

**PRELIMINARY ASSESSMENT OF
ENVIRONMENTAL NOISE**

**TWELVE OAKS REDEVELOPMENT
CEQA NOISE REPORT**

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By

Veneklasen Associates, Inc.
1711 16th Street
Santa Monica, CA 90404

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ASSESSMENT OF ENVIRONMENTAL NOISE

1.0 INTRODUCTION

This report evaluates potential impacts associated with the construction and operation noise of the Twelve Oaks Redevelopment Project.

1.1 Project Description

The proposed project will consist of a complete modification of an existing senior housing facility. The central structure will replace 14 smaller existing structures distributed throughout the site. The expansion of the retirement community is proposed as a three-story (TYPE II) structure constructed over a (TYPE I) subterranean parking garage. The project site is bounded by Sycamore Avenue to the north, La Crescenta Avenue to the east, and residential properties to the west and south.

1.2 Characteristics of Noise

Noise is usually defined as unwanted sound and can be an undesirable by-product of society's normal day-to-day activities. Sound becomes unwanted when it interferes with normal activities, causes actual physical harm, or has an adverse effect on health.

People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness." However, the sound pressure magnitude can be objectively measured and quantified using a logarithmic ratio of pressures which yields the level of sound, utilizing the measurement scale of decibels (dB). The decibel is generally adjusted to the A-weighted level (dBA) which de-emphasizes very low frequencies to better approximate the human ear's range of sensitivity. In practice, the noise level of a sound source is measured using a sound level meter that includes an electronic filter corresponding to the A-weighting curve. Table A.1 in Appendix A of this report defines the decibel along with other technical terms used in this analysis.

Even though the A-weighted scale accounts for the relative loudness perceived by the human ear and, therefore, is commonly used to quantify individual events or general community sound levels, the degree of annoyance or other response effects also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- Magnitude of the event sound level relative to the background noise
- Spectral (frequency) composition (e.g. presence of tones)
- Duration of the sound event
- Number of event occurrences, repetitiveness, and intermittency
- Time of day the event occurs.

In determining the daily level of environmental noise, it is important to account for the difference in human responses to daytime and nighttime noises. At night, exterior background noise levels are generally lower than daytime levels. However, most household noise also decreases at night, and exterior noise may become increasingly noticeable. Further, most people sleep at night and have greater sensitivity to noise intrusion. To account for human sensitivity to nighttime noise levels, a 24-hour descriptor, the Community Noise Equivalent Level (CNEL) has been developed. CNEL divides the 24-hour day into a daytime period of 7:00 a.m. to 7:00 p.m., an evening period from 7:00 p.m. to 10:00 p.m., and a nighttime period of 10:00 p.m. to 7:00 a.m. In determining the CNEL, noise levels occurring during the evening period are increased by 5 dB, while noise levels occurring during the nighttime period are increased by 10 dB to account for the greater sensitivity during the evening and nighttime periods.

The effects of noise on people fall into three general categories:

- Subjective effects of annoyance and nuisance
- Interference with activities such as speech, sleep and learning
- Physiological effects such as hearing loss

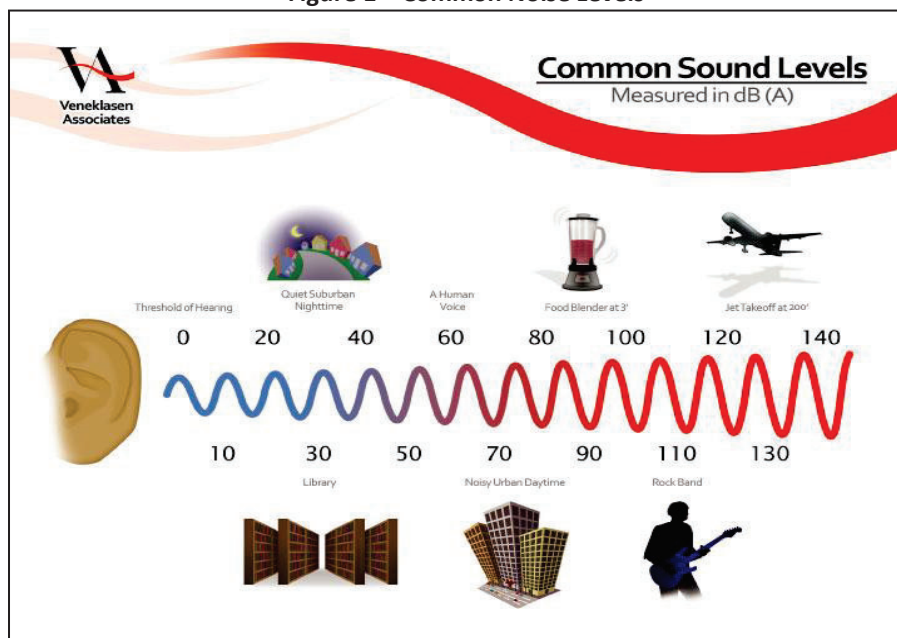
In most cases, the levels associated with environmental noise produce effects only in the first two categories. However, workers in industrial plants may experience noise effects in the last category. There is no completely effective way to measure the subjective effects of noise or the corresponding reactions of annoyance, because of the wide variation in individual thresholds of annoyance and degrees to which people become acclimated to noise. Thus, an important way of determining a person's subjective reaction to a new noise source is by comparison to the existing environment to which they are accustomed (the "ambient environment"). In general, the more the level of a noise event exceeds the prevailing ambient noise level, the less acceptable the noise source will be to those exposed to it.

With regard to increases in A-weighted noise levels, the following relationships are applicable to this analysis:

- Except in carefully controlled laboratory experiments, a 1 dB change cannot be perceived.
- Outside of a laboratory, a 3 dBA change will be generally perceivable by most people.
- A change in level of at least 5 dBA is considered a noticeable change by most people.
- A 10 dBA change will result in the perception of doubling or halving the loudness of the noise.

Common noise levels associated with various activities are shown on Figure 1 below.

Figure 1 – Common Noise Levels



Noise sources are either “point sources”, such as stationary equipment or individual motor vehicles, or “line sources”, such as a roadway with a large number of mobile point sources (motor vehicles). Sound generated by a stationary point source typically diminishes (attenuates) at a rate of 6 dBA for each doubling of distance from the source to the receptor at acoustically “hard” sites, and at a rate of 7.5 dBA at acoustically “soft” sites.¹ For example, a 60 dBA noise level measured at 50 feet from a point source at an acoustically hard site would be 54 dBA at 100 feet from the source and it would be 48 dBA at 200 feet from the source. Sound generated by a line source typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling of distance from the source to the receptor for hard and soft sites, respectively.² Man-made or natural barriers can also attenuate sound levels.

The minimum attenuation of exterior to interior noise provided by typical structures is provided in Table 1 below.

Table 1 – Outside to Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows ¹
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/Convalescent Homes	17	25
Offices	17	25
Theaters	20	30
Hotels/Motels	17	25

Source: Transportation Research Board, National Research Council, Highway Noise: A Design Guide for Highway Engineers, National Cooperative Highway Research Program Report 117.

¹ As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.

¹ U.S. Department of Transportation, Federal Highway Administration, *Highway Noise Fundamentals*, (Springfield, Virginia: U.S. Department of Transportation, Federal Highway Administration, September 1980), p. 97. A “hard” or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt, concrete, and very hard packed soils. An acoustically “soft” or absorptive site is characteristic of normal earth and most ground with vegetation.

² U.S. Department of Transportation, Federal Highway Administration, *Highway Noise Fundamentals*, (Springfield, Virginia: U.S. Department of Transportation, Federal Highway Administration, September 1980), p. 97.

1.3 Characteristics of Vibration

Vibration is minute variation in pressure through structures and the earth, whereas, noise is minute variation in pressure through air. Some vibration effects can be caused by noise; e.g., the rattling of windows from truck pass-bys. This phenomenon is related to the coupling of the acoustic energy at frequencies that are close to the resonant frequency of the material being vibrated. Ground-borne vibration attenuates rapidly as distance from the source of the vibration increases. Vibration amplitude can be measured as peak particle velocity (PPV), the maximum instantaneous peak amplitude in inches per second, or root-mean-square (RMS) velocity in inches per second or as vibration level in decibels (VdB) referenced to 1 micro-inch per second. The ratio between the PPV and the maximum RMS amplitude is termed the “crest factor.” According to the Federal Transit Administration (FTA), the PPV level for construction equipment is typically 1.7 to 6 times greater than the RMS vibration level. The FTA uses a crest factor of 4 for the conversion of PPV levels to RMS vibration levels. For the purposes of ground-borne vibration analysis of impacts to existing structures, vibration velocity is described in terms of PPV. For the analysis of the human response to vibration, VdB is utilized.

The vibration velocity threshold of perception for humans is approximately 65 VdB, and a vibration velocity of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people³. Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. Common ground-induced vibrations related to roadway traffic and construction activities pose no threat to buildings or structures. If a roadway is smooth, the ground-borne vibration from traffic is barely perceptible. The range of interest is from approximately 50 VdB, which is typically the background vibration velocity, to 94 VdB. This 94 VdB vibration level corresponds to 0.2 PPV, which is the general threshold where minor damage can occur in non-engineered timber and masonry buildings.

2.0 REGULATORY FRAMEWORK

Many government agencies have established noise regulations and policies to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise and ground-borne vibration. The City of Glendale has adopted the Noise Hazards section of the General Plan, which is based in part on federal and State regulations and is intended to control, minimize or mitigate environmental noise effects. The regulations and policies that are relevant to project construction and operation noise are discussed below.

³ U.S. Department of Transportation, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, (Washington, DC: U.S. Department of Transportation, Federal Transit Administration, May 2006), p. 7-8.

2.1 Applicable State Noise Standards

The State of California has adopted noise compatibility guidelines for general land use planning. The types of land uses addressed by the State standards and the acceptable noise categories for each land use are included in the State of California General Plan Guidelines, which is published and updated by the Governor's Office of Planning and Research. The level of acceptability of the noise environment is dependent upon the activity associated with the particular land use. According to the State, an exterior noise environment up to 65 CNEL is "normally acceptable" for single and multi-family residential uses, up to 75 CNEL is "conditionally acceptable" with special noise insulation requirements, while 75 CNEL and above is identified as "clearly unacceptable" noise levels for residential and hotel uses, respectively.⁴ The maximum allowable interior noise level for residential structures is 45 CNEL.

The California Environmental Quality Act (CEQA) Guidelines establishes guidelines for the evaluation of significant impacts of environmental noise attributable to a proposed project. The guidelines ask whether the project would result in:

1. 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?
2. Generation of excessive groundborne vibration or groundborne noise levels?
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan as 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?

2.2 City of Glendale General Plan – Noise Element (Traffic Noise and Construction Noise)

The Noise Element of the General Plan identifies noise and land use compatibility standards for various land uses. The City's goal is to minimize the impact of noise on people through noise reduction and suppression techniques, and through appropriate land use policies. The Exterior Noise Compatibility Standards listed in Table 2 are used to determine the compatibility of land uses when evaluating proposed development projects.

Table 2 – Interior and Exterior Noise Standards

LAND USE CATEGORIES		ENERGY AVERAGE (CNEL)	
CATEGORIES	USES	INTERIOR	EXTERIOR
RESIDENTIAL	Single Family	45 ¹	65 ²
	Multi-Family	45 ¹	65 ³
	Residential withing Mixed Use	45 ¹	--
COMMERCIAL	Hotel, Motel, Transient Lodging	45 ¹	--
INSTITUTIONAL	Hospital, School Classroom, Church, Library	45 ¹	--
OPEN SPACE	Park (4)	--	65

Notes:

1 Applies to the indoor environment excluding bathrooms, toilets, closets and corridors.

2 Applies to the outdoor environment limited to the private yard of single-family residences.

3 Applies to the patio area where there is an expectation of privacy (i.e., not a patio area which also serves as, or is adjacent to, the primary entrance to the unit).

4 Only applies to parks where peace and quiet are determined to be of prime importance, such as hillside open space areas open to the public. Generally would not apply to urban parks or active-use parks.

⁴ State of California, Governor's Office of Planning and Research, *General Plan Guidelines*, (Sacramento, CA: State of California, Governor's Office of Planning and Research, October 2003), p. 250.

Section 4.4.3 of the City of Glendale's Noise Element states that:

Construction noise is addressed in the Noise Ordinance in Section 8.36.080.

If construction occurs within 500 feet of a residential zone, then construction is prohibited from 7 p.m. to 7 a.m. every night and from 7 p.m. on Saturday to 7 a.m. on Monday (i.e., no Sunday construction). Construction on certain holidays is also prohibited. To respond to complaints about noise from construction on the weekend, Program 4.1 proposes to change the Noise Ordinance by restricting construction on Saturday to the hours of 9 a.m. to 5 p.m.

2.3 City of Glendale Municipal Code – Noise Ordinance (Operational and Construction Noise)

The goal of the City's Noise Ordinance is "to protect quiet residential areas from stationary noise sources". The City's Noise Ordinance Section 8.36.040 establishes the indoor and outdoor noise standards for residential land use as provided in Table 3.

Table 3 – City Noise Ordinance Standards - Residential

Hours	Interior Noise Standards	Exterior Noise Standards
Nighttime (10:00pm – 7:00am)	45dBA	45 dBA
Daytime (8:00am – 9:00pm)	55dBA	55 dBA

Section 8.36.050 of the Noise Ordinance states the following:

"Where the actual ambient is less than the presumed ambient, the actual ambient shall control and any noise in excess of the actual ambient, plus five dbA, shall be a violation."

"Where the actual ambient is equal to or more than the presumed ambient, the actual ambient shall control and any noise may not exceed the actual ambient by more than five dbA; however, in no event may the actual ambient exceed the presumed noise standards by five dbA."

Section 8.36.080 of the noise ordinance limits construction activity to the hours shown in Table 4 in a radius of 500 ft of a residential zone.

Table 4 – Hours for Construction Activities

Allowable Hours	Days
Not Authorized	Sundays and holidays
7:00am – 7:00pm	Every day

2.4 City of Glendale Municipal Code – Vibration Standards

In order to assess the potential for vibration annoyance, the City of Glendale has defined “vibration perception threshold” as:

Vibration perception threshold” means the minimal ground or structure borne vibrational motion necessary to cause a normal person to be aware of the vibration by such direct means as, but not limited to, sensation by touch or visual observation of moving objects. The perception shall be presumed to be a motion velocity of 0.01 in./sec. over the range of one to one hundred Hz.

Section 8.36.210, Vibration, of the City’s Municipal Code states that:

Operating or permitting the operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet from the source if on a public space or public right-of-way shall be a violation.

2.5 Federal Transit Administration (FTA) Guidelines – Construction Noise

According to the 2018 FTA guidelines, local noise ordinances are typically not well-suited for evaluating construction noise. These ordinances often address nuisance issues and permitted activity hours, and sometimes set maximum noise limits, but they are generally not practical for assessing the overall impact of a construction project. Construction noise criteria should consider several factors: the existing noise environment, the absolute noise levels during construction, the duration of the activities, and the adjacent land uses. In the absence of standardized construction noise thresholds, the FTA provides guidelines that serve as reasonable criteria for assessing construction noise. Table 5 below outlines the noise thresholds for various land use categories.

Table 5 – General Assessment Construction Noise Criteria		
Land Use	Leq (1hr), dBA	
	Day	Night
Residential	90	80
Commercial	100	100
Industrial	100	100

2.6 Federal Transit Administration Guidelines – Vibration

According to the 2018 Transit Administration Guidelines Manual, establish that a vibration level of 94 VdB (see Table 6 below) is considered the threshold of structure damage in buildings of non-engineered timber and masonry. It is worth noting that these guidelines are not mandatory regulations but are provided as recommendations to help manage construction vibration impact to nearby residents.

Table 6 – Construction Vibration Damage Criteria

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

2.7 Project Requirements

The above requirements for the project are summarized in the following Table 7.

Table 7 – Project Requirements

Enforcement	Condition	Standard
City of Glendale Noise Ordinance (Operational Noise)	Interior	45 dBA (Nighttime) 55 dBA (Daytime)
	Exterior	45 dBA (Nighttime) 55 dBA (Daytime)
	Construction Noise (8.63.80)	- Construction is only allowed every day between 7:00am to 7:00pm. - Construction is not allowed on Sundays and holidays.
City of Glendale Noise Element (Traffic Noise)	Interior	45 CNEL
	Exterior	65 CNEL
	Construction Noise	Amend the Noise Ordinance 8.36.80

3.0 ENVIRONMENTAL IMPACTS AND SIGNIFICANCE

3.1 Significance Thresholds

The following significance thresholds are used in this report to evaluate the significance of the project impacts.

- Would the project expose persons to or generate noise levels in excess of standards established in the City's General Plan or Noise Ordinance? Refer to Section 3.2 of this report for a detailed response to the impact related to this question.
- Would the project generate excessive ground borne vibration or ground born noise levels affecting the project vicinity? Refer to Section 3.3 of this report for a detailed response to the impact related to this question.
- 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 be residing or working in the project area to excessive noise levels. The project is not within two miles of a public airport or public use airport. Refer to Section 3.4 of this report for a detailed response to the impact related to this question.

3.2 Impact 1. Noise Levels in Excess of Standards

Would the project generate 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?

3.2.1 Existing Noise Conditions (Noise Measurements)

To assess the existing ambient noise levels at the proposed site and its surrounding areas, a field monitoring study was conducted. Noise measurements were taken around the project site to document ambient conditions using Bruel & Kjaer Model 2270 and 2250 Sound Level Meters, which comply with American National Standards Institute (ANSI) requirements for general environmental noise measurement. Vehicular traffic was identified as the predominant noise source in the area.

Measurements were conducted at multiple locations, as shown in Figure 2, from March 18 to March 21, 2025. Noise levels were recorded at 1-second intervals using “A” frequency weighting with a fast time response. Weather conditions were normal, with no anomalies observed during the survey period. Table 8, provides the noise level data associated with each measurement position.

Figure 2 – Measurement Location



Table 8 – Measured Exterior Noise Levels

Location	Daytime Noise Levels (8:00 am – 10:00 pm) Leq (dBA)	Nighttime Noise Levels (11:00 pm – 7:00 am) Leq (dBA)	Average Daily Noise Level (dBA CNEL)
Pos 1	56	48	56
Pos 2	49	45	52
Pos 3	48	47	53
Pos 4	48	47	52
Pos 5	50	49	55
Pos 6*	45	45	51
Pos 7	48	48	53

*Position 6 was obtained by extrapolating data from position 5 and position 7.

As shown in the table above, the measured CNEL exterior noise levels are below the City of Glendale’s Noise Element presumed exterior ambient levels (65 CNEL).

3.2.2 Future Exterior Noise Levels due to Traffic Increase

To assess future noise levels in the area due to projected traffic growth caused by the proposed project, Veneklasen utilized the traffic study conducted by Jano Baghdanian & Associates Consultants, dated May 30, 2023. This study provides traffic volume forecasts for conditions at project completion. Using these projected traffic counts, Veneklasen quantified the anticipated noise level increase by utilizing the algorithm defined by the Federal Highway Administration (FHWA) Highway Noise methodology within the SoftNoise Prediction Model (TNM Version 2.5). The calculations for the future traffic conditions determined an overall CNEL noise level increase of 0.5.

As presented in Table 8 (Measured Noise Levels), the maximum recorded CNEL level at measurement position 1 was 56. With a projected CNEL increase of only 0.5 dB, the resultant noise levels will remain well below the 65 CNEL threshold set by the City of Glendale’s Noise Element. Consequently, the anticipated noise increment due to future traffic conditions will comply with the city’s noise standards for both on-site and off-site areas.

3.2.3 Future Interior Noise Levels due to Traffic Increase

With the highest projected exterior noise level due to increased traffic flow from the proposed project reaching 56.5 dB CNEL, and standard residential construction providing a minimum noise reduction of 25 dB CNEL (as outlined in Table 1: (Outside-to-Inside Noise Attenuation), the resulting interior noise level will not exceed 32.5 dB CNEL. This ensures compliance with the City of Glendale’s Noise Element interior noise threshold of 45 dB CNEL for both on-site and off-site areas.

3.2.4 Future Exterior Operational Noise Levels

Veneklasen understands that the project will include outdoor mechanical equipment, such as split-system outdoor condensing units. Veneklasen has utilized sound power data for typical air conditioning condensing units which range between 2 to 5 tons. In order to represent the worst-case scenario, Veneklasen modeled the operation of multiple condensing units operating 24-hours a day located at the roof area of the future project building. Variance submittal drawing set dated June 30, 2023, indicates that mechanical pit on roof area will be 7 ft. lower than the top point of the roof. The computer model SoftNoise Predictor LIMA-ISO 9613 modeling software was utilized to model this noise condition which considers the distance sound attenuation as well as the height of the mechanical equipment relative to the receiver height. Existing terrain grading for all the receivers were considered for the analysis too. Figure 3 below shows the location of the outdoor condensing units and the noise levels throughout the project site. Table 9 shows the predicted noise levels at receptor positions and equipment sound data is shown in Appendix C.

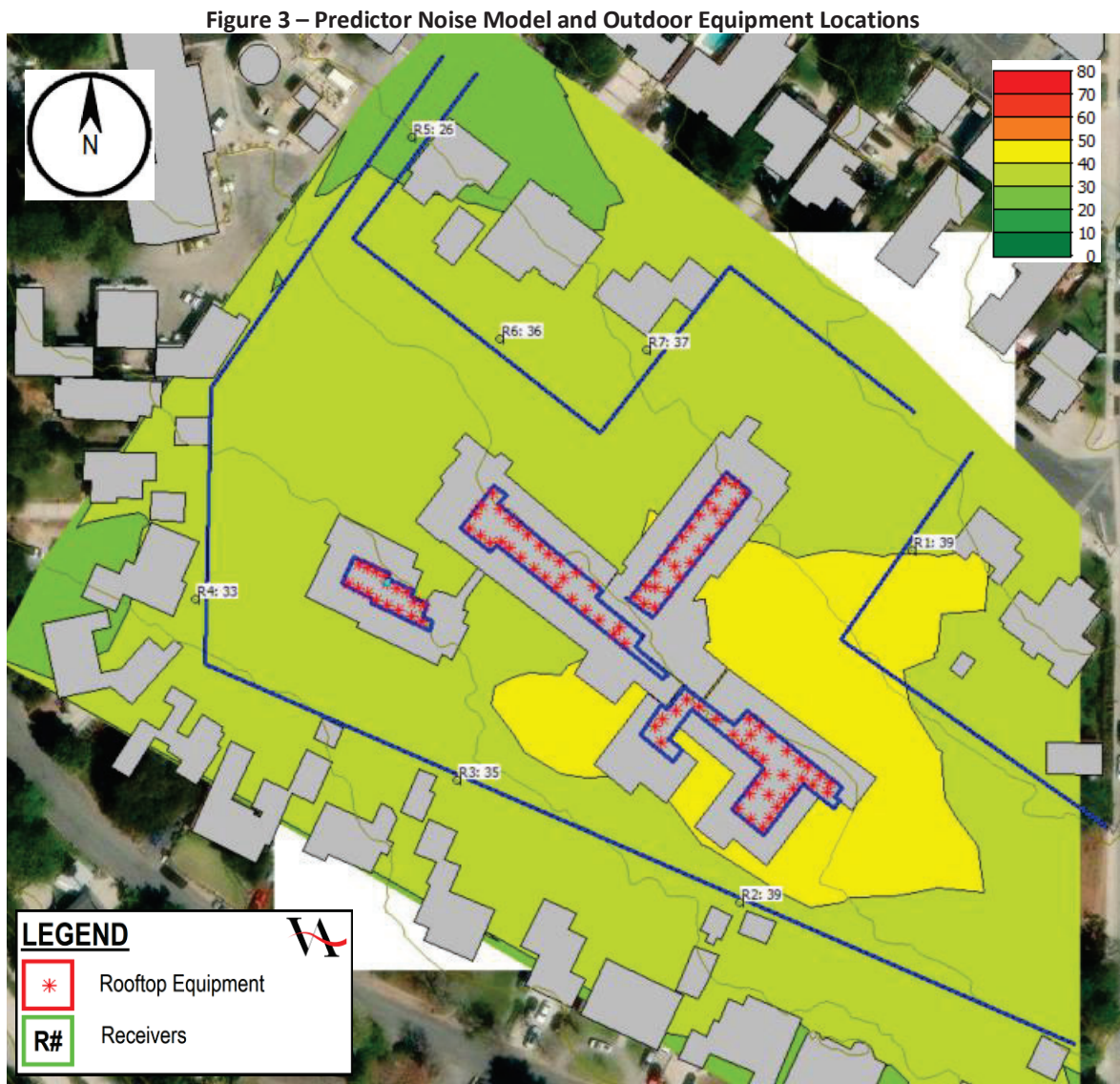


Table 9 – Predicted HVAC Outdoor Equipment Noise Levels

Receiver Positions	Calculated Noise Levels (dBA)	Allowable Daytime Exterior Noise Level (dBA)	Allowable Nighttime Exterior Noise Level (dBA)
R1	39	60	53
R2	39	54	50
R3	35	53	52
R4	33	53	52
R5	26	55	54
R6	36	50	50
R7	37	53	53

3.2.5 Future Interior Operational Noise Levels

With the highest projected exterior noise level due to future mechanical equipment from the proposed project reaching 58 dBA, and standard residential construction providing a minimum noise reduction of 25 dB CNEL (as outlined in Table 1: (Outside-to-Inside Noise Attenuation)), the resulting interior noise level will not exceed 33 dBA. This ensures compliance with the City of Glendale’s Noise Ordinance interior noise threshold of 45 dBA for both on-site and off-site areas.

3.2.6 Construction Noise (City of Glendale Noise Ordinance and Noise Element)

Section 4.4.3 of the City of Glendale Noise Element refers to City of Glendale Noise Ordinance 8.36.080 to address construction noise.

If construction occurs within 500 feet of a residential zone, then construction is prohibited from 7 p.m. to 7 a.m. every night and from 7 p.m. on Saturday to 7 a.m. on Monday (i.e., no Sunday construction). Construction on holidays is also prohibited.

Furthermore, Noise Ordinance 8.36.080 does not establish noise level thresholds for construction noise.

3.2.7 Construction Noise (FTA Guidelines)

The "General Assessment" methodology outlined in the Federal Transit Administration (FTA) manual provides a standardized framework for evaluating construction noise impacts. This approach incorporates several key assumptions to estimate noise levels generated by construction activities, assess their potential impact on surrounding areas, and determine compliance with applicable noise criteria. The methodology accounts for factors such as equipment noise emissions, usage, distance, and ground conditions. The following assumptions are established within the FTA manual to facilitate this evaluation. It is important to note that the methodology outlined

in the FTA guidelines is based on average hourly noise levels (LAeq 1-hour) rather than absolute maximum noise levels (LAmx). This approach accounts for the movement of construction equipment across the site, providing a more representative assessment of overall noise exposure rather than isolated peak noise events.

- **Noise Emission Level.** Determine the emission level at 50 ft according to noise from typical construction equipment described in below.
- **Usage Factor.** This assumes a time period of one-hour with full power operation at any given hour.
- **Distance.** Assumes that all equipment operates at the center of the project.
- **Ground Effect.** Assumes a free-field condition or man-made barriers.

The construction noise impact was analyzed considering the type and amount of equipment used at each phase of construction. An itemized list of the equipment used at each construction phase was provided by the developer and is shown in Table 10 below.

To predict construction noise impact, equation “Eq.1-1” as per page 177 of the FTA guidelines.

$$L_{eq, equip} = L_{emission} + 10 \log(Adj_{usage}) - 20 \log\left(\frac{D}{50}\right) - 10G \log\left(\frac{D}{50}\right) \quad \text{Eq. 7-1}$$

where:

- $L_{eq, equip}$ = $L_{eq(t)}$ at a receiver from the operation of a single piece of equipment over a specified time period, dBA
- $L_{emission}$ = noise emission level of the particular piece of equipment at the reference distance of 50 ft, dBA
- Adj_{usage} = usage factor to account for the fraction of time that the equipment is in use over the specified time period
- D = distance from the receiver to the piece of equipment, ft
- G = a constant that accounts for topography and ground effects

The analysis evaluated the nearest property line for each receiver position listed in Table 8 and Figure 2. The maximum predicted hourly average noise levels at these sensitive receptors due to construction operations are presented in Table 11. Additionally, the analysis accounts for the proposed 6-foot perimeter fence/wall, as shown on drawing sheet FW-2 in Appendix F.

Table 10 – Proposed Equipment used in Construction Phases

Type of Equipment	Acoustic Usage Factor	Suggested Maximum Sound Levels for Analysis (dBA L _{max} at 50 feet)
Air Compressor	100	80
Chain saw	20	85
Concrete Mixer Truck	40	85
Delivery Trucks	40	84
Dozer	40	85
Dump Truck	40	84
Excavator	40	85
Forklifts	40	80
Grader	40	85
Paver	50	88
Pneumatic Tools	50	85
Roller	20	85
Scraper	40	87
Skip Loader	40	80
Track Loader	100	80
Water Truck	100	88
Wheel Loader	100	80

Source: FHWA. Highway Construction Noise Handbook (August 2006).
See Appendix Section G for detailed noise levels at construction phases.

Table 11 – Construction Noise Levels at the Boundary of Receiver Positions

Receiver Positions	Average Distance (feet)	Range of Construction Noise Level (Leq-1hr) dBA	Exceed 90 (Leq-1hr) dBA Threshold?
Pos 1	116	72-77	No
Pos 2	148	70-75	No
Pos 3	128	72-76	No
Pos 4	129	72-76	No
Pos 5	224	67-71	No
Pos 6	93	74-79	No
Pos 7	114	73-77	No

As shown in Table 11, the hourly construction noise level will range between 67 to 79 (LAeq 1-hour) at the nearest property line which is below the 90 dBA residential threshold specified by the FTA General Assessment Construction Noise Criteria (see Table 5 for reference). For additional details, refer to Appendix E, which provides the calculated noise levels associated with each phase of construction.

3.3 Impact 2. Excessive Ground-borne Vibration

Generation of excessive groundborne vibration or groundborne noise levels?

3.3.1 City of Glendale Municipal Code

The City of Glendale Noise Ordinance stipulates that if construction occurs within 500 feet of a residential zone, then construction is prohibited from 7 p.m. to 7 a.m. every night and from 7 p.m. on Saturday to 7 a.m. on Monday (i.e., no Sunday construction). Construction on certain holidays is also prohibited.

Additionally, the municipal code defines perceptible vibration to be a minimum motion velocity of 0.01 in./sec.

3.3.2 Vibration due to Construction Activities (FTA Guidelines)

The FTA guidelines manual suggests that vibration levels related to construction activities should not exceed motion velocity of 0.2 in/sec to prevent structural damage for non-engineered timber and masonry buildings (see Table 6).

Table 12 presents the reference vibration information for construction equipment to be used during construction. The vibration levels were sourced from the Federal Transit Administration (FTA) Manual, and all calculations were performed in accordance with FTA methodologies.

Sample calculations are included in Appendix D, illustrating how vibration levels were derived and applied to the equipment in question.

Table 12 – Velocity Vibration Levels (PPV in/sec) of Typical Construction Equipment at 25 ft

Type of Equipment	Reference Level at 25 ft PPV (in/sec)
Air Compressor (Jackhammer)	0.035
Delivery / Concrete Mixer/Dump Trucks	0.076
Dozer / Grader / Scraper	0.089
Excavator	0.202
Paver (Vibratory Roller)	0.210
Skip Loader	0.003

Source: Transit Noise and Vibration Impact Assessment (FTA 2018).

Ft = feet

FTA = Federal Transit Administration

In/sec = inches per second

PPV = peak particle velocity

Given the reference vibration levels shown in Table 12, the vibration levels were calculated at the nearest neighboring properties to show compliance with damage and annoyance criteria. Table 13 presents the estimated vibration levels at each location and for each type of construction equipment.

Table 13 – Construction Vibration Levels

Equipment Type	Location	Distance (ft)	Reference Vibration Levels at 25 ft. (PPV in/sec)	Maximum Vibration Level (PPV)	Compliance with Damage Criteria of 0.2 PPV in/sec?	Compliance with Annoyance Criteria of 0.01 PPV in/Sec?
Air Compressor (Jackhammer)	Pos 1 (2820 Sycamore Ave)	19	0.035	0.037	Yes	Yes*
	Pos 2 (2820 Sycamore Ave)	2		0.058	Yes	Yes*
	Pos 3 (3648 Glenwood Ave)	13		0.040	Yes	Yes*
	Pos 4 (3700 Glenwood Ave)	7		0.045	Yes	Yes*
	Pos 5 (2842 Sycamore Ave)	35		0.033	Yes	Yes*
	Pos 6 (2838 Sycamore Ave)	50		0.030	Yes	Yes*
	Pos 7 (2828 Sycamore Ave)	14		0.039	Yes	Yes*
Delivery / Concrete Mixer/Dump Trucks	Pos 1 (2820 Sycamore Ave)	19	0.0762	0.080	Yes	Yes*
	Pos 2 (2820 Sycamore Ave)	2		0.126	Yes	Yes*
	Pos 3 (3648 Glenwood Ave)	13		0.087	Yes	Yes*
	Pos 4 (3700 Glenwood Ave)	7		0.098	Yes	Yes*
	Pos 5 (2842 Sycamore Ave)	35		0.071	Yes	Yes*
	Pos 6 (2838 Sycamore Ave)	50		0.066	Yes	Yes*
	Pos 7 (2828 Sycamore Ave)	14		0.085	Yes	Yes*
Dozer / Grader / Scraper	Pos 1 (2820 Sycamore Ave)	19	0.089	0.094	Yes	Yes*
	Pos 2 (2820 Sycamore Ave)	2		0.147	Yes	Yes*
	Pos 3 (3648 Glenwood Ave)	13		0.101	Yes	Yes*
	Pos 4 (3700 Glenwood Ave)	7		0.115	Yes	Yes*
	Pos 5 (2842 Sycamore Ave)	35		0.083	Yes	Yes*
	Pos 6 (2838 Sycamore Ave)	50		0.077	Yes	Yes*
	Pos 7 (2828 Sycamore Ave)	14		0.100	Yes	Yes*
Excavator	Pos 1 (2820 Sycamore Ave)	19	0.202	0.213	Yes*	Yes*
	Pos 2 (2820 Sycamore Ave)	2		0.335	Yes*	Yes*
	Pos 3 (3648 Glenwood Ave)	13		0.230	Yes*	Yes*
	Pos 4 (3700 Glenwood Ave)	7		0.261	Yes*	Yes*
	Pos 5 (2842 Sycamore Ave)	35		0.189	Yes	Yes*
	Pos 6 (2838 Sycamore Ave)	50		0.176	Yes	Yes*
	Pos 7 (2828 Sycamore Ave)	14		0.227	Yes*	Yes*
Paver (Vibratory Roller)	Pos 1 (2820 Sycamore Ave)	19	0.210	0.222	Yes*	Yes*
	Pos 2 (2820 Sycamore Ave)	2		0.348	Yes*	Yes*
	Pos 3 (3648 Glenwood Ave)	13		0.239	Yes*	Yes*
	Pos 4 (3700 Glenwood Ave)	7		0.271	Yes*	Yes*
	Pos 5 (2842 Sycamore Ave)	35		0.196	Yes	Yes*
	Pos 6 (2838 Sycamore Ave)	50		0.183	Yes	Yes*
	Pos 7 (2828 Sycamore Ave)	14		0.236	Yes*	Yes*
Skip Loader	Pos 1 (2820 Sycamore Ave)	19	0.003	0.003	Yes	Yes
	Pos 2 (2820 Sycamore Ave)	2		0.005	Yes	Yes
	Pos 3 (3648 Glenwood Ave)	13		0.003	Yes	Yes
	Pos 4 (3700 Glenwood Ave)	7		0.004	Yes	Yes
	Pos 5 (2842 Sycamore Ave)	35		0.003	Yes	Yes
	Pos 6 (2838 Sycamore Ave)	50		0.003	Yes	Yes
	Pos 7 (2828 Sycamore Ave)	14		0.003	Yes	Yes

Source: Federal Transit Administration (except Hanson 2001 for Vibratory rollers), 1995.

*In compliance with mitigation measures in place. Refer to Section 4.2.

3.4 Impact 3. Airport noise exposure

For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The project is not within two miles of a public airport or public use airport. Therefore, there is no noise impact.

4.0 SUMMARY OF BEST MANAGEMENT PRACTICES AND RECOMMENDATIONS

4.1 Noise Abatement Measures

- Construction haul trucks and materials delivery vehicles shall not travel through residential areas except when no reasonable alternative route is available. When travel through residential areas is unavoidable, the contractor shall minimize trips during sensitive hours, comply with posted speed limits, and implement measures to reduce noise, vibration, and safety impacts to the community.
- The construction contractor shall, to the maximum extent feasible, position noise-generating equipment and locate construction staging areas as far as practicable from noise-sensitive uses.
- All construction equipment and generators shall be equipped with properly functioning factory-installed or equivalent mufflers to reduce noise emissions. Mufflers shall be maintained in good working condition throughout the duration of construction. Additionally, equipment should be operated in a manner that minimizes unnecessary idling or high-speed operation near noise-sensitive areas to further reduce noise impacts.
- A 6-foot-tall solid fence will be installed along the project site perimeter to function as a noise barrier during construction activities. The fence will help reduce the line-of-sight between construction equipment and nearby receptors, thereby minimizing noise propagation into adjacent properties. This measure is intended to provide consistent noise reduction throughout the duration of the construction period.
- To ensure nearby residents are adequately informed, post a clearly visible sign at the project site that can be read from a distance of at least 50 feet. The sign should include the date(s) of the planned construction activities, a brief description of the type of work being performed and a contact phone number for the construction coordinator in case residents have questions or concerns.

4.2 Vibration Mitigation Measures

- Excavators and vibratory rollers shall operate at least 30 feet away from any building structure. If vibratory rollers are used, they must be operated with the vibration function turned off.
- For construction activities occurring within 30 feet of a building structure, the contractor shall implement alternative construction techniques or utilize equipment specifically designed to minimize vibration impacts. Acceptable alternatives may include, but are not limited to: hand excavation in lieu of mechanical

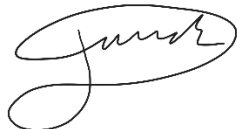
excavation in sensitive areas; the use of smaller soil compactors, mini-excavators, or compact track loaders where feasible; and strategic sequencing of work to avoid the simultaneous operation of vibration-intensive equipment.

4.3 Summary of Significance of Impacts

CEQA Noise Impact Question		No Impact	Less Than Significant	Less Than Significant with Mitigation	Potentially Significant
1	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.		X		
2	Generation of excessive ground borne vibration or ground born noise levels.		X		
3	For a project within 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.	X			

We trust this meets the project's needs. If you have any questions, please do not hesitate to call.

Sincerely,
Veneklasen Associates, Inc.



David Varela
Associate



Pablo H. Cantero
Senior Associate

APPENDIX A

Table A.1 – Definitions of Noise-Related Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound equivalent to 20 times the logarithm, to the base 10, of the ratio of the pressure of the sound to the reference pressure of 20 μ Pa.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured in an A-weighting filter network. The A-weighting de-emphasizes the very low frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are in the A-weighted scale.
L_0 (L_{max}), L_2, L_8, L_{25}, L_{50}	The A-weighted noise levels that are exceeded 0 percent (maximum noise level), 2 percent, 8 percent, 25 percent, and 50 percent of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the stated measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 P.M. to 10:00 P.M., and after addition of 10 decibels to noise levels in the night between 10:00 P.M. and 7:00 A.M.
Day-Night Noise Level, DNL, L_{dn}	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 P.M. and 7:00 A.M.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Impulsive Noise	Sound of short duration. Typically associated with an abrupt onset and rapid decay (i.e., gun-shots, etc.).
Pure Tones	A sound wave, residing over a small range of frequencies, which has a sinusoidal behavior over time.
VdB	Unit of measurement used by FHWA to describe ground-borne vibration. Equivalent to 20 times the logarithm, to the base 10, of the ratio of the root mean square ground-borne velocity to the reference of reference of 1×10^{-6} in/sec.

APPENDIX B

Traffic Noise Modeling Parameters

Table 1 - Project Trip Generation¹
Twelve Oaks Senior Community
2820 Sycamore Avenue, Glendale CA

Land Use (ITE Code)	Size	Units	AM Peak Hour Trips				PM Peak Hour Trips				Daily Trips	
			Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total
New Project Land Use Added												
Assisted Living (254)	36	Employees	0.42	15	64%	36%	0.48	17	32%	68%	4.24	153
					10	5			5	12		
Subtotal				15	10	5		17	5	12		153
Existing Project												
Assisted Living (254)	18	Employees	0.42	-7	64%	36%	0.48	-8	32%	68%	4.24	-76
					-4	-3			-3	-5		
Subtotal				-7	-4	-3		-8	-3	-5		-76
Net Trip Generation				8	6	2	-	9	2	7	-	77
¹ ITE "Trip Generation" Manual, 11th Edition, 2021												

¹ ITE "Trip Generation" Manual, 11th Edition, 2021

Source: Traffic study to be provided at a future date by Jano Baghdanian & Associates Consultants.

Table 2
Arterial Roadway Vehicle Mix Data
(Traffic distribution per time of day in percent of Average Daily Traffic – ADT)

VEHICLE TYPE	DAY (7 a.m. to 7 p.m.)	EVENING (7 p.m. to 10 p.m.)	NIGHT (10 p.m. to 7 a.m.)	TOTAL
Automobile	75.51	12.57	9.34	97.42
Medium Truck	1.56	0.09	0.19	1.84
Heavy Truck	0.64	0.02	0.08	0.74

Road	ADT	SPEED	CNEL 50' From CL	Distance to Contour From CL (ft)		
				70	65	60
HONOLULU AVE.						
West of Boston Ave.	6000	35	74.30	84	152	277
East of Boston Ave.	7000	35	75.00	91	165	300
East of Dunsmore Ave.	10000	35	76.60	109	199	361
East of New York Ave.	9000	35	76.10	104	188	341
West of Pennsylvania Ave.	5000	35	73.60	76	139	252
West of Ocean View Blvd.	10000	35	76.60	109	199	361
East of Ocean View Blvd.	8000	35	75.60	97	177	321
LA CRESCENTA AVE.						
North of Montrose Ave.	18000	40	80.80	173	307	547
South of Montrose Ave.	11000	40	78.60	135	240	427
South of Honolulu Ave.	10000	40	78.20	129	229	407
West of Roselawn Ave.	7000	40	76.70	108	192	341
East of Roselawn Ave.	9000	40	77.80	122	217	387

Source: Technical Appendix Glendale Noise Element.

APPENDIX C

Proposed Mechanical Equipment Sound Data

Project: 1013990 - 12 Oaks Assisted Living

Model Number: DSH0363W000014C

Design Requirements		Model Number:	DSH0363W000014C
Cooling Capacity	3 Ton	Code String:	DSH0363WXXXAXADXXXCXXX
Tap	T3	Tag:	RTU-2 (3T)
Configuration	Downflow	Cooling Performance	
Standard Features: DS Series Packaged Units		Total Capacity	34,862 BTU/h
- R-32 chlorine-free refrigerant		Sensible Capacity	25,955 BTU/h
- High-efficiency Copeland scroll compressor(s)		Cooling Stages	One
- Copper tube / aluminum fin coils		Refrig Type	R-32
- High-capacity, steel-cased filter dryer		Compressor Type	Copeland Scroll
- High- and Low-pressure switches		Pressure Switches	High & Low Pressure (std)
- Lugged electrical contactor		Outdoor Design Temp	95.0°F
- Single-point power		Entering Air Temp(db)	80.0°F
- Color Coded Wiring		Entering Air Temp(wb)	67.0°F
- Foil Faced Internal Insulation		Leaving Air Temp(db)	59.8°F
- Heavy-gauge, galvanized-steel cabinet		Leaving Air Temp(wb)	57.6°F
- UV-resistant powder-paint finish		Efficiency (M1)	14.0 SEER2/12.00 EER2
- Full perimeter base rail		Heating Performance	
Unit Electrical Data		Heat Type	Heat Pump
Power Supply	208-230/3/60 VOLT/PH	LAT (47°F)	81.6
Total Unit MCA	19.2/19.2 A	BTU/h (47°F)	33600
Total Unit MOP	25/25 A	HSPF	6.9
Indoor Motor HP	1.2 HP	Supply Air Blower Performance	
Total Unit FLA	16.55/16.55 A	ACFM	1171 CFM
• Compressor RLA	10.6	SCFM	1171 CFM
• Blower FLA	5.0	ESP	1.5 IWG
• Outdoor Fan FLA	0.95	Ultra Low-Leak Downflow Economizer W/ Dry Bulb Sensor	0.05 IWG
SCCR	5 kA	Filtration-MERV13	0.06 IWG
		Total ESP	1.61 IWG
		Blower Type	Direct Drive - High Static
		Elevation	0 ft
		Physical Attributes	
		Base Unit Oper. Weight (lbs)	535
		Filter(s)	Qty (4) 14"X20"X2"

Outdoor sound (db) at 60 Hz									
Model	A-Weighted	63	125	250	500	1000	2000	4000	8000
1	74.7	N/A	61.8	65.6	68.9	70.3	66.4	60.1	51.8

db - decibel

Notes:

1 Outdoor sound data is measured in accordance with AHRI standard 270.

2 Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environment factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.

3 A-weighted sound ratings filter out high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Daikin units are taken in accordance with AHRI standard 270.

Project: 1013990 - 12 Oaks Assisted Living

Model Number: DSH0603W000022C

Design Requirements		Model Number:	DSH0603W000022C
Cooling Capacity	5 Ton	Code String:	DSH0603WXXXAXADXXCXXX
Tap	T5	Tag:	RTU-4 (5T)
Configuration	Downflow	Cooling Performance	
Standard Features: DS Series Packaged Units		Total Capacity	57,575 BTU/h
- R-32 chlorine-free refrigerant - High-efficiency Copeland scroll compressor(s) - Copper tube / aluminum fin coils - High-capacity, steel-cased filter dryer - High- and Low-pressure switches - Lugged electrical contactor - Single-point power - Color Coded Wiring - Foil Faced Internal Insulation - Heavy-gauge, galvanized-steel cabinet - UV-resistant powder-paint finish - Full perimeter base rail		Sensible Capacity	42,716 BTU/h
Unit Electrical Data		Cooling Stages	One
Power Supply	208-230/3/60 VOLT/PH	Refrig Type	R-32
Total Unit MCA	31.3/31.3 A	Compressor Type	Copeland Scroll
Total Unit MOP	45/45 A	Pressure Switches	High & Low Pressure (std)
Indoor Motor HP	2.3 HP	Outdoor Design Temp	95.0°F
Total Unit FLA	27.00/27.00 A	Entering Air Temp(db)	80.0°F
• Compressor RLA	17.3	Entering Air Temp(wb)	67.0°F
• Blower FLA	7.7	Leaving Air Temp(db)	59.4°F
• Outdoor Fan FLA	2.0	Leaving Air Temp(wb)	57.3°F
SCCR	5 kA	Efficiency (M1)	13.70 SEER2/11.80 EER2
		Heating Performance	
		Heat Type	Heat Pump
		LAT (47°F)	82
		BTU/h (47°F)	55000
		HSPF	6.9
		Supply Air Blower Performance	
		ACFM	1888 CFM
		SCFM	1888 CFM
		ESP	1.5 IWG
		Ultra Low-Leak Downflow Economizer W/ Dry Bulb Sensor	0.13 IWG
		Filtration-MERV13	0.06 IWG
		Total ESP	1.69 IWG
		Blower Type	Direct Drive - High Static
		Elevation	0 ft
		Physical Attributes	
		Base Unit Oper. Weight (lbs)	596
		Filter(s)	Qty (4) 14"X20"X2"

Outdoor sound (db) at 60 Hz									
Model	A-Weighted	63	125	250	500	1000	2000	4000	8000
3	78.8	N/A	62.1	68.3	72.1	73.8	72.9	68.4	58.3

db - decibel

Notes:

¹ Outdoor sound data is measured in accordance with AHRI standard 270.

² Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environment factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.

³ A-weighted sound ratings filter out high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Daikin units are taken in accordance with AHRI standard 270.

Project: 1013990 - 12 Oaks Assisted Living

Model Number: DSH0723W000018C

Design Requirements		Model Number:	DSH0723W000018C
Cooling Capacity	6 Ton	Code String:	DSH0723WXXXCXADXXXCXXX
Tap	T5	Tag:	RTU-5 (6T)
Configuration	Downflow	Cooling Performance	
Standard Features: DS Series Packaged Units		Total Capacity	67,866 BTU/h
- R-32 chlorine-free refrigerant - High-efficiency Copeland scroll compressor(s) - Copper tube / aluminum fin coils - High-capacity, steel-cased filter dryer - High- and Low-pressure switches - Lugged electrical contactor - Single-point power - Color Coded Wiring - Foil Faced Internal Insulation - Heavy-gauge, galvanized-steel cabinet - UV-resistant powder-paint finish - Full perimeter base rail		Sensible Capacity	52,128 BTU/h
Unit Electrical Data		Cooling Stages	Two
Power Supply	208-230/3/60 VOLT/PH	Refrig Type	R-32
Total Unit MCA	30.6/30.6 A	Compressor Type	Copeland Scroll
Total Unit MOP	45/45 A	Pressure Switches	High & Low Pressure (std)
Indoor Motor HP	2.3 HP	Outdoor Design Temp	95.0°F
Total Unit FLA	26.50/26.50 A	Entering Air Temp(db)	80.0°F
• Compressor RLA	16.1	Entering Air Temp(wb)	67.0°F
• Blower FLA	7.7	Leaving Air Temp(db)	59.7°F
• Outdoor Fan FLA	2.7	Leaving Air Temp(wb)	57.8°F
SCCR	5 kA	Efficiency	16.70 IEER/11.30 EER
		Heating Performance	
		Heat Type	Heat Pump
		LAT (47°F)	81.6
		COP (47°F)	3.4
		BTU/h (47°F)	67000
		COP (17°F)	2.25
		Supply Air Blower Performance	
		ACFM	2333 CFM
		SCFM	2333 CFM
		ESP	1.25 IWG
		Ultra Low-Leak Downflow Economizer W/ Dry Bulb Sensor	0.19 IWG
		Filtration-MERV13	0.06 IWG
		Total ESP	1.55 IWG
		Blower Type	Direct Drive - High Static
		Elevation	0 ft
		Physical Attributes	
		Base Unit Oper. Weight (lbs)	649
		Filter(s)	Qty (2) 14/20"X20"X2"

Outdoor sound (db) at 60 Hz									
Model	A-Weighted	63	125	250	500	1000	2000	4000	8000
9	82.3	N/A	67.3	74.6	77.0	77.4	73.7	68.0	60.7

db - decibel

Notes:

1 Outdoor sound data is measured in accordance with AHRI standard 270.

2 Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environment factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.

3 A-weighted sound ratings filter out high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Daikin units are taken in accordance with AHRI standard 270.

Project: 1013990 - 12 Oaks Assisted Living

Model Number: DSH0903W000007C

Design Requirements		Model Number:	DSH0903W000007C
Cooling Capacity	7.5 Ton	Code String:	DSH0903WXXXCXADXXCXXX
Tap	T7	Tag:	RTU-6 (7.5T)
Configuration	Downflow	Cooling Performance	
Standard Features: DS Series Packaged Units		Total Capacity	168,132 BTU/h
- R-32 chlorine-free refrigerant - High-efficiency Copeland scroll compressor(s) - Copper tube / aluminum fin coils - High-capacity, steel-cased filter dryer - High- and Low-pressure switches - Lugged electrical contactor - Single-point power - Color Coded Wiring - Foil Faced Internal Insulation - Heavy-gauge, galvanized-steel cabinet - UV-resistant powder-paint finish - Full perimeter base rail		Sensible Capacity	123,463 BTU/h
Unit Electrical Data		Cooling Stages	Two
Power Supply	208-230/3/60 VOLT/PH	Refrig Type	R-32
Total Unit MCA	42.3/42.3 A	Compressor Type	Copeland Scroll
Total Unit MOP	50/50 A	Pressure Switches	High & Low Pressure (std)
Indoor Motor HP	3.5 HP	Outdoor Design Temp	95.0°F
Total Unit FLA	39.30/39.30 A	Entering Air Temp(db)	80.0°F
• Compressor RLA	24.4	Entering Air Temp(wb)	67.0°F
• Blower FLA	10.9	Leaving Air Temp(db)	39.8°F
• Outdoor Fan FLA	4.0	Leaving Air Temp(wb)	39.8°F
SCCR	5 kA	Efficiency	16 IEER/11.4 EER
		Heating Performance	
		Heat Type	Heat Pump
		LAT (47°F)	83.4
		COP (47°F)	3.4
		BTU/h (47°F)	86000
		LAT (17°F)	71.5
		COP (17°F)	2.25
		BTU/h (17°F)	50000
		Supply Air Blower Performance	
		ACFM	2800 CFM
		SCFM	2800 CFM
		ESP	1.5 IWG
		Ultra Low-Leak Downflow Economizer W/ Dry Bulb Sensor	0.06 IWG
		Filtration-MERV13	0.06 IWG
		Total ESP	1.62 IWG
		Blower Type	Direct Drive - High Static
		Elevation	0 ft
		Physical Attributes	
		Base Unit Oper. Weight (lbs)	1157
		Filter(s)	Qty (2)25"X25"X2(2) 20"X25"X2"

Outdoor sound (db) at 60 Hz									
Model	A-Weighted	63	125	250	500	1000	2000	4000	8000
11	86.8	95.4	85.3	86.8	83.3	81.7	79.8	72.2	66.9

db - decibel

Notes:

- 1 Outdoor sound data is measured in accordance with AHRI standard 270.
- 2 Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environment factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
- 3 A-weighted sound ratings filter out high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Daikin units are taken in accordance with AHRI standard 270.

	DP5HM 2441** + OTHPPKG	DP5HM 3041**	DP5HM 3641**	DP5HM 4241**	DP5HM 4841**	DP5HM 6041**
COOLING CAPACITY						
Total BTU/h	24,000	29,600	34,000	40,500	46,500	56,500
Sensible BTU/h	18,400	22,800	26,000	30,000	36,000	44,000
SEER2 / EER2	15.2 / 11.4	15.2 / 11.4	15.2 / 11.4	15.2 / 11.4	15.2 / 11.2	15.2 / 11.2
AHRI Numbers	210288041	210288042	210288043	210288044	210288045	210288046
HEATING CAPACITY						
BTU/h (47°F)	22,800	28,600	33,800	38,500	44,500	58,500
C.O.P. (47°F)	3.68	3.45	3.70	3.60	3.53	3.73
BTU/h (17°F)	11,200	16,300	19,700	22,200	25,700	32,100
C.O.P. (17°F)	1.95	2.23	2.28	2.15	2.23	2.45
HSPF2	6.70	6.70	6.80	6.80	6.80	6.80
EVAPORATOR MOTOR						
Type	ECM	ECM	ECM	ECM	ECM	ECM
Wheel (D x W)	10 x 9	10 x 9	10 x 9	10 x 9	10 x 9	11 x 10
Cooling CFM ³	850	1050	1200	1300	1600	2000
No. of Speeds	Variable	Variable	Variable	Variable	Variable	Variable
Horsepower- RPM	¼-1,050	¼-1,050	¼-1,050	¼-1,050	¼-1,050	1-1,200
EVAPORATOR COIL						
Face Area (ft ²)	4.55	4.55	6.2	6.2	6.2	9.16
Rows Deep	4	4	4	4	4	4
Fins per Inch	14	14	14	14	14	16
Metering Device Type	TXV	TXV	TXV	TXV	TXV	TXV
Drain Size (NPT)	¾"	¾"	¾"	¾"	¾"	¾"
Refrigerant Charge (oz.)	147	150	165	170	170	225
CONDENSER FAN						
Horsepower- RPM	¼- 830	¼- 830	¼- 1,075	¼- 1,075	¼- 1,075	¼- 1,090
Fan Diameter	22	22	22	22	22	22
# of Fan Blades	3	3	3	3	3	3
CONDENSER COIL						
Face Area (ft ²)	15.24	15.24	19.05	19.05	19.05	19.01
Rows Deep	2	2	2	2	2	2
Fins per Inch	16	16	16	16	16	16
Metering Device Type	TXV	TXV	TXV	TXV	TXV	TXV
COMPRESSOR						
Quantity	1	1	1	1	1	1
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Stage	Two	Two	Two	Two	Two	Two
Sound Power						
dBA	76	76	81	80	79	80
ELECTRICAL DATA						
Compressor RLA/LRA	10.9 / 61.0	13.1 / 73	14.1 / 84.2	19.9 / 150.7	21.2 / 104	22.9 / 147.2
Voltage/Phase (60 Hz)	208-230/ 1	208-230/ 1	208-230/ 1	208-230/ 1	208-230/ 1	208-230/ 1
Indoor Blower FLA	4.3	4.3	4.3	6.8	6.8	6.9
Outdoor Fan FLA	1.3	1.3	1.4	1.4	1.4	3.5
M.C.A. ¹	19.2	22	23.3	33.1	34.7	39
M.O.P. ²	30	35	35	50	50	60
SHIPPING WEIGHTS (LBS)						
	376	385	492	492	492	688

¹ Wire size should be determined in accordance with National Electrical Codes. Extensive wire runs will require larger wire sizes.

² Must use time-delay fuses or HACR-type circuit breakers of the same size as noted.

³ Factory

Always check the S&R plate for electrical data on the unit being installed.

Note: ¹ Always check the S&R plate for electrical data on the unit being installed.

² "OTHPPKG" stands for Outdoor Thermostat Heat Pump Package. The OTHPPKG Kit is required for DP5HM2441 unit to achieve the published HSPF2 value.



Submittal Data Sheet
3.0 Ton VRV-IVS Heat Pump
RXTQ36TBVJUB

PERFORMANCE

Outdoor Unit Model No.	RXTQ36TBVJUB	Outdoor Unit Name:	3.0 Ton VRV-IVS Heat Pump
Type:	Heat Pump		
Rated Cooling Conditions:	Indoor ("F DB/DB): 80 / 67 Ambient ("F DB/WB): 95 / 75	Rated Heating Conditions:	Indoor ("F DB/WB): 70 / 60 Ambient ("F DB/WB): 47 / 43
Rated Piping Length(ft):			
Rated Height Difference (ft):			
Cooling Capacity (Rated/Non-Ducted/Ducted) (Btu/hr):	/ 34,200 / 34,200	Heating Capacity (Rated/Non-Ducted/Ducted) (Btu/hr):	//
Cooling Input Power (kW):		Heating Input Power (kW):	
EER2 (Non-Ducted/Ducted):	12.00 / 9.20	SEER2 (Non-Ducted/Ducted):	23.00 / 15.30
HSPF2 (Non-Ducted/Ducted):	9.6 / 8.5	Heating COP (Non-Ducted/Ducted):	

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208-230 / 60 / 1	Compressor Stage:	
Power Supply Connections:		Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	19.8	Airflow Rate (H) (CFM):	2682
Max Overcurrent Protection (MOP) (A):	20	Gas Pipe Connection (inch):	5/8
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	3/8
Rated Load Amps RLA(A):		Sound Pressure (H) (dBA):	58
Dimensions (HxWxD) (in):	39 x 37 x 12-5/8	Sound Power Level (dBA):	
Net Weight (lb):	172		



Submittal Data Sheet
2.0 T Residential VRV
RXSQ24TBVJUB

PERFORMANCE

Outdoor Unit Model No.:	RXSQ24TBVJUB	Outdoor Unit Name:	2.0 T Residential VRV
Type:	Heat Pump		
Rated Cooling Conditions:	Indoor ("F DB/DB): 80 / 67 Ambient ("F DB/WB): 95 /	Rated Heating Conditions:	Indoor ("F DB/WB): 70 / Ambient ("F DB/WB): 47 / 43
Rated Piping Length(ft):			
Rated Height Difference (ft):			
Cooling Capacity (Rated/Non-Ducted/Ducted) (Btu/hr):	/ 23,000 / 23,000	Heating Capacity (Rated/Non-Ducted/Ducted) (Btu/hr):	//
Cooling Input Power (kW):		Heating Input Power (kW):	
EER2 (Non-Ducted/Ducted):	14.50 / 11.20	SEER2 (Non-Ducted/Ducted):	23.00 / 15.90
HSPF2 (Non-Ducted/Ducted):	9.6 / 8.2	Heating COP (Non-Ducted/Ducted):	

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208/230 / 60 / 1	Compressor Stage:	
Power Supply Connections:		Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	19.8	Airflow Rate (H) (CFM):	2682
Max Overcurrent Protection (MOP) (A):	20	Gas Pipe Connection (inch):	5/8
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	3/8
Rated Load Amps RLA(A):		Sound Pressure (H) (dBA):	58
Dimensions (HxWxD) (in):	39 x 37 x 12-5/8	Sound Power Level (dBA):	
Net Weight (lb):	172		



Cut Sheet - Not for Submittal
Printed Date: 09/03/2024
Mark: GEF-2
Model: USF-27

Performance	
Quantity	1
Volume (CFM)	10,700
Total External SP (in. wg)	2.173
Operating Power (hp)	5.75
Required Power (hp)	5.75
Fan RPM	1252
Max Fan RPM	1,542
Oper. Frequency (Hz)	64
Elevation (ft)	325
Start-up Temp.(F)	70
Operating Temp.(F)	70

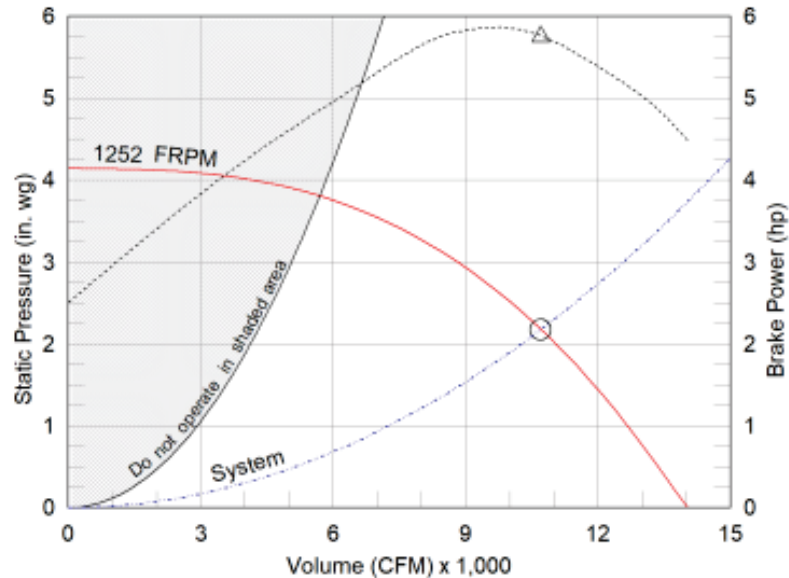
Fan Configuration	
Size	27
Wheel Type	AF
Arrangement	4
Drive Type	Direct
Class	I
Rotation	CW
Discharge Position	TH
Construction Type	PermaLock
Spark Resistance	None
Scroll Material	Steel
Wheel Material	Steel
Inlet Cone Material	Steel
Pedestal Material	Steel

Equipment Weights	
Fan (LMD)(lb)	399
Motor/Drive (lb)	322
Accessories (lb)	54
Fan Total (lb)	775

Misc Fan Data	
Fan Energy Index (FEI)	1.35
Outlet Velocity (ft/min)	2,551
Static Efficiency (%)	64
Tip Speed (ft/min)	8,848
Shaft Bearing Type	N/A
Bearing Life Calculation	N/A

Motor and Drives	
Motor	Included
Size (hp)	10
RPM	1170
Enclosure	TEFC
V/C/P	208/60/3
Frame Size	254T
Max Frame Size	365
Location	Centered
MCA* (Amps)	40.5
MOP* (Amps)	50
SCCR* (Kiloamps)	5

Model: USF-27 Universal Single Width Fan Operating Performance



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- - - System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1.5 in. wg
Damper	0.673 in. wg
Total External SP	2.173 in. wg

Nameplate Model: USF-27-5-A2-00-02-02



Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	93	96	90	83	78	73	69	65	87	75	27
Outlet	92	91	89	85	80	75	74	70	87	75	26

*Values are estimated and subject to change. Actual values provided on fan at time of manufacture.

LwA - A weighted sound power level, based on ANSI S1.4

dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International

Sones - calculated using AMCA 301 at 5 ft

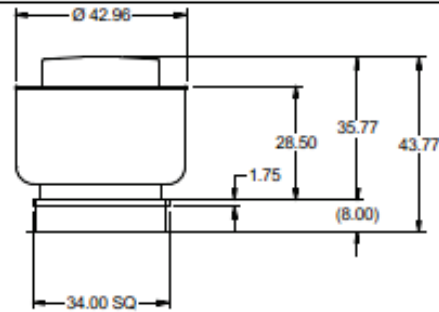


Cut Sheet - Not for Submittal
Printed Date: 09/03/2024
Mark: GEF-1
Model: CUBE-240HP-VGD-30

Model: CUBE-240HP-VGD-30

Belt Drive Upblast Centrifugal Roof Exhaust Fan

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	181
Weight w/ Acc's (lb)	210
Weight w/ Acc's and Curb (lb)	251
Max T Motor Frame Size	184
Standard Curb Cap Size (in.)	34 x 34
Optional Damper (in.)	24 x 24
Roof Opening (in.)	30.5 x 30.5

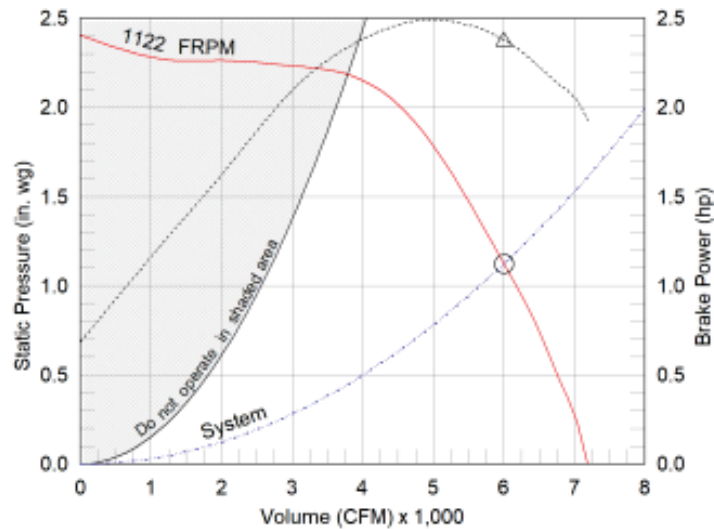


Performance	
Requested Volume (CFM)	6,000
Actual Volume (CFM)	6,000
Total External SP (in. wg)	1.123
Fan RPM	1122
Operating Power (hp)	2.37
Elevation (ft)	325
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.074
Drive Loss (%)	4.6
Tip Speed (ft/min)	7,193
Static Eff. (%)	47

Misc Fan Data	
Fan Energy Index (FEI)	1.04
Outlet Velocity (ft/min)	1,596

Motor	
Motor Included	Yes
Size (hp)	3
Voltage/Cycle/Phase	208/60/3
Enclosure	ODP
Motor RPM	1725
Efficiency Rating	NEMA Premium
Windings	1
NEC FLA* (Amps)	10.6
Min. Circuit Ampacity (MCA)	13.65
Max. Overcurrent Protection (MOP)	25
Short Circuit Current Rtg (SCCR)	50 kAIC

OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Static Pressure Calculations

External SP	1 in. wg
Damper	0.123 in. wg
Total External SP	1.123 in. wg

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory.
MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4 dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using ANSI/AMCA 301 at 5 ft
Sound value does not include carrier frequencies associated with motor controller



Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	80	82	88	81	76	74	69	66	84	72	21



Cut Sheet - Not for Submittal
Printed Date: 09/03/2024
Mark: KEF-1
Model: USF-15

Performance	
Quantity	1
Volume (CFM)	3,000
Total External SP (in. wg)	1.5
Operating Power (hp)	1.25
Required Power (hp)	1.25
Fan RPM	1821
Max Fan RPM	2,016
Oper. Frequency (Hz)	62
Elevation (ft)	325
Start-up Temp.(F)	70
Operating Temp.(F)	70

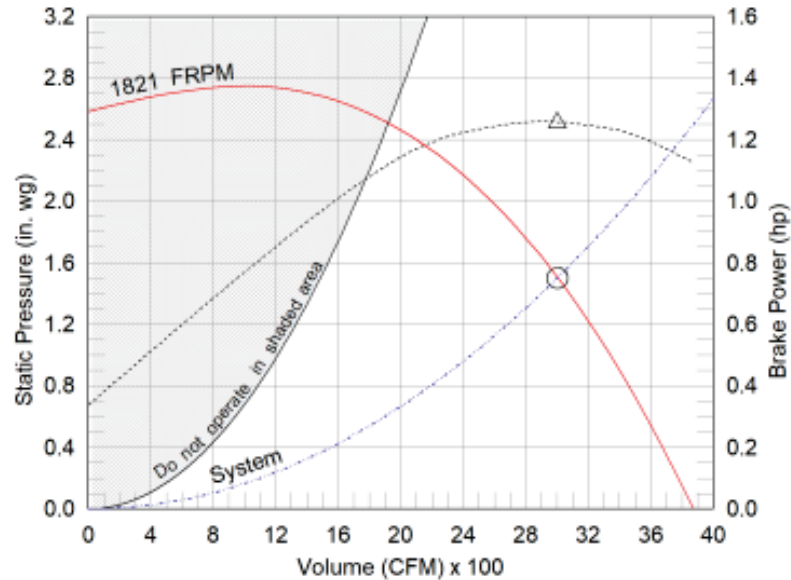
Fan Configuration	
Size	15
Wheel Type	BI
Arrangement	4
Drive Type	Direct
Class	0
Rotation	CW
Discharge Position	UB
Construction Type	PermaLock
Spark Resistance	None
Scroll Material	Steel
Wheel Material	Aluminum
Inlet Cone Material	Galvanized
Pedestal Material	Steel

Equipment Weights	
Fan (LMD)(lb)	117
Motor/Drive (lb)	48
Accessories (lb)	15
Fan Total (lb)	179

Misc Fan Data	
Fan Energy Index (FEI)	1.36
Outlet Velocity (ft/min)	2,318
Static Efficiency (%)	56
Tip Speed (ft/min)	6,940
Shaft Bearing Type	N/A
Bearing Life Calculation	N/A

Motor and Drives	
Motor	Included
Size (hp)	2
RPM	1770
Enclosure	TEFC
V/Hz/P	208/60/3
Frame Size	145T
Max Frame Size	215
Location	Centered
MCA* (Amps)	9.38
MOP* (Amps)	15
SCCR* (Kiloamps)	5

Model: USF-15 Universal Single Width Fan Operating Performance



- △ Operating Bhp point
- Operating point at Total External SP
- Fan curve
- System curve
- Brake horsepower curve

Nameplate Model: USF-15-3-B7-00-02-02



Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	86	83	85	82	76	74	71	64	84	72	21
Outlet	97	88	88	82	79	76	71	65	85	74	25

*Values are estimated and subject to change. Actual values provided on fan at time of manufacture.
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per octave band at 5 ft- dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft



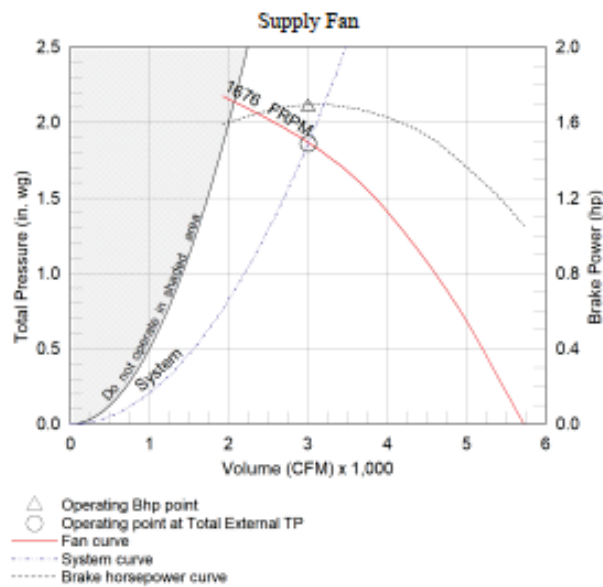
Cut Sheet - Not for Submittal
Printed Date: 09/03/2024
Mark: MUA-1
Model: MSX-P116-H22-MF

Fan Charts And Performance

Supply Fan Performance									
Total Volume (CFM)	External SP (in. wg)	Total SP (in. wg)	RPM	Operating Power (hp)	Motor		Fan		
					Qty	Size (HP)	Qty	Type	Drive-Type
3,000	1.5	1.858	1676	1.68	1	2	1	Mixed Flow	Direct

Pressure Drop (in. wg)							
Diffuser	Weatherhood	Filter	Damper	Cooling	Heating	External	Total
-	-	-	-	0.358	-	1.5	1.858

Sound Performance in Accordance with AMCA									
Sound Power by Octave Band								Lwa	dBA
62.5	125	250	500	1000	2000	4000	8000		Sones
79	74	73	74	75	75	74	70	81	70





Submittal Data Sheet

0.75-Ton FDMQ Ducted Concealed Unit
FDMQ09WVJU9RX09WMVJU9

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208/230 / 60 / 1	Compressor Stage:	Inverter
Power Supply Connections:	1, 2, 3, Ground	Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	7.6	Airflow Rate (H) (CFM):	985
Max Overcurrent Protection (MOP) (A):	15	Gas Pipe Connection (inch):	3/8
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	1/4
Rated Load Amps RLA(A):	7.5	Sound Pressure (H) (dBA):	46
Dimensions (HxWxD) (in):	21-5/8 x 26-9/16 x 11-3/16	Sound Power Level (dBA):	
Net Weight (lb):	63		



Submittal Data Sheet

1.5-Ton FDMQ Ducted Concealed Unit
FDMQ18WVJU9RX18WMVJU9

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208/230 / 60 / 1	Compressor Stage:	Inverter
Power Supply Connections:	1, 2, 3, Ground	Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	11.6	Airflow Rate (H) (CFM):	2461
Max Overcurrent Protection (MOP) (A):	15	Gas Pipe Connection (inch):	1/2
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	1/4
Rated Load Amps RLA(A):	10.8	Sound Pressure (H) (dBA):	54
Dimensions (HxWxD) (in):	28-15/16 x 34-1/4 x 12-5/8	Sound Power Level (dBA):	
Net Weight (lb):	100		



Submittal Data Sheet

1.0-Ton FDMQ Ducted Concealed Unit
FDMQ12WVJU9RX12WMVJU9

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208/230 / 60 / 1	Compressor Stage:	Inverter
Power Supply Connections:	1, 2, 3, Ground	Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	7.7	Airflow Rate (H) (CFM):	1105
Max Overcurrent Protection (MOP) (A):	15	Gas Pipe Connection (inch):	3/8
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	1/4
Rated Load Amps RLA(A):	7.5	Sound Pressure (H) (dBA):	49
Dimensions (HxWxD) (in):	21-5/8 x 26-9/16 x 11-3/16	Sound Power Level (dBA):	
Net Weight (lb):	63		



Submittal Data Sheet

2.0-Ton FDMQ Ducted Concealed Unit
FDMQ24WVJU9RX24WMVJU9

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208/230 / 60 / 1	Compressor Stage:	Inverter
Power Supply Connections:	1, 2, 3, Ground	Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	13.1	Airflow Rate (H) (CFM):	2641
Max Overcurrent Protection (MOP) (A):	20	Gas Pipe Connection (inch):	5/8
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	1/4
Rated Load Amps RLA(A):	12.0	Sound Pressure (H) (dBA):	56
Dimensions (HxWxD) (in):	28-15/16 x 34-1/4 x 12-5/8	Sound Power Level (dBA):	
Net Weight (lb):	109		



Submittal Data Sheet

3.0 Ton VRV-IVS Heat Pump

RXTQ36TBVJUB

PERFORMANCE

Outdoor Unit Model No.	RXTQ36TBVJUB	Outdoor Unit Name:	3.0 Ton VRV-IVS Heat Pump
Type:	Heat Pump		
Rated Cooling Conditions:	Indoor (*F DB/DB): 80 / 67 Ambient (*F DB/WB): 95 / 75	Rated Heating Conditions:	Indoor (*F DB/WB): 70 / 60 Ambient (*F DB/WB): 47 / 43
Rated Piping Length(ft):			
Rated Height Difference (ft):			
Cooling Capacity (Rated/Non-Ducted/Ducted) (Btu/hr):	/ 34,200 / 34,200	Heating Capacity (Rated/Non-Ducted/Ducted) (Btu/hr):	//
Cooling Input Power (kW):		Heating Input Power (kW):	
EER2 (Non-Ducted/Ducted):	12.00 / 9.20	SEER2 (Non-Ducted/Ducted):	23.00 / 15.30
HSPF2 (Non-Ducted/Ducted):	9.6 / 8.5	Heating COP (Non-Ducted/Ducted):	

OUTDOOR UNIT DETAILS

Power Supply (V/Hz/Ph):	208-230 / 60 / 1	Compressor Stage:	
Power Supply Connections:		Capacity Control Range (%):	-
Min. Circuit Amps MCA (A):	19.8	Airflow Rate (H) (CFM):	2682
Max Overcurrent Protection (MOP) (A):	20	Gas Pipe Connection (inch):	5/8
Max Starting Current MSC(A):		Liquid Pipe Connection (inch):	3/8
Rated Load Amps RLA(A):		Sound Pressure (H) (dBA):	58
Dimensions (HxWxD) (in):	39 x 37 x 12-5/8	Sound Power Level (dBA):	
Net Weight (lb):	172		

APPENDIX D

Construction Equipment Vibration Calculation Samples

			Receptor R1	
			Building category	Criteria PPV (in/sec)
			III. Non-engineered timber and masonry buildings	0.2
			Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R1	PPV _{equip} at R1	
Jackhammer	0.035	19	0.037	
Loaded trucks	0.076	19	0.080	
Large Bulldozer	0.089	19	0.094	
Excavator	0.202	19	0.213	
Vibratory Roller	0.210	19	0.222	
Small bulldozer	0.003	19	0.003	
			Receptor R2	
			Building category	Criteria PPV (in/sec)
			III. Non-engineered timber and masonry buildings	0.2
			Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R2	PPV _{equip} at R2	
Jackhammer	0.035	2	0.058	
Loaded trucks	0.076	2	0.126	
Large Bulldozer	0.089	2	0.147	
Excavator	0.202	2	0.335	
Vibratory Roller	0.210	2	0.348	
Small bulldozer	0.003	2	0.005	
			Receptor R3	
			Building category	Criteria PPV (in/sec)
			III. Non-engineered timber and masonry buildings	0.2
			Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R3	PPV _{equip} at R3	
Jackhammer	0.035	13	0.040	
Loaded trucks	0.076	13	0.087	
Large Bulldozer	0.089	13	0.101	
Excavator	0.202	13	0.230	
Vibratory Roller	0.210	13	0.239	
Small bulldozer	0.003	13	0.003	
			Receptor R4	
			Building category	Criteria PPV (in/sec)
			III. Non-engineered timber and masonry buildings	0.2
			Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R4	PPV _{equip} at R4	
Jackhammer	0.035	7	0.045	
Loaded trucks	0.076	7	0.098	
Large Bulldozer	0.089	7	0.115	
Excavator	0.202	7	0.261	
Vibratory Roller	0.210	7	0.271	
Small bulldozer	0.003	7	0.004	
			Receptor R5	
			Building category	Criteria PPV (in/sec)
			III. Non-engineered timber and masonry buildings	0.2
			Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R5	PPV _{equip} at R5	
Jackhammer	0.035	35	0.033	
Loaded trucks	0.076	35	0.071	
Large Bulldozer	0.089	35	0.083	
Excavator	0.202	35	0.189	
Vibratory Roller	0.210	35	0.196	
Small bulldozer	0.003	35	0.003	
			Receptor R6	
			Building category	Criteria PPV (in/sec)
			III. Non-engineered timber and masonry buildings	0.2
			Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R6	PPV _{equip} at R6	
Jackhammer	0.035	50	0.030	
Loaded trucks	0.076	50	0.066	
Large Bulldozer	0.089	50	0.077	
Excavator	0.202	50	0.176	
Vibratory Roller	0.210	50	0.183	
Small bulldozer	0.003	50	0.003	

Twelve Oaks CEQA Noise Report
January 28, 2026

		Receptor R7	
		Building category	Criteria PPV (in/sec)
Damage Criteria		III. Non-engineered timber and masonry buildings	0.2
Annoyance Criteria		Category II: Residences and building where people normally sleep	
Equipment type	PPV _{ref} at 25 ft (in/sec)	Distance (ft) to R7	PPV _{equip} at R7
Jackhammer	0.035	14	0.039
Loaded trucks	0.076	14	0.085
Large Bulldozer	0.089	14	0.100
Excavator	0.202	14	0.227
Vibratory Roller	0.210	14	0.236
Small bulldozer	0.003	14	0.003

APPENDIX E

Construction Equipment Noise Calculation Samples

Phase 1 Site Clearance

[illegible]

Phase 2 Grading

Project No.

Twelve Oaks

8623-001

Project Date

4/7/2025

Project criteria (dBA)

90

Calculation of sound levels - user only edits project criteria max level, equipment type and quantity, and barrier distances. If needed, manually adjust distances between source and receiver (if center point at project site is not used) and reference utilization %

Equipment	Qty	Reference Sound Pressure Level @ 50 ft (dBA re: 20µPa)						Reference Utilization (%)			Receptor R1		Receptor R2	
		Client	FTA	FHWA (Predicted)	FHWA (Measured)	VA	Used	Client	FHWA	Used	Distance to R1 (ft)	Sound Pressure Level @ R1 (dBA re: 20µPa)	Distance to R2 (ft)	Sound Pressure Level @ R2 (dBA re: 20µPa)
Excavator	2	0	0	85	81	0	85	N/A	40%	40%	116	77	148	75
Loader	1	0	80	0	0	0	80	N/A	N/A	100%	116	73	148	71
Loader	1	0	80	0	0	0	80	N/A	N/A	100%	116	73	148	71
Scraper	1	0	85	85	84	87	87	N/A	40%	40%	116	76	148	74
Dozer	2	0	85	85	82	0	85	N/A	40%	40%	116	77	148	75
Front end loader	2	0	80	80	79	78	80	N/A	40%	40%	116	72	148	70
Truck	1	0	84	0	0	88	88	N/A	N/A	100%	116	81	148	78
No equipment	1	0	0	0	0	0	N/A	N/A	N/A	N/A	116	0	148	0
No equipment	1	0	0	0	0	0	N/A	N/A	N/A	N/A	116	0	148	0
No equipment	1	0	0	0	0	0	N/A	N/A	N/A	N/A	116	0	148	0
Total Sound Pressure Level at Receiver NO Barrier											85		83	
Total Sound Pressure Level at Receiver WITH Barrier											77		75	

Receptor R3		Receptor R4		Receptor R5		Receptor R6		Receptor R7	
Distance to R3 (ft)	Sound Pressure Level @ R3 (dBA re: 20µPa)	Distance to R4 (ft)	Sound Pressure Level @ R4 (dBA re: 20µPa)	Distance to R5 (ft)	Sound Pressure Level @ R5 (dBA re: 20µPa)	Distance to R6 (ft)	Sound Pressure Level @ R6 (dBA re: 20µPa)	Distance to R7 (ft)	Sound Pressure Level @ R7 (dBA re: 20µPa)
128	76	129	76	224	71	93	79	114	77
128	72	129	72	224	67	93	75	114	73
128	72	129	72	224	67	93	75	114	73
128	75	129	75	224	70	93	78	114	76
128	76	129	76	224	71	93	79	114	77
128	71	129	71	224	66	93	74	114	72
128	80	129	80	224	75	93	83	114	81
128	0	129	0	224	0	93	0	114	0
128	0	129	0	224	0	93	0	114	0
128	0	129	0	224	0	93	0	114	0
	84		84		79		87		85
	76		76		71		79		77

Calculation of sound levels - user only edits project criteria max level, equipment type and quantity, and barrier distances. If needed, manually adjust distances between source and receiver (if center point at project site is not used) and reference utilization %

Phase 4 Foundation & SOG

Calculation of sound levels - user only edits project criteria max level, equipment type and quantity, and barrier distances. If needed, manually adjust distances between source and receiver (if center point at project site is not used) and reference utilization %

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APPENDIX F

Proposed Equipment used in Construction Phases

Table 14 – Proposed Equipment used in Construction Phases

Phase Name	Equipment Type	Sound Level at Reference Distance (dBA at 50-feet)	Total number of Equipment Allowed to be used at each Phase	Load Factor	Noise Data Source
Phase 1-Site Clearance	Chain saw	85	3	20%	FHWA
	Dozer	85	2	40%	FHWA
	Grader	85	2	40%	FHWA
	Delivery Trucks	84	3	40%	FHWA
Phase 2-Grading	Excavator	85	2	40%	FHWA
	Track Loader	80	1	100%	FTA
	Wheel Loader	80	1	100%	FTA
	Scraper	87	1	40%	FHWA
	Dozer	85	2	40%	FHWA
	Skip Loader	80	2	40%	FHWA
	Water Truck	88	1	100%	FHWA
	Dump Truck	84	3	40%	FHWA
Phase 3-Site Utility	Excavators	85	2	40%	FHWA
	Forklifts	80	1	40%	FHWA
	Excavators	85	1	40%	FHWA
Phase 4- Foundation & SOG	Concrete Mixer Truck	85	5	40%	FHWA
	Forklifts	80	1	40%	FHWA
	Delivery Trucks	84	4	40%	FHWA
	Pneumatic Tools	85	3	50%	FHWA
	Concrete Mixer Truck	85	1	40%	FHWA
Phase 5-Building Construction	Forklifts	80	2	40%	FHWA
	Delivery Trucks	84	5	40%	FHWA
	Pneumatic Tools	85	3	50%	FHWA
	Air Compressor	80	4	100%	FTA
	Excavators	85	1	40%	FHWA
Phase 6-Landscape & Paving	Dozer	85	1	40%	FHWA
	Paver	88	1	50%	FHWA
	Roller	85	1	20%	FHWA
	Delivery Trucks	84	3	40%	FHWA
	Forklifts	80	1	40%	FHWA