Ambient noise levels at the nearby noise-sensitive receivers near the Project site:
  - are less than 60 dBA L_{eq} CNEL and the project creates a 5 dBA L_{eq} or greater project-related noise level increase: or
  - exceed 60 dBA $L_{eq,}$ CNEL, and the project creates a 3 dBA Leq or greater project-related noise level increase.

Although the City of Canyon Lake does not have any specified thresholds for vibration, the FTA vibration criteria will be utilized to evaluate vibration impacts. If long-term project generated operational source vibration levels exceed the FTA maximum acceptable vibration standard of 80 vibration decibels (VdB) at noise-sensitive receiver locations, noise levels will exceed the vibration CEQA threshold.

CONSTRUCTION NOISE AND VIBRATION

If project-related construction activities create noise levels at sensitive receiver locations in the City of Canyon Lake above the construction noise level limit of 80 dBA L_{max} (City of Canyon Lake Municipal Code11.15.030), noise levels will exceed the noise CEQA threshold.

Although the City of Canyon Lake does not have any specified thresholds for vibration, the FTA vibration criteria will be utilized to evaluate vibration impacts. If short-term project-generated construction source vibration levels exceed the FTA maximum acceptable vibration standard of 80 vibration decibels (VdB) at noise-sensitive receiver locations, noise levels will exceed the vibration CEQA threshold.

5.0 EXISTING NOISE MEASUREMENTS

The existing noise environment was characterized by collecting field noise measurements at sensitive residential properties within the project area. A total of two (2) long-term 24-hour measurements were taken at the project site on September 15 and September 16, 2021. **Table 5-1** presents the CNEL values and hourly day and night noise levels for the project site for the sensitive receivers identified in **Figure 5**. Appendix A includes the field monitoring data for each monitoring location.

5.1 Measurement Procedure and Criteria

Hourly noise levels were measured during typical weekday conditions over 24 hours to describe the existing noise environment, the daytime, nighttime hourly noise levels, and associated 24-hour CNEL. The 24-hour measurements provide the hourly noise levels to calculate the CNEL for the project area. Long-term noise measurements were taken using a Larson Davis Type 1 precision sound level meter. All noise meters were programmed in "slow" mode to record noise levels in the "A" weighted form. The sound level meter and microphone were mounted, five feet above the ground, and equipped with a windscreen during all measurements. The Larson Davis sound level meter was calibrated before the monitoring using a CAL200 calibrator. All noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

5.2 Noise Measurement Locations

The noise monitoring location was selected based on the proximity to nearby residential properties and local roadways. Noise measurement locations Site 1 and Site 2 are shown in **Figure 5**. **Table 5-1** identifies the hourly daytime (7:01 am to 10:00 pm) and nighttime (10:01 pm to 7:00 am) noise levels at each noise level measurement location consistent with the City of Canyon Lake Municipal Code. Appendix A provides a summary of the existing hourly ambient noise levels as described below:

Site 1 represents the noise levels adjacent to the Canyon Lake Golf Course to the west portion of the Project site boundary. The noise level measurements collected show an overall 24-hour exterior noise level of 51.7 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 47.2 dBA L_{eq} with an average nighttime noise level of 38.2 dBA L_{eq}.

Site 2 represents the noise levels adjacent to the east portion of the Project site boundary south of Railroad Canyon Road. The noise level measurements collected show an overall 24-hour exterior noise level of 55.7 dBA CNEL. The energy (logarithmic) average daytime noise level was calculated at 49.0 dBA L_{eq} with an average nighttime noise level of 45.8 dBA L_{eq}.

Table 5-1. Existing (Ambient) Long-Term (24-hour) Noise Level Measurements[1]

Noise Monitoring Location ID[2,3]	Description	Hourly Noise Levels (1hr-L_{eq})[4]						24-hour Noise Levels (CNEL)
		Daytime Minimum	Daytime Maximum	Average Daytime	Nighttime Minimum	Nighttime Maximum	Average Nighttime	
Site 1	West of Project Boundary (adjacent to Canyon Lake Golf Course)	44.4	57.4	47.2	37.8	48.7	38.2	51.7
Site 2	East of Project Boundary (south of Railroad Canyon Road)	47.7	50.6	49.0	42.9	51.19	45.8	55.7

[1] Noise measurements were taken on September 15, 2021, and September 16, 2021. See Appendix A for monitoring data.

[2] See Figure 5 for the location of the monitoring sites.

[3] Taken with Larson Davis Type 1 noise meter

[4] Daytime hours- 7:01am to 10:00pm, Nighttime hours-10:01pm to 7:00am

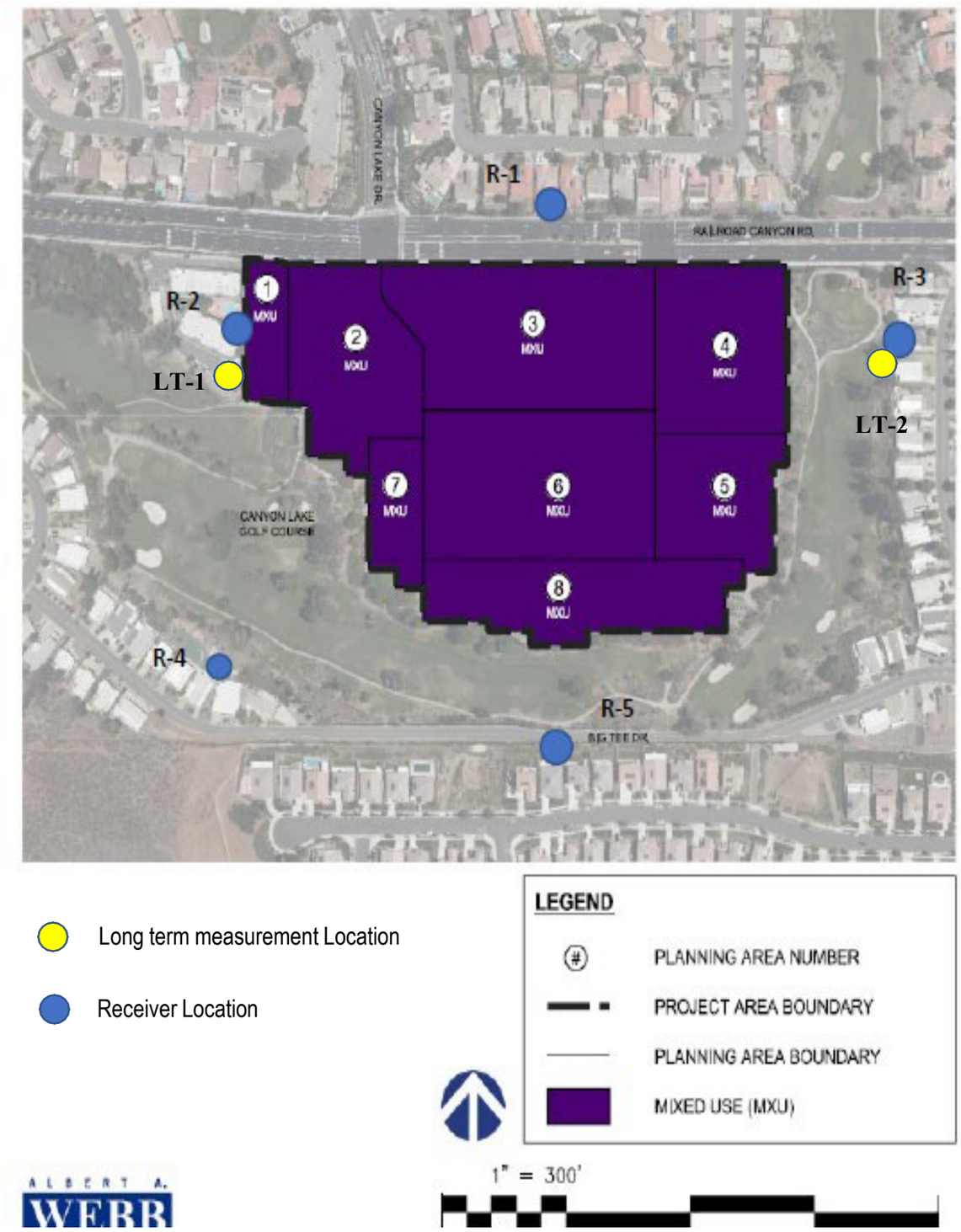

Figure 5. Receiver and Long-Term Monitoring Locations

6.0 ANALYSIS METHODS AND PROCEDURES

The following section outlines the analysis methods utilized to predict future noise and vibration levels from the construction and operation of the project.

6.1 Construction

6.1.1 Noise Analysis Methods

The assessment of the construction noise impacts must be relatively general at this phase of the project because many of the decisions affecting noise will be at the contractor's discretion. However, an assessment based on the type of equipment expected to be used by the contractor can provide a reasonable estimate of potential noise impacts and the need for noise mitigation. A worst-case construction noise scenario was developed to estimate the loudest activities occurring at the project site. Pile driving and blasting activities are not anticipated; therefore, the loudest construction activities are centered around the movement of heavy construction equipment during site preparation, grading operations, and the erection of buildings. Noise levels were estimated based on a worst-case scenario, which assumed all pieces of equipment would be operating simultaneously during each construction phase. The calculated noise level was then compared to the local noise regulation to determine if construction would exceed the City of Canyon Lake's exterior noise standard of 80 dBA L_{max} at nearby residential land uses. Construction of the project is expected to occur over nine months. Receiver distance to the construction activity and the equipment operating at the maximum load will have the greatest influence on construction noise levels experienced at residential land uses.

6.1.2 Vibration Analysis Methods

Ground-borne vibration levels resulting from construction activities within the project area were estimated using the FTA data in its Transit Noise and Vibration Impact Assessment Manual (FTA, 2018). Predicted construction vibration levels were identified at the nearest off-site residential land use and compared to the FTA damage and human annoyance criteria, as shown previously in **Table 3-1** and **Table 3-2**, respectively.

6.2 Operational Noise & Vibration Analysis

6.2.1 Operational Traffic Noise Analysis Methods

The project roadway noise impacts from vehicular traffic were predicted using SoundPlan. SoundPlan incorporates the FHWA TNM 2.5 Model and computes the noise level through several adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments that are made to the REMEL to account for: roadway classifications (e.g., collector, secondary, major, or arterial), active roadway width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), traffic volumes, travel speed, percentages of automobiles, medium trucks, and heavy trucks, roadway grade, angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the adsorption of the ground, pavement, or landscaping).

6.2.2 Operational Traffic Noise Analysis Inputs

A qualitative analysis was performed to determine whether the project would provide a net increase in vehicle trips compared to existing conditions that would have the ability to increase noise levels to a perceptible level of 3 dBA or greater. If increases are perceptible, the Project would have a significant impact. Based on 2019 traffic counts, the existing ADT along Railroad Canyon Road west of the project site is 33,958. A 2% growth factor was applied to the ADT to establish the existing ADT for 2021. The project's daily trips are projected to be 3,196. Existing plus Project Noise levels were predicted based on the project's added traffic volumes using Sound Plan.

6.2.3 Stationary Noise Analysis Method

The primary non-transportation noise sources associated with the project are rooftop HVAC equipment and on-site parking lot circulation. In order to evaluate these noise sources at the nearest noise-sensitive receptors, the SoundPLAN noise prediction model was utilized. The SoundPLAN noise prediction model was used to calculate noise levels at the noise-sensitive receptors located around the project site. Inputs to the SoundPLAN model included ground topography and ground type, noise source locations and heights, receiver locations, and sound power level data. These predictions are made in accordance with International Organization for Standardization (ISO) standard 9613-2:1996 (Acoustics – Attenuation of sound during propagation outdoors).

It should be noted that sound power measures the total acoustic energy emitted by a noise source and is irrespective of the distance from the source. Sound power is input into the SoundPLAN model to represent the total acoustic energy emitted by a specific noise source. Sound power levels in this report are reported as A-weighted decibel levels, noted as "dBA, PWL" per industry standards. The model then corrects the many factors (i.e., distance, terrain shielding, atmospheric absorption, etc.) that affect sound propagation from the noise source to the receiver location.

7.0 OFF-SITE TRANSPORTATION NOISE IMPACTS

Roadway Noise

It is anticipated that the implementation of the Towne Center Specific Plan would generate increased traffic volumes along Railroad Canyon Road. The project is expected to generate 3,192 daily trips. The Project's increase in traffic would result in noise increases on Project area roadways. In general, a traffic noise increase of 3 dBA is barely perceptible to people, while a 5-dBA increase is readily noticeable. Traffic volumes on Project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA.

Traffic noise modeling was conducted to determine the Project's incremental traffic-related noise impacts at receiving land uses adjacent to roadways conveying Project traffic. The expected roadway noise level increases resulting from Project-related vehicle trip contributions were calculated SoundPlan that replicates the FHWA's Traffic Noise Prediction Model-FHWA-RD-77-108 (DOT 1978). The FHWA Model inputs include the total average daily traffic, the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relating to the absorption of the ground, pavement, or landscaping), and the percentage of total average daily traffic that flows each hour throughout a 24-hour period. The project noise levels do not consider the effect of any existing noise barriers or topography that may attenuate ambient noise levels. For analytical purposes, the "without Project" conditions would reflect the 2021 Project ADT volumes, and the "with Project" conditions would reflect the net change in noise levels due with the project.

Table 7-1 presents the roadway parameters used to assess the Project's off-site transportation noiseimpacts. Traffic noise analysis was conducted for the following traffic scenarios: Existing (2021) and Existing plus Project (E+P) (net change in trips of Project compared to the Existing Adjusted 2021 ADT levels).

Table 7.1 Roadway parameters for Towne Center Specific Plan

Roadway	Classificatior	2021 ADT[1]	Project ADT	Existing + Project ADT[1]	Speed (MPH)	Site Conditions
Railroad Canyon Road	Main Arterial	35,330	3,196	38,526	50	Soft
Vehicle Distribution and Mix[1]						
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**		**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		77.5		12.9	9.6	97.42
Medium Trucks		84.8		4.9	10.3	1.54
Heavy Trucks		86.5		2.7	10.8	0.74

[1]County of Riverside Department of Environmental Health Memo Requirements for determining and mitigating traffic noise impacts to residential structures. April 2015.

Table 7-2 summarizes the exterior traffic noise levels, without barrier attenuation, for the Railroad Canyon roadway segment analyzed from the without Project conditions to the with Project conditions (proposed Specific Plan). Appendix B includes a summary of the SoundPlan outputs for each condition. Table 7.2 shows that the increase in project traffic on Railroad Canyon Road is negligible. Existing traffic noise levels along Railroad Canyon road exceed the 60 dBA CNEL; therefore, only an increase of 3 dBA is allowable. Further, the Project Only CNEL is below 65 dBA CNEL. Thus, the Project would not generate enough traffic that would result in a permanent 3-dBA increase in ambient noise levels, and traffic noise would not exceed any local standards.

Table 7.2 Existing, Project and Existing Plus Project Noise Levels (dBA CNEL)

Receiver Location	Existing	Project Only	Existing Plus Project	Net Increase over Existing CNEL
R1	69	59	70	1
R2	49	38	49	0
R3	65	55	66	1
R4	50	40	51	1
R5	42	31	42	0

8.0 STATIONARY-RELATED NOISE IMPACTS

The project was evaluated for stationary noise impacts. The City of Canyon Lake Municipal Code, Section 11.15.030, requires operational noise levels not to exceed the 80 dBA L_{max} daytime or 60 dBA L_{max} nighttime noise level standards at the nearby sensitive receiver locations in the City of Canyon Lake. This noise study evaluates noise levels at residential zones surrounding the project site. Stationary-related noise impacts were evaluated utilizing the maximum noise levels assumptions for the HVAC equipment and on-site parking lot circulation.,

Table 8-1 provides a listing of the sensitive residential receiver locations near the project site. Distances from the sensitive receiver location to the project site were from receivers R1 through R5. Each operational source type's predicted operational noise levels were combined to obtain the total project-only operational noise level at each nearby sensitive residential receiver location. The combined project operational noise levels at receivers R1 through R5 range from 43 to 60 dBA $L_{max,}$ as shown in Table 8-1. Therefore, operational noise levels associated with the project will satisfy the City of Canyon Lake Municipal Code exterior noise level standards of 80 dBA L_{max} daytime and 60 dBA L_{max} nighttime.

Table 8-1. Project Only Operational Noise levels (dBA L_{max})

Receiver Location[1]	Distance	Parking lot Circulation & Air Conditioning units (dBA L_{max})	Daytime Standard 80 dBA L_{max} Exceeded	Nighttime Standard 60 dBA L_{max} Exceeded
R1	125	54	No	No
R2	45	60	No	No
R3	300	46	No	No
R4	450	43	No	No
R5	200	44	No	No

[1] Figure 5 shows the receiver locations.

9.0 SHORT-TERM CONSTRUCTION NOISE & VIBRATION IMPACTS

Construction noise represents a temporary impact on ambient noise levels. Construction noise is primarily caused by diesel engines (trucks, dozers, backhoes), impacts (jackhammers, pile drivers, hoe rams), and backup alarms. Construction equipment can be stationary or mobile. Stationary equipment operates in one location for hours or days in a constant mode (generators, compressors) or generates variable noise operations (pile drivers, jackhammers), producing constant noise for a period of time. Mobile equipment moves around the site and is characterized by variations in power and location, resulting in significant variations in noise levels over time. Grading activities and rock blasting typically generate the greatest noise impacts during construction. This section assesses the potential noise impacts to the existing sensitive residential land uses during construction.

9.1 Noise Sensitive Uses and Construction Noise Standards

Pursuant to the City of Canyon Lake Municipal Code Section 11.15.030, construction activities shall not exceed 80 dBA L_{max} beyond the project site boundary. There are several residential land uses that surrounding land uses the project site. Receivers R1 through R5, except for R2, represent areas of residential land uses that would experience construction noise levels. R2 represents an adjacent commercial land use. The construction noise levels were evaluated at these receivers to present maximum construction noise levels by construction phase. As a conservative measure, it was assumed that construction for the Specific Plan would occur at one time, and all the maximum noise levels for each phase would occur at the project site boundary. Construction noise levels were predicted at Receivers R1 through R5 from the nearest project site boundary to provide the maximum noise levels in these areas during construction.

Table 9-1. Construction Receiver locations by Distance

Receiver ID	Distance to the Project Site Boundary
R1	125
R2	45
R3	300
R4	450
R5	200

9.2 Construction Schedule

The construction schedule for the project is described below.

As shown in **Table 9-1**, the estimated construction period for the project is approximately nine months. Construction is anticipated to begin with grading in April 2021 and end with architectural coatings (painting) starting in December 2023, as shown in **Table 9-2**.

Table 9-2. Construction Schedule

Construction Activity	Start Date	End Date
Demolition	09/01/2022	09/28/2022
Grading	09/29/2022	11/9/2022
Building Construction	11/10/2022	1/31/2024
Paving	01/4/2024	1/31/2024
Architectural Coating	01/4/2024	1/31/2024

Table 9-3 presents the equipment for each construction activity based on engineering estimates and the Applicant.

Table 9-3. Equipment by Construction Activity		
Construction Activity	Off-Road Equipment	Unit Amount
Demolition	Concrete/Industrial Saws	1
	Excavators	3
	Rubber Tired Dozers	3
Grading	Excavators	4
	Rubber Tired Dozers	1
	Scrapers	2
	Tractors/Loaders/Backhoes	2
	Grader	1
Building Construction	Crane	2
	Forklifts	6
	Generator Sets	2
	Tractors/Loaders/Backhoes	6
	Welders	2
	Paver	2
	Paving Equipment	2
	Rollers	2
Architectural Coating	Air Compressors	2

9.3 Construction Noise Levels

The RCNM model was used to determine which phase of construction activity for the project would generate the greatest construction noise level. The receiver distance was measured from the project site boundary to the nearest property line of the affected residential or commercial land use represented by receivers R1 through R5. **Table 9-4** presents the noise levels in L_{max} for each construction phase. As shown in **Table 9-4**, all other receiver locations, except for Receiver R-2, will experience construction noise levels below 80 dBA Lmax. Receiver R2, which represents a commercial land use directly adjacent to the west project site boundary, would experience noise levels above 80 dBA. These construction noise levels at the property boundary would exceed 80 dBa Lmax. Therefore mitigation measures would be required to reduce construction noise levels at the property boundary.

Table 9-4. Construction Noise Levels dbA, L_{max} by Construction Phase					
Receiver ID	**R-1**	**R-2**	**R-3**	**R-4**	**R-5**
Demolition	81.6	90.5	74	70.5	77.5
Grading	76.0	84.9	68.4	69.9	72.0
Building	77.0	85.9	69.4	65.9	73.0
Paving	76.0	84.9	68.4	64.9	72.0
Painting	72.0	80.9	64.4	60.9	68.0

[1]**Worst-case construction noise levels evaluated at the property line of receiver R6, the closest receivers to the project site.**

9.4 Construction Vibration

Ground-borne vibration levels resulting from construction activities occurring within the project site were estimated using the FTA data. Construction activities that would occur within the project site include grading, building construction, paving, and painting. These activities have the potential to generate low levels of ground-borne vibration.

Using the vibration source level of construction equipment provided in Table 7-4 and the FTA's construction vibration assessment methodology, it is possible to estimate the project vibration impacts. **Table 9-5** presents the expected project-related vibration levels at 45 feet at the nearest land use located at R2. The receiver distance was measured from the west project site boundary to receiver R2.

Table 9-5. Construction Equipment Vibration Levels				
Noise Receiver	**Distance to Property Line[1]**	**Large Bulldozer Reference Vibration Level PPV_{ref} (VdB) at 25ft**	**Peak Vibration PPV (VdB) at 45 ft**	**Exceed 80 VdB Threshold?**
R2	45 feet	87VdB	79VdB	No

[1] **Reference noise level obtained from the FTA Noise and Vibration Manual, Table** 7-4. (FTA, 2018)

Based on the FTA's reference vibration levels, a large bulldozer represents the peak vibration source with a reference level of 87 VdB at a distance of 25 feet. At 45 feet, construction vibration levels are expected to approach 57VdB. Using the construction vibration assessment annoyance criteria provided by the FTA for infrequent events, as shown in **Table 3-2**, the construction of the project site will not result in a perceptible human response (annoyance). Impacts at the closest sensitive receptor site are unlikely to be sustained during the entire construction period. Moreover, construction at the project site will be restricted to daytime hours, thereby eliminating potential vibration impacts during sensitive nighttime hours. Further, the predicted construction noise level is below the FTA vibration threshold of 80 VdB.

9.5 Construction Mitigation Measures

For the majority of the land uses beyond the project site boundary, the project's construction noise and vibration impacts will be below City standards and CEQA thresholds. However, at the project site boundary and receivers within 50 feet of the project site will be subject to the following applicable mitigation measures:

- **MM Noise 1**: Limit construction hours to occur between the hours of 7:00 am and 7:00 pm weekdays.

- **MM Noise 2**: During all project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with the manufacturers' standards. The construction contractors shall place all stationary equipment, so that emitted noise is directed away from the noise-sensitive receptors nearest the project site.

- **MM Noise 2**: During construction, stationary construction equipment, stockpiling, and vehicle staging areas will be placed a minimum of 125 feet away from the property boundary.

- **MM Noise 3**: No combustion-powered equipment, such as pumps or generators, shall be allowed to operate within 125 feet of any property boundary unless a noise protection barrier surrounds the equipment.

- **MM Noise 4:** Construction contractors implementing development projects shall limit haul truck deliveries to the same hours specified for construction equipment. To the extent feasible, haul routes shall not pass sensitive land uses or residential dwellings.

10.0 REFERENCES

California Department of Transportation's (Caltrans). 2013. *Transportation- and Construction-Vibration Guidance Manual*.

California Department of Transportation (Caltrans). 2013. Technical Noise Supplement (TeNS), A Technical Supplement to the Traffic Noise Analysis Protocol. http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf

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Federal Highway Administration (FHWA) Construction Noise Handbook Section 9.0. Accessed at: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

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Federal Highway Administration (FHWA), Roadway Construction Noise Model (RCNM) (2008).

Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment. https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/fta-noise-and-vibration-impact-assessment

Appendix A Noise Monitoring Data

Site 1 - CNEL Values, September 15, 2021 -September 16, 2021					
Background Leq and Hour Averaging DNL					
Hour	**Background L_{eq}**	**Penalty**	**L_{eq} DNL (L_{eq} + 10)**		**L_{eq} DNL (10^(D/10))**
0	43.9	10	53.9	DNL	64565.4229
1	42.9	10	52.9	DNL	60255.95861
2	45.4	10	55.4	DNL	66069.3448
3	49	10	59	DNL	85113.80382
4	50.9	10	60.9	DNL	186208.7137
5	52.5	10	62.5	DNL	741310.2413
6	50.6	10	60.6	DNL	346736.8505
7	50.2		50.2		27542.28703
8	49.1		49.1		30199.5172
9	50.2		50.2		75857.7575
10	49.2		49.2		67608.29754
11	47.8		47.8		549540.8739
12	47.7		47.7		39810.71706
13	49.7		49.7		29512.09227
14	49.3		49.3		54954.08739
15	49.5		49.5		83176.37711
16	50		50		69183.09709
17	49.5		49.5		72443.59601
18	49.7		49.7		33884.41561
19	50.6	5	55.6	CNEL	102329.2992
20	51.9	5	56.9	CNEL	97723.7221
21	49.8	5	54.8	CNEL	63095.73445
22	48.1	10	58.1	DNL	524807.4602
23	45.1	10	55.1	DNL	97723.7221
(Hour 23 is 23:00 to 23:59)				Average=	148735.5579
	10LOG10 of (Average=)				**51.7**

Site 2 - CNEL Values, September 15, 2021 -September 16, 2021					
Background Leq and Hour Averaging DNL					
Hour	**Background L_{eq}**	**Penalty**	**L_{eq} DNL (L_{eq} + 10)**		**L_{eq} DNL (10^(D/10))**
0	43.9	10	53.9	DNL	245470.8916
1	42.9	10	52.9	DNL	194984.46
2	45.4	10	55.4	DNL	346736.8505
3	49	10	59	DNL	794328.2347
4	50.9	10	60.9	DNL	1230268.771
5	52.5	10	62.5	DNL	1778279.41
6	50.6	10	60.6	DNL	1148153.621
7	50.2		50.2		104712.8548
8	49.1		49.1		81283.05162
9	50.2		50.2		104712.8548
10	49.2		49.2		83176.37711
11	47.8		47.8		60255.95861
12	47.7		47.7		58884.36554
13	49.7		49.7		93325.43008
14	49.3		49.3		85113.80382
15	49.5		49.5		89125.09381
16	50		50		100000
17	49.5		49.5		89125.09381
18	49.7		49.7		93325.43008
19	50.6	5	55.6	CNEL	363078.0548
20	51.9	5	56.9	CNEL	489778.8194
21	49.8	5	54.8	CNEL	301995.172
22	48.1	10	58.1	DNL	645654.229
23	45.1	10	55.1	DNL	323593.6569
(Hour 23 is 23:00 to 23:59)				Average=	371056.7702
	10LOG10 of (Average=)				**55.7**

Appendix B SoundPlan Output Data

Source	Source ty	Tr. lane	Ldn dB(A)	A dB	
Receiver Receiver 1 Fl G dB(A) Ldn 69.0 dB(A)					
Railroad Canyon Road	Road		69.0	0.0	
Receiver Receiver 2 Fl G dB(A) Ldn 48.6 dB(A)					
Railroad Canyon Road	Road		48.6	0.0	
Receiver Receiver 3 Fl G dB(A) Ldn 65.3 dB(A)					
Railroad Canyon Road	Road		65.3	0.0	
Receiver Receiver 4 Fl G dB(A) Ldn 50.0 dB(A)					
Railroad Canyon Road	Road		50.0	0.0	
Receiver Receiver 5 Fl G dB(A) Ldn 41.7 dB(A)					
Railroad Canyon Road	Road		41.7	0.0	

Source	Source ty	Tr. lane	Ldn dB(A)	A dB	
Receiver Receiver 1 Fl G dB(A) Ldn 58.7 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		58.7	0.0	
Receiver Receiver 2 Fl G dB(A) Ldn 38.3 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		38.3	0.0	
Receiver Receiver 3 Fl G dB(A) Ldn 55.0 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		55.0	0.0	
Receiver Receiver 4 Fl G dB(A) Ldn 39.8 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		39.8	0.0	
Receiver Receiver 5 Fl G dB(A) Ldn 31.4 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		31.4	0.0	

Source	Source ty	Tr. lane	Ldn dB(A)	A dB	
Receiver Receiver 1 Fl G dB(A) Ldn 69.6 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		69.6	0.0	
Receiver Receiver 2 Fl G dB(A) Ldn 49.1 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		49.1	0.0	
Receiver Receiver 3 Fl G dB(A) Ldn 65.8 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		65.8	0.0	
Receiver Receiver 4 Fl G dB(A) Ldn 50.6 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		50.6	0.0	
Receiver Receiver 5 Fl G dB(A) Ldn 42.2 dB(A)					
Railroad Canyon Road - Existing + Projec	Road		42.2	0.0	

Appendix C RCNM Output Data

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 9/24/2021
Case Descr Canyon Lake Towne Center

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	48.9	46.6	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	125	0
Compressor (air)	No	40		77.7	125	0

Results

Equipment	Calculated (dBA) *Lmax	L10	Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limits (dBA) Day Lmax	Day L10
Compressor (air)	69.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	69.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.7	71.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	45	0
Compressor (air)	No	40		77.7	45	0

Results

Equipment	Calculated (dBA) *Lmax	L10	Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax	Night L10	Noise Limits (dBA) Day Lmax	Day L10
Compressor (air)	78.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	78.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	78.6	80.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R3	Commercial	48.8	50.3	45.9

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	300	0
Compressor (air)	No	40		77.7	300	0

Results

	Calculated (dBA)		Noise Limits (dBA)							Noise
			Day		Evening		Night		Day	
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Compressor (air)	62.1	61.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	62.1	61.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	62.1	64.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R4	Commercial	48.9	46.6	41.2

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	450	0
Compressor (air)	No	40		77.7	450	0

Results

	Calculated (dBA)		Noise Limits (dBA)							Noise
			Day		Evening		Night		Day	
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Compressor (air)	58.6	57.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	58.6	57.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	58.6	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R5	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Recept Distanc (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	200	0
Compressor (air)	No	40		77.7	200	0

Results

	Calculated (dBA)		Noise Limits (dBA)							Noise
			Day		Evening		Night		Day	
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10	Lmax	L10
Compressor (air)	65.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	65.6	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.6	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Limit Exceedance (dBA)

Evening		Night	
Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Limit Exceedance (dBA)

Evening		Night	
Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Limit Exceedance (dBA)

Evening		Night	
Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Limit Exceedance (dBA)

Evening		Night	
Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Limit Exceedance (dBA)

Evening		Night	
Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 9/24/2021
Case Descri Canyon Lake Towne Center

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	125	0
Crane	No	16		80.6	125	0
Forklift	No	20		74.7	125	0
Forklift	No	20		74.7	125	0
Forklift	No	20		74.7	125	0
Forklift	No	20		74.7	125	0
Forklift	No	20		74.7	125	0
Forklift	No	20		74.7	125	0
Generator	No	50		80.6	125	0
Generator	No	50		80.6	125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Welder / Torch	No	40		74	125	0
Welder / Torch	No	40		74	125	0

Equipment	Calculated (dBA) *Lmax	L10	Results Day Lmax	Noise Limits (dBA) Day L10	Evening Lmax	Evening L10	Night Lmax
Crane	72.6	67.6	N/A	N/A	N/A	N/A	N/A
Crane	72.6	67.6	N/A	N/A	N/A	N/A	N/A
Forklift	66.7	62.8	N/A	N/A	N/A	N/A	N/A
Forklift	66.7	62.8	N/A	N/A	N/A	N/A	N/A
Forklift	66.7	62.8	N/A	N/A	N/A	N/A	N/A
Forklift	66.7	62.8	N/A	N/A	N/A	N/A	N/A
Forklift	66.7	62.8	N/A	N/A	N/A	N/A	N/A
Forklift	66.7	62.8	N/A	N/A	N/A	N/A	N/A
Generator	72.7	72.7	N/A	N/A	N/A	N/A	N/A
Generator	72.7	72.7	N/A	N/A	N/A	N/A	N/A

Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Welder / Torch	66	65.1	N/A	N/A	N/A	N/A	N/A
Welder / Torch	66	65.1	N/A	N/A	N/A	N/A	N/A
Total	76	84.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R2	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	45	0
Crane	No	16		80.6	45	0
Forklift	No	20		74.7	45	0
Forklift	No	20		74.7	45	0
Forklift	No	20		74.7	45	0
Forklift	No	20		74.7	45	0
Forklift	No	20		74.7	45	0
Forklift	No	20		74.7	45	0
Generator	No	50		80.6	45	0
Generator	No	50		80.6	45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Welder / Torch	No	40		74	45	0
Welder / Torch	No	40		74	45	0

	Calculated (dBA)		Results	Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Crane	81.5	76.5	N/A	N/A	N/A	N/A	N/A
Crane	81.5	76.5	N/A	N/A	N/A	N/A	N/A
Forklift	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Forklift	75.6	71.6	N/A	N/A	N/A	N/A	N/A

Forklift	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Forklift	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Forklift	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Forklift	75.6	71.6	N/A	N/A	N/A	N/A	N/A
Generator	81.5	81.5	N/A	N/A	N/A	N/A	N/A
Generator	81.5	81.5	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Welder / Torch	74.9	73.9	N/A	N/A	N/A	N/A	N/A
Welder / Torch	74.9	73.9	N/A	N/A	N/A	N/A	N/A
Total	84.9	93	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R3	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	300	0
Crane	No	16		80.6	300	0
Forklift	No	20		74.7	300	0
Forklift	No	20		74.7	300	0
Forklift	No	20		74.7	300	0
Forklift	No	20		74.7	300	0
Forklift	No	20		74.7	300	0
Forklift	No	20		74.7	300	0
Generator	No	50		80.6	300	0
Generator	No	50		80.6	300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Welder / Torch	No	40		74	300	0
Welder / Torch	No	40		74	300	0

Results

Calculated (dBA)	Noise Limits (dBA)

Equipment	*Lmax	L10	Day Lmax	Day L10	Evening Lmax	Evening L10	Night Lmax
Crane	65	60	N/A	N/A	N/A	N/A	N/A
Crane	65	60	N/A	N/A	N/A	N/A	N/A
Forklift	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Forklift	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Forklift	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Forklift	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Forklift	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Forklift	59.1	55.1	N/A	N/A	N/A	N/A	N/A
Generator	65.1	65.1	N/A	N/A	N/A	N/A	N/A
Generator	65.1	65.1	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Welder / Torch	58.4	57.5	N/A	N/A	N/A	N/A	N/A
Welder / Torch	58.4	57.5	N/A	N/A	N/A	N/A	N/A
Total	68.4	76.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R4	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	450	0
Crane	No	16		80.6	450	0
Forklift	No	20		74.7	450	0
Forklift	No	20		74.7	450	0
Forklift	No	20		74.7	450	0
Forklift	No	20		74.7	450	0
Forklift	No	20		74.7	450	0
Forklift	No	20		74.7	450	0
Generator	No	50		80.6	450	0
Generator	No	50		80.6	450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0

Tractor	No	40	84		450	0
Welder / Torch	No	40		74	450	0
Welder / Torch	No	40		74	450	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Crane	61.5	56.5	N/A	N/A	N/A	N/A	N/A
Crane	61.5	56.5	N/A	N/A	N/A	N/A	N/A
Forklift	55.6	51.6	N/A	N/A	N/A	N/A	N/A
Forklift	55.6	51.6	N/A	N/A	N/A	N/A	N/A
Forklift	55.6	51.6	N/A	N/A	N/A	N/A	N/A
Forklift	55.6	51.6	N/A	N/A	N/A	N/A	N/A
Forklift	55.6	51.6	N/A	N/A	N/A	N/A	N/A
Forklift	55.6	51.6	N/A	N/A	N/A	N/A	N/A
Generator	61.5	61.5	N/A	N/A	N/A	N/A	N/A
Generator	61.5	61.5	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	63.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	63.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	63.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	63.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	63.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	63.9	N/A	N/A	N/A	N/A	N/A
Welder / Torch	54.9	53.9	N/A	N/A	N/A	N/A	N/A
Welder / Torch	54.9	53.9	N/A	N/A	N/A	N/A	N/A
Total	64.9	73	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R5	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	200	0
Crane	No	16		80.6	200	0
Forklift	No	20		74.7	200	0
Forklift	No	20		74.7	200	0
Forklift	No	20		74.7	200	0
Forklift	No	20		74.7	200	0
Forklift	No	20		74.7	200	0
Forklift	No	20		74.7	200	0
Generator	No	50		80.6	200	0

Generator	No	50		80.6	200	0
Tractor	No	40	84		200	0
Tractor	No	40	84		200	0
Tractor	No	40	84		200	0
Tractor	No	40	84		200	0
Tractor	No	40	84		200	0
Tractor	No	40	84		200	0
Welder / Torch	No	40		74	200	0
Welder / Torch	No	40		74	200	0

			Results				
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Crane	68.5	63.6	N/A	N/A	N/A	N/A	N/A
Crane	68.5	63.6	N/A	N/A	N/A	N/A	N/A
Forklift	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Forklift	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Forklift	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Forklift	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Forklift	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Forklift	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Generator	68.6	68.6	N/A	N/A	N/A	N/A	N/A
Generator	68.6	68.6	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Welder / Torch	62	61	N/A	N/A	N/A	N/A	N/A
Welder / Torch	62	61	N/A	N/A	N/A	N/A	N/A
Total	72	80	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)

	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 9/24/2021
Case Descri Canyon Lake Towne Center

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R1	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	125	0
Excavator	No	40		80.7	125	0
Excavator	No	40		80.7	125	0
Dozer	No	40		81.7	125	0
Excavator	No	40		80.7	125	0
Dozer	No	40		81.7	125	0

				Results				
		Calculated (dBA)		Noise Limits (dBA)				
				Day		Evening		Night
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Saw		81.6	74.6	N/A	N/A	N/A	N/A	N/A
Excavator		72.8	68.8	N/A	N/A	N/A	N/A	N/A
Excavator		72.8	68.8	N/A	N/A	N/A	N/A	N/A
Dozer		73.7	69.7	N/A	N/A	N/A	N/A	N/A
Excavator		72.8	68.8	N/A	N/A	N/A	N/A	N/A
Dozer		73.7	69.7	N/A	N/A	N/A	N/A	N/A
	Total	81.6	78.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R2	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	45	0
Excavator	No	40		80.7	45	0
Excavator	No	40		80.7	45	0
Dozer	No	40		81.7	45	0

Excavator	No	40	80.7	45	0
Dozer	No	40	81.7	45	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Saw	90.5	83.5	N/A	N/A	N/A	N/A	N/A
Excavator	81.6	77.6	N/A	N/A	N/A	N/A	N/A
Excavator	81.6	77.6	N/A	N/A	N/A	N/A	N/A
Dozer	82.6	78.6	N/A	N/A	N/A	N/A	N/A
Excavator	81.6	77.6	N/A	N/A	N/A	N/A	N/A
Dozer	82.6	78.6	N/A	N/A	N/A	N/A	N/A
Total	90.5	87.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R3	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	300	0
Excavator	No	40		80.7	300	0
Excavator	No	40		80.7	300	0
Dozer	No	40		81.7	300	0
Excavator	No	40		80.7	300	0
Dozer	No	40		81.7	300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Saw	74	67	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	61.2	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A
Total	74	70.9	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R4	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	450	0
Excavator	No	40		80.7	450	0
Excavator	No	40		80.7	450	0
Dozer	No	40		81.7	450	0
Excavator	No	40		80.7	450	0
Dozer	No	40		81.7	450	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Saw	70.5	63.5	N/A	N/A	N/A	N/A	N/A
Excavator	61.6	57.6	N/A	N/A	N/A	N/A	N/A
Excavator	61.6	57.6	N/A	N/A	N/A	N/A	N/A
Dozer	62.6	58.6	N/A	N/A	N/A	N/A	N/A
Excavator	61.6	57.6	N/A	N/A	N/A	N/A	N/A
Dozer	62.6	58.6	N/A	N/A	N/A	N/A	N/A
Total	70.5	67.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R5	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	200	0
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Dozer	No	40		81.7	200	0
Excavator	No	40		80.7	200	0
Dozer	No	40		81.7	200	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax

Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Total	77.5	74.4	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Noise Limit Exceedance (dBA)						
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 9/24/2021
Case Descri Canyon Lake Towne Center

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R1	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	125	0
Excavator	No	40		80.7	125	0
Grader	No	40	85		125	0
Dozer	No	40		81.7	125	0
Scraper	No	40		83.6	125	0
Scraper	No	40		83.6	125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Excavator	No	40		80.7	125	0
Excavator	No	40		80.7	125	0

	Calculated (dBA)		Results	Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Excavator	72.8	71.8	N/A	N/A	N/A	N/A	N/A
Excavator	72.8	71.8	N/A	N/A	N/A	N/A	N/A
Grader	77	76.1	N/A	N/A	N/A	N/A	N/A
Dozer	73.7	72.7	N/A	N/A	N/A	N/A	N/A
Scraper	75.6	74.6	N/A	N/A	N/A	N/A	N/A
Scraper	75.6	74.6	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	75.1	N/A	N/A	N/A	N/A	N/A
Excavator	72.8	71.8	N/A	N/A	N/A	N/A	N/A
Excavator	72.8	71.8	N/A	N/A	N/A	N/A	N/A
Total	77	83.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R2	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	45	0
Excavator	No	40		80.7	45	0
Grader	No	40	85		45	0
Dozer	No	40		81.7	45	0
Scraper	No	40		83.6	45	0
Scraper	No	40		83.6	45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Excavator	No	40		80.7	45	0
Excavator	No	40		80.7	45	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Excavator	81.6	80.6	N/A	N/A	N/A	N/A	N/A
Excavator	81.6	80.6	N/A	N/A	N/A	N/A	N/A
Grader	85.9	84.9	N/A	N/A	N/A	N/A	N/A
Dozer	82.6	81.6	N/A	N/A	N/A	N/A	N/A
Scraper	84.5	83.5	N/A	N/A	N/A	N/A	N/A
Scraper	84.5	83.5	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	83.9	N/A	N/A	N/A	N/A	N/A
Excavator	81.6	80.6	N/A	N/A	N/A	N/A	N/A
Excavator	81.6	80.6	N/A	N/A	N/A	N/A	N/A
Total	85.9	92.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R3	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	300	0
Excavator	No	40		80.7	300	0
Grader	No	40	85		300	0
Dozer	No	40		81.7	300	0
Scraper	No	40		83.6	300	0
Scraper	No	40		83.6	300	0

Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Excavator	No	40		80.7	300	0
Excavator	No	40		80.7	300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Excavator	65.1	64.2	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	64.2	N/A	N/A	N/A	N/A	N/A
Grader	69.4	68.5	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	65.1	N/A	N/A	N/A	N/A	N/A
Scraper	68	67	N/A	N/A	N/A	N/A	N/A
Scraper	68	67	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	67.5	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	64.2	N/A	N/A	N/A	N/A	N/A
Excavator	65.1	64.2	N/A	N/A	N/A	N/A	N/A
Total	69.4	76.2	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R4	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	450	0
Excavator	No	40		80.7	450	0
Grader	No	40	85		450	0
Dozer	No	40		81.7	450	0
Scraper	No	40		83.6	450	0
Scraper	No	40		83.6	450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0
Excavator	No	40		80.7	450	0
Excavator	No	40		80.7	450	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Excavator	61.6	60.6	N/A	N/A	N/A	N/A	N/A

Excavator		61.6	60.6	N/A	N/A	N/A	N/A	N/A
Grader		65.9	64.9	N/A	N/A	N/A	N/A	N/A
Dozer		62.6	61.6	N/A	N/A	N/A	N/A	N/A
Scraper		64.5	63.5	N/A	N/A	N/A	N/A	N/A
Scraper		64.5	63.5	N/A	N/A	N/A	N/A	N/A
Tractor		64.9	63.9	N/A	N/A	N/A	N/A	N/A
Tractor		64.9	63.9	N/A	N/A	N/A	N/A	N/A
Excavator		61.6	60.6	N/A	N/A	N/A	N/A	N/A
Excavator		61.6	60.6	N/A	N/A	N/A	N/A	N/A
	Total	65.9	72.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R5	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Grader	No	40	85		200	0
Dozer	No	40		81.7	200	0
Scraper	No	40		83.6	200	0
Scraper	No	40		83.6	200	0
Tractor	No	40	84		200	0
Tractor	No	40	84		200	0
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0

	Calculated (dBA)		Results	Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Excavator	68.7	67.7	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	67.7	N/A	N/A	N/A	N/A	N/A
Grader	73	72	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	68.6	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	70.6	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	70.6	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Tractor	72	71	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	67.7	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	67.7	N/A	N/A	N/A	N/A	N/A
Total	73	79.8	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)						
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)						
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 9/24/2021
Case Descri Canyon Lake Towne Center

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	125	0
Paver	No	50		77.2	125	0
Paver Equipment	No	50		77.2	125	0
Paver Equipment	No	50		77.2	125	0
Roller	No	20		80	125	0
Roller	No	20		80	125	0

Equipment	Calculated (dBA) *Lmax	L10	Results Day Lmax	Noise Limits (dBA) L10	Evening Lmax	L10	Night Lmax
Paver	69.3	69.3	N/A	N/A	N/A	N/A	N/A
Paver	69.3	69.3	N/A	N/A	N/A	N/A	N/A
Paver Equipment	69.2	69.2	N/A	N/A	N/A	N/A	N/A
Paver Equipment	69.2	69.2	N/A	N/A	N/A	N/A	N/A
Roller	72	68.1	N/A	N/A	N/A	N/A	N/A
Roller	72	68.1	N/A	N/A	N/A	N/A	N/A
Total	72	76.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	45	0
Paver	No	50		77.2	45	0
Paver Equipment	No	50		77.2	45	0
Paver Equipment	No	50		77.2	45	0

Roller	No	20	80	45	0
Roller	No	20	80	45	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Paver	78.1	78.1	N/A	N/A	N/A	N/A	N/A
Paver	78.1	78.1	N/A	N/A	N/A	N/A	N/A
Paver Equipment	78.1	78.1	N/A	N/A	N/A	N/A	N/A
Paver Equipment	78.1	78.1	N/A	N/A	N/A	N/A	N/A
Roller	80.9	76.9	N/A	N/A	N/A	N/A	N/A
Roller	80.9	76.9	N/A	N/A	N/A	N/A	N/A
Total	80.9	85.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R3	Commercial	48.8	50.3	45.9

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	300	0
Paver	No	50		77.2	300	0
Paver Equipment	No	50		77.2	300	0
Paver Equipment	No	50		77.2	300	0
Roller	No	20		80	300	0
Roller	No	20		80	300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Paver	61.7	61.6	N/A	N/A	N/A	N/A	N/A
Paver	61.7	61.6	N/A	N/A	N/A	N/A	N/A
Paver Equipment	61.6	61.6	N/A	N/A	N/A	N/A	N/A
Paver Equipment	61.6	61.6	N/A	N/A	N/A	N/A	N/A
Roller	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Roller	64.4	60.4	N/A	N/A	N/A	N/A	N/A
Total	64.4	69.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
R4	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	450	0
Paver	No	50		77.2	450	0
Paver Equipment	No	50		77.2	450	0
Paver Equipment	No	50		77.2	450	0
Roller	No	20		80	450	0
Roller	No	20		80	450	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax
Paver	58.1	58.1	N/A	N/A	N/A	N/A	N/A
Paver	58.1	58.1	N/A	N/A	N/A	N/A	N/A
Paver Equipment	58.1	58.1	N/A	N/A	N/A	N/A	N/A
Paver Equipment	58.1	58.1	N/A	N/A	N/A	N/A	N/A
Roller	60.9	56.9	N/A	N/A	N/A	N/A	N/A
Roller	60.9	56.9	N/A	N/A	N/A	N/A	N/A
Total	60.9	65.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

	Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R5	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	200	0
Paver	No	50		77.2	200	0
Paver Equipment	No	50		77.2	200	0
Paver Equipment	No	50		77.2	200	0
Roller	No	20		80	200	0
Roller	No	20		80	200	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	L10	Lmax	L10	Lmax	L10	Lmax

Paver	65.2	65.2	N/A	N/A	N/A	N/A	N/A
Paver	65.2	65.2	N/A	N/A	N/A	N/A	N/A
Paver Equipment	65.2	65.1	N/A	N/A	N/A	N/A	N/A
Paver Equipment	65.2	65.1	N/A	N/A	N/A	N/A	N/A
Roller	68	64	N/A	N/A	N/A	N/A	N/A
Roller	68	64	N/A	N/A	N/A	N/A	N/A
Total	68	72.6	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
L10	Lmax	L10	Lmax	L10	Lmax	L10

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date 9/24/2021
Case Descri Canyon Lake Towne Center

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R1	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	125	0
Dozer	No	40		81.7	125	0
Dozer	No	40		81.7	125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0
Tractor	No	40	84		125	0

Results

Equipment	Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax
Dozer	73.7	69.7	N/A	N/A	N/A	N/A	N/A
Dozer	73.7	69.7	N/A	N/A	N/A	N/A	N/A
Dozer	73.7	69.7	N/A	N/A	N/A	N/A	N/A
Tractor	76	72.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	72.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	72.1	N/A	N/A	N/A	N/A	N/A
Tractor	76	72.1	N/A	N/A	N/A	N/A	N/A
Total	76	79.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
R2	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	45	0
Dozer	No	40		81.7	45	0

Dozer	No	40		81.7	45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0
Tractor	No	40	84		45	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Dozer	82.6	78.6	N/A	N/A	N/A	N/A	N/A
Dozer	82.6	78.6	N/A	N/A	N/A	N/A	N/A
Dozer	82.6	78.6	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	80.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	80.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	80.9	N/A	N/A	N/A	N/A	N/A
Tractor	84.9	80.9	N/A	N/A	N/A	N/A	N/A
Total	84.9	88.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R3	Commercial	48.8	50.3	45.9

			Equipment Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	300	0
Dozer	No	40		81.7	300	0
Dozer	No	40		81.7	300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0
Tractor	No	40	84		300	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A
Dozer	66.1	62.1	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A

Tractor		68.4	64.5	N/A	N/A	N/A	N/A	N/A
	Total	68.4	72.1	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R4	Commercial	48.9	46.5	41.2

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	450	0
Dozer	No	40		81.7	450	0
Dozer	No	40		81.7	450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0
Tractor	No	40	84		450	0

			Results				
	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Dozer	62.6	58.6	N/A	N/A	N/A	N/A	N/A
Dozer	62.6	58.6	N/A	N/A	N/A	N/A	N/A
Dozer	62.6	58.6	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	60.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	60.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	60.9	N/A	N/A	N/A	N/A	N/A
Tractor	64.9	60.9	N/A	N/A	N/A	N/A	N/A
Total	64.9	68.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #5 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
R5	Commercial	48.8	50.3	45.9

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	200	0
Dozer	No	40		81.7	200	0
Dozer	No	40		81.7	200	0

Tractor	No	40	84	200	0
Tractor	No	40	84	200	0
Tractor	No	40	84	200	0
Tractor	No	40	84	200	0

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A
Tractor	72	68	N/A	N/A	N/A	N/A	N/A
Tractor	72	68	N/A	N/A	N/A	N/A	N/A
Tractor	72	68	N/A	N/A	N/A	N/A	N/A
Tractor	72	68	N/A	N/A	N/A	N/A	N/A
Total	72	75.6	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

		Noise Limit Exceedance (dBA)				
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)						
	Day		Evening		Night	
Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A