
Appendix G. Noise Impact Analysis



Transit Villages Specific Plan (TVSP)

NOISE IMPACT AND VIBRATION ANALYSIS

CITY OF REDLANDS

PREPARED BY:

Bill Lawson, PE, INCE
blawson@urbanxroads.com
(949) 336-5979

JULY 7, 2022

TABLE OF CONTENTS

TABLE OF CONTENTS.....	I
APPENDICES.....	II
LIST OF EXHIBITS.....	III
LIST OF TABLES	III
LIST OF ABBREVIATED TERMS	IV
EXECUTIVE SUMMARY	1
1 INTRODUCTION.....	3
1.1 Project Location	3
1.2 Project Description.....	3
1.3 TVSP Regulating Plans and Zones	6
2 FUNDAMENTALS.....	9
2.1 Range of Noise	9
2.2 Noise Descriptors	10
2.3 Sound Propagation.....	10
2.4 Noise Control	11
2.5 Noise Barrier Attenuation	11
2.6 Land Use Compatibility With Noise	12
2.7 Community Response to Noise	12
2.8 Vibration	13
3 REGULATORY SETTING	15
3.1 State of California Noise Requirements.....	15
3.2 City of Redlands General Plan Noise Element	16
3.3 City of Redlands General Plan Noise Element Environmental Impact Report.....	20
3.4 City of Redlands Operational Noise Standards	21
3.5 City of Redlands Construction Noise Standards.....	22
3.6 City of Redlands Construction Vibration Standards.....	23
3.7 Redlands Passenger Rail Project (Final EIS/EIR)	23
3.8 San Bernardino International Airport (SBIA).....	26
4 SIGNIFICANCE CRITERIA	29
4.1 CEQA Guidelines Not Further Analyzed	29
4.2 Incremental Noise Level Increases.....	29
4.3 Significance Criteria Summary	30
5 EXISTING NOISE LEVEL MEASUREMENTS	31
5.1 Measurement Procedure and Criteria	31
5.2 Noise Measurement Locations	31
5.3 Noise Measurement Results	33
6 NOISE/LAND USE COMPATIBILITY	35
7 OFF-SITE TRAFFIC NOISE.....	37
8 ON-SITE TRAFFIC NOISE.....	39
8.1 On-Site Exterior Noise Analysis.....	39
8.2 On-Site Exterior Noise Mitigation	39
8.3 On-Site Interior Noise Analysis	40

8.2	On-Site Interior Noise Mitigation.....	40
9	OPERATIONAL IMPACTS	41
9.1	Operational Noise Levels	41
9.2	Operational Noise Mitigation	41
9.3	Operational Vibration Levels	41
10	CONSTRUCTION IMPACTS	43
10.1	Construction Noise Levels.....	43
10.2	Construction Noise Level Compliance	43
10.3	Construction Vibration Impacts	44
10.4	Construction Noise and Vibration Mitigation Measures	45
11	REFERENCES.....	47
12	CERTIFICATION.....	49

APPENDICES

APPENDIX 3.1: CITY OF REDLANDS MUNICIPAL CODE

APPENDIX 5.1: STUDY AREA PHOTOS

APPENDIX 5.2: NOISE LEVEL MEASUREMENT WORKSHEETS

LIST OF EXHIBITS

EXHIBIT 1-A: TRANSIT VILLAGES SPECIFIC PLAN (TVSP) AREA.....	4
EXHIBIT 1-B: TVSP REGULATING PLAN	7
EXHIBIT 2-A: TYPICAL NOISE LEVELS	9
EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION	12
EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION	14
EXHIBIT 3-A: NOISE/LAND USE COMPATIBILITY MATRIX AND INTERPRETATION	17
EXHIBIT 3-B: INTERIOR AND EXTERIOR NOISE STANDARDS.....	18
EXHIBIT 3-C: SAN BERNARDINO INTERNATIONAL AIRPORT (SBIA) NOISE CONTOURS	27
EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS.....	32

LIST OF TABLES

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS.....	1
TABLE 3-1: OPERATIONAL NOISE STANDARDS	21
TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY	30
TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS	33
TABLE 5-2: EXISTING LAND USE COMPATIBILITY	35
TABLE 10-1: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT	44
TABLE 10-2: CONSTRUCTION EQUIPMENT VIBRATION LEVELS	45

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
L_{eq}	Equivalent continuous (average) sound level
L_{max}	Maximum level measured over the time interval
L_{min}	Minimum level measured over the time interval
mph	Miles per hour
OPR	Office of Planning and Research
PPV	Peak Particle Velocity
Project	Transit Villages Specific Plan (TVSP)
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this program-level noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Transit Villages Specific Plan (TVSP). The proposed TVSP area generally includes the parcels located within approximately one-half mile, or a 10-minute walk, of the three new Arrow rail stations that are being developed in the city as part of the Redlands Passenger Rail Project. The three Arrow stations include: 1) New York Street/Esri Station near the intersection of Redlands Boulevard and New York Street across from the existing Esri campus, 2) Downtown Station north of the Santa Fe Depot between Eureka Street and Orange Street, and 3) University Street Station adjacent to the University of Redlands at the south end of campus near North University Street. The entire TVSP area, covers approximately 947 acres or roughly 1.5 square miles.

This Noise Impact and Vibration Analysis has been prepared to satisfy applicable City of Redlands noise standards and significance criteria based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) The results of this Transit Villages Specific Plan (TVSP) Noise Impact and Vibration Analysis are summarized below based on the significance criteria in Section 4 of this report. Table ES-1 shows the findings of significance for each potential noise and/or vibration impact under CEQA before and after any required mitigation measures.

TABLE ES-1: SUMMARY OF CEQA SIGNIFICANCE FINDINGS

Analysis	Report Section	Significance Findings	
		Unmitigated	Mitigated
Off-Site Traffic Noise	7	<i>Less Than Significant</i>	-
On-Site Traffic Noise	8	<i>Potentially Significant</i>	<i>Less Than Significant</i>
Operational Noise	9	<i>Potentially Significant</i>	<i>Less Than Significant</i>
Operational Vibration		<i>Less Than Significant</i>	-
Construction Noise	10	<i>Less Than Significant</i>	-
Construction Vibration		<i>Potentially Significant</i>	<i>Less Than Significant</i>

This page intentionally left blank

1 INTRODUCTION

This program-level noise analysis has been completed to determine the noise impacts associated with the development of the Transit Villages Specific Plan (TVSP). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for noise analysis, and evaluates the exterior noise environment.

1.1 PROJECT LOCATION

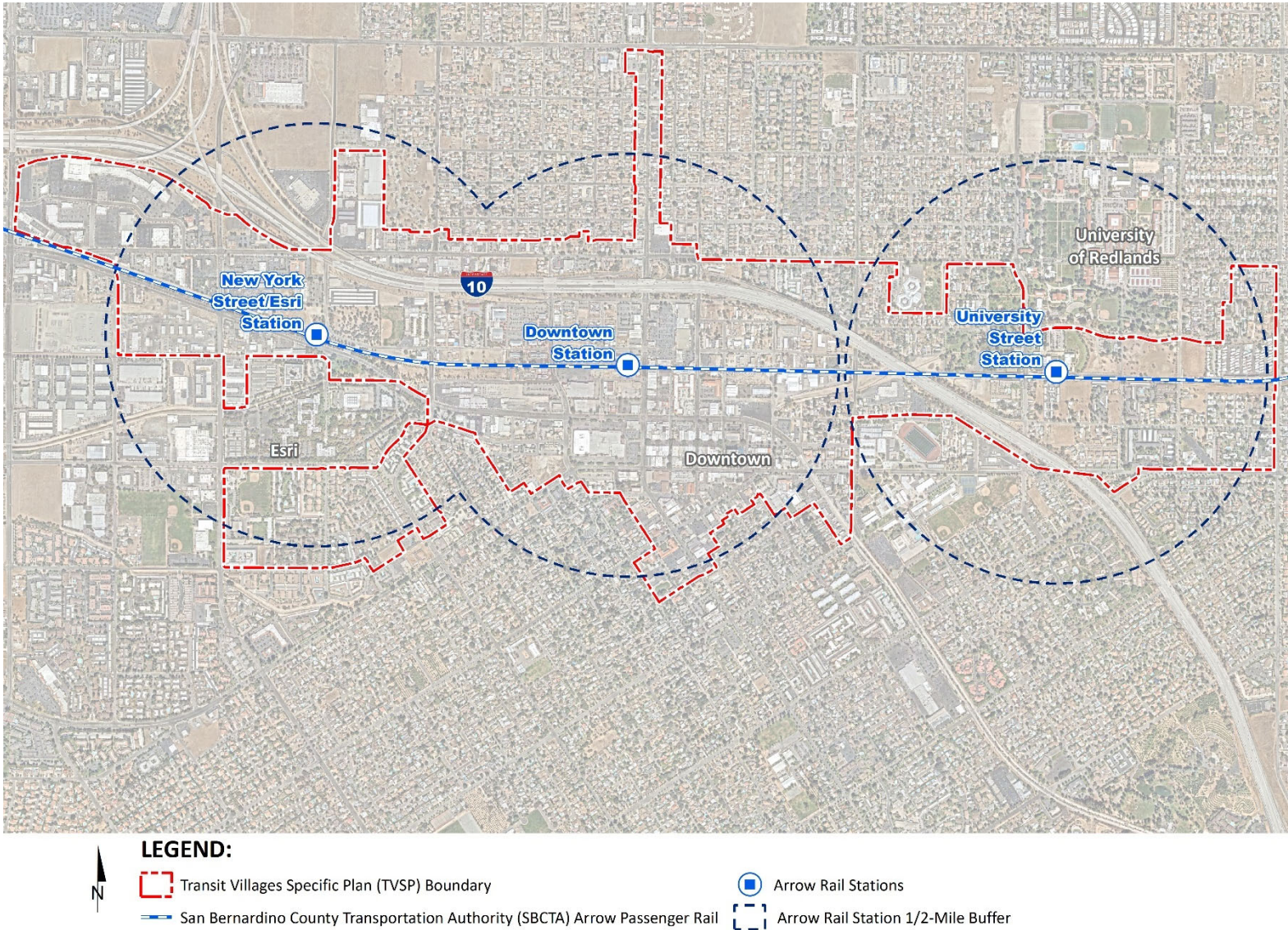
A new commuter rail line, called the Arrow, is under construction in the city that will be operated by San Bernardino County Transportation Authority (SBCTA). The Arrow will initially include five stations connecting the existing San Bernardino Transit Center in Downtown San Bernardino and the University of Redlands using an approximately 9-mile stretch of former Atchison, Topeka, and Santa Fe railway right-of-way. The proposed TVSP area generally includes the parcels located within approximately one-half mile, or a 10-minute walk, of the three new Arrow stations.

The three Arrow stations are being developed in the city, which include: 1) New York Street/Esri Station near the intersection of Redlands Boulevard and New York Street across from the existing Esri campus, 2) Downtown Station north of the Santa Fe Depot between Eureka Street and Orange Street, and 3) University Street Station adjacent to the University of Redlands at the south end of campus near North University Street. The entire TVSP area, which covers approximately 947 acres (approximately 1.5 square miles) is generally bounded to the west by Kansas Street, Redlands Boulevard, Alabama Street, and Tennessee Street; to the north by the I-10, Colton Avenue, and Sylvan Boulevard; to the east by Judson Street; and to the south by Citrus Avenue, Central Avenue, Redlands Boulevard, Olive Avenue, Brookside Avenue, Ash Street, Pine Avenue, Tennessee Street, and State Street. The TVSP area also includes the parcels along both sides of Orange Street between Colton Avenue and Lugonia Avenue as shown on Exhibit 1-A.

1.2 PROJECT DESCRIPTION

The City of Redlands proposes the TVSP as a means of implementing the Transit Village Concept promoted in the City of Redlands General Plan 2035 (GP2035), which encourages new infill transit-oriented development (TOD) surrounding the three new Arrow train stations in existing developed areas of the city. TOD is a planning concept typified by the location of residential and commercial districts in a compact design around a transit station or corridor intended to facilitate transit use. The TVSP provides a “road map” for growth and change for the TVSP area through the year 2040. When development projects within the TVSP area are reviewed by the City, staff will use the TVSP as a primary means of evaluating the proposed project by judging the project’s consistency with the TVSP’s vision and policies as well as conformance with its development standards as contained in the Development Code.

EXHIBIT 1-A: TRANSIT VILLAGES SPECIFIC PLAN (TVSP) AREA



The TVSP area is divided into three planning areas referred to as transit villages, which generally circle each new Arrow station, as shown on Exhibit 1-A. The New York Street/Esri Transit Village area is generally west of Texas Street and Center Street. The Downtown Transit Village area is generally bounded to the east by Church Street, and to the west by Texas Street, and includes the parcels along both sides of Orange Street between Colton Avenue and Lugonia Avenue. The University Street Transit Village area is located east of Church Street and west of Judson Street, which are further described below.

1.2.1 New York Street/Esri Transit Village. The area around this station is currently car oriented. Large blocks generally comprise the area with commercial and light industrial buildings set back away from the street behind parking lots or landscaped front yards. The I-10 and SR-210 interchange is to the northwest of this transit village. Freeway access is provided at Alabama Street and Tennessee Street. Alabama Street, Tennessee Street, and Texas Street pass beneath the I-10, connecting the transit village area to the neighborhoods north of the freeway. The transit village is traversed east-west by the railways, which run along the north side of Redlands Boulevard, until New York Street, where they branch off from one another as they proceed eastward.

The Arrow station will be located along the north side of Redlands Boulevard at New York Street. To the south of the station site is Esri's campus headquarters and to the southeast (across the roadway intersection) from the station site is Jennie Davis Park, a 5.2-acre neighborhood park with picnic and playground facilities. Land uses to the west of the Esri campus and south of the railway consists primarily of light industrial warehouse buildings. North of the railway, existing development consists of car-oriented uses, strip mall shopping centers, fast-food restaurants, hotels, and recreational facilities. North of the I-10 are commercial and single-family residences. Buildings within this area range from one to three-story buildings. Many of the one-story light industrial and retail buildings are tall one-story buildings facing the street. The parcels surrounding the station are largely vacant.

1.2.2 Downtown Transit Village. This area includes the city's urban core and Santa Fe Depot. The station site will be north of the Santa Fe Depot. Blocks located east of Orange Street within Downtown are small and promote walkability with commercial and mixed-use buildings built adjacent to, and accessed directly from, the sidewalk. Blocks west of Orange Street are larger and less pedestrian-friendly with buildings and site designs that are more car-oriented, with buildings located behind street-facing parking lots. Access to the I-10 is via Sixth Street, Orange Street, and Eureka Street. Streets that pass underneath the freeway include Texas Street, Eureka Street, Orange Street, Sixth Street, and Church Street.

State Street, which is lined with buildings that face and are accessed from the sidewalk and shaded by Ficus trees, is the city's prime pedestrian-friendly street. Sidewalks within the Downtown Village are typically eight feet wide and located adjacent to the curb. Additionally, bicycle facilities exist along segments of Colton Avenue and Citrus Avenue.

Many parcels west of the Downtown Station are vacant. Additionally, vacant packinghouse buildings lie to the north and south of the Santa Fe Depot. Most of the buildings within this transit village are one- and two-story in height. A notable exception is the Citibank building, which is six stories tall. In addition, many of the old packinghouse buildings surrounding the Santa Fe Depot are one-story buildings with tall interiors.

There are two parks within this transit village, Terrace Park and the northeastern tip of Smiley Park. Terrace Park is a linear park built along the south side of Colton Avenue between Orange Street and Church Street. The portion of Smiley Park within the transit village consist of the lawns, paths, and benches that surround the historic Police Annex building. The rest of Smiley Park that is not within the TVSP area, includes the Redlands Bowl amphitheater, the Lincoln Memorial Shrine, the A.K. Smiley Library, shuffleboard courts, and a restroom building.

1.2.3 University Street Transit Village. This area includes the portion of the University of Redlands campus located south of Sylvan Boulevard and Sylvan Park, which is 18-acres. Access to the I-10 is provided via University Street and Cypress Avenue. Church Street, University Street, and Citrus Street pass underneath the freeway providing access to other areas in the city.

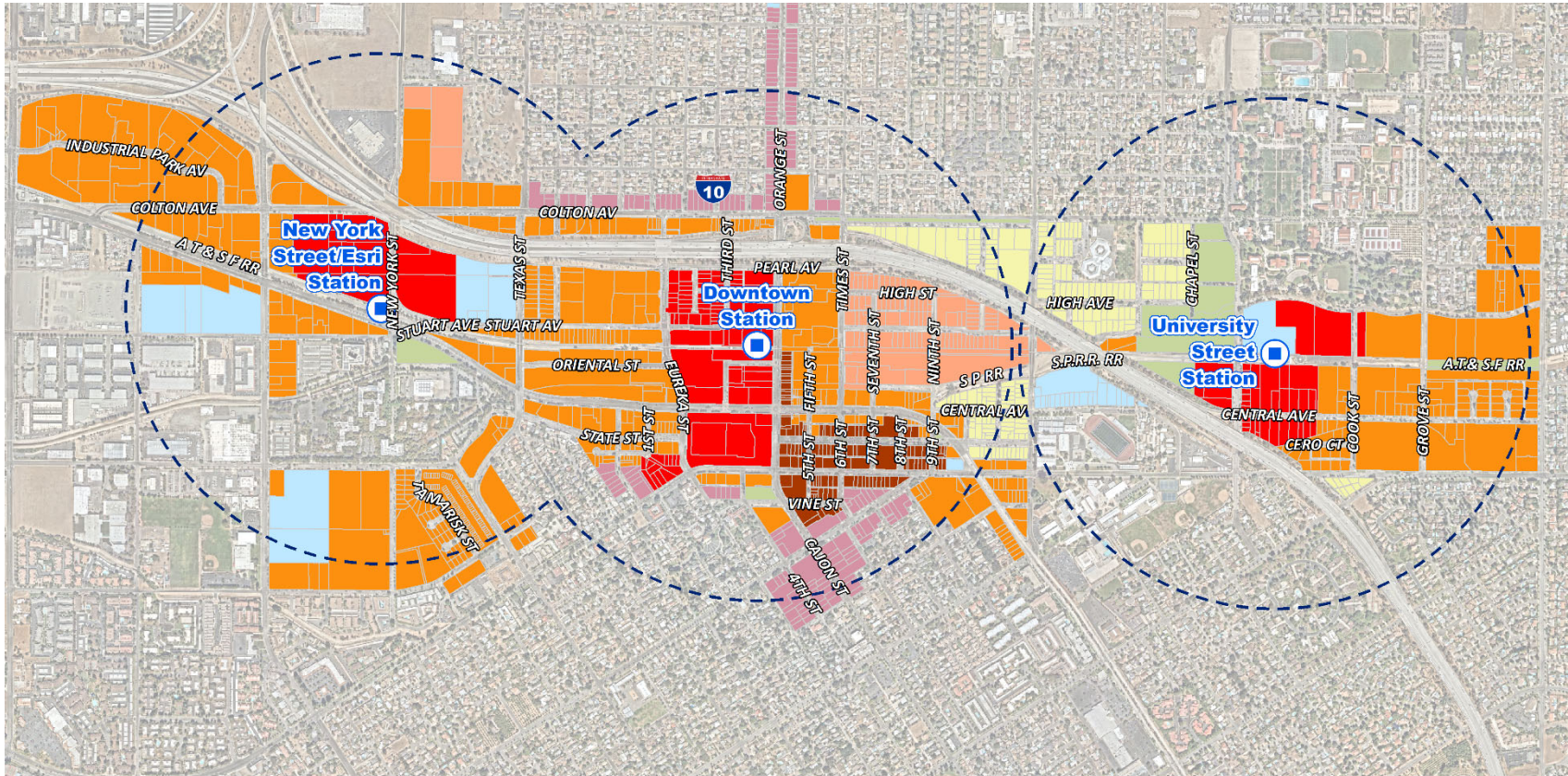
Land uses located north of the I-10 and west of University Street include Sylvan Park, single-family residences, and some multi-family buildings. The southeast portion of the village primarily consists of multi-family buildings. Most of the buildings within this transit village area are one- and two-story in height. Single-family residences are mostly one-story and multi-family buildings are two stories. Most of the land surrounding the station site is vacant.

1.3 TVSP REGULATING PLANS AND ZONES











The Project identifies allowed land uses and, through the TVSP, provides detailed standards for building placement, height, massing, articulation, frontage, landscape, and parking based on a form-based code. The form-based code incorporates a gradual transitioning of the height and mass of larger buildings from larger to smaller to avoid incompatible buildings heights next to each other. The TVSP's regulating plan is shown in Exhibit 1-B would serve as the zoning map for the TVSP. The Regulating Plan includes the following districts:

- **Village Center (VC).** This district applies to the parcels immediately surrounding the three Arrow stations. Like the three- and four-story buildings that lined State Street and Orange Street prior to World War II, new buildings in this zone could reach a height of four stories and would be mixed-use, all residential, or all office. Retail ground floors would be located at the back of sidewalk, while residential ground floors may be placed behind small front yards. Parking would be located within structured garages behind buildings or storefront liners, or constructed subterranean.

EXHIBIT 1-B: TVSP REGULATING PLAN



LEGEND:

- | | | | |
|--|--|---|---|
|  Arrow Rail Stations |  Village Center (VC) |  Village Corridor (COR) |  Special District (SD 1) |
|  Arrow Rail Station 1/2-Mile Buffer |  Downtown (DT) |  Neighborhood General 1 (NG1) |  Civic Space (CS) |
| |  Village General (VG) |  Neighborhood General 2 (NG 2) | |

- **Downtown (DT).** The district applies to parcels facing State Street east of Orange Street, and along the east side of Orange Street between the railway right of way and State Street. This district is largely built-out. New buildings could be up to three stories in height and accommodate a mix of uses with commercial ground floors and residential or commercial upper floors. Parking would be located within structured garages behind buildings or storefront liners, subterranean, or in park-once lots or structures.
- **Village General (VG).** This district applies to parcels located around the periphery of the three Arrow stations and permits multi-family and mixed-use buildings with an average height of three stories. Parking may be within structured garages or surface lots that would be located behind buildings, or subterranean garages.
- **Village Corridor (COR).** This district applies to parcels located along the north side of Colton Avenue, both sides of Orange Street north of the I-10, and both sides of Olive Avenue. This district provides for small-scale mixed-use buildings up to two stories in height, with commercial ground floors and residential or commercial upper floors. Parking lots would be located behind and to the sides of buildings.
- **Village Neighborhood 1 (NG1).** This district applies to parcels located between Sixth Street and Church Street and would provide for small-scale commercial and residential-style buildings that accommodate commercial, light industrial, and live-work uses. New buildings would be up to two stories in height. Parking lots would be allowed behind and to the side of buildings.
- **Village Neighborhood 2 (NG2).** This district would enable house-form buildings that accommodate residential, and office uses. New buildings would be up to two stories in height and set back from the sidewalk behind front yards. Parking lots would be located behind buildings. New buildings would match or complement prevalent building setbacks along the length of the block and complement building heights and massing of adjacent buildings or buildings across the street.
- **Special District (SD).** This district applies to school and other institutional sites. New buildings would accommodate educational, religious, and other civic uses. Parking would be in surface parking lots or garages.
- **Civil Space (CS).** This district applies to parks, plazas, greens, and other open spaces within the TVSP area. These open spaces may accommodate small structures such as gazebos, restrooms, and community centers.

2 FUNDAMENTALS

Noise is simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	SPEECH INTERFERENCE
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	SLEEP DISTURBANCE
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 1,000 feet, which can cause serious discomfort. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most used metric is the equivalent level (L_{eq}). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the “average” noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite 24-hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time-of-day corrections require the addition of 5 decibels to dBA L_{eq} sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA L_{eq} sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise sensitive time periods during the evening and night hours when noise can become more intrusive. CNEL does not represent the actual sound level heard at any time, but rather represents the total sound exposure. The City of Redlands relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The way noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. (2)

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually

sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source. (4)

2.3.3 ATMOSPHERIC EFFECTS

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects. (2)

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby residents. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of-sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The Federal Highway Administration (FHWA) does not consider the planting of vegetation to be a noise abatement measure. (5)

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for an observation point or receiver by controlling the noise source, transmission path, receiver, or all three. This concept is known as the source-path-receiver concept. In general, noise control measures can be applied to these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receiver. Noise barriers, however, do have limitations. For a noise barrier to work, it must block the line-of-sight path of sound from the noise source.

2.6 LAND USE COMPATIBILITY WITH NOISE

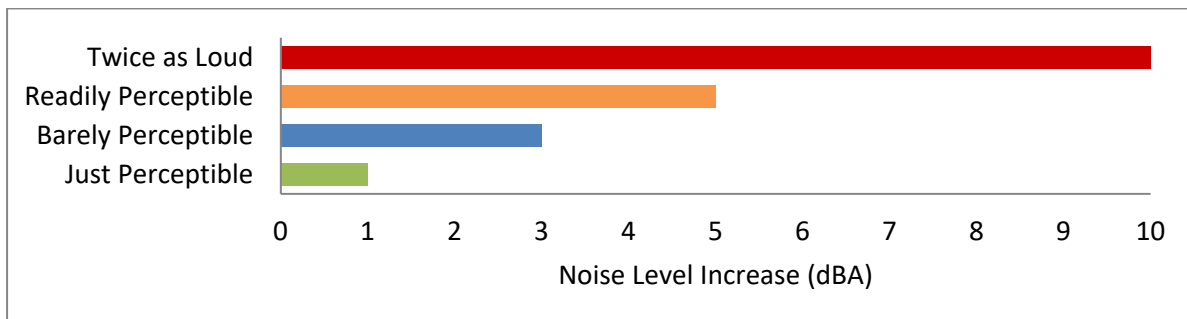
Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (6)

2.7 COMMUNITY RESPONSE TO NOISE

Approximately sixteen percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints may occur. Twenty to thirty percent of the population will not complain even in very severe noise environments. (7 pp. 8-6) Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Surveys have shown that community response to noise varies from no reaction to vigorous action for newly introduced noises averaging from 10 dB below existing to 25 dB above existing. (8) According to research originally published in the Noise Effects Handbook (7), the percentage of high annoyance ranges from approximately 0 percent at 45 dB or less, 10 percent are highly annoyed around 60 dB, and increases rapidly to approximately 70 percent being highly annoyed at approximately 85 dB or greater. Despite this variability in behavior on an individual level, the population can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. A change of 3 dBA is considered barely perceptible, and changes of 5 dBA are considered readily perceptible. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



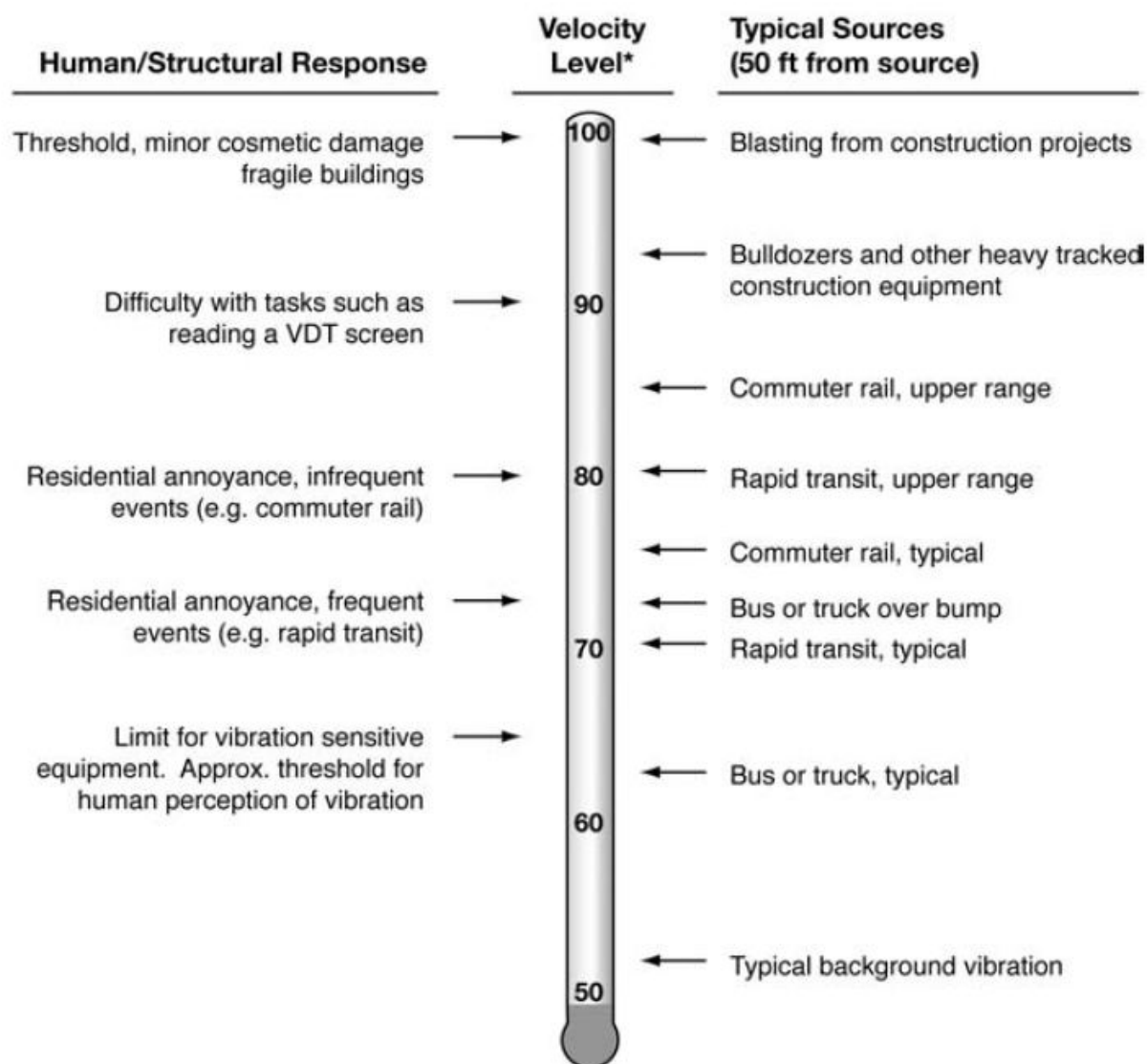
2.8 VIBRATION

Per the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Impact Assessment Manual* (8), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that 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 but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment and/or activities.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



* RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second

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

3 REGULATORY SETTING

The federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards, and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared per guidelines adopted by the Governor's Office of Planning and Research (OPR). (9) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.1.1 RESIDENTIAL CONSTRUCTION

The State of California's noise insulation standards for all residential units are codified in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Chapter 12, Section 1206. These noise standards are applied to new construction that contains dwelling units or sleeping units, such as residential and hotel or motel uses, in California for controlling interior noise levels resulting from exterior noise sources. For new buildings, the acceptable interior noise limit is 45 dBA CNEL in habitable rooms (10).

3.1.2 NON-RESIDENTIAL CONSTRUCTION

The State of California's Green Building Standards Code contains mandatory measures for non-residential building construction in Section 5.507 on Environmental Comfort. (11) These noise standards are applied to new construction in California for controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when non-residential structures are developed in areas where the exterior noise levels exceed 65 dBA CNEL, such as within a noise contour of an airport, freeway, railroad, and other noise source. If the development falls within an airport or freeway 65 dBA CNEL noise contour, buildings shall be constructed to provide an interior noise level environment attributable to exterior sources that does not exceed an hourly equivalent level of 50 dBA L_{eq} in occupied areas during any hour of operation.

3.2 CITY OF REDLANDS GENERAL PLAN NOISE ELEMENT

The City of Redlands has adopted the required General Plan Noise Element in Chapter 7 Healthy Community, Section 7.5 Noise. (12) The Noise Element specifies the maximum allowable exterior noise levels for new developments impacted by transportation noise sources such as arterial roads, freeways, airports, and railroads.

3.2.1 LAND USE COMPATIBILITY GUIDELINES

The Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. The noise criteria identified in the City of Redlands Noise Element (Table 7-10) are guidelines to evaluate the land use compatibility of transportation related noise. The compatibility criteria, shown on Exhibit 3-A, provides the city with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

The *Noise/Land Use Compatibility Matrix and Interpretation* describes categories of compatibility and not specific noise standards. Land uses exposed to *clearly compatible* exterior noise levels, are assumed to meet interior noise level standards using “*normal conventional construction without any special noise insulation requirements*”. For *normally compatible* exterior noise levels, *new...development should be undertaken only after detailed analysis of the noise reduction requirements are 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.* For *normally incompatible* exterior noise levels, *new...development should generally be discouraged. If new...development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.* For *clearly incompatible* exterior noise levels, *new...development should generally not be undertaken.*

Residential designated land uses are considered *clearly compatible* with exterior noise levels below 60 dBA CNEL, and *normally incompatible* with exterior noise levels of up to 75 dBA CNEL, and *clearly incompatible* with exterior noise level greater than 75 dBA CNEL. Commercial designated land uses in the Project study (Commercial: Village District) are considered *clearly compatible* with exterior noise levels below 75 dBA CNEL, *normally compatible* with exterior noise levels of up to 85 dBA CNEL, and *clearly incompatible* with exterior noise levels over 85 dBA CNEL.

3.3.2 NOISE STANDARDS

To ensure noise-sensitive land uses are protected from high levels of noise, Table 7-11 of the Noise Element identifies the specific criteria to evaluate proposed developments based on exterior and interior noise level limits for land uses and requires a noise analysis to determine needed mitigation measures if necessary. The Noise Element identifies schools, hospitals, places of worship, and homes as a noise-sensitive land use (7-A.135).

EXHIBIT 3-A: NOISE/LAND USE COMPATIBILITY MATRIX AND INTERPRETATION

Land Use Categories		Community Noise Equivalent Level (CNEL)							
Categories	Uses	<	60	65	70	75	80	85	>
RESIDENTIAL	Single Family, Duplex Multiple Family	A	C	C	C	D	D	D	
RESIDENTIAL	Mobile Homes	A	C	C	C	D	D	D	
COMMERCIAL Regional, District	Hotel, Motel, Transient Lodging	A	A	B	B	C	C	D	
COMMERCIAL Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theater	A	A	A	A	B	B	C	
COMMERCIAL INDUSTRIAL INSTITUTIONAL	Office Building, Research & Dev., Professional Offices, City Office Building	A	A	A	B	B	C	D	
COMMERCIAL Recreation INSTITUTIONAL Civic Center	Amphitheater, Concert Hall, Auditorium, Meeting Hall	B	B	C	C	D	D	D	
COMMERCIAL Recreation	Childrens Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club	A	A	A	A	B	B	B	
COMMERCIAL General, Special INDUSTRIAL, INSTITUTIONAL	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B	
INSTITUTIONAL General	Hospital, Church, Library, Schools Classroom	A	A	B	C	C	D	D	
OPEN SPACE	Parks	A	A	A	B	C	D	D	
OPEN SPACE	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	A	B	C	C	
AGRICULTURE	Agriculture	A	A	A	A	A	A	A	
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 NORMALLY COMPATIBLE		New construction or development should be undertaken only after detailed analysis of the noise reduction requirements are 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.							
ZONE D CLEARLY INCOMPATIBLE		New construction or development should generally not be undertaken.							

City of Redlands General Plan Noise Element, Chapter 7 Healthy Community, Section 7.5 Noise, Table 7-10.

EXHIBIT 3-B: INTERIOR AND EXTERIOR NOISE STANDARDS

Land Use Categories Uses	Community Noise Equivalent Level (CNEL) Energy Average CNEL	
	Interior ¹	Exterior ²
RESIDENTIAL		
Single Family, Duplex, Multiple Family	45 ³	60
Mobile Home	---	60 ⁴
COMMERCIAL, INDUSTRIAL, INSTITUTIONAL		
Hotel, Motel, Transient Lodging	45	65 ⁵
Commercial Retail, Bank Restaurant	55	---
Office Building, Research & Development, Professional Offices, City Office Building	50	---
Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	---
Gymnasium (Multipurpose)	50	---
Sports Club	55	---
Manufacturing, Warehousing, Wholesale, Utilities	60	---
Movie Theaters	45	---
INSTITUTIONAL		
Hospital, Schools classrooms	45	60
OPEN SPACE		
Parks	---	60
Notes: * CNEL (Community Noise Equivalent Level) - The average equivalent A-weighted sound level during a 24 hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 pm to 10 pm and ten decibels to sound levels at night after 10 pm and before 7 am. 1. Indoor environment excluding bathrooms, toilets, closets, corridors. 2. Outdoor environment limited to private yard of single family as measured at the property line; multifamily private patio or balcony which is served by a means of exit from inside; mobile home park; hospital patio; park picnic area; school playground; hotel and recreational area. 3. Noise level requirement with open windows, if they are used to meet natural ventilation requirement. 4. Exterior noise level should be such that interior level will not exceed 45 CNEL. 5. Except those areas affected by aircraft noise. See also Policy 9.0s		
Source: Mestre Greve Associates.		

City of Redlands General Plan Noise Element, Chapter 7 Healthy Community, Section 7.5 Noise, Table 7-11.

To limit transportation related noise impacts, the City of Redlands maintains an exterior (outdoor) noise standard of 60 dBA CNEL. As shown on Exhibit 3-B, the outdoor environment is limited to private yard of single family as measured at the property line; multifamily private patio or balcony which is served by a means of exit from inside; mobile home park; hospital patio; park picnic area; school playground; hotel and recreational area. In addition, the City of Redlands has adopted an interior noise level limit of 45 dBA CNEL for residential land uses.

3.2.3 NOISE PRINCIPLES AND ACTIONS

The Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. To protect City of Redlands residents from excessive noise, the Noise Element contains the following noise Principles and Actions related to the Project:

Principles

- 7.P.39 Support measures to reduce noise emissions by motor vehicles, aircraft, and trains.
- 7.P.40 Protect public health and welfare by eliminating existing noise problems where feasible and by preventing significant degradation of the future acoustic environment.
- 7.P.41 Ensure that new development is compatible with the noise environment by continuing to use potential noise exposure as a criterion in land use planning
- 7.P.42 Guide the location and design of transportation facilities, industrial uses, and other potential noise generators to minimize the effects of noise on adjacent land uses
- 7.P.43 Ensure long-term compatibility between the Redlands Municipal Airport and surrounding land uses.

Actions

- 7-A.135 Use the noise and land use compatibility matrix (Table 7-10) and Future Noise Contours map (Figure 7-9) as criteria to determine the acceptability of a given land use, including the improvement/construction of streets, railroads, freeways, and highways. Do not permit new noise-sensitive uses—including schools, hospitals, places of worship, and homes—where noise levels are “normally unacceptable” or higher, if alternative locations are available for the uses in the city.
- 7-A.136 Require a noise analysis be conducted for all development proposals located where projected noise exposure would be other than “clearly” or “normally compatible” as specified in Table 7-10.
- 7-A.137 For all projects that have noise exposure levels that exceed the standards in Table 7-10, require site planning and architecture to incorporate noise-attenuating features. With mitigation, development should meet the allowable outdoor and indoor noise exposure standards in Table 7-11. When a building’s openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation shall be provided.
- 7-A.137 For all projects that have noise exposure levels that exceed the standards in Table 7-10, require site planning and architecture to incorporate noise-attenuating features. With mitigation, development should meet the allowable outdoor and indoor noise exposure

standards in Table 7-11. When a building's openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation shall be provided.

- 7-A.138 Continue to maintain performance standards in the Municipal code to ensure that noise generated by proposed projects is compatible with surrounding land uses.

Railroad Noise

- 7-A.139 Work with SANBAG and other agencies to ensure that the Redlands Rail project incorporates mitigation to minimize potential impacts to the surrounding noise-sensitive uses once the final design is complete.
- 7-A.140 Coordinate with other agencies and private entities to implement a railroad quiet zone and other methods of reducing railroad noise impacts on surrounding uses along the Redlands Rail project and Southern Pacific Railroad.

The City of Redlands General Plan incorporates the implementing noise policies from Measure U. Measure U was certified by The City of Redlands in 1997 to address impacts from growth. Implementing policies for the noise standards include requirements for a noise impact evaluation, consideration of a noise monitoring program, the minimization of transportation noise, and other requirements for noise mitigation and the administration of the standards.

3.3 CITY OF REDLANDS GENERAL PLAN NOISE ELEMENT ENVIRONMENTAL IMPACT REPORT

To support the General Plan Noise Element, the City of Redlands adopted an Environmental Impact Report (EIR). (13 pp. 3.12-17) Section 3.12 of the EIR describes the potential Rail Noise source activities.

The noise impacts associated with rail activities depend on numerous factors, including the type of train, the length of train, the physical track conditions, the geometry and intervening structures between the rail line and its receptor, the number of trains operating during the daytime, the number of trains operating during the nighttime, and the speed of the train. Additionally, if the horn is required to sound a warning (typically at at-grade crossings), the noise level impact will be greater to those uses nearest the intersection.

Currently, two rail lines pass through portions of the city. The first is located along the Redlands Boulevard corridor and runs in an east-west direction generally following I-10 and runs through Downtown Redlands. This rail line is currently inactive. However, the San Bernardino Associated Governments' (SANBAG's) Redlands Passenger Rail Project is now cleared for final design and construction. Impacts associated with the addition of the operations within the Redlands Corridor were assessed in a technical noise report, which follows the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment. Mitigation measures were provided in the analysis; however, it was determined that further analysis to assess all the potential impacts on the surrounding noise-sensitive uses would be necessary once the final design is complete. Noise contours for the Passenger Rail Project were not available, but the final project EIR for the Passenger Rail Project screened various locations within screening distance of the rail line to show potential noise impacts. With the implementation of quiet zones, most locations would experience

less than severe noise impacts. In February 2015, the City Redlands approved quiet zones for the Redlands Passenger Rail Project.

3.4 CITY OF REDLANDS OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from non-transportation noise source activities such as the expected air conditioning units, loading dock activities, parking lots, trash enclosures, any number of other outdoor activities within the Transit Villages Specific Plan (TVSP) Project, are evaluated against standards established in the Municipal Code. The City of Redlands Municipal Code noise standards are provided in Appendix 3.1. The City of Redlands Municipal Code, Chapter 8.06 relies on the use of percentile noise descriptors to ensure that the duration of the noise source is fully considered. However, due to the relatively constant intensity of the Project noise activities, the L_{50} or average L_{eq} noise level metrics best describe the Project related operational noise source activities. The L_{eq} noise level metric accounts for noise fluctuations over time by averaging the louder and quieter events and giving more weight to the louder events. In addition, due to the mathematical relationship between the median (L_{50}) and the mean (L_{eq}), the L_{eq} will always be larger than or equal to the L_{50} . The more variable the noise becomes, the larger the L_{eq} becomes in comparison to the L_{50} . Therefore, this noise study conservatively relies on the average L_{eq} sound level limits to describe the Project noise levels.

For the noise-sensitive residential uses in the Project study area, Section 8.06.070[A] Table 1 identifies the base exterior noise level standard of 60 dBA L_{eq} during the daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA L_{eq} during the nighttime (10:00 p.m. to 7:00 a.m.) hours as shown on Table 3-1. (14)

TABLE 3-1: OPERATIONAL NOISE STANDARDS

Land Use	Time Period	Exterior Noise Level Standards (dBA) ¹				
		L_{50} (30 mins)	L_{25} (15 mins)	L_8 (5 mins)	L_2 (1 min)	L_{max} (0 min)
Residential	Daytime	60	65	70	75	80
	Nighttime	50	55	60	65	70
Commercial	Daytime	65	70	75	80	85
	Nighttime	60	65	70	75	80
Industrial	Anytime	75	80	85	90	95

¹ City of Redlands Municipal Code, Section 8.06.070 [A]-Table 1 (Appendix 3.1). Section 8.06.070[C] states that if the measured ambient level exceeds the allowable noise exposure standard within any of the first four (4) noise limit categories above, the allowable noise exposure standard shall be adjusted in five (5) dB increments in each category as appropriate to encompass or reflect said ambient noise level. The percent noise level is the level exceeded "n" percent of the time during the measurement period. L_{50} is the noise level exceeded 50% of the time. "Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

Section 8.06.070[B] indicates that No person shall operate, or cause to be operated, any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property to exceed:

1. The exterior noise standard of the applicable land use category for a cumulative period of 30 minutes in any hour (L_{50}); or
2. The exterior noise standard of the applicable land use category, plus 5 dBA, for a cumulative period of more than 15 minutes in any hour (L_{25}); or
3. The exterior noise standard of the applicable land use category, plus 10 dBA, for a cumulative period of more than 5 minutes in any hour (L_8); or
4. The exterior noise standard of the applicable land use category, plus 15 dBA, for a cumulative period of more than 1 minute in any hour (L_2).
5. The exterior noise standard for the applicable land use category, plus 20 dBA, or the maximum measured ambient noise level, for any period of time (L_{max}).

In addition, Section 8.06.070[C] states *that if the measured ambient level exceeds the allowable noise exposure standard within any of the first four (4) noise limit categories above, the allowable noise exposure standard shall be adjusted in five (5) dB increments in each category as appropriate to encompass or reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.* In effect, when the ambient noise levels exceed the base exterior noise level limits, the noise level standard shall be adjusted as appropriate to encompass or reflect the ambient noise level. The noise level limit adjustments for the City of Redlands noise standards are shown on Table 3-1.

3.5 CITY OF REDLANDS CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the TVSP, noise from construction activities is typically limited to the hours of operation established under a jurisdiction's Municipal Code. Section 8.06.090(F) the City of Redlands Municipal Code, provided in Appendix 3.1, indicates that construction activity is considered exempt from the noise level standards between the hours of 7:00 a.m. to 6:00 p.m. Monday to Saturdays; with no activity allowed on Sundays or holidays. (14) However, neither the City of Redlands General Plan and Municipal Codes establish numeric maximum acceptable construction source noise levels at potentially affected receivers, which would allow for a quantified determination of what CEQA constitutes a *substantial temporary or periodic noise increase*. Therefore, a numerical construction threshold based on Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* is used for analysis of daytime construction impacts, as discussed below.

According to the FTA, local noise ordinances are typically not very useful in evaluating construction noise. They usually relate to nuisance and hours of allowed activity, and sometimes specify limits in terms of maximum levels, but are generally not practical for assessing the impact of a construction project. Project construction noise criteria should account for the existing noise environment, the absolute noise levels during construction activities, the duration of the construction, and the adjacent land use. Due to the lack of standardized construction noise thresholds, the FTA provides guidelines that can be considered reasonable criteria for construction noise assessment. The FTA considers a daytime exterior construction noise level of

80 dBA L_{eq} and nighttime exterior construction noise level of 70 dBA L_{eq} as a reasonable threshold for noise sensitive residential land use. (8 p. 179)

3.6 CITY OF REDLANDS CONSTRUCTION VIBRATION STANDARDS

The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS. As such, this noise study uses the City of Redlands Municipal Code vibration perception threshold of 0.01 in/sec RMS to assess the potential vibration impacts due to Project construction.

3.7 REDLANDS PASSENGER RAIL PROJECT (FINAL EIS/EIR)

In February 2015, the San Bernardino Associated Governments' (SANBAG's) adopted the Final Environmental Impact Statement and Record of Decision/Environmental Impact Report (Final EIS/EIR) for the Redlands Passenger Rail Project. (16) The Final EIS/EIR determined that the *Project would increase ambient noise levels as a result of passenger train operations along the nine-mile railroad corridor. Multiple forms of noise mitigation are considered and discussed in this EIS/EIR, including the implementation of quiet zones and/or construction of sound barriers.*

3.7.1 LONG-TERM OPERATIONAL

The Final EIS/EIR determined that the Redlands Passenger Rail long-term operations would result in increased noise levels from daily passenger rail operations. Redlands Passenger Rail operations would involve new passenger rail service consisting of 22 daily and three evening train trips that would pass along the railroad corridor. Typical train speeds along the railroad corridor would range from 20 to 35 miles per hour.

Over the long-term operation of the Redlands Passenger Rail project, passenger train movements back and forth through the railroad corridor would result in ground-borne vibration and/or noise and a corresponding potential for vibration-related damage to occur to adjacent structures and in close proximity to the rail corridor. Although no ground-borne noise impacts are predicted from the Redlands Passenger Rail project, damage from groundborne vibration could occur to structures within 50 feet of the SANBAG right of way. Damage as a result of ground-borne vibration from train operations is extremely rare for new structures and is typically of greatest concern for older structures. Considering the railroad corridor has been used previously over the course of many years since the construction of the Redlands Santa Fe Depot, it is unlikely that this historic building would suffer any structural damage due to Project-related ground vibration.

3.7.2 TEMPORARY CONSTRUCTION

Construction of the Redlands Passenger Rail Project would result in temporary noise and vibration-related effects along the railroad corridor from use of heavy equipment and machinery. Construction activities can produce varying degrees of ground vibration depending on the equipment and methods employed and the soil conditions within the area.

3.7.3 MITIGATION MEASURES

The Redlands Passenger Rail Project Final EIS/EIR identified the following mitigation measures to avoid,

minimize, or reduce adverse noise and vibration effects

NV-1 Employ Noise-Reducing Measures during Construction. SANBAG shall require its construction contractors to employ measures to minimize and reduce construction noise. Noise reduction measures that shall be implemented to reduce construction noise to acceptable levels may include but are not limited to the following:

- Use available noise suppression devices and techniques, including:
 - Equipping all internal combustion engine-driven equipment with mufflers, air-inlet silencers, and any other shrouds, shields, or other noise-reducing features that are in good operating condition and appropriate for the equipment (5 to 10 dB reduction possible).
 - Using “quiet” models of air compressors and other stationary noise sources where such technology exists.
 - Using electrically powered equipment instead of pneumatic or internal combustion-powered equipment, where feasible.
 - Using noise-producing signals, including horns, whistles, alarms, and bells, for safety-warning purposes only.
 - Locating stationary noise-generating equipment, construction parking, and maintenance areas as far as reasonable from sensitive receivers when sensitive receivers adjoin or are near the construction project area of potential effect (APE).
 - Prohibiting unnecessary idling of internal combustion engines (i.e., in excess of 5 minutes).
 - Placing temporary soundwalls or enclosures around stationary noise-generating equipment when located near noise-sensitive areas (5 to 15 dB reduction possible).
 - Ensuring that project-related public address or music systems are not audible at any adjacent receiver.

NV-2 Prepare a Community Notification Plan for Project Construction. The construction contractor shall prepare and maintain a community notification plan to address project construction issues the community may have during construction. Components of the plan may include construction phasing to minimize the duration of noise or vibration at any one location. Initial information packets shall be prepared and mailed to all residences within a 500-foot radius of project construction, with updates prepared as necessary to indicate new scheduling or processes. A project liaison shall be identified who will be available to respond to questions from the community or other interested groups.

NV-2 Prepare a Community Notification Plan for Project Construction. The construction contractor shall prepare and maintain a community notification plan to address project construction issues the community may have during construction. Components of the plan may include construction phasing to minimize the duration of noise or vibration at

any one location. Initial information packets shall be prepared and mailed to all residences within a 500-foot radius of project construction, with updates prepared as necessary to indicate new scheduling or processes. A project liaison shall be identified who will be available to respond to questions from the community or other interested groups.

NV-3 Establish Quiet Zones. At-grade crossings shall be designed and constructed to be compatible with the formation of Quiet Zones. Prior to the operation, SANBAG shall coordinate with the City of San Bernardino, City of Loma Linda, and the City of Redlands, to construct and establish quiet zones at the following grade crossings:

- South Arrowhead Avenue;
- South Sierra Way;
- West Central Avenue;
- East Orange Show Road;
- South Waterman Avenue;
- South Tippecanoe Avenue;
- South Richardson Street;
- Mountain View Avenue;
- West Colton Avenue;
- Alabama Street
- Tennessee Street;
- Church Street; and
- North University Street

NV-4 Construct Sound Barriers. SANBAG shall install up to 12-foot in height sound barriers at priority locations along portions of the rail corridor to reduce noise levels at receivers identified with severe noise impacts following the application of quiet zones.

NV-5 Wayside Rail Lubrication. SANBAG shall install wayside applicators for all tight-radius curves on the project alignment prior to the start of Project operations. If the wayside applicators are not sufficient to reduce squeal to an acceptable level, additional reduction may be required through customized profiling of the rail to reduce the forces required for trains to negotiate the curve.

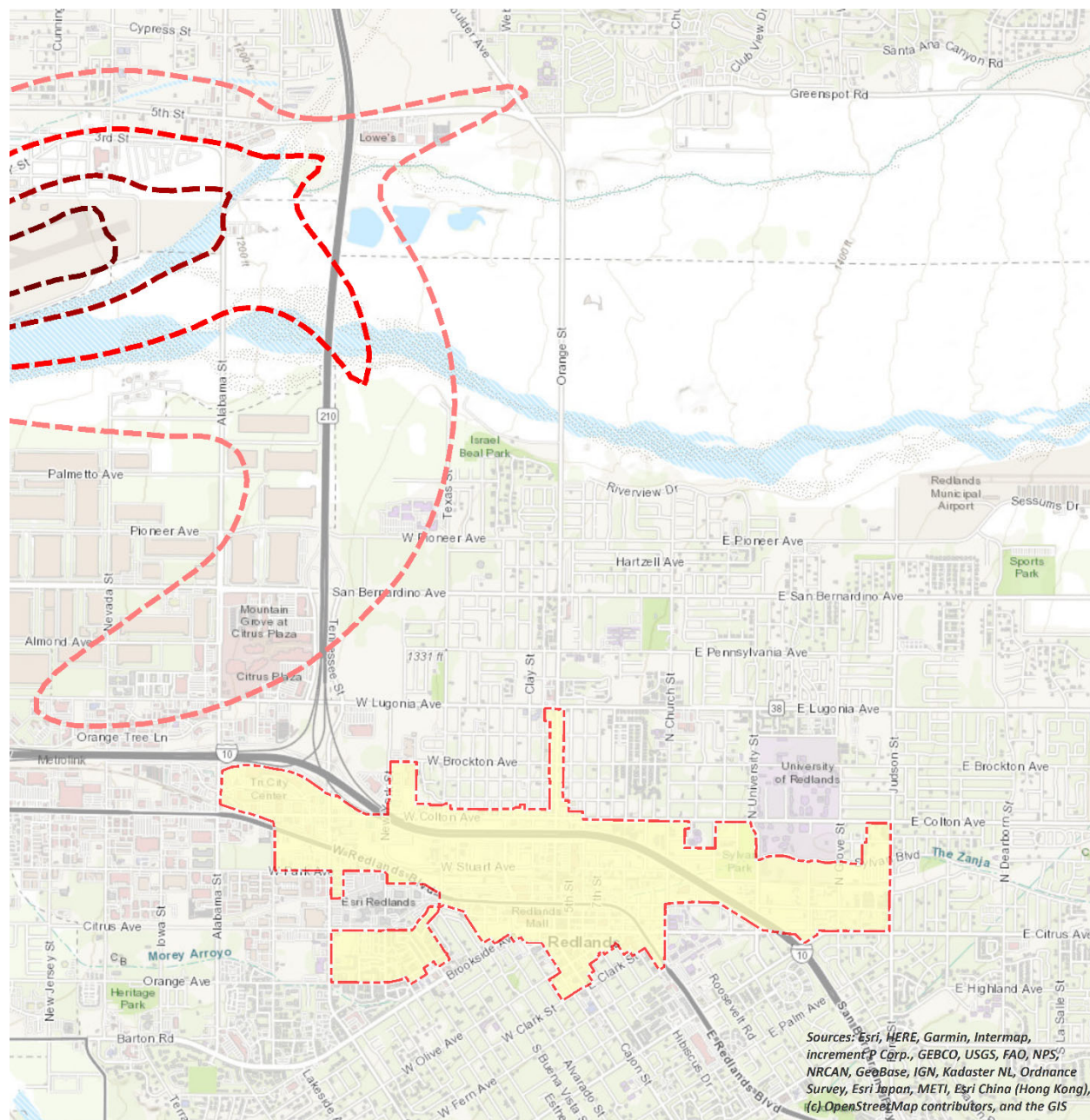
NV-6 Use Ballast Mats, Resiliently Supported Ties, or Measures of Comparable Effectiveness on Portions of the Rail near Sensitive Receivers. SANBAG shall install track design specifications as part of project design to include the use of ballast mats or resiliently supported ties on portions of the track near sensitive receivers to minimize project-related ground-borne vibration and wheel rail noise generated when the trains pass sensitive receivers. The actual measures and their corresponding placement will be determined following more detailed vibration testing and analysis during final engineering design.

NV-7 Wayside Rail Lubrication. Provide Building Noise Insulation to Severe- and Moderate-Impact Residences. For the ten residential structures represented by Receivers 3, 22, and 41, SANBAG will offer to install sound insulation. Treatments may include sealing and relocating vents, caulking and sealing gaps in the building façade and installing new doors and windows that are specially designed to meet acoustical transmission-loss requirements. Acoustical performance ratings are published in terms of Sound Transmission Class (STC) for these special windows. A minimum STC rating of 39 will be used on any window exposed to the noise source.

3.8 SAN BERNARDINO INTERNATIONAL AIRPORT (SBIA)

The San Bernardino International Airport (SBIA) is located approximately 2.4 miles northwest of the Project site. This places the Project site within the SBIA Influence Area. The SBIA was initially built as Norton Air Force Base by the United States Air Force (USAF). Under the Base Realignment and Closure Act of 1990, Norton Air Force base was closed and disposed of by the USAF for a civilian aviation reuse in 1994 and transferred to the San Bernardino International Airport Authority (SBIAA). The SBIAA operates the facility as a public-use general aviation airport that accommodates aircraft ranging from piston-powered propeller aircraft to multi-engine jet aircraft including large air cargo aircraft. (17) The latest aircraft noise contour boundaries for the SBIA were published by the SBIAA on July 2, 2019, as part of the Eastgate Air Cargo Facility Final Environmental Assessment. (17) Figure 4-6 of the Final Environmental Assessment describes the future 2024 Proposed Project CNEL Contours for the SBIA. The future SBIA noise level contours boundaries representing approximately 87,500 annual aircraft operations are shown on Exhibit 3-C.

As shown on Exhibit 3-C the Project land uses are generally located well outside the 60 dBA CNEL noise level contours of the SBIA. Therefore, the Project land use is considered *normally acceptable* according to the City of Redlands *Community Noise and Land Use Compatibility* guidelines as shown on Exhibit 3-A.

EXHIBIT 3-C: SAN BERNARDINO INTERNATIONAL AIRPORT (SBIA) NOISE CONTOURS**LEGEND:****San Bernardino International (SBD) Airport Future Noise Level Contour Boundaries**

Project Site Boundary
 60 dBA CNEL
 65 dBA CNEL
 70 dBA CNEL
 75 dBA CNEL

Source: Figure 4-6 of the Eastgate Air Cargo Facility Final Environmental Assessment published by the SBIAA on July 2, 2019.

This page intentionally left blank

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on currently adopted guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. (1) For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

- 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 CEQA GUIDELINES NOT FURTHER ANALYZED

The Project site is not located within two miles of a public airport or within an airport land use plan. The closest airport is the San Bernardino International Airport (SBIA) located roughly 2.4 miles northwest of the Project site. As such, the Project site would not be exposed to excessive noise levels from airport operations, and therefore, impacts are considered *less than significant*, and no further noise analysis is conducted in relation to CEQA Appendix G Guideline C.

4.2 INCREMENTAL NOISE LEVEL INCREASES

Noise level increases resulting from the Project are evaluated based on the Appendix G CEQA Guidelines described above at the nearest receiver locations. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers to determine if a noise level increase represents a significant adverse environmental impact (18). There is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged.

To describe the amount to which a given noise level increase is considered acceptable, the City of Redlands General Plan Noise Element has adopted criteria for determining appropriate mitigation under the California Environmental Quality Act (CEQA). An increase in ambient noise levels is assumed to be a significant noise impact if a project causes ambient noise levels to exceed the following:

- An increase in exposure of four or more dB if the resulting noise level would exceed that described as clearly compatible for the affected land use, as established in the *Noise/Land Use Compatibility Matrix and Interpretation* (Exhibit 3-A)

- Any increase of six dB or more, due to the potential for adverse community response.

4.3 SIGNIFICANCE CRITERIA SUMMARY

Noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development. Table 4-1 shows the significance criteria summary matrix.

TABLE 4-1: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Affected GP Land Use ²	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Noise/Land Use Compatibility ¹	All	Exterior Noise Level Criteria	See Table 3-1	
Operational ²	Residential	If ambient ≥ 60 dBA L _{eq}	≥ 4 dBA L _{eq} Project increase	
	Comm./Industrial	If ambient ≥ 75 dBA L _{eq}		
	All	Any ambient L _{eq}	≥ 6 dBA L _{eq} Project increase	
Construction	All	Permitted hours between 7:00 a.m. to 6:00 p.m. except Sundays or federal holidays. ³		
		Noise Level Threshold ⁴	80 dBA L _{eq}	70 dBA L _{eq}
		Vibration Level Threshold ⁵	0.01 in/sec RMS	n/a

¹ City of Redlands General Plan Noise/Land Use Compatibility Matrix and Interpretation (Exhibit 3-A).

² City of Redlands General Plan Measure U Policy 9.0v.

³ City of Redlands Municipal Code, Section 8.06.090 (F) (Appendix 3.1).

⁴ Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual.

⁵ City of Redlands Municipal Code, Section 8.06.020 (Appendix 3.1).

"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.; "RMS" = Root-mean-square.

5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, ten 24-hour noise level measurements were taken near each of the Arrow rail stations and each of the regulating land uses within the TVSP. The receiver locations were selected to describe and document the existing noise environment. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, November 10, 2021. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

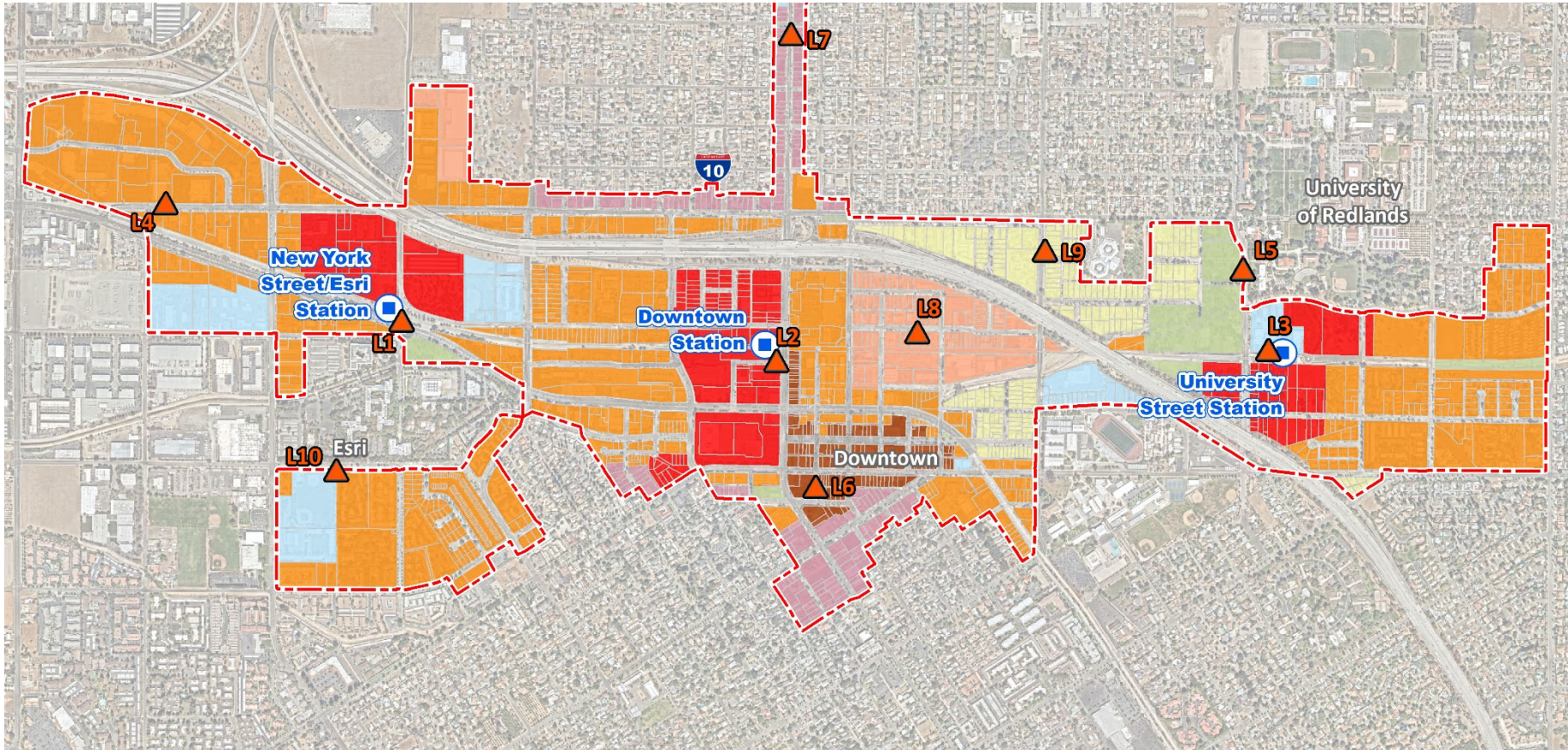
To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the equivalent daytime and nighttime hourly noise levels. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (19)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. Both Caltrans and the FTA recognize that it is not reasonable to collect noise level measurements that can fully represent every part of a private yard, patio, deck, or balcony normally used for human activity when estimating impacts for new development projects. This is demonstrated in the Caltrans general site location guidelines which indicate that, *sites must be free of noise contamination by sources other than sources of interest. Avoid sites located near sources such as barking dogs, lawnmowers, pool pumps, and air conditioners unless it is the express intent of the analyst to measure these sources.* (2) Further, FTA guidance states, *that it is not necessary nor recommended that existing noise exposure be determined by measuring at every noise-sensitive location in the project area. Rather, the recommended approach is to characterize the noise environment for clusters of sites based on measurements or estimates at representative locations in the community.* (8)

Based on recommendations of Caltrans and the FTA, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. (8) In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS



LEGEND:

-  N
-  Measurement Locations
-  Transit Villages Specific Plan (TVSP) Boundary
-  Arrow Rail Stations

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (L_{eq}). The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location ¹	TVSP Land Use ²		Description	Energy Average Noise Level (dBA L_{eq}) ³		CNEL ⁴
				Daytime	Nighttime	
L1	Village General	(VG)	Located southwest of the New York Street/ESRI Station north of Redlands Boulevard.	69.6	63.6	72.0
L2	Village Center	(VC)	Located near Historic Redlands Train Station at 383-389 Orange Street.	69.9	63.1	71.7
L3	Special District 1	(SD1)	Located west of the University Street Station north Park Avenue near Frederick Loewe Theatre.	57.1	57.6	64.4
L4	Village General	(VG)	Located north of Colton Avenue in the Tri City Shopping Center south of the CVS Pharmacy.	66.4	62.0	69.7
L5	Civic Space	(CS)	Located northwest of the University Street Station near Sylvan Park at 601 North University Street.	64.6	64.0	70.7
L6	Downtown	(DT)	Located north of East Vine Street and south of East Citrus Avenue.	57.6	56.0	62.9
L7	Village Corridor	(COR)	Located near the existing single-family residence at 1154 Orange Street.	70.2	65.5	73.4
L8	Neighborhood General 2	(NG2)	Located near the existing single-family residence at 410 East Stuart Street.	63.1	59.3	66.9
L9	Neighborhood General 1	(NG1)	Located near the existing single-family residence at 801 Stillman Avenue.	65.1	59.2	67.5
L10	Special District 1	(SD1)	Located south of the ESRI campus near the Redlands Adventist Academy at 130 Tennessee Street.	64.4	55.3	65.0

¹ See Exhibit 5-A for the noise level measurement locations.

² Transit Villages Specific Plan regulating land use as shown on Exhibit 5-A.

³ Energy (logarithmic) average levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.

"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

⁴ Calculated 24-hour Community Noise Equivalent Level (CNEL).

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L₁, L₂, L₅, L₈, L₂₅, L₅₀, L₉₀, L₉₅, and L₉₉ percentile noise levels observed during the daytime and nighttime periods.

6 NOISE/LAND USE COMPATIBILITY

The Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community and establishes noise level requirements for all land uses. The compatibility criteria, shown on Exhibit 3-A, provides the city with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels. The *Noise/Land Use Compatibility Matrix and Interpretation* describes categories of compatibility and not specific noise standards. Table 5-2 summarizes the existing ambient noise level conditions in relation to the *Noise/Land Use Compatibility Matrix and Interpretation* compatibility guidelines identified in the Table 7-10 of City of Redlands Noise Element (Exhibit 3-A). Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

TABLE 5-2: EXISTING LAND USE COMPATIBILITY

Location ¹	TVSP Land Use ²		CNEL ³	Existing General Plan Land Use Category	General Plan Noise/Land Use Compatibility ⁴
L1	Village General	(VG)	72.0	Commercial	Zone A - Clearly Compatible
L2	Village Center	(VC)	71.7	Commercial	Zone A - Clearly Compatible
L3	Special District 1	(SD1)	64.4	Commercial	Zone A - Clearly Compatible
L4	Village General	(VG)	69.7	Commercial	Zone A - Clearly Compatible
L5	Civic Space	(CS)	70.7	Open Space	Zone B - Normally Compatible
L6	Downtown	(DT)	62.9	Commercial	Zone A - Clearly Compatible
L7	Village Corridor	(COR)	73.4	Commercial	Zone A - Clearly Compatible
L8	Neighborhood General 2	(NG2)	66.9	Commercial	Zone A - Clearly Compatible
L9	Neighborhood General 1	(NG1)	67.5	Residential	Zone C - Normally Incompatible
				Commercial	Zone A - Clearly Compatible
L10	Special District 1	(SD1)	65.0	Public/Institutional	Zone A - Clearly Compatible

¹ See Exhibit 5-A for the noise level measurement locations.

² Transit Villages Specific Plan regulating land use as shown on Exhibit 5-A.

³ Calculated 24-hour Community Noise Equivalent Level (CNEL).

⁴ City of Redlands Noise Element (Table 7-10) Noise/Land Use Compatibility Matrix and Interpretation (Exhibit 3-A).

Table 5-2 shows that the TVSP commercial land uses are generally considered as *clearly compatible* with the Noise/Land Use Compatibility Matrix and Interpretation compatibility guidelines. *Clearly compatible* land use is considered satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements. For *normally compatible* land use, new construction or development should be undertaken only after detailed analysis of the noise reduction requirements are 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.

The existing noise level measurements also show that the residential land uses located within the Village Corridor, Neighborhood General 1 and Neighborhood General 2 are considered *normally incompatible* and 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.

7 OFF-SITE TRAFFIC NOISE

Consistent with the City of Redlands General Plan Update, the TVSP would generate traffic which would increase the traffic noise levels along existing and future roadways. According to the Traffic Noise section (Chapter 3.12) in the *Revised Draft Environmental Impact Report for the Redlands General Plan Update and Climate Action Plan*, the proposed General Plan update would increase the off-site traffic noise levels by 1.2 dBA CNEL. (13) This is not normally perceptible by the human ear in an outdoor environment. Therefore, consistent with the General Plan EIR, the potential TVSP off-site traffic noise impacts would be less than significant.

This page intentionally left blank

8 ON-SITE TRAFFIC NOISE

An on-site exterior noise impact analysis has been completed to determine the traffic-related noise levels and to identify potential necessary mitigation measures for future residential uses within the TVSP. It is expected that the primary source of noise impacts to the TVSP study area will be traffic-related noise from the I-10 Freeway, and key arterial roadways such as New York Street, Eureka Street, Orange Street, Church Street, Grove Street, Judson Street, Colton Avenue, Park Avenue, Redlands Boulevard, State Street, and Citrus Avenue.

8.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA noise prediction model, the *Revised Draft Environmental Impact Report for the Redlands General Plan Update and Climate Action Plan* (13) determined that traffic impacts could occur due to increased vehicular traffic associated with future growth. However, with the implementation of the General Plan principles and actions would further minimize the noise and vibration impacts. The traffic noise analysis shows that noise sensitive land uses adjacent to the Arrow commuter rail line, the I-10 Freeway and key arterial roadways will experience future unmitigated exterior noise levels greater than 65 dBA CNEL, which represents *normally incompatible* residential use based on the City of Redlands *Noise/Land Use Compatibility Matrix and Interpretation* guidelines. *For normally incompatible exterior noise levels, 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.*

Therefore, the based on the proximity of future noise sensitive land uses adjacent to the arrow commuter rail line, the I-10 Freeway and key arterial roadways, the on-site traffic-related noise impacts at future residential dwelling units within the TVSP will be *potentially significant* and require exterior noise mitigation. However, with the exterior noise mitigation measures identified in this report, the on-site traffic noise impacts will be reduced to *less than significant* impacts with mitigation.

8.2 ON-SITE EXTERIOR NOISE MITIGATION

To reduce the on-site traffic noise levels for future residential dwelling units to *less than significant*, all future development within the TVSP shall provide the following.

- Prior to the issuance of a building permit for new residential dwelling units within the TVSP, the Project Applicant/ Developer shall demonstrate compliance with the City of Redlands 60 dBA CNEL exterior noise level standards as defined by Table 7-11 of the City of Redlands General Plan Noise Element. As shown on Exhibit 3-B, footnote 2, the “outdoor environment is limited to private yard of single family as measured at the property line; multifamily private patio or balcony which is served by a means of exit from inside; mobile home park; hospital patio; park picnic area; school playground; hotel and recreational area.”
- If the exterior noise levels cannot be fully mitigated to the 60 dBA CNEL exterior noise level standard for outdoor environments, the final acoustical report shall satisfy the 45 dBA CNEL

interior noise level standard of the City of Redlands General Plan Noise Element (Table 7-11), and by Title 24, Part 2, of the California Building Code.

8.3 ON-SITE INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels of future residential dwelling units comply with the City of Redlands interior noise level standards, future exterior noise levels discussed in Section 8.1 are used in this section to evaluate potential interior noise levels of the Project.

8.3.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building facade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." (20) The use of central air conditioning provides noise reduction benefits by permitting windows to be kept closed. (21) However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: [1] weather-stripped solid core exterior doors; [2] upgraded dual glazed windows; [3] mechanical ventilation/air conditioning; and [4] exterior wall/roof assemblies free of cut outs or openings. Each of these methods are included in City construction standards.

8.3.2 INTERIOR NOISE LEVEL ASSESSMENT

To provide the necessary interior noise level reduction, TVSP buildings will require a windows-closed condition and a means of mechanical ventilation (e.g. air conditioning). With typical building construction and a windows-closed condition, a minimum 25 dBA CNEL reduction is achievable for residential dwelling units of the Project. However, since the exterior noise levels from future noise sensitive land uses adjacent to the arrow commuter rail line, the I-10 Freeway and key arterial roadways will exceed 60 dBA CNEL, detailed interior noise analysis based on site-specific architectural floor plans and elevations are required to satisfy the City of Redlands General Plan Noise Element, Table 7-11 (Exhibit 3-B), 45 dBA CNEL interior noise level standard for residential dwelling units. Therefore, since future interior noise levels of residential dwelling units may exceed 45 dBA CNEL, the noise level impact will be *potentially significant*, requiring interior noise mitigation.

8.4 ON-SITE INTERIOR NOISE MITIGATION

To reduce the on-site interior noise levels for future residential dwelling units, a site-specific noise study is required for all future development with residential units located within the TVSP.

- Prior to the issuance of a building permit for residential dwelling units within the TVSP, the Project Applicant/ Developer shall demonstrate compliance with the City of Redlands 45 dBA CNEL interior noise level standards as defined by Table 7-11 of the City of Redlands General Plan Noise Element and by Title 24, Part 2, of the California Building Code.

9 OPERATIONAL IMPACTS

This section discusses the potential noise and vibration impacts due to the operation of the proposed Project.

9.1 OPERATIONAL NOISE LEVELS

The TVSP will include a combination of noise source activities consistent with the underlying land uses outlined in the Regulating Plan shown on Exhibit 1-B. It is expected that the on-site Project-related exterior noise sources will include: air conditioning units, loading dock activities, parking lots, trash enclosures, any number of other outdoor activities. These expected Project-related noise sources are consistent with the types of existing noise sources observed in the Project study area.

Since the Project includes the potential for the operation of nuisance noise source activity, the impacts due to Project operational noise levels is determined to be *potentially significant*. However, with the mitigation measures identified below, operational noise impacts will be *less than significant*.

9.2 OPERATIONAL NOISE MITIGATION

The following mitigation measures are identified to reduce the operational noise levels associated with the Project.

- Prior to the issuance of a building permit for non-residential uses potentially impact noise sensitive residential land uses, the Project Applicant/ Developer shall demonstrate compliance with the Section 8.06.090(F) the City of Redlands Municipal Code.

9.3 OPERATIONAL VIBRATION LEVELS

The Project's residential development is not expected to include any specific type of operational vibration sources, and therefore, the potential operational vibration impacts for the Transit Villages Specific Plan (TVSP) residential land use are considered *less than significant*.

This page intentionally left blank

10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project. To prevent high levels of construction noise from impacting noise-sensitive land uses, Section 8.06.090(F) the City of Redlands Municipal Code, indicates that construction activity is considered exempt from the noise level standards between the hours of 7:00 a.m. to 6:00 p.m. Monday to Saturdays; with no activity allowed on Sundays or holidays. (14)

10.1 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers, and portable generators that when combined can reach high levels. This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the peak construction activity noise levels during Project construction. The construction reference noise level measurements represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 68 dBA to more than 80 dBA when measured at 50 feet. Hard site conditions are used in the construction noise analysis which result in noise levels that attenuate (or decrease) at a rate of 6 dBA for each doubling of distance from a point source (i.e. construction equipment). For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver and would be further reduced to 68 dBA at 200 feet from the source to the receiver.

10.2 CONSTRUCTION NOISE LEVEL COMPLIANCE

The construction noise analysis shows that the highest construction noise levels will occur when construction activities take place at the closest point from the edge of primary construction activity to each of the nearby receiver locations. Project construction noise levels are considered exempt if activities occur within the hours specified in the City of Redlands Municipal Code, Section 8.06.090(F) of 7:00 a.m. to 6:00 p.m. Monday to Saturdays; with no activity allowed on Sundays or holidays. (14)

If Project construction activity occurs outside of the hours specified in the Municipal Code, noise levels shall satisfy the FTA nighttime exterior construction noise level of 70 dBA L_{eq} for noise sensitive residential land use. No Project construction activity is anticipated within the hours specified in the City of Redlands Municipal Code, Section 8.06.090(F) and therefore, the noise impacts due to project construction noise is considered *less than significant*.

10.3 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. Ground-borne vibration levels resulting from typical construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration (FTA). (8) However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used.

Ground vibration levels associated with various types of construction equipment are summarized on Table 10-1. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the potential Project construction vibration levels using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation:

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

TABLE 10-1: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV (in/sec) at 25 feet
Small bulldozer	0.003
Jackhammer	0.035
Loaded Trucks	0.076
Large bulldozer	0.089

Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual

Using the vibration source level of construction equipment provided on Table 10-1 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 0.089 in/sec PPV at 25 feet. To describe the RMS vibration level and demonstrate compliance with the City of Redlands perceptible vibration threshold of 0.01 in/sec RMS, PPV velocities are converted to RMS vibration levels based on the Caltrans *Transportation and Construction Vibration Guidance Manual* conversion factor of 0.71.

Table 10-2 presents the expected Project related vibration levels at distances ranging from 25 to 150 feet from construction activity. Table 10-2 shows that construction vibration levels in RMS are expected to range from 0.004 to 0.063 in/sec RMS and will exceed the City of Redlands perceptible vibration threshold of 0.01 in/sec RMS at distances of less than 100 feet. Therefore, the Project-related vibration impacts will be *potentially significant* during the construction activities at the Project site and mitigation is required.

TABLE 10-2: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Distance to Const. Activity (Feet)	Receiver Levels (in/sec) PPV ¹					Velocity Levels (in/sec) RMS ²	Threshold (in/sec) RMS ³	Threshold Exceeded? ⁴
	Small Bulldozer	Jack-hammer	Loaded Trucks	Large Bulldozer	Peak Vibration			
25'	0.0030	0.0350	0.0760	0.0890	0.0890	0.063	0.01	Yes
50'	0.0011	0.0124	0.0269	0.0315	0.0315	0.022	0.01	Yes
100'	0.0004	0.0044	0.0095	0.0111	0.0111	0.008	0.01	No
125'	0.0003	0.0031	0.0068	0.0080	0.0080	0.006	0.01	No
150'	0.0002	0.0024	0.0052	0.0061	0.0061	0.004	0.01	No

¹ Based on the Vibration Source Levels of Construction Equipment included on Table 10-1.

² Vibration levels in PPV are converted to RMS velocity using a 0.71 conversion factor identified in the Caltrans Transportation and Construction Vibration Guidance Manual, September 2013.

³ City of Redlands Municipal Code, Section 8.06.020.

⁴ Does the vibration level exceed the maximum acceptable vibration threshold?

10.4 CONSTRUCTION NOISE AND VIBRATION MITIGATION MEASURES

Though construction noise and vibration are temporary, intermittent and of short duration, and will not present any long-term impacts, the following mitigation measures would reduce noise and vibration levels produced by construction equipment to nearby noise-sensitive uses. Temporary construction-related noise and vibration impacts will be reduced to *less than significant* impacts with the incorporation of the following mitigation measures:

- All construction activities shall be limited to the daytime hours of between 7:00 a.m. to 6:00 p.m. Monday to Saturdays; with no activity allowed on Sundays or holidays. Section 8.06.090(F) the City of Redlands Municipal Code.
- Construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards, and all stationary construction equipment shall be placed so that emitted noise is directed away from the noise-sensitive use nearest the construction activity.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receiver nearest to the construction activity.
- All construction activity within the TVSP shall satisfy the following construction noise level thresholds:
 - Daytime (7:00 a.m. to 10:00 p.m.) exterior construction noise level of 80 dBA L_{eq}
 - Nighttime (10:00 p.m. to 7:00 a.m.) exterior construction noise level of 70 dBA L_{eq} .
- Install temporary construction noise barriers for occupied noise-sensitive uses for the duration of construction activities exceeding the TVSP construction noise level thresholds. The noise control barrier(s) must provide a solid face from top to bottom and shall:
 - Provide a minimum transmission loss of 20 dBA and be constructed with an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts;

- Be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired; and
 - Be removed and the site appropriately restored upon the conclusion of the construction activity.
- Prior to approval of a demolition permit, grading plans, and/or issuance of building permits for construction activities within 100 feet of existing residential structures or occupied noise-sensitive uses that require the use of large bulldozers, large loaded trucks, jackhammers, pile drivers, and/or caisson drills, the City of Redlands shall ensure that construction plans and specifications state that the use of such vibratory equipment shall be prohibited within 100 feet of existing residential structures or occupied noise-sensitive uses. Instead, small rubber-tired bulldozers shall be used within this area during demolition and/or grading operations to reduce vibration effects. If the use of large bulldozers, loaded trucks, jackhammers, pile drivers, and/or caisson drills is necessary within 100 feet of existing residential structures or occupied noise-sensitive uses, the Project Applicant/Developer shall demonstrate compliance with the City of Redlands Municipal Code, Section 8.06.020 vibration perception threshold as 0.01 inches per second (in/sec) RMS.
- Any site-specific development project within 25 feet of an extremely fragile historic building shall engage a qualified structural engineer to conduct a pre-construction assessment of the structural integrity of the nearby historic structure(s) and submit evidence that the operation of vibration-generating equipment associated with the new development would not result in structural damage to the adjacent historic building(s). If recommended by the pre-construction assessment, groundborne vibration monitoring of nearby historic structures shall be required.

11 REFERENCES

1. **State of California.** *California Environmental Quality Act, Appendix G.* 2018.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* December 2011.
5. **U.S. Department of Transportation Federal Highway Administration.** *Highway Noise Barrier Design Handbook.* 2001.
6. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
7. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
8. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment Manual.* September 2018.
9. **Office of Planning and Research.** *State of California General Plan Guidelines.* October 2019.
10. **State of California.** California Code of Regulations, Title 24, Part 2, Volume 1, Chapter 12, Section 1206.4, Allowable Interior Noise Level. *ICC Digital Coes.* [Online] 2019. <https://codes.iccsafe.org/content/CABCV12019/chapter-12-interior-environment>.
11. —. *2019 California Green Building Standards Code.* January 2020.
12. **City of Redlands General Plan.** *Chapter 7 Healthy Community, Section, 7.5 Noise.* December 2017.
13. **LSA.** *Revised Draft Environmental Impact Report for the Redlands General Plan Update and Climate Action Plan, Chapter 3.12: Noise.* July 21, 2017.
14. **City of Redlands.** *Municipal Code, Chapter 8.06.*
15. **San Bernardino Associated Governments.** *Redlands Passenger Rail Project Final Environmental Impact Statement and Record of Decision/Environmental Impact Report SCH No. 2012041012.* February 2015.
16. **San Bernardino International Airport Authority.** *Final Environmental Assessment - Eastgate Air Cargo Facility.* December 2019.
17. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
18. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
19. **California Department of Transportation.** *Traffic Noise Analysis Protocol.* April 2020.
20. **U.S. Department of Housing and Urban Development.** *The Noise Guidebook.* March 2009.

This page intentionally left blank

12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Transit Villages Specific Plan (TVSP) Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 584-3148.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
1133 Camelback #8329
Newport Beach, CA 92658
(949) 581-3148
blawson@urbanxroads.com



EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of San Diego • March, 2018
Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

This page intentionally left blank

APPENDIX 3.1:

CITY OF REDLANDS MUNICIPAL CODE

This page intentionally left blank

CHAPTER 8.06

COMMUNITY NOISE CONTROL

SECTION:

8.06.010: Purpose

8.06.020: Definitions

8.06.030: General Noise Regulations

8.06.040: Enforcement Authority

8.06.050: Noise Measurement Procedure

8.06.060: Noise Measurement Methodology

8.06.070: Exterior Noise Limits

8.06.080: Interior Noise Standards

8.06.090: Noise Disturbances Prohibited

8.06.100: Residential Air Conditioning Or Air Handling Equipment

8.06.110: Tampering

8.06.120: Exemptions

8.06.130: Preexisting Noise Sources

8.06.140: Violation; Penalty

8.06.010: PURPOSE:

The purpose of this chapter is to implement the noise control provisions of the Redlands general plan by establishing comprehensive regulations for the control of noise within the city. (Ord. 2579 § 1, 2004)

8.06.020: DEFINITIONS:

The following words and phrases shall have the meanings set out in this section. All terminology used in this chapter, not defined below, shall be in conformance with applicable publications of the American National Standards Institute (ANSI) or its successor body.

A-WEIGHTED SOUND LEVEL: The sound level in decibels as measured on a sound level meter using the A-weighting network. The level so read is designated dBA.

AMBIENT NOISE LEVEL: The all encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

COMMERCIAL: Generally consisting of uses permitted in the commercial zones as set forth in title 18 of this code or adopted specific plans.

CONSTRUCTION: Any site preparation, grading, assembly, erection, substantial repair, alteration and related material handling and disposition, or similar activity, for or on public or private rights of way, structures, utilities or public or private property.

CUMULATIVE PERIOD: An additive period of time composed of individual time segments that may be continuous or interrupted.

DECIBEL: A unit for measuring the amplitude of a sound, equal to twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) micropascals.

DEMOLITION: Any dismantling, intentional destruction or removal of structures, utilities, public or private right of way surfaces or similar improvements on public or private property.

EMERGENCY WORK: Any work performed for the purpose of preventing or alleviating the physical trauma or property damage which requires immediate mitigation.

FIXED NOISE SOURCE: A stationary device which creates sounds while fixed or motionless including, but not limited to, residential, agricultural, industrial and commercial machinery and equipment, pumps, fans, compressors, air conditioners or refrigeration equipment.

INDUSTRIAL: Generally consisting of uses permitted in the industrial zones as set forth in title 18 of this code or adopted specific plans.

LICENSED: The possession of a license or a permit issued by the appropriate jurisdictional authority; or, where no permits

or licenses are issued, the sanctioning of the activity by the jurisdiction as noted in public record.

MOBILE NOISE SOURCE: Any noise source other than a fixed noise source.

MOTOR VEHICLE: Shall include any and all self-propelled vehicles as defined in the California Vehicle Code.

MUFFLER OR SOUND DISSIPATIVE DEVICE: A device consisting of a series of chambers or baffle plates, or other mechanical design, for the purpose of receiving exhaust gas from an internal combustion engine and effective in reducing noise.

NOISE CONTROL OFFICER ("NCO"): The code enforcement division of the city or such other employees of the city so designated by the city manager to enforce this chapter.

NOISE DISTURBANCE: Any sound not in compliance with the quantitative standards as listed herein which either:

- A. Endangers or injures the safety or health of human beings or animals;
- B. Annoys or disturbs reasonable persons of normal sensitivities;
- C. Endangers or injures personal or real property; or
- D. Violates section 8.06.030 or 8.06.090 of this chapter.

NOISE SENSITIVE ZONE: Any area designated as such pursuant to this chapter for the purpose of ensuring exceptional quiet.

NOISE ZONE: Any defined areas or regions of a generally consistent land use wherein the ambient noise levels are within a range of five (5) dB.

PERSON: Any individual, association, partnership or corporation, and includes any officer, employee, department, agency or instrumentality of a state or any political subdivision of a state.

POWERED MODEL VEHICLE: Any self-propelled, airborne, waterborne or landborne plane, vessel or vehicle which is not designed to carry persons including, but not limited to, any model airplane, boat, car or rocket.

PUBLIC RIGHT OF WAY: Any street, avenue, boulevard, highway, sidewalk, alley or similar place owned or controlled by a governmental entity.

PUBLIC SPACE: Any real property or structure thereon which is owned or controlled by a governmental entity.

RESIDENTIAL: Generally consisting of uses as permitted in the residential zones as set forth in title 18 of this code or adopted specific plans.

SOUND AMPLIFYING EQUIPMENT: Any device for the amplification of the human voice, music or any other sound, excluding standard automobile radios or stereo systems when used and heard only by the occupants of the vehicle in which the radio or stereo system is installed, excluding warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.

SOUND LEVEL METER: An instrument, including a microphone, amplifier, output meter and frequency weighting networks for the measurement of sound levels which meets or exceeds the requirements of the American National Standard Institute's S1.4-1971, or the most recent revision thereof, for type 1 or type 2 sound level meters.

SOUND TRUCK: Any motor vehicle regardless of motive power, whether in motion or stationary, having mounted thereon or attached thereto, any sound amplifying equipment.

VIBRATION PERCEPTION THRESHOLD: The minimum ground or structure borne vibrational motion necessary to cause a normal person to be aware of the vibration by such direct means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold shall be presumed to be a motion velocity of 0.01 inches per second over the range of one to one hundred (100) Hz.

WEEKDAY: Any day, Monday through Friday, which is not a legal holiday. (Ord. 2579 § 1, 2004)

8.06.030: GENERAL NOISE REGULATIONS:

It shall be unlawful for any person to wilfully or negligently make, or cause to be made, any loud, unnecessary or unusual noise which disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to a reasonable person of normal sensitivity in the area. The factors that may be considered in determining whether a violation of this chapter exists include, but are not limited to, the following:

- A. The sound level of the objectionable noise;
- B. The sound level of the ambient noise;
- C. The proximity of the noise to residential living or sleeping facilities;
- D. The nature and zoning of the area within which the noise emanates;
- E. The number of persons affected by the noise;
- F. The time of day or night the noise occurs;

- G. The duration of the noise;
- H. The tonal, informational or musical content of the noise;
- I. Whether the noise is continuous, recurrent or intermittent;
- J. Whether the noise is produced by a commercial or noncommercial activity;
- K. Whether the nature of the noise is usual or unusual;
- L. Whether the origin of the noise is natural or unnatural; and
- M. Whether the noise occurs on a weekday, weekend or a holiday. (Ord. 2579 § 1, 2004)

8.06.040: ENFORCEMENT AUTHORITY:

- A. The NCO and the NCO's duly authorized representatives may enforce the provisions of this chapter.
- B. The NCO and its authorized representatives shall have satisfactorily completed an instructional program as recommended by the measuring instrument's manufacturer.
- C. No person shall interfere with, oppose or resist the NCO or any authorized person charged with the enforcement of this chapter when such persons are engaged in the performance of their duties. (Ord. 2579 § 1, 2004)

8.06.050: NOISE MEASUREMENT PROCEDURE:

The NCO, equipped with sound level measurement equipment satisfying the requirements in section 8.06.020 of this chapter, may investigate any complaint relating to a violation of this chapter. The investigation shall consist of a measurement and the gathering of data to adequately define the noise problem and include, but not be limited to, the following:

- A. Type of noise source;
- B. Location of noise source relative to the complainant's property;
- C. Time period during which noise source is considered by complainant to be intrusive;
- D. Total duration of noise produced by noise source; and
- E. Date and time of noise measurement survey. (Ord. 2579 § 1, 2004)

8.06.060: NOISE MEASUREMENT METHODOLOGY:

- A. Utilizing the A-weighting scale of the sound level meter and the "slow" meter response (use "fast" response for impulsive type sounds), the noise level shall be measured at a position or positions at any point on the receiver's property deemed appropriate to determine whether the noise level complies with this chapter.
- B. The microphone shall be located four (4) to five feet (5') above the ground; ten feet (10') or more from the nearest reflective surface, where possible. However, in those cases where another elevation is deemed appropriate, the latter shall be utilized. If the noise complaint is related to interior noise levels, interior noise measurements shall be made within the affected residential building or unit. The measurements shall be made at a point at least four feet (4') from the wall, ceiling or floor nearest the noise source, with the windows closed.
- C. Calibration of the measurement equipment, utilizing an acoustic calibrator, shall be performed immediately prior to recording any noise data. Standard maintenance of the measuring equipment shall be in accordance with the manufacturer's recommendations.
- D. No outdoor measurements shall be taken:
 - 1. During periods when wind speeds (including gusts) exceed fifteen (15) miles per hour;
 - 2. Without a windscreen, as recommended by the measuring instrument's manufacturer, properly attached to the measuring instrument;
 - 3. Under any condition that allows the measuring instrument to become wet (e.g., rain or condensation); or
 - 4. When the ambient temperature is out of the range of the tolerance of the measuring instrument. (Ord. 2579 § 1, 2004)

8.06.070: EXTERIOR NOISE LIMITS:

- A. The noise standards for the categories of land uses identified in table 1 of this section shall, unless otherwise specifically indicated, apply to all such property within a designated zone.

TABLE 1

MAXIMUM PERMISSIBLE SOUND LEVELS BY RECEIVING LAND USE

Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	10:00 P.M. – 7:00 A.M.	50
	7:00 A.M. – 10:00 P.M.	60

Multi-family residential districts; public space; institutional	10:00 P.M. – 7:00 A.M.	50
	7:00 A.M. – 10:00 P.M.	60
Commercial	10:00 P.M. – 7:00 A.M.	60
	7:00 A.M. – 10:00 P.M.	65
Industrial	Any time	75

B. No person shall operate, or cause to be operated, any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property to exceed:

1. The noise standard for that land use specified in table 1 of this section for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard specified in table 1 of this section plus five (5) dB for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard specified in table 1 of this section plus ten (10) dB for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard specified in table 1 of this section plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or
5. The noise standard specified in table 1 of this section plus twenty (20) dB or the maximum measured ambient level, for any period of time.

C. If the measured ambient level exceeds the allowable noise exposure standard within any of the first four (4) noise limit categories above, the allowable noise exposure standard shall be adjusted in five (5) dB increments in each category as appropriate to encompass or reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

D. The ambient noise shall be measured at the same location along the property line utilized in subsection 8.06.060B of this chapter, with the alleged offending noise source inoperative. If the alleged offending noise source cannot be shut down, the ambient noise shall be estimated by performing a measurement in the same general area of the source but at a sufficient distance that the noise from the source is at least ten (10) dB below the ambient in order that only the ambient level be measured. If the difference between the ambient and the noise source is five (5) to ten (10) dB, then the level of the ambient itself can be reasonably determined by subtracting a one decibel correction to account for the contribution of the source.

E. In the event the alleged offensive noise contains a steady, audible tone such as a whine, screech, hum, or is a repetitive noise such as hammering or riveting, or contains music or speech conveying informational content, the standard limits set forth in table 1 of this section shall be reduced by five (5) dB. (Ord. 2579 § 1, 2004)

8.06.080: INTERIOR NOISE STANDARDS:

A. No person shall operate or cause to be operated any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving occupied building to exceed the following standards:

1. The noise standard for that land use specified in table 2 of this section for a cumulative period of more than five (5) minutes in any hour.
2. The noise standard for that land use specified in table 2 of this section plus five (5) dB for a cumulative period of more than one minute in any hour.
3. The noise standard for that land use specified in table 2 of this section plus ten (10) dB for the maximum measured ambient noise level for any period of time.

B. If the measured ambient level exceeds the allowable exterior noise exposure standard in table 1 of this chapter, the allowable interior noise exposure level shall be adjusted in five (5) dB increments as appropriate to reflect the ambient noise level.

TABLE 2

MAXIMUM PERMISSIBLE INTERIOR SOUND LEVELS BY RECEIVING LAND USE

Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	Any time	45
Multi-family residential districts; institutional; hotels	Any time	45
Commercial	Any time	50
Industrial	Any time	60

8.06.090: NOISE DISTURBANCES PROHIBITED:

The following acts, and the causing or permitting thereof, are declared to be in violation of this chapter:

A. Radio, Television Set, Etc.: Operating, playing, or permitting the operation or playing of any radio, television set, phonograph, drum, musical instrument or similar device which produces or reproduces sound:

1. Between the hours of ten o'clock (10:00) P.M. and seven o'clock (7:00) A.M. in such a manner as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of section 8.06.030 or 8.06.070 of this chapter.

2. In such a manner as to exceed the levels set forth for public space in table 1 of this chapter, measured at a distance of at least fifty feet (50') from such device operating on a public right of way or public space.

B. Loudspeaker Or Stereo Systems: Using or operating for any purpose any loudspeaker, loudspeaker system, stereo system or similar device between the hours of ten o'clock (10:00) P.M. and seven o'clock (7:00) A.M., such that the sound therefrom creates a noise disturbance across a residential property line, or at any time violates the provisions of section 8.06.030 or 8.06.070 of this chapter, except for noncommercial public speaking, public assembly or activity for which an exemption has been provided for in either this section or section 8.06.120 of this chapter.

C. Street Sales: Offering for sale, selling anything, or advertising by shouting or outcry within the city except by permit issued by the city. This subsection shall not be construed to prohibit the selling by outcry of merchandise, food or beverages at licensed sporting events, parades, fairs, circuses or other similar licensed public entertainment events.

D. Animals And Birds: Owning, possessing or harboring any animal or bird which frequently, or for long duration, howls, barks, meows, squawks or makes other sound which creates a noise disturbance across a residential or commercial real property line or within a noise sensitive zone.

E. Loading And Unloading: Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, refuse containers or similar objects between the hours of ten o'clock (10:00) P.M. and six o'clock (6:00) A.M. in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate section 8.06.030 of this chapter.

F. Construction And/Or Demolition: Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between weekday hours of six o'clock (6:00) P.M. and seven o'clock (7:00) A.M., including Saturdays, or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work by public service utilities, the city or another governmental entity. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

G. Vibration: Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right of way.

H. Powered Model Vehicles: Operating or permitting the operation of powered model vehicles:

1. Between the hours of seven o'clock (7:00) P.M. and seven o'clock (7:00) A.M. so as to create a noise disturbance across a residential or commercial real property line or at any time in violation of section 8.06.030 of this chapter.

2. In such a manner as to exceed the levels set forth for public space land use in table 1 of this chapter measured at a distance not less than one hundred feet (100') from any point on the path of a vehicle operating on public space or public right of way.

I. Stationary, Nonemergency Signaling Devices:

1. Sounding or permitting the sounding of any electronically amplified signal from any stationary bell, chime, siren, whistle or similar device intended primarily for nonemergency purposes, from any place for more than ten (10) seconds in any hourly period.

2. Places of worship and public and private schools shall be exempt from the operation of this subsection.

J. Emergency Signaling Devices:

1. Alarms, Sirens, Whistles: The intentional sounding or permitting the sounding outdoors of any fire, burglar or civil defense alarm, siren, whistle or similar stationary emergency signaling device, except for emergency purposes or for testing as provided in subsection J2 of this section.

2. Testing:

a. Testing of a stationary emergency signaling device shall not occur before seven o'clock (7:00) A.M. or after seven o'clock (7:00) P.M. Any such testing shall use only the minimum cycle test time. In no case shall such test time exceed sixty (60) seconds.

b. Testing of the complete emergency signaling system, including the functioning of the signaling device, and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall not occur before seven o'clock (7:00) A.M. or after ten o'clock (10:00) P.M. The time limit specified in subsection J2a of this section shall not apply to such complete system testing.

3. Burglar, Fire, Motor Vehicle Alarms: Sounding or permitting the sounding of any exterior burglar or fire alarm or any motor vehicle burglar alarm unless such alarm is terminated within five (5) minutes of activation.

K. Noise Sensitive Zones: Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in table 1 of this chapter and subsection 8.06.070B of this chapter, or so as to interfere with the functions of such activity or annoy the occupants in the activity, provided that conspicuous signs are displayed indicating the presence of the zone.

L. Domestic Power Tools And Machinery:

1. Operating or permitting the operation of any mechanically powered saw, sander, drill, grinder, lawn or garden tool, or similar tool between ten o'clock (10:00) P.M. and seven o'clock (7:00) A.M., so as to create a noise disturbance across a residential or commercial real property line.

2. Motor, machinery and pumps, such as swimming pool equipment, shall be sufficiently enclosed or muffled and maintained so as not to create a noise disturbance in accordance with table 1, section 8.06.070 of this chapter.

M. Places Of Public Entertainment: Operating or permitting the operation or playing of any loudspeaker, musical instrument or other source of sound in any place of public entertainment that exceeds ninety five (95) dBA as read on the slow response of a sound level meter at any point normally occupied by a customer, without a conspicuous and legible sign with minimum one inch (1") letter height stating:

WARNING! SOUND LEVELS WITHIN MAY CAUSE HEARING IMPAIRMENT.

(Ord. 2579 § 1, 2004)

8.06.100: RESIDENTIAL AIR CONDITIONING OR AIR HANDLING EQUIPMENT:

It shall be unlawful to operate or permit the operation of any air conditioning or air handling equipment in such a manner as to exceed the sound levels set forth in table 1, section 8.06.070 of this chapter. (Ord. 2579 § 1, 2004)

8.06.110: TAMPERING:

The following acts or the causing thereof are prohibited:

A. The removal or rendering inoperative, other than for purposes of maintenance, repair or replacement, of any noise control device or element thereof of any product required to meet specified noise emission limits under federal, state or local law.

B. The removal of any noise label from any product identified in subsection A of this section.

C. The use of a product identified in subsection A of this section, which has had a noise control device or element thereof or noise label removed or rendered inoperative. (Ord. 2579 § 1, 2004)

8.06.120: EXEMPTIONS:

A. Emergency Exemption: This chapter shall not apply to:

1. The emission of sound for the purpose of alerting persons to the existence of an emergency such as, but not limited to, loudspeakers, horns, sirens, whistles or other similar devices which emit sound, only for the time required to make notification of the emergency condition; or

2. The emission of sound in the performance of emergency work or the temporary provision of essential services such as, but not limited to, utility system repairs or upgrades, infrastructure repairs, structural repairs and other unscheduled, infrequent and nonrecurring activities, required to protect persons and property from physical harm or loss of essential services.

B. Warning Devices: This chapter shall not apply to warning devices necessary for the protection of public safety. Police, fire and ambulance sirens and train horns are exempt from this chapter.

C. Outdoor Activities: This chapter shall not apply to occasional outdoor public gatherings, public dances, shows, and sporting and entertainment events conducted within city parks and city owned facilities, including events conducted at the Redlands Bowl, provided such events are conducted pursuant to a permit or license issued by the city.

D. School Activities: This chapter shall not apply to activities and operations conducted on the grounds of any public or private elementary, intermediate or secondary school or colleges and universities.

E. Hospital: This chapter shall not apply to activities and operations conducted within the grounds of the Redlands Community Hospital provided that said activities and operations are in compliance with the acoustical provisions of the hospital's conditional use permit.

F. Minor Maintenance Of Residential Property: This chapter shall not apply to noise sources associated with the minor maintenance of residential property, provided such activities take place between the hours of seven o'clock (7:00) A.M. to eight o'clock (8:00) P.M. on weekdays, and seven o'clock (7:00) A.M. to eight o'clock (8:00) P.M. on weekends and legal

holidays, and provided that such activities generate no more than ninety (90) dBA at or within the real property line of the residential property. Activities covered under this provision include, but are not limited to, maintenance of landscaping and minor repair of residential dwellings or ancillary structures.

G. Construction Activity: This chapter shall not apply to noise sources associated with new construction, remodeling, rehabilitation or grading of any property provided such activities take place between the hours of seven o'clock (7:00) A.M. and six o'clock (6:00) P.M. on weekdays, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. All motorized equipment used in such activity shall be equipped with functioning mufflers.

H. Agricultural Operations: This chapter shall not apply to mobile noise sources associated with agricultural operations for use in maintenance, cultivation, planting and harvesting of agricultural areas provided said activities take place between the hours of seven o'clock (7:00) A.M. to eight o'clock (8:00) P.M. on weekdays, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. All motorized equipment used in such activity shall be equipped with functioning mufflers.

I. Chapter Application: This chapter shall not apply to any activity in which state or federal law has preempted the regulation of such activity. (Ord. 2579 § 1, 2004)

8.06.130: PREEXISTING NOISE SOURCES:

Those commercial and industrial operations in existence prior to the date of adoption hereof, if in compliance with the city's zoning laws, may be granted a period from such date within which to comply with this chapter.

A. Such compliance period shall be based on the estimated cost to make the equipment comply, as follows:

1. If the cost is one thousand dollars (\$1,000.00) or less, ninety (90) days;
2. If the cost is one thousand dollars (\$1,000.00) to five thousand dollars (\$5,000.00), one year;
3. If the cost is five thousand dollars (\$5,000.00) to twenty thousand dollars (\$20,000.00), two (2) years; or
4. If the cost is greater than twenty thousand dollars (\$20,000.00) or more, three (3) years.

B. At the time of request for extended compliance periods in subsections A2 through A4 of this section, any person requesting such extension shall submit a plan for such compliance, including temporary mitigation of such noise levels to within five (5) dBA of the complying level. Such extended period and temporary mitigation shall not exceed one year beyond the initial compliance period. If the compliance period is granted, mitigation measures included in the plan must be completed within ninety (90) days from the date of approval of the compliance period.

C. If, at the end of the compliance period, it is shown that compliance with the provisions herein constitute a hardship in terms of technical and economical feasibility, additional applications for exception may be granted on an annual basis until such time as compliance may be effected, provided the temporary mitigation remains in place.

D. Requests for extended compliance periods or exceptions shall be submitted to the city's planning commission with the submittal of plans and other information as required by the community development director. Such applications shall be filed by the owner of the property affected thereby or the owner's authorized agent, with the community development director, on forms furnished by the director, which shall set forth fully the nature of the proposed use, and the facts sufficient to justify the granting of the compliance period in accordance with the provisions of this chapter.

E. The applicant shall furnish to the director an accurate list of the names and addresses of all property owners to whom notice must be given as provided in this chapter.

F. Each such application shall be accompanied by a filing and processing fee in the amount established by resolution of the city council. Any applicant may withdraw his application by filing a written request to do so at any time prior to final action thereon, provided that there shall be no refund of fees. (Ord. 2579 § 1, 2004)

8.06.140: VIOLATION; PENALTY:

A. It is illegal to use, occupy or maintain property in violation of this chapter.

B. Violation of this chapter shall be a misdemeanor, but may be prosecuted as either a misdemeanor or an infraction in the discretion of the city attorney.

C. Any person who violates the provisions of this chapter is guilty of a separate offense for each day, or portion thereof, during which the violation continues.

D. Violation of this chapter that threatens to be continuing in nature is a public nuisance which may be abated or enjoined in accordance with the law. (Ord. 2579 § 1, 2004)

This page intentionally left blank

APPENDIX 5.1:

STUDY AREA PHOTOS

This page intentionally left blank

JN: 12240 Study Area Photos



L1_E
34, 3' 34.910000" 117, 11' 44.360000"



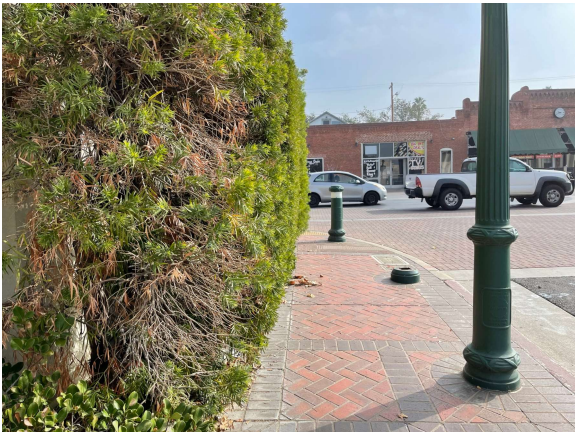
L1_N
34, 3' 34.920000" 117, 11' 44.390000"



L1_S
34, 3' 34.890000" 117, 11' 44.360000"



L1_W
34, 3' 34.930000" 117, 11' 44.390000"



L2_E
34, 3' 31.140000" 117, 10' 58.190000"



L2_N
34, 3' 31.170000" 117, 10' 58.220000"

JN: 12240 Study Area Photos



L2_S
34, 3' 31.160000" 117, 10' 58.250000"



L2_W
34, 3' 31.140000" 117, 10' 58.110000"



L3_E
34, 3' 32.780000" 117, 9' 57.790000"



L3_N
34, 3' 32.850000" 117, 9' 57.790000"



L3_S
34, 3' 32.830000" 117, 9' 57.790000"



L3_W
34, 3' 32.750000" 117, 9' 57.790000"

JN: 12240 Study Area Photos



L4_E
34, 3' 46.740000" 117, 12' 13.530000"



L4_N
34, 3' 46.730000" 117, 12' 13.500000"



L4_S
34, 3' 46.730000" 117, 12' 13.530000"



L4_W
34, 3' 46.740000" 117, 12' 13.560000"



L5_E
34, 3' 40.700000" 117, 10' 1.060000"



L5_N
34, 3' 41.060000" 117, 10' 1.060000"

JN: 12240 Study Area Photos



L5_S
34, 3' 40.960000"117, 10' 1.010000"



L5_W
34, 3' 40.730000"117, 10' 1.120000"



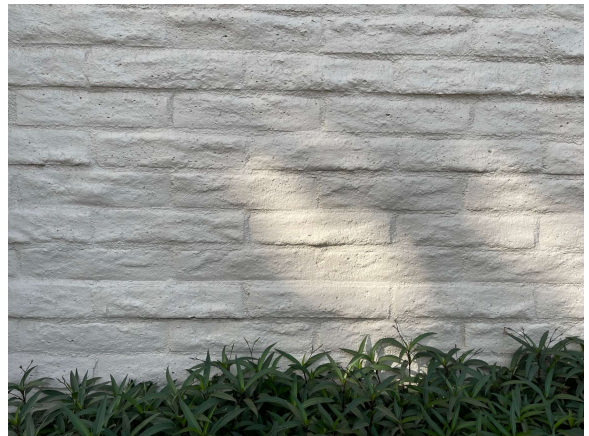
L6_E
34, 3' 18.300000"117, 10' 53.300000"



L6_W
34, 3' 18.260000"117, 10' 53.190000"



L6_S
34, 3' 18.300000"117, 10' 53.250000"



L6_W
34, 3' 18.340000"117, 10' 53.330000"

JN: 12240 Study Area Photos



L7_E
34, 4' 4.620000"117, 10' 56.820000"



L7_N
34, 4' 4.650000"117, 10' 56.820000"



L7_S
34, 4' 4.690000"117, 10' 56.870000"



L7_W
34, 4' 4.650000"117, 10' 56.820000"



L8_E
34, 3' 42.710000"117, 10' 25.370000"



L8_N
34, 3' 42.730000"117, 10' 25.400000"

JN: 12240 Study Area Photos



L8_S
34, 3' 42.710000" 117, 10' 25.370000"



L8_W
34, 3' 42.670000" 117, 10' 25.400000"



L9_E
34, 3' 34.140000" 117, 10' 40.910000"



L9_N
34, 3' 34.220000" 117, 10' 40.940000"



L9_S
34, 3' 34.080000" 117, 10' 40.910000"



L9_W
34, 3' 34.080000" 117, 10' 40.910000"

JN: 12240 Study Area Photos



L10_E

34, 3' 19.620000" 117, 11' 52.240000"



L10_N

34, 3' 19.580000" 117, 11' 52.240000"



L10_S

34, 3' 19.610000" 117, 11' 52.240000"



L10_W

34, 3' 19.640000" 117, 11' 52.240000"

This page intentionally left blank

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

This page intentionally left blank

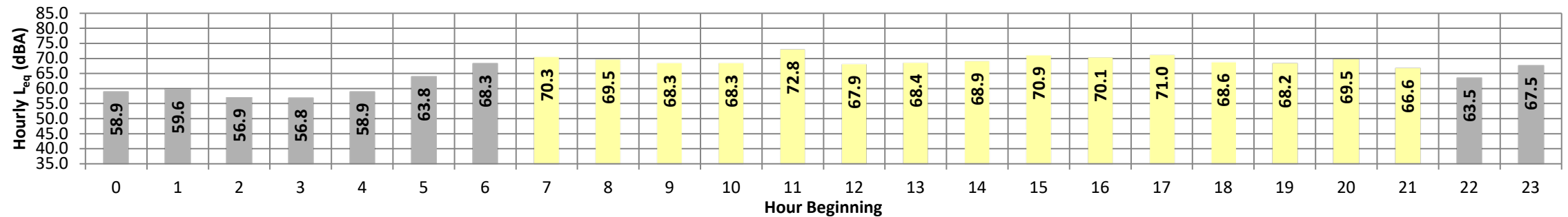
24-Hour Noise Level Measurement Summary

Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L1 - Located southwest of the New York Street/ESRI Station north of Redlands Boulevard
Source: within the Village General (VG) TVSP regulating land use.

Meter: Piccolo II
JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	58.9	70.3	48.0	69.9	69.1	66.3	64.3	56.4	51.4	48.7	48.4	48.1	58.9	10.0	68.9
	1	59.6	71.7	46.4	71.4	70.8	67.6	65.1	55.0	51.9	47.6	47.1	46.6	59.6	10.0	69.6
	2	56.9	70.5	44.4	69.9	68.9	64.6	60.8	50.7	47.0	45.1	44.8	44.5	56.9	10.0	66.9
	3	56.8	69.1	48.2	68.6	67.8	64.1	61.1	53.5	50.6	48.8	48.5	48.3	56.8	10.0	66.8
	4	58.9	69.3	53.9	69.0	68.2	64.9	62.3	57.3	55.7	54.4	54.3	54.0	58.9	10.0	68.9
	5	63.8	74.5	56.6	74.1	73.3	70.4	68.2	62.6	59.5	57.2	57.0	56.7	63.8	10.0	73.8
	6	68.3	80.2	60.2	79.6	78.5	75.0	72.2	66.6	63.0	60.8	60.5	60.3	68.3	10.0	78.3
Day	7	70.3	80.9	59.7	80.4	79.6	77.0	75.1	70.1	65.5	61.2	60.7	60.0	70.3	0.0	70.3
	8	69.5	78.6	56.4	78.2	77.6	75.9	74.7	70.3	65.4	57.9	57.1	56.5	69.5	0.0	69.5
	9	68.3	77.9	55.8	77.3	76.5	74.5	73.3	69.1	64.1	57.1	56.4	55.9	68.3	0.0	68.3
	10	68.3	77.3	56.4	76.9	76.4	74.7	73.3	69.0	64.4	58.2	57.3	56.5	68.3	0.0	68.3
	11	72.8	86.2	54.9	85.8	84.6	79.6	76.8	69.1	64.5	57.0	55.9	55.1	72.8	0.0	72.8
	12	67.9	77.5	55.3	77.0	76.4	74.4	72.7	68.3	63.9	57.2	56.3	55.5	67.9	0.0	67.9
	13	68.4	77.8	56.0	77.4	76.7	74.6	73.0	69.1	64.7	57.8	56.9	56.2	68.4	0.0	68.4
	14	68.9	78.7	57.4	78.2	77.5	75.1	73.5	69.2	65.2	59.1	58.4	57.6	68.9	0.0	68.9
	15	70.9	82.7	57.1	82.3	81.3	78.1	75.0	69.3	65.3	59.1	58.1	57.3	70.9	0.0	70.9
	16	70.1	79.2	57.8	78.7	78.1	76.3	75.0	70.5	66.6	59.7	58.8	58.0	70.1	0.0	70.1
	17	71.0	81.7	59.1	81.3	80.3	77.3	76.1	70.4	66.7	61.0	60.0	59.3	71.0	0.0	71.0
	18	68.6	77.9	59.6	77.5	76.5	74.5	73.2	69.1	65.2	60.8	60.2	59.7	68.6	0.0	68.6
	19	68.2	78.8	60.6	78.0	77.1	74.7	72.6	67.5	63.9	61.2	61.0	60.7	68.2	5.0	73.2
	20	69.5	79.7	60.6	79.3	78.6	77.2	75.5	67.3	63.5	61.3	61.0	60.7	69.5	5.0	74.5
	21	66.6	77.1	59.2	76.8	76.0	73.3	71.1	65.3	62.0	59.9	59.6	59.2	66.6	5.0	71.6
Night	22	63.5	73.1	57.8	72.6	71.7	69.3	67.5	62.7	60.6	58.5	58.3	57.9	63.5	10.0	73.5
	23	67.5	82.6	57.1	81.5	80.3	71.9	67.8	61.6	59.6	57.8	57.5	57.2	67.5	10.0	77.5
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	66.6	77.1	54.9	76.8	76.0	73.3	71.1	65.3	62.0	57.0	55.9	55.1	72.0		
	Max	72.8	86.2	60.6	85.8	84.6	79.6	76.8	70.5	66.7	61.3	61.0	60.7			
Energy Average		69.6	Average:		79.0	78.2	75.8	74.1	68.9	64.7	59.2	58.5	57.9	69.6		
Night	Min	56.8	69.1	44.4	68.6	67.8	64.1	60.8	50.7	47.0	45.1	44.8	44.5	63.6		
	Max	68.3	82.6	60.2	81.5	80.3	75.0	72.2	66.6	63.0	60.8	60.5	60.3			
Energy Average		63.6	Average:		72.9	72.1	68.2	65.5	58.5	55.5	53.2	52.9	52.6			

24-Hour Noise Level Measurement Summary

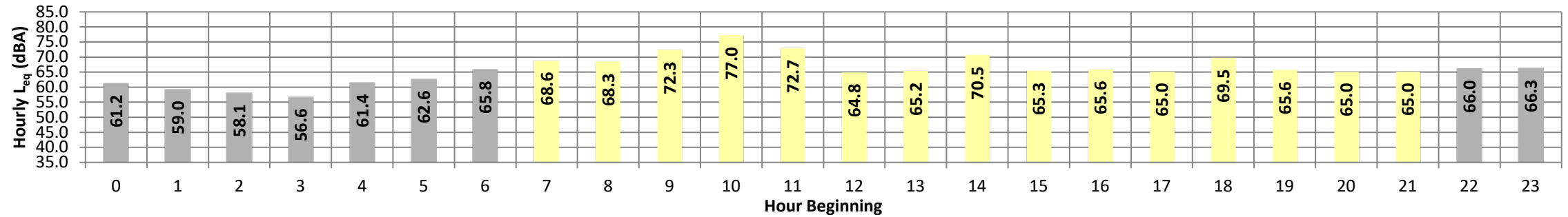
Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L2 - Located near Historic Redlands Train Station at 383-389 Orange Street within the
Source: Village Center (VC) TVSP regulating land use.

Meter: Piccolo II

JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	61.2	74.2	47.9	73.2	71.9	69.2	66.0	58.1	52.8	49.1	48.7	48.1	61.2	10.0	71.2
	1	59.0	70.1	47.6	69.6	68.7	66.2	64.7	57.1	53.2	48.9	48.4	47.8	59.0	10.0	69.0
	2	58.1	69.5	45.2	68.9	67.9	65.4	63.7	56.0	50.3	46.1	45.6	45.3	58.1	10.0	68.1
	3	56.6	69.1	46.3	68.2	67.2	64.2	61.8	53.2	48.6	46.8	46.5	46.4	56.6	10.0	66.6
	4	61.4	72.5	49.1	71.8	70.8	68.8	67.4	59.5	53.1	49.7	49.4	49.2	61.4	10.0	71.4
	5	62.6	73.3	51.1	72.6	71.8	69.8	68.1	61.9	56.3	51.6	51.4	51.2	62.6	10.0	72.6
	6	65.8	74.3	54.7	73.8	73.2	71.8	70.8	67.0	62.1	55.5	55.1	54.8	65.8	10.0	75.8
Day	7	68.6	76.3	55.6	75.6	75.0	73.8	72.9	70.1	66.4	58.5	56.9	55.8	68.6	0.0	68.6
	8	68.3	78.7	55.2	77.6	76.4	73.8	72.1	68.9	65.8	58.4	56.7	55.4	68.3	0.0	68.3
	9	72.3	84.6	54.0	83.7	83.1	79.3	77.9	69.0	64.3	56.8	55.3	54.2	72.3	0.0	72.3
	10	77.0	92.3	53.6	91.3	89.6	84.0	78.9	67.1	63.6	56.2	54.9	53.9	77.0	0.0	77.0
	11	72.7	85.2	66.9	84.3	82.8	79.5	75.3	70.1	68.9	67.5	67.3	67.0	72.7	0.0	72.7
	12	64.8	72.4	53.9	71.8	71.1	69.4	68.5	66.0	63.3	56.4	55.2	54.1	64.8	0.0	64.8
	13	65.2	73.9	55.1	73.1	72.3	70.6	68.9	66.1	63.3	57.3	56.2	55.2	65.2	0.0	65.2
	14	70.5	82.4	54.9	81.7	81.3	79.0	74.8	66.8	63.7	57.6	56.3	55.1	70.5	0.0	70.5
	15	65.3	72.8	55.5	72.3	71.6	70.2	69.1	66.4	63.7	58.3	57.2	55.8	65.3	0.0	65.3
	16	65.6	73.6	55.0	73.0	72.2	70.5	69.5	66.7	64.0	57.8	56.4	55.2	65.6	0.0	65.6
	17	65.0	72.5	56.2	71.9	71.2	69.6	68.7	66.1	63.6	58.6	57.4	56.4	65.0	0.0	65.0
	18	69.5	81.4	56.2	80.9	80.2	77.6	74.5	66.6	63.8	58.3	57.2	56.3	69.5	0.0	69.5
	19	65.6	74.8	56.9	74.1	73.2	71.7	69.7	66.0	63.1	58.0	57.5	57.0	65.6	5.0	70.6
	20	65.0	73.1	57.6	72.3	71.5	70.0	69.0	65.8	63.0	58.9	58.3	57.8	65.0	5.0	70.0
	21	65.0	73.9	58.9	73.1	72.1	70.1	68.9	65.6	62.7	59.6	59.3	59.0	65.0	5.0	70.0
Night	22	66.0	79.1	56.4	78.1	76.9	72.4	69.2	64.0	60.4	57.4	57.0	56.6	66.0	10.0	76.0
	23	66.3	77.0	54.7	76.6	76.1	74.5	72.5	63.3	59.1	55.8	55.3	54.9	66.3	10.0	76.3
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	64.8	72.4	53.6	71.8	71.1	69.4	68.5	65.6	62.7	56.2	54.9	53.9	71.7	69.9	63.1
	Max	77.0	92.3	66.9	91.3	89.6	84.0	78.9	70.1	68.9	67.5	67.3	67.0			
Energy Average		69.9	Average:		77.1	76.2	73.9	71.9	67.2	64.2	58.5	57.5	56.6			
Night	Min	56.6	69.1	45.2	68.2	67.2	64.2	61.8	53.2	48.6	46.1	45.6	45.3			
	Max	66.3	79.1	56.4	78.1	76.9	74.5	72.5	67.0	62.1	57.4	57.0	56.6			
Energy Average		63.1	Average:		72.5	71.6	69.2	67.1	60.0	55.1	51.2	50.8	50.5			

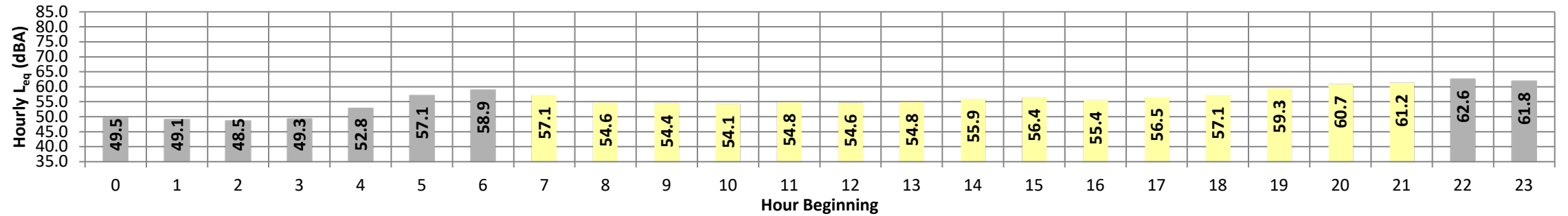
24-Hour Noise Level Measurement Summary

Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L3 - Located west of the University Street Station north Park Avenue near Frederick
Source: Loewe Theatre within Special District 1 (SD 1) TVSP regulating land use.

Meter: Piccolo II JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	49.5	58.9	45.0	58.1	57.2	54.6	52.5	49.3	47.5	45.7	45.4	45.1	49.5	10.0	59.5
	1	49.1	56.4	44.4	55.7	55.1	53.6	52.8	49.5	47.1	45.1	44.8	44.5	49.1	10.0	59.1
	2	48.5	55.1	45.4	54.4	53.5	51.6	50.7	48.9	47.7	46.1	45.8	45.5	48.5	10.0	58.5
	3	49.3	56.8	45.9	56.1	55.4	53.6	52.5	49.3	47.9	46.4	46.2	46.0	49.3	10.0	59.3
	4	52.8	58.7	50.0	58.1	57.4	56.0	55.1	53.2	52.0	50.6	50.3	50.1	52.8	10.0	62.8
	5	57.1	61.6	54.3	61.3	60.8	59.9	59.3	57.6	56.5	54.9	54.7	54.4	57.1	10.0	67.1
	6	58.9	62.6	56.8	62.3	62.0	61.0	60.5	59.3	58.5	57.4	57.2	56.9	58.9	10.0	68.9
Day	7	57.1	63.0	54.2	62.6	62.1	60.5	59.6	57.4	56.3	54.8	54.6	54.3	57.1	0.0	57.1
	8	54.6	62.8	50.0	62.2	61.6	59.5	57.9	54.8	53.0	50.7	50.4	50.1	54.6	0.0	54.6
	9	54.4	60.2	50.3	59.8	59.3	58.3	57.6	55.3	53.0	50.9	50.6	50.4	54.4	0.0	54.4
	10	54.1	60.6	51.0	60.1	59.6	57.9	56.5	54.3	53.1	51.6	51.4	51.1	54.1	0.0	54.1
	11	54.8	63.2	50.5	62.7	62.0	59.9	57.8	54.4	52.9	51.2	51.0	50.6	54.8	0.0	54.8
	12	54.6	60.2	51.2	59.8	59.3	58.1	57.1	55.2	53.8	51.9	51.6	51.3	54.6	0.0	54.6
	13	54.8	59.5	51.6	59.1	58.7	57.7	57.1	55.5	54.2	52.4	52.1	51.7	54.8	0.0	54.8
	14	55.9	61.1	52.7	60.7	60.2	59.0	58.2	56.4	55.2	53.5	53.2	52.8	55.9	0.0	55.9
	15	56.4	61.8	53.4	61.4	60.9	59.7	58.8	56.8	55.6	54.1	53.9	53.6	56.4	0.0	56.4
	16	55.4	60.9	52.2	60.4	59.9	58.5	57.7	56.0	54.7	52.9	52.6	52.3	55.4	0.0	55.4
	17	56.5	61.5	53.6	61.1	60.6	59.6	59.1	56.9	55.7	54.2	54.0	53.7	56.5	0.0	56.5
	18	57.1	63.0	54.2	62.6	62.0	60.4	59.5	57.4	56.3	54.9	54.6	54.3	57.1	0.0	57.1
	19	59.3	63.9	56.6	63.6	63.1	62.1	61.4	59.8	58.7	57.4	57.1	56.7	59.3	5.0	64.3
	20	60.7	66.7	57.7	66.3	65.6	64.2	63.3	60.9	60.0	58.4	58.1	57.8	60.7	5.0	65.7
	21	61.2	65.1	58.3	64.9	64.6	63.7	63.2	61.8	60.7	59.1	58.8	58.4	61.2	5.0	66.2
Night	22	62.6	66.7	59.2	66.5	66.3	65.7	65.0	63.3	61.9	60.0	59.7	59.3	62.6	10.0	72.6
	23	61.8	65.8	58.3	65.6	65.3	64.6	64.2	62.7	61.3	59.3	58.9	58.4	61.8	10.0	71.8
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	54.1	59.5	50.0	59.1	58.7	57.7	56.5	54.3	52.9	50.7	50.4	50.1	64.4 57.1 57.6		
	Max	61.2	66.7	58.3	66.3	65.6	64.2	63.3	61.8	60.7	59.1	58.8	58.4			
Energy Average		57.1	Average:		61.8	61.3	59.9	59.0	56.9	55.6	53.9	53.6	53.3			
Night	Min	48.5	55.1	44.4	54.4	53.5	51.6	50.7	48.9	47.1	45.1	44.8	44.5			
	Max	62.6	66.7	59.2	66.5	66.3	65.7	65.0	63.3	61.9	60.0	59.7	59.3			
Energy Average		57.6	Average:		59.8	59.2	57.9	57.0	54.8	53.4	51.7	51.4	51.1			

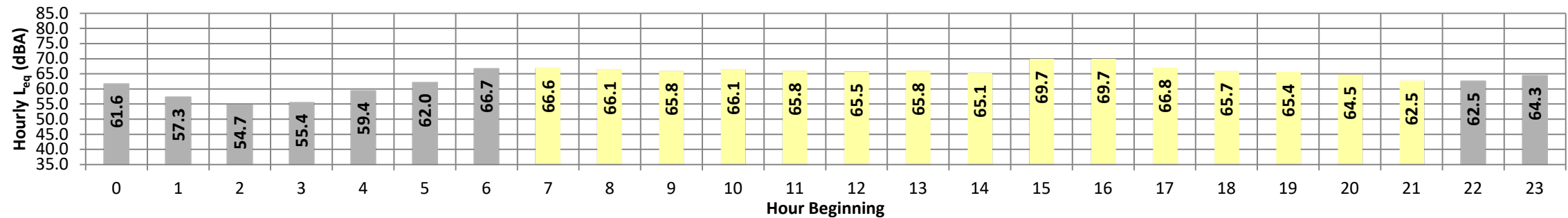
24-Hour Noise Level Measurement Summary

Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L4 - Located north of Colton Avenue in the Tri City Shopping Center south of the CVS
Source: Pharmacy within the Village General (VG) TVSP regulating land use.

Meter: Piccolo II JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	61.6	75.1	50.9	74.8	73.8	69.0	63.8	55.7	54.1	52.3	51.8	51.2	61.6	10.0	71.6
	1	57.3	69.1	48.3	68.5	67.4	63.8	61.0	55.1	53.0	50.1	49.5	48.7	57.3	10.0	67.3
	2	54.7	67.8	45.4	67.0	65.7	62.1	58.8	49.9	47.6	46.1	45.9	45.6	54.7	10.0	64.7
	3	55.4	68.3	46.5	67.5	66.1	62.4	59.7	52.0	49.0	47.3	47.0	46.7	55.4	10.0	65.4
	4	59.4	71.9	52.8	71.2	69.9	65.7	62.6	56.4	55.0	53.5	53.2	52.9	59.4	10.0	69.4
	5	62.0	73.4	56.8	72.6	71.3	67.3	64.9	60.8	59.0	57.4	57.2	56.9	62.0	10.0	72.0
Day	6	66.7	80.9	59.2	79.7	77.1	72.3	69.2	63.6	61.6	59.9	59.6	59.3	66.7	10.0	76.7
	7	66.6	77.6	59.0	76.9	75.8	73.0	71.2	65.5	62.3	60.0	59.6	59.1	66.6	0.0	66.6
	8	66.1	77.5	51.3	76.8	75.6	73.0	71.4	65.8	58.3	52.1	51.8	51.4	66.1	0.0	66.1
	9	65.8	76.7	51.6	76.0	74.9	72.6	71.3	65.4	59.1	52.9	52.3	51.7	65.8	0.0	65.8
	10	66.1	77.0	51.8	76.4	75.5	72.8	71.1	65.9	60.6	53.1	52.4	51.9	66.1	0.0	66.1
	11	65.8	77.5	50.4	76.8	75.5	72.3	70.3	65.4	60.3	52.0	51.0	50.5	65.8	0.0	65.8
	12	65.5	76.7	50.9	76.1	75.0	71.8	70.1	65.3	60.1	52.4	51.6	51.0	65.5	0.0	65.5
	13	65.8	77.0	50.9	76.3	75.1	72.3	70.8	65.5	59.9	52.5	51.6	51.0	65.8	0.0	65.8
	14	65.1	75.9	52.2	75.1	74.1	71.6	70.1	65.4	60.0	53.7	52.8	52.3	65.1	0.0	65.1
	15	69.7	82.6	51.8	82.0	81.0	77.4	74.3	66.3	61.2	53.4	52.6	52.0	69.7	0.0	69.7
	16	69.7	81.8	52.1	81.1	80.1	77.9	75.6	66.7	61.7	53.8	52.8	52.2	69.7	0.0	69.7
	17	66.8	77.9	53.5	77.2	75.9	73.0	71.4	66.9	62.3	55.0	54.3	53.7	66.8	0.0	66.8
	18	65.7	75.8	57.4	75.1	74.1	71.8	70.2	65.7	61.9	58.3	57.9	57.5	65.7	0.0	65.7
	19	65.4	74.8	58.4	74.3	73.4	71.2	69.8	65.3	62.2	59.2	58.8	58.4	65.4	5.0	70.4
	20	64.5	74.7	58.7	74.1	72.8	70.1	68.4	63.9	61.5	59.5	59.2	58.8	64.5	5.0	69.5
Night	21	62.5	72.5	57.6	71.6	70.4	67.9	66.2	62.0	60.0	58.3	58.1	57.7	62.5	5.0	67.5
	22	62.5	72.3	57.0	71.7	70.6	68.0	66.2	61.7	59.9	57.8	57.4	57.1	62.5	10.0	72.5
	23	64.3	76.0	55.9	75.4	74.6	72.5	68.9	60.9	58.5	56.7	56.4	56.0	64.3	10.0	74.3
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	62.5	72.5	50.4	71.6	70.4	67.9	66.2	62.0	58.3	52.0	51.0	50.5	69.7	66.4	62.0
	Max	69.7	82.6	59.0	82.0	81.0	77.9	75.6	66.9	62.3	60.0	59.6	59.1			
Energy Average		66.4	Average:		76.4	75.3	72.6	70.8	65.4	60.8	55.1	54.5	54.0			
Night	Min	54.7	67.8	45.4	67.0	65.7	62.1	58.8	49.9	47.6	46.1	45.9	45.6			
	Max	66.7	80.9	59.2	79.7	77.1	72.5	69.2	63.6	61.6	59.9	59.6	59.3			
Energy Average		62.0	Average:		72.1	70.7	67.0	63.9	57.3	55.3	53.5	53.1	52.7			

24-Hour Noise Level Measurement Summary

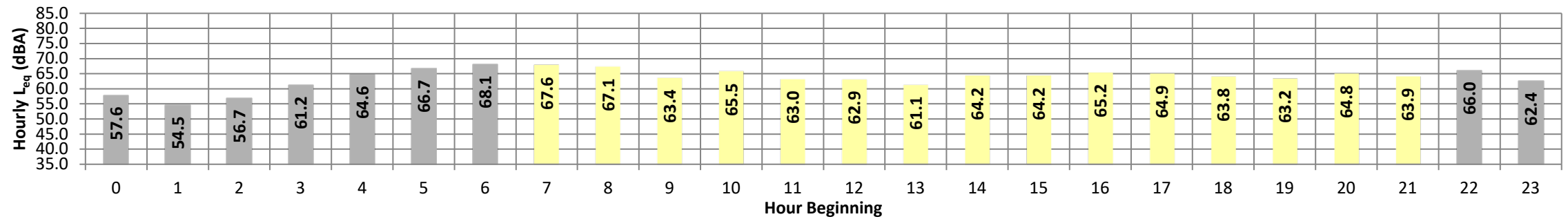
Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L5 - Located northwest of the University Street Station near Sylvan Park at 601 North
Source: University Street within the Civic Space (CS) TVSP regulating land use.

Meter: Piccolo II

JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	57.6	68.8	44.2	68.4	67.7	64.9	62.8	56.7	50.6	45.2	44.7	44.3	57.6	10.0	67.6
	1	54.5	64.5	43.9	64.3	63.8	61.8	59.8	53.8	49.0	44.8	44.4	44.0	54.5	10.0	64.5
	2	56.7	68.8	44.3	68.1	67.4	64.5	61.7	54.2	48.5	45.1	44.8	44.5	56.7	10.0	66.7
	3	61.2	73.9	45.6	73.2	72.4	68.2	65.8	58.9	52.7	46.8	46.1	45.8	61.2	10.0	71.2
	4	64.6	75.6	51.2	75.3	74.7	72.0	69.5	63.0	58.7	52.3	51.7	51.3	64.6	10.0	74.6
	5	66.7	78.2	56.6	77.3	76.3	72.8	70.7	65.9	62.9	58.0	57.3	56.8	66.7	10.0	76.7
	6	68.1	78.0	60.0	77.7	76.9	73.9	71.6	67.9	65.5	61.6	60.8	60.1	68.1	10.0	78.1
Day	7	67.6	76.3	59.9	76.0	75.3	73.1	71.6	67.6	65.6	61.8	60.9	60.0	67.6	0.0	67.6
	8	67.1	79.1	56.8	78.4	77.2	73.3	70.6	65.5	63.4	58.9	57.8	57.0	67.1	0.0	67.1
	9	63.4	72.4	54.5	72.0	71.3	68.9	67.6	63.4	61.1	56.5	55.4	54.6	63.4	0.0	63.4
	10	65.5	78.2	54.3	77.4	76.3	73.5	69.2	62.1	59.5	55.8	55.0	54.4	65.5	0.0	65.5
	11	63.0	73.5	53.3	73.1	72.3	70.0	67.3	62.1	59.5	54.8	54.0	53.5	63.0	0.0	63.0
	12	62.9	73.0	53.9	72.7	72.1	69.3	67.2	62.0	59.7	55.4	54.6	54.0	62.9	0.0	62.9
	13	61.1	70.1	53.7	69.8	69.3	66.8	65.1	60.9	58.7	55.2	54.5	53.8	61.1	0.0	61.1
	14	64.2	73.8	57.6	73.1	72.6	70.4	68.1	63.5	61.6	58.9	58.4	57.8	64.2	0.0	64.2
	15	64.2	73.5	57.7	72.9	72.3	69.8	68.0	63.9	61.9	59.0	58.4	57.9	64.2	0.0	64.2
	16	65.2	75.9	58.3	75.1	74.0	70.9	68.5	64.5	62.6	59.7	59.1	58.5	65.2	0.0	65.2
	17	64.9	75.8	56.7	75.0	73.7	70.9	68.7	64.1	61.8	58.3	57.6	56.9	64.9	0.0	64.9
	18	63.8	74.0	57.0	73.4	72.3	68.8	66.9	63.6	61.8	58.4	57.7	57.1	63.8	0.0	63.8
	19	63.2	70.0	58.4	69.7	69.3	67.4	66.1	63.7	62.2	59.4	58.8	58.5	63.2	5.0	68.2
	20	64.8	75.1	58.4	74.6	73.7	70.3	67.8	64.2	62.3	59.5	58.9	58.5	64.8	5.0	69.8
	21	63.9	72.6	58.7	72.3	71.7	69.2	67.5	63.8	62.0	59.6	59.2	58.8	63.9	5.0	68.9
Night	22	66.0	76.4	59.8	75.6	75.0	72.8	70.0	64.5	62.8	60.8	60.4	60.0	66.0	10.0	76.0
	23	62.4	68.5	58.3	68.2	67.8	66.3	65.4	63.0	61.4	59.2	58.8	58.4	62.4	10.0	72.4
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	61.1	70.0	53.3	69.7	69.3	66.8	65.1	60.9	58.7	54.8	54.0	53.5	70.7 64.6 64.0		
	Max	67.6	79.1	59.9	78.4	77.2	73.5	71.6	67.6	65.6	61.8	60.9	60.0			
Energy Average		64.6	Average:		73.7	72.9	70.2	68.0	63.7	61.6	58.1	57.4	56.7			
Night	Min	54.5	64.5	43.9	64.3	63.8	61.8	59.8	53.8	48.5	44.8	44.4	44.0			
	Max	68.1	78.2	60.0	77.7	76.9	73.9	71.6	67.9	65.5	61.6	60.8	60.1			
Energy Average		64.0	Average:		72.0	71.3	68.6	66.4	60.9	56.9	52.7	52.1	51.7			

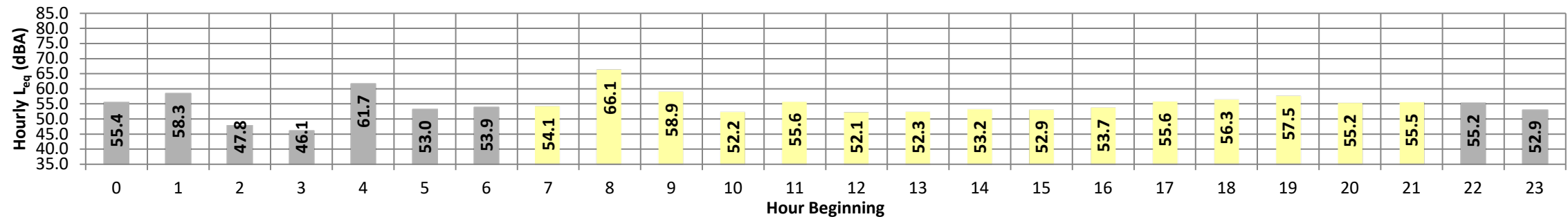
24-Hour Noise Level Measurement Summary

Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L6 - Located north of East Vine Street and south of East Citrus Avenue within the
Source: Downtown (DT) TVSP regulating land use.

Meter: Piccolo II JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}
Night	0	55.4	64.7	48.2	64.1	63.4	62.0	60.0	55.2	52.3	49.3	48.9	48.4	55.4	10.0	65.4
	1	58.3	70.4	47.8	70.1	69.4	65.1	62.7	55.4	52.4	49.3	48.8	48.0	58.3	10.0	68.3
	2	47.8	57.4	42.9	56.8	55.8	52.9	50.6	47.1	45.7	43.8	43.4	43.1	47.8	10.0	57.8
	3	46.1	53.6	43.6	52.7	51.4	49.7	48.8	46.3	44.9	44.0	43.9	43.7	46.1	10.0	56.1
	4	61.7	74.7	61.6	74.1	73.7	72.3	71.5	68.3	63.6	62.0	61.9	61.7	61.7	10.0	71.7
	5	53.0	56.8	50.9	56.5	56.1	55.2	54.8	53.5	52.6	51.5	51.2	51.0	53.0	10.0	63.0
	6	53.9	60.4	51.1	60.0	59.3	58.0	56.6	54.1	52.8	51.5	51.3	51.1	53.9	10.0	63.9
Day	7	54.1	62.9	49.5	62.1	61.0	59.4	58.2	53.8	52.1	50.3	50.0	49.7	54.1	0.0	54.1
	8	66.1	70.7	62.4	70.4	70.1	69.5	69.0	67.2	65.3	63.0	62.9	62.7	66.1	0.0	66.1
	9	58.9	67.3	49.2	66.7	66.3	64.6	62.8	60.2	56.2	49.9	49.7	49.4	58.9	0.0	58.9
	10	52.2	60.1	47.9	59.4	58.7	57.0	55.8	52.2	50.6	48.5	48.3	48.0	52.2	0.0	52.2
	11	55.6	69.9	48.3	69.5	69.2	67.0	63.5	55.4	51.9	49.1	48.8	48.5	55.6	0.0	55.6
	12	52.1	60.2	48.4	59.2	58.3	56.5	55.3	52.0	50.6	49.1	48.8	48.6	52.1	0.0	52.1
	13	52.3	60.4	48.7	59.3	58.5	56.2	54.9	52.5	51.2	49.4	49.1	48.8	52.3	0.0	52.3
	14	53.2	62.1	49.3	61.3	60.4	57.9	56.5	52.8	51.3	49.9	49.7	49.4	53.2	0.0	53.2
	15	52.9	61.3	48.7	60.6	59.8	57.8	56.4	53.0	51.0	49.3	49.1	48.8	52.9	0.0	52.9
	16	53.7	64.6	48.6	63.5	62.4	59.3	56.7	52.7	50.9	49.2	49.0	48.7	53.7	0.0	53.7
	17	55.6	64.9	50.8	64.3	63.6	61.6	59.5	54.9	53.1	51.4	51.2	50.9	55.6	0.0	55.6
	18	56.3	64.5	53.4	63.7	62.8	60.5	59.1	56.1	54.9	53.9	53.7	53.5	56.3	0.0	56.3
	19	57.5	68.4	53.5	67.5	65.8	61.7	59.8	56.7	55.4	54.1	53.9	53.6	57.5	5.0	62.5
	20	55.2	62.4	52.3	61.6	60.8	58.8	57.9	55.3	54.1	52.9	52.6	52.4	55.2	5.0	60.2
	21	55.5	68.8	51.9	67.9	67.1	63.7	60.1	55.7	53.8	52.4	52.2	52.0	55.5	5.0	60.5
Night	22	55.2	65.5	50.6	64.8	63.7	60.7	58.2	54.6	52.7	51.2	50.9	50.7	55.2	10.0	65.2
	23	52.9	60.5	49.6	59.7	58.8	56.9	56.0	52.8	51.6	50.2	50.0	49.7	52.9	10.0	62.9
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	52.1	60.1	47.9	59.2	58.3	56.2	54.9	52.0	50.6	48.5	48.3	48.0	62.9	57.6	56.0
	Max	66.1	70.7	62.4	70.4	70.1	69.5	69.0	67.2	65.3	63.0	62.9	62.7			
Energy Average		57.6	Average:		63.8	63.0	60.8	59.0	55.4	53.5	51.5	51.3	51.0			
Night	Min	46.1	53.6	42.9	52.7	51.4	49.7	48.8	46.3	44.9	43.8	43.4	43.1	62.9	57.6	56.0
	Max	61.7	74.7	61.6	74.1	73.7	72.3	71.5	68.3	63.6	62.0	61.9	61.7			
Energy Average		56.0	Average:		62.1	61.3	59.2	57.7	54.1	52.1	50.3	50.0	49.7			

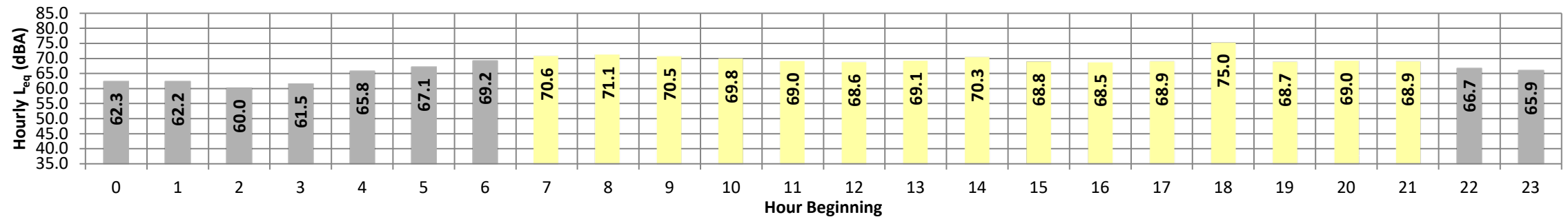
24-Hour Noise Level Measurement Summary

Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L7 - Located near the existing single-family residence at 1154 Orange Street within the
Source: Village Corridor (COR) TVSP regulating land use.

Meter: Piccolo II JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	62.3	75.2	39.5	74.6	73.4	69.6	67.5	59.2	50.6	42.0	40.7	39.7	62.3	10.0	72.3
	1	62.2	75.0	40.7	74.5	73.5	69.9	67.3	57.9	51.6	44.5	43.4	41.1	62.2	10.0	72.2
	2	60.0	72.3	38.3	71.8	70.8	67.9	65.6	56.8	47.0	39.3	38.7	38.4	60.0	10.0	70.0
	3	61.5	73.9	42.2	73.4	72.3	69.4	67.2	57.3	49.4	43.2	42.7	42.3	61.5	10.0	71.5
	4	65.8	79.2	47.1	78.5	76.9	72.6	70.6	63.3	55.0	48.1	47.6	47.2	65.8	10.0	75.8
	5	67.1	77.8	50.9	77.4	76.6	74.2	72.4	66.6	59.8	52.1	51.5	51.1	67.1	10.0	77.1
	6	69.2	80.2	54.0	79.1	77.9	75.2	73.8	69.9	64.8	55.7	54.8	54.2	69.2	10.0	79.2
Day	7	70.6	80.6	55.7	80.0	78.9	76.0	74.6	71.5	67.8	58.6	57.1	55.9	70.6	0.0	70.6
	8	71.1	80.9	56.5	80.4	79.6	77.0	75.2	71.5	68.3	59.8	58.2	56.7	71.1	0.0	71.1
	9	70.5	81.4	52.7	80.6	79.9	76.9	75.0	70.6	66.7	56.2	54.7	52.9	70.5	0.0	70.5
	10	69.8	80.8	52.9	80.0	78.9	75.8	74.0	70.0	65.9	56.1	54.4	53.1	69.8	0.0	69.8
	11	69.0	78.6	54.2	77.7	76.6	74.3	73.1	69.9	66.6	57.9	56.2	54.5	69.0	0.0	69.0
	12	68.6	76.7	54.3	76.2	75.5	73.7	72.6	69.9	66.6	58.0	56.2	54.6	68.6	0.0	68.6
	13	69.1	78.4	55.5	78.0	77.0	74.5	73.0	69.8	66.6	59.0	57.2	55.8	69.1	0.0	69.1
	14	70.3	81.3	56.4	80.8	79.2	76.1	74.4	70.1	67.2	59.8	58.1	56.7	70.3	0.0	70.3
	15	68.8	79.1	57.8	78.6	77.6	74.7	72.7	68.7	65.9	60.4	59.0	58.0	68.8	0.0	68.8
	16	68.5	77.3	57.2	77.0	76.3	74.2	72.7	69.0	66.3	60.2	58.8	57.4	68.5	0.0	68.5
	17	68.9	79.7	58.6	79.3	78.5	75.2	72.7	68.0	65.6	60.8	59.8	58.8	68.9	0.0	68.9
	18	75.0	89.1	57.7	88.5	86.9	82.0	77.6	70.0	66.8	60.2	59.2	57.9	75.0	0.0	75.0
	19	68.7	78.4	54.8	77.9	76.9	74.3	72.7	69.6	65.8	57.2	55.8	55.0	68.7	5.0	73.7
	20	69.0	79.8	54.6	79.2	78.2	75.4	73.6	69.2	64.7	56.3	55.5	54.8	69.0	5.0	74.0
	21	68.9	81.2	54.8	80.4	79.1	75.1	72.6	68.2	63.2	56.2	55.5	55.0	68.9	5.0	73.9
Night	22	66.7	78.5	52.7	77.7	76.5	73.3	71.4	66.3	60.4	54.0	53.3	52.9	66.7	10.0	76.7
	23	65.9	77.9	52.7	77.3	76.2	73.0	71.0	64.3	58.6	53.8	53.3	52.9	65.9	10.0	75.9
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	68.5	76.7	52.7	76.2	75.5	73.7	72.6	68.0	63.2	56.1	54.4	52.9	73.4	70.2	65.5
	Max	75.0	89.1	58.6	88.5	86.9	82.0	77.6	71.5	68.3	60.8	59.8	58.8			
Energy Average		70.2	Average:		79.6	78.6	75.7	73.8	69.7	66.3	58.5	57.0	55.8			
Night	Min	60.0	72.3	38.3	71.8	70.8	67.9	65.6	56.8	47.0	39.3	38.7	38.4			
	Max	69.2	80.2	54.0	79.1	77.9	75.2	73.8	69.9	64.8	55.7	54.8	54.2			
Energy Average		65.5	Average:		76.0	74.9	71.7	69.6	62.4	55.2	48.1	47.3	46.6			

24-Hour Noise Level Measurement Summary

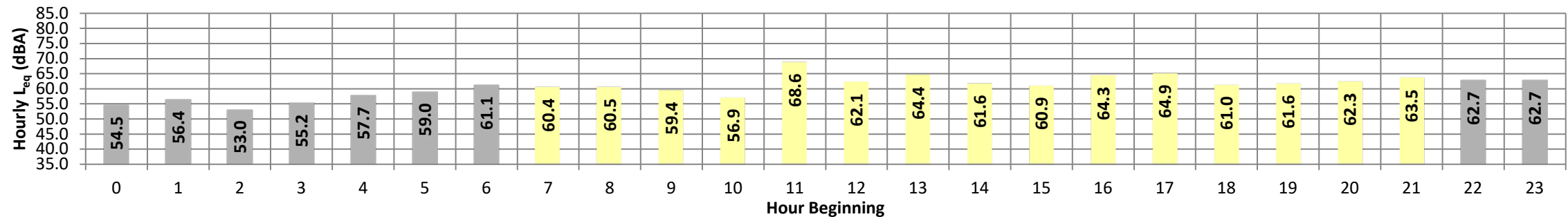
Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L8 - Located near the existing single-family residence at 410 East Stuart Street within the
Source: Neighborhood General 2 (NG2) TVSP regulating land use.

Meter: Piccolo II

JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}
Night	0	54.5	58.6	51.0	58.4	58.0	57.2	56.8	55.3	54.0	51.9	51.5	51.1	54.5	10.0	64.5
	1	56.4	62.8	50.6	62.4	62.1	61.3	60.6	57.4	54.3	51.5	51.2	50.7	56.4	10.0	66.4
	2	53.0	57.6	49.2	57.3	56.9	56.1	55.5	53.8	52.5	50.1	49.7	49.3	53.0	10.0	63.0
	3	55.2	61.4	51.9	61.1	60.6	59.1	57.5	55.6	54.3	52.6	52.3	52.0	55.2	10.0	65.2
	4	57.7	65.4	54.3	65.0	64.4	62.5	60.2	57.4	56.4	55.0	54.7	54.4	57.7	10.0	67.7
	5	59.0	65.4	56.2	64.9	64.3	62.3	61.2	59.1	58.1	56.9	56.6	56.3	59.0	10.0	69.0
	6	61.1	67.9	58.6	67.4	66.5	64.8	63.4	61.0	60.1	59.1	58.9	58.7	61.1	10.0	71.1
Day	7	60.4	68.1	56.6	67.7	67.1	65.6	64.0	60.2	58.6	57.3	57.0	56.7	60.4	0.0	60.4
	8	60.5	67.8	57.4	67.2	66.5	64.4	63.2	60.6	59.1	57.9	57.7	57.5	60.5	0.0	60.5
	9	59.4	69.0	55.2	68.0	67.1	64.6	62.4	58.8	57.3	55.8	55.6	55.3	59.4	0.0	59.4
	10	56.9	63.9	53.8	63.4	62.7	61.2	59.8	57.1	55.6	54.3	54.1	53.9	56.9	0.0	56.9
	11	68.6	81.0	56.3	80.2	78.7	75.5	73.0	67.5	62.4	57.2	56.7	56.4	68.6	0.0	68.6
	12	62.1	71.8	57.7	71.6	71.1	68.2	65.2	60.8	59.4	58.2	58.0	57.8	62.1	0.0	62.1
	13	64.4	75.3	59.4	74.0	72.5	70.3	68.3	63.6	61.4	60.0	59.8	59.5	64.4	0.0	64.4
	14	61.6	67.0	59.2	66.7	66.2	65.0	63.9	61.7	60.8	59.8	59.6	59.3	61.6	0.0	61.6
	15	60.9	71.2	54.7	70.5	69.8	67.5	65.1	60.0	57.1	55.3	55.1	54.8	60.9	0.0	60.9
	16	64.3	75.1	56.8	74.5	74.0	71.9	69.2	62.0	59.1	57.4	57.2	56.9	64.3	0.0	64.3
	17	64.9	74.2	59.2	73.1	72.0	69.5	68.6	65.2	63.1	60.0	59.6	59.3	64.9	0.0	64.9
	18	61.0	68.4	58.1	68.1	67.5	65.4	63.9	60.8	59.7	58.5	58.3	58.2	61.0	0.0	61.0
	19	61.6	66.3	59.4	66.0	65.6	64.5	63.6	61.8	61.0	59.9	59.7	59.5	61.6	5.0	66.6
	20	62.3	66.7	59.9	66.4	66.0	64.9	64.3	62.8	61.7	60.5	60.3	60.0	62.3	5.0	67.3
	21	63.5	68.4	60.9	68.2	67.9	67.2	66.5	63.6	62.7	61.6	61.3	61.0	63.5	5.0	68.5
Night	22	62.7	66.4	60.2	66.1	65.8	65.0	64.4	63.2	62.4	60.9	60.6	60.3	62.7	10.0	72.7
	23	62.7	65.8	60.0	65.6	65.3	64.8	64.5	63.3	62.4	60.8	60.4	60.1	62.7	10.0	72.7
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	56.9	63.9	53.8	63.4	62.7	61.2	59.8	57.1	55.6	54.3	54.1	53.9	66.9	63.1	59.3
	Max	68.6	81.0	60.9	80.2	78.7	75.5	73.0	67.5	63.1	61.6	61.3	61.0			
Energy Average		63.1	Average:		69.7	69.0	67.1	65.4	61.8	59.9	58.2	58.0	57.7			
Night	Min	53.0	57.6	49.2	57.3	56.9	56.1	55.5	53.8	52.5	50.1	49.7	49.3	66.9	63.1	59.3
	Max	62.7	67.9	60.2	67.4	66.5	65.0	64.5	63.3	62.4	60.9	60.6	60.3			
Energy Average		59.3	Average:		63.1	62.7	61.4	60.4	58.5	57.2	55.4	55.1	54.8			

24-Hour Noise Level Measurement Summary

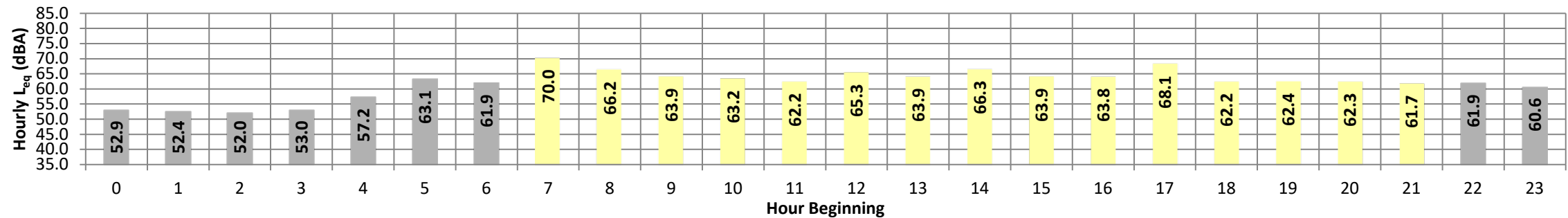
Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L9 - Located near the existing single-family residence at 801 Stillman Avenue within the
Source: Neighborhood General 1 (NG1) TVSP regulating land use.

Meter: Piccolo II

JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L _{eq}	Adj.	Adj. L _{eq}	
Night	0	52.9	64.3	45.5	63.9	63.0	59.4	57.2	51.0	48.4	46.2	45.8	45.5	52.9	10.0	62.9	
	1	52.4	61.8	45.7	61.5	60.9	58.6	56.8	51.9	49.0	46.5	46.1	45.8	52.4	10.0	62.4	
	2	52.0	62.8	44.9	62.6	62.1	59.2	56.1	49.5	47.7	45.6	45.3	45.0	52.0	10.0	62.0	
	3	53.0	63.9	45.6	63.6	62.9	60.1	57.2	50.8	48.6	46.3	46.0	45.7	53.0	10.0	63.0	
	4	57.2	69.1	49.9	68.7	67.4	64.0	61.3	54.5	52.0	50.5	50.2	50.0	57.2	10.0	67.2	
	5	63.1	75.2	52.8	75.0	74.5	71.1	67.6	58.9	55.6	53.4	53.1	52.8	63.1	10.0	73.1	
	6	61.9	71.9	54.6	71.5	70.8	68.6	66.7	61.3	57.4	55.1	54.9	54.7	61.9	10.0	71.9	
Day	7	70.0	84.4	54.9	83.6	82.0	77.3	71.1	65.2	61.6	56.3	55.6	55.0	70.0	0.0	70.0	
	8	66.2	76.9	53.3	76.3	75.3	72.7	70.9	66.1	62.2	54.8	53.9	53.3	66.2	0.0	66.2	
	9	63.9	74.1	53.3	73.8	73.0	70.5	68.3	63.8	59.5	54.3	53.8	53.4	63.9	0.0	63.9	
	10	63.2	73.2	52.5	72.7	72.0	69.9	68.1	63.3	58.6	53.5	53.1	52.6	63.2	0.0	63.2	
	11	62.2	71.4	52.1	71.0	70.4	68.5	67.2	62.9	57.9	53.0	52.5	52.2	62.2	0.0	62.2	
	12	65.3	74.4	54.6	73.9	73.3	71.5	70.0	65.9	61.6	56.2	55.4	54.8	65.3	0.0	65.3	
	13	63.9	72.7	57.4	72.3	71.6	69.4	67.8	63.9	61.4	58.4	58.1	57.5	63.9	0.0	63.9	
	14	66.3	72.6	60.8	72.1	71.6	70.2	69.4	67.3	65.3	62.2	61.7	61.0	66.3	0.0	66.3	
	15	63.9	72.6	55.4	72.2	71.4	69.1	67.6	64.7	61.7	56.6	55.9	55.6	63.9	0.0	63.9	
	16	63.8	73.0	54.7	72.3	71.5	69.3	68.2	64.4	61.3	56.1	55.3	54.8	63.8	0.0	63.8	
	17	68.1	80.8	57.3	80.5	79.4	75.1	71.0	65.4	62.8	58.4	57.9	57.4	68.1	0.0	68.1	
	18	62.2	70.5	53.4	70.1	69.5	67.9	66.7	63.1	59.5	54.5	53.9	53.5	62.2	0.0	62.2	
	19	62.4	71.7	54.7	71.3	70.7	68.6	66.9	62.4	58.8	55.4	55.1	54.8	62.4	5.0	67.4	
	20	62.3	73.1	55.1	72.2	71.4	68.2	66.4	61.8	58.3	55.7	55.4	55.1	62.3	5.0	67.3	
	21	61.7	71.4	56.7	70.4	69.2	66.4	65.2	61.7	59.3	57.4	57.1	56.7	61.7	5.0	66.7	
Night	22	61.9	70.8	57.4	70.5	69.9	67.4	65.4	61.2	59.6	58.0	57.8	57.5	61.9	10.0	71.9	
	23	60.6	68.3	57.4	67.7	66.8	64.4	63.1	60.6	59.5	58.0	57.7	57.4	60.6	10.0	70.6	
Timeframe	Hour	L _{eq}	L _{max}	L _{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL	Leq (dBA)		
Day	Min	61.7	70.5	52.1	70.1	69.2	66.4	65.2	61.7	57.9	53.0	52.5	52.2		Daytime (7am-10pm)	Nighttime (10pm-7am)	
	Max	70.0	84.4	60.8	83.6	82.0	77.3	71.1	67.3	65.3	62.2	61.7	61.0				
Energy Average		65.1	Average:		73.6	72.8	70.3	68.3	64.1	60.6	56.2	55.6	55.2		67.5	65.1	59.2
Night	Min	52.0	61.8	44.9	61.5	60.9	58.6	56.1	49.5	47.7	45.6	45.3	45.0				
	Max	63.1	75.2	57.4	75.0	74.5	71.1	67.6	61.3	59.6	58.0	57.8	57.5				
Energy Average		59.2	Average:		67.2	66.5	63.7	61.3	55.5	53.1	51.1	50.8	50.5				

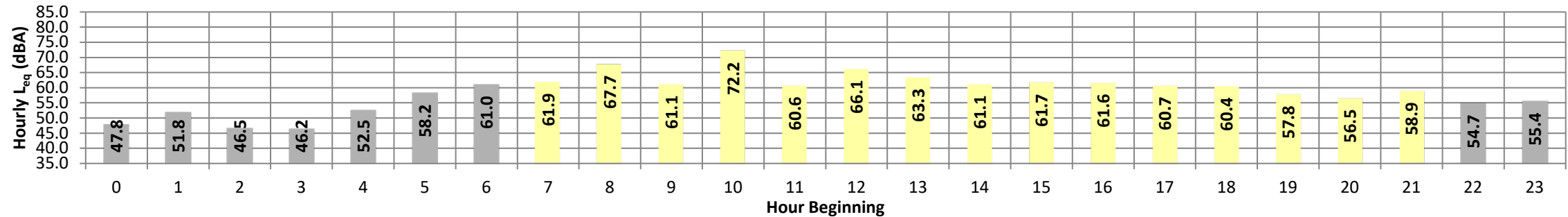
24-Hour Noise Level Measurement Summary

Date: Wednesday, November 10, 2021
Project: Transit Village

Location: L10 - Located south of the ESRI campus near the Redlands Adventist Academy at 130
Source: Tennessee Street within the Special District 1 (SD1) TVSP regulating land use.

Meter: Piccolo II
JN: 12240
Analyst: A. Khan

Hourly L_{eq} dBA Readings (unadjusted)



Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	L_{eq}	Adj.	Adj. L_{eq}
Night	0	47.8	59.0	42.9	58.7	58.0	53.9	50.8	45.5	44.1	43.3	43.2	43.0	47.8	10.0	57.8
	1	51.8	60.9	41.8	60.5	59.7	57.6	56.0	52.8	48.6	43.5	43.0	41.9	51.8	10.0	61.8
	2	46.5	58.9	39.8	58.4	57.4	53.5	50.1	42.9	41.2	40.1	40.0	39.9	46.5	10.0	56.5
	3	46.2	56.0	43.0	55.6	54.8	51.3	48.7	44.7	44.1	43.4	43.2	43.1	46.2	10.0	56.2
	4	52.5	62.4	48.1	61.9	61.1	58.2	55.9	51.2	49.9	48.7	48.5	48.2	52.5	10.0	62.5
	5	58.2	69.3	51.3	68.9	68.0	65.0	62.6	56.1	53.2	51.8	51.6	51.4	58.2	10.0	68.2
Day	6	61.0	70.9	56.1	70.5	69.6	66.4	64.4	60.3	58.1	56.6	56.4	56.2	61.0	10.0	71.0
	7	61.9	69.8	56.6	69.4	68.8	66.9	65.8	62.3	59.7	57.3	57.0	56.7	61.9	0.0	61.9
	8	67.7	73.3	65.0	72.9	72.3	70.8	69.9	68.1	67.0	65.6	65.4	65.1	67.7	0.0	67.7
	9	61.1	69.6	56.9	69.2	68.5	66.1	64.6	60.7	59.0	57.6	57.3	57.1	61.1	0.0	61.1
	10	72.2	80.9	63.2	80.4	79.8	77.9	76.6	73.0	69.3	64.4	63.8	63.3	72.2	0.0	72.2
	11	60.6	71.2	53.1	70.6	69.7	66.9	64.8	60.0	57.0	54.0	53.6	53.2	60.6	0.0	60.6
	12	66.1	76.3	53.1	75.8	74.7	72.4	70.4	66.7	63.2	54.4	53.9	53.2	66.1	0.0	66.1
	13	63.3	74.2	55.2	73.8	73.0	69.8	67.5	62.4	59.3	56.2	55.8	55.4	63.3	0.0	63.3
	14	61.1	71.8	51.4	71.3	70.3	67.4	65.6	60.7	56.8	52.2	51.9	51.5	61.1	0.0	61.1
	15	61.7	73.1	50.8	72.4	71.6	68.3	66.2	61.1	56.5	51.9	51.5	51.0	61.7	0.0	61.7
	16	61.6	72.2	51.7	71.8	71.0	67.9	66.1	61.3	56.4	52.7	52.2	51.9	61.6	0.0	61.6
	17	60.7	70.2	52.5	69.8	69.2	67.0	65.5	60.6	56.5	53.2	52.9	52.6	60.7	0.0	60.7
	18	60.4	71.4	54.5	70.8	69.7	66.2	64.0	59.4	56.8	55.1	54.8	54.6	60.4	0.0	60.4
	19	57.8	67.1	53.5	66.6	65.9	63.0	61.3	57.0	55.5	54.1	53.8	53.5	57.8	5.0	62.8
	20	56.5	64.9	52.6	64.6	64.0	61.5	59.8	56.0	54.6	53.2	52.9	52.7	56.5	5.0	61.5
	21	58.9	72.2	51.2	71.3	70.2	65.7	62.3	54.4	52.8	51.7	51.5	51.3	58.9	5.0	63.9
Night	22	54.7	64.5	51.1	63.9	63.0	59.5	57.2	53.8	52.5	51.5	51.4	51.2	54.7	10.0	64.7
	23	55.4	67.6	49.7	66.9	65.8	61.9	58.4	52.6	51.4	50.3	50.1	49.8	55.4	10.0	65.4
Timeframe	Hour	L_{eq}	L_{max}	L_{min}	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%	24-Hour CNEL		
Day	Min	56.5	64.9	50.8	64.6	64.0	61.5	59.8	54.4	52.8	51.7	51.5	51.0	65.0	64.4	55.3
	Max	72.2	80.9	65.0	80.4	79.8	77.9	76.6	73.0	69.3	65.6	65.4	65.1			
Energy Average		64.4	Average:		71.4	70.6	67.9	66.0	61.6	58.7	55.6	55.2	54.9			
Night	Min	46.2	56.0	39.8	55.6	54.8	51.3	48.7	42.9	41.2	40.1	40.0	39.9			
	Max	61.0	70.9	56.1	70.5	69.6	66.4	64.4	60.3	58.1	56.6	56.4	56.2			
Energy Average		55.3	Average:		62.8	61.9	58.6	56.0	51.1	49.2	47.7	47.5	47.2			