NOISE ASSESSMENT

Woodward 46 Specific Plan
SP22-0005, SP22-0006, GPA22-0004, MFSD22-0005, TSM22-0004
City of San Marcos, CA

Prepared for:

City of San Marcos
1 Civic Center Drive
San Marcos, CA 92069

Prepared By:

Ldn Consulting, Inc.
42428 Chisolm Trail
Murrieta, California 92562
760-473-1253

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GLOSSARY OF COMMON TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (Ldn): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for nighttime noise. Typically, Ldn's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise impacts to and from the proposed residential project. The project is located north of State Route 78 (SR-78) and Mission Road along the east side of Woodward Street in the Richland neighborhood in the City of San Marcos CA.

Construction Noise

The grading equipment will be spread out over the project site from distances near the occupied property lines to distances of 400 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 280 feet from the property lines. At an average distance of 280 feet from the construction activities to the nearest property line, noise levels will comply with the 75 dBA Leq standard over 8 hours at the property lines. Therefore, construction related noise impacts would be less than significant and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible.

Additionally, the project may require blasting which would also require the need for a rock drill. Rock drilling and blasting will occur on an as-needed basis on site. In the event that the rock drill is staged within 160 feet of any occupied noise sensitive land use, it is recommended that a specific noise mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by an acoustical engineer. A mitigation plan should be developed that may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height may be needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold. The mitigation plan can also incorporate the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier if one is necessary. The project's requested approvals include a Conditional Use Permit, which would allow for the use of the temporary rock crusher.

Rock Crusher Noise

The rock crushing equipment will be located in the central portion of the site at the proposed building pads, and more than 300 feet from the nearest residences. The noise levels are anticipated to be below the City's 60 dBA Leq standard at the property lines without mitigation.

Noise measurements of the rock crusher should be conducted once the final rock crusher type and location are determined to ensure compliance with the City's noise requirements. If the rock crusher is located within 400 feet of a single family residential use without shielding, noise levels

may exceed the applied threshold. If noise levels are found to be above the applied thresholds of 60 dBA at any existing single family residential use, 65 dBA for any multifamily use or 70 dBA at a commercial use then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

Construction Vibration

Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 79 VdB and 0.03 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second.

Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided it can be minimized by following the City's blasting procedures.

Onsite Transportation Noise

It was determined that the outdoor noise levels are expected to be as high as 65 dBA CNEL at the proposed private patios, balconies, rooftop decks, and common area parks and would comply with the City's noise standard and no additional mitigation is required. Additionally, a final noise assessment is required prior to the issuance of the first building permit since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans. It should be noted; interior noise levels of 45 dBA CNEL can be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g., air conditioning) and upgraded

windows for all sensitive rooms (e.g., bedrooms and living spaces).

Offsite Transportation Noise

The Project does not create a direct or cumulative noise increase of more than 3 dBA CNEL on any of the analyzed roadway segments. Therefore, the Project's contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

1.0 PROJECT INTRODUCTION

1.1 Purpose of this Study

The purpose of this Noise study is to determine potential noise impacts (if any) created from the proposed construction operations and to determine potential noise impacts (if any) to the site generated from offsite sources. Should impacts be determined, the intent of this study would be to recommend suitable measures to bring those impacts to a level that would meet local requirements.

1.2 Project Location

The vacant 8.57 acre project site having an Assessor Parcel Number (APN) of 220-210-49-00 is located along Woodward Street in the Richland Community in the City of San Marcos. Specifically, the project site is located north of State Route 78 (SR-78) and Mission Road along the east side of Woodward Street. A project vicinity map and location map are shown in Figure 1-A. The existing site is currently vacant. The project vicinity includes single-family residential neighborhoods to the north and east, multi-family residential developments to the south, and undeveloped land to the west across Woodward Street. Directly north of the project site is an area designated as Open Space in the City's General Plan.

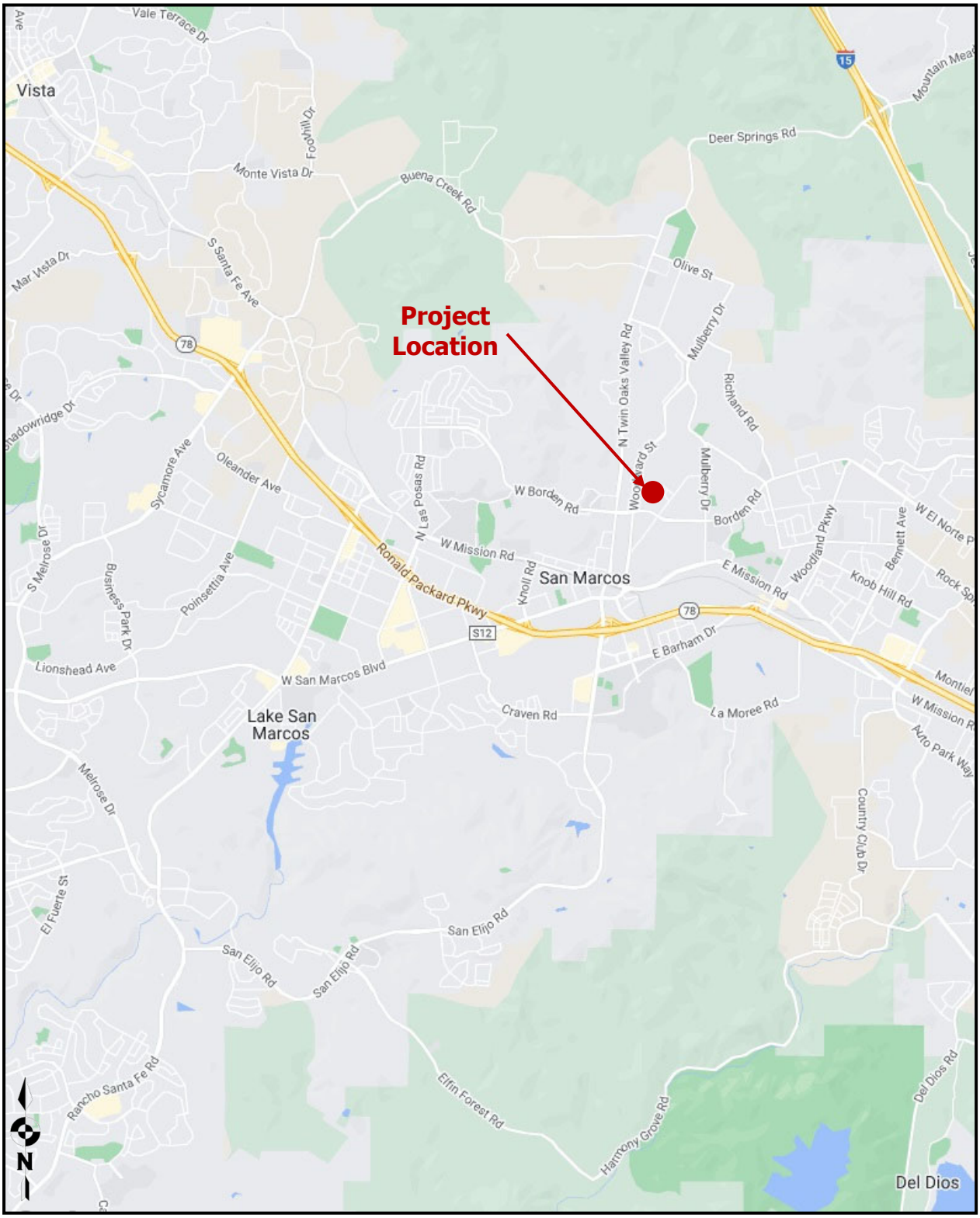
1.3 Project Description and Purpose

The project proposes 46 three-story multi-family residential duplex units situated on approximately 8.57 gross acres. The project would include open space land use as well as private open space in the form of a deck and private yard space. Common recreational spaces within the residential land use consists of approximately 6.01 acres of open space, will be designed with urban-style amenities such as picnic stations, turf play area, a tot lot, and a sensory garden. The project development plan is shown on Figure 1-B of this report.

1.4 Blasting and Rock Crushing Operations

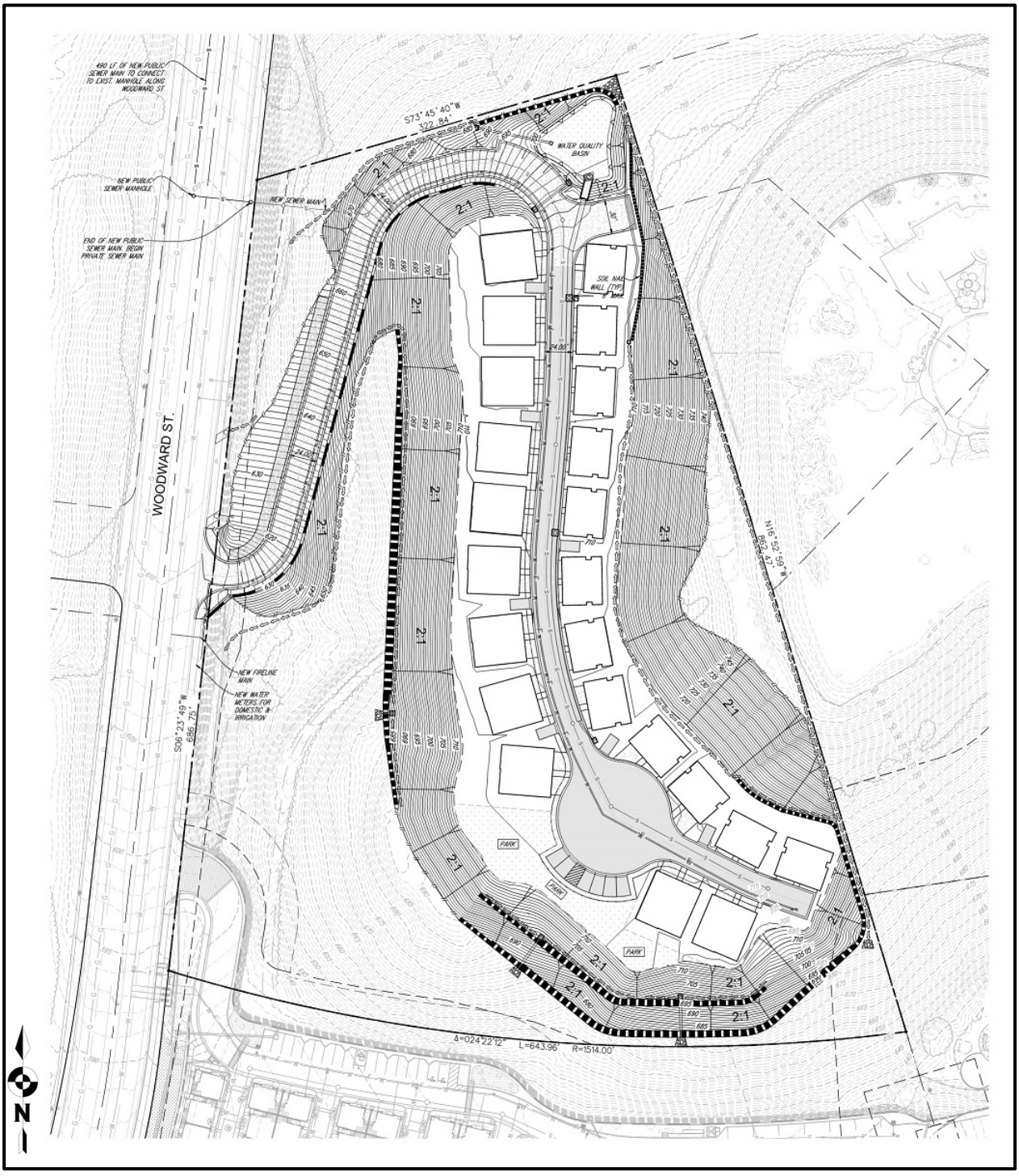
Additionally, some of the extracted material will need to be crushed onsite prior to placement at the site. The crusher would be located over 300 feet from the nearest residence. It is anticipated that the project will utilize a Thunderbird Hazemag Impact Crushing Plan #CP300 or equivalent. Rock crushing will occur between the hours of 7:00 AM and 4:00 PM. The rock crushing equipment will be located in the central portion of the site, more than 300 feet from the nearest residence. The rock crusher location is shown in Figure 1-C. If blasting is required, the contractor will be required to follow the City's blasting protocols per the City's Municipal Code Section 17.60.06 (City of San Marcos Municipal Code, 2019).

Figure 1-A: Project Vicinity Map



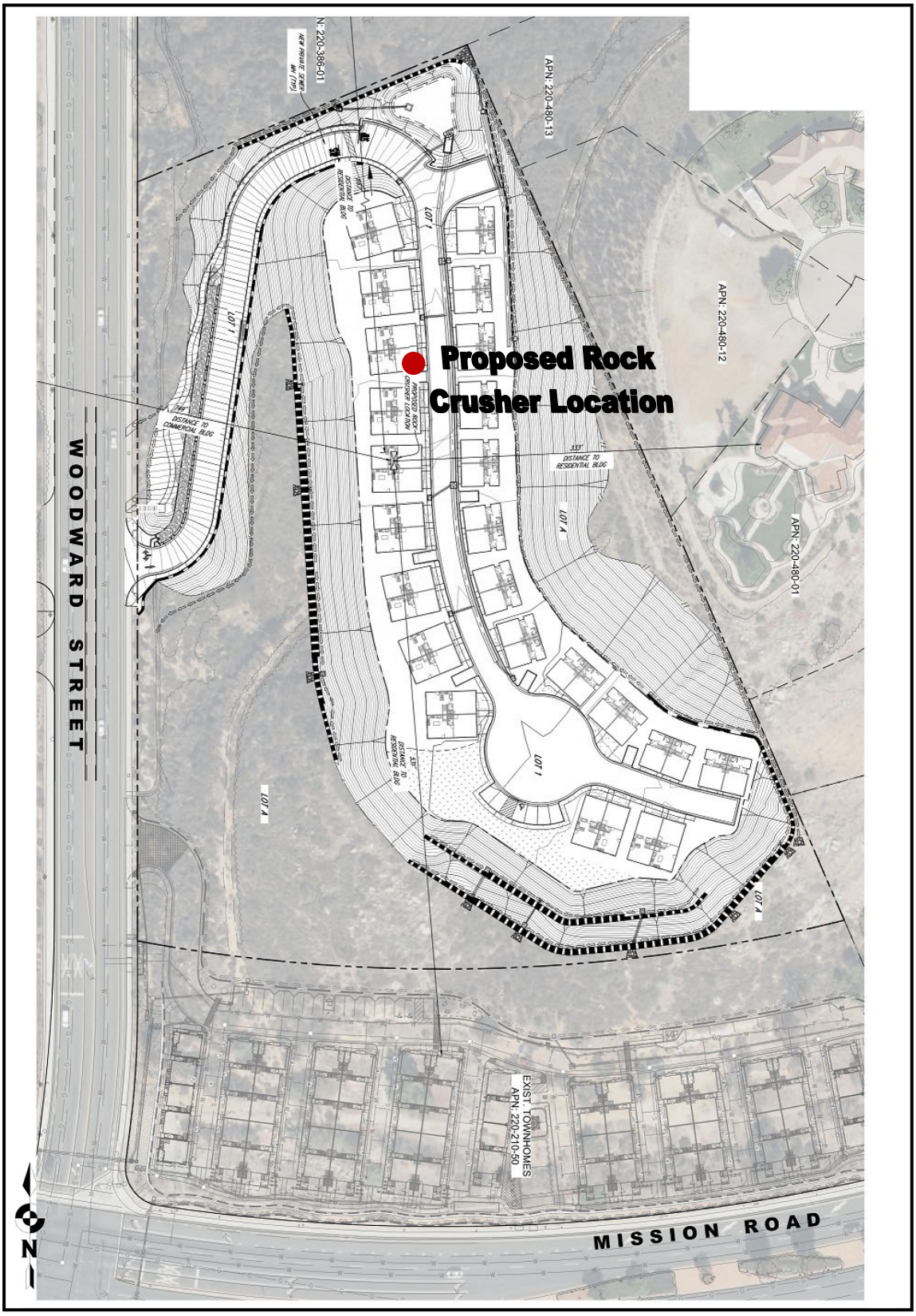
Source: (Google)

Figure 1-B: Residential Development Details



Source: (Excel Engineering)

Figure 1-C: Proposed Rock Crusher Location



2.0 FUNDAMENTALS

2.1 Acoustical Fundamentals

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs and when the noise occurs. Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24 hour A-weighted average for sound, with corrections or penalties for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sounds appear louder.

A vehicle's noise level is from a combination of the noise produced by the engine, exhaust and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by higher traffic volumes, greater speeds and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. On the other hand, fixed/point sources radiate outward uniformly as it travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source, blocking the noise transmission with barriers or relocating the receiver. Any or all of these methods may be required to reduce noise levels to an acceptable level.

2.2 Vibration Fundamentals

Vibration is a trembling or oscillating motion of the ground. Like noise, vibration is transmitted in waves, but in this case through the ground or solid objects. Unlike noise, vibration is typically felt rather than heard. Vibration can be either natural as in the form of earthquakes, volcanic eruptions, or manmade as from explosions, heavy machinery, or trains. Both natural and manmade vibration may be continuous, such as from operating machinery; or infrequent, as from an explosion.

As with noise, vibration can be described by both its amplitude and frequency. Amplitude may be characterized in three ways: displacement, velocity, and acceleration. Particle displacement is a measure of the distance that a vibrated particle travels from its original position and for the purposes of soil displacement is typically measured in inches or millimeters. Particle velocity is the rate of speed at which soil particles move in inches per second or millimeters per second. Particle acceleration is the rate of change in velocity with respect to time and is measured in inches per second or millimeters per second. Typically, particle velocity (measured in inches or millimeters per second) and/or acceleration (measured in gravities) are used to describe vibration. Table 2-1 shows the human reaction to various levels of peak particle velocity.

Vibrations also vary in frequency and this affects perception. Typical construction vibrations fall in the 10 to 30 Hz range and usually occurring around 15 Hz. Traffic vibrations exhibit a similar range of frequencies; however, due to their suspension systems, it is less common, to measure traffic frequencies above 30 Hz.

Propagation of ground-borne vibrations is complicated and difficult to predict because of the endless variations in the soil through which the waves travel. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by dropping an object into water. P-waves, or compression waves, are waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the energy is spread over an ever-increasing area such that the energy level is reduced with the distance from the energy source. This geometric spreading loss is inversely proportional to the square of the distance. Wave energy is also reduced

with distance as a result of material damping in the form of internal friction, soil layering, and special voids. The amount of attenuation provided by material damping varies with soil type and condition as well as the frequency of the wave.

Table 2-1: Human Reaction to Typical Vibration Levels

Vibration Level Peak Particle Velocity (in/sec)	Human Reaction	Effect on Buildings
0.006–0.019	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: Caltrans, Division of Environmental Analysis, *Transportation Related Earthborne Vibration, Caltrans Experiences*, Technical Advisory, Vibration, TAV-02-01-R9601, 2020 (Caltrans).

3.0 SIGNIFICANCE THRESHOLDS AND STANDARDS

3.1 Construction Noise

The City of San Marcos Municipal Code (City of San Marcos Municipal Code) Section 17.08.080 addresses the limits of grading, extraction and construction activities between 7:00 a.m. and 6:00 p.m. Monday through Friday, 8:00 a.m. and 5:00 p.m. Saturdays, and no grading, extraction or construction is allowed on Sundays or City holidays. The Municipal code does not set noise limits on construction activities. Commonly, the City has utilized Section 36.409 of the County of San Diego's Noise Ordinance noise limit of 75 dBA Leq (8-hour) for other projects.

3.2 Blasting and Vibration Standards

The City of San Marcos Section 17.60.06 of the City's Municipal Code states that all blasting operations within the City of San Marcos are prohibited unless a Certificate of Authorization is first obtained from the San Marcos Building Director and an Operations Permit issued by the Fire Chief. Additional relevant sections of the City's Code for Blasting are provided below:

- The general contractor or property owner/developer shall give reasonable notice in writing at the time of issuance of a building permit, grading permit or encroachment license to all residences or businesses within 600 feet of any potential blast location. The notice shall be in a form approved by the Building Director. Any resident or business receiving such notice may request of the Building Director that a notice of impending blasting be given by the blaster at the time of the 12 hour advance notice given to the Building Director. The general contractor or property owner/developer shall make all reasonable efforts to contact any and all parties requesting the second notice.

- The blaster shall file a written certification with the Building Director certifying that the general notice required by Section 17.60.060(b) has been given. The certificate shall include addresses and date(s) of notification. A copy shall be retained on file at the Building Division.

- Inspections of all structures within 300 feet of the blast site shall be made before blasting operations. The persons inspecting shall obtain the permission of the building owner to conduct an inspection. The inspections shall be done by a registered structural engineer employed by the blaster or project contractor. The inspection shall be only for the purpose of determining the existence of any visible or reasonably recognizable pre-existing defects or damages in any structure. Inspection refusal shall be at the discretion of the property owner.

- Blasting shall only be permitted between the hours of 9:00 a.m. and 4:00 p.m. during any weekday, Monday through Friday, exclusive of City recognized holidays unless special circumstances warrant another time or day and special approval is granted by the Building Director and Fire Chief.

The City of San Marcos has not yet adopted vibration criteria for construction. The United States Department of Transportation Federal Transit Administration (FTA) provides criteria for acceptable levels of groundborne vibration for various types of special buildings that are sensitive to vibration. For purposes of identifying potential project-related vibration impacts, the FTA criteria will be used. The human reaction to various levels of vibration is highly subjective. The upper end of the range shown for the threshold of perception, or roughly 65 VdB, may be considered annoying by some people. Vibration below 65 VdB may also cause secondary audible effects, such as a slight rattling of doors, suspended ceilings/fixtures, windows, and dishes, any of which may result in additional annoyance. Table 3-1 shows the FTA groundborne vibration and noise impact criteria for human annoyance.

Table 3-1: Groundborne Vibration and Noise Impact Criteria (Human Annoyance)

	Groundborne Vibration Impact Levels (VdB re 1 microinch/second)			Groundborne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* 2018 (FTA).

[1] "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2] "Occasional Events" are defined as between 30 and 70 vibration events of the same source per day. Most commuter truck lines have this many operations.

[3] "Infrequent Events" are defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

[4] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[5] Vibration-sensitive equipment is not sensitive to groundborne noise.

In addition to the vibration annoyance standards presented above, the FTA also applies the following standards for construction vibration damage. Table 3-2 on the following page, structural damage is possible for typical residential construction when the peak particle velocity (PPV) exceeds 0.2 inch per second (in/sec). This criterion is the threshold at which there is a risk of damage to normal dwellings.

In the context of this analysis, the noise and vibration impacts associated with the construction operations and blasting operations will be conditioned to comply with the thresholds stated above. The potential noise and vibration impacts are analyzed separately below.

Table 3-2: Groundborne Vibration Impact Criteria (Structural Damage)

Building Category	PPV (in/sec)	VdB
I. Reinforced-concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Source: United States Department of Transportation Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment,* 2018 (FTA).
Notes: RMS velocity calculated from vibration level (VdB) using the reference of one microinch/second.

3.3 Transportation Noise Standards

The City's General Plan Chapter 7 Noise Element uses the Noise Compatibility Guidelines listed in Table 7-3 of the General Plan Noise Element (provided below as Table 3-3) to determine the compatibility of land use when evaluating proposed development projects. The Noise Compatibility Guidelines indicate ranges of compatibility and are intended to be flexible enough to apply to a range of projects and environments (City of San Marcos General Plan). For example, a commercial project would be evaluated differently than a residential project.

A land use located in an area identified as "acceptable" indicates that standard construction methods would attenuate exterior noise to an acceptable indoor noise level and that people can carry out outdoor activities with minimal noise interference. Land uses that fall into the "conditionally acceptable" noise environment should have an acoustical study that considers the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source may interfere with sleep, speech, or other activities characteristic of the land use. For land uses indicated as "conditionally acceptable," structures must be able to attenuate the exterior noise to the indoor noise level as indicated in the Noise Standards listed in Table 7-4 of the General Plan Noise Element (provided below as Table 3-4). For land uses where the exterior noise levels fall within the "unacceptable" range, new construction generally should not be undertaken.

Table 3-3: Noise Compatibility Guidelines

Table 7-3
Noise and Land Use Compatibility Guidelines for Transportation-related Noise

	Land Use Category	Exterior Noise Level (CNEL) 55	60	65	70	75	80
A	Residential—single family residences, mobile homes, senior/age-restricted housing						
B	Residential—multifamily residences, mixed use (residential/commercial)						
C	Lodging—hotels, motels						
D[2]	Schools, churches, hospitals, residential care facility, child care facilities						
E[2]	Passive recreational parks, nature preserves, contemplative spaces, cemeteries						
F[2]	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation						
G[2]	Office/professional, government, medical/dental, commercial, retail, laboratories						
H[2]	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair						

Acceptable - Specified land use is satisfactory, based upon the assumption that any buildings involved

Conditionally Acceptable - New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table 7-4, Noise Standards. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate County decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.

Unacceptable - New construction or development shall not be undertaken.

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Table 3-4: Noise Standards

Table 7-4
Noise Standards[1]

1. The exterior noise level (as defined in Item 3) standard for Category A shall be 60 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.

2. The exterior noise level standard for Categories B and C shall be 65 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.

3. The exterior noise level standard for Categories D and G shall be 65 CNEL and the interior noise level standard shall be 50 dBA Leq (one hour average).

4. For single-family detached dwelling units, "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: (i) for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet, (ii) for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10 percent of the lot area; (iii) for lots over 10 acres in area, the exterior area shall include 1 acre.

5. For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways

6. For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.

7. For noise sensitive land uses where people normally do not sleep at night, the exterior and interior noise standard may be measured using either CNEL or the one-hour average noise level determined at the loudest hour during the period when the facility is normally occupied.

8. The exterior noise standard does not apply for land uses where no exterior use area is proposed or necessary, such as a library.

9. For Categories E and F the exterior noise level standard shall not exceed the limit defined as "Acceptable" in by the City, or an equivalent one-hour noise standard.

(1) Exterior Noise Level compatibility guidelines for Land Use Categories A-H are identified in Table 3.11-6, Noise Compatibility Guidelines.
Note: "Category(ies)" discussed in this table refer to lettered Land Use Category(ies) in Table 7-3 of this Element.

3.4 Operational Noise Standards

The City noise regulations that apply to the Project are found in Chapter 20.300 Site Planning and General Development Standards of the City Municipal Code. These regulations aim to prohibit unnecessary, excessive, and annoying noises from all sources, as certain noise levels are detrimental to the health and welfare of individuals. The standards of this section and of Chapter 10.24 Noise of the Municipal Code apply to all land uses in all Zones unless otherwise specified. No person shall create or allow the creation of exterior noise that causes the noise level to exceed the noise standards established by Table 20.300-4 (provided in Table 3-5 on the following page).

The City Ordinance limits noise generation in commercial/and multi-family zones to 65 dB Leq (one-hour average) between the hours of 7 am and 10 pm and 55 dB Leq between the hours of 10 pm and 7 am as measured at the project property line as shown below in Table 3-5. Per the City of San Marcos General Plan Noise Element (GPNE), noise standards for commercial, multi-family, and mixed-use land uses are the same, and are higher than single-family residential areas because they reflect a more urban environment (GPNE, pg. 7-10). Higher thresholds are permitted due to the integrated mix of residential and commercial activity and their usual location near major arterials (GPNE, pg. 7-9). Properties directly surrounding the project site are all designated as either single or multi-family use under the City General Plan. The nearest single-family residential uses are located to the north and east. Therefore, the City Ordinance limits of 60 dBA hourly noise standard during the daytime hours between 7 a.m. and 10 p.m., a 50 dBA standard during the nighttime hours between 10 p.m. and 7 a.m. would apply at the property lines to the north and east.

Table 3-5: Sound Level Limits

Zone	Allowable Noise Level (dBA Leq) Measured from the Property Line
Single-Family Residential (A, R-1, R-2) [1, 2]	
7 a.m. to 10 p.m. (daytime)	60
10 p.m. to 7 a.m. (overnight)	50
Multifamily Residential (R-3) [1, 2]	
7 a.m. to 10 p.m. (daytime)	65
10 p.m. to 7 a.m. (overnight)	55
Commercial (C, O-P, SR) [3]	
7 a.m. to 10 p.m. (daytime)	65
10 p.m. to 7 a.m. (overnight)	55
Industrial	
7 a.m. to 10 p.m. (daytime)	65
10 p.m. to 7 a.m. (overnight)	60

1. For single-family detached dwelling units, the "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: (i) for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet, (ii) for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10 percent of the lot area; (iii) for lots over 10 acres in area, the exterior area shall include 1 acre.
2. For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways.
3. For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.

3. For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.

4.0 CONSTRUCTION NOISE

4.1 Construction Noise Prediction Methodology

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders and scrapers can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor and reduced to 63 dBA at 200 feet from the source.

Using a point-source noise prediction model, calculations of the expected construction noise impacts were completed. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers. The equipment needed for the development will consist of up to one large bulldozers, a water truck, a medium sized front loader, a medium sized crawler type excavator, a small to medium sized road grader, a medium sized rubber tire backhoe and a small to medium sized drill rig. Based on the EPA noise emissions, empirical data and the amount of equipment needed, worst case noise levels from the construction equipment for site preparation would occur during the grading operations.

The potential noise sensitive uses are located adjacent or near the property lines. The affected land uses include the existing residential uses adjacent to the project to the north, east, and south. Woodward Street is located to the west and is not considered sensitive use. Existing ambient noise levels were determined to be 55.3 dBA Leq without construction noise as identified in Section 5.1 of this report.

4.2 Grading Activities Noise Findings and Mitigation

The grading activities will consist of the preparation of internal roadways, parking and the finished pads. The grading equipment will be spread out over the project site from distances near the occupied property lines to distances of 400 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 280 feet from the property lines. This

means that most of the time the average distance from all the equipment to the nearest property line is 280 feet. It should be noted that construction activities would be on average approximately 140 feet from the residences to the east, however, the homes are elevated over 50-feet above the proposed pads. Therefore, noise levels would be reduced a minimum of 5 dBA due to the topography blocking line of sight to the existing homes.

As can be seen in Table 4-1, at an average distance of 280 feet from the construction activities to the nearest property line would result in a noise attenuation of 15.0 dBA without shielding. This results in a property line noise level of 74.7 dBA. Given this, the noise levels will comply with the 75 dBA Leq standard at the property lines. Therefore, the construction noise impacts would be considered less than significant and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible. Because the rock drill and rock crusher will work independently of the construction equipment, additional analysis for each or them is provided below.

Table 4-1: Construction Noise Levels

Equipment Type	Quantity Used	Source @ 50 Feet (dBA)	Cumulative Noise Level @ 50 Feet (dBA)
Tractor/Backhoe	1	72	72.0
Dozer D9 Cat	1	74	74.0
Loader/Grader	1	73	73.0
Excavator	1	72	72.0
Water Trucks	1	70	70.0
Paver/Blade	1	75	75.0
Rock Drill	1	85	85.0
Hoe Ram	1	87	87.0
Rock Crusher	1	78	78.0
		Cumulative Level	89.7
		Distance to Sensitive Use	280
		Noise Reduction due to Distance	-15.0
		Property Line Noise Level	**74.7**

4.3 Rock Drill Noise Findings and Mitigation

Areas of the project site that require deeper cuts and where the native material is not easily rippable (graded) may require blasting and the use of a rock drill. The rock drill would be moved around the

site on an as needed basis dependent upon the site characteristics. The use of a rock drill would occur independently of all other proposed equipment. The drilling and blasting activities would occur in one area then the grading equipment would relocate or remove the debris. To determine the worst-case noise levels from the drilling operations the noise level from the rock drill would be 85.0 dBA at 50 feet. Utilizing a 6 dBA reduction per doubling of distance, at an average distance of 160 feet from any property line, the noise levels will comply with the 75 dBA standard as shown in Table 4-2.

Table 4-2: Construction Noise Levels from Rock Drill

Construction Equipment	Quantity	Source Level @ 50 Feet (dBA)	Duty Cycle (Hours/Day)	Noise Level @ 50 Feet (dBA)
Rock Drill	1	85	8	85.0
			Noise Reduction Needed to Comply	-10.0
			Distance Required to Reduce Noise Levels	160
			NEAREST PROPERTY LINE NOISE LEVEL	**74.9**

Rock drilling and blasting will occur on an as-needed basis on site. In the event that the rock drill is staged within 160 feet of any occupied noise sensitive land use, it is recommended that a specific noise mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by an acoustical engineer. A mitigation plan should be developed that may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height may be needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold. The mitigation plan can also incorporate the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier if one is necessary. The project's requested approvals include a Conditional Use Permit, which would allow for the use of the temporary rock crusher.

Blasting may be required during the project grading and site preparation activities. The project would comply with all provisions identified in the City's Municipal Code Section 17.60.06 as it relates to blasting and blasting shall only be permitted between the hours of 9:00 AM and 4:00 PM during any weekday.

4.4 Rock Crushing Noise Findings and Mitigation

This section examines the potential noise source impacts associated with the operation of the proposed temporary rock crushing facility. Rock crushing will occur between the hours of 7:00

AM and 4:00 PM. The rock crushing equipment will be located in the central portion of the site at the proposed building pads, over 300 feet from the nearest residences to the east, over 530 feet from the residences to the south, and over 660 feet from the residences to the north. Based on empirical data collected at the existing Mission 316 residential development from a similar rock crusher, noise levels ranged between 70-72 dBA at 100 feet (Ldn, 2021). A worst-case noise level of 72 dBA at 100 feet will be utilized for the analysis.

It was determined that the noise levels of the rock crusher would be reduced a minimum of 5 dBA due to the topography blocking line of sight to the existing homes to the east. As can be seen in Table 4-3, the anticipated noise levels at the eastern residential property line would be below the City's 75 dBA Leq construction noise standard without mitigation. In the past, the City of San Marcos has applied the operational noise standards to rock crushing activities when operating on a longer-term basis. The rock crushing equipment would be below the City's 60 dBA Leq operational noise standard at the nearest single-family residences.

Table 4-3: Rock Crushing Noise Levels (East)

Equipment Type	Quantity Used	Source @ 100 Feet (dBA)	Duty Cycle (hrs/day)	Cumulative Noise Level @ 100 Feet (dBA)
Thunderbird Hazemag #CP300	1	72	8	72.0
			Distance to Sensitive Use	300
			Noise Reduction due to Distance	-9.5
			Noise Reduction due to Topography	-5.0
			Property Line Noise Level	**57.5**

The rock crushing equipment would be located over 530 feet from residences to the south and over 660 feet from the residences to the north. No reductions were taken due to topography. As can be seen in Table 4-4, at 530-feet, the noise levels would be reduced to 57.5 dBA and would be below the City's 75 dBA Leq construction noise standard as well as the City's 60 dBA Leq operational noise standard without mitigation.

Table 4-4: Rock Crushing Noise Levels (South)

Equipment Type	Quantity Used	Source @ 100 Feet (dBA)	Duty Cycle (hrs/day)	Cumulative Noise Level @ 50 Feet (dBA)
Thunderbird Hazemag #CP300	1	72	8	72.0
			Distance to Sensitive Use	530
			Noise Reduction due to Distance	-14.5
			Property Line Noise Level	**57.5**

Noise measurements of the rock crusher should be conducted once the final rock crusher type and location are determined to ensure compliance with the City's noise requirements. If the rock crusher is located within 75 feet of a single-family residential use without shielding, noise levels may exceed the applied construction noise threshold of 75 dBA Leq. If the noise levels are found to be above the applied threshold at any property line, then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

Additionally, if the City applies the operational noise threshold of 60 dBA Leq and the rock crusher is located within 400 feet of a single-family residential use without shielding, noise levels may exceed the applied threshold. If noise levels are found to be above the applied thresholds of 60 dBA at any existing single family residential use, 65 dBA for any multifamily use or 70 dBA at a commercial use then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

4.5 Construction Vibration Findings and Mitigation

The nearest vibration-sensitive uses are the existing single-family homes to the east located 280 feet or more from the center of the proposed construction. Table 4-5 lists the average vibration levels that would be experienced at the nearest vibration sensitive land uses from the temporary construction activities.

The FTA has determined vibration levels that would cause annoyance to a substantial number of people and potential damage to building structures. The FTA criterion for vibration induced structural damage is 0.20 in/sec for the peak particle velocity (PPV). Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, project construction activities would not result in vibration induced structural damage to residential buildings near the construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities

would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Table 4-5: Vibration Levels from Construction Activities (Residential Receptors)

Equipment	Approximate Velocity Level at 25 Feet (VdB)	Approximate PPV Level at 25 Feet (in/sec)	Approximate Velocity Level at 280 Feet (VdB)	Approximate PPV Level at 280 Feet (in/sec)
Small bulldozer	58	0.003	26.5	0.0001
Jackhammer	79	0.035	47.5	0.0009
Loaded trucks	86	0.076	54.5	0.0020
Large bulldozer	87	0.089	55.5	0.0024
FTA Criteria			80	0.2
Significant Impact?			**No**	**No**

[1] PPV at Distance D = PPVref x $(25/D)^{1.5}$

4.6 Blasting Vibration Findings and Mitigation

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. As discussed above the smallest distance between an existing residence and the blasting activity was assumed to be 160 feet. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 85 VdB and 0.07 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second. Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided. However, it can be minimized by following the City's blasting procedures as stated above in Section 3.2 and by providing proper notice.

4.7 Construction Noise and Vibration Conclusions

The grading equipment will be spread out over the project site from distances near the occupied property lines to distances of 400 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 280 feet from the property lines. At an average

distance of 280 feet from the construction activities to the nearest property line, noise levels will comply with the 75 dBA Leq standard over 8 hours at the property lines. Therefore, impacts would be less than significant and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away from the existing residence as possible.

Additionally, the project may require blasting which would also require the need for a rock drill. Rock drilling and blasting will occur on an as-needed basis on site. In the event that the rock drill is staged within 160 feet of any occupied noise sensitive land use, it is recommended that a specific noise mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by an acoustical engineer. A mitigation plan should be developed that may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height maybe needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold. The mitigation plan can also incorporate the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier if one is necessary. The project's requested approvals include a Conditional Use Permit, which would allow for the use of the temporary rock crusher.
The rock crushing equipment will be located in the central portion of the site at the proposed building pads, and more than 300 feet from the nearest residences. The noise levels are anticipated to be below the City's 60 dBA Leq standard at the property lines without mitigation.

Noise measurements of the rock crusher should be conducted once the final crusher type and location are determined to ensure compliance with the City's thresholds. If noise levels are found to be above the established thresholds of 60 dBA at any existing single family residential use, 65 dBA for any multifamily use or 70 dBA at a commercial use then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

5.0 TRANSPORTATION NOISE

5.1 Existing Noise Environment Onsite

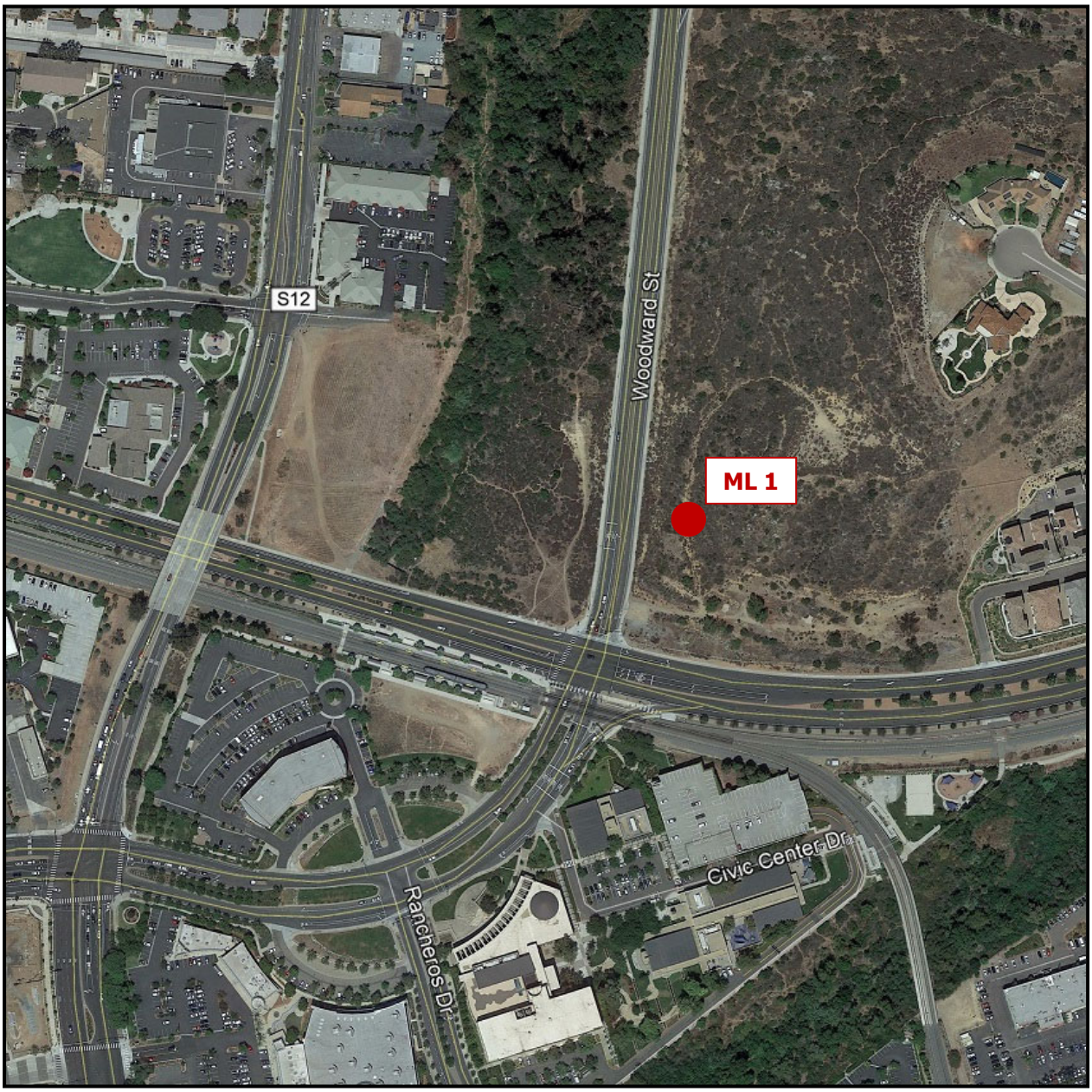
Noise measurements were taken using a Larson-Davis Model LxT Type 1 precision sound level meter, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

The ambient measurements were conducted on July 14, 2023 between 12:00 p.m. – 1:00 p.m. The results of the noise level measurements are presented in Table 5-1. The measurements were taken on site to establish a baseline of the vehicle noise from Woodward Street and Mission Road and train noise from the SPRINTER. The measurements were free of obstruction and had a direct line of sight to the roadways. The overall sound level was found to be 55.3 dBA. The statistical indicators Lmax, Lmin, L10, L50 and L90, are also given for the monitoring location. The noise monitoring locations can be seen in Figure 5-A on the following page.

Table 5-1: Measured Ambient Noise Levels

Measurement Identification	Description	Time	Noise Levels (dBA Leq)					
			Leq	Lmax	Lmin	L10	L50	L90
ML 1	Woodward Street	12:00 p.m. – 1:00 p.m.	55.3	66.7	48.4	58.9	54.8	50.5
Source: Ldn Consulting July 14, 2023								

Figure 5-A: Ambient Monitoring Locations



5.2 Future Onsite Roadway Noise

To determine the future noise environment and impact potentials the Sound32 model was utilized. The critical model input parameters, which determine the projected vehicular traffic noise levels, include vehicle travel speeds, the percentages of automobiles, medium trucks and heavy trucks in the roadway volume, the site conditions and the peak hour traffic volume. The peak hour traffic volumes range between 6-12% of the average daily traffic (ADT) and 10% is generally acceptable for noise modeling.

Table 5-2 presents the roadway parameters used in the analysis including the peak traffic volumes, vehicle speeds and the hourly traffic flow distribution (vehicle mix). The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the Sound32 Model. The Buildout conditions include the future traffic volume forecasts provided by the project's traffic study (Linscott, Law & Greenspan Engineers).

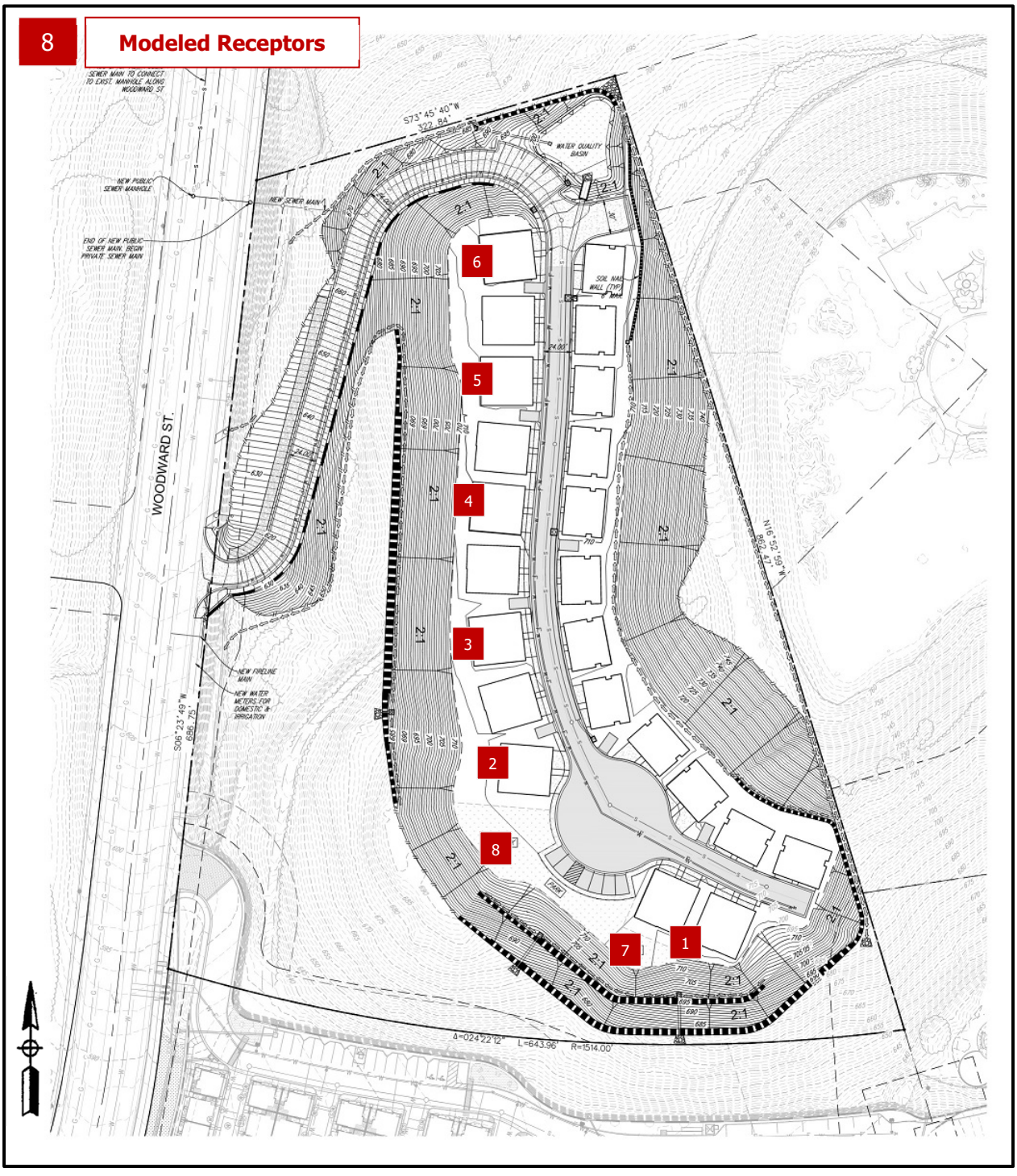
Table 5-2: Future Traffic Parameters

Roadway	Average Daily Traffic (ADT)[1]	Peak Hour Volumes[1]	Modeled Speeds (MPH)	Vehicle Mix %[2]		
				Auto	Medium Trucks	Heavy Trucks
E Mission Road	21,827	2,183	45	96	2	2
Woodward Street	5,920	592	40	96	2	2

[1] Source: (Linscott, Law & Greenspan Engineers)
[2] Typical vehicle mix

The required coordinate information necessary for the Sound32 model input was taken from the precise grading plans provided by Excel Engineering, 2023. The grading plans were used to identify the pad elevations, roadway elevations, and the relationship between the noise source(s) and the outdoor receptor areas. To evaluate the potential noise impacts on the proposed development, outdoor observers were located throughout the site and placed five feet above the finished pad elevation. The modeled observer locations for the potential outdoor use areas for are presented in Figure 5-B. Private outdoor use areas would be provided by ground floor rear yards, second floor balconies, and rooftop decks which were modeled to determine if shielding/mitigation is required to reduce the noise levels below the City's 65 dBA CNEL threshold.

Figure 5-B: Modeled Ground Floor Receptor Locations



5.3 Onsite Rail Line Noise

The proposed Project is located a minimum of 400 feet from the San Diego Northern Railroad (SDNR) consisting of SPRINTER service operated by the North County Transit District (NCTD). According to the City of San Marcos General Plan Noise Element, Figure 7-2, the future 65 dBA CNEL noise contour from the anticipated increased rail activity, with no shielding, is located 130 feet from the centerline of the railroad. No reduction factor was taken for the building facades.

5.4 Cumulative Onsite Noise Levels and Findings

Ground floor rear yards, upper floor balconies, and roof decks were modeled to determine if shielding/mitigation is required to reduce the noise levels below the City's 65 dBA CNEL threshold. The noise levels determined for the roadway and train activities were combined to determine the overall cumulative noise levels at the proposed outdoor use areas, balconies, and rooftop decks. The resultant cumulative noise levels from the traffic and train activities are provided below in Table 5-3 for each of the ground floor patios and upper floor areas. It was determined that the outdoor use areas would be in compliance with the City of San Marcos Noise standards of 65 dBA CNEL. The modeling input and outputs are provided in ***Attachment A***.

Table 5-3: Combined Future Exterior Noise Levels

Receptor Number	Unmitigated Noise Levels from Roadways (dBA CNEL)	Unmitigated Noise Levels from Train (dBA CNEL)	Cumulative Noise Levels at Ground Floor (dBA CNEL)[1]	Cumulative Noise Levels at Upper Floors (dBA CNEL)[1]
1	62	60	64	64
2	62	59	63	63
3	61	58	63	63
4	61	57	62	62
5	60	57	62	62
6	60	56	61	61
7	63	60	65	--
8	62	59	64	--

[1] Interior Noise Study required per City Guidelines if building façade is above 60 dBA CNEL.

Additionally, a final noise assessment is required prior to the issuance of the first building permit for first, second and third floors of the units since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans to meet the City's established interior noise limit of 45 dBA CNEL. It should be noted; interior noise levels of 45 dBA CNEL can easily be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation

(e.g., air conditioning) for each building and upgraded windows for all sensitive rooms (e.g., bedrooms and living spaces).

5.5 Project Related Offsite Transportation Noise

The off-site Project related roadway segment noise levels projected in this report were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December, 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections. The noise contours are then established by iterating the equivalent noise level over many distances until the distance to the desired noise contour(s) are found.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore, the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiant in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. Hard site conditions, to be conservative, were used to develop the noise contours and analyze noise impacts along all roadway segments. The future traffic noise model utilizes a typical, conservative vehicle mix of 96% Autos, 2% Medium Trucks and 2% Heavy Trucks for all analyzed roadway segments. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA Model.

Community noise level changes greater than 3 dBA are often identified as audible and considered potential significant, while changes less than 1 dBA will not be discernible to local residents. In the range of 1 to 3 dBA, residents who are very sensitive to noise may perceive a slight change. There is no scientific evidence available to support the use of 3 dBA as the significance threshold. Community noise exposures are typically over a long time period rather than the immediate comparison made in a laboratory situation. Therefore, the level at which changes in community noise levels become discernible is likely greater than 1 dBA and 3 dBA appears to be appropriate for most people. For the purposes for this analysis a direct and cumulative roadway noise impacts would be considered significant if the project increases noise levels for a noise sensitive land use by 3 dBA CNEL and if the project increases noise levels above an unacceptable noise level per the City's General Plan in the area adjacent to the roadway segment.

Direct Noise Impacts

To determine if direct off-site noise level increases associated with the development of the Project will create noise impacts. The noise levels for the existing conditions were compared with the noise level increase from the Project. Utilizing the Project's traffic assessment (Linscott, Law & Greenspan Engineers) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Project: Current day noise conditions plus the completion of the project.

Existing vs. Existing Plus Project: Comparison of the direct project related noise level increases in the vicinity of the project site.

The noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 5-4 for the Existing Scenario and in Table 5-5 for the Existing Plus Project Scenario. Note that the values given do not take into account the effect of any noise barriers or topography that may affect ambient noise levels. Table 5-6 presents the comparison of the Existing Year with and without Project related noise levels. The overall roadway segment noise levels will increase from 0.0 to 0.3 dBA CNEL with the development of the Project. The Project does not create a direct noise increase of more than 3 dBA CNEL on any roadway segment. Therefore, the Project's direct contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

Table 5-4: Existing Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Mission Road	Pico Ave. to Woodward St.	11,590	45	69.9	486
	Woodward St. to Mission Villas Rd.	19,810	45	72.2	831
San Marcos Boulevard	Rancheros Dr. to Mission Rd.	14,860	40	69.8	481
Woodward Street	E. Mission Rd. to Project	5,210	40	65.3	169
	Project to Vineyard Rd.	5,210	40	65.3	169

[1] Source: Project Traffic study prepared by Linscott, Law, & Greenspan Engineers, 2023

Table 5-5: Existing + Project Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Mission Road	Pico Ave. to Woodward St.	11,627	45	69.9	488
	Woodward St. to Mission Villas Rd.	19,847	45	72.2	833
San Marcos Boulevard	Rancheros Dr. to Mission Rd.	15,136	40	69.9	490
Woodward Street	E. Mission Rd. to Project	5,560	40	65.6	180
	Project to Vineyard Rd.	5,228	40	65.3	169

[1] Source: Project Traffic study prepared by Linscott, Law, & Greenspan Engineers, 2023

Table 5-6: Existing vs. Existing + Project Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Project Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Mission Road	Pico Ave. to Woodward St.	69.9	69.9	0.0
	Woodward St. to Mission Villas Rd.	72.2	72.2	0.0
San Marcos Boulevard	Rancheros Dr. to Mission Rd.	69.8	69.9	0.1
Woodward Street	E. Mission Rd. to Project	65.3	65.6	0.3
	Project to Vineyard Rd.	65.3	65.3	0.0

Cumulative Noise Impacts

To determine if cumulative off-site noise level increases associated with the development of the Project and other planned or permitted projects in the vicinity will create noise impacts. The noise levels for the near-term Project Buildout and other planned and permitted projects were compared with the existing conditions. Utilizing the Project's traffic assessment (Linscott, Law & Greenspan Engineers) noise contours were developed for the following traffic scenarios:

Existing: Current day noise conditions without construction of the project.

Existing Plus Cumulative Projects Plus Project: Current day noise conditions plus the completion of the project and the completion of other permitted, planned projects or approved ambient growth factors.

Existing vs. Existing Plus Cumulative Plus Project: Comparison of the existing noise levels and the related noise level increases from the combination of the project and all

other planned or permitted projects in the vicinity of the site.

The existing noise levels and reference distances to the 60 dBA CNEL contours for the roadways in the vicinity of the Project site are given in Table 5-4 above for the Existing Scenario. The near-term cumulative noise conditions are provided in Table 5-7. No noise barriers or topography that may affect noise levels were incorporated in the calculations.

Table 5-8 presents the comparison of the Existing Year and the Near-Term Cumulative noise levels. The overall roadway segment noise levels will increase 0.1 to 0.4 dBA CNEL with the development of the Project and proposed cumulative projects. The cumulative noise increase is less than 3 dBA CNEL on any roadway segment, impacts would be less than significant.

Table 5-7: Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	ADT[1]	Vehicle Speeds (MPH)[1]	Noise Level @ 50-Feet (dBA CNEL)	60 dBA CNEL Contour Distance (Feet)
Mission Road	Pico Ave. to Woodward St.	11,947	45	70.0	501
	Woodward St. to Mission Villas Rd.	20,727	45	72.4	869
San Marcos Boulevard	Rancheros Dr. to Mission Rd.	16,256	40	70.2	526
Woodward Street	E. Mission Rd. to Project	5,720	40	65.7	185
	Project to Vineyard Rd.	5,388	40	65.4	174
[1] Source: Project Traffic study prepared by Linscott, Law, & Greenspan Engineers, 2023					

Table 5-8: Existing vs. Existing + Project + Cumulative Noise Levels

Roadway	Roadway Segment	Existing Noise Level @ 50-Feet (dBA CNEL)	Existing Plus Cumulative Plus Project Noise Level @ 50-Feet (dBA CNEL)	Project Related Noise Level Increase (dBA CNEL)
Mission Road	Pico Ave. to Woodward St.	69.9	70.0	0.1
	Woodward St. to Mission Villas Rd.	72.2	72.4	0.2
San Marcos Boulevard	Rancheros Dr. to Mission Rd.	69.8	70.2	0.4
Woodward Street	E. Mission Rd. to Project	65.3	65.7	0.4
	Project to Vineyard Rd.	65.3	65.4	0.1

5.6 Offsite Noise Findings and Mitigation

The Project does not create a direct or cumulative noise increase of more than 3 dBA CNEL on any of the analyzed roadway segments. Therefore, the Project's contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

5.7 Train Vibration

Train vibration depends on the weight of the train, travel speed, the condition of the track and soil characteristics. The proposed project buildings would be more than 400 feet from the centerline of the tracks. Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual (FTA 2018) predicts that freight train vibration levels are as high as 73 VdB at 175 feet from the track centerline for a locomotive-powered freight train traveling at speeds of 50 MPH and up to 62 VdB for commuter rail train events at that speed.

Therefore, the frequent commuter train activities will be below the 72 VdB frequent event annoyance thresholds as identified in Category 2 of Table 3-1. Additionally, due to the close proximity of the San Marcos Civic Center SPRINTER station, the commuter trains will be traveling at a slower speed of approximately 15 MPH as they enter and exit the station, which would reduce the vibration levels 8 VdB. Therefore, the train activities would have a less than significant impact on the proposed project.

7.0 SUMMARY OF PROJECT IMPACTS, MITIGATION & CONCLUSION

Construction Noise

The grading equipment will be spread out over the project site from distances near the occupied property lines to distances of 400 feet or more away. Based upon the site plan the majority of the grading operations, on average, will occur more than 280 feet from the property lines. At an average distance of 280 feet from the construction activities to the nearest property line, noise levels will comply with the 75 dBA Leq standard over 8 hours at the property lines. Therefore, noise impacts would be less than significant and no mitigation is required during construction of the proposed Project. Additionally, all equipment should be properly fitted with mufflers and all staging and maintenance should be conducted as far away for the existing residence as possible.

Additionally, the project may require blasting which would also require the need for a rock drill. Rock drilling and blasting will occur on an as-needed basis on site. In the event that the rock drill is staged within 160 feet of any occupied noise sensitive land use, it is recommended that a specific noise mitigation plan based upon the location of the construction equipment, topography and construction schedule be identified by an acoustical engineer. A mitigation plan should be developed that may include a temporary noise barrier along any property line where the impacts could occur. Based on previous projects, a barrier ranging from 8 to 12 feet in height may be needed. The proposed noise barrier will need to be of solid non-gapping material to adequately reduce construction noise levels below the noise threshold. The mitigation plan can also incorporate the usage of the equipment (amount of time used and/or the location in respect to the property line). The mitigation plan would determine the final height and location of a temporary barrier if one is necessary. The project's requested approvals include a Conditional Use Permit, which would allow for the use of the temporary rock crusher.

Rock Crusher Noise

The rock crushing equipment will be located in the central portion of the site at the proposed building pads, and more than 300 feet from the nearest residences. The noise levels are anticipated to be below the City's 60 dBA Leq standard at the property lines without mitigation.

Noise measurements of the rock crusher should be conducted once the final rock crusher type and location are determined to ensure compliance with the City's noise requirements. If the rock crusher is located within 400 feet of a single family residential use without shielding, noise levels may exceed the applied threshold. If noise levels are found to be above the applied thresholds of 60 dBA at any existing single family residential use, 65 dBA for any multifamily use or 70 dBA at a commercial use then additional mitigation in the form of higher barriers, sound absorbing materials or operational limits on the crushers usage will need to be incorporated.

Construction Vibration

Project construction activities would result in PPV levels below the FTA's criteria for vibration induced structural damage. Therefore, Project construction activities would not result in vibration induced structural damage to residential buildings near the construction areas. The FTA criterion for infrequent vibration induced annoyance is 80 Vibration Velocity (VdB) for residential uses. Construction activities would generate levels of vibration that would not exceed the FTA criteria for nuisance for nearby residential uses. Therefore, vibration impacts would be less than significant.

Blasting Vibration

Blasting for construction projects typically results in an RMS vibration velocity of about 100 VdB at 50 feet from the blast based on FTA findings. This is equivalent to a peak particle velocity of about 0.4 inch per second. Given attenuation of vibration velocities with distance, the RMS vibration velocity and peak particle velocity at the nearest existing residence would be about 79 VdB and 0.03 inch per second, respectively. Based on the construction vibration damage criteria published by the FTA, the threshold vibration levels for damage to "Non-engineered timber and masonry buildings" are 94 VdB and 0.20 inch per second.

Therefore, the effect of the blasting activity on nearby residential structures will not be significant. On the other hand, the human annoyance criterion of 80 VdB would be slightly exceeded when blasting occurred within about 250 feet of existing residences. If blasting is required within 250 feet of existing residences, the potential annoyance may not be completely avoided it can be minimized by following the City's blasting procedures.

Onsite Transportation Noise

It was determined that the outdoor noise levels are expected to be as high as 65 dBA CNEL at the proposed private patios, balconies, rooftop decks, and common area parks and would comply with the City's noise standard and no additional mitigation is required. Additionally, a final noise assessment is required prior to the issuance of the first building permit since the building facades are above 60 dBA CNEL. This final report would identify the interior noise requirements based upon architectural and building plans. It should be noted; interior noise levels of 45 dBA CNEL can be obtained with conventional building construction methods and providing a closed window condition requiring a means of mechanical ventilation (e.g., air conditioning) and upgraded windows for all sensitive rooms (e.g., bedrooms and living spaces).

Offsite Transportation Noise

The Project does not create a direct or cumulative noise increase of more than 3 dBA CNEL on any of the analyzed roadway segments. Therefore, the Project's contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

8.0 REFERENCES

Caltrans. "Transportation Related Earthborne Vibration, Caltrans Experiences." 2020. <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf>.

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ATTACHMENT A

FUTURE NOISE MODEL INPUT
AND OUTPUT FILES

Woodward 46 - Ground Level Unmitigated
T-PEAK HOUR TRAFFIC CONDITIONS, 1
2095 , 45 , 44 , 45 , 44 , 45
T-PEAK HOUR TRAFFIC CONDITIONS, 2
568 , 40 , 12 , 40 , 12 , 40
L-Mission, 1
N,579.,213,578,
N,697.,177,580,
N,884.,121,584,
N,1095.,70,588,
N,1307.,44,592,
N,1779.,92,592,
N,2056.,173,593,
N,2316.,288,595,
L-Woodward, 2
N,884,121,584,
N,917,257,585,
N,935,374,590,
N,967,661,605,
N,987,842,610,
N,1033.,1256,606,
1113.,1880,587,
R, 1 , 65 ,10
1433,483,718.,R1
R, 2 , 65 ,10
1267,631,717.,R2
R, 3 , 65 ,10
1246,738,716.,R3
R, 4 , 65 ,10
1247,859,715.,R4
R, 5 , 65 ,10
1255,965,714.,R5
R, 6 , 65 ,10
1256,1071,713.,R6
R, 7 , 65 ,10
1378,463,718.,Park
R, 8 , 65 ,10
1260,562,718.,Park
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Woodward 46 - Ground Level Unmitigated

RECEIVER	LEQ
R1	62.3
R2	61.5
R3	61.0
R4	60.5
R5	60.1
R6	59.9
Park	62.6
Park	62.0

Woodward 46 - Upper Level Unmitigated
T-PEAK HOUR TRAFFIC CONDITIONS, 1
2095 , 45 , 44 , 45 , 44 , 45
T-PEAK HOUR TRAFFIC CONDITIONS, 2
568 , 40 , 12 , 40 , 12 , 40
L-Mission, 1
N,579.,213,578,
N,697.,177,580,
N,884.,121,584,
N,1095.,70,588,
N,1307.,44,592,
N,1779.,92,592,
N,2056.,173,593,
N,2316.,288,595,
L-Woodward, 2
N,884,121,584,
N,917,257,585,
N,935,374,590,
N,967,661,605,
N,987,842,610,
N,1033.,1256,606,
1113.,1880,587,
R, 1 , 65 ,10
1433,483,728.,R1
R, 2 , 65 ,10
1267,631,727.,R2
R, 3 , 65 ,10
1246,738,726.,R3
R, 4 , 65 ,10
1247,859,725.,R4
R, 5 , 65 ,10
1255,965,724.,R5
R, 6 , 65 ,10
1256,1071,723.,R6
C,C

SOUND32 - RELEASE 07/30/91

TITLE:
Woodward 46 - Upper Level Unmitigated

RECEIVER	LEQ
R1	62.3
R2	61.5
R3	61.0
R4	60.5
R5	60.1
R6	59.8