Noise and Vibration Impact Assessment Technical Report

HIGH-CUBE WAREHOUSE / DISTRIBUTION CENTER BLOOMINGTON, CA

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1.0 INTRODUCTION AND SUMMARY

This Noise and Vibration Impact Assessment Technical Report assesses potential operational and construction noise and vibration impacts associated with the proposed High-Cube Warehouse / Distribution Center project. The applicant proposes to entitle the construction and operation of a high-cube warehouse building on an approximate 28.95-acre project site at the northwest and northeast corners of Cedar Avenue and Orange Street in the Bloomington area of unincorporated San Bernardino County, California. The project vicinity is shown on Figure 1.

A project site reconnaissance was performed to identify noise-sensitive receptors and to conduct sound level measurements. Noise-sensitive land uses potentially affected by the project consist of single-family residential and school properties across Orange Street to the south of the project site. Sound level measurements were conducted to estimate existing ambient noise levels near noise-sensitive locations in the project vicinity.

Onsite operational noise levels at property lines of nearby noise-sensitive receptors were estimated using the Cadna/A noise model, using operational parameters obtained from the applicant and a conceptual mechanical layout. Operational noise impacts as a result of the project would be less than significant.

Offsite traffic noise level increases were estimated using the Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5. Traffic volumes were obtained from the project traffic impact study. Traffic noise impacts as a result of the project would be less than significant.

Operation of the project would generate vibration levels below the allowable limit at vibration-sensitive receptors in the project area. Operational vibration impacts as a result of the project would be less than significant.

Construction of the project would generate a temporary increase in noise at noise-sensitive receptors in the project area. Construction noise impacts as a result of the project would be less than significant.

Construction of the project would generate vibration levels below the allowable limit at vibration-sensitive receptors in the project area. Construction vibration impacts as a result of the project would be less than significant.

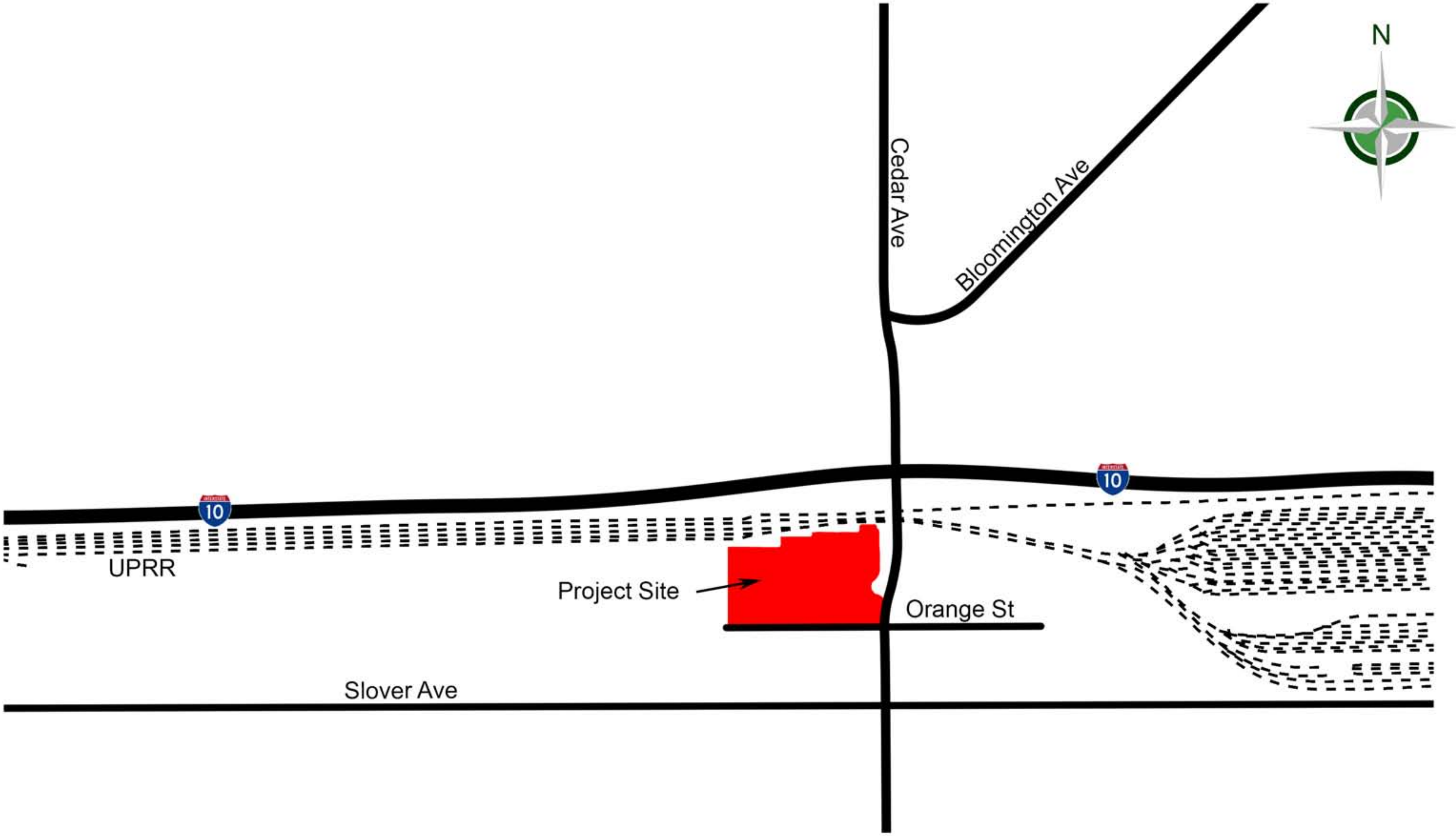

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FIGURE 1
Vicinity Map

1.1 PROJECT DESCRIPTION

1.1.1 Project Location

The project site is comprised of one parcel located northwest of the intersection of Cedar Avenue at Orange Street in the community of Bloomington in unincorporated San Bernardino County, California. The parcel (Assessor Parcel Map [APN] 0253-171-16) is located northwest of the intersection of Cedar Avenue at Orange Street. The parcel is generally bounded to the north by vacant property, Union Pacific Railroad (UPRR) tracks, and Interstate 10 (I-10); to the south by Orange Street; to the east by Cedar Place and Cedar Avenue; and to the west by Linden Avenue.

1.1.2 Existing Site Conditions

The project site is relatively flat, with a slope of less than two percent, and ranges in elevation from north to south from approximately 1,090 feet above mean sea level (msl) to approximately 1,077 feet above msl. The project site is vacant, with no structures.

1.1.3 Surrounding Land Uses

The following land uses border the project site:

- North: Fenced parcel with manufactured building owned by the West San Bernardino County Water District facility; Union Pacific Rail Company railroad tracks; I-10 is located north of the railroad property.
- South: Orange Avenue is the southern boundary. To the south of Orange Avenue are single-family residences. The property on the southwest corner of the intersection of Cedar Avenue at Orange Street is vacant.
- East: Cedar Place, which is an unmaintained road that provides access to the West San Bernardino County Water District property. Cedar Avenue is east of Cedar Place.
- West: Freight transfer facility with three industrial buildings and a proposed high-cube warehouse.

1.1.4 Project Description

As proposed, the project would allow for the construction and operation of a 371,000(±)-sf high-cube warehouse building on an approximate 19.14-acre project site northwest of the intersection of Cedar Avenue at Orange Street. The project site parcel is zoned Community Industrial (IC).

High-cube warehouses or distribution centers are primarily for the storage and/or consolidation of manufactured goods (and to a lesser extent, raw materials) prior to their distribution to retail locations or other warehouses. These facilities are generally very large buildings characterized by a small employment count due to a high level of automation, and truck activities are frequently outside of the peak hour of the adjacent street system.

The building is a rectangular structure (approximately 1,022 feet long east-to-west and 354 feet wide north-to-south) and is symmetrical along both the north/south and east/west axes. The building is a cross-dock facility with vertical-lift dock-high roll up doors. Truck maneuvering and staging would be located along the north and south sides of the building to allow access for the loading and unloading of products from trucks/trailers. The warehouse doors and staging areas are accessible to trucks through ingress/egress drive aisles. There would be up to 84 dock doors: 35 dock doors on the northern side of the warehouse and 49 dock doors on the southern side of the warehouse. There would be two 5,000-sf offices, at the southeast and southwest corners of the building. The building would be a concrete tilt-up structure with a height of approximately 42-46 feet above grade.

With respect to operations, the analysis presented in this report assumes that the facility could operate seven days per week in two eight-hour shifts. The estimated number of employees would be 100.

Access into and out of the project site would be provided from four driveways: (1) Cedar Place via Cedar Street; (2) Orange Street; and (3 and 4) Linden Avenue. Both auto and truck traffic would be permitted at these locations. 161 automobile parking spaces would be provided.

All truck and staging areas would be screened with 14-foot-high concrete tilt-up walls to obscure the visibility of these areas from public view.

Total grading for the project is estimated to be approximately 89,000 cubic yards (cy) of raw cut and 75,000 cy of raw fill. Accounting for over-excavation, shrinkage, and subsidence, the combined properties are expected to balance.

Construction is expected to begin in December 2015. The expected duration of construction is 8 months. The project would be developed in one phase. The expected project opening year is 2016.

1.2 NOISE DESCRIPTORS

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and that interferes with or disrupts normal activities. Human environments are characterized by a generally consistent noise level which varies with each area. This is called ambient noise. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, perceived importance of the noise and its appropriateness in the setting, time of day and type of activity during which the noise occurs, sensitivity of the individual, and change from ambient conditions.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and intensity. Frequency describes the sound’s pitch and is measured in cycles per second, or hertz (Hz), whereas intensity describes the sound’s loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above about 120 dB begin to be felt inside the human ear as discomfort and eventually as pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. The average person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness; this relation holds true for sounds of any loudness. Sound levels of typical noise sources and environments are provided in Table 1.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. A simple rule is useful, however, in dealing with sound levels: if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example, 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB.

The normal human ear can detect sounds that range in frequency from about 20 Hz to 20,000 Hz. However, all sounds in this wide range of frequencies are not heard equally well by the human ear, which is most sensitive to frequencies in the range of 1,000 Hz to 4,000 Hz. This frequency dependence can be taken into account by applying a correction to each frequency range to approximate the sensitivity of the human ear within each range. This is called A-weighting and is commonly used in measurements of community environmental noise. The A-weighted sound pressure level (abbreviated as dBA) is the sound level with the "A-weighting" frequency correction. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Community noise levels usually change continuously during the day. The equivalent continuous A-weighted sound pressure level (Leq) is normally used to describe community noise. The Leq is the energy-averaged A-weighted sound level during a measured time interval, and is equal to the level of a continuous steady sound containing the same total acoustical energy over the averaging time period as the actual time-varying sound. Additionally, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the Lmax and Lmin indicators, which represent the root-mean-square maximum and minimum noise levels obtained during the measurement interval. The Lmin value obtained for a particular monitoring location is often called the "acoustic floor" for that location.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10, 50, and 90 percent of a stated time, respectively. Sound levels associated with L10 typically describe transient or short-term events, whereas levels associated with L90 describe the steady-state (or most prevalent) noise conditions.

Another sound measure known as the Day-Night Sound Level (Ldn) is an adjusted average A-weighted sound level for a 24-hour day. It is calculated by adding a 10-dBA adjustment to sound levels during nighttime hours (10:00 p.m. to 7:00 a.m.). This adjustment compensates for the increased sensitivity to noise during the typically quieter nighttime hours. The Ldn is used by agencies such as the U.S. Department of Housing and Urban Development (HUD) and the U.S. Environmental Protection Agency (EPA) to evaluate land-use compatibility with regard to noise.

Another sound measure known as the Community Noise Equivalent Level (CNEL) is an adjusted average A-weighted sound level for a 24-hour day. It is calculated by adding a 5-dB adjustment to sound levels during evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dB adjustment to sound levels during nighttime hours (10:00 p.m. to 7:00 a.m.). These adjustments compensate for the increased sensitivity to noise during the typically quieter evening and nighttime hours. The CNEL is used by the State of California and San Bernardino County (County) to evaluate land-use compatibility with regard to noise. Generally, the Ldn is approximately 1 dBA less than the CNEL.

The sound power level is a distance-independent measure of a noise source’s energy.

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

Noise Source (at Given Distance)	Noise Environment	A-Weighted Sound Level	Human Judgment of Noise Loudness (Relative to Reference Loudness of 70 Decibels*)
Military Jet Takeoff with Afterburner (50 ft)	Carrier Flight Deck	140 Decibels	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)	Higher Limit of Urban Ambient Sound	80	2 times as loud
Passenger Car, 65 mph (25 ft) Living Room Stereo (15 ft) Vacuum Cleaner (10 ft)		70	Reference Loudness **Moderately Loud**
Normal Conversation (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**
		10	1/64 as loud
		0	1/128 as loud **Threshold of Hearing**

Source: Compiled by dBF Associates, Inc.

1.3 VIBRATION DESCRIPTORS

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of input excitation. Input excitation, generally in the form of an applied force or displacement, is the mechanism required to start some type of vibratory response. Sources of earthborne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or manmade (explosions, machinery, traffic, construction equipment, etc.).

Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous peak of the vibration signal in inches per second. Table 2 illustrates common vibration sources and the human and structural responses to ground-borne vibration.

Table 2. Reaction of People and Damage to Buildings at Various Continuous Vibration Levels

Vibration Level (in/sec PPV)*	Human Reaction	Effect on Buildings
0.006 - 0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of “architectural” damage to normal buildings
0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of “architectural” damage to normal dwelling - houses with plastered walls and ceilings Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize “architectural” damage
0.40 - 0.60	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause “architectural” damage and possibly minor structural damage.

*The vibration levels are based on peak particle velocity in the vertical direction. Where human reactions are concerned, the value is at the point at which the person is situated. For buildings, the value refers to the ground motion. No allowance is included for the amplifying effect, if any, of structural components.

Source: Transportation-Related Earthborne Vibrations, Technical Advisory TAV-96-01-R9201, June 13, 1996

2.0 IMPACT CRITERIA

This section presents the guidelines, criteria, and regulations used to assess noise and vibration impacts associated with the proposed project. Section (§) 83.01.080 and §83.01.090 of the San Bernardino County Development Code (SBCDC) govern noise and vibration, respectively, within unincorporated areas of San Bernardino County.

San Bernardino County does not define thresholds of significance for traffic noise increases when existing traffic noise levels currently exceed the standard. Sound level variations of up to 3 dBA are not detectable by the typical human ear. Therefore, when existing traffic noise levels exceed the standard, an increase of 3 dBA CNEL directly attributable to the project is considered significant.

2.1 SAN BERNARDINO COUNTY DEVELOPMENT CODE

§83.01.080 Noise

This Section establishes standards concerning acceptable noise levels for both noise-sensitive land uses and for noise-generating land uses.

(a) Noise Measurement. Noise shall be measured:

(1) At the property line of the nearest site that is occupied by, and/or zoned or designated to allow the development of noise-sensitive land uses;

(2) With a sound level meter that meets the standards of the American National Standards Institute (ANSI § SI4 1979, Type 1 or Type 2);

(3) Using the "A" weighted sound pressure level scale in decibels (ref. pressure = 20 micronewtons per meter squared). The unit of measure shall be designated as dB(A).

(b) Noise Impacted Areas. Areas within the County shall be designated as "noise-impacted" if exposed to existing or projected future exterior noise levels from mobile or stationary sources exceeding the standards listed in Subdivision (d) (Noise Standards for Stationary Noise Sources) and Subdivision (e) (Noise Standards for Adjacent Mobile Noise Sources), below. New development of residential or other noise-sensitive land uses shall not be allowed in noise-impacted areas unless effective mitigation measures are incorporated into the project design to reduce noise levels to these standards. Noise-sensitive land uses shall include residential uses, schools, hospitals, nursing homes, religious institutions, libraries, and similar uses.

(c) Noise Standards for Stationary Noise Sources.

(1) Noise Standards. Table 83-2 (Noise Standards for Stationary Noise Sources) describes the noise standard for emanations from a stationary noise source, as it affects adjacent properties:

Table 83-2 **Noise Standards for Stationary Noise Sources**		
Affected Land Uses (Receiving Noise)	7 am-10 pm Leq	10 pm-7 am Leq
Residential	55 dB(A)	45 dB(A)
Professional Services	55 dB(A)	55 dB(A)
Other Commercial	60 dB(A)	60 dB(A)
Industrial	70 dB(A)	70 dB(A)
Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically 1, 8 or 24 hours.		
dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.		
Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10 pm to 7 am). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.		

(2) Noise Limit Categories. No person shall operate or cause to be operated a source of sound at a location or allow the creation of noise on property owned, leased, occupied, or otherwise controlled by the person, which causes the noise level, when measured on another property, either incorporated or unincorporated, to exceed any one of the following:

(A) The noise standard for the receiving land use as specified in Subdivision (b) (Noise-Impacted Areas), above, for a cumulative period of more than 30 minutes in any hour.

(B) The noise standard plus five dB(A) for a cumulative period of more than 15 minutes in any hour.

(C) The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour.

(D) The noise standard plus 15 dB(A) for a cumulative period of more than one minute in any hour.

(E) The noise standard plus 20 dB(A) for any period of time.

(d) Noise Standards for Adjacent Mobile Noise Sources. Noise from mobile sources may affect adjacent properties adversely. When it does, the noise shall be mitigated for any new development to a level that shall not exceed the standards described in the following Table 83-3 (Noise Standards for Adjacent Mobile Noise Sources).

Table 83-3 Noise Standards for Adjacent Mobile Noise Sources			
Land Use		Ldn (or CNEL) dB(A)	
Categories	Uses	Interior [(1)]	Exterior [(2)]
Residential	Single and multi-family, duplex, mobile homes	45	60 [(3)]
Commercial	Hotel, motel, transient housing	45	60 [(3)]
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65

Notes:

(1) The indoor environment shall exclude bathrooms, kitchens, toilets, closets and corridors.

(2) The outdoor environment shall be limited to:

- Hospital/office building patios
- Hotel and motel recreation areas
- Mobile home parks
- Multi-family private patios or balconies
- Park picnic areas
- Private yard of single-family dwellings
- School playgrounds

(3) An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dB(A) (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation.

CNEL = (Community Noise Equivalent Level). The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and 10 decibels to sound levels in the night from 10 p.m. to 7 a.m.

(e) Increases in Allowable Noise Levels. If the measured ambient level exceeds any of the first four noise limit categories in Subdivision (d)(2), above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category in Subdivision (d)(2), above, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

(f) Reductions in Allowable Noise Levels. If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in Table 83-2 (Noise Standards for Stationary Noise Sources) shall be reduced by five dB(A).

(g) Exempt Noise. The following sources of noise shall be exempt from the regulations of this Section:

(1) Motor vehicles not under the control of the commercial or industrial use.

(2) Emergency equipment, vehicles, and devices.

(3) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

(h) Noise Standards for Other Structures. All other structures shall be sound attenuated against the combined input of all present and projected exterior noise to not exceed the criteria.

Table 83-4
Noise Standards for Other Structures

Typical Uses	12-Hour Equivalent Sound Level (Interior) in dBA Ldn
Educational, institutions, libraries, meeting facilities, etc.	45
General office, reception, etc.	50
Retail stores, restaurants, etc.	55
Other areas for manufacturing, assembly, testing, warehousing, etc.	65

In addition, the average of the maximum levels on the loudest of intrusive sounds occurring during a 24-hour period shall not exceed 65 dBA interior.

Adopted Ordinance 4011 (2007); Amended Ordinance 4067 (2009); Amended Ordinance 4245 (2014)

§83.01.090 Vibration

(a) Vibration standard. No ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to two-tenths (0.2) inches per second [in/sec] measured at or beyond the lot line.

(b) Vibration measurement. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity, or acceleration. Readings shall be made at points of maximum vibration along any lot line next to a parcel within a residential, commercial and industrial land use-zoning district.

(c) Exempt vibrations. The following sources of vibration shall be exempt from the regulations of this Section.

(1) Motor vehicles not under the control of the subject use.

(2) Temporary construction, maintenance, repair, or demolition activities between 7:00 a.m. and 7:00 p.m., except Sundays and Federal holidays.

Adopted Ordinance 4011 (2007); Amended Ordinance 4067 (2009)

3.0 EXISTING NOISE ENVIRONMENT

Many land uses are considered sensitive to noise. Noise-sensitive receptors are land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise, such as residential dwellings, transient lodging (hotels/motels), dormitories, hospitals, educational facilities, and libraries. Industrial and commercial land uses are generally not considered sensitive to noise. The existing sound level at any given location depends on the distance to a roadway, proximity to commercial and neighborhood noise sources, and intervening structures and topography.

Noise-sensitive land uses potentially affected by the project consist of 14 single-family residential properties across Orange Street to the south and southwest (10432 Linden Avenue, 10404 & 10407 Orchard Street, and 18509, 18519, 18527, 18537, 18551, 18599, 18613, 18623, 18633, 18639, & 18661 Orange Street), the CJUSD facility and the Bloomington Middle School / Bloomington Junior High School / Slover Mountain High School campus across Orange Street to the south and southeast, and along project access roadways.

Non-noise-sensitive land uses adjacent to the project site include: UPRR tracks, I-10, and the Water District facility to the north, northeast, and northwest; the vacant land to the east; and the freight transfer facility to the west. The project site and all adjacent properties are in unincorporated San Bernardino County.

Noise sources in the project area consist of vehicular traffic on I-10, Cedar Avenue, and Orange Street, and UPRR traffic. Primary project access roadways would include Valley Boulevard, Orange Street, Slover Avenue, and Cedar Street.

The largest closest operational airports to the project site are the San Bernardino International Airport to the east and the LA/Ontario International Airport to the west. The project site is located outside the 60 dBA CNEL noise contours of both airports. No airport-related noise sources affect the project site or surrounding properties.

3.1 SOUND LEVEL MEASUREMENTS

An ambient noise level survey was conducted on Tuesday, December 23, 2014 to estimate the existing noise environment near noise-sensitive areas within the project area. Sound measurement locations (MLs) were selected near single-family residential land uses and/or project boundaries. Three attended short-term (20-minute) measurements were conducted during the daytime period (7:00 a.m. – 7:00 p.m.).

The data collection device was a Larson-Davis Model 820 American National Standards Institute (ANSI) Integrating Sound Level Meter (SLM). The meter was field-calibrated with a Larson Davis Model CAL200 acoustic calibrator. The meter was set for “slow” time response and A-weighting for all measurements. The microphone was equipped with a windscreen and placed five feet above the ground to simulate the average height of the human ear. Weather conditions during the measurements were approximately 75°F, calm wind, and clear skies. The results of the measurements are summarized in Table 3 and correspond to the locations depicted on Figure 2.

Noise sources observed during the measurements included vehicular traffic on Cedar Avenue and Orange Street, UPRR traffic, wind through vegetation, birds, and occasional domestic activity.

Table 3. Sound Level Measurements (dBA)

Measurement	Location	Time	Leq	Lmin	Lmax	L10	L50	L90
ML1	South side of project site Across from 10407 Orange Street	9:00 a.m. – 9:20 a.m.	64.9	58.8	77.4	67.8	62.7	60.6
ML2	Field northwest of school campus Southeast of project site	9:30 a.m. – 9:50 a.m.	67.3	60.1	80.3	70.3	62.9	61.3
ML3	Northeast corner of Cedar Avenue and Orange Street Across from CJUSD facility	10:00 a.m. – 10:20 a.m.	70.8	60.9	80.9	73.2	67.8	64.9

Notes:

All measurements conducted on Wednesday, October 15, 2014.

Traffic on Orange Street during ML1: 36 cars, 9 medium trucks, and 4 heavy trucks.
Traffic on Orange Street during ML2: 27 cars, 4 medium trucks, and 12 heavy trucks.
Traffic on Cedar Avenue during ML3: 375 cars, 29 medium trucks, 20 heavy trucks, and 3 buses.

All sound level measurements were in accordance with ISO 1996-1, -2, and -3. The accuracy of the equipment is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology (NIST).

High Cube Warehouse/Distribution Center - Bloomington, CA
Noise and Vibration Impact Assessment

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FIGURE 2

Sound Level Measurement Locations

4.0 IMPACTS

4.1 SIGNIFICANCE CRITERIA

The SBCDC standards for stationary noise sources affecting school land uses are unclear. For the purposes of the operational portion of this analysis, the three-building CJUSD facility at the southwest corner of Orange Street and Cedar Avenue was evaluated as a Professional Services land use, and the school campus between the CJUSD facility and Larch Avenue was evaluated as a residential land use. For the purposes of the offsite traffic portion of this analysis, both the CJUSD facility and the school campus were considered institutional land uses.

The proposed project could have a significant effect with respect to noise or vibration if:

- Operational noise levels at an offsite residential or school campus property line exceed 55 dBA Leq between 7:00 a.m. and 10:00 p.m. or 45 dBA Leq between 10:00 p.m. and 7:00 a.m.
- Operational noise levels at a CJUSD facility property line exceed 55 dBA Leq at any time.
- Operational noise levels at a commercial property line exceed 60 dBA Leq at any time.
- Operational noise levels at a CJUSD facility property line exceed 70 dBA Leq at any time.
- Construction activities occur outside of the County's allowable construction hours – between 7:00 a.m. and 7:00 p.m. – or on a Sunday or a Federal holiday.
- Project-generated traffic increases the noise level at a residential land use to 60 dBA CNEL or above, and/or by 3 dBA CNEL.
- Project-generated traffic increases the noise level at an institutional land use to 65 dBA CNEL or above, and/or by 3 dBA CNEL.
- Vibration levels from construction occurring outside of the County's allowable construction hours – between 7:00 a.m. and 7:00 p.m. – or on a Sunday or a Federal holiday exceed 0.2 in/sec peak particle velocity (PPV) at a project property line.
- Operational vibration levels exceed 0.2 in/sec PPV at a project property line.

4.2 OPERATION

4.2.1 Onsite Operational Noise

The Datakustik Cadna/A industrial noise prediction model was used to estimate noise levels from noise sources on the project site, which are expected to include vehicular traffic and mechanical equipment. The locations of the project building were imported from the site plan [HPA 2014]. The mechanical equipment was positioned according to a conceptual mechanical layout based on a similar facility; refer to Figure 3 for details. The project is not expected to include exterior trash compactors. The assumptions made for source input into the noise model are detailed below.

Onsite project traffic would primarily consist of trucks in the trailer parking yards. All project trucks were assumed to be heavy trucks. The project building would be equipped with 86 dock doors (49 on the south side and 35 on the north side). The project would generate a daily truck volume of 125 trucks [Hall & Foreman 2015] During the highest (P.M.) peak hour, the project would generate an hourly truck volume of 9 trucks. During a typical nighttime hour, based on the remainder of daily non-peak-hour trucks distributed over a 16-hour (two 8-hour shifts) work day, the project is expected to generate an hourly truck volume of 8 trucks.

Heavy truck traffic at 15 mph generates an hourly noise level of approximately 64.3 dBA Leq(h) at a distance of 50 feet from a frequency of one truck per minute (46.5 dBA Leq(h) from one truck per hour) [FHWA 1978]. Onsite vehicles were treated as areas of moving point sources. It was assumed that an average truck would operate on site for a period of 5 minutes.

The project is expected to include up to one exterior emergency generator. The generator is expected to be ground-mounted at the west end of the south trailer parking yard. The generator is expected to be a 750kw Cummins Model DQCB (or similar), housed in a Cummins Quiet Site II Second Stage enclosure (or similar). This generator configuration is approximately 7 feet in height and produces 74 dBA at 7 meters (23 feet). The generator was treated as a stationary point source and was assumed to run for a standard testing duration of one hour during daytime hours.

The project building would be approximately 42-49 feet in height. Rooftop mechanical equipment is expected to consist of two make-up air handling units (MUHs), two office rooftop package units (RTUs), 4 supply fans (SFs), and 4 exhaust fans (EFs). Each MUH was assumed to be a 10-horsepower (hp) Greenheck Model DGX-120-H32 (or similar), which is approximately 4 feet in height and produces a sound power level of 78 dBA. Each office RTU was assumed to be a 20-ton Carrier Model 48A3D020 (or similar), which is approximately 3 feet in height and produces a sound power level of 78 dBA. Each SF was assumed to be a 7-hp Cook HXFL (or similar), which is approximately 3.5 feet in height and produces a sound power level of 76 dBA. Each EF was assumed to be a 5-hp Cook LXUL (or similar), which is approximately 4.25 feet in height and produces a sound power level of 79 dBA. Rooftop mechanical equipment was treated as stationary point sources and was assumed to be constantly operational.

Onsite operational noise levels at various points along offsite property lines would range from approximately 39 dBA Leq at the northwest property line corner to approximately 56 dBA Leq at the north property line. Refer to Figure 3 for details.

The properties adjacent to the south and southeast of the project site are currently developed as single-family residences and school facilities, respectively. The project operational noise levels at the south offsite property lines would be as high as 53 dBA Leq between 7:00 a.m. and 10:00 p.m. / 44 dBA Leq between 10:00 p.m. and 7:00 a.m, The project operational noise level at the south offsite residential property lines would not exceed the San Bernardino County unmitigated property line noise limits of 55 dBA Leq between 7:00 a.m. and 10:00 p.m. / 45 dBA Leq between 10:00 p.m. and 7:00 a.m. The project operational noise level at the south offsite school property lines would not exceed the San Bernardino County unmitigated property line noise limits of 55 dBA Leq at any time.

The properties adjacent to the north, east, and west of the project site are commercial / industrial land uses. The project operational noise level at the north, east, and west offsite property lines would be as high as 56 dBA Leq. The project operational noise level at the north, east and west offsite property lines not exceed 60 dBA Leq at any time. The project operational noise level at the commercial offsite property lines would not exceed the San Bernardino County unmitigated property line noise limits of 60 dBA Leq at any time. The project operational noise level at the industrial offsite property lines would not exceed the San Bernardino County unmitigated property line noise limits of 70 dBA Leq at any time.

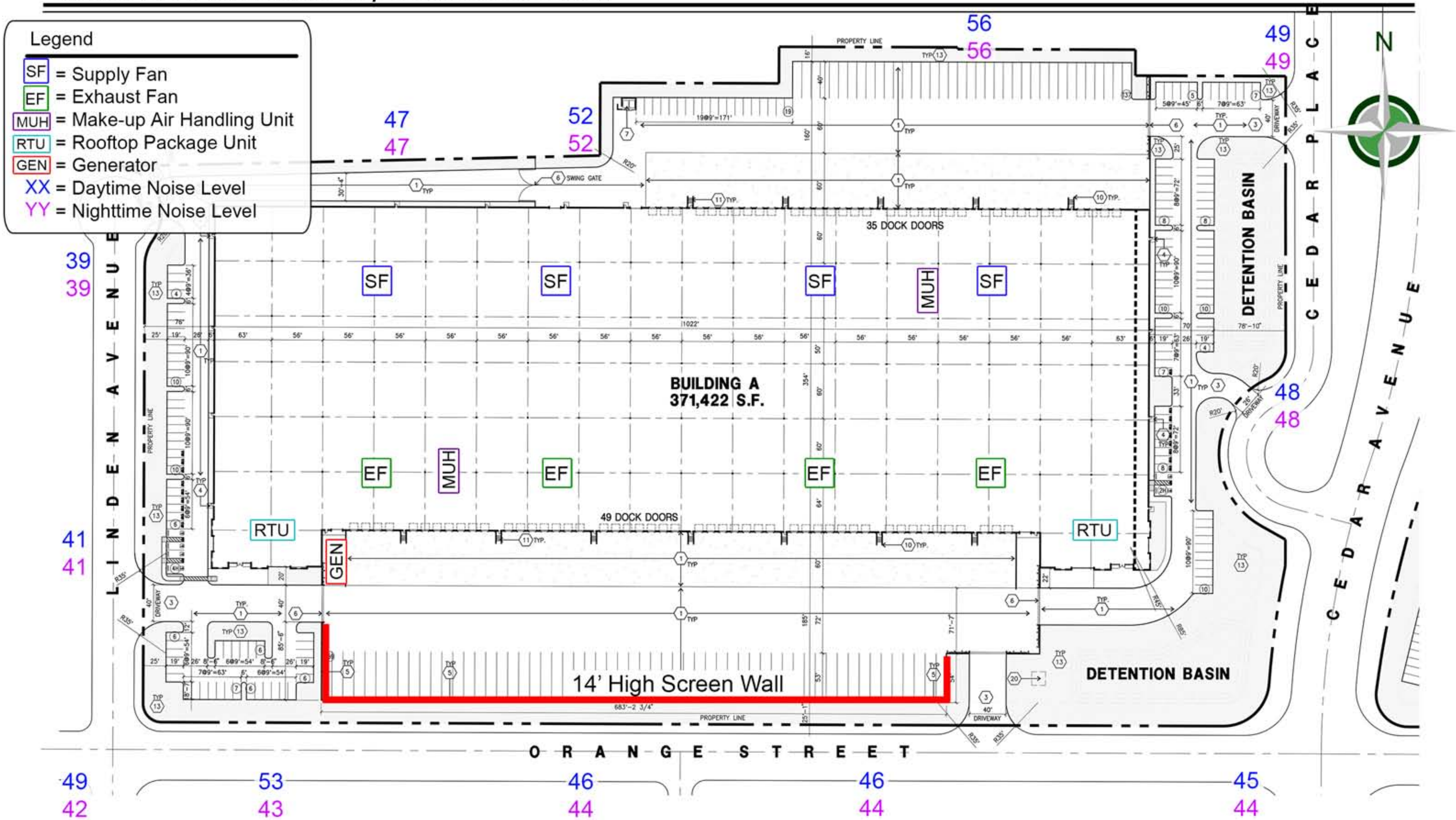

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FIGURE 3

Conceptual Mechanical Layout / Project-Generated Noise Levels (Leq)

4.2.2 Offsite Traffic Noise

An analysis was conducted of the project's effect on traffic noise conditions. Without-project traffic noise levels were compared to with-project traffic noise levels. Acoustical calculations were performed using the FHWA TNM version 2.5 to estimate sound levels at a general reference distance of 50 feet from the centerline of the nearest roadway. The modeling effort considered the peak-hour traffic volume, average estimated vehicle speed, and estimated vehicle mix, i.e., percentage of cars, medium (2-axle) trucks, and heavy (3+axle) trucks.

Sound levels caused by line sources (i.e., variable or moving sound sources such as traffic) generally decrease at a rate of 3.0 to 4.5 dBA when the distance from the road is doubled, depending on the ground surface hardness between the source and the receiving property. The model assumed "hard soil" propagation conditions, which corresponds to a drop-off rate of approximately 3 dBA per doubling of distance. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures (walls and buildings), barriers, and topography. The noise attenuating effects of changes in elevation, topography, and intervening structures were not included in the model. Therefore, the modeling effort is considered a worst-case representation of the roadway noise.

The existing and project-generated peak-hour traffic volumes on project access roadway segments were generated from turning movements or roadway segment volumes presented in the traffic impact study (TIS) [Hall & Foreman 2015]. The PM volumes were generally greater than AM volumes; therefore, AM peak-hour turning movements were used for the analysis. Average speeds were obtained from an aerial photography review; where not available, speeds were estimated based on field observations. The average existing vehicle mix of 9% medium trucks and 7% heavy trucks on project access roadways was estimated from aggregation of classification count data conducted during the site visit. The project vehicle mix would be 80% automobiles and 20% trucks. It was assumed that all project trucks would be heavy trucks.

Table 4 shows the vehicle speeds, existing and project-generated peak-hour traffic modeled on each roadway segment. Table 5 shows traffic noise levels, without and with the project, respectively.

Existing traffic noise levels along most project roadway segments currently exceed the standard. Project-generated traffic would increase noise levels along project roadway segments by up to 1 dBA. All project-generated traffic noise increases would be lower than the applicable thresholds of significance. The impact is less than significant.

Table 4. Modeled Vehicle Speeds and P.M. Peak-Hour Volumes

Roadway	Segment	Speed	Existing	Project-Generated	
				Autos	Trucks
Valley Boulevard	West of Cedar Avenue	40 mph	3,655	10	3
	East of Cedar Avenue	40 mph	2,815	10	3
Orange Street	West of Project Driveway	25 mph*	550	30	10
	Project Driveway – Cedar Avenue	25 mph*	550	30	8
	East of Cedar Avenue	25 mph*	175	0	0
Slover Avenue	West of Linden Avenue	50 mph	1,065	10	3
	Linden Avenue – Cedar Avenue	50 mph	780	0	0
	East of Cedar Avenue	50 mph	560	10	3
Linden Avenue	North of Slover Avenue	35 mph*	385	0	0
	South of Slover Avenue	35 mph*	340	0	0
Cedar Avenue	North of Valley Boulevard	40 mph	2,945	10	3
	Valley Boulevard – I-10 Westbound Ramps	40 mph	4,415	30	10
	I-10 Eastbound Ramps – Cedar Place	40 mph	2,850	30	8
	Cedar Place – Orange Street	40 mph	2,850	30	8
	Orange Street – Slover Avenue	40 mph	3,360	20	7
	South of Slover Avenue	45 mph	2,110	10	3

Notes:

* estimated speed

Table 5. Traffic-Related Noise Levels along Project Roadways (dBA CNEL)

Roadway	Segment	Existing	Existing + Project	Project-Generated Noise Increase	Threshold of Significance	Adjacent Noise-Sensitive Use?	Impact?
Valley Boulevard	West of Cedar Avenue	75	75	+ 0	60 / + 3	Yes	No
	East of Cedar Avenue	74	74	+ 0	60 / + 3	Yes	No
Orange Street	West of Project Driveway	65	66	+ 1	60 / + 3	Yes	No
	Project Driveway – Cedar Avenue	70	71	+ 1	60 / + 3	Yes	No
	East of Cedar Avenue	70	70	+ 0	65 / + 3	Yes	No
Slover Avenue	West of Linden Avenue	72	72	+ 0	60 / + 3	Yes	No
	Linden Avenue – Cedar Avenue	71	71	+ 0	60 / + 3	Yes	No
	East of Cedar Avenue	69	69	+ 0	60 / + 3	Yes	No
Linden Avenue	North of Slover Avenue	66	66	+ 0	60 / + 3	Yes	No
	South of Slover Avenue	64	64	+ 0	60 / + 3	Yes	No
Cedar Avenue	North of Valley Boulevard	74	74	+ 0	60 / + 3	Yes	No
	Valley Boulevard – I-10 Westbound Ramps	76	76	+ 0	None	No	No
	I-10 Eastbound Ramps – Cedar Place	74	74	+ 0	None	No	No
	Cedar Place – Orange Street	74	74	+ 0	None	No	No
	Orange Street – Slover Avenue	74	74	+ 0	60 / + 3	Yes	No
	South of Slover Avenue	73	73	+ 0	60 / + 3	Yes	No

Notes:
All noise levels are reported at 50 feet from centerlines of roadways.

4.2.3 Operational Vibration

Vibration associated with operation of the project would be generated by vehicular traffic and mechanical equipment operation.

Vehicles traveling on a smooth pavement surface are rarely, if ever, the source of perceptible ground vibration. All vehicles on the project site would have rubber tires and suspension systems that isolate vibration from the ground, and would generally travel at a maximum speed of approximately 10 miles per hour. All vehicular traffic would operate over 25 feet from vibration-sensitive land uses. Vibration is expected to be consistent with the existing condition, and would be negligible.

All mechanical equipment would be located over 100 feet from vibration-sensitive land uses. Groundborne vibration levels resulting from mechanical equipment are dependent of the design of the equipment. All ground-mounted mechanical equipment would be installed using vibration-dampening resilient isolators designed to ensure that vibration levels would be lower than 0.2 in/sec PPV at project property lines adjacent to vibration-sensitive land uses.

No operational significant vibration impacts would be expected.

4.3 CONSTRUCTION

Noise and vibration levels associated with the construction phase of the project were estimated based on information from the project developer for construction equipment requirements and schedule. It was assumed that construction of the project would require approximately 8 months to complete. The initial phase of construction would involve fine grading of the site, along with site development activities, including construction of internal roadways which involves trenching and paving activities. Following site preparation activities, the project would include construction of buildings, including office and warehousing space. Construction of the buildings would require the following phases: site development (fine grading, trenching, and paving), building construction, architectural coatings application, and paving associated with buildings.

Fine grading is expected to produce the highest construction noise and vibration levels. Grading is estimated to require two to three motor graders, two to three dozers, one excavator, three scrapers, and one water truck. All construction activity would occur between 7:00 a.m. and 7:00 p.m. Monday through Sunday; no construction activity would occur on a Federal holiday.

4.3.1 Construction Noise

Project construction would result in a temporary increase in noise levels in the project vicinity. Construction noise varies depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. Typical noise sources and noise levels associated with site grading are shown in Figure 4.

Project construction would occur only during the hours and days allowed by San Bernardino County. Project construction activities would comply with SBCDC §83.01.080.

4.3.2 Construction Vibration

Because project construction is temporary and would occur during the hours and days allowed by San Bernardino County, vibration generated by construction of this project is exempt from regulation per SBCDC §83.01.090(C)(2). Typical vibration levels associated with project construction equipment are presented in Table 6.

Table 6. Construction Equipment Vibration Source Levels

Equipment	PPV at 25 feet
Grader	0.11 in/sec
Large Bulldozer	0.089 in/sec
Small Bulldozer	0.003 in/sec
Excavator	0.11 in/sec
Loaded Truck	0.076 in/sec
Scraper	0.11 in/sec
Front-End Loader	0.089 in/sec

Source: FTA 2006

In addition, project construction would not require pile driving.

Project construction would occur only during the hours and days allowed by San Bernardino County. Project construction activities would comply with SBCDC §83.01.090.

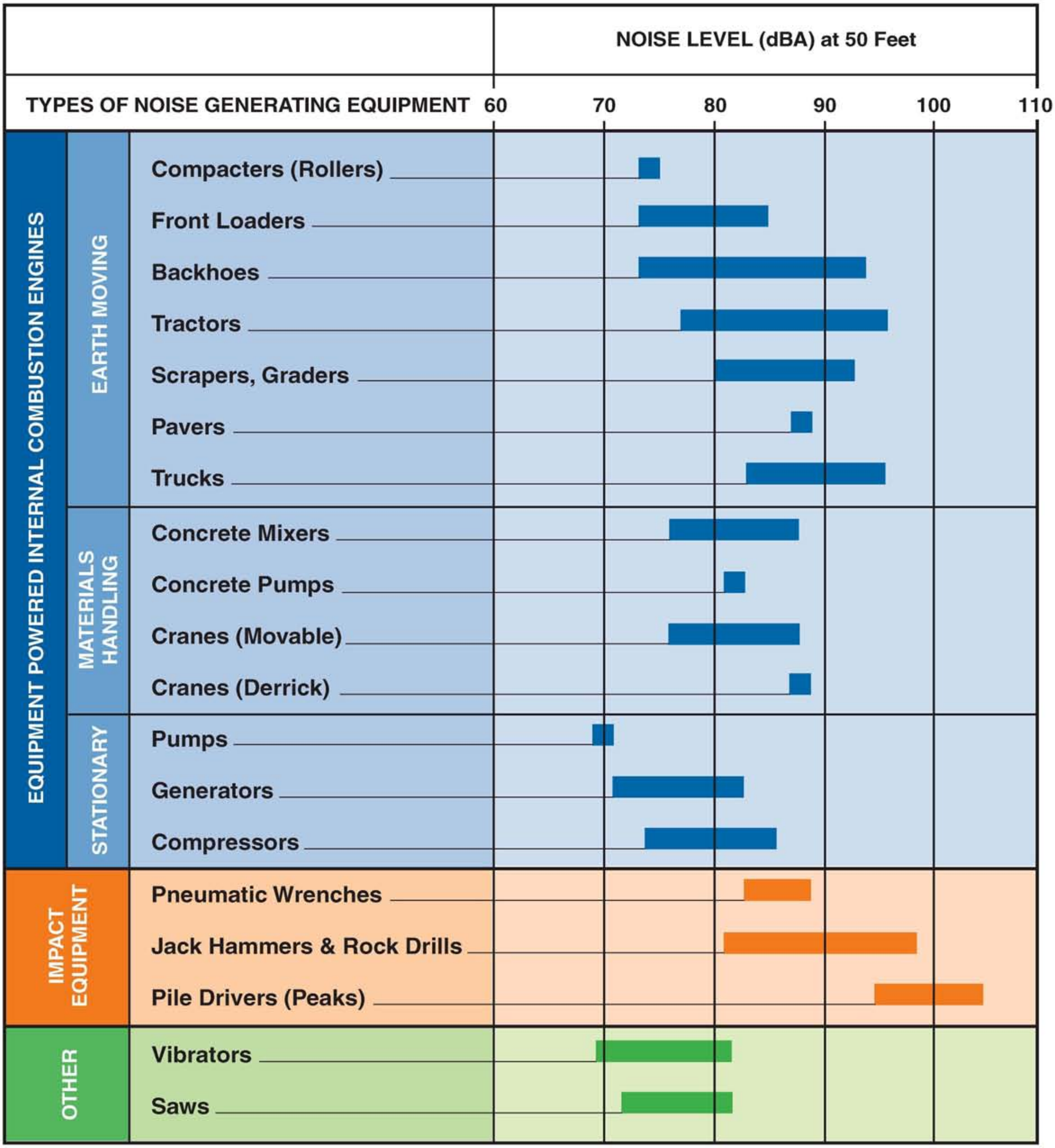

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FIGURE 4
Typical Construction Equipment Noise Levels

4.4 MITIGATION

This section discusses the possible mitigation measures that can be implemented to either reduce or mitigate the impacts generated by the development of the proposed project.

4.4.1 Operation

4.4.1.1 Onsite Operational Noise

No impacts were identified. No mitigation is necessary.

4.4.1.2 Offsite Traffic Noise

No impacts were identified. No mitigation is necessary.

4.4.1.3 Operational Vibration

No impacts were identified. No mitigation is necessary.

4.4.2 Construction

4.4.2.1 Construction Noise

No impacts were identified. No mitigation is necessary. However, to avoid unnecessary annoyance from construction noise, the following construction noise control measures should be implemented:

- Perform all construction in a manner to minimize noise and vibration. The contractor should be required to select construction processes and techniques that create the lowest noise levels.
- Equip all internal combustion engines with a muffler of a type recommended by the manufacturer.
- Turn off idling equipment.
- Perform noisier operations during the times least sensitive to receptors.
- Implement a noise control monitoring program to limit the impacts.
- The construction contractor should be required by contract specification to comply with all local noise ordinances and obtain all necessary permits and variances.

4.4.2.2 Construction Vibration

No impacts were identified. No mitigation is necessary.

5.0 REFERENCES

Caltrans. 2006. Technical Advisory TAV-96-01. Transportation-Related Earthborne Vibrations. June 13.

County of San Bernardino. Development Code. §83.01.080 and §83.01.090.

Federal Highway Administration (FHWA). 1978. FHWA Highway Traffic Noise Prediction Model, Federal Highway Administration Report FHWA-RD-77-108.

Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May.

Hall & Foreman. 2015. Traffic Impact Study. High-Cube Warehouse / Distribution Center, Bloomington, CA. March 18.

Harris, Cyril M. 1998. Handbook of Acoustical Measurements and Noise Control, Third Edition. Acoustical Society of America. Woodbury, NY.

HPA Architecture. 2014. Cedar & Orange Business Center. Sheet A1.1: Overall Site Plan. December 2.

International Organization For Standardization (ISO). 1996a. Description and Measurement of Environmental Noise, Basic Quantities and Procedures Part 1. ISO 1996/1.

1996b. Description and Measurement of Environmental Noise, Basic Quantities and Procedures, Acquisition of Data Pertinent to Land Use, Part 2. ISO 1996/2.

1996c. Description and Measurement of Environmental Noise, Basic Quantities and Procedures, Application to Noise Limits, Part 3. ISO 1996/3.

APPENDICES

APPENDIX A

MECHANICAL EQUIPMENT

DGX-120-H32-GH50-1600

PERFORMANCE AND SPECIFICATIONS

Description/Arrangement

Model	Qty	Unit Weight (lb)	Discharge Position	Air Flow Arrangement	Unit Arrangement
DGX-120-H32-GH50-1600	4	1,839	Downblast	50/50 Rrecirculation	Horizontal

Design Conditions

Elevation (ft)	Winter DB (F)	Space Temperature (F)	Unit Installation
807	0	65	Outdoor

Air Performance

Type	Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor Size (hp)
Supply	12,544	0.25	1.411	799	7.94	10

Electrical/Motor Specifications

V/C/P	Unit MCA (amps)	Unit MOP (amps)	Enclosure	Supply Motor RPM	Supply Efficiency
460/60/3	18.4	30	ODP	1725	Premium

Heating Specifications

Heating Type	Gas Type	Input (MBH)	Output (MBH)	Usable (MBH)	LAT (F)	Temp.Rise (F)
Direct Gas	Natural	1,600.0	1,472.0	898.0	140.0	108.0

Sound Performance in Accordance with AMCA

Fan	Sound Power by Octave Band								Lwa	dBA	Sones
	62.5	125	250	500	1000	2000	4000	8000			
Supply	100	89	87	86	83	83	79	74	89	78	33

Office RTU's

Performance Summary For RTU-1

Project: Medline - Freije
Prepared By: Troy Chisham

02/14/2014
11:23AM

Part Number: **48A3D020LJ-621HT**

Unit Refrigerant: **R410A**
EER (ARI 360): **10.1**
IEER: **11.7**

Shipping Dimensions

Unit Length:	**13' 9"**	
Unit Width:	**7' 10"**	
Unit Height:	**6' 1"**	
Unit Shipping Weight:	**4650**	lb

Unit

Supply/Return:	**Vertical/Vertical**	
Application Type:	**VAV**	
Voltage:	**460-3-60**	
Cooling Airflow:	**8000**	CFM
Altitude:	**0**	ft
Cond. Ent. Air Temp:	**95.0**	F
Ent. Air Dry Bulb:	**80.0**	F
Ent. Air Wet Bulb:	**67.0**	F
Ent. Air Enthalpy:	**31.44**	BTU/lb
Lvg. Air Dry Bulb:	**58.7**	F
Lvg. Air Wet Bulb:	**56.9**	F
Lvg. Air Enthalpy:	**24.35**	BTU/lb
Gross Cooling Capacity:	**255.00**	MBH
Gross Sensible Clg. Cap:	**184.00**	MBH
Compressor Power:	**18.3**	kW
Coil Bypass Factor:	**0.18**	

Part Load(%) Operation

Standard Capacity Steps:	**30,70,100**

Gas Heating Data:

Heating Airflow:	**8000**	CFM
Heating Ent. Air Temp:	**68.0**	F
Gas Input (Min):	**265.6**	MBH
Gas Input (Max):	**350**	MBH
Gas Output:	**287**	MBH
Heating Lvg. Air Temp:	**101.2**	F
Steady State Eff:	**82**	
Temp.Rise:	**33.2**	F

Supply Fan Information:

Ext.Static Pressure:	**1.00**	in wg
Selection Static Pressure:	**1.00**	in wg
Supply Fan RPM:	**696**	*
Supply Fan BHP:	**3.81**	BHP
Supply Fan Motor HP:	**05 HP**	

Field supplied and installed sheave package may be required

Power Exhaust Information:

Airflow:	**6000**	CFM
Tot. Static:	**0.99**	in wg

Electrical Data

Minimum Voltage:	**414**
Maximum Voltage:	**508**
Compressor #A1 RLA:	**10.6**
Compressor #A1 LRA:	**75**

Office RTU's

Performance Summary For RTU-1

Project: Medline - Freije
Prepared By: Troy Chisham

02/14/2014
11:23AM

Compressor #A2 RLA: **10.6**
Compressor #A2 LRA: **75**
Compressor #B1 RLA: **12.8**
Compressor #B1 LRA: **100**
Indoor Fan Motor HP: **5**
Indoor Fan Motor FLA: **7.6**
Condenser Fan Motor Qty: **2**
Condenser Fan Motor FLA (ea): **3.3**
Power Supply MCA: **68**
Power Supply MOCP (Fuse or HACR): **80**
Electrical Convenience Outlet: .... **Yes**
Pwr. Exhaust Fan Motor FLA (Total): **12.6**

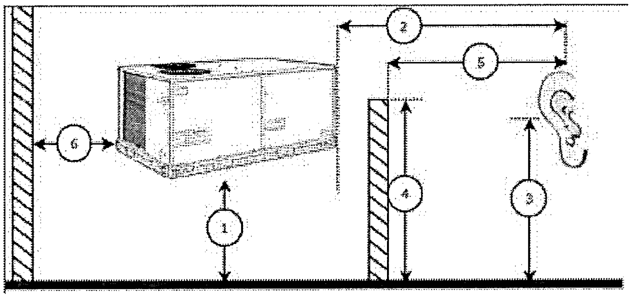
Acoustic Information

	Discharge, Lw	Inlet, Lw	Outdoor, Lw
63 Hz	89.2	88.1	65.8
125 Hz	77.8	78.6	79.6
250 Hz	75.2	75.9	86.5
500 Hz	73.6	71.4	89.7
1000 Hz	73.2	72.8	90.5
2000 Hz	69.9	68.7	86.0
4000 Hz	66.9	67.3	82.9
8000 Hz	61.3	62.8	77.7

Discharge and Inlet data tested per AHRI 260 standards

Calculation methods used in this program are patterned after the ASHRAE Guide; other ASHRAE Publications and the AHRI Acoustical Standards. While a very significant effort has been made to insure the technical accuracy of this program, it is assumed that the user is knowledgeable in the art of system sound estimation and is aware of the tolerances involved in real world acoustical estimation. This program makes certain assumptions as to the dominant sound sources and sound paths which may not always be appropriate to the real system being estimated. Because of this, no assurances can be offered that this software will always generate an accurate sound prediction from user supplied input data. If in doubt about the estimation of expected sound levels in a space, an Acoustical Engineer or a person with sound prediction expertise should be consulted.

Advanced Acoustics



Advanced Accoustics Parameters

1. Unit height above ground: .... **30.0** ft
2. Horizontal distance from unit to receiver: .... **50.0** ft
3. Receiver height above ground: .... **5.7** ft

Detailed Acoustics Information

Octave Band Center Freq. Hz	63	125	250	500	1k	2k	4k	8k	Overall

COOK EF

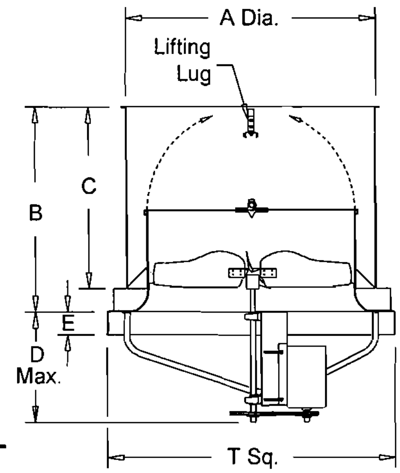
MARK: EF-1 THRU 8
PROJECT: MEDLINE CHESTERFIELD
DATE: 4/16/2014

LXUL

Low Silhouette
Upblast Exhaust Ventilator
Low Pressure X-Stream Propeller
Roof Mounted/Belt Drive

STANDARD CONSTRUCTION FEATURES:

X-Stream steel propeller - All non-galvanized steel components finished with Lorenized baked powder coat - 14 gauge spun steel Venturi/curb cap - 14 gauge steel lower drum - Minimum 18 gauge steel windband -Welded tubular steel power assembly - 2 point lifting lugs - Aluminum butterfly damper doors (20-36) - Galvanized steel butterfly dampers (42-60) - Welded curb cap corners - Adjustable pitch drives through 5 hp - Regreasable bearings in cast housing, rated at 200,000 hours average life - Propellers are statically and dynamically balanced - Corrosion resistant fasteners - Oil and heat resistant, static conducting belts - All fans factory adjusted to specified RPM



Dimensions (inches)

A Dia.	67-1/4
B	51
C	49
D Max.	28
E	3
T Sq.	72
Roof Open.	67-1/2

NOTE: Accessories may affect dimensions shown.

Shipping Weight(lbs)***	1111

***Includes fan, motor & accessories.

Performance

Qty	Catalog Number	Flow (CFM)	SP (inwc)	Fan RPM	Power (HP)	FEG
8	60 LXUL	48000	.100	401	5.52	67

Altitude (ft): 807 Temperature (F): 70

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	Mounted
7-1/2	1725	460/3/60	ODP -PE	No

NEMA Premium® efficiency motor per MG-1 (2011) Table 12-12

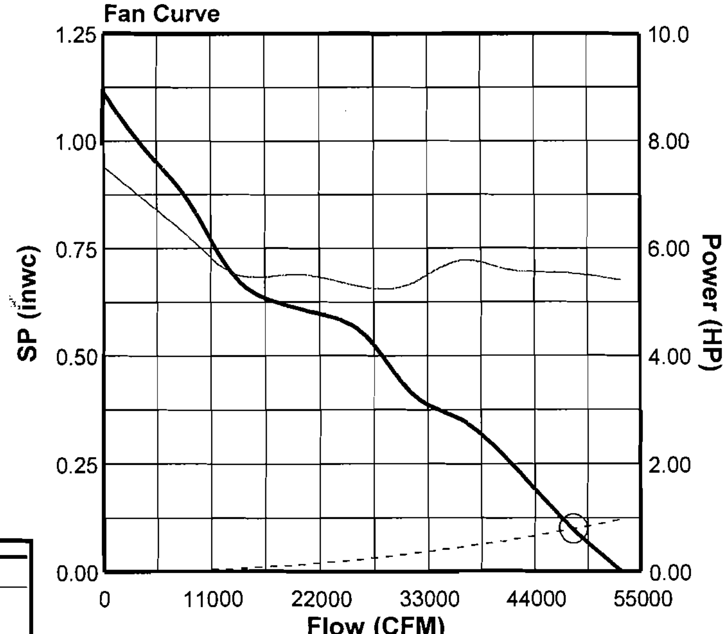
Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
91	95	93	85	82	79	76	67	89	78	30

Accessories:

Premium Efficiency Motor (Min. 91.0%)
DRIVES (1.5 SF) @ 401 RPM
STD DISCONNECT PRE-WIRED NEMA1
ROOF CURB RCG 70-24H
MAGNETIC LATCHES
ANTICONDENSATE COAT

Fan Curve



Fan Curve Legend

CFM vs SP	thick line
CFM vs HP	thin line
Point of Operation	○
System Curve	dotted line

COOK SF

MARK: SF-1 THRU 9
PROJECT: MEDLINE CHESTERFIELD
DATE: 4/16/2014

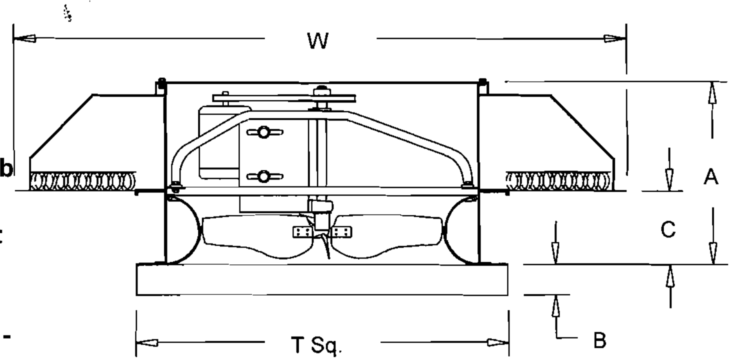
HXFL

Hooded Filtered Supply Ventilator
Low-Pressure Steel Propeller
Roof Mounted/Belt Drive

STANDARD CONSTRUCTION FEATURES:

X-stream steel propeller - Spun steel Venturi/curb cap - Lorenized steel lower housing - Galvanized steel hood - Heavy duty steel power assembly - Welded curb cap corners - Adjustable pitch drives through 5 hp motor - Regreasable bearings in cast housing rated at 200,000 hours average life - Propellers are statically and dynamically balanced - Washable filters - Quick release filter retainers - Corrosion resistant fasteners - Oil and heat resistant, static conducting belts - All fans factory adjusted to specified RPM.

NOTE: Sizes 36-60 require field assembly of hood.



Dimensions (inches)

A	42
B	3
C	14-1/2
L x W	146 x 119
T Sq.	72
Base	14
Hood	18
Max Mtr Frame	256T
Roof Open.Sq.*	67-1/2

NOTE: Accessories may affect dimensions shown.

Shipping Weight(lbs)***	2231

* ROOF OPENING SIZE FOR CURBS SUPPLIED BY COOK ONLY.
***Includes fan, motor & accessories.

Performance

Qty	Catalog Number	Flow (CFM)	SP (inwc)	Fan RPM	Power (HP)	FEG
9	60HXFL13B	48000	.150	414	7.15	53

Altitude (ft): 807 Temperature (F): 70

Motor Information

HP	RPM	Volts/Ph/Hz	Enclosure	Mounted
10	1725	460/3/60	ODP -PE	No

NEMA Premium® efficiency motor per MG-1 (2011) Table 12-12

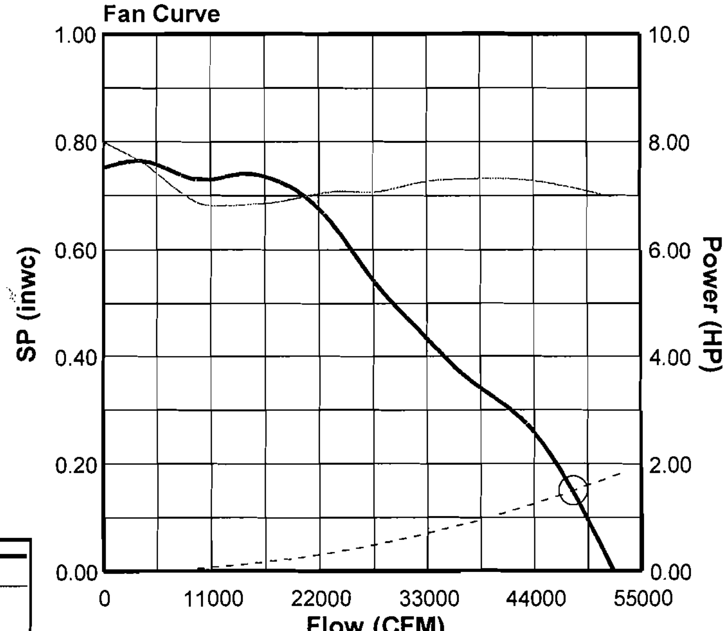
Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones
88	92	89	85	81	79	76	69	88	76	27

Accessories:

Premium Efficiency Motor (Min. 91.7%)
DRIVES (1.5 SF) @ 414 RPM
STD DISCONNECT NEMA3 PRE-WIRED L-T
BDIC-66 DAMPER
ROOF CURB RCG 70-13.5H W/TRAY
LIFTING LUGS - SHIPPED LOOSE
ANTICONDENSATE COAT

Fan Curve



Fan Curve Legend

CFM vs SP	(thick solid line)
CFM vs HP	(thin solid line)
Point of Operation	○
System Curve	(dashed line)

Specification sheet

Diesel generator set QSK23 series engine

545 kW - 800 kW

Description

Cummins Power Generation commercial generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary standby and prime power applications.

Features

Cummins® heavy-duty engine - Rugged 4-cycle, industrial diesel delivers reliable power, low emissions and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Permanent magnet generator (PMG) - Offers enhanced motor starting and fault clearing short-circuit capability.

Control system - The PowerCommand® electronic control is standard equipment and provides total genset system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

Cooling system - Standard integral set-mounted radiator system, designed and tested for rated ambient temperatures, simplifies facility design requirements for rejected heat.

Enclosures - Optional weather protective and sound attenuated enclosures are available.

NFPA - The genset accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby rating		Prime rating		Continuous rating		Data sheets	
Model	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz kW (kVA)	50 Hz kW (kVA)	60 Hz	50 Hz
DQCA	600 (750)		545 (681)				D-3352	
DQCB	750 (938)		680 (850)				D-3353	
DQCC	800 (1000)		725 (906)				D-3354	

Sound Pressure Level @ 7 meters, dB(A)

See Notes 1-8 listed below

Configuration		Measurement Location Number								Average
		1	2	3	4	5	6	7	8	
Standard - Unhoused	Infinite Exhaust	90	95	95	96	93	96	94	95	95
F200 –Weather	Mounted Muffler	85	81	79	90	91	91	78	81	87
F201 - Quiet Site II First Stage	Mounted Muffler	85	80	73	74	78	74	74	80	79
F202 - Quiet Site II Second Stage	Mounted Muffler	73	71	74	74	75	76	75	72	74

Sound Power Level, dB(A)

See Notes 2-6, 9, 10 listed below

Configuration		Octave Band Center Frequency (Hz)								Overall Sound Power Level
		63	125	250	500	1000	2000	4000	8000	
Standard - Unhoused	Infinite Exhaust	83	102	107	113	115	115	113	108	121
F200 –Weather	Mounted Muffler	93	102	107	109	108	107	104	99	115
F201 - Quiet Site II First Stage	Mounted Muffler	92	100	101	102	101	101	100	95	109
F202 - Quiet Site II Second Stage	Mounted Muffler	86	96	96	93	100	99	99	91	106

Exhaust Sound Pressure Level @ 1 meter, dB(A)

Open Exhaust (No Muffler Rated Load)	Octave Band Center Frequency (Hz)								Sound Pressure Level
	63	125	250	500	1000	2000	4000	8000	
	105	112	120	121	125	126	126	124	132

Note:

1. Position 1 faces the engine front. The positions proceed around the generator set in a counter-clockwise direction in 45° increments. All positions are at 7m (23 ft) from the surface of the generator set and 1.2m (48") from floor level.
2. Sound levels are subject to instrumentation, measurement, installation and manufacturing variability.
3. Sound data with remote-cooled generator sets are based on rated loads without cooling fan noise.
4. Sound levels for aluminum enclosures are approximately 2 dB(A)s higher than listed sound levels for steel enclosures.
5. Sound data for generator set with infinite exhaust do not include exhaust noise.
6. Data is based on full rated load with standard radiator-cooling fan package
7. Sound Pressure Levels are measured per ANSI S1.13 and ANSI S12.18, as applicable.
8. Reference sound pressure is 20 µPa.
9. Sound Power Levels per ISO 3744 and ISO 8528-10, as applicable.
10. Reference power = 1 pw (10^{-12} W)
11. Exhaust Sound Pressure Levels are per ISO 6798, as applicable.