NOISE IMPACT ANALYSIS

XEBEC RIVERSIDE AVENUE INDUSTRIAL PROJECT

RIALTO, CALIFORNIA

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BACKGROUND

The Project is located at 11190 Riverside Avenue in the City of Rialto and proposes a 221,000-sf industrial building which replaces 5,740 sf of existing industrial use. All project traffic will access the site from Riverside Avenue.

There will be 23 loading docks along the eastern building façade. The closest residential use to the site is along Jurupa Avenue, west of Willow Avenue. The home is approximately 970 feet southwest of the site and could potentially be exposed to loading dock noise and construction noise. However, no Project traffic is anticipated to be routed along Jurupa Avenue.

The traffic report anticipates that 90% of project traffic will head north on Riverside Avenue to access the I-10 freeway. Five percent of traffic is expected to utilize Santa Ana Avenue west of the Project. There are sensitive uses along Santa Avenue. Although these homes are 3,000 feet from the site, they will be exposed to a small amount of Project pass-by traffic which requires analysis.

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally considered to be unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

The decibel (dBA) scale is used to quantify sound pressure levels. Although decibels are most commonly associated with sound, "dB" is a generic descriptor that is equal to ten times the logarithmic ratio of any physical parameter versus some reference quantity. For sound, the reference level is the faintest sound detectable by a young person with good auditory acuity.

Since the human ear is not equally sensitive to all sound frequencies within the entire auditory spectrum, human response is factored into sound descriptions by weighting sounds within the range of maximum human sensitivity more heavily in a process called “A-weighting,” written as dB(A). Any further reference in this discussion to decibels written as "dBA" should be understood to be A-weighted.

For “stationary” noise sources, or noise sources emanating from private property, such as a loading docks, the City has legal authority to establish noise performance standards designed to not adversely impact adjoining uses. These standards are typically articulated in the jurisdictional Municipal Code. These standards typically recognize the varying noise sensitivity of both transmitting and receiving land uses. The property line noise performance standards are normally structured according to land use and time-of-day and expressed as a Leq.

Leq is a time-averaged sound level; a single-number value that expresses the time-varying sound level for the specified period as though it were a constant sound level with the same total sound energy as the time-varying level. Its unit is the decibel (dBA). The most common averaging period for Leq is hourly.

Because community receptors are more sensitive to unwanted noise intrusion during more sensitive evening and nighttime hours, state law requires that an artificial dBA increment be added to quiet time noise levels. The 24-hour noise descriptor with a specified evening and nocturnal penalty is called the Community Noise Equivalent Level (CNEL). CNEL's are a weighted average of hourly Leq's.

PLANNING STANDARDS

The City of Rialto has established guidelines for acceptable community noise levels that are based upon the CNEL rating scale to ensure that noise exposure is considered in any development. CNEL-based standards apply to noise sources whose noise generation is preempted from local control (such as from on-road vehicles, trains, airplanes, etc.) and are used to make land use decisions as to the suitability of a given site for its intended use. These CNEL-based standards are articulated in the Noise Element of the General Plan.

Figure 1 shows the noise compatibility guidelines for various uses. These guidelines would apply in usable outdoor space such as patios, yards, spas, etc. The guidelines indicate that an exterior noise level of 60 dB CNEL is considered a "normally acceptable" noise level for residential development involving normal conventional construction, without any special noise insulation requirements. Exterior noise levels up to 70 dB CNEL are typically considered "conditionally acceptable", and residential construction should only occur after a detailed analysis of the noise reduction requirements is made and needed noise attenuation features are included in the project design. Exterior noise attenuation features include, but are not limited to, setbacks to place structures outside the conditionally acceptable noise contour, orienting structures so no windows open to the noise source, and /or installing noise barriers such as berms or solid walls. Industrial land uses are not considered noise sensitive and are normally acceptable with exterior noise levels below 75 dBA CNEL and conditionally acceptable with exterior noise levels below 80 dBA CNEL.

The City of Rialto Municipal Code contains no numerical noise standards. However, the Code of Ordinances, Section 9.50.060 Exemptions states:

- The following activities and noise sources shall be exempt from the provisions of this chapter (9.50): Sounds generated in commercial and industrial zones that are necessary and incidental to the uses permitted therein.

The City's Noise Ordinance does contain time restrictions regarding construction noise. Construction is exempt from noise regulation if hours are restricted to the permissible daytime time hours. Section 9.50.070 of the Municipal Code provides the following permitted hours of construction:

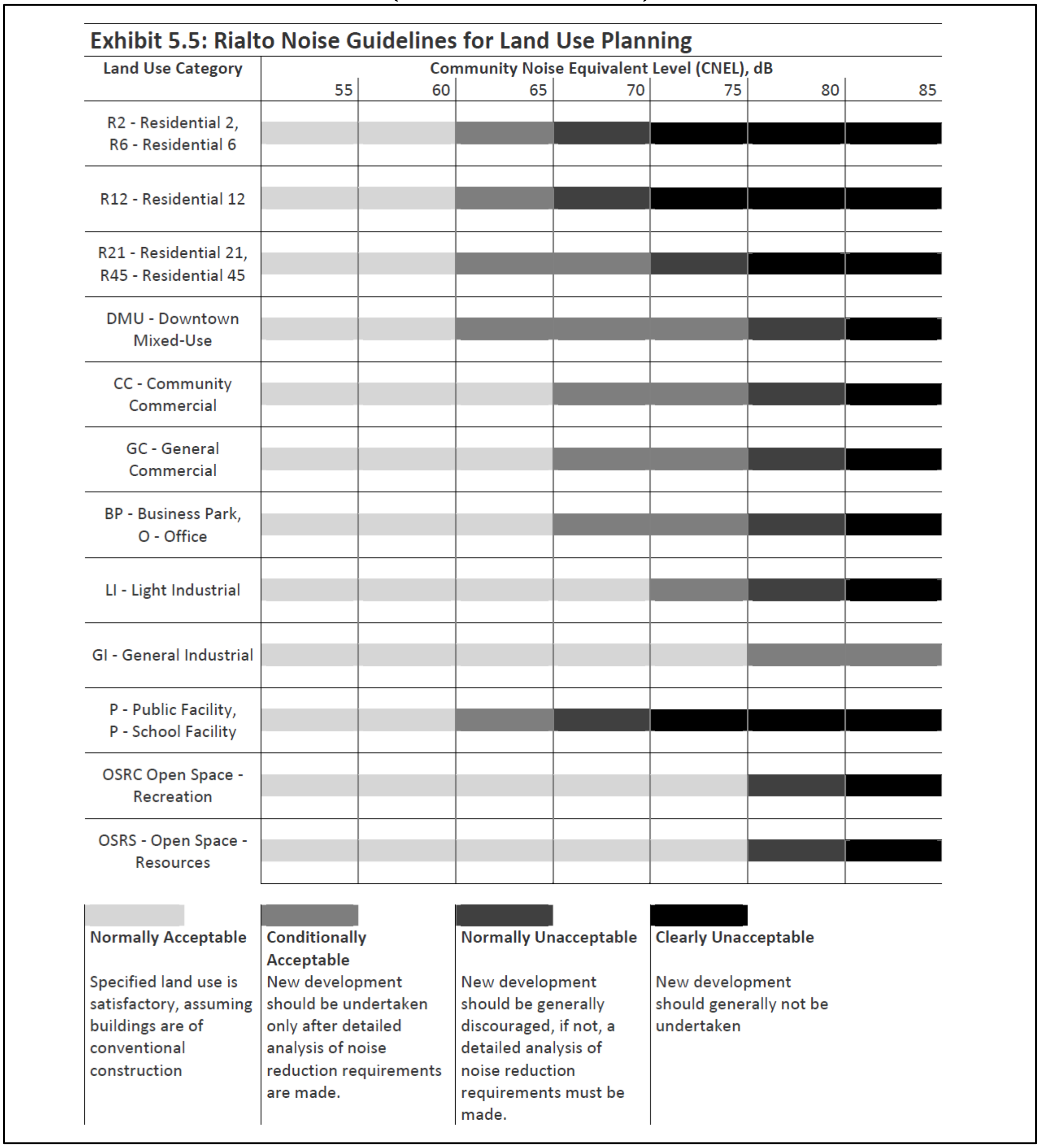
October 1st through April 30th.

Monday—Friday	7:00 a.m. to 5:30 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

May 1st through September 30th.

Monday—Friday	6:00 a.m. to 7:00 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

Figure 1 Noise Compatibility Guidelines
(Rialto General Plan)



BASELINE NOISE LEVELS

An on-site noise measurement was made to document the existing baseline level in the area. This short-term measurement was conducted by Giroux & Associates on Thursday, November 3, 2022. The measurement result is shown below, and a graphic of the meter location is provided in Figure 2.

Short-Term Noise Measurements (dB[A])

Time	Leq	Lmax	Lmin
12:30-12:45	67.4	73.2	52.9

The meter was placed to reflect existing traffic noise levels from Riverside Avenue. The observed noise level was 67.4 dBA Leq at 50 feet from the roadway centerline. Usually, a CNEL is a few decibels higher than the afternoon hourly Leq.

Figure 2
Noise Monitor Location

NOISE IMPACTS

IMPACT SIGNIFICANCE CRITERIA

According to the current CEQA Appendix G guidelines, noise impacts are considered potentially significant if they result in:

1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of a project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
2. Generation of excessive groundborne vibration or groundborne noise levels?
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The terms "substantial" or "excessive" are not defined in most environmental compliance guidelines. Noise analysis methodology is accurate only to the nearest whole decibel and the human ear can only clearly detect changes of around 3 dBA; changes of less than 3 dBA, while audible under controlled circumstances, are not readily discernable in an outdoor environment. Thus, a change of 3 dBA is considered as a perceptible audible change. It would require a doubling of traffic to create a +3 dBA noise increase due to the logarithmic nature of noise calculations.

CONSTRUCTION NOISE IMPACTS

Thresholds

The noise ordinance exempts construction activities from compliance with numerical noise limits if activity occurs within permitted hours as shown below:

October 1st through April 30th.

Monday—Friday	7:00 a.m. to 5:30 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

May 1st through September 30th.

Monday—Friday	6:00 a.m. to 7:00 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

The City of Rialto does not include a numerical significance threshold to assess construction noise impacts. Therefore, a noise threshold utilizing the OSHA (Occupational Safety and Health Administration) agency limits of noise exposure was used for analysis of construction significance. The OSHA standard limits noise exposure of workers to 90 dBA or less over eight continuous hours, or 105 dBA or less over one continuous hour. For the purpose of analyzing potential noise significance for this report, the OSHA established noise thresholds were adopted for use. For this analysis, a noise impact is considered potentially significant if construction activities extended beyond ordinance time limits for construction or construction-related noise levels exceed the OSHA standards unless technically infeasible to do so.

Methodology

Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level. Short-term construction noise impacts tend to occur in discrete phases dominated by large, earth-moving equipment sources for demolition and grading. During construction and paving, equipment is generally less noisy.

In 2006, the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model that includes a national database of construction equipment reference noise emissions levels. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power during a construction phase. The usage factor is a key input variable that is used to calculate the average Leq noise levels.

Table 1 identifies highest (Lmax) noise levels associated with each type of equipment identified for use, then adjusts this noise level for the extent of equipment usage (usage factor), which is represented as Leq. The table is organized by construction activity and equipment associated with each activity. Table 1 describes the noise level for each piece of equipment at a reference 50-foot distance after adjusting for usage.

Quantitatively, the primary noise prediction equation is expressed as follows for the hourly average noise level (Leq) at distance D between the source and receiver (dBA):

Leq = Lmax @ 50’ – 20 log (D/50’) + 10log (U.F%/100) – I.L.(bar)
Where:
Lmax @ 50’ is the published reference noise level at 50 feet
U.F.% is the usage factor for full power operation per hour
I.L.(bar) is the insertion loss for intervening barriers

Table 1
Construction Equipment Noise Levels

Phase Name	Equipment	Usage Factor[1]	Max Noise @ 50 feet (dB)[2]	Average Noise Level @ 50 feet (dB)
Demolition	Concrete Saw	20%	90	84
	Excavator	40%	81	77
	Dozer	40%	85	82
Grading	Grader	40%	85	81
	Dozer	40%	85	82
	Excavator	40%	81	77
	Loader/Backhoe	37%	78	74
Construction	Crane	16%	81	73
	Loader/Backhoe	37%	78	74
	Welder	46%	74	71
	Generator Set	50%	81	78
	Forklift	20%	75	69
Paving	Paver	50%	77	74
	Paving Equipment	40%	76	72
	Roller	20%	80	74

Source: FHWA's Roadway Construction Noise Model, 2006

1. Estimates the fraction of time each piece of equipment is operating at full power during a construction operation
2. The Lmax values presented are the actual measured values summarized in the Roadway Noise Model User Guide (FHWA 2006) unless the actual is unavailable in which case the equipment specifications were used.

Table 2 adjusts the expected maximal construction noise level from a reference distance of 50 feet to the actual distance separation unique to the closest sensitive use along Jurupa Avenue west of Willow Ave. The setback is 970 feet from the closest site perimeter.

Table 2
Maximum Construction Noise Equipment Levels at Off-Site Sensitive Use (dBA Leq)

Phase Name	Equipment	Closest Residence
Demolition	Concrete Saw	58
	Excavator	51
	Dozer	56
Grading	Grader	55
	Dozer	56
	Excavator	51
	Loader/Backhoe	48
Construction	Crane	47
	Loader/Backhoe	48
	Welder	45
	Generator Set	52
	Forklift	43
Paving	Paver	48
	Paving Equipment	46
	Roller	48

The distances modeled in Table 2 represent the worst-case impact when equipment is operating directly at the closest point to the homes. However, most construction will occur at a greater setback distance.

Shielding by buildings or terrain would result in lower construction noise levels at the above distant receptors. Nevertheless, as shown, construction noise levels will not exceed 90 dBA, the OSHA threshold adopted for use for this Project.

Therefore, the following measures are recommended to ensure noise compliance during construction activities:

- Construction is only permitted between the following hours:

October 1st through April 30th.

Monday—Friday	7:00 a.m. to 5:30 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

May 1st through September 30th.

Monday—Friday	6:00 a.m. to 7:00 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

- Construction vehicles and equipment (fixed or mobile) shall be equipped with properly operating and maintained mufflers.
- Material stockpiles and/or vehicle staging areas shall be located as far as practical from dwelling units.

With inclusion of these measures, construction noise impacts from the Project would be reduced to a less than significant level.

VIBRATION

Construction activities generate ground-borne vibration when heavy equipment travels over unpaved surfaces or when it is engaged in soil movement. The effects of ground-borne vibration include discernible movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Vibration related problems generally occur due to resonances in the structural components of a building because structures amplify groundborne vibration. Within the "soft" sedimentary surfaces of much of Southern California, ground vibration is quickly damped out. Groundborne vibration is almost never annoying to people who are outdoors (FTA 2006).

Groundborne vibrations from construction activities rarely reach levels that can damage structures. Because vibration is typically not an issue, very few jurisdictions have adopted vibration significance thresholds. Vibration thresholds have been adopted for major public works construction Projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance.

A vibration descriptor commonly used to determine structural damage is the peak particle velocity (ppv) which is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in in/sec. The range of such vibration is as follows in Table 3:

Table 3
Human Response To Transient Vibration

Average Human Response	ppv (in/sec)
Severe	2.00
Strongly perceptible	0.90
Distinctly perceptible	0.24
Barely perceptible	0.03

Source: Caltrans Transportation and Construction Vibration Guidance Manual, 2013.

Over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. As shown in Table 4**,** according to Caltrans and the FTA, the threshold for structural vibration damage for modern structures is 0.5 in/sec for intermittent sources, which include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment. Older, typically historical residential structures have a 0.3 in/sec threshold. Below this level there is virtually no risk of building damage.

Table 4
FTA and Caltrans Guideline Vibration Damage Potential Threshold Criteria

Building Type	**PPV (in/sec)**
FTA Criteria	
Reinforced concrete, steel or timber (no plaster)	0.5
Engineered concrete and masonry (no plaster)	0.3
Non-engineered timber and masonry buildings	0.2
Buildings extremely susceptible to vibration damage	0.12
Caltrans Criteria	
Modern industrial/commercial buildings	0.5
New residential structures	0.5
Older residential structures	0.3
Historic old buildings	0.25
Fragile Buildings	0.1
Extremely fragile ruins, ancient monuments	0.08

The predicted vibration levels generated by construction equipment anticipated for use are shown below in Table 5.

Table 5
Estimated Vibration Levels During Project Construction

Equipment	PPV at 10 ft (in/sec)	PPV at 15 ft (in/sec)	PPV at 25 ft (in/sec)	PPV at 40 ft (in/sec)	PPV at 50 ft (in/sec)
Large Bulldozer	0.352	0.191	0.089	0.044	0.031
Loaded trucks	0.300	0.163	0.076	0.037	0.027
Jackhammer	0.138	0.075	0.035	0.017	0.012
Small Bulldozer	0.012	0.006	0.003	0.001	<0.001

Source: FHWA Transit Noise and Vibration Impact Assessment

The calculation to determine PPV at a given distance is:

PPVdistance = PPVref*(25/D)^1.5

Where:

PPVdistance = the peak particle velocity in inches/second of the equipment adjusted for distance,

PPVref = the reference vibration level in inches/second at 25 feet, and

D = the distance from the equipment to the receiver.

As shown, even at 15 feet, vibration levels from a large bulldozer are reduced to a level at which structural damage would not occur at a fragile structure. All off-site structures have a much greater setback than 15-feet. Most other construction equipment has a much lower vibration signature. Therefore, vibration impacts are less-than-significant.

VEHICULAR NOISE IMPACTS

Site access is from Riverside Avenue. Approximately 90% of Project traffic will route along Riverside Avenue north of the site to access the I-10 freeway. In this vicinity, Riverside Avenue contains only industrial uses and therefore will not impact adjoining sensitive uses. Only the vehicular trips that pass by adjoining residential areas could potentially create a significant noise increase.

Five percent of Project traffic is expected to travel on Santa Ana Avenue west of the site. There are adjoining sensitive uses which could be noise impacted. The Project is expected to generate 378 new warehouse and office trips. Project trips will have the distribution shown in Table 6 organized by vehicle type, peak hour and pass-by trips.

Table 6
Project Traffic Distribution

Vehicle Type	Daily Trips	Peak Hour Trips	Daily Trips Westbound on Santa Ana
Passenger Cars	227	24	11
4 Axle Truck	106	33	5
3 Axle Truck	42	8	2
2 Axle Truck	3	0	1
Total Trips	**378**	**65**	**19**

Table 7 summarizes the 24-hour CNEL level at 50 feet from the roadway centerline along area roadway segments. Opening year (2024) was evaluated for "with project" and "without project" conditions.

As shown in Table 7, Project implementation in the opening year timeframe does little to change the overall traffic noise environment. Because the area is mostly built out, addition of Project traffic to area roadways does little to the noise environment. The percentage of traffic turning onto west Santa Ana Avenue, which has adjacent residential uses, is low. The largest traffic noise increase attributed to Project implementation is on Riverside Avenue north of the site and is only +0.3 dBA CNEL which is well below the +3 dBA CNEL significance threshold. The few trucks that will travel west on Santa Ana Avenue could create a +0.1 dBA impact which is similarly considered to be less than significant.

Table 7
Traffic Noise Impact Analysis
(dBA CNEL at 50 feet from centerline)

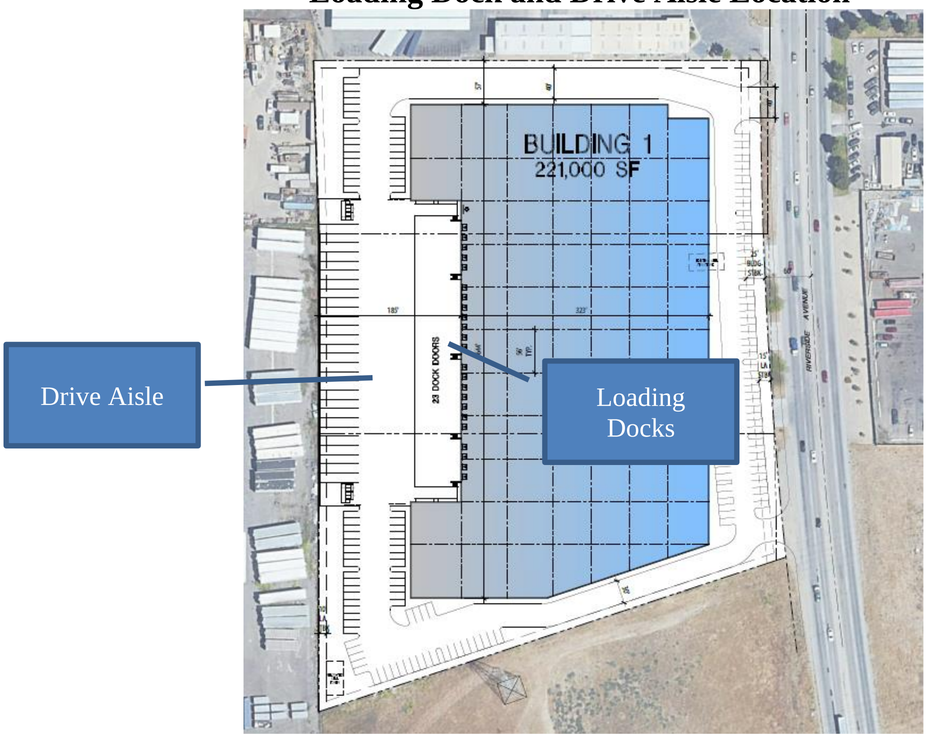
Segment		2024 No Proj.	2024 W Proj.	Difference
Riverside	S of Jurupa	67.3	67.3	0.0
	N of Jurupa	67.1	67.1	0.0
	S of Santa Ana	67.6	67.9	0.3
	N of Santa Ana	68.1	68.2	0.1
	S of Slover	68.1	68.3	0.2
	N of Slover	69.7	69.8	0.1
Jurupa	W of Riverside	59.9	59.9	0.0
Santa Ana	W of Riverside	60.7	60.8	0.1
	E of Riverside	58.3	58.3	0.0
Slover	W of Riverside	66.2	66.2	0.0
	E of Riverside	62.4	62.4	0.0

PROJECT OPERATIONAL NOISE

The location of the drive aisles and loading docks that could impact area sensitive uses are located on the western building façade as shown in Figure 3.

The loudest operational noise generation from the warehouse tends to be very brief interspersed, with extended periods of lesser noise audibility. For example, a diesel delivery truck pass-by noise typically lasts only a few seconds as it rises to a peak and then falls off. The hourly average is a few seconds of engine/exhaust noise and 59+ minutes of no truck noise. FHWA (FHWA, RD-77-108) has published the reference energy mean emission levels from autos, medium trucks and heavy (3 or more axles) trucks that allow one to calculate the traffic noise exposure as a function of vehicle type, travel speed and source-receiver distance. Project traffic was calculated with an assumed 25 mph travel speed.

Figure 3
Loading Dock and Drive Aisle Location



As shown in Table 6, a peak hour is expected to create 41 PCE truck trips entering or leaving the site. The noise associated with these trucks is around 60.0 dBA Leq. Attenuating to 970 feet, the distance to the closest sensitive use, would yield a residual noise level of less than 41 dBA Leq. This is a peak hour noise level, so other times of day would be even lower. Regardless, this noise level would not be discernible at the closest uses.

The loading docks are 185 feet within the western site perimeter. This would provide approximately 1,155 feet of distance separation between the loading docks and the closest residence. The reference noise level from loading dock operations is typically less than 70 dB Leq for any delivery event. Approximately 34 decibels of noise attenuation are afforded by the separation distance between the loading dock and closest residence. Unloading activity noise would be around 35 dBA Leq at the closest residence. Again, this noise level would not be discernible.

SUMMARY

Noise from temporary construction activities is exempt from noise ordinances if the construction activities occur within the following hours.

October 1st through April 30th.

Monday—Friday	7:00 a.m. to 5:30 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

May 1st through September 30th.

Monday—Friday	6:00 a.m. to 7:00 p.m.
Saturday	8:00 a.m. to 5:00 p.m.
Sunday	No permissible hours
State holidays	No permissible hours

In addition, the following measures are recommended:

- Construction vehicles and equipment (fixed or mobile) shall be equipped with properly operating and maintained mufflers.
- Material stockpiles and/or vehicle staging areas shall be located as far as practical from dwelling units.

The Project is expected to generate a net of 378 daily vehicular trips of which 151 will be trucks. Most traffic will be head north on Riverside Avenue to access the freeway. Only industrial uses adjoin Riverside Avenue. The only segment that could potentially impact residential uses is on Santa Ana Avenue west of the site. The Project related noise increase on Santa Ana Avenue is only +0.1 dBA. The threshold is +3 dBA. Therefore, the Project traffic will not create a significant impact.

On-Site Project operational noise, both from loading dock activity and truck travel will be minimal at the closest sensitive uses. The closest sensitive use is more than 970 feet from the closest Project perimeter.