RECON

Noise Analysis for Sharp Ocean View Tower Chula Vista, California

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Executive Summary

This report evaluates potential noise and vibration impacts associated with the proposed Sharp Ocean View Tower project (project) located at 751 Medical Center Court, in Chula Vista, California. The site is currently developed with the existing Sharp Chula Vista Hospital.

As part of this assessment, noise levels due to vehicle traffic were calculated and evaluated against City of Chula Vista (City) noise and land use compatibility guidelines. In addition to compatibility, the potential for noise to impact adjacent properties from future on-site sources and construction activity was assessed. Additionally, vibration impacts from construction activity were evaluated. A summary of the findings is provided below.

On-site Traffic Noise

As demonstrated in this analysis, ground floor noise levels are not projected to exceed 65 community noise equivalent level (CNEL). These projected exterior noise levels would be considered "compatible" for medical offices and hospital uses. Based on the traffic noise model results, exterior noise levels would be compatible with City standards. Additionally, interior noise levels are not projected to exceed the Title 24 interior noise level standard of 45 CNEL.

Off-site Traffic Noise

Project traffic would increase existing (2015) traffic noise levels along all roadway segments by 1 CNEL or less. Under the near-term (2020) condition, noise level increases would also be 1 CNEL or less. Under the cumulative (2035) conditions, cumulative traffic growth would increase noise levels by 6 CNEL along East Palomar Road between Oleander Avenue and Medical Center Drive and by 2 CNEL along East Palomar Street between Medical Center Drive and Medical Center Court and along Medical Center Court between Medical Center Drive and the hospital; however, the project contributes 1 CNEL or less to all cumulative increases. Thus, while a cumulative traffic noise increase would occur, the project's contribution would be less than cumulatively considerable.

On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to include sources typical of the existing site, such as vehicles arriving and leaving, landscape maintenance machinery, and mechanical equipment used for heating, cooling, and ventilation as well as emergency power. These future noise sources are not anticipated to violate the City of Chula Vista Municipal Code (CVMC). Noise levels resulting from the ventilation units were based on the use of 11 rooftop-mounted ventilation (air handler) units, a new cooling tower, boiler room exhaust stack, and an emergency generator. Equipment noise levels were modeled at the nearest residential property line to determine

compliance with the CVMC. As calculated, operation noise levels at the property line would not exceed the CVMC standards.

Construction Noise

Hourly average construction noise levels at the northern residential property lines would be 69 dB(A) L_{eq} or less. Although the existing adjacent residences would be exposed to construction noise levels that would be heard above ambient conditions, the exposure would be short-term. Additionally, construction activities would occur between the hours of 7:00 A.M. and 10:00 P.M., Monday through Friday, and between the hours of 8:00 A.M. and 10:00 P.M., Saturday and Sunday, as specified in the Chula Vista Construction Noise Ordinance. Construction activities associated with the proposed project would comply with the applicable regulation for construction, and temporary increases in noise levels from construction activities would not be considered a substantial increase.

Vibration

Maximum construction vibration at the nearest receptors would range from 0.009 to 0.013 inches per second (in/sec) peak particle velocity (PPV). Based on several state and federal studies, the threshold of perception is 0.035 in/sec PPV, with 0.24 in/sec PPV being distinctly perceptible (Caltrans 2013a). Construction-related vibrations would not be perceptible at the nearest residence. Additionally, due to the low vibration levels, neither cosmetic nor structural damage of buildings would occur.

1.0 Introduction

1.1 Project Description

The proposed project would include construction of a new hospital tower within the existing Sharp Chula Vista hospital campus. The new critical care tower ("Ocean View Tower") would be seven stories in height and would include 138 beds, six operating rooms with pre- and post-op support, sterile processing, dietary services, material management, dock, and other related support services. The 197,696-square-foot "Ocean View Tower" would be seven floors, six above grade and one mostly sub-grade (subterranean on three sides; above ground on one side). The new boiler room would be located in the top floor of the new tower with an exhaust stack located on the roof of the seven-story tower. Nine air handlers would be located on the second-floor roof of the lower portion of the new tower located between the patient tower and the existing hospital. Two additional units would be located on the roof of the seven-story tower. A new 1,500-kiloWatt (kW) emergency generator housed in a sound enclosure would be located west of the existing parking structure and immediately east of the existing generator building. Total height would be 110' 9" for the seven-story tower and 120' to the top of the elevator structure.

The Sharp Chula Vista hospital campus is located at 751 Medical Center Court, east of Interstate 5, south of Telegraph Canyon Road, and between Medical Center Drive and Paseo Ladera. The campus is comprised of a central 17.2-acre acute care parcel, a 10-acre outpatient parcel, and a 5-acre medical office building parcel. The proposed tower would be constructed immediately adjacent to the existing east tower at the northeastern corner of the acute care portion of the campus. Figure 1 shows the regional location of the project; Figure 2 shows an aerial photograph of the project vicinity; and Figure 3 shows the proposed site plan for the project.

1.2 Fundamentals of Noise

Sound levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes (Caltrans 2013a). Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease.

Additionally, in technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power, expressed as L_{pw}, is the energy converted into sound by the source. The L_{pw} is used to estimate how far a noise will travel and to predict the sound levels at various distances from the source.

FIGURE 1
Regional Location

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Image Source: USDA FSA (flown May 2014)

FIGURE 2

Project Location on Aerial Photograph

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Map Source: Smith Group JJR

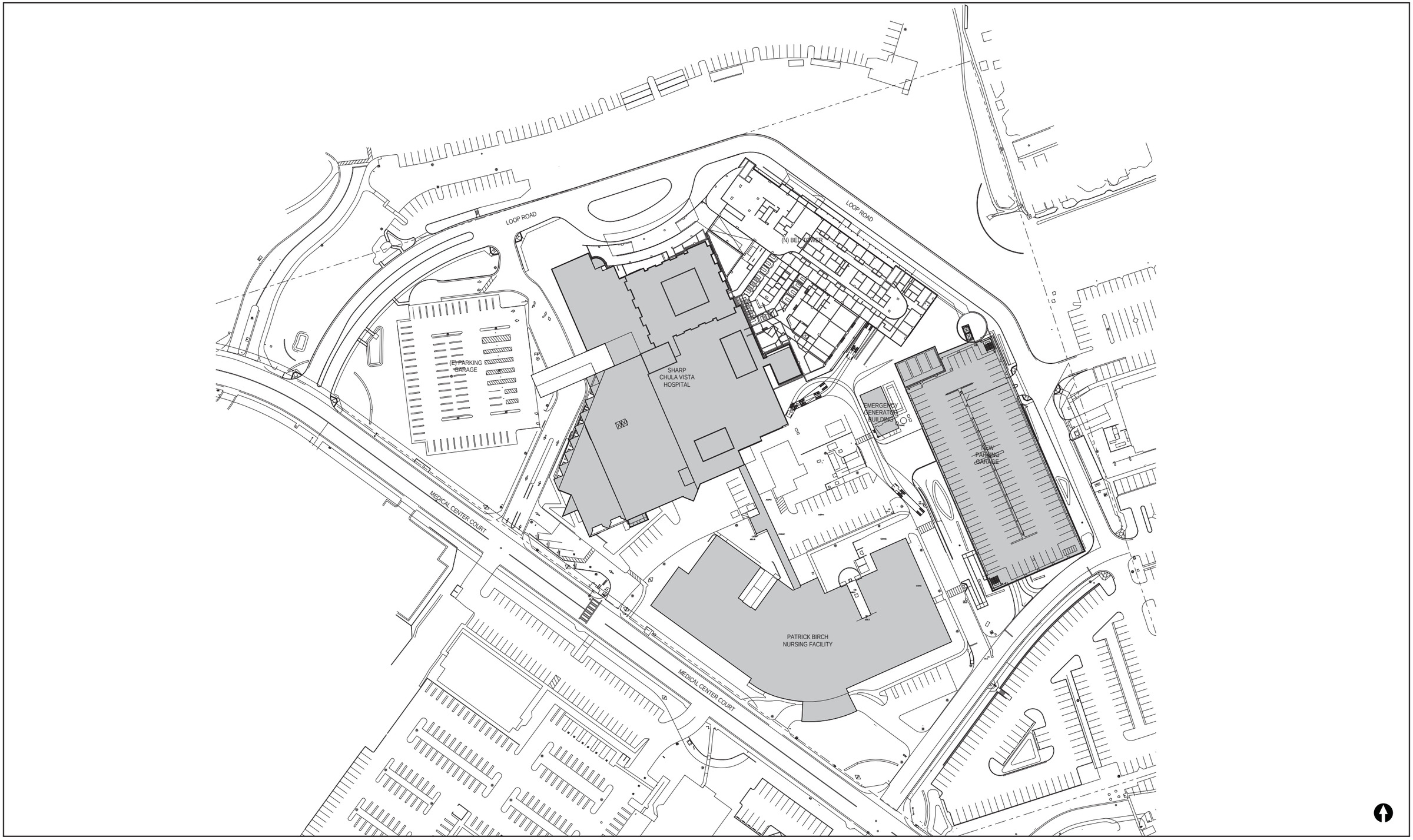

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FIGURE 3
Site Plan

As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an eardrum or microphone and is the sound pressure level. Noise measurement instruments only measure sound pressure, and noise level limits used in standards are generally sound pressure levels.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds (Caltrans 2013a). Therefore, the "A-weighted" noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are designated with the notation dB(A).

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important. In addition, most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors has been developed. The noise descriptors used for this study are the one-hour equivalent noise level (L_{eq}), the community noise equivalent level (CNEL), and the sound exposure level (SEL). The CNEL is a 24-hour equivalent sound level. The CNEL calculation applies an additional 5 dB(A) penalty to noise occurring during evening hours, between 7:00 P.M. and 10:00 P.M., and an additional 10 dB(A) penalty is added to noise occurring during the night, between 10:00 P.M. and 7:00 A.M. These increases for certain times are intended to account for the added sensitivity of humans to noise during the evening and night. The SEL is a noise level over a stated period of time or event and normalized to one second.

Sound from a small, localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern, known as geometric spreading. The sound level decreases or drops off at a rate of 6 dB(A) for each doubling of the distance.

Traffic noise is not a single, stationary point source of sound. The movement of vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The drop-off rate for a line source is 3 dB(A) for each doubling of distance.

The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site (such as parking lots or smooth bodies of water) receives no additional ground attenuation, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the source. A soft site (such as soft dirt, grass, or scattered bushes and trees) receives an additional ground attenuation value of 1.5 dB(A) per doubling of distance (Caltrans 2013a). Thus, a point source over a soft site would attenuate at 7.5 dB(A) per doubling of distance.

Human perception of noise has no simple correlation with acoustical energy. A change in noise levels is generally perceived as follows: 3 dB(A) barely perceptible, 5 dB(A) readily perceptible, and 10 dB(A) perceived as a doubling or halving of noise (Caltrans 2013a).

1.3 Fundamentals of Vibration

Vibration consists of energy waves transmitted through solid material (Caltrans 2013b). Groundborne vibration propagates from the source through the ground to adjacent buildings by surface waves. Vibration may be composed of a single pulse, a series of pulses, or a continuous oscillatory motion. The frequency of a vibrating object describes how rapidly it is oscillating, measured in hertz (Hz). The normal frequency range of most groundborne vibration that can be felt generally starts from a low frequency of less than 1 Hz to a high of about 200 Hz (FTA 2006).

Vibration energy spreads out as it travels through the ground, causing the vibration amplitude to decrease with distance away from the source. Groundborne vibration is measured by its peak particle velocity (PPV). The PPV is normally described in inches per second (in/sec).

Groundborne vibration is not a common environmental problem. It is unusual for vibration from transportation sources, such as buses and trucks to be perceptible, even in locations close to major roads (Caltrans 2013b). However, sources, such as trains, and construction activities can represent significant vibrations sources. This is of particular concern in projects involving blasting or pile-driving.

2.0 Applicable Standards

2.1 City of Chula Vista General Plan

2.1.1 Noise Compatibility

The Environmental Element of the City's General Plan contains applicable noise/land use compatibility guidelines, which are shown in Table 1. As shown, hospitals are not specifically listed land uses in Table 1; however, hospitals are considered similar to the schools, libraries, daycare facilities, and convalescent homes, which are considered compatible when located in areas where exterior noise levels are 65 CNEL or less (City of Chula Vista 2005).

Table 1 Exterior Land Use/Noise Compatibility Guidelines						
Land Use	CNEL					
	50	55	60	65	70	75
Residential						
Schools, Libraries, Daycare Facilities, Convalescent Homes, Outdoor Use Areas, and Other Similar Uses Considered Noise Sensitive						
Neighborhood Parks, Playgrounds						
Community Parks, Athletic Fields						
Offices and Professional						
Places of Worship (excluding outdoor use areas)						
Golf Courses						
Retail and Wholesale Commercial, Restaurants, Movie Theaters						
Industrial, Manufacturing						
SOURCE: City of Chula Vista 2005.						

2.1.2 Policies

The following policies from the General Plan are relevant to this noise analysis:

EE 21.1 Apply the exterior land use-noise compatibility guidelines contained in Table 9-2 of this Environmental Element to new development where applicable and in light of project-specific considerations. (Note: Table 9-2 of the Environmental Element is Table 1 of this report.)

EE 21.2 Where applicable, the assessment and mitigation of interior noise levels shall adhere to the applicable requirements of the California Building Code with local amendments and other applicable established City standards.

EE 21.3 Promote the use of available technologies in building construction to improve noise attenuation capacities.

EE 22.5 Require projects to construct appropriate mitigation measures in order to attenuate existing and projected traffic noise levels in accordance with applicable standards, including the exterior land use/noise compatibility guidelines contained in Table 9-2 of this Environmental Element.

2.2 City of Chula Vista Noise Control Ordinance

2.2.1 On-site Generated Noise

The Noise Control Ordinance (City of Chula Vista Municipal Code [CVMC] Chapter 19.68) establishes noise criteria to prevent noise and vibration that may jeopardize the health or welfare of the City's citizens or degrade their quality of life. CVMC Section 19.68.030

defines exterior noise standards for various receiving land uses. The noise standards are not to be exceeded at the portion of a property used for a particular land use. For nuisance noise, the noise standards cannot be exceeded at any time. Examples of nuisance noise provided in the Noise Control Ordinance include pets in residential neighborhoods, private parties of limited duration, sound amplifiers and musical instruments, and any activities in commercial areas other than permitted uses. For environmental noise, the L_{eq} in any one hour cannot exceed the noise standards. These standards are shown in Table 2. The noise standards in Table 2 do not apply to construction activities. The project site is surrounded by institutional and office land uses on the east, southwest, and west; single-family and multi-family residential uses to the northeast and south; and an institutional/residential use (Veterans Home of California – Chula Vista) located to the north and northwest.

Table 2
City of Chula Vista Exterior Noise Limits

Receiving Land Use Category	Noise Level [dB(A)][1,2,3]	
	10:00 P.M. to 7:00 A.M. (Weekdays)	7:00 A.M. to 10:00 P.M. (Weekdays)
	10:00 P.M. to 8:00 A.M. (Weekends)	8:00 A.M. to 10:00 P.M. (Weekends)
All residential (except multiple dwelling)	45	55
Multiple dwelling residential	50	60
Commercial	60	65
Light Industry – I-R and I-L zone	70	70
Heavy Industry – I zone	80	80

SOURCE: CVMC Section 19.68.030
NOTES:
[1]Environmental Noise – L_{eq} in any hour; Nuisance Noise – not to be exceeded any time
[2]According to CVMC Section 19,68,030(b)(2), if the alleged offensive noise contains a steady, audible sound such as a whine, screech or hum, or contains a repetitive impulsive noise such as hammering or riveting, the standard limits shall be reduced by 5 dB.
[3]If the measured ambient level, measured when the alleged noise violation source is not operating, exceeds the standard noise limit, the allowable noise exposure standard shall be the ambient noise level.

2.2.2 Construction Noise

Construction noise is regulated by CVMC Section 17.24.040, which prohibits construction and building work in residential zones that would cause noises disturbing to the peace, comfort, and quiet enjoyment of property of any person residing or working in the vicinity between the hours of 10:00 P.M. and 7:00 A.M. Monday through Friday, and between the hours of 10:00 P.M. and 8:00 A.M. Saturday and Sunday.

2.2.3 Vibration

The Noise Ordinance (CVMC Section 19.68.050) regulates vibration from operational sources. It prohibits operating or permitting the operation of any device that creates a vibration that is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property or at 150 feet from the source if on a public space or public rights-of-way. Construction vibration levels were evaluated using Federal Transit Administration (FTA) standards.

2.3 California Code of Regulations

Interior noise levels for dwellings other than detached single-family dwellings are regulated by Title 24 of the California Code of Regulations, California Noise Insulation Standards. Title 24, Chapter 12, Section 1207, of the California Building Code requires that interior noise levels, attributable to exterior sources, not exceed 45 CNEL in any habitable room within a residential structure. A habitable room in a building is used for living, sleeping, eating, or cooking. Bathrooms, closets, hallways, utility spaces, and similar areas are not considered habitable spaces. Additionally, acoustical studies must be prepared for proposed residential structures located where the exterior noise level exceeds 60 CNEL. The studies must demonstrate that the design of the building would reduce interior noise to 45 CNEL in habitable rooms. If compliance requires windows to be inoperable or closed, the structure must include ventilation or air-conditioning (24 CCR 1207 2010).

3.0 Existing Conditions

Existing noise levels at the project site were measured and traffic volumes were counted on November 23, 2015, using one Larson-Davis LxT Sound Expert Sound Level Meter, serial number 3829. The following parameters were used:

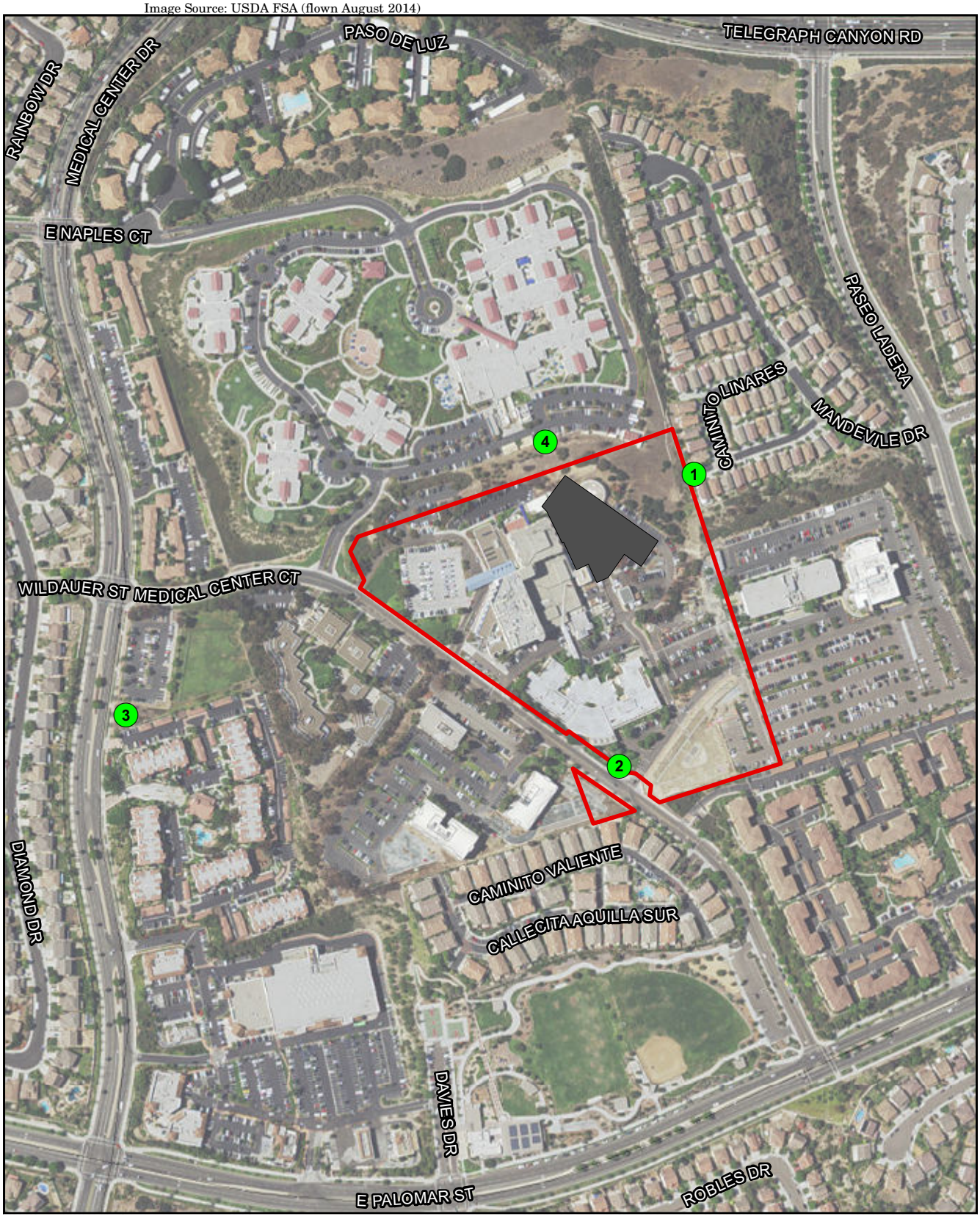
Filter:	A-weighted
Response:	Slow
Time History Period:	5 seconds

A total of four 15-minute ground-floor measurements (5 feet above the ground) were taken. Measurements were made on and in the vicinity of the project site, as described below. The locations of the measurements are shown on Figure 4, and the noise measurement data are contained in Attachment 1.

Measurement 1 was located at the western end of Caminito Cumbres, east of the project boundary near the nearest residences. The main source of noise at this location was vehicle traffic on local roadways. Noise from local residence, such as music and televisions was also audible. The average measured noise level during Measurement 1 was 50.5 dB(A) L_{eq}.

Measurement 2 was located at approximately 50 feet from the northern edge of Medical Center Court. The main source of noise at this location was vehicle traffic on Medical Center Court. Traffic volumes were counted on Medical Center Court, and the results are summarized in Table 3. The measured noise level during Measurement 2 was 58.2 dB(A) L_{eq}.

Image Source: USDA FSA (flown August 2014)



Project Parcel

Measurement Locations

New Tower

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FIGURE 4

Noise Measurement Locations

Measurement 3 was located at the southern project boundary at approximately 50 feet east of the edge of Medical Center Drive. The main source of noise at this location was vehicle traffic on Medical Center Drive. Traffic volumes were counted on Medical Center Drive, and the results are summarized in Table 3. The average measured noise level during Measurement 3 was 62.2 dB(A) L_{eq}.

Measurement 4 was located at the northern project boundary at approximately at the edge of the parking lot with the Veterans Home of California, Chula Vista. The main source of noise at this location was vehicle traffic on local roads and parking lot noise. The average measured noise level during Measurement 4 was 47.4 dB(A) L_{eq}.

Table 3
15-minute Traffic Counts

Measurement	Roadway	Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles
2	Medical Center Drive	87	2	0	3	0
3	Medical Center Court	212	1	0	4	0
NOTE: Traffic volumes were not counted during measurements 1 and 4						

4.0 Analysis Methodology

4.1 Traffic Noise Analysis

4.1.1 On-site Traffic Noise

Noise generated by future traffic was modeled using the Federal Highway Administration's Traffic Noise Model algorithms and reference levels to calculate noise levels at selected receiver locations. On-site noise levels and related contours were developed using SoundPlan, noise modeling software (Navcon Engineering 2015). The Federal Highway Administration model uses various input parameters, such as projected hourly average traffic rates; vehicle mix, distribution, and speed; roadway lengths and gradients; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. Receivers, roadways, and barriers were input into the model using three-dimensional coordinates. The locations of future buildings were obtained from project plans and drawings. For modeling purposes, "pavement" ground conditions were used for the analysis of future conditions, since a large portion of the site and surrounding areas are developed and paved.

The main source of traffic noise at the project site is vehicle traffic on Medical Center Court, Telegraph Canyon Road, East Palomar Street, and Medical Center Drive. On-site noise level contours were calculated based on the peak traffic hour volumes. Peak hour traffic volumes were calculated as 10 percent of the total average daily traffic (ADT) volume. Typically, the predicted CNEL and the maximum daytime hourly L_{eq} calculated are equal.

Cumulative (2035) traffic volumes on roadways in the vicinity of the project site were obtained from the project traffic report (LLG 2015). Table 4 summarizes the future traffic volumes and posted speeds for modeled roadways near the project site. The vehicle classification mix was developed from field observations, which were used to determine the vehicle classification mix, or the percentage of automobiles, medium trucks, and heavy trucks from the total volume.

Table 4
Future Vehicle Traffic Parameters

Roadway	Cumulative Plus Project ADT	Peak Hour Volume	Speed (mph)	Vehicle Classification Mix				
				Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles
Medical Center Drive	24,400	2,440	35	2,318	54	32	24	12
Telegraph Canyon Road	52,500	5,250	50	4,987	116	68	53	26
East Palomar Street between Medical Center Drive and Medical Center Court	17,900	1,790	35	1,702	39	23	18	9
East Palomar Street between Medical Center Court and Heritage Road	14,100	1,410	35	1,340	31	18	14	7
Medical Center Court	14,400	1,440	25	1,370	32	18	14	7

ADT = average daily traffic
mph = miles per hour
SOURCE: LLG 2015

4.1.2 Off-site Traffic Noise

Off-site traffic noise impacts are based on the changes in traffic noise levels along affected roadways. Existing (2015), near-term (2020), and future (2035) cumulative with project traffic volumes on roadways in the vicinity of the project site were obtained from the project traffic report (LLG 2015). Table 4 summarizes the future (2035) cumulative plus project traffic volumes for modeled roadways near the project site.

The increase in noise due to the addition of project traffic was calculated by determining the increase over the existing condition with the project traffic volumes as well as the future growth predicted in the traffic report. This relative increase in noise was calculated by comparing traffic volumes using the following formula:

$$\Delta dB = 10 \times log \frac{ADT2}{ADT1}$$

Where ADT1 is the baseline traffic volume and ADT2 is traffic volume for the scenario being analyzed. For example, when calculating the increase in noise level between the

existing and the existing plus project scenarios, ADT1 would be the existing traffic volume and ADT2 would be the existing plus the project traffic volume.

4.2 On-site Generated Noise Analysis

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of the existing campus, such as vehicles arriving and leaving, including emergency vehicles; mechanical equipment; and maintenance activities. Parking lot noise, emergency vehicles, and general maintenance activities are anticipated to violate the CVMC or result in a substantial permanent increase in existing noise levels. However, ventilation intake and exhaust units with fans mounted on the roofs have the potential to produce noise level in excess of CVMC limits (see Table 2).

The proposed project does not include the construction of a new central plant; however, a new cooling tower would be installed within the existing cooling tower structure at the north end of the parking structure. A new 1,500 kW emergency generator would be required for the new tower. The new emergency generator would be located immediately east of the existing emergency generator building. Due to current stage of design, the specific model of generator has not been selected, therefore, this analysis uses a Cummins QSK 50 series generator, model DQGAF (see Attachment 2). The new tower would also include a boiler room on the top floor of the new tower. The project would install three boilers. The boiler room would be located inside the building, and the primary noise source for the boilers would be the exhaust stack located on the roof of the seven-story tower. Other mechanical noise sources associated with the new structure would be 11 roof-mounted air handler units, 9 of which would be located on the second floor of the tower between the new seven-story tower and the existing hospital building. It is not known at this time which manufacturer, brand, or model of ventilation unit or units would be selected for use in the project. Noise level data for modeled equipment was based on review of project plans and a review of manufacturer specifications for similarly sized equipment (see Attachment 2). The list in Table 5 was developed as representative of the potential equipment that would be associated with the project. The locations of modeled noise sources are shown in Attachment 3.

Table 5
Modeled Stationary Equipment

Equipment	Number of Units	Modeled Noise Level (dB(A) L_{pw})[1]
Cooling Tower	1	116.3[2]
Generator (Unshielded)	1	122.6
Generator (Enclosed)	1	107.6
Boiler Room Exhaust	2	94.3
Air Handlers (36,400 CFM)	9	95.5
Air Handlers (93,900 CFM)	2	97.9

SOURCE: Attachment 2.
[1]Reported power levels may differ slightly from Attachment 2 source levels due to rounding of octave band sound levels.
[2]Calculated based on octave band data.

The emergency generator would be located in a sound enclosure, however, specific information on Cummins generator enclosures for the model identified was not available. Based on specification sheets for an enclosure for a similar sized Kohler generator, the enclosure would reduce generator noise by 15 dB (see Attachment 2). This is a typical reduction for a level 1 generator sound enclosure.

Noise level data for the boiler room exhaust stack was estimated based sound level data from equipment specification sheets for Cleaver Brooks Boilers. According to the manufacture, the boiler generates a noise level of 81 dB(A) at 3 feet. Based on this sound pressure level, a boiler sound power level was calculated as 91.3 dB. A maximum of two boiler units would be active at any time, and the boiler room would have a single exhaust stack. Based on two units operating at the same time, this would represent a doubling of the sound energy, which would increase the noise level by 3 dB to 94.3 dB. As no octave band data was available in the manufactures data, the boiler was modeled at a mean frequency of 500 Hz. This is considered a representative noise level for the exhaust stack. The boiler exhaust stack was modeled 14 feet above the roof of the proposed tower.

Nine air handlers were modeled at the second-floor portion of the tower. These air handler units would have a maximum capacity of 24,000 cubic feet per minute (CFM) each. For modeling purposes, each of these units was conservatively modeled based on units with a capacity of 36,400 CFM. Each of these units was modeled approximately 3 feet above the roof surface. Two larger air handler units that would be housed in mechanical rooms were modeled at the top of the patient tower. These air handler units would have a maximum capacity of 82,000 CFM each. For modeling purposes, each of these units was conservatively modeled based on noise level data for units with a capacity of 93,900 CFM. The primary noise source of these larger air handlers would be the exhaust and intake ports on the housing structure, thus primary noise source on these units was modeled at a height of 8 feet above the roof surface. Additionally, modeling included a 3-foot-high parapet wall around the roof edge at the top of the tower.

The new cooling tower is anticipated to be similar to a Tower Tech cooling tower model TTXL-081930. Based on cooling tower specification sheets included in Attachment 2, the primary noise source would be the cooling fans located near the bottom of the unit. Therefore, the primary noise source on the cooling tower was modeled at a height of 6 feet above finish grade of the enclosure. The cooling tower enclosure was modeled with a height of 15 feet based on field observations.

On-site noise sources were modeled with SoundPLAN. SoundPLAN is a noise modeling computer program based on the International Organization for Standardization method of noise propagation, *ISO 9613-2 – Acoustics, Attenuation of Sound during Propagation Outdoors*. SoundPlan is used to calculate level contours as well as noise levels at selected receiver locations using input parameter estimates such as total noise generated by each noise source; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. However, no terrain data was included in the model and all sources and receivers were modeled based on flat terrain. Receivers were

modeled 5 feet above ground level and at 14 feet high as the majority of residential units had second stories. Noise level contours were also modeled at 5 feet above the ground level.

4.3 Construction Noise Analysis

Project construction noise would be generated by diesel engine-driven construction equipment used for site preparation and grading, removal of existing structures and pavement, loading, unloading, and placing materials and paving. Diesel engine-driven trucks also would bring materials to the site and remove the soils from excavation.

Construction equipment with a diesel engine typically generates maximum noise levels from 80 to 90 dB(A) L_{eq} at a distance of 50 feet (FTA 2006). Table 6 summarizes typical construction equipment noise levels.

During excavating, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Although maximum noise levels may be 85 to 90 dB(A) at a distance of 50 feet during most construction activities, hourly average noise levels from the grading phase of construction, based three large pieces of equipment (e.g. a dozer, a grader, and a front-end loader) are operating simultaneously for the entire hour, would be 85 dB(A) L_{eq} at 50 feet from the center of construction activity.

Table 6
Typical Construction Equipment Noise Levels

Equipment	Noise Level at 50 Feet [dB(A) L_{eq}]
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Crane, Derrick	88
Dozer	85
Grader	85
Jack Hammer	88
Loader	85
Paver	89
Pump	76
Roller	74
Scraper	89
Truck	88
SOURCE: FTA 2006.	

4.4 Construction Vibration

A quantitative assessment of potential vibration impacts from construction activities, such as blasting, pile-driving, vibratory compaction, demolition, drilling, or excavation, may be conducted using the following equations (Caltrans 2013b).

Vibration impacts from normal equipment to structures may be estimated at any distance from the following equation:

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$$

Where: PPV_{equip} is the peak particle velocity in in/sec of the equipment adjusted for distance, PPV_{ref} is the reference vibration level in in/sec at 25 feet as shown in Table 7, and D is the distance from the equipment to the receptor.

Table 7
Typical Construction Equipment Vibration Levels

Equipment	PPV at 25 feet (in/sec)[1]
Large Bulldozer	0.089
Trucks	0.076
Mounted Impact Hammer	0.089

[1]Where PPV is the peak particle velocity.
[2] Where noise level is the level in decibels referenced to 1 micro-inch/second and based on the RMS velocity amplitude.
SOURCE: Caltrans 2013b

5.0 Future Acoustical Environment and Impacts

5.1 On-site Traffic Noise

Traffic noise contours were developed using the SoundPLAN program. Noise level contours, modeled 5 feet above the ground, are shown in Figure 5. These do not take into account topography or existing buildings. SoundPLAN data is contained in Attachment 3.

As shown in Figure 5, first-floor noise levels at the project site are projected to range from 50 to 65 CNEL.

Noise levels were also modeled at 12 specific receiver locations at the exterior façade of each floor to evaluate the compatibility of the proposed project with future traffic noise levels. The modeled receiver locations and noise level contours are shown in Figure 5. Modeled noise levels at the building façade were compared with the City's exterior noise compatibility standard of 65 CNEL. Modeled noise levels took into account the proposed buildings, however, to be conservative the model assumed flat terrain with no intervening structures.

Table 8 summarizes the projected future noise levels at the 12 modeled receivers. As seen from this table, first-, third-, fifth-, and seventh-floor noise levels are not projected to exceed 65 CNEL. These projected exterior noise levels would be considered "compatible" for hospital land uses.

Image Source: USDA FSA (flown August 2014)

FIGURE 5

Traffic Noise Contours and Receivers

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Table 8 Future (2035) Vehicle Traffic Exterior Noise Levels (CNEL)				
Receiver	First Floor	Third Floor	Fifth Floor	Seventh Floor
1	48	53	55	56
2	48	54	56	57
3	48	53	55	56
4	45	52	54	55
5	45	51	53	54
6	44	51	53	54
7	44	51	53	54
8	43	45	47	48
9	44	46	47	48
10	46	51	54	55
11	47	52	54	55
12	46	51	54	55

As shown in Table 8, exterior noise levels are not predicted to exceed 65 CNEL at the façade of the new tower. Therefore, the proposed project would not be exposed to noise levels in excess of City compatibility standards.

As discussed in Section 2.3, interior noise levels are regulated by Title 24 of the California Code of Regulations. Interior noise levels attributable to exterior sources shall not exceed 45 CNEL. Standard masonry construction would provide a noise reduction of at least 25 dB (FHWA 2011). As shown in Table 8, the loudest projected exterior noise level due to vehicle traffic is 57 CNEL. A 25 dB reduction would result in interior noise levels of 32 CNEL. Interior noise levels are not projected to exceed 45 CNEL.

5.2 Off-site Traffic Noise

The project would increase traffic volumes on local roadways. Noise level increases would be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic. The project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway; thus, the primary factor affecting off-site noise levels would be increased traffic volumes. Therefore, the increase in noise due to the addition of project traffic was calculated by determining the increase over the existing (2015) condition with the project traffic volumes as well as the near-term (2020), future (2035) cumulative growth predicted in the traffic report. The traffic volumes are shown in Table 9. The potential increase in noise levels is shown in Table 10.

As shown in Table 10, existing plus project traffic noise level increase along all roadway segments would be 1 CNEL or less when looking at the increase associated with the project only. Under the near-term (2020) condition, noise level increases would also be 1 CNEL or less. Under cumulative (2035) condition, there are predicted to be increases of 6 CNEL

Table 9 Project Traffic Scenarios							
Roadway	Segment	Existing[1]	Existing Plus Project	Near-term[2] No Project	Near-term Plus Project	Cumulative[3] No Project	Cumulative Plus Project
Telegraph Canyon Road	Halecrest Drive to Oleander Avenue	60,784	61,419	66,862	67,497	70,265	70,900
	Oleander Avenue to Medical Center Drive	56,236	57,064	61,860	62,688	64,972	65,800
	Medical Center Drive to Heritage Road	45,001	45,525	49,501	50,026	51,976	52,500
East Palomar Street	Oleander Avenue to Medical Center Drive	4,428	4,787	4,871	5,230	17,441	17,800
	Medical Center Drive to Medical Center Court	12,593	12,593	13,852	13,852	17,900	17,900
	Medical Center Court to Heritage Road	10,257	10,754	11,283	11,780	13,603	14,100
Olympic Parkway	I-805 to Oleander Avenue	55,710	56,041	61,281	61,612	45,969	46,300
	Oleander Avenue to Brandywine Avenue	53,460	53,736	58,806	59,082	48,524	48,800
	Brandywine Avenue to Heritage Road	52,125	52,153	57,338	57,365	52,972	53,000
Medical Center Drive	Telegraph Canyon Road to Medical Center Court	18,807	20,297	20,688	22,178	22,910	24,400
	Medical Center Court to East Palomar Street	9,062	9,835	9,968	10,741	11,027	11,800
Medical Center Court	Medical Center Drive to Hospital	9,829	12,092	10,812	13,075	12,137	14,400
	Hospital to East Palomar Street	4,171	4,668	4,588	5,085	5,103	5,600

[1]Existing = 2015
[2]Near-term = 2020
[3]Cumulative = 2035

Table 10 Project Related Traffic Noise Level Increases					
		Noise Level Increase (CNEL)			
Roadway	Segment	Between Existing[1] and Existing Plus Project	Between Existing and Near-term[2] Plus Project	Between Existing and Cumulative[3] Plus Project	Project Contribution to Cumulative Noise Increase
Telegraph Canyon Road	Halecrest Drive to Oleander Avenue	0	0	1	0
	Oleander Avenue to Medical Center Drive	0	0	1	0
	Medical Center Drive to Heritage Road	0	0	1	0
East Palomar Street	Oleander Avenue to Medical Center Drive	0	1	6	0
	Medical Center Drive to Medical Center Court	0	0	2	0
	Medical Center Court to Heritage Road	0	1	1	0
Olympic Parkway	I-805 to Oleander Avenue	0	0	-1	0
	Oleander Avenue to Brandywine Avenue	0	0	0	0
	Brandywine Avenue to Heritage Road	0	0	0	0
Medical Center Drive	Telegraph Canyon Road to Medical Center Court	0	1	1	0
	Medical Center Court to East Palomar Street	0	1	1	0
Medical Center Court	Medical Center Drive to Hospital	1	1	2	1
	Hospital to East Palomar Street	0	1	1	0

[1]Existing = 2015
[2]Near-term = 2020
[3]Cumulative = 2035

along East Palomar Road between Oleander Avenue and Medical Center Drive and 2 CNEL increases along East Palomar Street between Medical Center Drive and Medical Center Court and along Medical Center Court between Medical Center Drive and the hospital, however, as shown in Table 10, the project contributes 1 CNEL or less to cumulative increases. Thus, while a cumulative traffic noise increase would occur, the project's contribution is less than cumulatively considerable.

5.3 On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of the existing campus and would represent a substantial increase in activity. Activities would include a slight increase in parking lot noise as vehicles, including emergency vehicles, arrive and leave, mechanical equipment operation, and maintenance activities, such as landscaping. With the exception of the mechanical equipment, none of these noise sources are anticipated to violate the CVMC.

Heating and cooling would take place within a new boiler room located within the top of the new tower with an exhaust stack for ventilation located on the roof. Smaller air handler units would be mounted on the roof with exterior fans. These smaller air handlers and exhaust systems would be screened from view by a 3-foot-high parapet wall around the roof. In addition, a third cooling tower would be paced next to the existing cooling towers at northern end of the existing parking structure and a 1,500 kW emergency generator would be located immediately west of the parking structure between the existing emergency generators and the parking structure.

Due to the stage of design, it is not known at this time which manufacturer, brand, or model of unit or units will be selected for use in the project. Modeled equipment was based on reviews of the project plans and various manufacturer specifications (see Table 5).

Equipment noise levels were modeled at the property line of the nearest residential uses. Figure 6 shows the noise level contours and the property line receivers. Modeled noise source locations are shown in Attachment 3. The results are summarized in Table 11. SoundPLAN data are contained in Attachment 3.

Table 11
Stationary Source Noise Levels
[dB(A) L_{eq}]

Receiver	First Floor	Second Floor
13	42	43
14	44	44
15	40	41
16	37	38
17	32	32
18	46	46
19	36	38
20	48	49

Image Source: USDA FSA (flown August 2014)

FIGURE 6

On-Site Noise Contours and Receivers

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As shown, equipment noise levels at the property line would not exceed the CVMC standard of 45 dB(A) L_{eq} at the single-family residential property lines to the south nor the CVMC standard of 50 dB(A) L_{eq} at the Veterans Home of California to the north or multi-family residential uses to the south.

5.4 Construction Noise

Noise associated with the demolition, grading, building, and paving activities for the project would potentially result in short-term impacts to surrounding properties. A variety of noise-generating equipment would be used during the construction phase of the project such as scrapers, backhoes, front-end loaders, and concrete saws, along with others. The exact number and pieces of construction equipment required are not known at this time. In the absence of specifics, it was assumed that the loudest noise levels would occur during grading activities. Although maximum noise levels may be 85 to 90 dB(A) L_{eq} at a distance of 50 feet during most construction activities, hourly average noise levels would be 85 dB(A) L_{eq} at 50 feet from the center of construction activity when assessing the loudest pieces of equipment working simultaneously.

Construction noise is considered a point source and would attenuate at approximately 6 dB(A) for every doubling of distance. Construction activities, such as grading, generate the loudest noise levels. There are residential uses 250 feet north of the project site and approximately 300 feet from the center of the proposed construction activity. Grading would occur over the entire site and would not be situated at any single location for a long period of time. Assuming the acoustic center of the construction activity would be the center of the entire project site, hourly average construction noise levels at the northern residential property lines would be 69 dB(A) L_{eq} or less. Construction activities would generally occur over an 8-hour period between 7:00 A.M. and 10:00 P.M. on weekdays. While construction may be heard over other noise sources in the area, noise levels of this order would not be a substantial increase in ambient noise levels during construction. Although the existing adjacent residences would be exposed to construction noise levels that could be heard above ambient conditions, the exposure would be short-term. Additionally, construction activities would occur between the hours of 7:00 A.M. and 10:00 P.M. Monday through Friday, and between the hours of 8:00 A.M. and 10:00 P.M. Saturday and Sunday, as specified in the Chula Vista Construction Noise Ordinance. Because construction activities associated with the proposed project would comply with the applicable regulation for construction, temporary increases in noise levels from construction activities would be less than significant.

5.5 Construction Vibration

Construction operations have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. The effects of ground vibration may be imperceptible at the lowest levels, low rumbling sounds and detectable

vibrations at moderate levels, and damage to nearby structures at the highest levels. Vibration perception would occur at structures, as people do not perceive vibrations without vibrating structures.

Project construction equipment used during site excavation would have the greatest potential to generate vibrations that would affect nearby residential land uses. Construction equipment would include loaded trucks, an excavator, as well as a dozer or loader. Vibration levels from these pieces of equipment would generate vibration levels with a PPV ranging from 0.035 to 0.089 in/sec PPV at the nearest residence. Human reaction to vibration is dependent on the environment the receiver is in as well as individual sensitivity. As example, vibration outdoors is rarely noticeable and generally not considered annoying. Typically, humans must be inside a structure for vibrations to become noticeable and/or annoying. Based on several federal studies the threshold of perception is 0.035 in/sec PPV, with 0.24 in/sec PPV being a distinctly perceptible (Caltrans 2013a). Neither cosmetic nor structural damage of buildings occurs at levels below 0.1 in/sec PPV. As construction vibration levels would be below the distinctly perceptible threshold, groundborne vibration and noise impacts from construction would be less than significant.

6.0 Conclusions and Noise Abatement Measures

6.1 On-Site Traffic Noise

As shown in Table 8, noise levels due to vehicle traffic are not projected to exceed 65 CNEL. These projected exterior noise levels would be considered "compatible" for a hospital land use. Additionally, interior noise levels are not projected to exceed the Title 24 interior noise level standard of 45 CNEL.

6.2 Off-Site Traffic Noise

As shown in Table 10, project traffic would increase existing (2015) traffic noise levels along all roadway segments by 1 CNEL or less. Under the near-term (2020) condition, noise level increases would also be 1 CNEL or less. Under the future (2035) cumulative condition, cumulative traffic growth would increase noise levels by 6 CNEL along East Palomar Road between Oleander Avenue and Medical Center Drive, and 2 CNEL increases along East Palomar Street between Medical Center Drive and Medical Center Court and along Medical Center Court between Medical Center Drive and the hospital, however, the project contributes 1 CNEL or less to all cumulative increases. Thus, while a cumulative traffic noise increase would occur, the project's contribution is less than cumulatively considerable.

6.3 On-site Generated Noise

As shown in Table 11, the noise sources on the project site after completion of construction are anticipated to include sources typical to the existing site, such as vehicles arriving and

leaving, landscape maintenance machinery and mechanical equipment used for heating, cooling, and ventilation. These future noise sources are not anticipated to violate the CVMC. Noise levels resulting from the mechanical equipment was modeled based on the proposed rooftop mounted air handlers, boiler exhaust, new cooling tower, and emergency generator. Equipment noise levels were modeled at the nearest residential property line to determine compliance with the CVMC. As calculated, operation noise levels at the property line would not exceed the CVMC standards.

6.4 Construction Noise

Hourly average construction noise levels at the northern residential property lines would be 69 dB(dB(A) L_{eq} or less. Although the existing adjacent residences would be exposed to construction noise levels that would be heard above ambient conditions, the exposure would be short-term. Additionally, construction activities would occur between the hours of 7:00 A.M. and 10:00 P.M. Monday through Friday, and between the hours of 8:00 A.M. and 10:00 P.M. Saturday and Sunday, as specified in the Chula Vista Construction Noise Ordinance. Because construction activities associated with the proposed project would comply with the applicable regulation for construction and because temporary increases in noise levels from construction activities would not be considered a substantial increase, construction noise impacts would be less than significant.

6.5 Construction Vibration

Maximum construction vibration at the nearest receptors would range from 0.009 to 0.013 in/sec PPV. Based on several federal studies the threshold of perception is 0.035 in/sec PPV, with 0.24 in/sec PPV being a distinctly perceptible (Caltrans 2013a). Neither cosmetic nor structural damage of buildings occurs at levels below 0.1 in/sec PPV. As construction vibration levels would be below the perception threshold, groundborne vibration and noise impacts from construction would be less than significant.

7.0 References Cited

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Chula Vista, City of

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2011 Highway Traffic Noise: Analysis and Abatement Guidance. FHWA-HEP-10-025. December 2011.

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ATTACHMENTS

ATTACHMENT 1

Noise Measurement Data

Summary

Filename	LxT_Data.259				
Serial Number	3898				
Model	SoundTrack LxT®				
Firmware Version	2.206				
User					
Location	**MS1**				
Job Description					
Note					
Measurement Description					
Start	2015/11/23 10:52:41				
Stop	2015/11/23 11:22:41				
Duration	0:30:00.5				
Run Time	0:30:00.5				
Pause	0:00:00.0				
Pre Calibration	2015/11/23 10:51:50				
Post Calibration	None				
Calibration Deviation	---				

Overall Settings

RMS Weight	A Weighting				
Peak Weight	A Weighting				
Detector	Slow				
Preamp	PRMLxT1				
Microphone Correction	Off				
Integration Method	Linear				
Overload	145.6 dB				
	A		**C**	**Z**	
Under Range Peak	**101.8**		98.8	103.8	dB
Under Range Limit	**37.9**		35.9	43.9	dB
Noise Floor	24.9		25.5	33.0	dB

Results

LAeq	50.5	dB		
LAE	83.0	dB		
EA	22.327	µPa²h		
EA8	357.132	µPa²h		
EA40	1.786	mPa²h		
LApeak (max)	2015/11/23 11:22:37		92.6	dB
LASmax	2015/11/23 11:07:46		71.9	dB
LASmin	2015/11/23 10:52:41		38.3	dB
SEA	-99.9	dB		

LAS > 85.0 dB (Exceedence Counts / Duration)	0	0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0	s

LCeq	62.7	dB
LAeq	50.5	dB
LCeq - LAeq	12.2	dB
LAleq	54.8	dB
LAeq	50.5	dB
LAleq - LAeq	4.4	dB
# Overloads	0	
Overload Duration	0.0	s

Dose Settings

Dose Name	OSHA-1	OSHA-2	
Exch. Rate	5	5	dB
Threshold	90	80	dB
Criterion Level	90	90	dB
Criterion Duration	8	8	h

Results

Dose	-99.9	-99.9	%
Projected Dose	-99.9	-99.9	%
TWA (Projected)	-99.9	-99.9	dB
TWA (t)	-99.9	-99.9	dB
Lep (t)	38.4	38.4	dB

Statistics

LAS5.00	50.7	dB
LAS10.00	48.7	dB
LAS33.30	45.0	dB
LAS50.00	43.8	dB
LAS66.60	43.0	dB
LAS90.00	41.7	dB

Summary

Filename	LxT_Data.261			
Serial Number	3898			
Model	SoundTrack LxT®			
Firmware Version	2.206			
User				
Location	**MS2**			
Job Description				
Note				
Measurement Description				
Start	2015/11/23 11:48:56			
Stop	2015/11/23 12:03:57			
Duration	0:15:00.9			
Run Time	0:15:00.9			
Pause	0:00:00.0			
Pre Calibration	2015/11/23 11:48:26			
Post Calibration	None			
Calibration Deviation	---			

Overall Settings

RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Linear			
Overload	145.5 dB			
	A	**C**	**Z**	
Under Range Peak	**101.6**	98.6	103.6	dB
Under Range Limit	**37.8**	35.8	43.8	dB
Noise Floor	24.9	25.4	33.0	dB

Results

LAeq	58.2		dB
LAE	87.7		dB
EA	65.476		µPa²h
EA8	2.093		mPa²h
EA40	10.466		mPa²h
LApeak (max)	2015/11/23 11:51:52	99.5	dB
LASmax	2015/11/23 11:51:52	74.6	dB
LASmin	2015/11/23 11:51:38	41.6	dB
SEA	-99.9		dB

LAS > 85.0 dB (Exceedence Counts / Duration)	0	0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0	s

LCeq	67.7	dB
LAeq	58.2	dB
LCeq - LAeq	9.5	dB
LAleq	67.8	dB
LAeq	58.2	dB
LAleq - LAeq	9.7	dB
# Overloads	0	
Overload Duration	0.0	s

Dose Settings

Dose Name	OSHA-1	OSHA-2	
Exch. Rate	5	5	dB
Threshold	90	80	dB
Criterion Level	90	90	dB
Criterion Duration	8	8	h

Results

Dose	-99.9	-99.9	%
Projected Dose	-99.9	-99.9	%
TWA (Projected)	-99.9	-99.9	dB
TWA (t)	-99.9	-99.9	dB
Lep (t)	43.1	43.1	dB

Statistics

LAS5.00	63.3	dB
LAS10.00	59.9	dB
LAS33.30	56.0	dB
LAS50.00	54.1	dB
LAS66.60	52.3	dB
LAS90.00	47.9	dB

Summary

Filename	LxT_Data.262			
Serial Number	3898			
Model	SoundTrack LxT®			
Firmware Version	2.206			
User				
Location	**MS3**			
Job Description				
Note				
Measurement Description				
Start	2015/11/23 12:29:05			
Stop	2015/11/23 12:44:06			
Duration	0:15:00.5			
Run Time	0:15:00.5			
Pause	0:00:00.0			
Pre Calibration	2015/11/23 12:25:14			
Post Calibration	None			
Calibration Deviation	---			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Linear			
Overload	145.6 dB			
	A		**C**	**Z**
Under Range Peak	**101.8**		98.8	103.8 dB
Under Range Limit	**37.9**		35.9	43.9 dB
Noise Floor	24.9		25.5	33.0 dB
Results				
LAeq	62.2 dB			
LAE	91.7 dB			
EA	165.422 µPa²h			
EA8	5.291 mPa²h			
EA40	26.453 mPa²h			
LApeak (max)	2015/11/23 12:33:15		91.6 dB	
LASmax	2015/11/23 12:35:48		70.0 dB	
LASmin	2015/11/23 12:30:25		47.9 dB	
SEA	-99.9 dB			
LAS > 85.0 dB (Exceedence Counts / Duration)	0		0.0 s	
LAS > 115.0 dB (Exceedence Counts / Duration)	0		0.0 s	
LApeak > 135.0 dB (Exceedence Counts / Duration)	0		0.0 s	
LApeak > 137.0 dB (Exceedence Counts / Duration)	0		0.0 s	
LApeak > 140.0 dB (Exceedence Counts / Duration)	0		0.0 s	
LCeq	70.2 dB			
LAeq	62.2 dB			
LCeq - LAeq	8.0 dB			
LAleq	63.6 dB			
LAeq	62.2 dB			
LAleq - LAeq	1.4 dB			
# Overloads	0			
Overload Duration	0.0 s			
Dose Settings				
Dose Name	OSHA-1	OSHA-2		
Exch. Rate	5	5 dB		
Threshold	90	80 dB		
Criterion Level	90	90 dB		
Criterion Duration	8	8 h		
Results				
Dose	-99.9	-99.9 %		
Projected Dose	-99.9	-99.9 %		
TWA (Projected)	-99.9	-99.9 dB		
TWA (t)	-99.9	-99.9 dB		
Lep (t)	47.1	47.1 dB		
Statistics				
LAS5.00	66.7 dB			
LAS10.00	65.7 dB			
LAS33.30	62.7 dB			
LAS50.00	60.8 dB			
LAS66.60	58.7 dB			
LAS90.00	53.9 dB			

Summary

Filename	LxT_Data.264			
Serial Number	3898			
Model	SoundTrack LxT®			
Firmware Version	2.206			
User				
Location	**MS4**			
Job Description				
Note				
Measurement Description				
Start	2015/11/23 13:17:43			
Stop	2015/11/23 13:32:43			
Duration	0:15:00.4			
Run Time	0:15:00.4			
Pause	0:00:00.0			
Pre Calibration	2015/11/23 13:17:05			
Post Calibration	None			
Calibration Deviation	---			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1			
Microphone Correction	Off			
Integration Method	Linear			
Overload	145.6 dB			
	A		**C**	**Z**
Under Range Peak	**101.8**		98.8	103.8 dB
Under Range Limit	**37.9**		35.9	43.9 dB
Noise Floor	24.9		25.5	33.0 dB
Results				
LAeq	47.4 dB			
LAE	77.0 dB			
EA	5.517 µPa²h			
EA8	176.453 µPa²h			
EA40	882.264 µPa²h			
LApeak (max)	2015/11/23 13:22:35		84.6	dB
LASmax	2015/11/23 13:22:23		57.2	dB
LASmin	2015/11/23 13:32:21		42.3	dB
SEA	-99.9 dB			
LAS > 85.0 dB (Exceedence Counts / Duration)	0		0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0		0.0	s
LCeq	64.2 dB			
LAeq	47.4 dB			
LCeq - LAeq	16.8 dB			
LAleq	50.0 dB			
LAeq	47.4 dB			
LAleq - LAeq	2.6 dB			
# Overloads	0			
Overload Duration	0.0 s			
Dose Settings				
Dose Name	OSHA-1	OSHA-2		
Exch. Rate	5	5	dB	
Threshold	90	80	dB	
Criterion Level	90	90	dB	
Criterion Duration	8	8	h	
Results				
Dose	-99.9	-99.9	%	
Projected Dose	-99.9	-99.9	%	
TWA (Projected)	-99.9	-99.9	dB	
TWA (t)	-99.9	-99.9	dB	
Lep (t)	32.4	32.4	dB	
Statistics				
LAS5.00	51.0 dB			
LAS10.00	50.3 dB			
LAS33.30	47.6 dB			
LAS50.00	45.9 dB			
LAS66.60	44.9 dB			
LAS90.00	43.9 dB			

ATTACHMENT 2

Sample Equipment Sheets

Specification sheet

Diesel generator set QSK50 series engine

1135 kW-1500 kW 60 Hz EPA emissions

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® digital 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™ protective relay, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance.

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

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	Emissions compliance	Data sheets
Model	60 Hz kW (kVA)	60 Hz kW (kVA)	60 Hz kW (kVA)	EPA	60 Hz
DQGAE	1250 (1563)	1135 (1419)	1000 (1250)	EPA Tier 2	D-3488
DQGAF	1500 (1875)	1365 (1706)	1100 (1375)	EPA Tier 2	D-3489

Generator set specifications

Governor regulation class	ISO 8528 Part 1 Class G3
Voltage regulation, no load to full load	± 0.5%
Random voltage variation	± 0.5%
Frequency regulation	Isochronous
Random frequency variation	± 0.25%
Radio frequency emissions compliance	IEC 801.2 through IEC 801.5; MIL STD 461C, Part 9

Engine specifications

Bore	159 mm (6.25 in)
Stroke	159 mm (6.25 in)
Displacement	50.3 litres (3067 in^3)
Configuration	Cast iron, V 16 cylinder
Battery capacity	1800 amps minimum at ambient temperature of 0 °C (32 °F)
Battery charging alternator	55 amps
Starting voltage	24 volt, negative ground
Fuel system	Cummins' Modular Common Rail System
Fuel filter	Two stage spin-on fuel filter and water separator system. Stage 1 has a three element 7 micron filter and Stage 2 has a three element 3 micron filter.
Air cleaner type	Dry replaceable element
Lube oil filter type(s)	Four spin-on, combination full flow filter and bypass filters
Standard cooling system	High ambient cooling system

Alternator specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Single bearing, flexible disc
Insulation system	Class H
Standard temperature rise	125 °C standby / 105 °C prime
Exciter type	PMG (permanent magnet generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 5% no load to full linear load, < 3% for any single harmonic
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 3

Available voltages

60 Hz line-neutral/line-line

- 220/380
- 240/416
- 255/440
- 277/480
- 347/600
- 2400/4160

Note: Consult factory for other voltages.

Generator set options and accessories

Engine

- ☐ 208/240/480 V thermo-statically controlled coolant heater for ambient above and below 4.5 °C (40 °F)
- ☐ Dual 120/208/240/480 V 300 W lube oil heaters
- ☐ Heavy duty air cleaner
- ☐ Triplex fuel filter

Alternator

- ☐ 80 °C rise
- ☐ 105 °C rise
- ☐ 125 °C rise
- ☐ 150 °C rise
- ☐ 120/240 V 300 W anti-condensation heater
- ☐ Increased motor starting capabilities

Control panel

- ☐ PowerCommand 3.3
- ☐ Multiple language support
- ☐ 120/240 V 100 W control anti-condensation heater
- ☐ Exhaust pyrometer
- ☐ Ground fault indication
- ☐ Remote annunciator panel
- ☐ Paralleling relay package
- ☐ Shutdown alarm relay package
- ☐ Audible engine shutdown alarm
- ☐ AC output analog meters (bargraph

Exhaust system

- ☐ Industrial grade exhaust silencer
- ☐ Residential grade exhaust silencer
- ☐ Critical grade exhaust silencer
- ☐ Exhaust packages

Cooling system

- ☐ Remote cooling
- ☐ Enhanced high ambient temperature (50 °C)

Generator set

- ☐ Battery
- ☐ Battery charger
- ☐ Bottom entry chute
- ☐ Circuit breaker – skid mounted up to 3000 Amp
- ☐ Circuit breaker auxiliary and trip contacts
- ☐ IBC and OSHPD seismic certification
- ☐ In-skid AVM
- ☐ LV and MV entrance box
- ☐ Manual language – English, French and Spanish
- ☐ Spring isolators
- ☐ 2 year warranty
- ☐ 5 year warranty
- ☐ 10 year major components warranty

Note: Some options may not be available on all models - consult factory for availability.

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PowerCommand 3.3 Control System

An integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

AmpSentry – Includes integral AmpSentry protection, which provides a full range of alternator protection functions that are matched to the alternator provided.

Power management – Control function provides battery monitoring and testing features and smart starting control system.

Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.

Communications interface – Control comes standard with PCCNet and Modbus interface.

Regulation compliant – Prototype tested: UL, CSA and CE compliant.

Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.

Easily upgradeable – PowerCommand controls are designed with common control interfaces.

Reliable design – The control system is designed for reliable operation in harsh environment.

Multi-language support

Operator panel features

Operator/display functions

- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions

- First Start Sensor System selects first genset to close to bus
- Phase Lock Loop Synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Load govern control for utility paralleling
- Extended Paralleling (baseload/peak shave) Mode
- Digital power transfer control, for use with a breaker pair to provide open transition, closed transition, ramping closed transition, peaking and base load functions,

Alternator data

- Line-to-neutral and line-to-line AC volts
- 3-phase AC current
- Frequency
- kW, kvar, power factor kVA (three phase and total)

Engine data

- DC voltage
- Engine speed
- Lube oil pressure and temperature
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data

- Genset model data
- Start attempts, starts, running hours, kW hours
- Load profile (operating hours at % load in 5% increments)
- Fault history
- Data logging and fault simulation (requires InPower)

Standard control functions

Digital governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 3-phase, 4-wire line-to-line sensing
- Configurable torque matching

AmpSentry AC protection

- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse var shutdown
- Field overload shutdown

Engine protection

- Battery voltage monitoring, protection and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown
- Fuel-in-rupture-basin warning or shutdown
- Full authority electronic engine protection

Control functions

- Time delay start and cool down
- Real time clock for fault and event time stamping
- Exerciser clock and time of day start/stop
- Data logging
- Cycle cranking
- Load shed
- Configurable inputs and outputs (4)
- Remote emergency stop

Options

- Auxiliary output relays (2)

Emergency standby power (ESP):

Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-time running power (LTP):

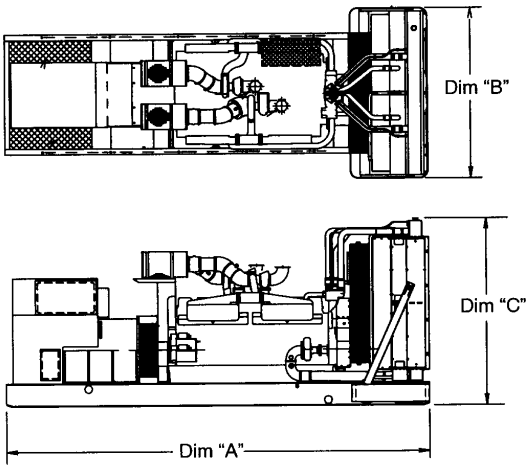
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime power (PRP):

Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base load (continuous) power (COP):

Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Set Weight* dry kg (lbs)	Set Weight* wet kg (lbs)
DQGAE	6381 (251)	2285 (90)	2474 (97)	11293 (24897)	11926 (26292)
DQGAF	6381 (251)	2285 (90)	2474 (97)	11551 (25465)	12184 (26861)

*Note: Weights represent a set with standard features. See outline drawings for weights of other configurations.

Codes and standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

ISO 9001	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.	UL	The generator set is available listed to UL 2200 for all 60 Hz low voltage models, Stationary Engine Generator Assemblies. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage. Circuit breaker assemblies are UL 489 Listed for 100% continuous operation and also UL 869A Listed Service Equipment.
PTS	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins Power Generation products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	**U.S. EPA**	Engine certified to Stationary Emergency U.S. EPA New Source Performance Standards, 40 CFR 60 subpart IIII Tier 2 exhaust emission levels. U.S. applications must be applied per this EPA regulation.
CSA	All low and medium voltage models are CSA certified to product class 4215-01.	**International Building Code**	The genset package is certified for seismic application in accordance with the following International Building Code: IBC2000, IBC2003, IBC2006, and IBC2009.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Minneapolis, MN 55432
USA

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S-1614a (8/12)

Power Generation

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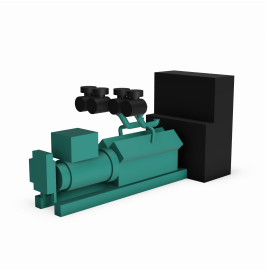
REVIT CONTENT GUIDE



Manufacturer: Cummins Power Generation, Inc.
File: Generator_Diesel-QSK50-Cummins_Power-Trinity.rfa
Type Catalog: Not Applicable
Rendering file: Not Applicable
Schedule file: Schedule - Generator_Diesel-QSK50-Cummins_Power-Trinity.rvt

Instance Properties

Analytical Model	
Octave Band - 1000 Hz*	117.000000
Octave Band - 125 Hz*	104.000000
Octave Band - 2000 Hz*	114.000000
Octave Band - 250 Hz*	114.000000
Octave Band - 4000 Hz*	110.000000
Octave Band - 500 Hz*	118.000000
Octave Band - 63 Hz*	85.000000
Octave Band - 8000 Hz*	108.000000
Sound Power Level*	122.000000
Sound Pressure Level*	94.000000

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Construction	
Alternator Model*	P734D
Alternator Model is HVSI804R	☐
Alternator Model is MV7F	☐
Alternator Model is MV7G	☐
Alternator Model is MV7H	☐
Alternator Model is P734B	☐
Alternator Model is P734C	☐
Alternator Model is P734D	☑
Alternator Model is P734E	☐
Alternator Model is P734F	☐
Alternator Model is P734G	☐
Configuration	Available
Control Box is Front Mounted	☑
Control Box is Left Side Mounted	☐
Control Box is Right Side Mounted	☐
Has Circuit Breaker Left Bottom Entry	☐
Has Circuit Breaker Left Top Entry	☐
Has Circuit Breaker Right Bottom Entry	☐
Has Circuit Breaker Right Top Entry	☐
Has Entrance Box Left Bottom Entry	☐
Has Entrance Box Left Top Entry	☐
Has Entrance Box Right Bottom Entry	☐
Has Entrance Box Right Top Entry	☐
Has Heavy Duty Air Cleaners	☑
Has Spring Isolators	☐
Has Terminal Housing Right Bottom Entry	☐
Has Terminal Housing Right Top Entry	☐
Radiator is Enhanced	☑
Radiator is Remote	☐
Radiator is Standard	☐
Radiator Selection*	Radiator is DQGAF 50 deg C
Terminal Housing or Entrance Box Configuration*	Right: None, Left: None
Data	
Cooling Coil Air Pressure Drop*	0.5000 in-wg
Graphics	
Clearance Depth Generator End	142.500
Clearance Depth Radiator End	184.500
Show Clearance Areas	☑
Identity Data	
Equipment Number*	
Part Description*	1500 kW STANDBY Diesel Generator Set
Part Number*	DQGAF
Structural	
Operating Weight*	25384.00 lb
Weight Disclaimer	Wet Weight Value is Approximate and Calculated Fom the Configurable Options

Type Properties

The family contains 8 types. These are a few of the types:

DQGAM - 1460 kW Standby Power (Values for this type are shown below)
DQGAE - 1250 kW Standby Power
DQGAF - 1500 kW Standby Power
DQGAG - 1360 kW Standby Power
DQGAH - 1232 kW Standby Power

Adsk Model Properties	
Engine Model*	QSK50-G5 NR2
Analytical Model	
Exhaust Octave Band - 1000 Hz*	132.000000
Exhaust Octave Band - 125 Hz*	120.000000
Exhaust Octave Band - 2000 Hz*	130.000000
Exhaust Octave Band - 250 Hz*	122.000000
Exhaust Octave Band - 4000 Hz*	130.000000
Exhaust Octave Band - 500 Hz*	128.000000
Exhaust Octave Band - 63 Hz*	97.000000
Exhaust Octave Band - 8000 Hz*	128.000000
Construction	
Coolant Heater is 40 Deg F Ambient	☑
Coolant Heater is Sub 40 Deg F Ambient	☐
Data	
Emissions CO (g/hp-hr)*	0.830000
Emissions HC (g/hp-hr)*	0.130000
Emissions NOx (g/hp-hr)*	5.700000
Emissions PM (g/hp-hr)*	0.040000
Emissions SO2 (g/hp-hr)*	0.110000
Engine Lube Oil Capacity*	62.0 gal
Exhaust Gas Flow Rate*	12105.000 CFM
Exhaust Stack Gas Temp*	965.00 °F
Exhaust System Backpressure*	27.0000 in-wg
Fuel Consumption Rate at Full Load*	109.964 gal/h
Heat Rejection to Aftercooler Circuit Coolant*	1479299.99 Btu/h
Heat Rejection to Jacket Water Coolant*	2447400.01 Btu/h

Electrical	
Amperage*	2.46 kA
Bus Voltage*	440.00 V
Coolant Heater Voltage*	208.00 V
Coolant Heater Voltage is 208 V	☑
Coolant Heater Voltage is 240 V	☐
Coolant Heater Voltage is 480 V	☐
Coolant Heater Voltage Selection	208 V
Coolant Heater Wattage*	7485.00 W
Frequency*	60.00 Hz
Load Classification*	Power
Number of Poles*	3
Power Rating*	1500.00000 kW
Voltage	440
Voltage is 11000	☐
Voltage is 3300	☐
Voltage is 380	☐
Voltage is 400	☐
Voltage is 416	☐
Voltage is 4160	☐
Voltage is 440	☑
Voltage is 480	☐
Voltage is 600	☐
Voltage is 6300	☐
Voltage is 6600	☐
Wattage	1500
Electrical Loads	
Apparent Load Phase A*	0.00 VA
Apparent Load Phase B*	0.00 VA
Apparent Load Phase C*	0.00 VA
Identity Data	
Copyright*	Copyright © 2011 Cummins Power Generation, Inc.
Date Last Modified*	September 16, 2013
Description	1500 kW STANDBY Diesel Generator Set
Equipment Abbreviation*	GS
Family Version*	1.0.0
Manufacturer	Cummins Power Generation, Inc.
Model	DQGAF
Model Disclaimer*	This Model Represents a Highly Customizable Piece of Equipment. For Accurate Selection Data, Contact Cummins Power Generation, Inc.
Original Creation Date*	September 16, 2013
Product Documentation Link*	https://powersuite.cummins.com/PS5/PS5Content/SiteContent/en/Binary_Asset/pdf/Commercial/Diesel/s-1614DC.pdf
Product Page URL*	http://power.cummins.com/onanpowerWeb/navigation.do?pageId=1098&parentId=533&linkName=Data%20Center%20Continuous%20Rating%20Generators
Provide Feedback*	https://www.surveymonkey.com/s/ZBZFRTF
URL	http://www.cumminspower.com/en/
Materials	
Product Material*	Steel - Cummins - Green

Halftone text in the property tables indicates that the value is locked from editing.
*Indicates Shared Parameter and can be scheduled

Loading and Placing into the Project

One "Electrical Equipment" family is supplied and can be loaded into a Revit project through all traditional methods. The generator requires a work-plane host to be placed within the project (i.e. floor). Also, ensure that the visibility settings within the project are modified to have the Electrical Equipment category visible.

The Generator will come into the project with a transparent red box (clearance area) around it, deselect the Show Clearance Areas option to hide the clearance area.

Project Behavior

Within the type and instance properties dialogues, the user will find useful information for scheduling purposes such as Engine Model, Frequency, and other unique properties of the model. In “Identity Data” the user will find information specific to Cummins Power Generation, Inc. and the model, i.e.: family revision information, Cummins Power Generation, Inc. copyright information, part description, product URL and other specific data. *See scheduling description below.

There are many options that are specific to one or a few types within the generator family, if an unavailable selection is made a red error box will surround the generator. The cause of the error and how to fix is can be found by referencing the construction parameter Configuration in the instance window.

The generator features many different options in order to configure the product as necessary. Certain options can be utilized to change between alternators or to swap out the standard air cleaners for a heavy duty set. When selecting between either a circuit breaker, termainal housing, or entrance box know that only one can be placed on each side of the generator. For more information about the available options and how they affect the model, *see Instance Parameter section below.

Instance Parameter

In the “Instance Parameters”, the user has the following options to modify:

- Equipment Number - For tagging each placed instance.
- Radiator is... - For selecting between a standard, enhanced, or a remote radiator.
- Has Terminal Housing... - For selecting either a top or bottom entry terminal housing for the right side of the generator.
- Has Spring Isolators - For selecting the use of the spring isolators.
- Has Entrance Box Left Top Entry - For selecting either a top or bottom entry entrance box for the left or right side of the generator.
- Has Heavy Duty Air Cleaners - For toggling between the standard and heavy duty air cleaners.
- Has Circuit Breaker... - For selecting either a top or bottom entry circuit breaker for the left or right side of the generator.
- Control Box is... - For selecting a control box for the front, left, or right side of the generator.
- Alternator Model is.... - Use options to select an alternator for the generator.
- Show Clearance Areas - For toggling the visibility of the clearance area.

Type Parameter

Each type represents a manufactured product. Therefore, the type parameters should not be modified by the user for standard configuration. Please note:

- Product Documentation Link – Directs a webpage to the products online listing.
- Equipment Abbreviation – For filtering schedules. *See scheduling description below.
- Coolant Heater is 40 Deg F Ambient – For toggling between the 40 deg F or Sub 40 deg F Coolant Heater.
- Voltage is... - For selecting the desired voltage for the generator.
- Coolant Heater Voltage is... - For selecting the desired Coolant Heater Voltage.

Visibility

For best performance, all model geometry is turned off inall views and represented through masking regions and symbolic/model lines that update automatically when a user changes view properties.

Rendering

When the family file is loaded into the project, standard Wiremold materials are imported. These may be modified, though ensure that the modification selection matches an actual manufacturer supplied option.

Schedule Creation

Cummins Power Generation, Inc. products may be scheduled utilizing the schedule view in the given project file. Select and copy (Ctrl-C) the schedule from the sheet view and paste it (Ctrl-V) into a sheet in your project. The schedule filters are set to look for only those units designated with Manufacturer as “Cummins Power Generation, Inc." and Equipment Abbreviation as "GS".

Enclosures

Sound-attenuated and weather-protective

Sound-attenuated and weather-protective enclosures from Cummins Power Generation meet even the strictest sound requirements and provide optimal protection from inclement weather.

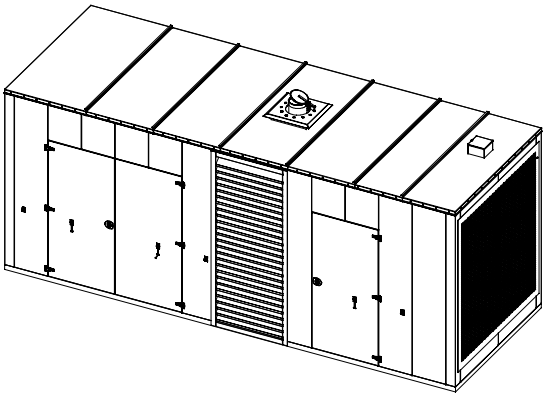
- Excellent sound attenuation design providing very low noise
- All-aluminum structure for best-in-class, corrosion-resistant performance
- Modular design for easy upgrade to sound level 2 in the field
- Aesthetic design with green and sandstone color options
- Best-in-class wind rating (180 mph)
- Standard IBC seismic certification on all enclosures
- UL 2200 certified

- Multiple levels of sound attenuation provide exceptional sound performance
- Available in steel and aluminum
- Fully housed, enclosed exhaust silencer ensures safety and protects against rust
- Easy access to all major generator and engine control components for servicing
- Embedded design for ingression protection and enhanced anti-corrosion performance
- IBC seismic certification option available
- UL 2200 certified

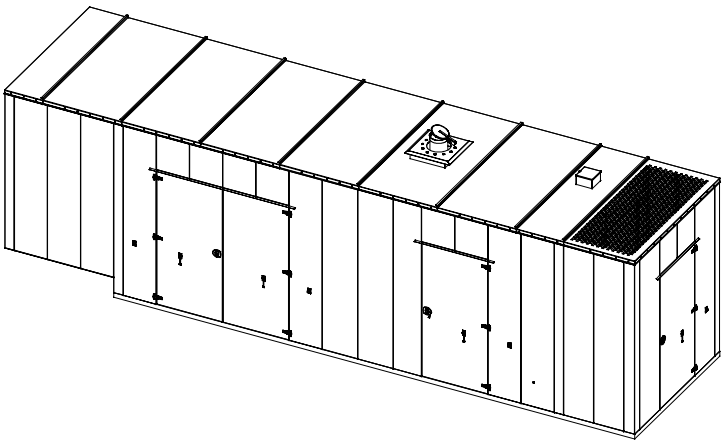
KOHLER. Power Systems

Aluminum Enclosure and Subbase Fuel Tank Package

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Weather Enclosure with Internal Silencer shown



Sound Enclosure Level 1 and Level 2 with Internal Silencer shown

Applicable to the following:

1250–2250REOZDD
1250–2000REOZMD

Weather Enclosure Standard Features

- Internal or external silencer, flexible exhaust connector, exhaust elbow, and rain cap.
- Mounts to lift base or subbase fuel tank. Aluminum construction with hinged and removable doors.
- Fade-, scratch-, and corrosion-resistant Kohler® cream beige polyurethane enamel that is wet-sprayed and has an automotive quality finish.
- Lockable, flush-mounted door latches.
- Air inlet louvers reduce rain and snow entry.

Sound Enclosure Standard Features

- Includes all of the weather enclosure features (except air inlet louvers) with the addition of acoustic insulation material.
- External vertical intake hood and internal vertical discharge scoop direct air up to reduce noise.
- Acoustic insulation that meets UL 94 HF1 flammability classification.
- Sound enclosure level 1 that offers sound reduction of 15 dB(A) at 7 m (23 ft.) using acoustic insulation and acoustic-lined air inlet hoods.
- Sound enclosure level 2 that offers sound reduction of 25 dB(A) at 7 m (23 ft.) using acoustic insulation, air inlet hoods, and air discharge hood.

Subbase Fuel Tank Features

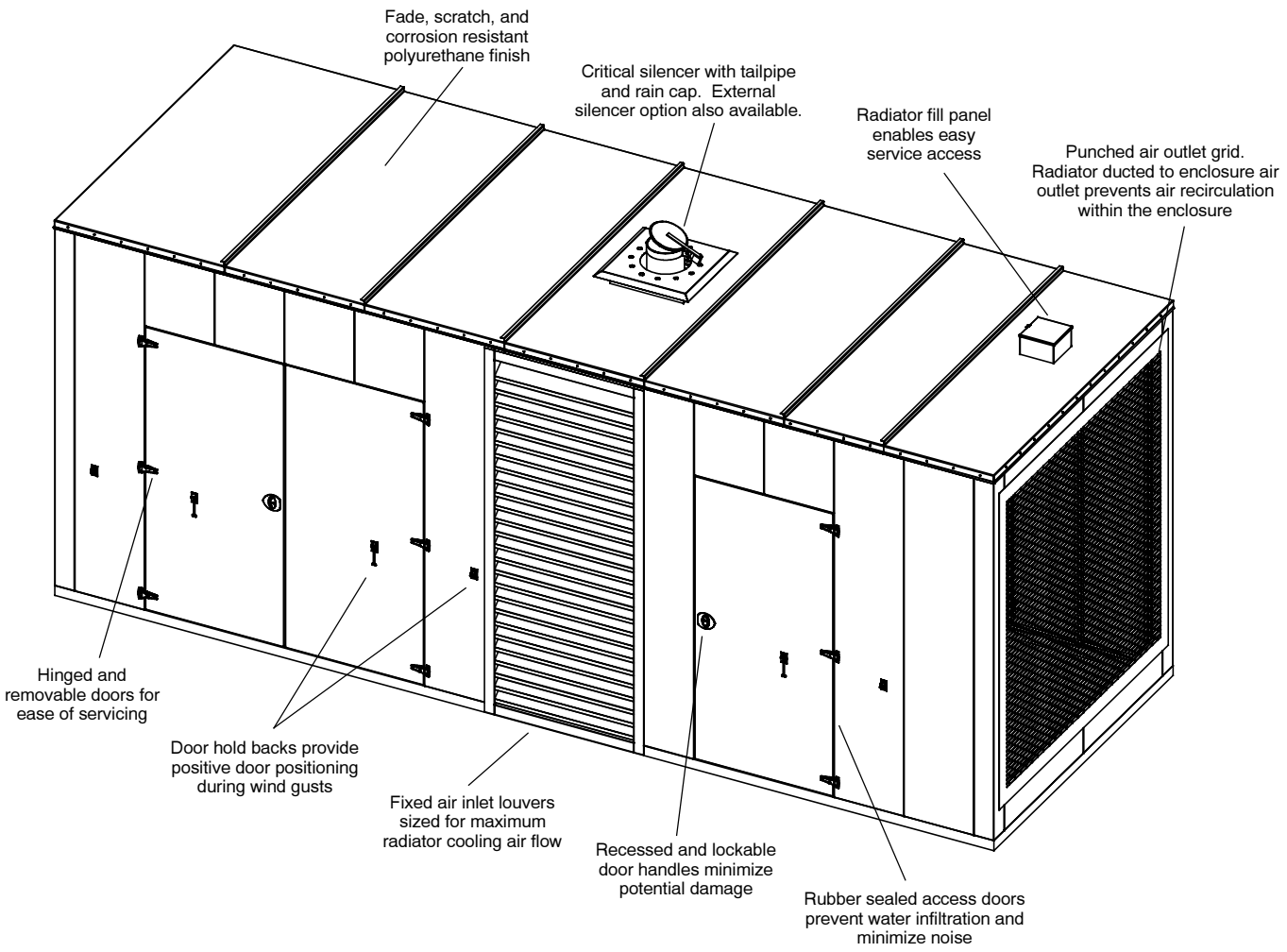
- The above-ground rectangular secondary containment tank mounts directly to the generator set, below the generator set skid (subbase).
- Both the inner and outer tanks have emergency relief vents.
- Flexible fuel lines are provided with subbase fuel tank selection.
- The secondary containment tank's construction protects against fuel leaks or ruptures. The inner (primary) tank is sealed inside the outer (secondary) tank. The outer tank contains the fuel if the inner tank leaks or ruptures.

Enclosure and Subbase Fuel Tank Combinations

There are six enclosure configurations available with the subbase fuel tanks.

Weather Enclosure with External Silencer
Sound Enclosure Level 1 with External Silencer
Sound Enclosure Level 2 with External Silencer
Weather Enclosure with Internal Silencer
Sound Enclosure Level 1 with Internal Silencer
Sound Enclosure Level 2 with Internal Silencer

Aluminum Weather Enclosure



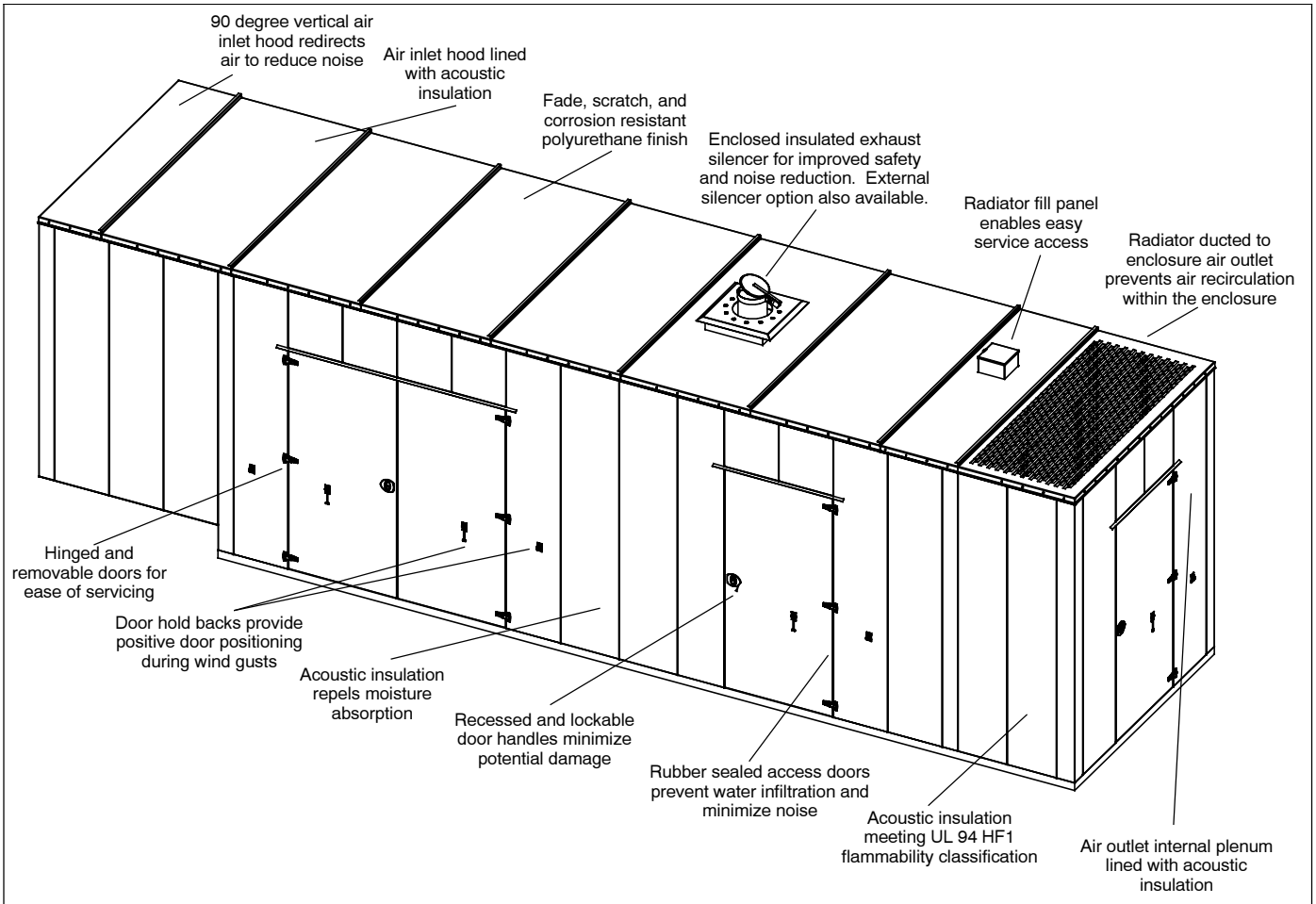
Enclosure ships assembled on subbase fuel tank or lifting base.
Note: Sample model shown, other models are similar.

Weather Enclosure Features

- Heavy-duty formed panels, solid construction. Preassembled package offering corrosion resistant, dent resilient structure mounting directly to lift base or fuel tank.
- Polyurethane enamel paint. Superior finish, durability, and appearance.
- Internal critical exhaust silencer. Offers maximum component life, operator safety, and includes rain shield and cap. Models with external silencer are also available.

  NOTE: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
- Interchangeable modular panel construction allows design flexibility without compromising building standards.
- Bolted panels facilitate service, future modification upgrades, or field replacement.
- Cooling/combustion air intake. Weather protective designs using fixed air inlet louvers. Sized for maximum cooling airflow.
- Cooling air discharge. Weather protective design featuring horizontal air discharge. Exhausts air through a removable punched air outlet grille.

Level 1 and Level 2 Aluminum Sound Enclosure



Enclosure ships assembled on subbase fuel tank or lifting base.
Note: Sample model shown, other models are similar.

Level 1 and Level 2 Sound Enclosure Features

- Heavy-duty formed panels, solid construction. Preassembled package offering corrosion resistant, dent resilient structure mounting directly to lift base or fuel tank.
- Polyurethane enamel paint. Superior finish, durability, and appearance.
- Internal exhaust silencer offering maximum component life and operator safety. Models with external silencer are also available.

  NOTE: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the fuel fill, fuel gauge, oil fill, and battery.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Bolted panels facilitate service, future modification upgrades, or field replacement.
- Cooling/combustion air intake. Attenuated models offering 90° vertical air hood redirects air to reduce noise.
- Cooling air discharge. Attenuated models offering an internal vertical discharge scoop that redirects cooling air up and above the enclosure to reduce noise.

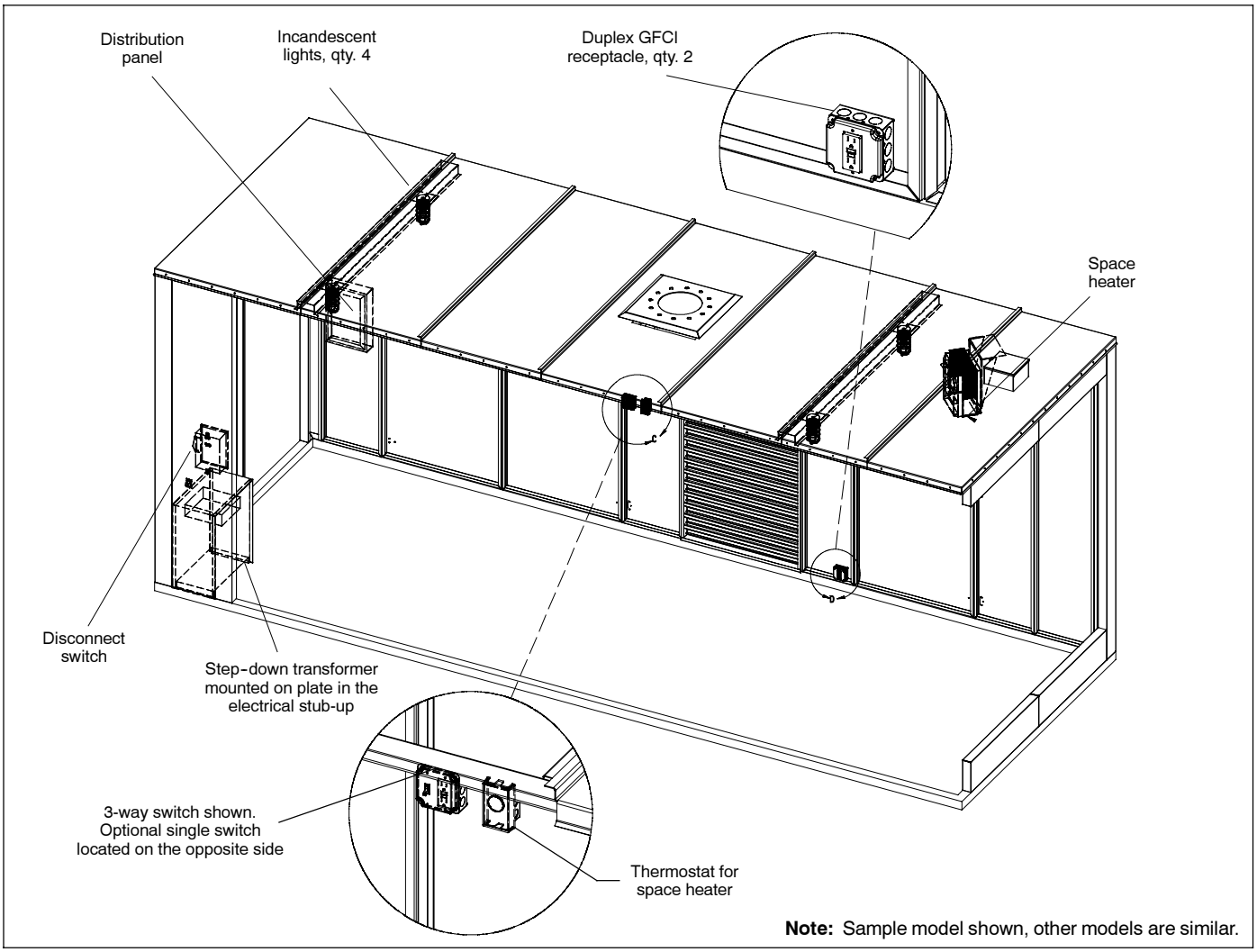
Level 1 Sound Enclosure Features

- Attenuated design using a critical silencer. Acoustic insulation UL 94 HF1 listed for flame resistance; design offering 15 dB(A) attenuation using acoustic insulation.

Level 2 Sound Enclosure Features

- Attenuated design using a hospital silencer. Acoustic insulation UL 94 HF1 listed for flame resistance; design offering 25 dB(A) attenuation using acoustic insulation.

Aluminum Weather and Sound Enclosure Options



Note: Sample model shown, other models are similar.

Enclosure Material

❑ **Aluminum Enclosure**

Enclosure Silencer Options

❑ **External Critical Silencer**, weather enclosure
❑ **External Critical Silencer**, sound enclosure, level 1
❑ **External Hospital Silencer**, sound enclosure, level 2

❑ **Internal Critical Silencer**, weather enclosure
❑ **Internal Critical Silencer**, sound enclosure, level 1
❑ **Internal Hospital Silencer**, sound enclosure, level 2

DC Light Package

DC Light Package (DLP). Prewired qty. 2, internal DC light package offering an economical alternative light source within the enclosure, as a complement to the BEP or a source of light when AC power is not available. Battery drain limited with fuse protection and controlled through a 0–60 minute, spring-wound, no-hold timer.

❑ Additional DC lights, qty. 2.

Aluminum Weather and Sound Enclosure Options, continued

Basic Electrical Package (BEP)

Distribution Panel/Load Center. Prewired AC power distribution of all factory-installed features including block heater, two GFCI-protected internal 120-volt service receptacles, internal lighting, and commercial grade wall switch. The single-phase or three-phase load center powered by building source power and protected by a main circuit breaker, rated for 100 or 200 amps with capacity and circuit positions for future expansion. AC power distribution installed in accordance with NEC and all wiring within EMT thin wall conduit. Incandescent or fluorescent AC lights located within UL-listed fixtures designed for wet locations.

- ❑ BEP, single-phase load center, 120/240 VAC with three AC incandescent lights.
- ❑ BEP, three-phase load center, 120/208/240 VAC with three AC incandescent lights.
- ❑ BEP, single-phase load center, 120/240 VAC with three AC fluorescent lights.
- ❑ BEP, three-phase load center, 120/208/240 VAC with three AC fluorescent lights.
- ❑ 100 amp load center.
- ❑ 200 amp load center.
- ❑ Additional AC lights (qty. 2).
- ❑ Additional GFCI duplex receptacles (qty. 2) internal mounted.
- ❑ Additional GFCI duplex receptacles (qty. 2) external mounted.

Enclosure Heater

Heater, 5 kW Ceiling Mounted. Electrical utility heater prewired to load center internal to enclosure. Rated at 17100 Btu. Includes adjustable louvers offering down flow and horizontal air tuning, built-in thermostat with automatic fan delay controls.

- ❑ Heater, single phase at 208 or 240 VAC.
- ❑ Heater, three phase at 208 or 240 VAC.

Emergency Lights

- ❑ **Emergency Lights.** Mounted inside the enclosure with batteries, qty. 2.

Exhaust Fan

- ❑ **Exhaust Fan.** Mounted inside the enclosure.

Miscellaneous Enclosure Accessories

- ❑ **Viewing Window.** Control panel viewing window (may compromise sound attenuation).
- ❑ **Emergency Stop Switch.** Generator set emergency stop switch, qty. 1.
- ❑ **Battery Charger, Mounted.** Mounting and prewiring of DC output and AC input when optional BEP is selected. Battery charger located inside the enclosure and accessible through an access door.
- ❑ **Battery Charger with Alarms.** Mounted and wired.
- ❑ **Internal Release Handles.** Internal release handle for each door.

Motorized Discharge Louvers.

- ❑ Aluminum construction

Gravity Discharge.

- ❑ Aluminum construction

Motorized Inlet Louvers.

- ❑ Aluminum construction

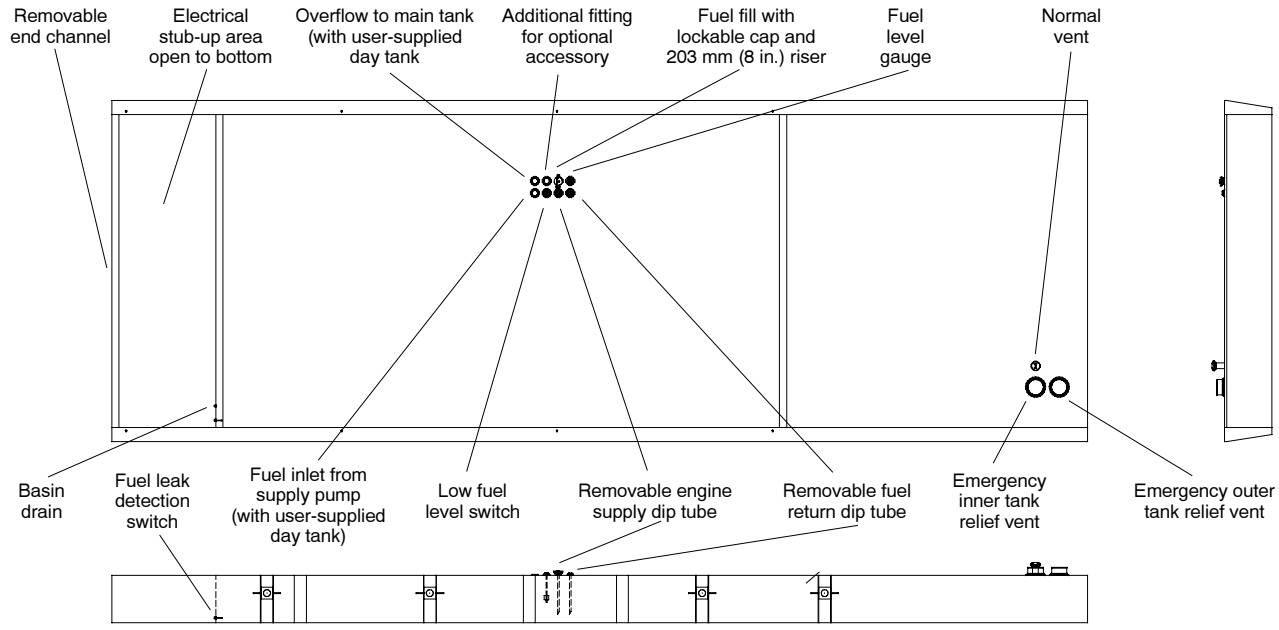
Stepdown Transformer. 37.5 kVA, 480 volt primary and 120/208 secondary. Mounted in electrical stub-up area.

- ❑ Single-phase
- ❑ Three-phase

Disconnect. Disconnect switch for 37.5 kVA transformer.

- ❑ Single-phase
- ❑ Three-phase

Subbase Fuel Tank



Note: Sample model shown, other models are similar.

ADV-7822-

Standard Subbase Fuel Tank Features

- Extended operation. Optional tank capacities for multiple hour requirements.
- UL listed. Secondary containment generator set base tank meeting UL 142 requirements.
- NFPA compliant. Designed to comply with the installation standards of NFPA 30 and NFPA 37.
- Integral external lift lugs. Enables crane with spreader-bar lifting of the complete package (empty tank, mounted generator set, and enclosure) to ensure safety.
- Emergency pressure relief vents. Vents ensure adequate venting of inner and outer tank under extreme pressure and/or emergency conditions.
- Normal vent with cap. Vent is raised above lockable fuel fill.
- Low fuel level switch. Annunciates a 50% low fuel level condition at generator set control.
- Leak detection switch. Annunciates a contained primary tank fuel leak condition at generator set control.
- Electrical stub-up.

Subbase Fuel Tank Option

❑ ULC-S601 tank listing

State Code Subbase Fuel Tank Options

Bottom Clearance/Coating

❑ I-beams, provides 106 mm (4.2 in.) of ground clearance

❑ Epoxy mastic coating

Fuel in Basin Options

❑ Fuel in basin switch, Florida Dept. of Environmental Protection (FDEP) File No. EQ-456 approved

Fuel Fill Options

❑ Fill pipe extension to within 152 mm (6 in.) of bottom of fuel tank

❑ 18.9 L (5 gallon) spill containment with 95% shutoff, Florida Dept. of Environmental Protection (FDEP) File No. EQ-567 approved

❑ 18.9 L (5 gallon) spill containment, Florida Dept. of Environmental Protection (FDEP) File No. EQ-567 approved

❑ 18.9 L (5 gallon) spill containment fill to within 152 mm (6 in.) of bottom of fuel tank

Fuel Supply Options

❑ Fire safety valve (installed on fuel supply line)

❑ Ball valve (installed on fuel supply line)

High Fuel Level Switch

❑ High fuel level switch

❑ High fuel level switch, Florida Dept. of Environmental Protection (FDEP) File No. EQ-456 approved

Normal Vent Options

❑ 3.7 m (12 ft.) above grade (without spill containment)

❑ 3.7 m (12 ft.) above grade (with spill containment)

Tank Marking Options

❑ Decal, Combustible Liquids – Keep Fire Away (qty. 2)

❑ Decal, NFPA 704 identification (qty. 2)

❑ Decal, tank number and safe fuel fill height (qty. 2)

❑ Decal, tank number and safe fuel fill height, NFPA 704 identification

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	1250/1500/1750REOZDD with 40°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	7468 (294)	2743 (108)	4140 (163)	18370 (40500)	203 (8)	—
5110 (1350)	14/12/11	7976 (314)		4318 (170)	19704 (43440)	381 (15)	
6057 (1600)	17/14/13			4369 (172)	19894 (43860)	432 (17)	
7949 (2100)	22/19/17	9296 (366)		4394 (173)	20479 (45150)	457 (18)	
9842 (2600)	28/23/21	11278 (444)			21228 (46800)		
11848 (3130)	33/28/25	13259 (522)			21999 (48500)		
15709 (4150)	44/37/33	8179 (322)		5156 (203)	21182 (46700)	1016 (40)	
19495 (5150)	55/46/42	9347 (368)		5207 (205)	21931 (48350)	1067 (42)	
23318 (6160)	65/55/50	10922 (430)			22797 (50260)		
29148 (7700)	82/69/62	13259 (522)			24131 (53200)		
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	11862 (467)	2896 (114)	4191 (165)	19936 (43950)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	14/12/11			4293 (169)	21061 (46430)	305 (12)	
6057 (1600)	17/14/13			4343 (171)	21206 (46750)	356 (14)	
7949 (2100)	22/19/17			4445 (175)	21501 (47400)	457 (18)	
9842 (2600)	28/23/21				22272 (49100)		
11848 (3130)	33/28/25	13208 (520)			23066 (50850)		
15709 (4150)	44/37/33	11862 (467)		5055 (199)	22666 (49970)	864 (34)	
19495 (5150)	55/46/42			5259 (207)	23247 (51250)	1067 (42)	
23318 (6160)	65/55/50				24131 (53200)		
29148 (7700)	82/69/62	13208 (520)			25538 (56300)		

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	1250/1500/1750REOZDD with 50°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	7620 (300)	3505 (138)	4140 (163)	19301 (42550)	203 (8)	—
5110 (1350)	14/12/11	8128 (320)		4216 (166)	20922 (46125)	279 (11)	
6057 (1600)	17/14/11			4267 (168)	21072 (46455)	330 (13)	
7949 (2100)	22/19/17			4369 (172)	21376 (47125)	432 (17)	
9842 (2600)	28/23/21	8839 (348)		4394 (173)	21773 (48000)	457 (18)	
11848 (3130)	33/28/25	10363 (408)			22487 (49575)		
15709 (4150)	44/37/33	13208 (520)			23841 (52560)		
19495 (5150)	55/46/42	8280 (326)		5080 (200)	22573 (49765)	940 (37)	
23318 (6160)	65/55/50	8687 (342)		5207 (205)	23245 (51245)	1067 (42)	
29148 (7700)	82/69/62	10414 (410)			24370 (53725)		
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	12776 (503)	3658 (144)	4191 (165)	20800 (45855)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	14/12/11			4293 (169)	22507 (49620)	305 (12)	
6057 (1600)	17/14/11				22689 (50020)		
7949 (2100)	22/19/17			4318 (170)	23036 (50785)	330 (13)	
9842 (2600)	28/23/21			4394 (173)	23310 (51390)	406 (16)	
11848 (3130)	33/28/25			4470 (176)	23591 (52010)	483 (19)	
15709 (4150)	44/37/33				24490 (53990)		
19495 (5150)	55/46/42			4953 (195)	24152 (53245)	762 (30)	
23318 (6160)	65/55/50			5080 (200)	24632 (54305)	889 (35)	
29148 (7700)	82/69/62			5258 (207)	25306 (55790)	1067 (42)	

Note: Refer to TIB-114 for generator set sound data.

***** Data in table is for reference only. Refer to your authorized Kohler distributor for enclosure and subbase fuel tank specification details.

† Max. weight includes the generator set (wet), enclosure, silencer, and tank (no fuel).

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	2000REOZDD with 40°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	7925 (312)	2743 (108)	4013 (158)	19135 (42185)	203 (8)	—
5110 (1350)	9	8433 (332)		4166 (164)	20541 (45285)	356 (14)	
6057 (1600)	11			4216 (166)	20688 (45610)	406 (16)	
7949 (2100)	14			4343 (171)	21012 (46325)	533 (21)	
9842 (2600)	18	9347 (368)		4369 (172)	21475 (47345)	559 (22)	
11848 (3130)	21	10922 (430)			22112 (48750)		
15709 (4150)	28	8433 (332)		4775 (188)	21784 (48025)	965 (38)	
19495 (5150)	35	9296 (366)		5080 (200)	22546 (49705)	1067 (42)	
23318 (6160)	42	10871 (428)			23387 (51560)		
29148 (7700)	52	13564 (534)			24882 (54855)		
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	12319 (485)	3150 (124)	4191 (165)	20625 (45470)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	9			4267 (168)	22210 (48965)	279 (11)	
6057 (1600)	11			4318 (170)	22367 (49310)	330 (13)	
7949 (2100)	14			4394 (173)	22630 (49890)	406 (16)	
9842 (2600)	18			4496 (177)	22920 (50530)	508 (20)	
11848 (3130)	21				23483 (51770)		
15709 (4150)	28			4953 (195)	23297 (51360)	762 (30)	
19495 (5150)	35			5131 (202)	23850 (52580)	940 (37)	
23318 (6160)	42			5258 (207)	24431 (53860)	1067 (42)	
29148 (7700)	52				25846 (56980)		

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	2000REOZDD with 50°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	8230 (324)	3658 (144)	4191 (165)	19775 (43595)	203 (8)	—
5110 (1350)	9	8738 (344)		4242 (167)	21535 (47475)	254 (10)	
6057 (1600)	11			4293 (169)	21684 (47805)	305 (12)	
7949 (2100)	14	9144 (360)		4343 (171)	22052 (48615)	356 (14)	
9842 (2600)	18	11125 (438)			22954 (50605)		
11848 (3130)	21	13005 (512)			23784 (52435)		
15709 (4150)	28	8738 (344)		4877 (192)	22941 (50575)	686 (27)	
19495 (5150)	35			5055 (199)	23517 (51845)	864 (34)	
23318 (6160)	42			5207 (205)	24011 (52935)	1016 (40)	
29148 (7700)	52	10160 (400)		5258 (207)	25191 (55535)	1067 (42)	
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	13818 (544)	3658 (144)	4191 (165)	21468 (47330)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	9			4242 (167)	23319 (51410)	254 (10)	
6057 (1600)	11				23550 (51920)		
7949 (2100)	14			4318 (170)	23813 (52500)	330 (13)	
9842 (2600)	18			4369 (172)	24040 (53000)	381 (15)	
11848 (3130)	21			4445 (175)	24294 (53560)	457 (18)	
15709 (4150)	28			4775 (188)	24280 (53530)	584 (23)	
19495 (5150)	35			4877 (192)	24716 (54490)	686 (27)	
23318 (6160)	42			5029 (198)	25274 (55720)	838 (33)	
29905 (7900)	52			5232 (206)	26059 (57450)	1041 (41)	

Note: Refer to TIB-114 for generator set sound data.

***** Data in table is for reference only. Refer to your authorized Kohler distributor for enclosure and subbase fuel tank specification details.

† Max. weight includes the generator set (wet), enclosure, silencer, and tank (no fuel).

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	2250REOZDD with 40/50°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	8230 (324)	3658 (144)	4191 (165)	19865 (43795)	203 (8)	—
5110 (1350)	8	8738 (344)		4242 (167)	21625 (47675)	254 (10)	
6057 (1600)	10			4293 (169)	21774 (48005)	305 (12)	
7949 (2100)	13	9144 (360)		4343 (171)	22142 (48815)	356 (14)	
9842 (2600)	16	11125 (438)			23044 (50805)		
11848 (3130)	19	13005 (512)			23875 (52635)		
15709 (4150)	25	8738 (344)		4877 (192)	23031 (50775)	686 (27)	
19495 (5150)	31			5055 (199)	23607 (52045)	864 (34)	
23318 (6160)	38			5207 (205)	24101 (53135)	1016 (40)	
29148 (7700)	47	10160 (400)		5258 (207)	25281 (55735)	1067 (42)	
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	13818 (544)	3658 (144)	4191 (165)	21559 (47530)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	8			4242 (167)	23409 (51610)	254 (10)	
6057 (1600)	10				23641 (52120)		
7949 (2100)	13			4318 (170)	23904 (52700)	330 (13)	
9842 (2600)	16			4369 (172)	24131 (53200)	381 (15)	
11848 (3130)	19			4445 (175)	24385 (53760)	457 (18)	
15709 (4150)	25			4775 (188)	24372 (53730)	584 (23)	
19495 (5150)	31			4877 (192)	24807 (54690)	686 (27)	
23318 (6160)	38			5029 (198)	25365 (55920)	838 (33)	
29905 (7900)	47			5232 (206)	26150 (57650)	1041 (41)	

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	1250REOZMD with 40°C/50°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	7163 (282)	2591 (102)	3708 (146)	14697 (32400)	203 (8)	—
5110 (1350)	13	7671 (302)		3912 (154)	15994 (35260)	406 (16)	
6057 (1600)	15			3988 (157)	16157 (35620)	483 (19)	
7949 (2100)	20			4115 (162)	16493 (36360)	610 (24)	
9842 (2600)	25			4242 (167)	16806 (37050)	737 (29)	
11848 (3130)	30	8128 (320)		4318 (170)	17196 (37910)	813 (32)	
15709 (4150)	40	10363 (408)			18201 (40125)		
19495 (5150)	50	9246 (364)		4369 (172)	19074 (42050)	864 (34)	
23318 (6160)	60	11430 (450)		4775 (188)	19274 (42490)	1067 (42)	
29148 (7700)	74	13970 (550)			20598 (45410)		
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	11278 (444)	2896 (114)	4191 (165)	16043 (35370)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	13			4293 (169)	17472 (38520)	305 (12)	
6057 (1600)	15			4343 (171)	17613 (38830)	356 (14)	
7949 (2100)	20			4445 (175)	17903 (39470)	457 (18)	
9842 (2600)	25				18624 (41060)		
11848 (3130)	30	12649 (498)			19377 (42720)		
15709 (4150)	40	11278 (444)		5055 (199)	18742 (41320)	864 (34)	
19495 (5150)	50			5258 (207)	19291 (42530)	1067 (42)	
23318 (6160)	60				20144 (44410)		
29148 (7700)	74	12700 (500)			21405 (47190)		

Note: Refer to TIB-114 for generator set sound data.

***** Data in table is for reference only. Refer to your authorized Kohler distributor for enclosure and subbase fuel tank specification details.

† Max. weight includes the generator set (wet), enclosure, silencer, and tank (no fuel).

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	1600REOZMD with 40°C/50°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	7874 (310)	2743 (108)	4039 (159)	17373 (38300)	203 (8)	—
5110 (1350)	10	8382 (330)		4191 (165)	18779 (41400)	356 (14)	
6057 (1600)	12			4242 (167)	18926 (41725)	406 (16)	
7949 (2100)	16			4343 (171)	19210 (42350)	508 (20)	
9842 (2600)	20	9246 (364)		4394 (173)	19700 (43430)	599 (22)	
11848 (3130)	24	10820 (426)			20344 (44850)		
15709 (4150)	32	14021 (552)			21636 (47700)		
19495 (5150)	40	9652 (380)		5055 (199)	21242 (46830)	1016 (40)	
23318 (6160)	48	10770 (424)		5105 (201)	21999 (48500)	1067 (42)	
29148 (7700)	60	13157 (518)			23337 (51450)		
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	12319 (485)	2896 (114)	4191 (165)	18654 (41125)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	10			4293 (169)	20130 (44380)	305 (12)	
6057 (1600)	12			4318 (170)	20312 (44780)	330 (13)	
7949 (2100)	16			4420 (174)	20625 (45470)	432 (17)	
9842 (2600)	20				21355 (47080)		
11848 (3130)	24	13767 (542)			22129 (48785)		
15709 (4150)	32	12319 (485)		4953 (195)	21673 (47780)	762 (30)	
19495 (5150)	40			5131 (202)	22224 (48995)	940 (37)	
23318 (6160)	48			5207 (205)	22993 (50690)	1016 (40)	
29148 (7700)	60	12395 (488)		5258 (207)	24131 (53200)	1067 (42)	

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	1750/2000REOZMD with 40°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	8128 (320)	2896 (114)	4089 (161)	18824 (41500)	203 (8)	—
5110 (1350)	10/8	8687 (342)		4216 (166)	20303 (44760)	330 (13)	
6057 (1600)	11/10			4267 (168)	20452 (45090)	381 (15)	
7949 (2100)	15/13			4369 (172)	20724 (45690)	483 (19)	
9842 (2600)	18/16	9652 (380)		4394 (173)	21264 (46880)	508 (20)	
11848 (3130)	22/20	11278 (444)			21926 (48340)		
15709 (4150)	29/26	9906 (390)		4851 (191)	21754 (47960)	762 (30)	
19495 (5150)	36/32			5029 (198)	22307 (49180)	940 (37)	
23318 (6160)	44/38	10312 (406)		5156 (203)	22956 (50610)	1067 (42)	
29905 (7900)	54/48	12802 (504)			24380 (53750)		
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	12319 (485)	2896 (114)	4191 (165)	19922 (43920)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5110 (1350)	10/8			4293 (169)	21398 (47175)	305 (12)	
6057 (1600)	11/10			4318 (170)	21580 (47575)	330 (13)	
7949 (2100)	15/13			4420 (174)	21893 (48265)	432 (17)	
9842 (2600)	18/16				22623 (49875)		
11848 (3130)	22/20	13767 (542)			23397 (51580)		
15709 (4150)	29/26	12319 (485)		4953 (195)	22941 (50575)	762 (30)	
19495 (5150)	36/32			5131 (202)	23492 (51790)	940 (37)	
23318 (6160)	44/38			5207 (205)	24261 (53485)	1016 (40)	
29905 (7900)	54/48	12395 (488)		5258 (207)	25399 (55995)	1067 (42)	

Note: Refer to TIB-114 for generator set sound data.

***** Data in table is for reference only. Refer to your authorized Kohler distributor for enclosure and subbase fuel tank specification details.

† Max. weight includes the generator set (wet), enclosure, silencer, and tank (no fuel).

Fuel Tank Capacity, L (gal.)	Est. Fuel Supply Hours at 60 Hz with Full Load	1750/2000REOZMD with 50°C Radiator				Fuel Tank Height, mm (in.)	Sound Pressure Reduction at 7 m (23 ft.)
		Max. Dimensions, mm (in.)			Max. Weight, † kg (lb.)		
		Length	Width	Height			
Weather Enclosure with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	8128 (320)	3200 (126)	4089 (161)	19904 (43880)	203 (8)	—
5510 (1350)	10/8	8687 (342)		4191 (165)	21437 (47260)	305 (12)	
6057 (1600)	11/10			4242 (167)	21582 (47580)	356 (14)	
7949 (2100)	15/13			4318 (170)	21886 (48250)	432 (17)	
9842 (2600)	18/16	8738 (344)		4394 (173)	22188 (48915)	508 (20)	
11848 (3130)	22/20	10211 (402)			22852 (50380)		
15709 (4150)	29/26	13157 (518)			24186 (53320)		
19495 (5150)	36/32	9144 (360)		5004 (197)	23215 (51180)	914 (36)	
23318 (6160)	44/38	9703 (382)		5105 (201)	23868 (52620)	1016 (40)	
29905 (7900)	54/48	11532 (454)		5156 (203)	25125 (55390)	1067 (42)	
Sound Enclosure (Level 2 Data Shown) with Internal Silencer and Subbase Fuel Tank *							
Lifting Base	0	12979 (511)	3150 (124)	4191 (165)	20965 (46220)	203 (8)	Level 1 -15dB(A) or Level 2 -25 dB(A)
5510 (1350)	10/8			4242 (167)	22659 (49955)	254 (10)	
6057 (1600)	11/10			4293 (169)	22761 (50180)	305 (12)	
7949 (2100)	15/13			4369 (172)	23025 (50760)	381 (15)	
9842 (2600)	18/16			4445 (175)	23288 (51340)	457 (18)	
11848 (3130)	22/20			4521 (178)	23605 (52040)	533 (21)	
15709 (4150)	29/26				24807 (54690)		
19495 (5150)	36/32			5029 (198)	24220 (53395)	838 (33)	
23318 (6160)	44/38			5182 (204)	24739 (54540)	991 (39)	
29905 (7900)	54/48			5258 (207)	25987 (57290)	1067 (42)	

Note: Refer to TIB-114 for generator set sound data.

***** Data in table is for reference only. Refer to your authorized Kohler distributor for enclosure and subbase fuel tank specification details.

† Max. weight includes the generator set (wet), enclosure, silencer, and tank (no fuel).

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
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Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

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Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

MECHANICAL EQUIPMENT SOUND DATA FACTORY TESTING

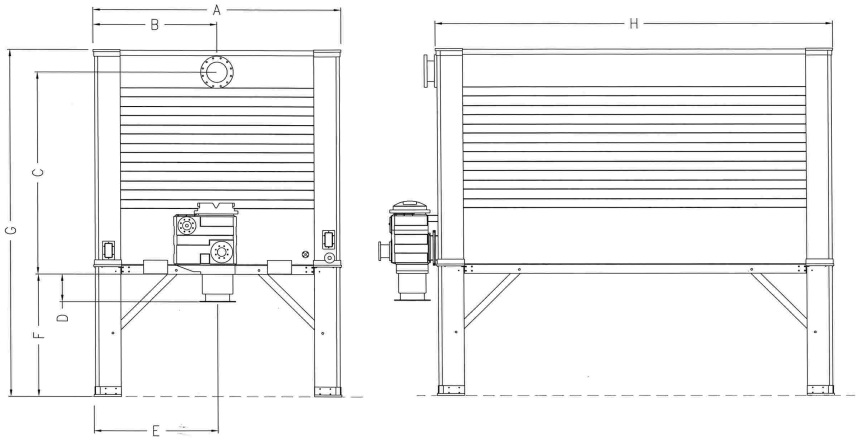
MODEL NO.	MAX CFM	MANUFACTURER	EQUIPMENT TYPE	NOISE TYPE	DB ATTENUATION BY OCTAVE BAND								Total
					63	125	250	500	1000	2000	4000	8000	
VIBRO-ACOUSTIC RFL-MV	93,900	HUNTAIR	OUTSIDE AIR	INLET	103	100	99	97	89	88	88	82	107
			RELIEF AIR	OUTLET	100	97	97	94	86	85	84	78	104
			RETURN FANS	INLET	101	98	98	99	92	92	91	86	106
			SUPPLY FANS	OUTLET	94	91	101	94	87	86	84	78	103
			AIR HANDUNG UNIT	CABINET RADIATED	81	73	75	72	60	54	50	43	83
			PWL		96	88	90	87	75	69	65	58	98
VIBRO-ACOUSTIC RFL-MV	36,400	HUNTAIR	OUTSIDE AIR	INLET	97	97	98	93	88	87	83	76	103
			RELIEF AIR	OUTLET	96	97	96	93	90	88	84	75	102
			RETURN FANS	INLET	97	96	94	91	83	81	79	75	101
			SUPPLY FANS	OUTLET	90	87	94	90	83	81	81	75	97
			AIR HANDUNG UNIT	CABINET RADIATED	79	71	70	70	58	51	49	42	81
			PWL		94	86	85	85	73	66	64	57	95

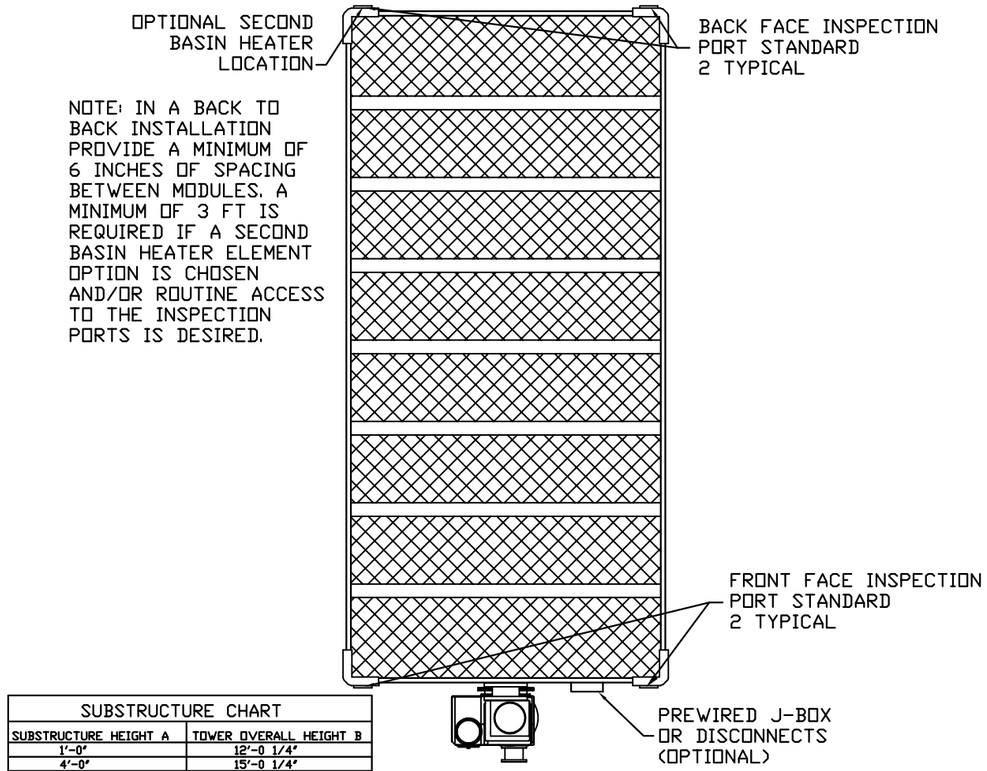
Weights and Dimensions

TTXL Model	Weights in Lbs. (kg)		Dimensions per Illustration Below [a] (cm)							
	Shipping	Operating	A	B	C	D	E	F	G	H
i219xx	5,245 (2,379)	9,609 (4,360)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	13'-06" (411.5)
i319xx	7,040 (3,194)	13,128 (5,956)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	19'-03" (586.7)
i419xx	8,835 (4,008)	16,641 (7,550)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	25'-00" (762.0)
0419xx	7,912 (3,590)	13,758 (6,242)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	13'-06" (411.5)
i519xx	10,630 (4,823)	20,163 (9,148)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	30'-09" (937.3)
0619xx	11,662 (5,291)	19,727 (8,950)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	19'-03" (586.7)
0819xx	15,412 (6,993)	25,695 (11,658)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	25'-00" (762.0)
1019xx	19,162 (8,694)	31,655 (14,362)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	30'-09" (937.3)
1219xx	22,912 (10,395)	37,623 (17,070)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	[b]	6'-00" (182.9)	17'-00" (518.2)	36'-06" (1,112.5)

[a] Dimensions are approximate and should not be used for construction purposes. Dimension F may be 1'-00" (30.5 cm), 4'-00" (121.9 cm), 6'-00" (182.9 cm), 8'-00" (243.8 cm), 10'-00" (304.8 cm), or 12'-00" (365.8 cm) depending on project requirements. 12'-00" (365.8 cm) may be specified with prior approval of Tower Tech engineeing manager only. Dimension F on drawing below is 6'-00" (182.9 cm).

[b] TTXL-1219xx requires two sumps. See TTXL-1219xx drawings on Tower Tech website.





SUBSTRUCTURE CHART	
SUBSTRUCTURE HEIGHT A	TOWER OVERALL HEIGHT B
1'-0"	12'-0 1/4"
4'-0"	15'-0 1/4"
6'-0"	17'-0 1/4"
8'-0"	19'-0 1/4"
10'-0"	21'-0 1/4"
12'-0"	23'-0 1/4"

GENERAL INFORMATION:

BASIC DATA (PER CELL):

MIN/MAX GPM RANGE - 800/2,400 MIN/MAX m3/hr RANGE - 181.7/545.1
SEE PROPOSAL DOCUMENTS FOR ACTUAL DESIGN

MOTOR DATA (PER CELL):

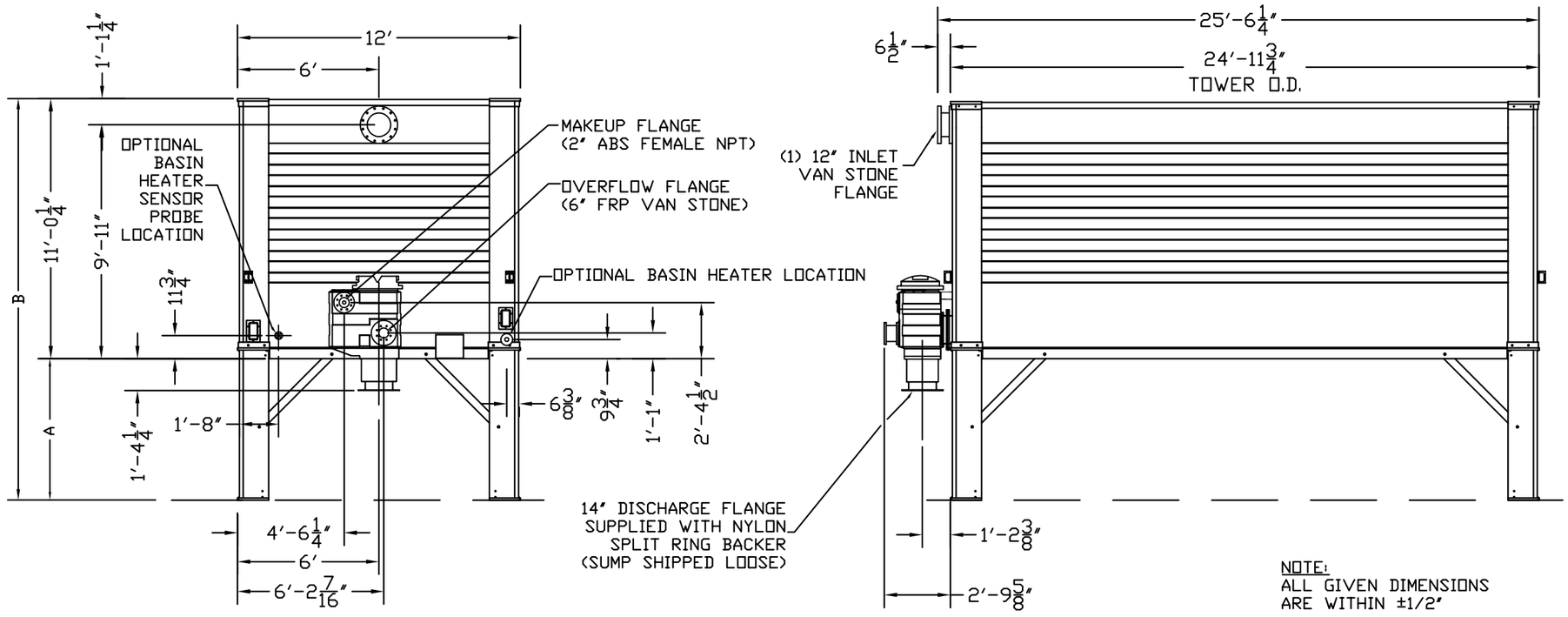
BRAND - BALDOR (OR EQUIV)
EFFICIENCY - HIGH

WEIGHTS (PER CELL):

DRY SHIPPING WEIGHT	15,412 lbs	6,990.8 kg
OPERATING WEIGHT	25,695 lbs	11,655.1 kg

NOTES:

1. ALL EXTERNAL PIPING PROVIDED BY CUSTOMER.
2. EXTERNAL PIPING TO BE 'STAND ALONE' (INDEPENDENTLY SUPPORTED).
3. NO LOAD TO BE APPLIED TO TOWER TECH TOWER OR SUMP.
4. FOR APPROPRIATE WATER LEVEL REFER TO STARTUP SECTION IN TOWER TECH'S DESIGN, INSTALLATION & OPERATION MANUAL.
5. MAKE-UP CONNECTION/FLOAT VALVE CONNECTION FLANGE IS MAKE FROM HIGH QUALITY PLASTIC TO ELIMINATE CORROSION.
6. THE MAXIMUM MAKE-UP WATER INLET PRESSURE IS 25 PSIG. FLOAT VALVE MAY NOT SHUT OFF TIGHT AGAINST HIGHER PRESSURES.



NOTE:
ALL GIVEN DIMENSIONS ARE WITHIN ±1/2"

TOWER TECH, Inc.
THE TECHNOLOGY COMPANY
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5400 NW 5th
OKLAHOMA CITY, OKLAHOMA 73127

TOWER TECH, INC.
1-Unit Installation
Plan/Elevation

Modular Fiberglass Cooling Tower
Model # TTXL-08XXXXX

FOR APPROVAL BY	DATE
Tower Tech Design Team	

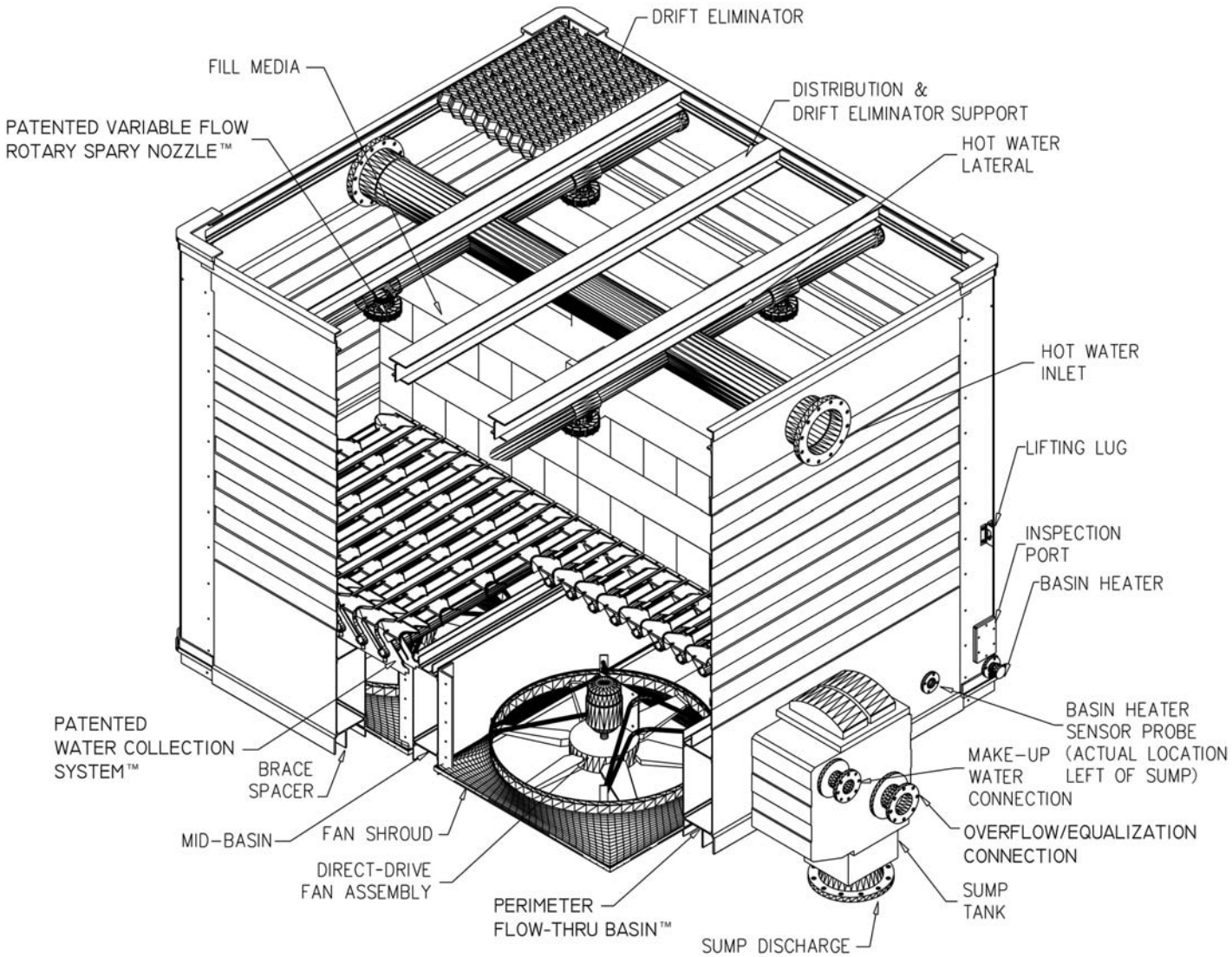
REVISIONS		
NO.	DATE	REVISION

DATE:	30 NOV 11
DRAWING#:	XL-08-2
PROJECT#:	LIBRARY
CUST PO#:	
DRAWN BY:	RFB
CHECKED BY:	
PLAN & ELEVATION	2

TTXL SERIES

FEATURES:

The TTXL Series forced-draft, counter-flow cooling tower delivers reliable thermal performance in both constant and variable heat load applications. Its modular design enables easy interconnectability to create virtually any size cooling tower and quickly accommodates future expansion of cooling tower capacity.



Unique design features include:

- Fully Enclosed Flow-Thru Basin™
- Variable-Flow Rotary Spray Nozzle™
- Water Collection System™
- Bottom Mounted Fans

Model No: 081930

VFD Operation: 56 Hz

Distance: 50 feet

Data at 60Hz

TOP	5ft	50ft
63Hz	95	85
125Hz	85	78
250Hz	81	70
500Hz	79	71
1kHz	73	64
2kHz	66	56
4kHz	60	52
8kHz	48	40
dB(A)	80	70

SIDE	5ft	50ft
63Hz	95	80
125Hz	87	77
250Hz	87	75
500Hz	85	68
1kHz	83	66
2kHz	77	60
4kHz	73	55
8kHz	66	47
dB(A)	89	72

END	5ft	50ft
63Hz	89	84
125Hz	83	74
250Hz	84	72
500Hz	83	69
1kHz	81	65
2kHz	76	59
4kHz	71	53
8kHz	64	45
dB(A)	85	71

PWL	
63Hz	115
125Hz	108
250Hz	105
500Hz	101
1kHz	97
2kHz	91
4kHz	87
8kHz	78

SPL at Distance	Distance 50 ft
63Hz	83
125Hz	76
250Hz	73
500Hz	69
1kHz	65
2kHz	59
4kHz	55
8kHz	46

dBA **71**

Data at Reduced Speed

PWL	Operational Speed 56 Hz
63Hz	116
125Hz	107
250Hz	103
500Hz	99
1kHz	95
2kHz	89
4kHz	88
8kHz	76

SPL at Distance	Distance 50 ft
63Hz	84
125Hz	75
250Hz	71
500Hz	67
1kHz	63
2kHz	57
4kHz	56
8kHz	44

dBA **69**

SPL at Distance Calculations are based on free field conditions. Environmental factors such as adjacent building surfaces and terrain characteristics may impact final results.

The acoustic performance in this report is extrapolated from extensive data testing gathered by independent third party Acoustical Consultants in full conformity with the Cooling Technology Institute Standard ATC 128, Test Code for Measurement of Sound from Water Cooling Towers.

Model CFLC
ClearFire Condensing Boiler

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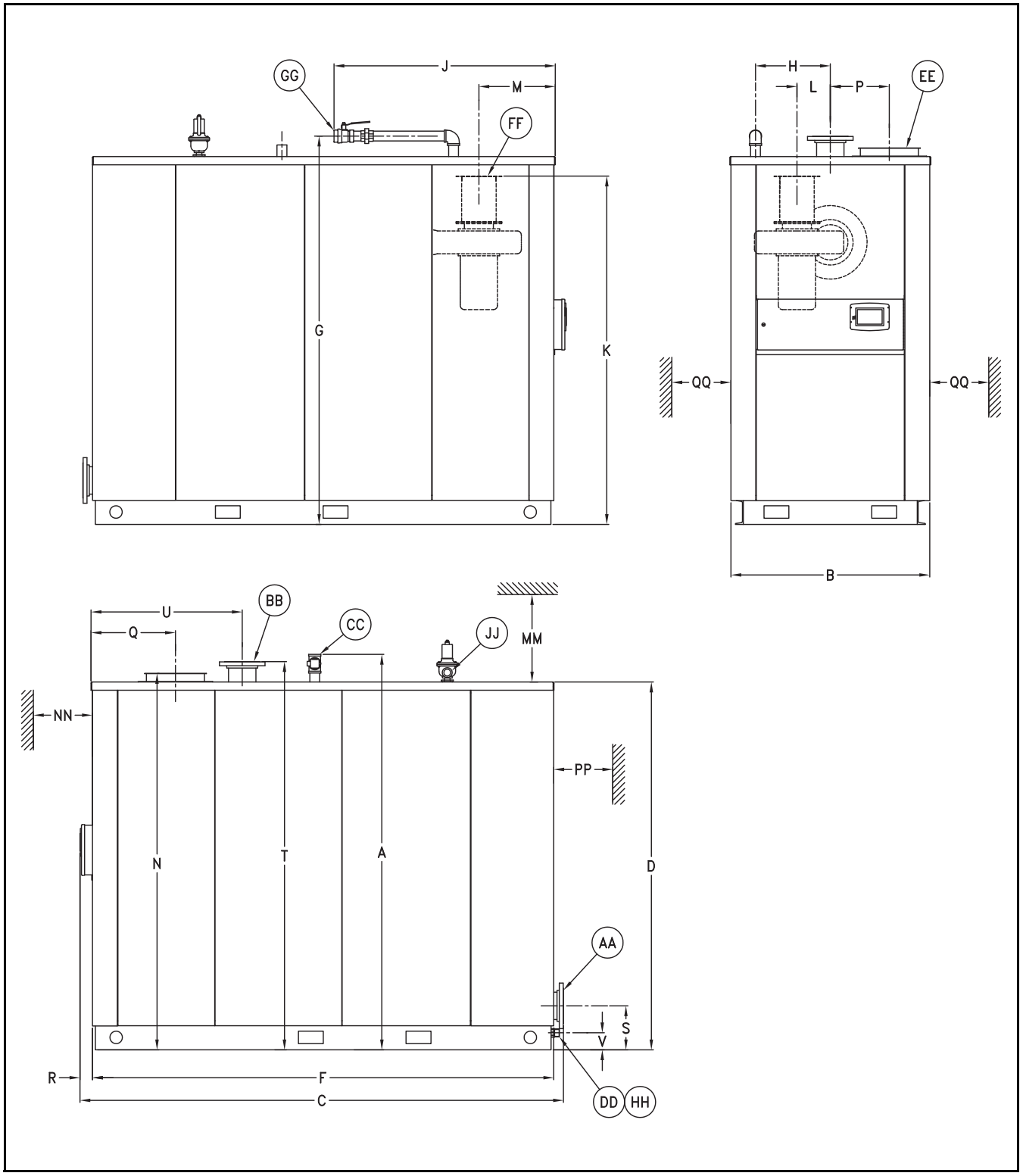


Figure 6. Model CFLC Dimensional Views

Emissions

Table 5. Model CFLC Boilers: Natural Gas, Estimated Emission Levels

POLLUTANT	UNITS	
CO	ppm[A]	<10
	lb/MMBtu	<0.007
NOx	ppm[A]	<20[B]
	lb/MMBtu	<0.024
SOx	ppm[A]	<1
	lb/MMBtu	<0.001
HC/VOC	ppm[A]	<4
	lb/MMBtu	<0.0016
PM	ppm[A]	-
	lb/MMBtu	<0.01

A. ppm levels are given on a dry volume basis and corrected to 3% oxygen (15% excess air).

B. Optional 9 ppm NOx available.

Noise Level

The Model CFLC is exceptionally quiet at all operating levels, does not require any sound level modifications to provide ultra low noise levels, and is virtually vibration free. Thus, it is very suitable in applications that demand low noise levels.

Table 6 shows the noise levels of the Clearfire at various firing rates.

	20% Firing Rate	50% Firing Rate	100% Firing Rate
CFLC 4000	67	69	76
CFLC 5000	70	71	80
CFLC 6000	65	69	79
CFLC 8000	67	70	82
CFLC 10000	64	70	81
CFLC 12000	65	72	85

Table 6. Noise Level (dBA) measured 3 feet in front of boiler

ENGINEERING DATA

Boiler Information

The Model CFLC boiler is designed for service in any closed hydronic system and can be used to augment any hot water system. It can be put into operation as a single stand-alone unit with 5:1 turndown or in multiple units for larger turndown and capacity.

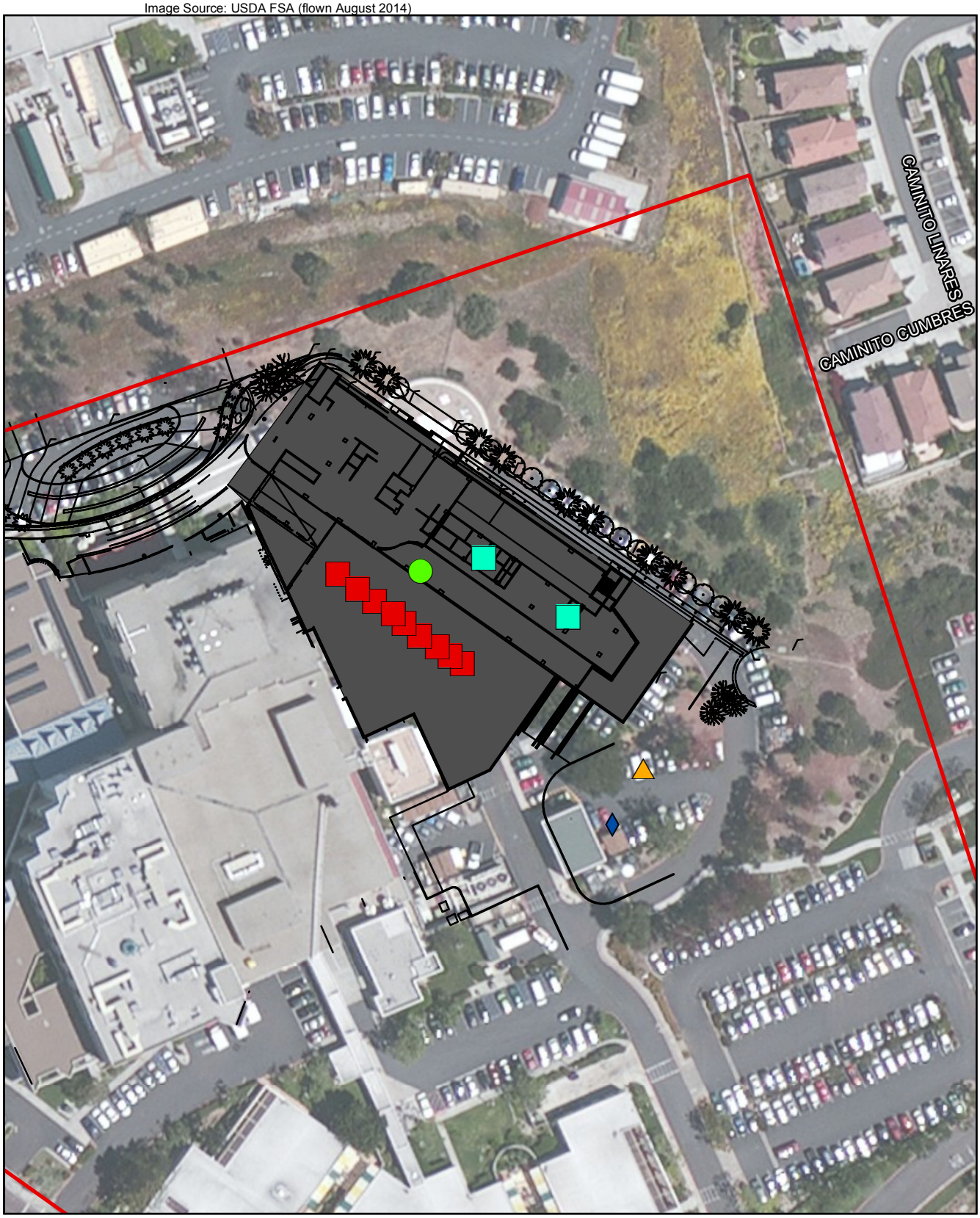
Clearfire boilers may be utilized in water heating systems with no minimum return temperature and supply temperatures from 130° F (55° C) to 230° F (110° C). Because the Clearfire is a full condensing boiler, low water temperature (below the dewpoint) restrictions do not apply. In fact, the lower the return the better the fuel savings.

Variable temperature differentials can be designed to make use of changing outdoor conditions and thus, the Clearfire is not restricted to a nominal 20° F (10 C) differential. The boiler is designed to withstand thermal stresses with supply and return temperature differences up to 100° F (55° C), without the use of a boiler-circulating pump, blend pump or minimum water flow.

ATTACHMENT 3

SoundPLAN Data

Image Source: USDA FSA (flown August 2014)



Equipment

- AHU 36,400 CFM
- AHU 93,900 CFM
- Boiler Stack
- Cooling Tower
- Emergency Generator

- Site Plan
- New Tower
- Project Parcel

0 Feet 100

RECON

M:\JOBS5\8063\nos\gis\MXD\Attachment_3.mxd 3/22/2016 modeling

Modeled Noise Source Locations

No.	Receiver name	Floor	Limit		Level		Conflict	
			Without Enclosure dB(A)	With Enclosure	Without Enclosure dB(A)	With Enclosure	Without Enclosure dB(A)	With Enclosure
1	Receiver_13	1.Fl	45	45	49.8	42.2	4.8	-
1	Receiver_13	2.Fl	45	45	50.3	42.7	5.3	-
2	Receiver_14	1.Fl	45	45	53.1	43.8	8.1	-
2	Receiver_14	2.Fl	45	45	53.8	44.4	8.8	-
3	Receiver_15	1.Fl	45	45	47.9	40.3	2.9	-
3	Receiver_15	2.Fl	45	45	48.4	40.7	3.4	-
4	Receiver_16	1.Fl	45	45	43.4	37.2	-	-
4	Receiver_16	2.Fl	45	45	43.5	37.5	-	-
5	Receiver_17	1.Fl	50	50	42.2	31.5	-	-
5	Receiver_17	2.Fl	50	50	42.2	31.5	-	-
6	Receiver_18	1.Fl	50	50	60.3	45.7	10.3	-
6	Receiver_18	2.Fl	50	50	60.9	46.3	10.9	-
7	Receiver_19	1.Fl	50	50	47.2	36.3	-	-
7	Receiver_19	2.Fl	50	50	49.2	37.6	-	-
8	Receiver_20	1.Fl	50	50	63	48.3	13	-
8	Receiver_20	2.Fl	50	50	63.6	48.8	13.6	-

Source name	Level Without Enclosure dB(A)	With Enclosure
Receiver_13 1.Fl	49.8	42.2
New_Air_Handler_01	22.5	22.5
New_Air_Handler_02	22	22
New_Air_Handler_03	7.4	7.4
New_Air_Handler_04	6.9	6.9
New_Air_Handler_05	8.5	8.5
New_Air_Handler_06	8.4	8.4
New_Air_Handler_07	8.3	8.3
New_Air_Handler_08	8	8
New_Air_Handler_09	7.9	7.9
New_Air_Handler_010	7.6	7.6
New_Air_Handler_011	7.2	7.2
New_Boiler_Exhaust	24.4	24.4
New_Cooling_Tower	41.3	41.3
New_Generator	49.1	34.1
Receiver_13 2.Fl	50.3	42.7
New_Air_Handler_01	23.3	23.3
New_Air_Handler_02	22.8	22.8
New_Air_Handler_03	7.8	7.8
New_Air_Handler_04	7.3	7.3
New_Air_Handler_05	10.5	10.5
New_Air_Handler_06	8.7	8.7
New_Air_Handler_07	8.5	8.5
New_Air_Handler_08	8.3	8.3
New_Air_Handler_09	8.1	8.1
New_Air_Handler_010	8	8
New_Air_Handler_011	7.6	7.6
New_Boiler_Exhaust	25.1	25.1
New_Cooling_Tower	41.7	41.7
New_Generator	49.6	34.6
Receiver_14 1.Fl	53.1	43.8
New_Air_Handler_01	22.2	22.2
New_Air_Handler_02	21.4	21.4
New_Air_Handler_03	6.5	6.5
New_Air_Handler_04	6	6
New_Air_Handler_05	7.1	7.1
New_Air_Handler_06	7.6	7.6
New_Air_Handler_07	7.4	7.4
New_Air_Handler_08	7.2	7.2
New_Air_Handler_09	6.9	6.9
New_Air_Handler_010	6.8	6.8
New_Air_Handler_011	6.3	6.3
New_Boiler_Exhaust	24.2	24.2
New_Cooling_Tower	42.5	42.5
New_Generator	52.7	37.7

Receiver_14	2.Fl	53.8	44.4
New_Air_Handler_01		23	23
New_Air_Handler_02		22.5	22.5
New_Air_Handler_03		7	7
New_Air_Handler_04		6.4	6.4
New_Air_Handler_05		7.2	7.2
New_Air_Handler_06		7.9	7.9
New_Air_Handler_07		7.8	7.8
New_Air_Handler_08		7.5	7.5
New_Air_Handler_09		7.3	7.3
New_Air_Handler_010		7.2	7.2
New_Air_Handler_011		6.8	6.8
New_Boiler_Exhaust		24.9	24.9
New_Cooling_Tower		43	43
New_Generator		53.4	38.4
Receiver_15	1.Fl	47.9	40.3
New_Air_Handler_01		23.2	23.2
New_Air_Handler_02		22.8	22.8
New_Air_Handler_03		14.2	14.2
New_Air_Handler_04		13.7	13.7
New_Air_Handler_05		12.2	12.2
New_Air_Handler_06		15.9	15.9
New_Air_Handler_07		16	16
New_Air_Handler_08		12.9	12.9
New_Air_Handler_09		13	13
New_Air_Handler_010		11.2	11.2
New_Air_Handler_011		14	14
New_Boiler_Exhaust		25.7	25.7
New_Cooling_Tower		39.1	39.1
New_Generator		47.2	32.2
Receiver_15	2.Fl	48.4	40.7
New_Air_Handler_01		24	24
New_Air_Handler_02		23.6	23.6
New_Air_Handler_03		15.8	15.8
New_Air_Handler_04		15.4	15.4
New_Air_Handler_05		13.7	13.7
New_Air_Handler_06		17.2	17.2
New_Air_Handler_07		17.4	17.4
New_Air_Handler_08		15.2	15.2
New_Air_Handler_09		15.4	15.4
New_Air_Handler_010		13	13
New_Air_Handler_011		15.6	15.6
New_Boiler_Exhaust		26.4	26.4
New_Cooling_Tower		39.3	39.3
New_Generator		47.8	32.8

Receiver_16	1.Fl	43.4	37.2
New_Air_Handler_01		23.2	23.2
New_Air_Handler_02		23	23
New_Air_Handler_03		12.8	12.8
New_Air_Handler_04		12.7	12.7
New_Air_Handler_05		11.9	11.9
New_Air_Handler_06		12.4	12.4
New_Air_Handler_07		12.5	12.5
New_Air_Handler_08		12.7	12.7
New_Air_Handler_09		12.8	12.8
New_Air_Handler_010		12.8	12.8
New_Air_Handler_011		12.7	12.7
New_Boiler_Exhaust		26	26
New_Cooling_Tower		35.7	35.7
New_Generator		42.3	27.3
Receiver_16	2.Fl	43.5	37.5
New_Air_Handler_01		24	24
New_Air_Handler_02		23.8	23.8
New_Air_Handler_03		15.2	15.2
New_Air_Handler_04		15.2	15.2
New_Air_Handler_05		13.3	13.3
New_Air_Handler_06		14.2	14.2
New_Air_Handler_07		14.6	14.6
New_Air_Handler_08		14.9	14.9
New_Air_Handler_09		15.1	15.1
New_Air_Handler_010		15.2	15.2
New_Air_Handler_011		15.2	15.2
New_Boiler_Exhaust		26.7	26.7
New_Cooling_Tower		35.9	35.9
New_Generator		42.3	27.3
Receiver_17	1.Fl	42.2	31.5
New_Air_Handler_01		15.2	15.2
New_Air_Handler_02		17.1	17.1
New_Air_Handler_03		11.5	11.5
New_Air_Handler_04		12.8	12.8
New_Air_Handler_05		9	9
New_Air_Handler_06		9.3	9.3
New_Air_Handler_07		9.5	9.5
New_Air_Handler_08		10	10
New_Air_Handler_09		10.5	10.5
New_Air_Handler_010		10.9	10.9
New_Air_Handler_011		12	12
New_Boiler_Exhaust		25	25
New_Cooling_Tower		26.2	26.2
New_Generator		41.9	26.9

Receiver_17	2.Fl	42.2	31.5
New_Air_Handler_01		15.4	15.4
New_Air_Handler_02		17.3	17.3
New_Air_Handler_03		11.6	11.6
New_Air_Handler_04		12.9	12.9
New_Air_Handler_05		9.2	9.2
New_Air_Handler_06		9.4	9.4
New_Air_Handler_07		9.6	9.6
New_Air_Handler_08		10.1	10.1
New_Air_Handler_09		10.6	10.6
New_Air_Handler_010		11	11
New_Air_Handler_011		12.2	12.2
New_Boiler_Exhaust		25	25
New_Cooling_Tower		26.1	26.1
New_Generator		41.9	26.9
Receiver_18	1.Fl	60.3	45.7
New_Air_Handler_01		20.6	20.6
New_Air_Handler_02		20.2	20.2
New_Air_Handler_03		18.9	18.9
New_Air_Handler_04		18.6	18.6
New_Air_Handler_05		14.4	14.4
New_Air_Handler_06		19.6	19.6
New_Air_Handler_07		19.7	19.7
New_Air_Handler_08		19.8	19.8
New_Air_Handler_09		20.2	20.2
New_Air_Handler_010		19	19
New_Air_Handler_011		18.7	18.7
New_Boiler_Exhaust		31.9	31.9
New_Cooling_Tower		27.5	27.5
New_Generator		60.3	45.3
Receiver_18	2.Fl	60.9	46.3
New_Air_Handler_01		21.3	21.3
New_Air_Handler_02		20.9	20.9
New_Air_Handler_03		19.4	19.4
New_Air_Handler_04		19.1	19.1
New_Air_Handler_05		16.4	16.4
New_Air_Handler_06		20.5	20.5
New_Air_Handler_07		20.6	20.6
New_Air_Handler_08		20.7	20.7
New_Air_Handler_09		21.3	21.3
New_Air_Handler_010		19.6	19.6
New_Air_Handler_011		19.2	19.2
New_Boiler_Exhaust		32.5	32.5
New_Cooling_Tower		27.3	27.3
New_Generator		60.9	45.9

Receiver_19	1.Fl	47.2	36.3
New_Air_Handler_01		21.7	21.7
New_Air_Handler_02		21.2	21.2
New_Air_Handler_03		17.3	17.3
New_Air_Handler_04		6.8	6.8
New_Air_Handler_05		15.9	15.9
New_Air_Handler_06		16.3	16.3
New_Air_Handler_07		16.2	16.2
New_Air_Handler_08		16.2	16.2
New_Air_Handler_09		17.7	17.7
New_Air_Handler_010		17.7	17.7
New_Air_Handler_011		15	15
New_Boiler_Exhaust		32.5	32.5
New_Cooling_Tower		24.4	24.4
New_Generator		47	32
Receiver_19	2.Fl	49.2	37.6
New_Air_Handler_01		22.6	22.6
New_Air_Handler_02		22	22
New_Air_Handler_03		20.3	20.3
New_Air_Handler_04		9	9
New_Air_Handler_05		18.2	18.2
New_Air_Handler_06		18.9	18.9
New_Air_Handler_07		18.8	18.8
New_Air_Handler_08		18.8	18.8
New_Air_Handler_09		20.5	20.5
New_Air_Handler_010		20.6	20.6
New_Air_Handler_011		18	18
New_Boiler_Exhaust		32.7	32.7
New_Cooling_Tower		24.3	24.3
New_Generator		49	34
Receiver_20	1.Fl	63	48.3
New_Air_Handler_01		21	21
New_Air_Handler_02		20.7	20.7
New_Air_Handler_03		18.9	18.9
New_Air_Handler_04		18.6	18.6
New_Air_Handler_05		20.9	20.9
New_Air_Handler_06		21.5	21.5
New_Air_Handler_07		21.6	21.6
New_Air_Handler_08		21.8	21.8
New_Air_Handler_09		21.6	21.6
New_Air_Handler_010		19	19
New_Air_Handler_011		18.7	18.7
New_Boiler_Exhaust		32.5	32.5
New_Cooling_Tower		29.6	29.6
New_Generator		63	48

Receiver_20	2.Fl	63.6	48.8
New_Air_Handler_01		21.8	21.8
New_Air_Handler_02		21.7	21.7
New_Air_Handler_03		19.4	19.4
New_Air_Handler_04		19.2	19.2
New_Air_Handler_05		21.5	21.5
New_Air_Handler_06		22.1	22.1
New_Air_Handler_07		22.2	22.2
New_Air_Handler_08		22.3	22.3
New_Air_Handler_09		22.1	22.1
New_Air_Handler_010		19.6	19.6
New_Air_Handler_011		19.3	19.3
New_Boiler_Exhaust		32.7	32.7
New_Cooling_Tower		29.4	29.4
New_Generator		63.6	48.6

Source name	Reference	Level	Frequency spectrum [dB]								Corrections		
				63	125	250	500	1	2	4	8	Kwall	CI	CT
			dB	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	dB(A)	dB(A)	dB(A)
New_Air_Handler_01	Unit	Without Enclosure	97.9	96	88	90	87	75	69	65	58	-	-	-
New_Air_Handler_01	Unit	With Enclosure	97.9	96	88	90	87	75	69	65	58	-	-	-
New_Air_Handler_010	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_010	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_011	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_011	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_02	Unit	Without Enclosure	97.9	96	88	90	87	75	69	65	58	-	-	-
New_Air_Handler_02	Unit	With Enclosure	97.9	96	88	90	87	75	69	65	58	-	-	-
New_Air_Handler_03	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_03	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_04	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_04	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_05	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_05	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_06	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_06	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_07	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_07	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_08	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_08	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_09	Unit	Without Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Air_Handler_09	Unit	With Enclosure	95.5	94	86	85	85	73	66	64	57	-	-	-
New_Boiler_Exhaust	Unit	Without Enclosure	94.3	-	-	-	94.3	-	-	-	-	-	-	-
New_Boiler_Exhaust	Unit	With Enclosure	94.3	-	-	-	94.3	-	-	-	-	-	-	-
New_Cooling_Tower	Unit	Without Enclosure	116.3	115	108	105	101	97	91	87	78	-	-	-
New_Cooling_Tower	Unit	With Enclosure	116.3	115	108	105	101	97	91	87	78	-	-	-
New_Generator	Unit	Without Enclosure	122.6	85	104	114	118	117	114	110	108	-	-	-
New_Generator	Unit	With Enclosure	107.6	70	89	99	103	102	99	95	93	-	-	-