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MEMORANDUM

To:	Mr. Bo Prock, Acquisitions Manager - Pacific Industrial
From:	Carson Wong, Cole Martin, Jim Cowan - Dudek
Subject:	17969 Railroad Street Warehouse Project Noise and Vibration Technical Memorandum
Date:	November 14, 2023
cc:	
Attachments:	Figures 1-4 A – Field Noise Measurement Data B – Construction Noise Modeling Input/Output Files C – Stationary Operations Calculations and CadnaA Input D – Peak Hour Truck Trip Calculations

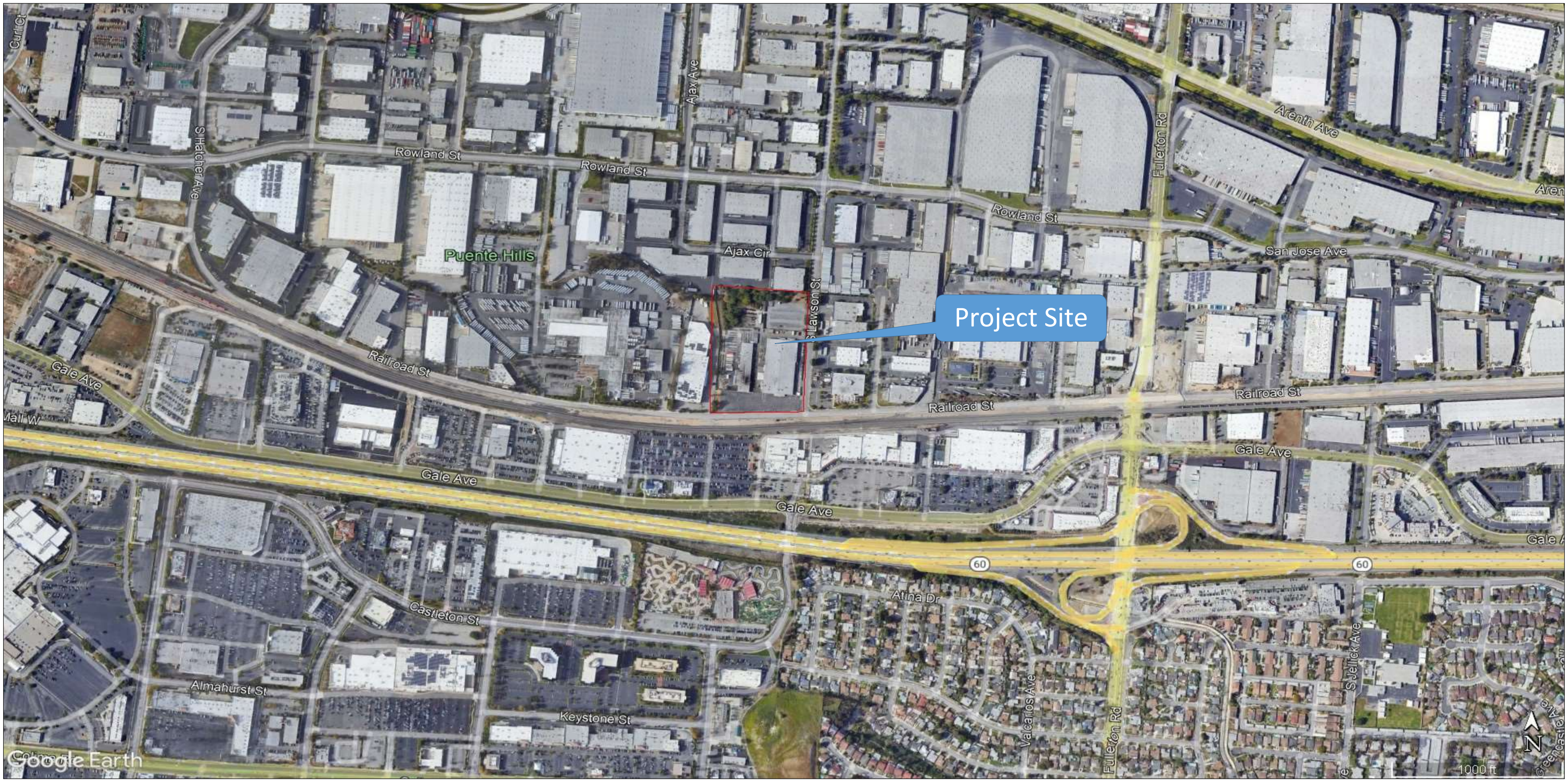
This technical memorandum analyzes noise and vibration impacts for the proposed 17969 Railroad Street Warehouse Project (Project) located in the City of Industry, California (City). The Project site would be located on approximately 9.81 acres of industrially zoned land (currently used for manufacturing) at 17969 Railroad Street in the City.

This memorandum estimates and assesses noise and vibration levels from construction and operation of the Project in accordance with the California Environmental Quality Act (CEQA) Guidelines and City of Industry standards.

The contents and organization of this memorandum are as follows: Project Description, General Analysis and Methodology, Thresholds of Significance and Impact Analyses for the Noise and Vibration Assessment, Conclusions, and References Cited.

1 Project Description

The Project involves the demolition of two existing dilapidated manufacturing facilities totaling approximately 75,000 square-foot and the construction and operation of an approximately 213,500 square-foot Type III-B occupancy S-1 dry storage warehouse on an approximately 9.81-acre site located at 17969 Railroad Street (Assessor Parcel Numbers [APNs] 8264-009-023 and 8264-009-022) located directly north of Railroad Street and west of Lawson Street (Project Location) as shown in Figure 1. The proposed site plan is shown in Figure 2. While this is a speculative warehouse project and no tenant has yet been identified, 25% cold storage was assumed in the analysis in order to accommodate the potential for a tenant with refrigerated storage needs.



SOURCE: Google 2023; Dudek 2023

DUDEK

0 59.5 119 Feet

FIGURE 1

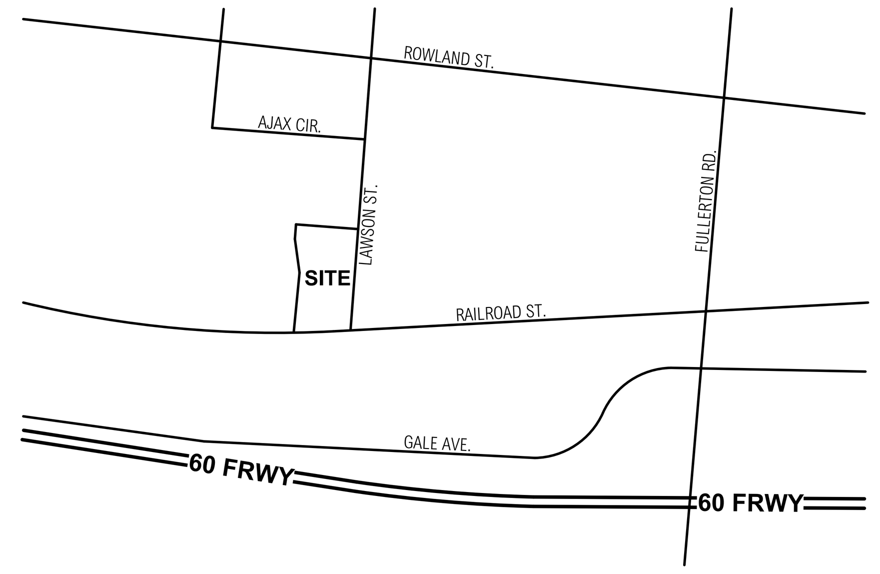
Project Location

17969 Railroad Street Warehouse Project

SITE LEGEND:

- PROPERTY / ROW LINE
- ADA PATH OF TRAVEL
- 8'H BLACK TUBE STEEL FENCE
- LANDSCAPE AREA
- FIRE HYDRANT
- PAD-MOUNT UTILITY TRANSFORMER
- TYPICAL PARKING STALLS - 9' X 19' STRIPED PER CITY STANDARDS

VICINITY MAP:



CODE ANALYSIS:

CONSTRUCTION TYPE:	III-B
OCCUPANCY:	S-1 PRIMARY OCC. B / F-1 ACCESSORY
FIRE SPRINKLERS:	FULLY SPRINKLERED
BUILDING HEIGHT:	
MAX. ALLOWABLE:	75'
PROPOSED:	47'
STORIES:	
MAX. ALLOWABLE:	3
PROPOSED:	1 + MEZZ.
ALLOWABLE AREA	UNLIMITED PER CBC 507

PROJECT DATA:

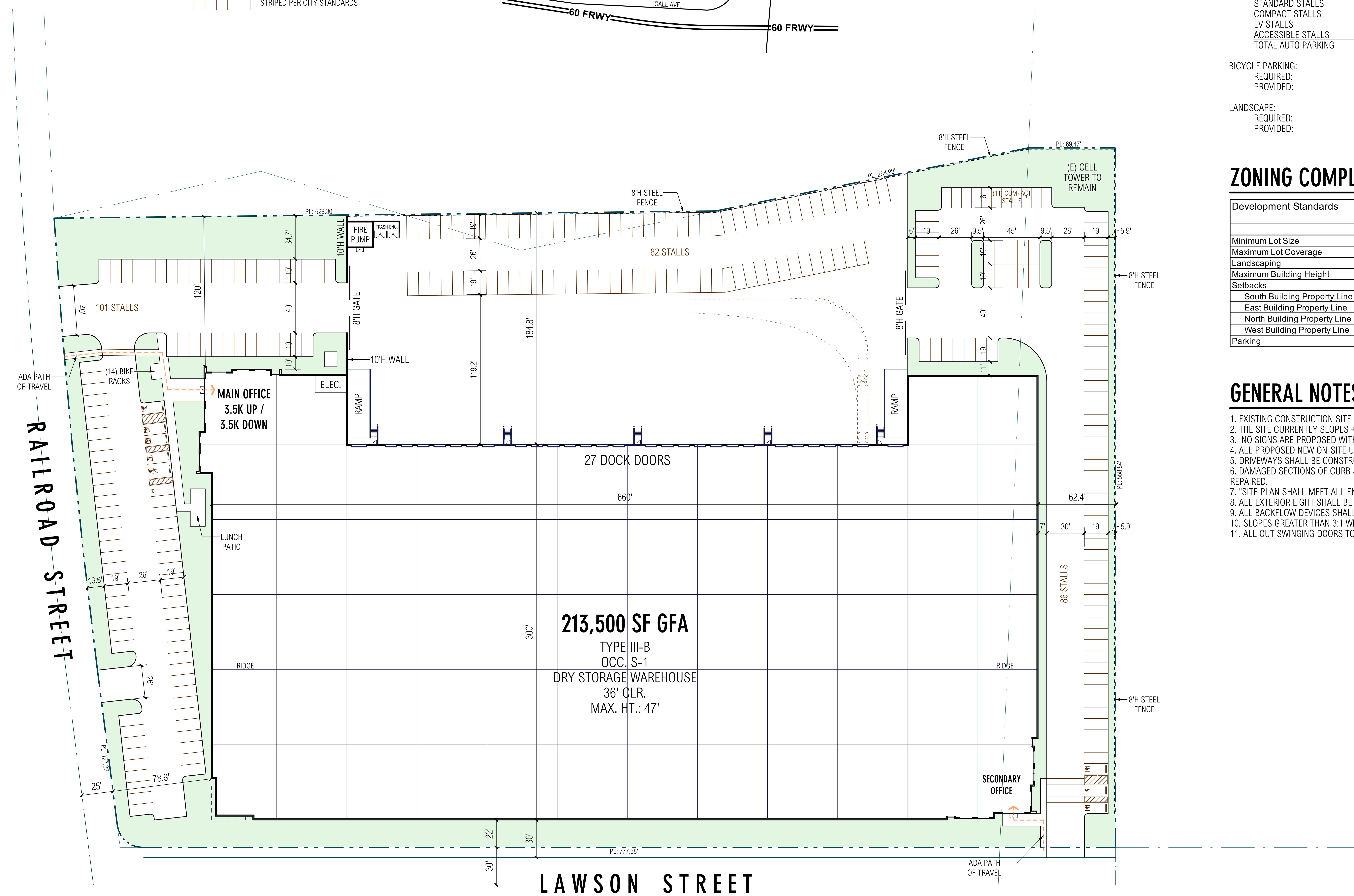
NET SITE AREA:	427,472 SF / 9.81 AC
FOOTPRINT AREA:	210,000 SF
MEZZANINE AREA:	3,500 SF
TOTAL FLOOR AREA:	213,500 SF
PROPOSED F.A.R.	0.499
AUTO PARKING REQUIRED	
7,000 SF OFFICE	N.A.
206,500 SF WAREHOUSE	
1 TO 25,000 SF (1/500 SF)	50 STALLS
25K TO 100K SF (1/750 SF)	100 STALLS
100K SF +	114 STALLS
TOTAL REQUIRED:	264 STALLS
AUTO PARKING PROVIDED:	
STANDARD STALLS	198 STALLS
COMPACT STALLS	11 STALLS
EV STALLS	55 STALLS
ACCESSIBLE STALLS	7 STALLS
TOTAL AUTO PARKING	271 STALLS
BICYCLE PARKING:	
REQUIRED:	14 REQUIRED
PROVIDED:	14 PROVIDED
LANDSCAPE:	
REQUIRED:	12% / 51,297 SF
PROVIDED:	12.5% / 53,000 SF

ZONING COMPLIANCE TABLE:

Development Standards	Required	Provided	Complies (Y or N)
Minimum Lot Size	50,000 SF	427,472 SF	Y
Maximum Lot Coverage	50%	49.9%	Y
Landscaping	12%	12.5%	Y
Maximum Building Height	150'-0"	47'-0"	Y
Setbacks			
South Building Property Line	30'	79'	Y
East Building Property Line	30'	30'	Y
North Building Property Line	0'	62'	Y
West Building Property Line	0'	120'	Y
Parking	264 Stalls	271 Stalls	Y

GENERAL NOTES:

1. EXISTING CONSTRUCTION SITE DEBRIS TO BE REMOVED.
2. THE SITE CURRENTLY SLOPES +/- 2 %.
3. NO SIGNS ARE PROPOSED WITH THIS APPLICATION PACKAGE.
4. ALL PROPOSED NEW ON-SITE UTILITY SERVICES SHALL BE UNDERGROUNDED.
5. DRIVEWAYS SHALL BE CONSTRUCTED PER CITY STANDARD PLAN.
6. DAMAGED SECTIONS OF CURB & GUTTER ALONG PUBLIC RIGHT OF WAY SHALL BE REPAIRED.
7. "SITE PLAN SHALL MEET ALL ENGINEERING AND NPDES REQUIREMENTS".
8. ALL EXTERIOR LIGHT SHALL BE A 1 FC MIN.
9. ALL BACKFLOW DEVICES SHALL HAVE A SECURE LOCKABLE CAGE AROUND IT.
10. SLOPES GREATER THAN 3:1 WILL REQUIRE JUTE NETTING WITH GROUNDCOVER.
11. ALL OUT SWINGING DOORS TO HAVE NON-REMOVABLE HINGE PINS.



SCALE: 1" = 40'-0" 0' 10' 20' 50' 100'

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INDUSTRY REDEVELOPMENT

17969 RAILROAD ST. INDUSTRY, CA

SCHEMATIC SITE PLAN

MARK	DATE	DESCRIPTION
	4/4/23	CONCEPTUAL SITE PLAN

RGA PROJECT NO:	23038.00
CAD FILE NAME:	23038-00-A1-1P
DRAWN BY:	CS
CHK'D BY:	CS
COPYRIGHT: RGA, OFFICE OF ARCHITECTURAL DESIGN	
SHEET TITLE	

Fig 2

2 Environmental Setting

2.1 Noise and Vibration Characteristics

2.1.1 Noise

Sound may be described in terms of level or amplitude (measured in decibels (dB)), frequency or pitch (measured in hertz (Hz) or cycles per second), and duration (measured in seconds or minutes). The standard unit of measurement of the amplitude of sound is the decibel. Because the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale is used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against low and very high frequencies in a manner approximating the sensitivity of the human ear when exposed to moderate sound levels. Several descriptors of noise (noise metrics) exist to help predict average community reactions to the adverse effects of environmental noise, including traffic-generated noise, on a community. These descriptors include the equivalent noise level over a given period (L_{eq}), the statistical sound level (L_n), the day–night average noise level (L_{dn}), and the community noise equivalent level (CNEL). Each of these descriptors uses units of dBA. Table 1 provides examples of A-weighted noise levels from common sounds. In general, human sound perception is such that a change in sound level of 3 dB is barely noticeable; a change of 5 dB is clearly noticeable; and a change of 10 dB is perceived as doubling or halving of the sound level.

Table 1. Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
—	110	Rock band
Jet flyover at 1,000 feet	100	—
Gas lawn mower at 3 feet	90	—
Diesel truck at 50 feet, at 50 mph	80	Food blender at 3 feet Garbage disposal at 3 feet
Noisy urban area, daytime gas lawn mower at 100 feet	70	Vacuum cleaner at 10 feet
Commercial area Heavy traffic at 300 feet	60	Normal speech at 3 feet
Quiet urban daytime	50	Large business office Dishwasher, next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	30	Library
Quiet rural night time	20	Bedroom at night, concert hall (background)
—	10	Broadcast/recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Notes: dBA = A-weighted decibels; mph = miles per hour
Source: Caltrans 2013.

L_{eq} is a sound energy level averaged over a specified period (typically no less than 15 minutes for environmental studies). L_{eq} is a single numerical value that represents the amount of variable sound energy received by a receptor during a time interval. For example, a 1-hour L_{eq} measurement would represent the average amount of energy contained in all the noise that occurred in that hour. L_{eq} is an effective noise descriptor because of its ability to assess the total time-varying effects of noise on sensitive receptors (see Section 2.2). L_{max} is the greatest sound level measured during a designated time interval or event.

Unlike the L_{eq} metrics, L_{dn} and CNEL metrics always represent 24-hour periods, usually on an annualized basis. L_{dn} and CNEL also differ from L_{eq} because they apply a time-weighted factor designed to emphasize noise events that occur during the evening and nighttime hours (when speech and sleep disturbance is of more concern). "Time weighted" refers to the fact that L_{dn} and CNEL penalize noise that occurs during certain sensitive periods. In the case of CNEL, noise occurring during the daytime (7:00 a.m.–7:00 p.m.) receives no penalty. Noise during the evening (7:00 p.m.–10:00 p.m.) is penalized by adding 5 dB, while nighttime (10:00 p.m.–7:00 a.m.) noise is penalized by adding 10 dB. L_{dn} differs from CNEL in that the daytime period is defined as 7:00 a.m.–10:00 p.m., thus eliminating the evening period. L_{dn} and CNEL are the predominant criteria used to measure roadway noise affecting residential receptors. These two metrics generally differ from one another by no more than 0.5 dB to 1 dB, and as such are often treated as equivalent to one another.

2.1.2 Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration can be a serious concern, causing buildings to shake and rumbling sounds to be heard. In contrast to noise, vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of vibration are trains, buses on rough roads, and construction activities, such as blasting, pile driving, and heavy earthmoving equipment.

Several different methods are used to quantify vibration. Peak particle velocity (PPV), expressed in inches per second (ips), is defined as the maximum instantaneous peak of the vibration signal and is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body and is defined as the average of the squared amplitude of the signal.

The calculation to determine PPV at a given distance is as follows:

$$PPV_{rcvr} = PPV_{ref} * (25/D)^n$$

Where:

PPV_{rcvr} = the peak particle velocity in inches per second of the equipment adjusted for distance (i.e., at the receiver)

PPV_{ref} = the reference peak particle velocity in inches per second at 25 feet

D = the distance from the equipment to the receiver

n = an exponent, for which a value of 1.1 would be consistent with California Department of Transportation (Caltrans) suggestion for class III "hard soils" composed of dense compacted sand or dry consolidated clay.

2.2 Sensitive Receptors

Noise- and vibration-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would be considered noise- and vibration-sensitive and may warrant unique measures for protection from intruding noise.

Sensitive receptors near the Project site are relatively limited. The nearest noise-sensitive land uses consist of residential land uses approximately 1,180 feet south of the Project site and south of the Pomona Freeway. Other nearby land uses include industrial use buildings approximately 200 feet away from the north, east, and west of the Project site.

2.3 Existing Noise Conditions

Noise measurements were conducted near the Project site on August 5th, 2023, to characterize the existing noise levels (Figure 3, Noise Measurement Locations). Table 2 provides the location, date, and time the noise measurements were taken. The noise measurements were taken using a Rion NL-52 sound level meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute standard for a Type 1 (Precision Grade) sound level meter. The accuracy of the sound level meter was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately 5 feet above the ground.

Three short-term noise measurement locations (ST1–ST3) were conducted adjacent to nearby land uses. The measured L_{eq} and maximum noise levels are provided in Table 2. The field noise measurement data sheets are provided in Attachment A. The primary noise sources consisted of traffic on the local roadways; secondary noise sources included distant industrial noise, distant conversations, birds, and leaves rustling. As shown in Table 2, the measured sound levels ranged from 53.0 to 64.2 dBA L_{eq}

Table 2. Measured Noise Levels

Receptors	Location	Date	Time	L_{eq} (dBA)	L_{max} (dBA)
ST1	South of proposed Project site at the edge of 17969 parking lot	8/5/2023	11:58 p.m.–12:23 p.m.	64.2	85.3
ST2	East of proposed Project site, across 1128 Lawson Street	8/5/2023	12:16 p.m.–12:31 p.m.	63.4	80.5
ST3	North of proposed Project site, at 17990 Ajax Circle	8/5/2023	12:36 p.m.–12:50 p.m.	53.0	65.2

Source: Attachment A
Notes: L_{eq} = equivalent continuous sound level (energy-averaged sound level); dBA = A-weighted decibels; L_{max} = maximum sound level during the measurement interval.

3 Regulatory Setting

3.1 Federal

There are no federal noise standards that would directly regulate environmental noise during construction and operation of the Project. The following is provided because guidance summarized herein is used or pertains to the analysis.

Federal Transit Administration

Although no federal regulations are applicable to this Project, guidance and methodologies from the Federal Transit Administration's (FTA's) Transit Noise and Vibration Impact Assessment Manual (FTA 2018) pertaining to construction noise and vibration are used in this analysis. The FTA Manual offers guidance on the estimation of construction noise levels from a construction Project site.

Federal Interagency Committee on Noise

In 1992 the Federal Interagency Committee on Noise (FICON) assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. Although the FICON recommendations were developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to roadway traffic, as detailed in Section 4.1, Thresholds of Significance.

3.2 State

In its Transportation and Construction Vibration Guidance Manual, Caltrans recommends a vibration velocity threshold of 0.2 ips PPV (Caltrans 2020) for assessing annoying vibration impacts to occupants of residential structures. Although this Caltrans guidance is not a regulation, it can serve as a quantified standard in the absence of such limits at the local jurisdictional level. Similarly, thresholds to assess building damage risk due to construction vibration vary with the type of structure and its fragility but tend to range between 0.2 ips and 0.3 ips PPV for typical residential structures (Caltrans 2020).

3.3 Local

City of Industry General Plan Noise Element and Municipal Code

The City of Industry General Plan addresses noise in Section 4.2.6 of its Safety Element (Chapter 4) (City of Industry 2014). Policy S6-2 states that noise and vibration impacts must be addressed through enforcement of the noise ordinance, project and environmental review, and compliance with state and federal standards. The City of Industry has not adopted noise and vibration standards for land use compatibility consideration, but rather uses the County of Los Angeles noise ordinance for environmental noise assessments. Thus, potential noise and vibration impacts were evaluated based on the County of Los Angeles Municipal Code and FTA methodology to determine whether a significant adverse noise impact would result from the construction and operation of the proposed project.

County of Los Angeles Noise Regulations

Section 12.08.440 of the County of Los Angeles Code of Ordinances addresses construction noise restrictions. Construction activity is prohibited between the hours of 7:00 p.m. and 7:00 a.m. Monday through Saturday and all day on Sundays, where the noise would create a disturbance across a residential property line. For single-family residences, that disturbance noise level overnight is defined as greater than 50 dBA (for construction with a duration greater than 10 days). For construction lasting longer than 10 days, the daytime limit for noise exposure at any residential property affected by the construction noise is 60 dBA. For Industrial property, disturbance noise level is defined as 70 dBA anytime of the day (County of Los Angeles 1978).

The Los Angeles County Code (Section 12.08.560) also specifies that operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet (46 meters) from the source if on a public space or public right-of-way, is prohibited. The perception threshold shall be a vibration velocity of 0.01 in/sec over the range of 1 to 100 Hz.

Section 12.08.390 of the County of Los Angeles Code of Ordinances establishes the maximum exterior noise level that may be generated within each of five designated noise zones. The noise zone descriptions and allowable exterior noise limits from LA County Code 12.08.390 are translated into the County Noise Element as Table 11.2 (reproduced here as Table 3).

The Los Angeles County General Plan was adopted by the Board of Supervisors on October 6, 2015. The Noise Element establishes noise generation limits for each land use type and provides noise management policies to protect residents from excessive noise exposure. The County adapted the State of California's overnight policy rate (OPR) Land Use Compatibility for Community Noise Environments Matrix to develop the County's exterior noise standards, as shown in Table 3. By controlling the noise generation from individual properties within a given land use designation (or zone district), all uses should be afforded protection against excessive noise exposure.

Table 3. Los Angeles County Community Noise Criteria (in dBA)

Noise Zone	Land Use of Receptor Property	Time	Std 1	Std 2	Std 3	Std 4	Std 5
			L50	L25	L8.3	L1.7	L0
			(30 min/hr)	(15 min/hr)	(5 min/hr)	(1 min/hr)	(at no time)
I	Noise Sensitive [a]	Anytime	45	50	55	60	65
II	Residential [b]	10:00 p.m.–7:00 a.m.	45	50	55	60	65
		7:00 a.m.–10:00 p.m.	50	55	60	65	70
III	Commercial	10:00 p.m.–7:00 a.m.	55	60	65	70	75
		7:00 a.m.–10:00 p.m.	60	65	70	75	80
IV	Industrial	Anytime	70	75	80	85	90

Source: County of Los Angeles 1978.

Notes: Std = Standard; min = minutes; hr = hour

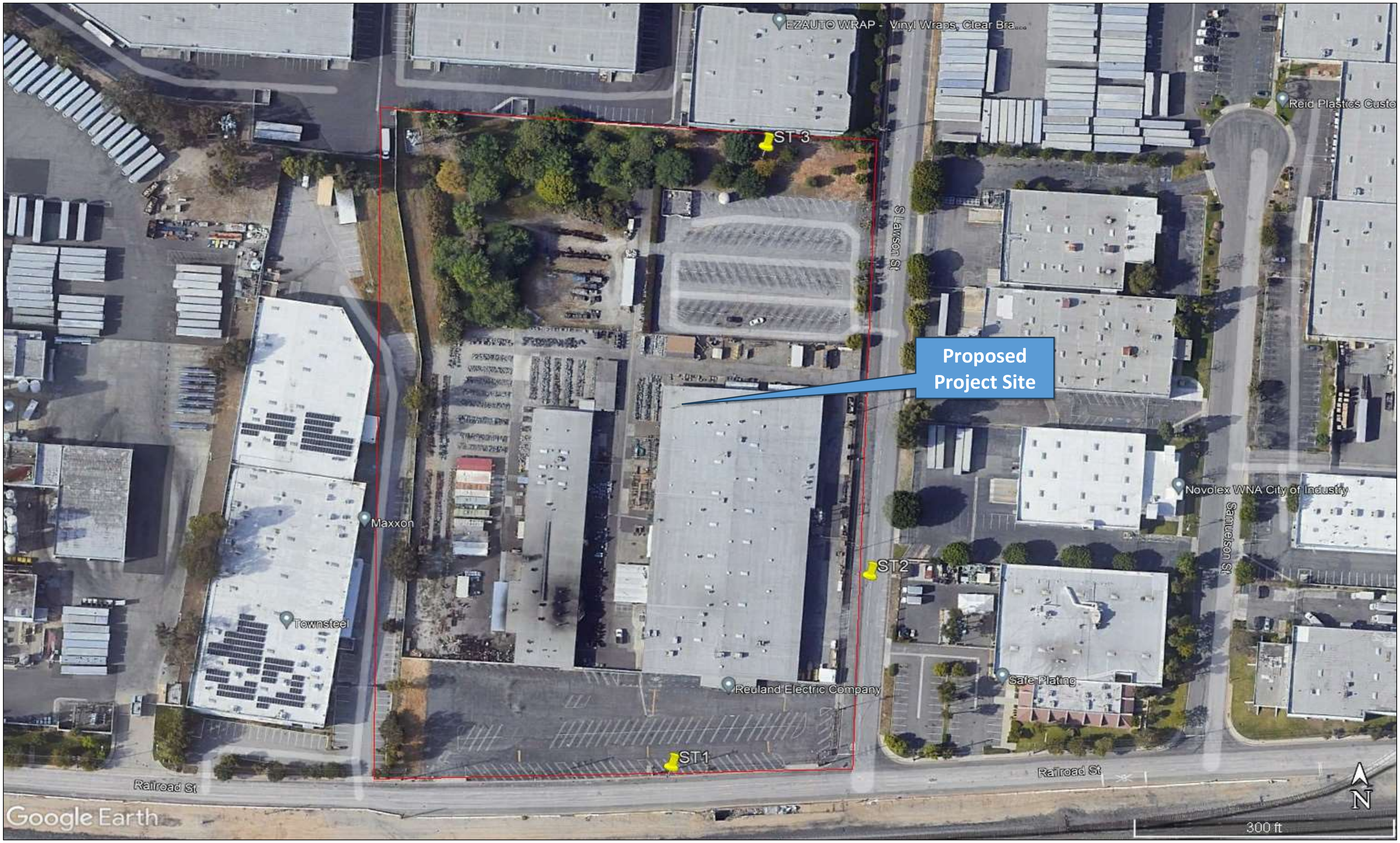
a Noise sensitive zones are designated by the County Health Officer and are required to be clearly identified with posted signs, such as hospital facilities.

b Residential includes single family and multiple family dwellings, but excludes transient lodging

Section 12.08.390 of the County of Los Angeles Code of Ordinances stipulates that if the ambient noise level (as defined by the L_{50} value from an ambient noise measurement) exceeds the Standard 1 noise level allowance, the measured L_{50} becomes the Standard 1 allowance.

The following policies from the County's General Plan Noise Element (Chapter 11) may be applicable to the Proposed Project (County of Los Angeles 2015):

- Policy N 1.1: Utilize land uses to buffer noise-sensitive uses from sources of adverse noise impacts.
- Policy N 1.2: Reduce exposure to noise impacts by promoting land use compatibility.
- Policy N 1.3: Minimize impacts to noise-sensitive land uses by ensuring adequate site design, acoustical construction, and use of barriers, berms, or additional engineering controls through Best Available Technologies (BAT).



SOURCE: Google 2023, Dudek 2023

DUDEK

0 67 134 Feet

FIGURE 3

Noise Measurement Locations

17969 Railroad Street Warehouse Project

4 Noise and Vibration Impacts Assessment

4.1 Thresholds of Significance

The following significance criteria, included in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.), will determine the significance of a noise impact. Impacts related to noise would be significant if the proposed project would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generation of excessive ground-borne vibration or ground-borne noise levels.
- 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, the exposure of people residing or working in the project area to excessive noise levels.

Quantitative thresholds of significance have been established for the purposes of this analysis based on the local polices and regulations described in Section 3.3 as well as those of federal and State agencies and are listed below.

- Construction Noise: During construction, the creation of noise during daytime hours (7 a.m. to 7 p.m) Monday through Saturday at any residential property greater than 60 dBA L_{eq} would be considered significant. Although nighttime construction noise work is not anticipated, a significant impact would occur if the County's threshold for "disturbance noise" (defined as greater than 50 dBA for construction with a duration greater than 10 days) is exceeded during nighttime hours.
- Traffic Noise: Guidance regarding the determination of a substantial permanent increase in transportation noise levels in the project vicinity above existing levels is provided by the 1992 findings of FICON, which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a qualitative measure of the adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment.

  The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn} (and, by extension, CNEL[1]). The changes in noise exposure that are shown in Table 4 are expected to result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to all transportation noise sources.[2]

1 As discussed in Section 2.1, the L_{dn} and CNEL noise metrics are very similar and often used interchangeably.

2 Traffic noise and other transportation noise sources are similar to aircraft/airport noise in that all of these noise sources can and do operate throughout the daytime and nighttime hours. The FICON recommendations using a weighted 24-hour noise metric, in which noise occurring during nighttime hours has a penalty applied to account for the increased sensitivity of persons to noise at night. Additionally, the graduated levels of the FICON guidance for substantial increase account for the diminishing tolerance of the typical person to noise increases as ambient noise levels are increased. Such is the case whether the dominant noise source is aircraft, or some other transportation source.

Table 4. Measures of Substantial Increase for Transportation Noise Sources

Ambient Noise Level Without Project (L_{dn}/CNEL)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels by:
<60 dB	+ 5.0 dB or more
60–65 dB	+ 3.0 dB or more
>65 dB	+ 1.5 dB or more

Source: FICON 1992.

- Project-Related Stationary Noise: A noise impact would be considered significant if predicted noise from typical operation of heating, ventilation and air conditioning (HVAC) and other electro-mechanical systems, as well as noise from parking and loading dock activities exceeds the applicable County of Los Angeles noise standards as detailed in Table 3.
- Construction Vibration: Ground-borne vibration would be considered significant if project construction or operation resulted in peak particle velocity levels of 0.01 in/sec or greater over the range of 1 to 100 Hz at a distance of 150 feet from the source. (Source: County of Los Angeles Code of Ordinances).

4.2 Impact Analysis

4.2.1 Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Noise generated by the Project would include short-term, on-site construction noise; off-site traffic noise along local roadways in the Project Area; and on-site mechanical noise from heating, ventilation, and air conditioning (HVAC) equipment and chillers associated with proposed cold storage areas (assumed to comprise up to 25% of the warehouse space).

Short-Term Construction Impacts

Construction noise and vibration are temporary phenomena. Construction noise and vibration levels vary from hour to hour and day to day, depending on the equipment in use, the operations being performed, and the distance between the source and receptor.

Equipment that would be in use during construction would include, in part, graders, backhoes, concrete saws, rubber-tired dozers, loaders, cranes, forklifts, cement mixers, pavers, rollers, and air compressors. The typical maximum noise levels for various pieces of construction equipment at a distance of 50 feet are presented in Table 5. Note that the equipment noise levels presented in Table 5 are maximum noise levels. Typically, construction equipment operates in alternating cycles of full power and low power, producing average noise levels less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 5. Construction Equipment Maximum Noise Levels

Equipment Type	Typical Equipment (dBA at 50 Feet)
Air compressor	81
Backhoe	85
Concrete pump	82
Concrete vibrator	76
Crane	83
Truck	88
Dozer	87
Generator	78
Loader	84
Paver	88
Pneumatic tools	85
Water pump	76
Power hand saw	78
Shovel	82
Trucks	88

Source: FTA 2018.
Notes: dBA = A-weighted decibels.

The maximum noise levels at 50 feet for typical construction equipment would be 88 dBA for the equipment typically used for this type of development project, although the hourly noise levels would vary. Construction noise in a well-defined area typically attenuates at approximately 6 dB per doubling of distance. Project construction would take place far from existing noise-sensitive uses. Most construction activities associated with the Project would occur at distances of approximately 1,180 feet or more from the nearest residence, which represents activities both near and far from any one receiver, as is typical for construction projects.

A spreadsheet-based version of the Federal Highway Administration's Roadway Construction Noise Model (RCNM) (FHWA 2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land use. (Although the model was funded and promulgated by the Federal Highway Administration, the RCNM is often used for non-roadway projects, because the same types of construction equipment used for roadway projects are often used for other types of construction.) Input variables for the RCNM consist of the receiver/land use types, the equipment type and number of each (e.g., two graders, a loader, a tractor), the duty cycle for each piece of equipment (e.g., percentage of hours the equipment typically works per day), and the distance from the noise-sensitive receiver. The RCNM has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty-cycle values were used for this noise analysis. Table 6 displays construction phases, one-way vehicle trips, equipment used for each phase, and daily hours used.

Table 6. Construction Scenario Assumptions

Construction Phase	One-Way Vehicle Trips			Equipment		
	Average One-Way Worker Trips per Day	Average One-Way Vendor Truck Trips per Day	Average One-Way Haul Truck Trips per Day	Equipment Type	Quantity	Daily Usage Hours
Demolition	16	4	86	Concrete/Industrial Saws	1	8
				Excavators	3	8
				Rubber Tired Dozers	2	8
				Jackhammer	2	8
Site Preparation	18	4	0	Rubber Tired Dozers	3	8
				Tractors/Loaders/Backhoes	4	8
Grading	16	4	76	Scraper	1	7
				Rubber Tired Dozers	3	8
				Flatbed truck	2	7
				Roller	1	7
				All other equipment >5 HP	1	8
Building Construction	70	28	0	Cranes	1	8
				Man lifts	3	8
				Generators Sets	1	8
				Tractors/Loaders/Backhoes	3	8
				Welders	1	8
Paving	16	4	0	Pavers	2	8
				Rollers	2	8
				Cement and Mortar Mixers	1	8
Architectural Coating	14	4	0	Air Compressors	1	8

Using the Federal Highway Administration's RCNM and the provided construction equipment information, the estimated noise levels from the major construction phases were calculated for the nearest noise-sensitive land use, as presented in Table 7. The RCNM inputs and outputs are provided in Attachment B. Using the provided construction information, prediction results are summarized in Table 7 at each of the surrounding noise-sensitive receiver categories for two calculation scenarios as follows:

- Usage of the shortest activity-to-receptor distance for the loudest equipment type and quantity associated with the studied construction phase, with less noisy equipment types at successive distance increments of 100 feet.
- An "acoustic centroid" approach, akin to the FTA general assessment technique for estimating construction noise, whereby all listed equipment for a construction phase is represented by a common location at the geographic center of the studied construction zone or area.

The first of these methods is considered a conservative approach to assess what might be characterized as a peak exposure level, applicable to not more than approximately 10%–15% of the total construction period and when the studied construction activity is taking place with equipment along the property boundary closest to these nearest off-site receivers. The second approach utilizes the acoustic centroid technique to represent a time-averaged location for the phase equipment and activity, thereby yielding average noise levels to represent overall noise exposure as experienced for adjacent receivers over the duration of each construction phase. The quantities and types of equipment per construction phase are the same in each of the two approaches (due primarily to the differences in source-to-receptor distance variables).

As shown in Table 7, typical construction noise levels at the nearest noise-sensitive land use (the residences to the south) are estimated to range from approximately 39 dBA L_{eq} during the architectural coating phase to approximately 53 dBA L_{eq} during the demolition and grading phases. As detailed on the worksheets in Attachment B, this 14 dB range of predicted construction noise levels is due to the intensity of construction activity and expected quantities and types of involved construction equipment. Table 7 and Attachment B worksheets also show construction noise level predictions at distances between the noise-sensitive receptor position and the anticipated nearest boundary associated with a construction phase, which are thus shorter than those with respect to the acoustic centroid for the same phase; however, these scenarios assume that equipment would be operating at a range of distances (because not all equipment for a phase would be operating at the same distance simultaneously) and result in levels that would range from approximately 41 dBA L_{eq} during the architectural coating phase to approximately 54 dBA L_{eq} during the demolition phase.

Table 7 shows that prediction results of both scenarios yield values that are below the County of Los Angeles noise threshold for daytime disturbance noise of 60 dBA L_{eq}. As stated previously, nighttime construction noise is not anticipated for the proposed Project. All noise-generating construction would take place between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday and would not occur on Sundays. The proposed Project would not conduct noisy construction activities between the specified hours or days, and the estimated noise levels would not exceed the County's noise standard of 60 dBA L_{eq}. Therefore, noise from Project construction would be less than significant. No mitigation is required.

Table 7. Construction Noise Model Results Summary

Land Use	Off-site Receptor Location	Distance from Construction Activity to Noise Receptor (feet)	Estimated Construction Noise Levels (dBA)					
			Demolition	Site Preparation	Grading	Building Construction	Paving	Architectural Coating
Residential	South of Project site	Typical Construction Activity /Receiver Distance (1,400 feet)	52.7	49.5	51.6	46.0	45.2	38.9
		Nearest Construction Activity /Receiver Distance (as near as 1,180 feet)	54.4	51.2	53.3	47.7	47.0	40.6

Source: Attachment B

Notes: L_{eq} = equivalent continuous sound level (energy-averaged sound level); dBA = A-weighted decibel.

Long-Term Operational Impacts

Long-term operational noise associated with the proposed Project includes on-site operational noise as well as Project-generated traffic off site. Each of these is addressed below.

On-Site Operational Noise

The completion of the building will add a variety of noise-producing mechanical equipment that include those presented and discussed in the following paragraphs. Most of these noise-producing equipment or sound sources would be considered stationary or limited in mobility to a defined area.

Prediction Method and Parameters

The aggregate noise emission from these outdoor-exposed sound sources has been predicted with the Datakustik CadnaA sound propagation program. CadnaA is a commercially available software program for the calculation, presentation, assessment, and prediction of environmental noise based on algorithms and reference data per International Organization of Standardization (ISO) Standard 9613-2, "Attenuation of Sound During Propagation Outdoors, Part 2: General Method of Calculation" (ISO 1996). The CadnaA computer software allows one to position sources of sound emission in a simulated three-dimensional (3-D) space having heights and footprints consistent with Project architectural plans and elevations. In addition to the above-mentioned sound source inputs and building-block structures that define the three-dimensional sound propagation model space, the following assumptions and parameters are included in this CadnaA-supported stationary noise source assessment:

- Ground effect acoustical absorption coefficient equal to 0.5, which intends to represent an average or blending of ground covers that are characterized largely by hard reflective pavements and existing building surfaces across the Project site and the surroundings;
- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces such as the modeled building masses;
- Off-site residential structures and buildings have not been rendered in the model;
- Calm meteorological conditions (i.e., no wind) with 68 degrees Fahrenheit and 50% relative humidity; and
- All of the modeled noise sources are operating concurrently and continuously for a minimum period of 1 hour.

Outdoor Mechanical Equipment

Based on the available plans and other design information, the proposed Project building would be served by roof-mounted air-conditioning equipment that includes outdoor-exposed packaged air-handling units and air-cooled condensers (ACC) that provide the expected cooling demand (expressed as refrigeration "tonnage") for a building. The following are descriptions of modeled sound area sources. In addition, the Project site proposes a docking station represented by a vertical area source with a line source representing a truck route. Table 8 exhibits modeled sound power level (PWL) data at octave-band center frequency (OBCF) resolution. Detailed information supporting these summary descriptions and quantities appear in Attachment C, along with detailed model input parameters.

Table 8. Modeled Sound Power Levels (PWL) for Stationary Sources (HVAC)

Building	Sound Source	Overall L_{eq} (dBA)	A-Weighted dB at Octave Band Center Frequency (OBCF, Hz)								
			32.5	63	125	250	500	1000	2000	4000	8000
1	Cold Room Refrigeration	95	68	68	81	84	91	87	86	85	79
	Building AHU	93	74	74	86	87	88	85	78	72	67
	Office Air Conditioning	75	48	48	61	65	73	74	66	63	55
	Non-Office Air Conditioning	93	66	66	79	82	89	85	84	83	77

The HVAC reference sound levels were calculated from a combination of inputs that include square footage values for the proposed Project's proposed office spaces, Project applicant response to data requests, and manufacturer sound power level data. For the analysis of noise from HVAC equipment operation, ten air conditioning units were modeled on the rooves of each Project building.

Other Stationary Noise Sources

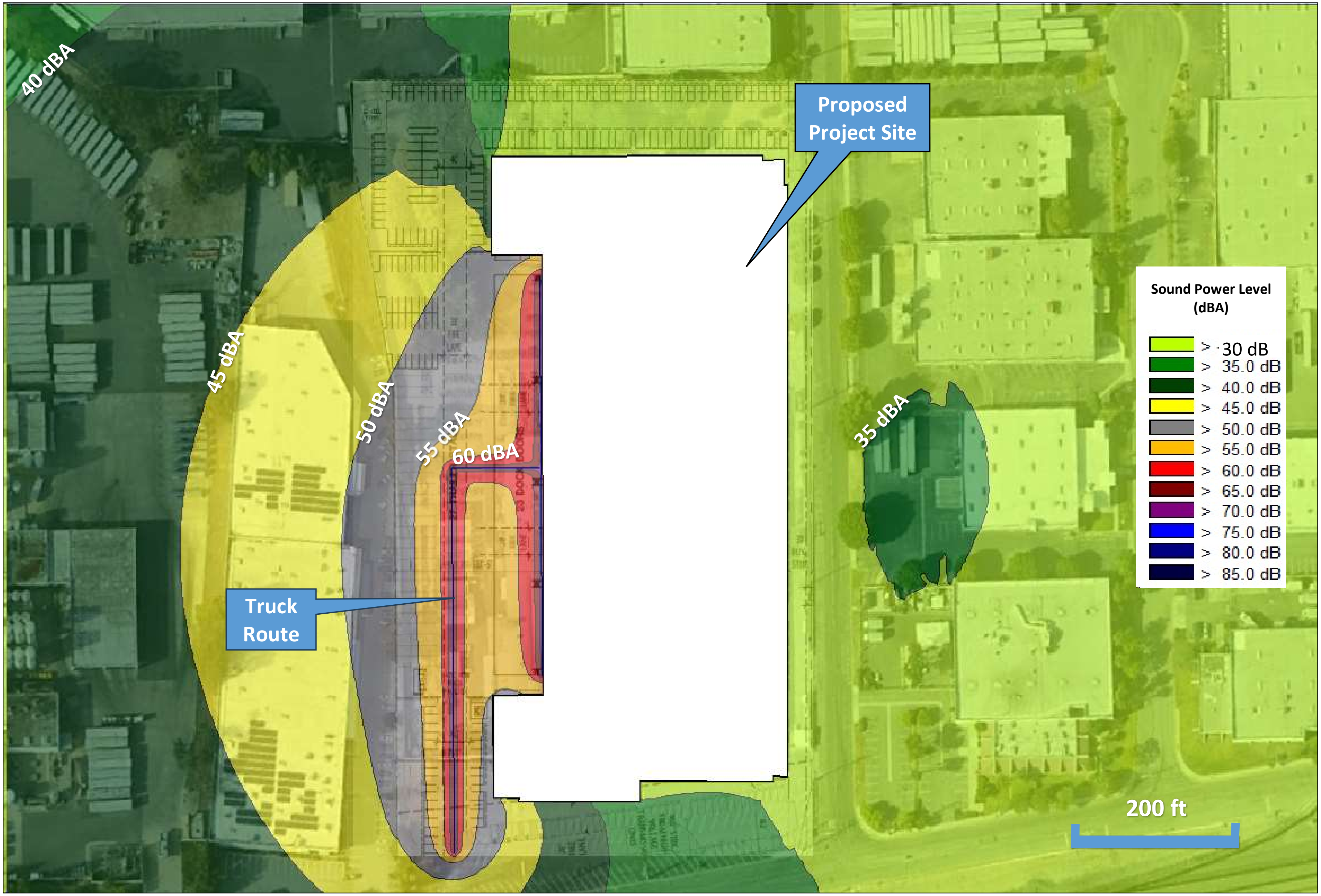
The proposed Project buildings may feature other noise emitters, but their contributions would tend to be sporadic or otherwise occur infrequently and thus be expected to have no greater acoustic contribution to an hourly L_{eq} than the continuous-type HVAC noise studied herein.

Truck Loading Dock / Truck Yard Activity

The proposed Project buildings also feature loading dock areas for the loading and unloading of heavy trucks. Onsite loading dock noise was calculated for a single heavy truck pass by (Salter 2014) and extrapolated based upon the number of heavy trucks entering or exiting the facility during the PM peak hour. Detailed information supporting the calculation of peak hour heavy truck trips can be found in Attachment D.

Stationary Operations Prediction Results

An operational scenario of the proposed Project was modeled that assumes all the HVAC equipment is operating simultaneously for a minimum period of one hour along with peak hour truck movements in the loading dock areas. Figure 4 displays the predicted noise contours associated with aggregate sound propagation from operating HVAC and loading dock sound sources.



SOURCE: Google 2023, Dudek 2023

DUDEK

FIGURE 4

Predicted Onsite Operations Noise Contours

17969 Railroad Street Warehouse Project

Figure 4 illustrates predicted aggregate SPL propagation solely from operation of the proposed Project sound sources as described herein. The color-coded annular bands of SPL are calculated across a field parallel with and five (5) feet above local grade.

Based on the noise level contours appearing in Figure 4, operation noise from the proposed Project is predicted to be up to 53 dBA L_{eq} at the western property line and is therefore expected to comply with the City's 70 dBA L_{eq} threshold for industrial properties.

Off-Site Traffic Noise Exposure

The Project is expected to generate a subtotal of 519 average daily trips to the roadway system, as shown in Table 1 of the Project's Transportation Technical Memorandum. During the afternoon (PM) peak-hour (the highest of the AM and PM peak hours), approximately 55 passenger car equivalent vehicles are estimated to enter or exit the Project site. Due to the unavailability of Average Daily Traffic (ADT) data from the City or County, level of service C volumes were used to predict the change in noise level due to the addition of Project trips. The level of service C volumes used in this analysis were assumed to be 1,290 vehicles per hour for Railroad Street and 1,250 vehicles per hour for Lawson Street per the Transportation Research Board's Highway Capacity Manual (2000). The calculated difference between the existing and existing plus Project volumes is approximately 4%.

The Project would not result in a doubling of trips. Typically, a doubling of the energy of a noise source, such as a doubling of traffic volume (a 100% increase), would increase noise levels by 3 dBA. The calculated difference between the existing traffic noise level and the existing plus Project traffic noise level is approximately 0.17 dBA. Because the Project would not result in a significant increase in traffic on local and regional roadways, the change in traffic noise due to the Project would not be significant[3]. Therefore, impacts associated with off-site Project-generated traffic noise would be less than significant. No mitigation measures are required.

Combined Ambient and Long-Term Operational Noise

The logarithmic summation of the measured ambient noise levels with the predicted long-term operational noise levels are presented in Table 9.

[3] Assuming level of service C traffic for Railroad Street and Lawson Street, a 0.1 dB increase due to Project traffic is predicted for receptors adjacent to the roadways.

Table 9. Measured Noise Levels

Receptors	Measured Ambient L_{eq}	Predicted Stationary Operations L_{eq}	Calculated Traffic Noise L_{eq} Increase	Combined Ambient and Predicted Stationary Operations L_{eq}	Calculated Project Increase Over Ambient L_{eq}
	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)
ST1	64.2	37.8	0.17	64.4	0.2
ST2	63.4	34.1		63.6	0.2
ST3	53.0	32.7		53.2	0.2

Source: Attachment A

Notes: L_{eq} = equivalent continuous sound level (energy-averaged sound level); dBA = A-weighted decibels; L_{max} = maximum sound level during the measurement interval.

As shown in Table 9, the calculated increase over ambient due to the project contribution to the noise environment is approximately 0.2 dBA. As described in Section 2.1.1, an increase of 3 dBA is generally considered to be barely perceptible. Thus, an increase of 0.2. dBA would not be perceptible. Therefore, impacts associated with on-site project-generated long-term operations noise would be **less than significant.** No mitigation measures are required.

4.2.2 Would the project result in the generation of excessive ground-borne vibration or ground-borne noise levels?

Section 2.1.2 provides the ground-borne vibration propagation expression for estimating vibration velocity (in ips PPV) at a receiving offsite structure. The main concern associated with ground-borne vibration is annoyance; however, in extreme cases, vibration can cause damage to buildings, particularly those that are old or otherwise fragile. Some common sources of ground-borne vibration are trains, and construction activities such as blasting, pile-driving, and heavy earth-moving equipment. The primary source of ground-borne vibration occurring as part of the project is construction activity.

According to Caltrans, excavators, earthmovers, and trucks have not exceeded 0.10 inches/second PPV at 10 feet (Caltrans 2020). Since the closest off-site residence is located approximately 1,180 feet away from likely heavy construction equipment, vibration from construction activities at the closest sensitive receiver would not exceed the significance threshold of 0.20 ips PPV.

As such, no building damage would be expected to occur as a result of Project-related vibration during construction or operation and impacts would be **less than significant.** No mitigation measures are required.

4.2.3 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?

No private airstrips exist within two miles of the Project vicinity. The nearest airport is San Gabriel Valley Airport, located approximately 9 miles to the-northwest of the Project site. The Project site is not located within 2 miles of any public airport, nor is it located within the boundaries of any airport land use plans. Therefore, the proposed Project would not expose or result in excessive noise for people residing or working in the Project area, and **no impact** would occur. No mitigation measures are required.

5 Conclusions

In summary, with implementation of standard construction and design techniques and practices, the Project's short- and long-term noise and vibration impacts would be less than significant. The proposed Project was analyzed using the conservative assumption that it may be operational 24 hours per day. Based upon the impacts analysis (Section 4.2), even if operated during nighttime and early morning hours the Project's noise would not exceed applicable standards and would be low relative to existing ambient levels. No mitigation measures are required.

6 References Cited

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Attachment A

Field Noise Measurement Data

Field Noise Measurement Data

Help Desk

FORMS FIELD DATA REPORT

Field Noise Measurement Data

ID	**1706**
Observer(s)	
Other Observer(s)	
erver(s)	
	2023-08-25
email	cwong@dudek.com

Meteorological Conditions

ID	**S1706**
Temp (F)	82
Humidity % (R.H.)	52
Wind	Calm
Wind Speed (MPH)	5
Wind Direction	North East
Sky	Clear

Instrument and Calibrator Information

ID	**S1706**
Instrument Name List	(ENC) Rion NL-52
Instrument Name	(ENC) Rion NL-52
Instrument Name Lookup Key	(ENC) Rion NL-52
Manufacturer	Rion
Model	NL-52
Serial Number	553896
Calibrator Name	(ENC) LD CAL150
Calibrator Name	(ENC) LD CAL150
Calibrator Name Lookup Key	(ENC) LD CAL150
Calibrator Manufacturer	Larson Davis
Calibrator Model	LD CAL150
Calibrator Serial #	5152
Pre-Test (dBA SPL)	94
Post-Test (dBA SPL)	94
Windscreen	Yes
Weighting?	A-WTD
Slow/Fast?	Slow

Monitoring

ID	**S1706**
Record #	1
Site ID	970
	Latitude:33.996861,

Site Location	Longitude:-117.912255, Altitude:134.508266, Speed:0.000000, Horizontal Accuracy:3.535534, Vertical Accuracy:3.000000, Time:08/25/2023 11:58:45 PDT
Site Location Lat/Long	33.996861, -117.912255
Begin (Time)	11:58:00
End (Time)	12:13:00
Leq	64.2
Lmax	85.3
	51.2
r Lx?	L90, L50, L10
	52.4
	53.8
L10	61
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Primary Noise Source	Traffic
Other Noise Sources (Background)	Distant Aircraft, Distant Industrial, Distant Traffic
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

Source Info and Traffic Counts

ID	S6944
Number of Lanes	2
Number of Lanes	2
Lane Width (feet)	10
Roadway Width (feet)	20
Roadway Width (m)	6.1
Distance to Roadway (feet)	6
Distance to Roadway (m)	1.8
Distance Measured to Centerline or Edge of Pavement?	Edge of Pavement
Estimated Vehicle Speed (MPH)	0
Estimated Vehicle Speed (km/h)	0

Traffic Counts

ID	S1637
Vehicle Count Summary	A 12, MT 0, HT 2, B 0, MC 0
Select Method for Recording Count Duration	Enter Manually
Count Duration Text	
Counting Both Directions?	Yes
Count Duration (minutes)	0
Vehicle Count Tally	
Select Method for Vehicle Counts	Enter Manually
Autos	0
Number of Vehicles - Autos	12

Medium Trucks	0
Number of Vehicles - Medium Trucks	0
Heavy Trucks	0
Number of Vehicles - Heavy Trucks	2
Buses	0
Number of Vehicles - Buses	0
Motorcycles	0
Number of Vehicles - Motorcyles	0

Description / Photos

S6944

Site Photos

ID	**S5228**
Photo	
Comments / Description	Facing southeast
ID	**S5228**
Photo	

Comments / Description	Facing west
ID	**S5228**

Comments / Description	Facing east

Monitoring

ID	**S1706**
Record #	2
Site ID	0971
Site Location	Latitude:33.997723, Longitude:-117.911386, Altitude:131.980565, Speed:0.168319, Horizontal Accuracy:4.784186, Vertical Accuracy:3.306977, Time:08/25/2023 12:17:06 PDT
Site Location Lat/Long	33.997723, -117.911386
Begin (Time)	12:16:00
End (Time)	12:31:00
Leq	63.4
Lmax	80.5
Lmin	53.7
Other Lx?	L90, L50, L10
L90	54.9
L50	56.3
L10	66.1
Other Lx (Specify Metric)	L
Primary Noise Source	Industrial
Primary Noise Source	Industrial
Other Noise Sources (Background)	Distant Industrial, Distant Traffic
Other Noise Sources Additional Description	Distant railway
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as	Yes

previously noted? Yes

Description / Photos

ID **S6947**

Site Photos

ID **S5231**

Photo

Comments / Description Facing south

ID **S5231**

Photo

Comments / Description Facing north

ID **S5231**

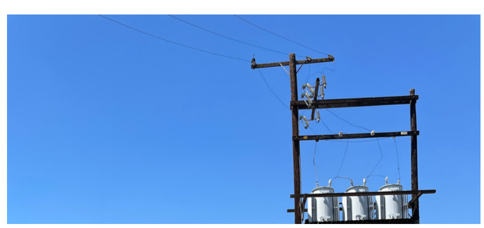


Photo	
ments / Description	Facing west
	S5231
Photo	
Comments / Description	Facing east

Monitoring

ID	**S1706**
Record #	3
Site ID	0972
Site Location	Latitude:33.998843, Longitude:-117.911599, Altitude:138.471645, Speed:3.050000, Horizontal Accuracy:15.633299, Vertical Accuracy:24.000000, Time:08/25/2023 12:50:57 PDT
Site Location Lat/Long	33.998843, -117.911599
Begin (Time)	12:36:00
End (Time)	12:50:00
Leq	53
Lmax	65.2
Lmin	48.8
Other Lx?	L90, L50, L10
L90	49.6

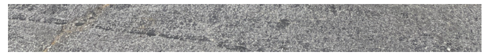
L50	51.6
L10	54.9
Other Lx (Specify Metric)	L
Primary Noise Source	Industrial
Primary Noise Source	Industrial
Other Noise Sources (Background)	Birds, Distant Industrial, Rustling Leaves
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as ously noted?	Yes

Description / Photos

S6951

Site Photos

ID	**S5235**
Photo	
Comments / Description	Facing southeast
ID	**S5235**
Photo	



Comments / Description	Facing north
ID	**S5235**

o

Attachment B

Construction Noise Modeling Input/Output Files

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 1
grnd abs? 1

magnitude of threshold (dBA) = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
1	Demolition	Concrete Saw	1	20	90	1400	0		54.9	8	480	48
		excavator	3	40	81	1400	0		45.9	8	480	47
		dozer	2	40	82	1400	0		46.9	8	480	46
		jackhammer	2	20	85	1400	0		49.9	8	480	46
											Total Aggregate Noise Exposure from Demolition Phase	**52.7**
3	Site Preperation	dozer	3	40	82	1400	0		46.9	8	480	48
		backhoe	4	40	78	1400	0		42.9	8	480	45
											Total Aggregate Noise Exposure from Site Preperation Phase	**49.5**
4	Grading	Scraper	1	40	84	1400	0		48.9	7	420	44
		dozer	3	40	82	1400	0		46.9	8	480	48
		All Other Equipment > 5 HP	1	50	85	1400	0		49.9	8	480	47
		flat bed truck	2	40	74	1400			38.9	7	420	37
		roller	1	20	80	1400			44.9	7	420	37
											Total Aggregate Noise Exposure from Grading Phase	**51.6**
5	Building construction	Crane	1	16	81	1400	0		45.9	8	480	38
		man lift	3	20	75	1400	0		39.9	8	480	38
		generator	1	50	72	1400	0		36.9	8	480	34
		backhoe	3	40	78	1400	0		42.9	8	480	44
		Welder / Torch	1	40	73	1400	0		37.9	8	480	34
											Total Aggregate Noise Exposure from Building construction Phase	**46.0**
6	Paving	paver	2	50	77	1400	0		41.9	6	360	41
		roller	2	20	80	1400	0		44.9	8	480	41
		concrete mixer truck	1	40	79	1400	0		43.9	8	480	40
											Total Aggregate Noise Exposure from Paving Phase	**45.2**
8	Architectual Coating	compressor (air)	1	40	78	1400	0		42.9	8	480	39
											Total Aggregate Noise Exposure from Phase	**38.9**

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 1
grnd abs? 1

magnitude of threshold (dBA) = 80
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
1	Demolition	Concrete Saw	1	20	90	1180	0		56.6	8	480	50
		excavator	3	40	81	1180	0		47.6	8	480	48
		dozer	2	40	82	1180	0		48.6	8	480	48
		jackhammer	2	20	85	1180	0		51.6	8	480	48
									Total Aggregate Noise Exposure from Demolition Phase			**54.4**
3	Site Preperation	dozer	3	40	82	1180	0		48.6	8	480	49
		backhoe	4	40	78	1180	0		44.6	8	480	47
									Total Aggregate Noise Exposure from Site Preperation Phase			**51.2**
4	Grading	Scraper	1	40	84	1180	0		50.6	7	420	46
		dozer	3	40	82	1180	0		48.6	8	480	49
		All Other Equipment > 5 HP	1	50	85	1180	0		51.6	8	480	49
		flat bed truck	2	40	74	1180			40.6	7	420	39
		roller	1	20	80	1180			46.6	7	420	39
									Total Aggregate Noise Exposure from Grading Phase			**53.3**
5	Building construction	Crane	1	16	81	1180	0		47.6	8	480	40
		man lift	3	20	75	1180	0		41.6	8	480	39
		generator	1	50	72	1180	0		38.6	8	480	36
		backhoe	3	40	78	1180	0		44.6	8	480	45
		Welder / Torch	1	40	73	1180	0		39.6	8	480	36
									Total Aggregate Noise Exposure from Building construction Phase			**47.7**
6	Paving	paver	2	50	77	1180	0		43.6	6	360	42
		roller	2	20	80	1180	0		46.6	8	480	43
		concrete mixer truck	1	40	79	1180	0		45.6	8	480	42
									Total Aggregate Noise Exposure from Paving Phase			**47.0**
8	Architectual Coating	compressor (air)	1	40	78	1180	0		44.6	8	480	41
									Total Aggregate Noise Exposure from Phase			**40.6**

Attachment C

Stationary Operations Calculations and CadnaA Input

AHUs (plenum-

Building Minimum Ventilation (no cold room)

A-weighting adjustments	26	13	9	3	0	-1	-1	1
average of values for the two fan diameter ranges, per Guyer (Table 12) plug	40	40	38	34	29	23	19	16
average of values for the two fan diameter ranges, per Guyer (Table 12) tube	47	44	46	47	44	45	38	35
per Guyer (Table 12, presumed based on Bies & Hansen ENC) prop	46	48	55	53	52	48	43	38

percent GSF reserved for "cold room": 25

Tag	Building	GSF	Avail. SF	Height (ft)	Avg. minutes to	Volume (ft3)	CFM	m^2	comparable facility function	Pressure (iwg)	Pressure (Pa)	Q (m^3/s)	fantype = plug, tube, or prop	A-weighted PWL (for CadnaA inputs) 63	125	250	500	1000	2000	4000	8000	OA dB
return air fans in building rooftop AHUs:																						
NB	North Bldg (Bldg. 3)	206500	154875	47	8	7279125	909890.625	14396	warehouse	2	500	429	plug	74	86	87	88	85	78	72	67	**93**

*from 2-10 minute range, per Loren Cook's "Engineering Cookbook", 1999 edition, p. 41

	63	125	250	500	1000	2000	4000	8000
fan or AHU cabinet liner/interior attenuation (excludes inlet/outlet PWL split, already in calcs above:	2	3	4	5	6	8	10	10

ACCs (air-cooled chillers on rooftops):

Building Interior Comfort (non-office)

with or without sound insulation? (enter Y/N): Y

unweighted PWL (dB) per OCBF (Hz) at full load (100%)

	tons	LWA	63	125	250	500	1000	2000	4000	8000
Bryant BH16-018 (no sound blanket)	1.5	67	66.2	66.2	63.9	63.8	62.3	58.4	56.4	50.3
Bryant BH16-024 (no sound blanket)	2	71	65	65	63.7	63.4	68.5	64.7	58.7	52.8
Bryant BH16-036 (no sound blanket)	3	71	68.2	68.2	66.4	67.5	68.4	59.6	58.2	52.4
Bryant BH16-048 (no sound blanket)	4	71	68.4	68.4	67.7	69.7	67.6	59.4	56.4	50
Bryant BH16-060 (no sound blanket)	5	69	63.7	63.7	65.4	67.3	64.9	58.3	56.2	51.9
Daikin AGZ-E 30 (w/out sound insulation)	30	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 40 (w/out sound insulation)	40	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 50 (w/out sound insulation)	50	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 60 (w/out sound insulation)	60	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 70 (w/out sound insulation)	70	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 80 (w/out sound insulation)	80	88	88	85	87	86	81	81	77	71
Daikin AGZ-E 90 (w/out sound insulation)	90	88	88	87	87	86	83	80	77	71
Daikin AGZ-E 120 (w/out sound insulation)	120	89	91	85	88	86	82	81	79	72
Daikin AGZ-E 240 (w/out sound insulation)	241	94	94	88	91	90	91	84	82	75

percent of GSF reserved for "cold room":	25
percent of remaining GSF reserved for "office space":	4.52
actual percent of GSF occupied:	75

Phase	Building Tag	GSF	Avail. SF	comparable facility function	Avg. GSF per ton*	tons of refrig.	Approx. Qty. of ACCs	tons per ACC	Approx. Total PWL (dBA)
NB	North Bldg (Bldg. 3)	206500	110906	Theatre (i.e., room volume is tall and large)	400	277.3	7	40	**93**

unweighted PWL (dB) per OCBF (Hz) at full load (100%)

		63	125	250	500	1000	2000	4000	8000
		92	92	91	92	85	83	82	78
A-weighting adjustments		26	13	9	3	0	-1	-1	1
	93	66	79	82	89	85	84	83	77

*based upon "lo" value per Loren Cook's "Engineering Cookbook", 1999 edition, pp. 59-60

ACCs (air-cooled chillers on rooftops):

Building Office Interior Comfort

with or without sound insulation? (enter Y/N): Y

	tons	LWA	63	125	250	500	1000	2000	4000	8000
			unweighted PWL (dB) per OCBF (Hz) at full load (100%)							
Bryant BH16-018 (no sound blanket)	1.5	67	66.2	66.2	63.9	63.8	62.3	58.4	56.4	50.3
Bryant BH16-024 (no sound blanket)	2	71	65	65	63.7	63.4	68.5	64.7	58.7	52.8
Bryant BH16-036 (no sound blanket)	3	71	68.2	68.2	66.4	67.5	68.4	59.6	58.2	52.4
Bryant BH16-048 (no sound blanket)	4	71	68.4	68.4	67.7	69.7	67.6	59.4	56.4	50
Bryant BH16-060 (no sound blanket)	5	69	63.7	63.7	65.4	67.3	64.9	58.3	56.2	51.9
Daikin AGZ-E 30 (w/out sound insulation)	30	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 40 (w/out sound insulation)	40	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 50 (w/out sound insulation)	50	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 60 (w/out sound insulation)	60	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 70 (w/out sound insulation)	70	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 80 (w/out sound insulation)	80	88	88	85	87	86	81	81	77	71
Daikin AGZ-E 90 (w/out sound insulation)	90	88	88	87	87	86	83	80	77	71
Daikin AGZ-E 120 (w/out sound insulation)	120	89	91	85	88	86	82	81	79	72
Daikin AGZ-E 240 (w/out sound insulation)	241	94	94	88	91	90	91	84	82	75

percent of GSF reserved for "cold room": 25

percent of remaining GSF reserved for "office space": 4.52

Phase	Building Tag	GSF	Avail. SF	comparable facility function	Avg. GSF per ton*	tons of refrig.	Approx. Qty. of ACCs	tons per ACC	Approx. Total PWL (dBA)	63	125	250	500	1000	2000	4000	8000
										unweighted PWL (dB) per OCBF (Hz) at full load (100%)							
NB	North Bldg (Bldg. 3)	206500	7000.35	office bldg., avg. of low and high	360	19.4	4	5	**77**	74	74	74	76	74	65	62	56
									A-weighting adjustments	26	13	9	3	0	-1	-1	1
							4	5	**75**	48	61	65	73	74	66	63	55

*based upon "lo" value per Loren Cook's "Engineering Cookbook", 1999 edition, pp. 59-60

ACCs (air-cooled chillers on rooftops):

Cold Room Refrigeration

with or without sound insulation? (enter Y/N): Y

	tons	LWA	unweighted PWL (dB) per OCBF (Hz) at full load (100%) 63	125	250	500	1000	2000	4000	8000
Bryant BH16-018 (no sound blanket)	1.5	67	66.2	66.2	63.9	63.8	62.3	58.4	56.4	50.3
Bryant BH16-024 (no sound blanket)	2	71	65	65	63.7	63.4	68.5	64.7	58.7	52.8
Bryant BH16-036 (no sound blanket)	3	71	68.2	68.2	66.4	67.5	68.4	59.6	58.2	52.4
Bryant BH16-048 (no sound blanket)	4	71	68.4	68.4	67.7	69.7	67.6	59.4	56.4	50
Bryant BH16-060 (no sound blanket)	5	69	63.7	63.7	65.4	67.3	64.9	58.3	56.2	51.9
Daikin AGZ-E 30 (w/out sound insulation)	30	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 40 (w/out sound insulation)	40	85	84	84	83	84	77	75	74	70
Daikin AGZ-E 50 (w/out sound insulation)	50	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 60 (w/out sound insulation)	60	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 70 (w/out sound insulation)	70	87	85	85	85	86	80	77	75	70
Daikin AGZ-E 80 (w/out sound insulation)	80	88	88	85	87	86	81	81	77	71
Daikin AGZ-E 90 (w/out sound insulation)	90	88	88	87	87	86	83	80	77	71
Daikin AGZ-E 120 (w/out sound insulation)	120	89	91	85	88	86	82	81	79	72
Daikin AGZ-E 240 (w/out sound insulation)	241	94	94	88	91	90	91	84	82	75

percent GSF reserved for "cold room": 25

Phase	Building Tag	GSF	Avail. SF	Avail. m^2	height (m)	floor, walls, and roof area (m^2)	temp. In (c)	temp. Out (c)	U ($W/m^2.K$)	% of cooling load = transmission (5-15)*	Total Load (kWh)	ton-hours of refrig.	Approx. Qty. of ACCs	tons per ACC	Approx. Total PWL (dBA)	unweighted PWL (dB) per OCBF (Hz) at full load (100%) 63	125	250	500	1000	2000	4000	8000
NB	North Bldg (Bldg. 3)	206500	51625	4798.6	14.3	13559.5	1.0	40.0	0.28	10	1480.7	421.0	10	42	**95**	94	94	93	94	87	85	84	80
															A-weighting adjustments	26	13	9	3	0	-1	-1	1
													10	42	**95**	68	81	84	91	87	86	85	79

*https://theengineeringmindset.com/cooling-load-calculation-cold-room/

Name	ID	Type	Oktave Spectrum (dB)											Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
cold room refrigeratior	CRR	Lw		94.0	94.0	94.0	93.0	94.0	87.0	85.0	84.0	80.0	94.6	101.2	
Office interior	BOI	Lw		74.0	74.0	74.0	74.0	76.0	74.0	65.0	62.0	56.0	77.4	82.3	
Non office comfort	NOI	Lw		92.0	92.0	92.0	91.0	92.0	85.0	83.0	82.0	78.0	92.6	99.2	
Building AHU	AHU	Lw	A	74.0	74.0	86.0	87.0	88.0	85.0	78.0	72.0	67.0	93.0	114.0	

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Correction			Sound Reduction		Attenuation	C
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min
Main Office			77.4	77.4	77.4	51.7	51.7	51.7	Lw	BOI		0.0	0.0	0.0				
Secondary Office			77.4	77.4	77.4	53.5	53.5	53.5	Lw	BOI		0.0	0.0	0.0				
Warehouse			98.2	98.2	98.2	54.4	54.4	54.4	Lw	AHU++NOI++CRR		0.0	0.0	0.0				

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time		
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)
Door Route			93.0	93.0	93.0	70.2	70.2	70.2	Lw	74		0.0	0.0	0.0			-9.5			

Name	M.	ID	Result. PWL			Result. PWL''			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time		
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)
Dock doors			93.0	93.0	93.0	66.0	66.0	66.0	Lw	74		0.0	0.0	0.0			-9.5			

Name	M.	ID	RB	Residents	Absorption	Height	
						Begin	
						(ft)	
Bldg			x	0		47.00	r

Attachment D

Peak Hour Truck Trip Calculations

from CMS "Midpoint at 237" March 27, 2014 noise study		dBA	dist (feet)	at 50'	Dudek time estimate minutes per hour	hourly Leq	source	PWL
truck passby		68	30	63.6	2	48.8	**traveling on lot**	**83.5**
truck airbrakes		72	25	66.0	0.05	35.2	at dock	69.8
truck backup alarm		79	30	74.6	0.05	43.8	at dock	78.4
idle before shutoff		70	25	64.0	1	46.2	at dock	80.9
truck engine ignition + airbrakes		71	25	65.0	0.05	34.2	at dock	68.8
truck accelerating from stop		74	25	68.0	0.05	37.2	at dock	71.8
							total at dock	**83.5**

dock door quantities from 2/16/22 siteplan		peak hour trips*	split**	log add***
Building 1	docks	9		
	27		NA	9.5

This is the sound power calculated for a single truck pass-by (i.e., low speed travel onsite) along a linear sound source route between the loading dock and the facility intersection at Stoddard. Attenuate the selected Sound Level (local) "MDEE" sound power value to get to this

This is the sound power calculated for a single truck at the loading dock. Attenuate the selected Sound Level (local) "MDEE" sound power value to get to this quantity.

*(3 and 4-axle trucks)
**(based on dock ratio for the building)
***(to single truck noise levels)

11/17/22, MCS: assume this is the *daytime* operations scenario, when peak-hour truck trips would occur.

For this project, I assumed that the peak hour trips would be approximately 12% of the total; this was derived by taking the total daily trips and dividing it by the peak hour trips