DEEMARCO COMMERCIAL CENTER PROJECT

NOISE STUDY

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PERRIS, CALIFORNIA
Noise Study

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NOISE STUDY

This report is an analysis of the potential noise and vibration impacts associated with the Deemarco Commercial Center project, a commercial center proposed for construction in unincorporated Riverside County west of the City of Perris, California. The report has been prepared by Birdseye Planning Group, LLC, under contract to the applicant to support the entitlement process and address a request from the Riverside County Planning Department. This study analyzes the potential for temporary impacts associated with construction activity, long-term impacts associated with traffic noise generated on neighboring roadways and construction of a commercial center adjacent to and south of Cajalco Road on the southwest corner of Carroll Street.

PROJECT DESCRIPTION

The proposed project is located on one parcel comprising 3.2 acres in the Mead Valley Area Plan, west of the City of Perris in unincorporated Riverside County. The site is at 21750 Cajalco Road which is located at the southwest corner of the Cajalco Road/Carroll Street intersection on APN 318-130-012. (see Figure 1 – Vicinity Map).

The applicant is proposing construction and operation of a 4,283 square foot convenience store, a 1,632 square foot restaurant with drive-thru in one building located along the eastern site boundary, a 4,991 square foot canopy over a 16 dispenser gasoline fueling island to the west, a 1,481 square foot car wash in the center of the site and a 6,630 square foot retail building with one 1,632 square foot drive thru restaurant and one 4,998 square foot high-turnover sit-down restaurant along the western site boundary. A total of 40 surface parking spaces would be provided. All fuel tanks would be underground and located beneath the fueling areas. Primary access would be from Cajalco Road near the center of the site. The primary entrance would be improved to a minimum of 24-feet in width to accommodate emergency vehicle and semi-truck access. Driveways to all areas of the project site would utilize the common entrance. A secondary access would be located at the southeast corner of the site to and from Carroll Street. The preliminary site plan is shown on Figure 2 – Proposed Site Plan.

The site is zoned Mixed-Use (MU). The proposed project would require approval of a zone change to allow development of the car wash. Adjacent land uses are vacant land to the north, a landscape materials business to the south, a vacant land and then single-family residential to the east and a storage yard to the west. The proposed Project is expected to be begin construction in mid-2021 and be operational in 2022.

Figure 1—Vicinity Map

- Project Site

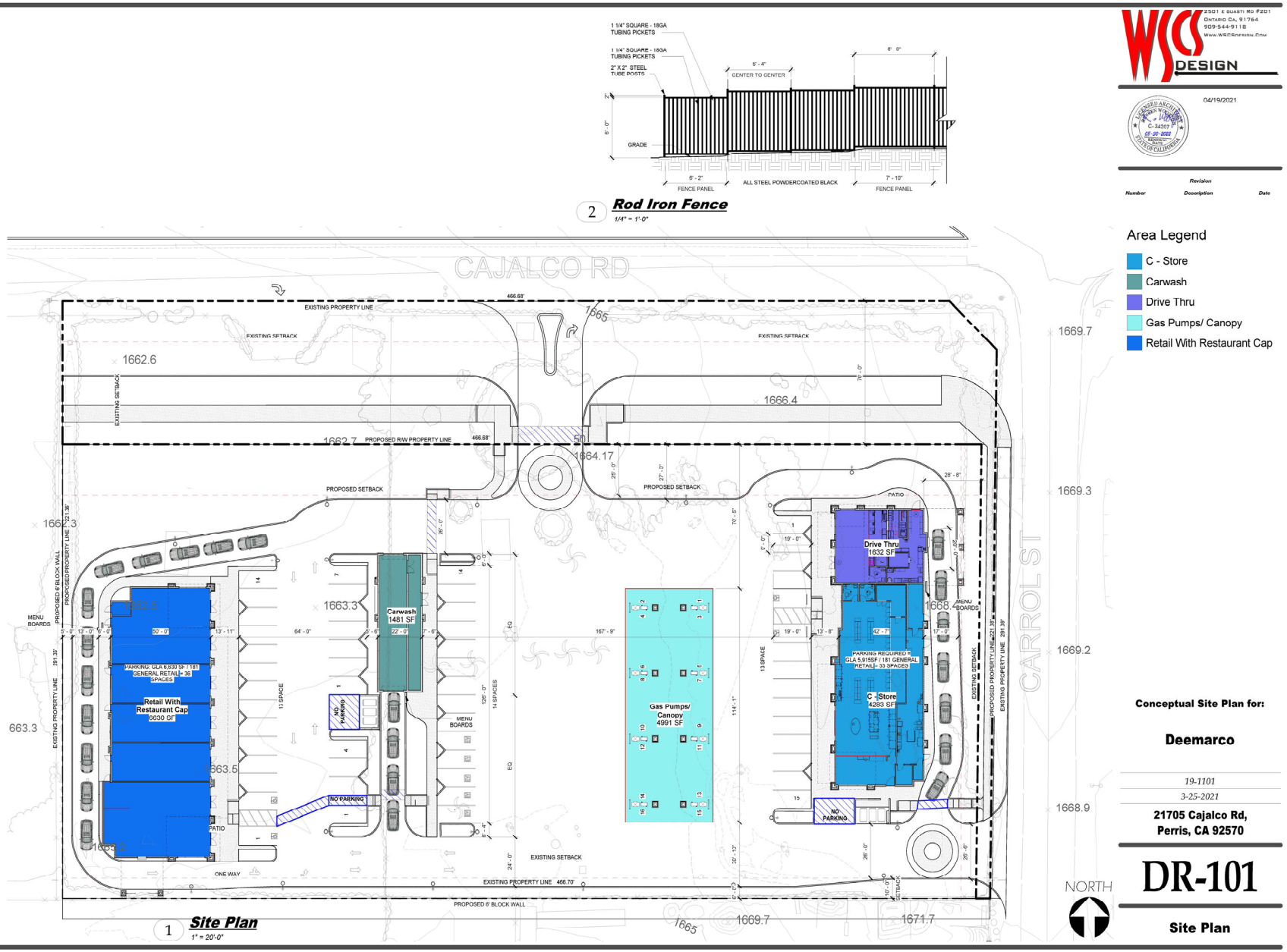

Figure 2—Site Plan

SETTING

Overview of Sound Measurement

Noise level (or volume/loudness) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

Sound pressure level is measured on a logarithmic scale with the 0 dB level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level would be half as loud and influence the character of ambient noise without influencing the overall sound level. Because of the nature of the human ear, a sound must be about 10 dBA greater than the reference sound to be judged as twice as loud. In general, a 3 dBA change in community noise levels is noticeable, while 1-2 dB changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while arterial streets are in the 50-60+ dBA range. Normal conversational levels are in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations. Noise levels typically attenuate (or drop off) at a rate of 6 dBA per doubling of distance from point sources (i.e., industrial machinery). Noise from lightly traveled roads typically attenuates at a rate of about 4.5 dBA per doubling of distance. Noise from heavily traveled roads typically attenuates at about 3 dBA per doubling of distance. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed (approximately 30 years old or older) generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units and office buildings construction to California Energy Code standards is generally 30 dBA or more (HMMH, 2006).

In addition to the actual instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound pressure level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest RMS (root mean squared) sound pressure level within the measuring period, and Lmin is the lowest RMS sound pressure level within the measuring period.

The time period in which noise occurs is also important since noise that occurs at night tends to be more disturbing than that which occurs during the day. Community noise is usually measured using Day-Night Average Level (Ldn), which is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10 p.m. to 7 a.m.) hours, or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7 p.m. to 10 p.m. and a 10 dBA penalty for noise occurring from 10 p.m. to 7 a.m. Noise levels described by Ldn and CNEL usually do not differ by more than 1 dB. Table 1 shows sounds levels of typical noise sources in Leq.

Sensitive Receptors

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with each of these uses. Urban areas contain a variety of land use and development types that are noise sensitive including residences, schools, churches, hospitals and convalescent care facilities. Nearby sensitive receptors are single-family residences located approximately 200 feet south and 260 feet east of the site.

Project Site Setting

The project area is urbanizing and along Cajalco Road, an east/west arterial connecting the City of Perris to the east with the City of Corona to the west. The most common and primary sources of noise in the project site vicinity are motor vehicles (e.g., automobiles and trucks) operating on Cajalco Road. Other sources include the operation of loading equipment associated with the adjacent landscape material business located adjacent to and south of the site. Motor vehicle noise is of concern because where a high number of individual events occur, it can create a sustained noise level. Aircraft overflights occur but do not noticeably contribute to the ambient noise environment.

To gather data on the general noise environment at the project site, two weekday morning 15-minute noise measurements were taken on and in proximity to the site on September 29, 2020, using an ANSI Type II integrating sound level meter. The predominant noise source was traffic. The temperature during monitoring was 70 degrees Fahrenheit with no perceptible wind.

Site 1 is located near the center of the project site approximately 75 feet south of the eastbound lanes. This location is on the site and represents noise levels at the nearest sensitive receiver located to the east on the east side Carroll Street. During monitoring, 221 cars/light trucks, 15 medium trucks (six tires/two axles) and 10 heavy trucks (all vehicles with three or more axles) passed the site. Site 2 is located south of the site adjacent to the intersection of Carrol Street and Elmwood Avenue. This location is south of the site and represents noise levels at the nearest sensitive receiver located to the south of the site on the northwest corner of Carroll Street and Elmwood Street. During monitoring, 41 cars/light trucks, one medium truck (six tires/two axles) and zero heavy trucks (all vehicles with three or more axles) passed the site. The dominant noise source is traffic on both Cajalco Road and Carroll Street. Table 2 identifies the noise measurement locations and measured noise levels.

Table 1. Sound Levels of Typical Noise Sources and Noise Environments

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level (Decibels)	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140	128 times as loud
Civil Defense Siren (100 ft)		130	64 times as loud
Commercial Jet Take-off (200 ft)		120	32 times as loud **Threshold of Pain**
Pile Driver (50 ft)	Rock Music Concert Inside Subway Station (New York)	110	16 times as loud
Ambulance Siren (100 ft) Newspaper Press (5 ft) Gas Lawn Mower (3 ft)		100	8 times as loud **Very Loud**
Food Blender (3 ft) Propeller Plane Flyover (1,000 ft) Diesel Truck (150 ft)	Boiler Room Printing Press Plant	90	4 times as loud
Garbage Disposal (3 ft)	Noisy Urban Daytime	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)	Commercial Areas	70	Reference Loudness **Moderately Loud**
Normal Speech (5 ft) Air Conditioning Unit (100 ft)	Data Processing Center Department Store	60	1/2 as loud
Light Traffic (100 ft)	Large Business Office Quiet Urban Daytime	50	1/4 as loud
Bird Calls (distant)	Quiet Urban Nighttime	40	1/8 as loud **Quiet**
Soft Whisper (5 ft)	Library and Bedroom at Night Quiet Rural Nighttime	30	1/16 as loud
	Broadcast and Recording Studio	20	1/32 as loud **Just Audible**
		0	1/64 as loud **Threshold of Hearing**

Source: Compiled by dBF Associates, Inc., 2016

Table 2
Noise Monitoring Results

Measurement Location	Primary Noise Source	Sample Time	Leq (dBA)
Project site approximately 50 feet south of the centerline of Cajalco Road	Traffic	Weekday morning	61.8
Southeast corner of Carroll Street and Elmwood Street	Traffic	Weekday morning	62.8

Source: Field visit using ANSI Type II Integrating sound level meter.

Monitoring locations are shown in Figure 3. As shown, the Leq was 61.8 dBA at Site 1 and 62.8 dBA at Site 2. The monitoring data sheet is provided as Appendix A.

Regulatory Setting

In 1976, the California Department of Health, State Office of Noise Control published a recommended noise/land use compatibility matrix which many jurisdictions have adopted as a standard in their general plan noise elements. The California State Office of Planning and Research 2017 updates to the General Plan Guidelines, Appendix D Noise Element Guidelines, Figure 2, shows that exterior noise levels up to 60 dBA (CNEL or Ldn) are normally compatible in rural residential areas. Noise levels up to 70 dBA (CNEL or Ldn) are conditionally compatible.

Riverside County Noise Ordinance

The County of Riverside Noise Ordinance is codified in Title 9 of the Riverside County Code of Ordinances. Section 9.52.040 establishes the exterior noise level criteria for properties affected by operational (stationary) noise sources. For residential properties the exterior noise level shall not exceed 55 dBA Leq during daytime hours (7:00 a.m. to 10:00 p.m.) and 45 dBA Leq during the nighttime hours (10:00 p.m. to 7:00 a.m.). The 55/45 dBA daytime/nighttime limit is discussed because of its applicability to some of the surrounding land uses (i.e., Rural Community – Very Low Density Residential). The site abuts commercial uses to the south and west and vacant land to the east across Carrol Street and north across Cajalco Road. Noise levels within commercial/office are limited to 65 dBA during the daytime hours (i.e., 7:00 a.m. to 10:00 p.m.) and 55 dBA from 10:00 p.m. to 7:00 a.m.

With respect to traffic noise, no specific standards for this source are provided in the Riverside County Noise Ordinance or General Plan Noise Element. Table N-1 in the General Plan Noise Element references the State Office of Planning and Research 2017 General Plan Guidelines Update sound levels stated herein; thus, the 60 dBA exterior standard for rural residential areas is used herein. The interior standard of 45 dBA for stationary noise sources is used herein to to determine consistency with the Riverside County Noise Ordinance.

Figure 3— Noise Monitoring Locations

- Project Site **M = Monitoring Site**

Section 9.52.020 of the County's Noise Ordinance states that noise sources associated with any private construction activity located within one-quarter of a mile from an inhabited dwelling is permitted between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May. While the County of Riverside limits the hours of construction activity, it does not specifically address construction noise limits. Thus, construction activities occurring between the prescribed hours are considered exempt from the ambient noise standards of the ordinance. Thus, noise from construction sites occurring within those hours are presumed to have a less than significant impact for the purposes of CEQA review.

Vibration Standards

Vibration is a unique form of noise as the energy is transmitted through buildings, structures and the ground whereas audible noise energy is transmitted through the air. Thus, vibration is generally felt rather than heard. The ground motion caused by vibration is measured as peak particle velocity in inches per second and is referenced as vibration decibels (VdB). The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels.

The Riverside County Code does not address construction-related vibration; thus, for the purpose of evaluating project-related vibration impacts, thresholds established in the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* (September 2018) (Table 6-3) are used. A threshold of 65 VdB is used for buildings where low ambient vibration is essential for interior operations. These buildings include hospitals and recording studios. A threshold of 72 VdB is used for residences and buildings where people normally sleep (i.e., hotels and rest homes). A threshold of 75 VdB is used for institutional land uses where activities occur primarily during the daytime (i.e., churches and schools). The threshold used for the proposed project is 72 VdB as single-family residences are the nearest sensitive receptors to the site.

Construction activities such as blasting, pile driving, demolition, excavation or drilling have the potential to generate ground vibrations. With respect to ground-borne vibration impacts on structures, the FTA states that ground-borne vibration levels in excess of 90 VdB would damage buildings extremely susceptible to vibration damage. No historic buildings or buildings extremely susceptible to vibration damage are known to occur near the site; thus, 94 VdB (PPV 0.2), the standard for non-engineered timber and masonry buildings is used herein to evaluate potential vibration impacts to neighboring structures. Construction activities referenced above that would generate significant vibration levels are not proposed. However, to provide information for use in completing the CEQA evaluation, construction-related vibration impacts are evaluated using the above referenced criteria.

IMPACT ANALYSIS

Methodology and Significance Thresholds

Construction noise estimates are based upon noise levels reported by the Federal Transit Administration, Office of Planning and Environment, and the distance to nearby sensitive receptors. Reference noise levels from that document were used to estimate noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 6 dB per doubling of distance (free field propagation of sound attenuation).

The proposed project would be a new use; thus, noise levels associated with existing and future traffic were based on the difference in trip volumes between existing conditions and the proposed use. A doubling of traffic volumes would be required to cause a noticeable increase (3 dBA) in traffic noise. As stated, baseline conditions currently exceed 60 dBA, the normally acceptable sound level depicted in Table N-1 of the Riverside County General Plan Noise Element. Thus, the baseline and with project sound levels were calculated to determine whether the project would generate enough traffic to noticeably increase (+3 dBA or greater) the Leq over baseline conditions. Stationary sources are evaluated separately and compared to the 55 dBA daytime standard for neighboring rural residential properties.

As noted, a noise increase greater than 3 dBA is readily perceptible to the average human ear; and thus, is the level considered a substantial noise increase related to traffic operations. For the purpose of this evaluation, the peak hour Leq is used for traffic noise as it provides a conservative estimate of potential noise levels. As discussed, existing noise levels exceed the normally acceptable soiund levels but are within the conditionally acceptable range as described above for single-family residential receivers. Thus, the impact determination is based on whether noise levels would exceed those levels considered acceptable for single-family residential areas and whether the interior noise standard (45 dBA) would be met.

Temporary Construction Noise

The main sources of noise during construction activities would include heavy machinery used during, grading and clearing the site, as well as equipment used during building construction and paving. Table 3 demonstrates the typical noise levels associated with heavy construction equipment. As shown, average noise levels associated with the use of heavy equipment at construction sites can range from about 81 to 95 dBA at 25 feet from the source, depending upon the types of equipment in operation at any given time and phase of construction (Hanson, Towers, and Meister, May 2006).

Noise-sensitive uses near the project site are existing single-family residences located approximately 200 feet south of the southern property line and 260 feet east of the eastern property line. Table 4 shows typical maximum construction noise levels at various distances from construction activity based on a standard noise attenuation rate of 6 dBA per doubling of

Table 3
Typical Maximum Construction Equipment Noise Levels

Equipment Onsite	Typical Maximum Level (dBA) 25 Feet from the Source	Typical Maximum Level (dBA) 50 Feet from the Source	Typical Maximum Level (dBA) 100 Feet from the Source
Air Compressor	84	78	64
Backhoe	84	78	64
Bobcat Tractor	84	78	64
Concrete Mixer	85	79	73
Bulldozer	88	82	76
Jack Hammer	95	89	83
Pavement Roller	86	80	74
Street Sweeper	88	82	76
Man Lift	81	75	69
Dump Truck	82	76	70

Source: Noise levels based on FHWA Roadway Construction Noise Model (2006) Users Guide Table 1.
Noise levels based on actual maximum measured noise levels at 50 feet (Lmax).
Noise levels assume a noise attenuation rate of 6 dBA per doubling of distance.

distance. The noise level used to estimate the maximum noise level that could occur is based on use of a bulldozer as it is likely to be the noisiest type of equipment used over a sustained period of time adjacent to nearby residences during demolition, site preparation and grading activities. Actual noise levels will fluctuate throughout the day and may periodically exceed 88 dBA at the property line depending on the type and location of equipment used and whether multiple pieces of equipment are operating simultaneously in the same area. However, typical maximum construction noise levels at 200 feet from the southern property line will attenuate to approximately 70 dBA based on a reference distance of 76 dBA at 100 feet.

Section 9.52.020 of the County's Noise Ordinance states that noise sources associated with any private construction activity located within one-quarter of a mile from an inhabited dwelling is permitted between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May.

Construction noise is restricted to specific hours of the day Monday through Friday as well as Saturday. Construction related noise is limited to 75 dBA at the property line. It is likely that temporary construction noise will periodically exceed the 75 dBA criteria at the property; however, this is allowed per Section 9.52.020 provided a variance is obtained prior to construction. As stated above, noise levels at actual receiving properties will be below the 75 dBA threshold. Temporary construction noise can be reduced by implementing one or more of the measures in the following section.

Table 4
Typical Maximum Construction Noise Levels at Various Distances from Project Construction

Distance from Construction	Typical Maximum Noise Level at Receptor (dBA)
25 feet	88
50 feet	82
100 feet	76
250 feet	70
500 feet	64
1,000 feet	58

Construction Noise Reduction Measures

Temporary construction noise levels could be reduced through implementation of the following measures:

N-1 **Construction Equipment**. Electrical power shall be used to run air compressors and similar power tools. Internal combustion engines should be equipped with a muffler of a type recommended by the manufacturer and in good repair. All diesel equipment should be operated with closed engine doors and should be equipped with factory-recommended mufflers. Construction equipment that continues to generate substantial noise at the project boundaries should be shielded with temporary noise barriers, such as barriers that meet a sound transmission class (STC) rating of 25, sound absorptive panels, or sound blankets on individual pieces of construction equipment. Stationary noise-generating equipment, such as generators and compressors, should be located as far as practically possible from the nearest residential property lines.

N-2 **Limit Operations Adjacent to Receivers**. Limit the number of large pieces of equipment (i.e., bulldozers or concrete mixers) operating adjacent to receivers to one at any given time.

N-3 **Neighbor Notification**. Provide notification to residential occupants nearest to the project site at least 24 hours prior to initiation of construction activities that could result in substantial noise levels at outdoor or indoor living areas. This notification should include the anticipated hours and duration of construction

and a description of noise reduction measures being implemented at the project site. The notification should include a telephone number for local residents to call to submit complaints associated with construction noise. The notification should be posted along Cajalco Road and Carrol Street and be visible from adjacent properties.

Temporary Construction-Related Vibration

Activities associated with the uses proposed do not generate vibration. Thus, this discussion focuses on temporary vibration caused by construction. As referenced, the closest single-family residence is approximately 200 feet south of the southern property line. Based on the information presented in Table 5, vibration levels would attenuate to approximately 69 dBA at this residence during construction assuming a bulldozer is the heaviest piece of equipment used during grading or site clearing. As discussed below, 100 VdB is the threshold where minor damage can occur in fragile buildings. Vibration levels are projected to be under this threshold; thus, structural damage is not expected to occur as a result of construction activities associated with the proposed project. Maximum vibration levels would be approximately 69 VdB and below the 72 VdB threshold referenced. Temporary vibration impacts would be **less than significant.**

Table 5
Vibration Source Levels for Construction Equipment

Equipment	Approximate VdB				
	25 Feet	50 Feet	60 Feet	75 Feet	100 Feet
Large Bulldozer	87	81	79	77	75
Loaded Trucks	86	80	78	76	74
Jackhammer	79	73	71	69	67
Small Bulldozer	58	52	50	48	46

Source: Federal Railroad Administration, 1998

Operational Noise Exposure

Operation of the proposed project was evaluated for potential exterior traffic related impacts caused by increased traffic volumes associated with the project as well as interior noise levels caused by traffic.

Exterior Traffic Noise. Traffic is one noise source that would be generated by the proposed project. Existing noise levels exceeded the exterior residential standard (60 dBA) referenced above during the monitoring period. Whether a traffic-related noise impact would occur is based on whether project traffic, when added to the existing observed traffic on Cajalco Road, Carroll Street and Elmwood Street), would cause noise to noticeably increase over

measured ambient conditions (i.e., +3 dBA) and/or exceed the 60 dBA standard in the Riverside County General Plan Noise Element.

The roadway network (i.e., Cajalco Road, Carroll Street, and Elmwood Street) adjacent to the project site was modeled using the Federal Highway Administration Traffic Noise Model (TNM) version 2.5 software (see Appendix A). The model calculates traffic noise at receiver locations based on traffic volumes, travel speed, mix of vehicle types operating on the roadways (i.e., cars/trucks, medium trucks and heavy trucks) and related factors. Traffic volumes and vehicle mix on Cajalco Road, Carroll Street and Elmwood Street are based on traffic counts obtained during the monitoring period.

Traffic volumes for the project were based on peak hour trip generation rates provided in the Traffic Impact Study (Mizuta Traffic Consulting, Inc. May 2021). The proposed project would generate approximately 2,499 net new daily trips. Of the total, approximately 211 would occur during the A.M. peak hour; 204 would occur during the P.M. peak hour. The A.M. peak hour trips were added to baseline conditions to determine whether noise levels would increase as a result of project operation. The model was calibrated to calculate noise levels that are +/- 2 dBA those measured on-site and reported in Table 2.

Hourly average baseline noise levels (Leq) were calculated for the residential receivers located along Cajalco Road east of the site and south of the site along Elmwood Street to establish baseline conditions. These are the closest receivers to the project site and would experience the highest concentration of project-related traffic. The receiving properties are defined as follows and shown in Figure 4:

1. Single-family residence at 21805 Cajalco Road east of the site;
2. Single-family residence at 21704 Elwood Street south of the site; and
3. Single-family residence at 21590 Elwood Street southwest of the site.

Baseline noise levels are shown Table 6. As shown, baseline conditions exceed the 55 dBA exterior standard at existing single-family residences and are consistent with measured noise levels.

Noise levels associated with the project were calculated by distributing the 211 A.M. peak hour project trips into the baseline traffic volumes on Cajalco Road and Carroll Street. Volumes were concentrated in this area for the purpose of evaluating worst case noise conditions. The results are also shown in Table 6. Project traffic will have no noticeable effect on baseline conditions.

Table 6
Modeled Noise Levels

Receptor	Existing Leq	With Project Leq	Decibel Change	Significant Impact
Site 1	63.0	63.5	+.5	No
Site 2	61.0	61.3	+.3	No
Site 3	60.6	60.9	+.6	No

Figure 4—Receiver Locations

- Project Site **R = Receiver Site**

Interior Traffic Noise. California Energy Code Title 24 standards specify construction methods and materials that result in energy efficient structures up to a 30 dBA reduction in exterior noise levels (assuming windows are closed). This includes operation of mechanical ventilation (e.g., heating and air conditioning), in combination with standard building construction that includes dual-glazed windows with a minimum Sound Transmission Class (STC) rating of 26 or higher. When windows are open, the insertion loss drops to about 10 dBA.

The residences within the project area appear to have been constructed before Title 24 standards were implemented. As stated, the manner in which older homes in California were constructed (approximately 30 years old or older) generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. Assuming windows are closed and a 20 dBA insertion loss, interior noise levels at residences modeled would range between 41 dBA and 44 dBA. Interior noise levels would be below the 45 dBA interior standard. In all cases modeled, the existing interior noise levels would not noticeably change with the addition of project traffic.

Car Wash. The proposed drive-thru car wash would be located near the center of the site in a north/south orientation. Cars would queue on the south side of the car wash, travel through the tunnel and exit on the north side approximately 100 feet north of the southern property line and 200 feet south of the northern property line. Automated car wash equipment and facilities have several noise-generating sources. These include pumps, compressors, high-pressure applicators and spray nozzles; scrubbers, and dryers. The mechanical equipment is proposed to be fully enclosed within an equipment room located within the structure and inside the car wash tunnel. Potential noise sources within the car wash tunnel would include the high-pressure applicators and spray nozzle manifolds; noise from the friction of the scrubber, wrap and brush wash systems; and noise generated from the dryer system. With the exception of the dryer blowers, the equipment is located inside the car wash tunnel and generally not audible outside the building. The dryer blowers; however, are the dominant noise source associated with car wash systems and because they are located near the tunnel exit, are the most audible at surrounding properties. Thus, operation of the dryer blowers is the focus of this evaluation.

The proposed car wash would use a MAXX 3 Model SGMX3 system. Specific noise data for the blowers were not provided with the manufacturers' specifications; thus, reference data for an automated rollover (i.e., a car wash with brushes that roll over the vehicle during operation) car wash with a 45-horsepower dryer blower. Baseline noise data for a similar system indicated operation would generate 79 dBA at a distance of 30 feet from the tunnel exit (Illingsworth & Rodkin, Inc. May 2014).

Blower noise would project to the north into the project site and towards Cajalco Road which is located approximately 200 feet north of the tunnel exit. North of Cajalco Road is undeveloped land designated Mixed-Use in the Mead Valley Area Plan. The nearest sensitive receivers are located to the south. However, land adjacent to and south of the site is designated Very Low Density Residential. The southern property line is approximately 50 feet south of the tunnel entrance.

It was assumed that the car wash would cycle one car every 5 minutes and that the drying cycle would last approximately 60 seconds. Thus, over a one-hour period under peak operation, the dryers would operate for a total of 12 minutes. Assuming a usage factor of 20% (60 minutes per hour/12 minutes of dryer operation) and a reference level of 79 dBA at 30 feet north of the dryers, the Leq (hourly average) at the tunnel exit would be approximately 72 dBA [Leq = 79 + 10 (log 20/100)] . Measured noise levels to the side of car wash tunnel exits are noticeably lower than at the front. Using a reference level of 60 dBA at 30 feet and 90 degrees from the tunnel exit (Dudek, 2014), and assuming free field propagation of 6 dBA per doubling of distance, blower noise would attenuate to 49.5 dBA at the southern property line. Thus, car wash blower noise would be below the 55 dBA standard for stationary sources at the residential property line. Noise levels at the northern property line (200 feet north of the car wash blowers) would attenuate to 56 dBA. This would be below the 65 dBA commercial standard for stationary noise sources.

Thus, car wash blower noise would not adversely affect residential properties located in proximity to the site. To avoid exceeding commercial standards during nighttime hours, the project could be conditioned to limit operation of the car wash from 7:00 a.m. to 10:00 p.m.

Drive Thru Window Speakers. Speaker noise is a variable noise source and subject to change based on volume settings. The nearest drive thru menu board and speaker would be located on the east side of the retail/drive thru restaurant building proposed for construction on the east side of the site adjacent to the Carroll Street. A second drive-thru is located along the west side of the site; however, there are no sensitive receptors proximal to and west of the site.

Menu board/speaker noise is assumed to project to the east. The restaurant is located approximately 300 feet west of Receiver 1 and 280 feet north of Receivers 2 and 3. Reference noise levels range from 58 to 65 dBA at 30 feet from the source (Illingworth & Rodkin, 2010). Assuming a reference level of 65 dBA at 30 feet, sound levels at 300 feet would attenuate to 45 dBA and sound levels at 280 feet would attenuate to 44 dBA.

- [65 - *20 log (300 ft) / (30 ft)] = 45*
- [65 – 20 log (280 ft) / (30 ft)] = 44

While speaker noise would meet the 55 dBA residential standard, it is recommended that the project be conditioned to ensure the drive thru speaker noise be inaudible beyond the immediate drive thru lane, order and pick-up window.

HVAC Systems. The HVAC system proposed for use on the site has not been specified and noise levels vary depending on the size of the system. However, it is assumed that two HVAC systems will be installed on the roof-top of each restaurant/retail buildings located along the east and west side of the site. Reference noise levels for the project are based on noise measurements made at similar facilities. HVAC noise levels can be expected to range from 60 to 70 dBA at 5 feet from the roof top equipment and ventilation openings (Illingworth & Rodkin,

2011). To conservatively evaluate HVAC noise levels, the Leq was predicted at the southern property line based on the distance between the sources and residence to the south. It assumed the closest HVAC units would be 100 feet north of the southern property lines and the furthest would be approximately 150 feet north of the southern property line, the combined sound level would attenuate to 46 dBA at the southern property line. HVAC noise from the four units would be approximately 49 dBA assuming all are running simultaneously. This would be below the 55 dBA standard.

CONCLUSION

The proposed project will have no adverse operational noise impacts. Section 9.52.020 of the County's Noise Ordinance states that noise sources associated with any private construction activity located within one-quarter of a mile from an inhabited dwelling is permitted between the hours of 6:00 a.m. and 6:00 p.m., during the months of June through September, and 7:00 a.m. and 6:00 p.m., during the months of October through May. Thus, construction activities occurring between the prescribed hours are considered exempt from the ambient noise standards of the ordinance. No significant or adverse noise impacts would occur as a result of project construction. Project related traffic would not noticeably change existing noise levels along Cajalco Road or Carrol Street. Operation of the car wash dryer blowers would not exceed the commercial noise standard at the southern property nor would it exceed the residential standard at properties located south and east of the site. Noise from the drive thru window speakers would not exceed the residential or commercial standards. Further, HVAC operations on-site would be below the 55 dBA standard at adjacent property lines.

REFERENCES

County of Riverside, Section 9.52.020 of the Noise Ordinance, amended November 2019

County of Riverside General Plan, Noise Element, Tables N-1 and N-2, December 2015.

dBF & Associates, Inc., Reference Noise Level Compilation Table, 2016.

Federal Highway Administration. *Roadway Construction Noise Model. 2006*. Users Guide Table 1.

Federal Highway Administration, Traffice Noise Model Version 2.5, 2004.

Federal Transit Administration. *Transit Noise and Vibration Impact Assessment*. September 2018.

Federal Rail Administration (FRA) Guidelines (Report Number 293630-1), December 1998.

Hanson, Carl E., Towers, David A., and Meister, Lance D. (2006, May). *Transit Noise and Vibration Impact Assessment.* Federal Transit Administration, Office of Planning and Environment. http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf

Harris Miller Miller & Hanson Inc. T*ransit Noise and Vibration Impact Assessment*, *Final Report*. May 2006.

Illingsworth & Rodkin. *Capital Toyota Expansion Initial Study-MND Noise Impact Assessment*, City of San Jose, May, 2014.

Illingsworth & Rodkin. *Noise and Vibration Assessment for the Curtner/Union Retail Project*, City of San Jose, December 2011.

Illingsworth & Rodkin. In-and-Out Burger, North Main Street, Noise and Vibration Impact Assessment, City of Pleasant Hill, June 2010.

Mizuta Traffic Consulting, Inc., *Deemarco Commercial Center Traffic Impact Study,* May 2021.

Appendix A

Monitoring Data Sheet and Modeling Results

FIELD NOISE MEASUREMENT DATA

Project Name: Cajalco Road | Page 1 of

Project #: | Day / Date 9/29 Tues | My Name.

Sound Level Meter	Calibrator	Weather Meter
Model #: Piccolo II	Model #	Model # Serial #
Serial #	Serial #	
Weighting: (A) / C / Flat	Pre-Test: ____ dBA SPL	Terrain: Hard / Soft / Mixed
Response: (Slow) / Fast / Impl	Post-Test: ____ dBA SPL	Topo: Flat / Hilly (describe)
Windscreen: (Yes) / No		Wind: Steady / Gusty

ID	Time Start	Time Stop	Leq	Lmin	Lmax	L10	L50	L90	Wind Spd/ Dir (mph)	Temp (°F)	RH (%)	Bar Psr (in Hg)	Cloud Cover (%)
1	8:25	8:40	61.8	47.6	74.6				0	80			0%
2	8:55	9:10	63.8	[illegible]	75.2								

		Location(s) / GPS Reading(s):
Roadway Name	Cajalco Road / Carroll St	Carroll / Elmwood
Speed (post/obs)	50	None posted
Number of Lanes	4 – other lanes closed for construction	2
Width (pave/row)	48	24
1- or 2- way	2	2
Grade	0%	0%
Bus Stops	NO	NO
Stoplights	Clark St. to west	NO
Street Parking	NO	YES
Automobiles	221	41
Medium Trucks	15	1
Heavy Trucks	10	0

Site 1 – location ~ 50 feet from centerline of Cajalco

Site 2 SE corner of Elmwood / Carroll St.

Other Noise Sources: distant (aircraft) / (roadway traffic) / trains / landscaping / rustling leaves / children playing / dogs barking / birds vocalizing

Notes and Sketches on Reverse

Site 1

Start Date	9/29/2020
Start Time	8:21:31 AM
End Time	8:36:30 AM
Duration	00:14:59
Meas Mode	Single
Input Range	Low
Input Type	Mic
SPL Time Weight	Slow
LN% Freq Weight	dBA
Overload	No
UnderRange	No
Sensitivity	18.44mV/Pa

LZeq	72.9
LCeq	71.7
LAeq	61.8
LZSmax	86.1
LCSmax	85.9
LASmax	74.6
LZSmin	64.5
LCSmin	62.3
LASmin	47.6
LZE	102.4
LCE	101.2
LAE	91.3
LZpeak	96.2
LCpeak	94.5
LApeak	87.8
1%	70.4
2%	68.8
5%	66.5
8%	65.4
10%	65.0
25%	62.5
50%	60.0
90%	52.3
95%	50.5
99%	48.2

Site 2

Start Date	9/29/2020
Start Time	8:52:01 AM
End Time	9:07:00 AM
Duration	00:14:59
Meas Mode	Single
Input Range	Low
Input Type	Mic
SPL Time Weight	Slow
LN% Freq Weight	dBA
Overload	No
UnderRange	No
Sensitivity	18.44mV/Pa

LZeq	70.8
LCeq	69.6
LAeq	62.8
LZSmax	86.0
LCSmax	84.6
LASmax	77.1
LZSmin	63.3
LCSmin	60.9
LASmin	44.5
LZE	100.3
LCE	99.1
LAE	92.3
LZpeak	105.3
LCpeak	103.5
LApeak	94.4
1%	74.1
2%	72.9
5%	70.1
8%	68.5
10%	67.4
25%	60.2
50%	53.0
90%	46.6
95%	45.9
99%	44.9

<Organization?>
<Analysis By?>

6 January 2021
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: Deemarco Cajalco Road - Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	63.0	66	63.0	10	----	63.0	0.0	8	-8.0
Receiver2	2	1	0.0	61.0	66	61.0	10	----	61.0	0.0	8	-8.0
Receiver3	3	1	0.0	60.6	66	60.6	10	----	60.6	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

<Organization?>
<Analysis By?>
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: <Project Name?>
RUN: Deemarco Cajalco Road - With Project
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

6 January 2021
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	63.5	66	63.5	10	----	63.5	0.0	8	-8.0
Receiver2	2	1	0.0	61.3	66	61.3	10	----	61.3	0.0	8	-8.0
Receiver3	3	1	0.0	60.9	66	60.9	10	----	60.9	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0