Appendix L

Acoustical Analysis

YANCHAR DESIGN & CONSULTING GROUP

ACOUSTICAL ENGINEERING ANALYSIS

Fuego Farms LLC
22750 Carancho Road
Temecula, CA 92590

June 1, 2021

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1.0 Project Description

The proposed project is located at 22750 Carancho Road, Temecula, CA. north of Carancho Road, east of El Calamar Road, and west of Deluz Road.

The Project consists of cannabis cultivation facility on vacant land currently zoned A-1-10 consisting of 17 greenhouses totaling 63.744 SF and a 4,800 SF general office building. The greenhouses will be constructed of a galvanized steel and covered with 8 mil polyethylene. The office building will be a metal structure.

Two 4.5 ft x 4.5 ft belt driven exhaust fans will be located in the west end of greenhouses 1-7 and the east end of greenhouses 8-17. The manufacturers noise specification is an intensity of ≤ 70 db.

An approximately 10-ton air conditioning compressor will be located on the south side of the office building with a manufacturer's noise rating of 87.3 db.

A standby generator will also be located on the south side of the office building. The generator will be enclosed in Level 2 sound enclosure with a rating of 71 db.

There will be a retaining wall located 10.5 feet from the south side of the office building. Perpendicular to the compressor the retaining wall is 8 feet high and perpendicular to the standby generator is 12 feet high.

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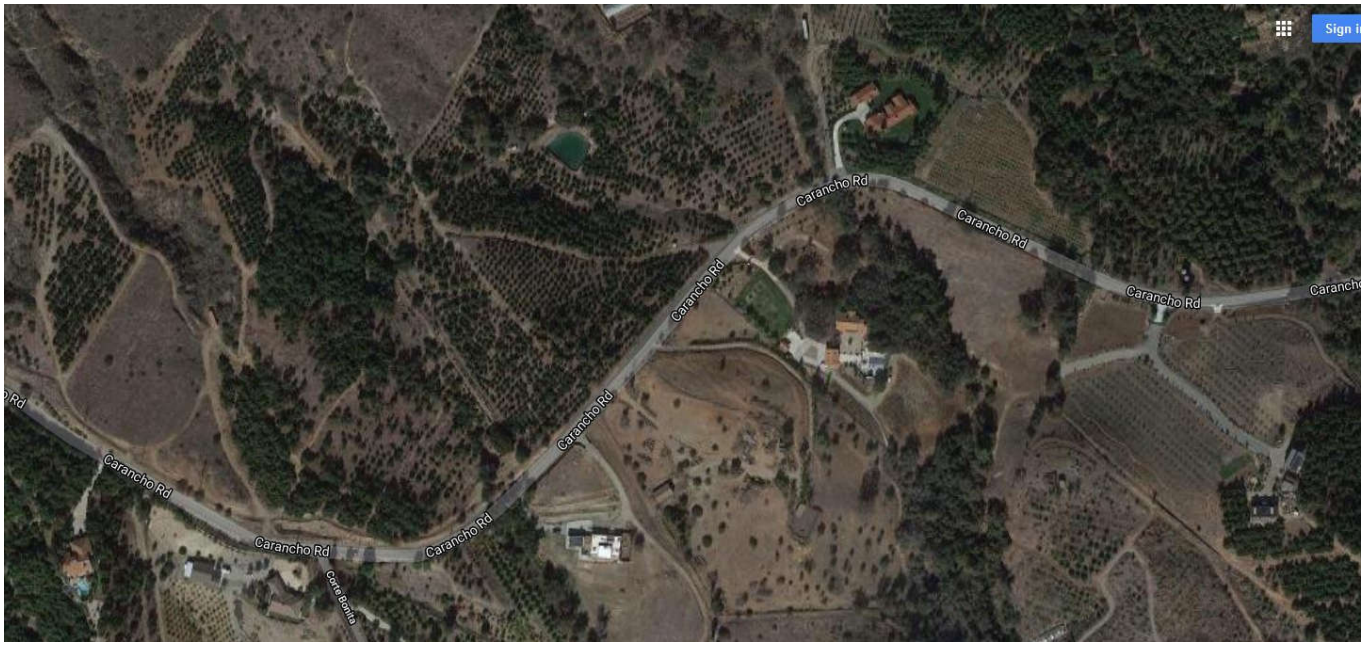
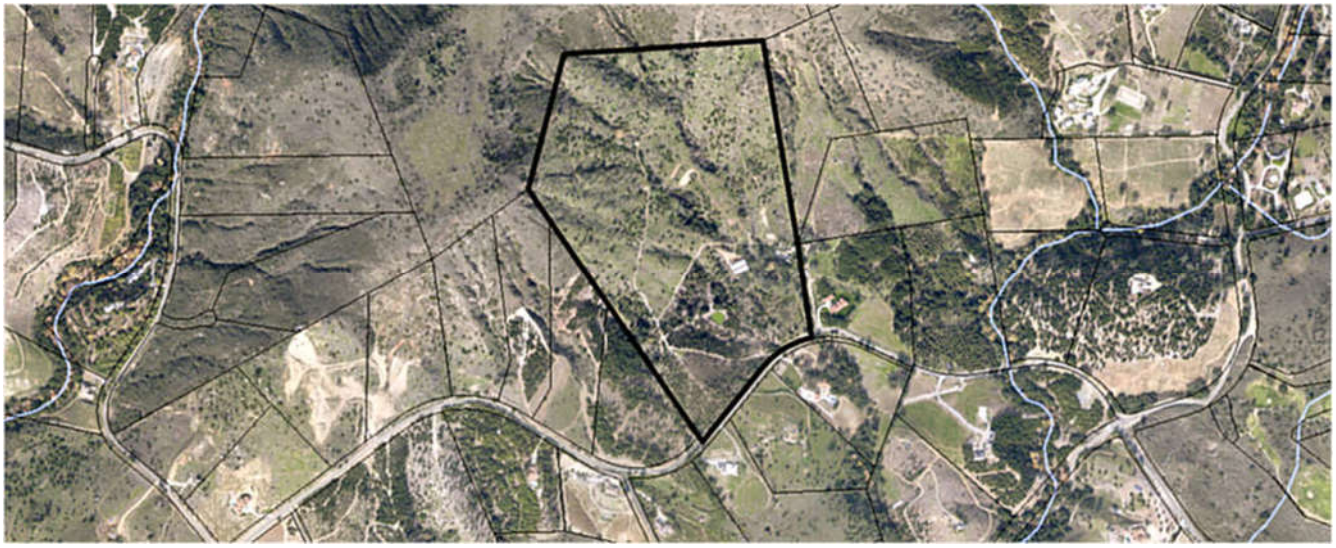
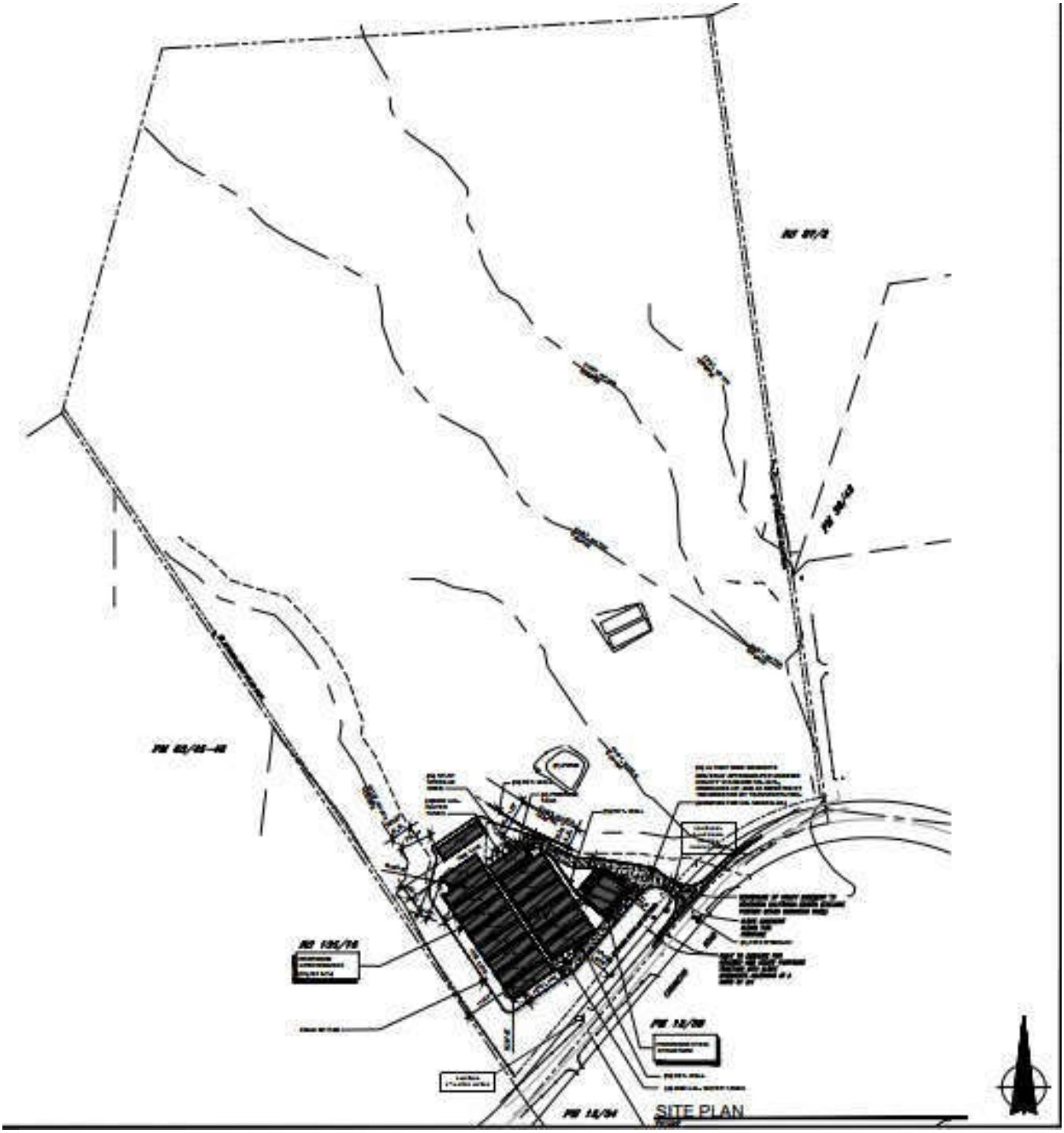
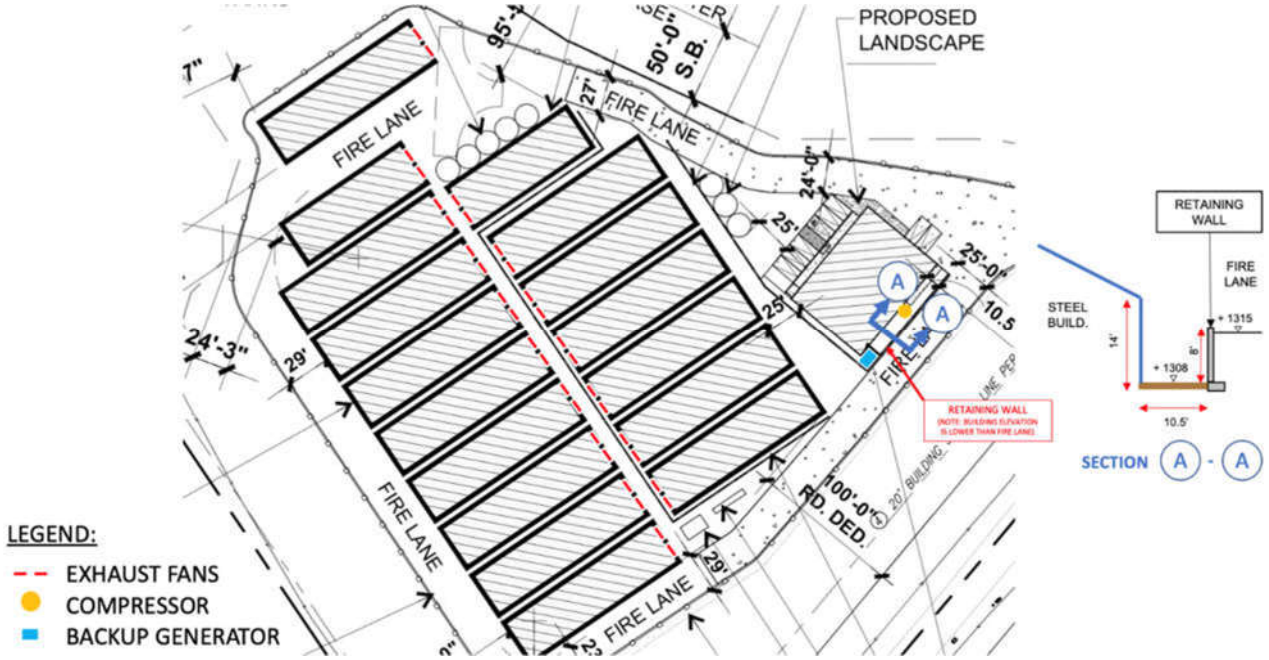
SITE VICINITY







SITE PLAN



ENLARGED SITE PLAN

2.0 Characteristics of Sound

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range of sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound10 dB higher than another is judged to be twice as loud; and 20 dB higher four times as loud; and so forth.

2.1 Sound Levels

Everyday sounds normally range in amplitude from 30 dB to over 100 dB Sound levels decrease as a function of distance from the source as a result of wave divergence, atmospheric absorption, and ground attenuation. As the sound waveform travels away from the source, the sound energy is dispersed over a greater area, thereby dispersing the sound power of the wave. Sound dissipates exponentially with distance from the sound source.

For a single point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for sound generated by stationary sources.

If the sound is produced by a non-stationary line source, such as highway traffic or railroad operations, the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source noise, when produced within a relatively flat environment with absorptive vegetation, decreases 4.5 dB for each doubling of distance from the source.

2.2 Pitch

Sound is composed of a spectrum of frequencies ranging from 20 Hz or vibrations per second to 20,000 Hz or vibrations per second. A slow vibration (low frequency) in sound gives the sensation of a low note. A more rapid sound vibration (higher frequency) produces a higher note. This is analogous to our perception of light. Red light is produced at the low-frequency end of the light spectrum while violet light is produced at the high-frequency end of the light spectrum. A change in frequency of sound waves causes an audible response—a difference in pitch. A change in the frequency of a light wave causes a visual response—a difference in color.

White light is the name given to what the human eye sees when all the colors that make up the visible light spectrum are combined; the visible light spectrum is made up of red, orange, yellow, green, blue, indigo, and violet light, and these colors combined make white light or simply "light". Similarly, the range of audible frequencies from low bass to high treble frequencies combine to produce what we measure as “sound”.

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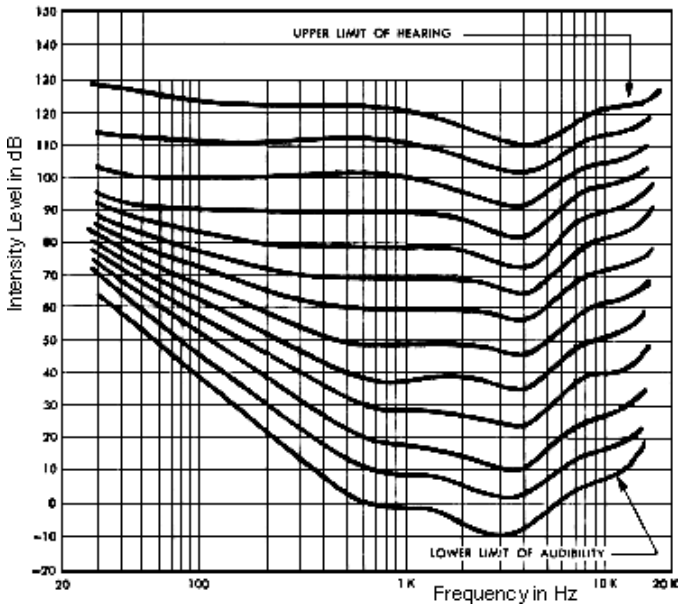
2.3 Relationship of Pitch and Amplitude

Our ears are not linear devices and what we experience as loudness varies with frequency. This relationship was originally studied by Fletcher and Munson at Bell labs in 1933 and is illustrated in Figure 1. The contours show that our ears are less responsive to bass frequencies, but that at higher sound levels, the response to these bass frequencies increases.

FIGURE 1 - FLETCHER MUNSON CONTOURS



Because the human ear is not equally responsive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human response. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the response of the human ear. Noise levels are measured in terms of the "A-weighted decibel," abbreviated dBA. Table in the Appendix B provides examples of various sounds and their typical A-weighted sound level.

2.4 Atmospheric Effects

Atmospheric absorption also influences the levels that are received by an observer. A greater distance traveled results in a greater influence and resultant fluctuations of the sound wave. The degree of absorption is a function of the frequency of the sound as well as the humidity and temperature of the air. Turbulence and gradients of wind, temperature, and humidity also play a role in determining the degree of attenuation. Intervening topography can also have an effect on the perceived sound levels.

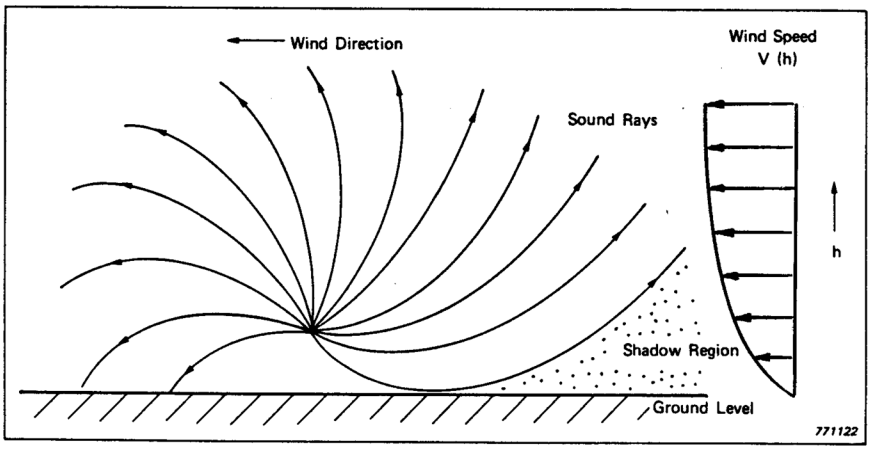
Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed.

Reflection from the ground can result in another mechanism by which sound levels are reduced. When the source and receiver are both close to the ground, the sound wave reflected from the ground may interfere destructively with the direct wave. This effect (called the *ground effect*) is normally noticed over distances of several meters and more, and in the frequency range of 200-600 Hz.

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 ft) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

Over open ground, substantial vertical wind velocity gradients commonly exist due to friction between the moving air and the ground. Wind speed profiles are strongly dependent on the time of day, weather conditions and the nature of the surface. The wind speed, in the absence of turbulence, typically varies logarithmically up to a height of 30 to 100 meters, then negligibly thereafter. As a result of this velocity gradient (and the resulting change in sound velocity which it causes), a sound wave propagating in the direction of the wind will be bent downward. In the upwind direction the sound speed decreases with altitude, sound waves are directed upward, away from the ground, forming a “shadow zone” into which no direct sound penetrates (Figure 2). This process is called refraction, whereby the path of sound waves curves in the direction of the lower sound velocity. The radius of curvature of the sound path is inversely proportional to the velocity gradient. Sound always refracts toward the lower sound speed.

FIGURE 2 - REFRACTION



In the area of the project, the wind speed averages 5.5 miles per hour, varying from 4.6 miles per hour to 6.3 miles per hour. The wind is typically from the west between February and November and from the east from November to February. The effect of wind will have an insignificant effect of the sound levels observed at the residential properties primarily to the south.

The proposed project will incorporate a chain link fence with slats and a landscape screen comprised of 8–12-foot trees along the southern perimeter adjacent to Carancho Road. This will not only provide a visual screen but also a slight amount of high frequency attenuation.

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. The perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction.

Significant attenuation can be achieved by the use of solid barriers. A barrier should be at least high enough to obscure the 'line of sight' between the noise source and receiver. Barriers smaller than this may have a negative effect by elimination of the destructive interference. phenomenon. A barrier is most effective for high frequencies since low frequencies are diffracted around the edge of a barrier more easily. The maximum performance of a barrier is limited to about 40 dB, due to scattering by the atmosphere. A barrier is most effective when placed either very close to the source or to the receiver.

Barriers not built for acoustical purposes are often found in sound propagation situations. The most common of these are hills and buildings. In urban situations, buildings can be effective barriers. It is possible for buildings to produce a different acoustical effect. In a street, multiple reflections from parallel building facades can result in considerable reverberation, and consequently reduced attenuation. This is often referred to as the canyon effect.

The speed that sound propagates in a gas depends on the temperature of the gas. Higher temperatures produce higher speeds of sound. Since the temperature of the atmosphere is not uniform there are local variations in the sound speed. For example, under normal conditions the atmosphere is cooler at higher altitudes. This results in sound waves being 'bent' upwards. This will result in the formation of a shadow zone, which is a region in which sound does not penetrate. In reality some sound will enter this zone due to *scattering.* Scattering occurs when sound waves are propagating through the atmosphere and meet a region of a local variation in sound speed or air density and some of their energy is re-directed into many other directions. In environmental noise situations, scattering is caused by air turbulence, rough surfaces, and obstacles such as trees. The scattering of sound by rain, snow or fog at ordinary frequencies is insignificant.

Under conditions of a temperature inversion (temperature increasing with increasing height), the sound waves will be refracted downwards, and therefore may be heard over larger distances. This frequently occurs in winter and at sundown

When a wind is blowing there will always be a wind gradient. This is due to the layer of air next to the ground being stationary. A wind gradient results in sound waves propagating upwind being 'bent' upwards and those propagating downwind being 'bent' downwards.

The minor dependence on humidity is usually neglected since large humidity gradients are not a common event in the atmosphere.

3.0 Sound Assessment Metrics

The description, analysis, and reporting of sound levels is made difficult by the complexity of human response to sound and the myriad of metrics that have been developed for describing sound impacts. Each of these metrics attempts to quantify sound levels with respect to human response. Most of the metrics use the A-Weighted sound level to quantify sound impacts on humans. As previously identified, A-Weighting is a frequency weighting that accounts for human sensitivity to different frequencies.

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise generally increases with the environmental sound level. However, many factors also influence people's response to noise. The factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence people's response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses would range from "not annoyed" to "highly annoyed."

Because sound levels can vary over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of sound events of arbitrary duration.

The scientific instrument used to measure sound is the sound level meter. Sound level meters can accurately measure environmental sound levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental sound levels from sources, such as roadways and airports. The accuracy of the models depends upon the distance the receptor is from the sound source. Close to the sound source, the models are accurate to within about plus or minus 1 to 2 dBA.

4.0 Regulatory Environment

The State of California and the Riverside County both have established regulatory criteria designed to guide compatible development in varying sound environments and protect existing uses from excessive sound increases.

The California State Building Code only addresses noise intrusion into multiple residential unit and hotel/motel structures. This is regulated by Chapter 12, Section 1207.4, allowable interior noise levels, attributable to exterior sources shall not exceed 45 dB_{DNL} in any habitable room.

4.1 Riverside County Noise Ordinance 847

GENERAL SOUND LEVEL STANDARDS.

No person shall create any sound, or allow the creation of any sound, on any property that causes the exterior sound level on any other occupied property to exceed the sound level standards set forth in Table 1.

The following exceptions are enumerated but may not be applicable for this project.

a. Private construction projects located one-quarter (1/4) of a mile or more from an inhabited dwelling.

b. Private construction projects located within one-quarter (1/4) of a mile from an inhabited dwelling, provided that:
   1. Construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September; and

c. Construction does not occur between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May. Property maintenance, including, but not limited to, the operation of lawnmowers, leaf blowers, etc., provided such maintenance occurs between the hours of 7 a.m. and 8 p.m.

d. Motor vehicles, other than off-highway vehicles. This exemption does not include sound emanating from motor vehicle sound systems

e. Heating and air conditioning equipment.

f. Safety, warning and alarm devices, including, but not limited to, house and car alarms, and other warning devices that are designed to protect the public health, safety, and welfare.

TABLE 1

RIVERSIDE COUNTY SOUND LEVEL STANDARDS (Db L_{max})					
GENERAL PLAN FOUNDATION COMPONENT	**GENERAL PLAN LAND USE DESIGNATION**	**GENERAL PLAN LAND USE DESIGNATION NAME**	**DENSITY**	**MAXIMUM DECIBEL LEVEL**	
				7am-10pm	**10pm-7am**
Community Development	EDR	Estate Density Residential	2 AC	55	45
	VLDR	Very Low density Residential	1 AC	55	45
	LDR	Low Density Residential	1/2 AC	55	45
	MDR	Medium Density Residential	2--5	55	45
	MHDR	Medium High Density Residential	5--8	55	45
	HDR	High Density Residential	8--14	55	45
	VHDR	Very High Density Residential	14-20	55	45
	H'TDR	Highest Density Residential	20+	55	45
	CR	Retail Commercial		65	55
	CO	Office Commercial		65	55
	CT	Tourist Commercial		65	55
	CC	Community Center		65	55
	LI	Light Industrial		75	55
	HI	Heavy Industrial		75	75
	BP	Business Park		65	45
	PF	Public Facility		65	45
	SP	Specific Plan-Residential		55	45
		Specific Plan-Commercial		65	55
		Specific Plan-Light Industrial		75	55
		Specific Plan-Heavy Industrial		75	75
Rural Community	EDR	Estate Density Residential	2 ac	55	45
	VLDR	Very Low Density Residential	1 ac	55	45
	LDR	Low Density Residential	1/2 ac	55	45
Rural	RR	Rural Residential	5 ac	45	45
	RM	Rural Mountainous	10 ac	45	45
	RD	Rural Desert	10 ac	45	45
Agriculture	AG	Agriculture	10 AC	45	45
Open Space	C	Conservation		45	45
	CH	Conservation Habitat		45	45
	REC	Recreation		45	45
	RUR	Rural	20 AC	45	45
	W	Watershed		45	45
	MR	Mineral Resources		75	45

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5.0 Mechanical Equipment Calculations

Each greenhouse will have two 4.5 ft x 4.5 ft belt driven exhaust fans located in the west end of greenhouses 1-7 and the east end of greenhouses 8-17. The manufacturers noise specification is an intensity of ≤ 70 db.

The distances of the exhaust fans and distance attenuation factor is listed in Table 2 for both the center line of the road and the nearest residence.

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TABLE 2 – DISTANCE OF THE EXHAUST FANS AND ATTENUATION FACTOR

	To center of Road		To Closest Residence	
Green House	Distance	Distance Factor	Distance	Distance Factor
GH1	104'10"	38	389'3"	49
GH2	138'7"	40	523'	51
GH3	172'7"	42	557'	51
GH4	206'9"	44	591'2"	51
GH5	240'11"	45	625'4"	51
GH6	275'4"	46	656'9"	51
GH7	316'4"	47	700'9"	51
GH8	422'11"	50	807'4"	51
GH9	379'5"	49	763'10"	51
GH10	352'9"	48	737'2"	51
GH11	321'11"	47	706'4"	51
GH12	290'4"	46	674'9"	51
GH13	261'5"	46	645'10"	51
GH14	236'1"	45	620'6"	51
GH15	210'10"	44	595'3"	51
GH16	188'8"	43	573'1"	51
GH17	169'1"	42	553'6"	51

Based on these distances, the combined sound level at the center of Carancho Road was calculated to be 36.0 dbA and 28.0 dbA at the closest residence This calculation is summarized in Tables 3 and 4.

There will be one air conditioning compressor located on the south side of the office building. In addition to the effect of distance, sound level of this unit will be reduced by the attenuation provided by the retaining wall which is 8 feet high at this location. A calculation was made to determine the predicted sound level at the center of Carancho Road was calculated to be 44.1 dbA and is illustrated in Table 5.

There will also be a 130-kW standby generator located on the southwest corner of the office building. Again, in addition to the attenuation provide by distance, the retaining wall is 12 feet high at this location. The calculated sound level is 40.0 dbA and is presented in Table 6.

TABLE 3 - EXHAUST FAN COMBINED SOUND LEVEL AT CENTER OF ROAD

Exhaust Fans	GH1	GH2	GH4	GH4	GH5	GH6	GH7	GH8	GH9	GH10	GH11	GH12	GH13	GH14	GH15	GH16	GH17
A-Weighted Sound Level Rating	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
Equipment Location Factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
-Barrier Shielding Factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-Sound Path Factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Distance Factor	43	44	45	46	47	48	49	51	50	49	48	47	47	45	44	43	41
=Estmated A-Weighted Sound Pressure Level	30.0	29.0	28.0	27.0	26.0	25.0	24.0	22.0	23.0	24.0	25.0	26.0	26.0	28.0	29.0	30.0	32.0
Estimated Combined A-Weighted Sound Pressure Level	36.0																

TABLE 4 - EXHAUST FAN COMBINED SOUND LEVEL AT NEAREST RESIDENCE

Exhaust Fans	GH1	GH2	GH4	GH4	GH5	GH6	GH7	GH8	GH9	GH10	GH11	GH12	GH13	GH14	GH15	GH16	GH17
A-Weighted Sound Level Rating	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
Equipment Location Factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
-Barrier Shielding Factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-Sound Path Factor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Distance Factor	49	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
=Estmated A-Weighted Sound Pressure Level	24.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Estimated Combined A-Weighted Sound Pressure Level	0.0																

TABLE 5 - AIR CONDITIONING COMPRESSOR NOISE LEVEL AT CENTER OF ROAD AND NEAREST RESIDENCE

10 Ton Airconditioner	ROAD	RESIDENCE
A-Weighted Sound Level Rating	87.3	87.3
Equipment Location Factor	6	6
Subtotal	93.3	93.3
-Barrier Shielding Factor	9.5	9.5
-Sound Path Factor	0	0
- Distance Factor	39.7	50.7
=Estmated A-Weighted Sound Pressure Level	44.1	33.1

TABLE 6 - STANDBY GENERATOR NOISE LEVEL AT CENTER OF ROAD AND NEAREST RESIDENCE

10 Ton Airconditioner	ROAD	RESIDENCE
A-Weighted Sound Level Rating	71	71
Equipment Location Factor	6	6
Subtotal	77	77
-Barrier Shielding Factor	13.6	13.6
-Sound Path Factor	0	0
- Distance Factor	39.7	50.7
=Estmated A-Weighted Sound Pressure Level	23.7	12.7

6.0 Short Term Construction Related Impacts

The project will utilize the following equipment during the construction phase:

1 Backhoe Loader

1 Dump Truck

1 Road Grader

2 Fork Lifts

Noise levels from construction activities for the proposed project may range up to 86 dBA at the adjacent to the project site for very limited times when construction occurs near the project's boundary. Construction related noise impacts from the proposed project would be potentially adverse; however, compliance with the County's construction hours requirement would reduce the impact to a less than significant level.

Short-term noise impacts would be associated with excavation and erecting of buildings on site during construction of the proposed project. Construction related short-term noise levels would be higher than existing ambient noise levels in the project area but would no longer occur once construction of the project is completed.

Two types of short-term noise impacts could occur during the construction of the proposed project. First, construction crew commutes and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Although there would be a relatively high single event noise exposure potential causing intermittent noise nuisance (passing trucks at 50 feet would generate up to a maximum of 87 dBA), the effect on longer term (hourly or daily) ambient noise levels would be small. Therefore, short-term construction related impacts associated with worker commute and equipment transport to the project site would be less than significant.

The second type of short-term noise impact is related to noise generated during excavation and erection of buildings on the project site. Construction is completed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on the site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction related noise ranges to be categorized by work phase. Table 7 lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor. The site preparation phase, which includes excavation of the site, tends to generate the highest noise levels.

Table 7: Typical Construction Equipment Noise Levels

`	Range of Maximum Sound Levels Measured (dBA at 50 Feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 Feet)
Pile Drivers, 12,000 to 18.000 ft-lb/blow	81-96	93
Rock Drills	83-99	96
Jackhammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	74-84	80
Scrapers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Dozers	77-90	85
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Backhoe	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-89	86
Trucks	81-87	86

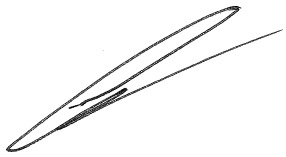
Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman, 1987.

The closest existing or planned noise-sensitive uses such as homes adjacent to the project site are more than 400 feet from the project boundary. These uses may be subject to short-term, intermittent, maximum noise generated by construction activities on site. Compliance with the construction hours specified in the County's Noise Ordinance would reduce the construction noise impacts to a less than significant level.

Deliveries would result in a maximum noise similar to noise readings from loading and unloading activities for other projects, which generate a noise level of 75 dBA L_{max} at 50 feet. This range of maximum noise levels would not exceed the typical exterior noise standards of 90 dBA L_{max} but would be potentially higher than the typical 75 dBA L_{15} standard if the noise lasts more than 15 minutes in any hour. Although a typical truck unloading process takes an average of 15-20 minutes, this maximum noise level occurs in a much shorter period of time, in a few minutes. Therefore, noise associated with loading and unloading activities would not result in noise levels exceeding the typical standards. No mitigation measures are required.

As described above, the proposed Project will meet the County's noise standards. No mitigation measures will be required.

Respectfully submitted,



Yanchar Design & Consulting Group
Carl J. Yanchar
President

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APPENDIX A

DESCRIPTION OF ACOUSTICAL TERMS

A-Weighted Sound Level (dBA):

The sound pressure level in decibels as measured on a sound level meter using the internationally standardized A-weighting filter or as computed from sound spectral data to which A-weighting adjustments have been made. A-weighting de-emphasizes the low and very high frequency components of the sound in a manner similar to the response of the average human ear. A-weighted sound levels correlate well with subjective reactions of people to noise and are universally used for community noise evaluations.

Acoustic; Acoustical:

Acoustic is usually used when the term being qualified designates something that has the properties, dimensions, or physical characteristics associated with sound waves (e.g., acoustic power); *acoustical* is usually used when the term which it modifies does not explicitly designate something that has the properties, dimensions, or physical characteristics of sound (e.g., acoustical material).

Airborne Sound:

Sound that travels through the air, as opposed to structure-borne sound.

Ambient Noise:

The prevailing general noise existing at a location or in a space, which usually consists of a composite of sounds from many sources near and far.

Attenuation:

The decrease in level of sound, usually from absorption, divergence, scattering, or the cancellation of the sound waves.

Average sound level (L_{eq}):

The level of a steady sound which, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Unit: decibel.

Background noise:

The total noise from all sources other than a particular sound that is of interest (e.g., other than the noise being measured or other than the speech or music being listened to).

Community Noise Equivalent Level (CNEL):

The L_{eq} of the A-weighted noise level over a 24-hour period with a 5 dB penalty applied to noise levels between 7 p.m. and 10 p.m. and a 10 dB penalty applied to noise levels between 10 p.m. and 7 a.m.

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Day-Night Sound Level (L_{dn}):

The L_{eq} of the A-weighted noise level over a 24-hour period with a 10 dB penalty applied to noise levels between 10 p.m. and 7 a.m.

Decibel (dB):

The decibel is a measure on a logarithmic scale of the magnitude of a particular quantity (such as sound pressure, sound power, sound intensity) with respect to a reference quantity.

Energy Equivalent Level (L_{eq}):

The level of a steady noise which would have the same energy as the fluctuating noise level integrated over the time period of interest. L_{eq} is widely used as a single-number descriptor of environmental noise. L_{eq} is based on the logarithmic or energy summation and it places more emphasis on high noise level periods than does L_{50} or a straight arithmetic average of noise level over time. This energy average is not the same as the average sound pressure levels over the period of interest, but must be computed by a procedure involving summation or mathematical integration.

Field Impact Insulation Class (FIIC):

A single number rating similar to the IIC except that the impact sound pressure levels are measured in the field.

Field Sound Transmission Class (FSTC):

A single number rating similar to STC, except that the transmission loss values used to derive the FSTC are measured in the field. All sound transmitted from the source room to the receiving room is assumed to be through the separating wall or floor-ceiling assembly.

Frequency (Hz):

The number of oscillations per second of a periodic noise (or vibration) expressed in Hertz (abbreviated Hz). Frequency in Hertz is the same as cycles per second.

Impact Isolation Class (IIC):

A single number rating used to compare the effectiveness of floor-ceiling assemblies in providing reduction of impact generated sounds such as footsteps. It is derived from the measurement of impact sound pressure levels across a series of 16 test bands using a standardized tapping machine.

Noise:

Any disagreeable or undesired sound, i.e., unwanted sound.

Noise level:

Same as sound level. Usually used to describe the sound level of an unwanted sound.

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Noise reduction (NR):

The difference in sound pressure level between any two points along a path of sound propagation.

Noise Isolation Class (NIC):

A single number rating derived from measured values of noise reduction between two enclosed spaces that are connected by one or more paths. The NIC is not adjusted or normalized to a standard reverberation time.

Normalized Noise Isolation Class (NNIC):

A single number rating similar to the NIC, except that the measured noise reduction values are normalized to a reverberation time of 1/2 second.

Outdoor-Indoor Transmission Class (OITC):

A single number classification, specified by the American Society for Testing and Materials (ASTM E 1332 issued 1994), that establishes the A-weighted sound level reduction provided by building facade components (walls, doors, windows, and combinations thereof), based upon a reference sound spectrum that is typical of air, road, and rail transportation sources. The OITC is the preferred rating when exterior facade components are exposed to noise environments dominated by transportation sources.

Octave Band - 1/3 Octave Band:

One octave is an interval between two sound frequencies that have a ratio of two. For example, the frequency range of 200 Hz to 400 Hz is one octave, as is the frequency range of 2000 Hz to 4000 Hz. An octave band is a frequency range that is one octave wide. A standard series of octaves is used in acoustics, and they are specified by their center frequencies. In acoustics, to increase resolution, the frequency content of a sound or vibration is often analyzed in terms of 1/3 octave bands, where each octave is divided into three 1/3 octave bands.

Sound:

(1) A change in air pressure that is capable of being detected by the human ear.
(2) The hearing sensation excited by a change in air pressure.

Sound Absorption Coefficient:

The absorption coefficient of a material is the ratio of the sound absorbed by the material to that absorbed by an equivalent area of open window. The absorption coefficient of a perfectly absorbing surface would be 1.0 while that for concrete or marble slate is approximately 0.01 (a perfect reflector would have an absorption of 0.00).

Sound Level:

Ten times the logarithm to the base 10 of the square of the ratio of the frequency- weighted (and time-averaged) sound pressure to the reference sound pressure of 20 micro pascals. The frequency-weightings and time-weighting employed should be specified; if they are not specified, it is understood that A-frequency-weighting is used and that an averaging time of 0.125 is used. *Unit*: decibel (dBA).

`

Sound Pressure Level (SPL):

The sound pressure level of sound in decibels is 20 times the logarithm to the base of 10 of the ratio of the RMS value of the sound pressure to the RMS value of a reference sound pressure. The standard reference sound pressure is 20 micro-pascals as indicated in ANSI S1.8-1969, "Preferred Reference Quantities for Acoustical Levels".

Sound Transmission Class (STC):

STC is a single number rating, specified by the American Society for Testing and Materials, which can be used to measure the sound insulation properties for comparing the sound transmission capability, in decibels, of interior building partitions for noise sources such as speech, radio, and television. It is used extensively for rating sound insulation characteristics of building materials and products.

Structure-Borne Sound:

Sound propagating through building structure. Rapidly fluctuating elastic waves in gypsum board, joists, studs, etc.

Statistical Distribution Terms:

L_{99} and L_{90} are descriptors of the typical minimum or "residual" background noise (or vibration) levels observed during a measurement period, normally made up of the summation of a large number of sound sources distant from the measurement position and not usually recognizable as individual noise sources. Generally, the prevalent source of this residual noise is distant street traffic. L_{90} and L_{99} are not strongly influenced by occasional local motor vehicle pass-bys. However, they can be influenced by stationary sources such as air conditioning equipment.

L_{50} represents a long-term statistical median noise level over the measurement period and does reveal the long-term influence of local traffic.

L_{10} describes typical or average levels for the maximum noise levels occurring, for example, during nearby pass bys of trains, trucks, buses and automobiles, when there is relatively steady traffic. Thus, while L_{10} does not necessarily describe the typical maximum noise levels observed at a point, it is strongly influenced by the momentary maximum noise level occurring during vehicle pass bys at most locations.

L_1, the noise level exceeded for 1% of the time is representative of the occasional, isolated maximum or peak level which occurs in an area. L1 is usually strongly influenced by the maximum short-duration noise level events which occur during the measurement time period and are often determined by aircraft or large vehicle pass bys.

`

APPENDIX B

COMMON SOUND LEVELS AND THEIR NOISE SOURCES

Source: Compiled by YDCG

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Evaluations
Near Jet Engine	140	Deafening	128 times as loud
Civil Defense Siren	130	Threshold of	64 times as loud
Hard Rock Band	120	Threshold of	32 times as loud
Accelerating Motorcycle at a Few Feet Away	110	Very Loud	16 times as loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very Loud	8 times as loud
Ambulance Siren; Food	95	Very Loud	
Garbage Disposal	90	Very Loud	4 times as loud
Freight Cars; Living Room Music	85	Loud	
Pneumatic Drill; Vacuum Cleaner	80	Loud	2 times as loud
Busy Restaurant	75	Moderately Loud	
Near Freeway Auto Traffic	70	Moderately Loud	
Average Office	60	Quiet	One-half as loud
Suburban Street	55	Quiet	
Light Traffic; Soft Radio Music in Apartment	50	Quiet	One-quarter as loud
Large Transformer	45	Quiet	
Average Residence without Stereo Playing	40	Faint	One-eighth as loud
Soft Whisper	30	Faint	
Rustling Leaves	20	Very Faint	
Human Breathing	10	Very Faint	
Threshold of Hearing	0	Very Faint	

`

APPENDIX C

MECHANICAL EQUIPMENT SUBMITTALS

Exhaust Fan

Each greenhouse will have 2-units of 4.5ft x 4.5 ft SainPoly hammer fans SBL-1380 or similar will be used for each greenhouse with the following specifications (total 17 greenhouses, 44 Fans). Please note we will operate these fans between 12-14 hours a day.

Code	Fan Diameter (mm)	Revolution Speed of the Blade(r/min)
SBL-1380	1250	439
Noise Intensity (dB)	Inpit Power(w)	Height (mm)
≤70	1100	1380

Job Name: SOO Hotel
Prepared By:
Unit Tag: Unit 1 G/E
Quantity: 1

Trane Precedent Gas/Electric Packaged Rooftop

Unit Overview - YHC120F4RLA**07D0000600000000000000000

Application	Unit Size	Supply Fan		External Dimensions (in.)			Operating Weight		EER	IEER/SEER	Elevation
		Airflow	External Static Pressure	Height	Width	Length	Minimum	Maximum			
DX cooling, gas heat	10 Ton	3565 cfm	1.500 in H2O	4.24 ft	5.27 ft	8.31 ft	1259.0 lb.	1608.0 lb.	12.4 EER	15.20	

Unit Features

SupplyFan/Drive/ MotorType	Multi speed fan

Unit Electrical

Voltage/phase/hertz	460/60/3
MCA	22.00 A
MOP	25.00 A

Controls

Unit Controls	Microprocessor controls
Communications Option	BACnet Communications Interface

Cooling Section

Entering Dry Bulb	80.00 F
Entering Wet Bulb	67.00 F
Ambient Temp	95.00 F
Leaving Coil Dry Bulb	56.54 F
Leaving Coil Wet Bulb	56.53 F
Leaving Unit Dry Bulb	57.83 F
Leaving Unit Wet Bulb	57.04 F
Refrigeration System Options	
Leaving Dew Point	56.53 F

Capacity	
Gross Total	112.07 MBh
Gross Sensible	90.33 MBh
Net Total	108.76 MBh
Net Sensible	87.01 MBh
Fan Motor Heat	3.31 MBh
Refrig Charge-circuit 1	7.1 lb
Refrig Charge-circuit 2	5.0 lb

Heating Section

Heat Type	Gas Heat
Heating Stages	2
Output Heating Capacity	120.00 MBh
Output Heating Capacity with Fan	123.31 MBh
Heating EAT	70.00 F
Heating LAT	101.50 F
Heating Temp Rise	31.50 F

Fan Section

Indoor Fan Data	
Type	BC Plenum
Drive Type	Direct
Evap Fan FLA	0.00 A
Indoor Fan Performance	
Airflow	3565 cfm
Design ESP	1.500 in H2O
Component SP	0.149 in H2O
Total SP	1.681 in H2O
Supply Motor Horsepower	2.750 hp
Indoor Motor Operating Power	1.14 bhp
Indoor Motor Power	0.85 kW
Indoor RPM	1418 rpm

Outdoor Fan Data	
Type	Propeller
Fan Quantity	1
Drive Type	Direct
Outdoor Fan Performance	
Outdoor Motor Power	0.53 kW
Condenser Fan FLA	1.50 A

Compressor Section

Power	7.79 kW
Circuit 1 RLA	8.20 A
Circuit 2 RLA	6.00 A

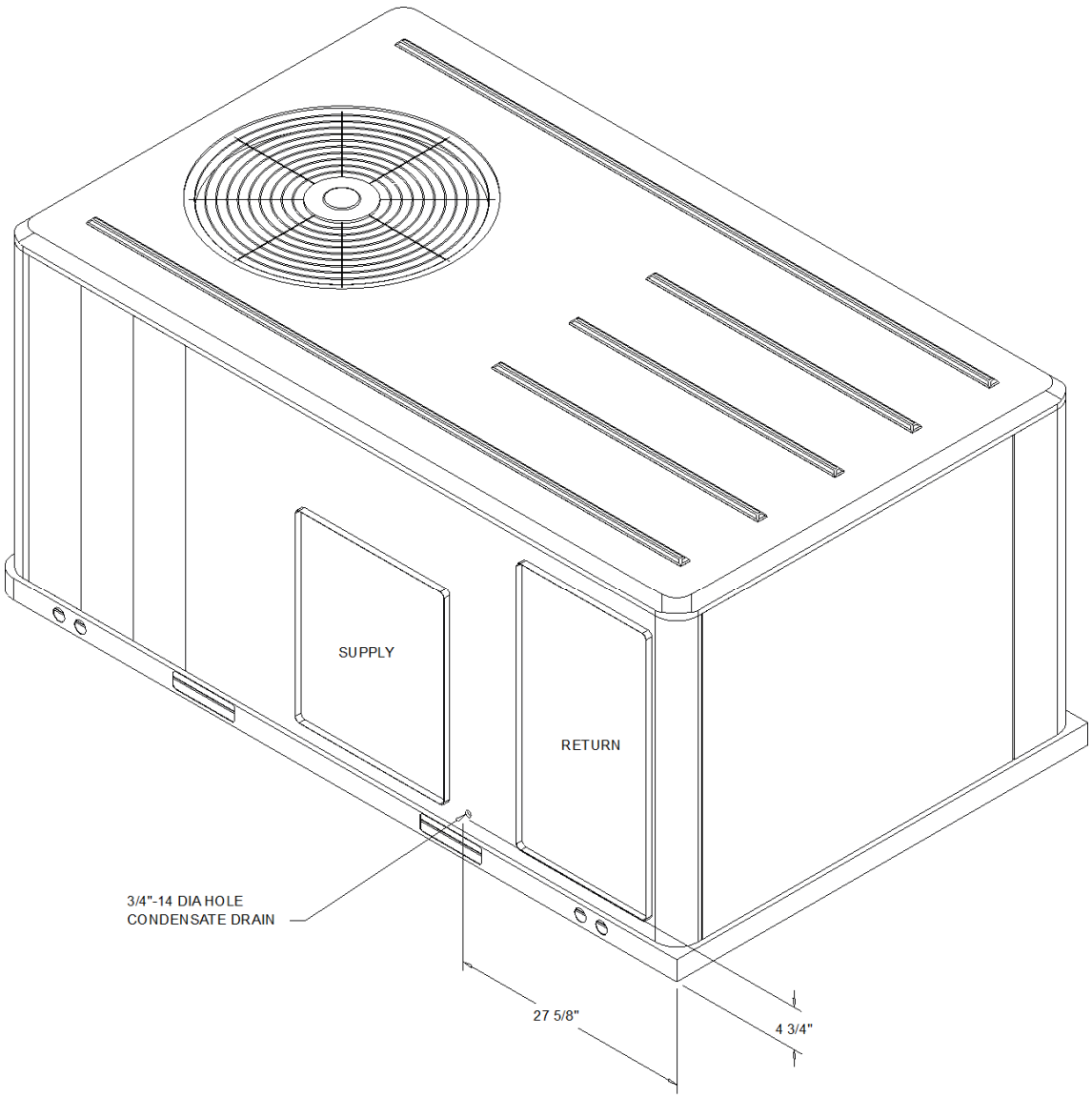
Accessories

Zone sensors	Programmable Zone Sensor - Title 24

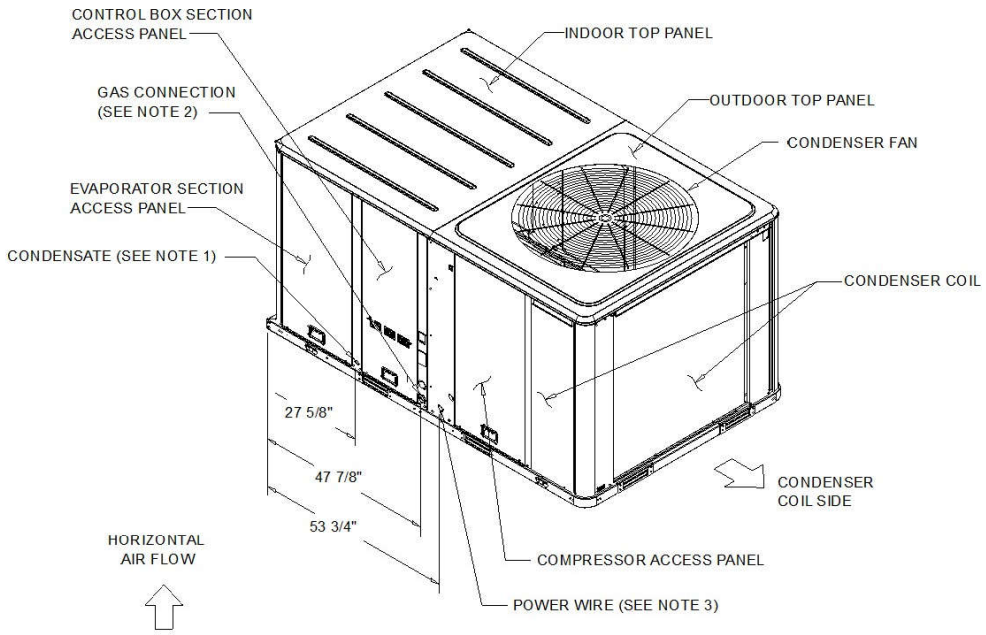
Acoustics

Sound Path	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Ducted Discharge	81 dB	89 dB	86 dB	82 dB	79 dB	74 dB	74 dB	67 dB
Ducted Inlet	81 dB	81 dB	81 dB	70 dB	61 dB	61 dB	63 dB	53 dB
Outdoor Noise	89 dB	87 dB	91 dB	85 dB	80 dB	77 dB	73 dB	66 dB

Note: Ducted Inlet and Ducted Discharge Sound Power Levels are in accordance with AHRI 260. Note: Outdoor Sound Power Levels are in accordance with AHRI 270.

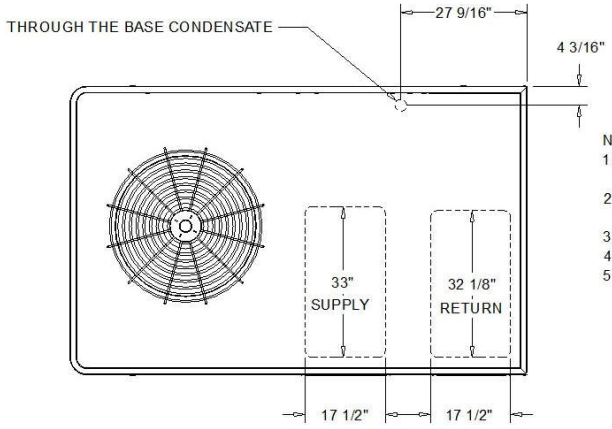


ISOMETRIC-PACKAGED COOLING



PACKAGED GAS / ELECTRICAL

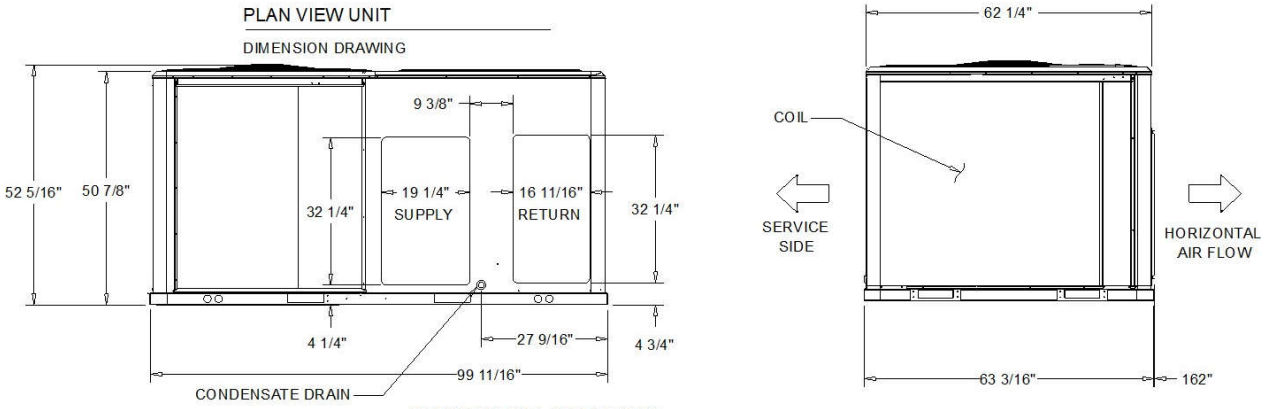
ISOMETRIC VIEW



NOTES:
1. ALTERNATE CONDENSATE DRAIN CONNECTION 3/4" - 14 NPT DIA. HOLE
2. 1/2" NPT GAS CONNECTION (80 mbh, 120 mbh) ; 3/4" NPT GAS CONNECTION (150mbh, 200mbh, 250mbh)
3. UNIT POWER WIRE 1 3/8" DIA. HOLE.
4. THRU -THE -BASE ELECTRICAL AND GAS IS NOT STANDARD ON ALL UNITS.
5. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION

PLAN VIEW UNIT

DIMENSION DRAWING



PACKAGED GAS / ELECTRICAL

DIMENSION DRAWING

ELECTRICAL / GENERAL DATA

GENERAL (2)(4)(6)

		Oversized Motor	
Model:	YHC120F	MCA:	N/A
Unit Operating Voltage:	414-506	MFS:	N/A
Unit Primary Voltage:	460	MCB:	N/A
Unit Secondary Voltage	--		
Unit Hertz:	60		
Unit Phase:	3		
EER	12.4		

Standard Motor		Field Installed Oversized Motor	
MCA:	22.0	MCA:	N/A
MFS:	25.0	MFS:	N/A
MCB:	25.0	MCB:	N/A

HEATING PERFORMANCE

HEATING - GENERAL DATA

Heating Model:	Low
Heating Input (BTU):	150,000/105,000
Heating Output (BTU):	120,000/84,000
No. Burners:	3
No. Stages	2

Gas Inlet Pressure

Natural Gas (Min/Max):	4 1/2"/14"
LP (Min/Max)	10"/14"
Gas Pipe Connection Size:	3/4"

INDOOR MOTOR

Standard Motor		Oversized Motor		Field Installed Oversized Motor	
Number:	1	Number:	N/A	Number:	N/A
Horsepower:	2.75	Horsepower:	N/A	Horsepower:	N/A
Motor Speed (RPM):	--	Motor Speed (RPM):	N/A	Motor Speed (RPM):	N/A
Phase	3	Phase	N/A	Phase	N/A
Full Load Amps:	3.6	Full Load Amps:	N/A	Full Load Amps:	N/A
Locked Rotor Amps:	--	Locked Rotor Amps:	N/A		N/A

COMPRESSOR Circuit 1/2

Number:	2
Horsepower:	5.1/2.7
Phase:	3
Rated Load Amps:	8.2/6.0
Locked Rotor Amps:	--

OUTDOOR MOTOR

Number:	1
Horsepower:	0.75
Motor Speed (RPM):	1100
Phase:	3
Full Load Amps:	1.5
	--

POWER EXHAUST ACCESSORY (3,7)

(Field Installed Power Exhaust)

Phase:	N/A
Horsepower:	N/A
Motor Speed (RPM):	N/A
Full Load Amps:	N/A
Locked Rotor Amps:	N/A

FILTERS

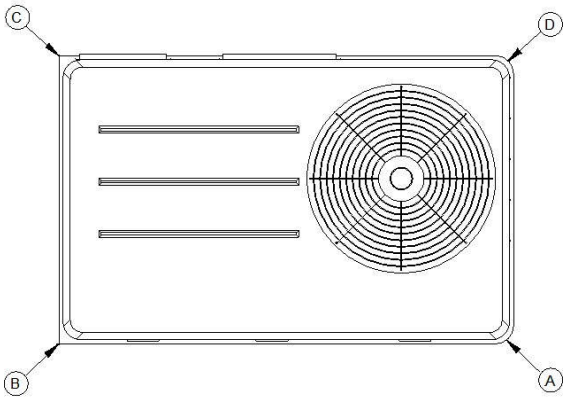
Type:	Throwaway
Furnished:	Yes
Number	3 / 2
Recommended	20"x25"x2"
	20"x30"x2"

REFRIGERANT (2)

Type	R-410
Factory Charge	
Circuit #1	7.1 lb
Circuit #2	5.0 lb

NOTES:

1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only.
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory.
4. Value includes oversized motor.
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.
7. Installation of this power exhaust kit will affect unit level MCA and could affect MOP sizing having a direct impact on existing field wiring and unit protection devices. The change in MCA/MOP is the sole responsibility of the field installing party. Trane will not issue new nameplates as a result of this power exhaust accessory installation. FLA of the power exhaust kit option must be added to the MCA of the unit for building supply conductor sizing determination.



PACKAGED GAS / ELECTRICAL

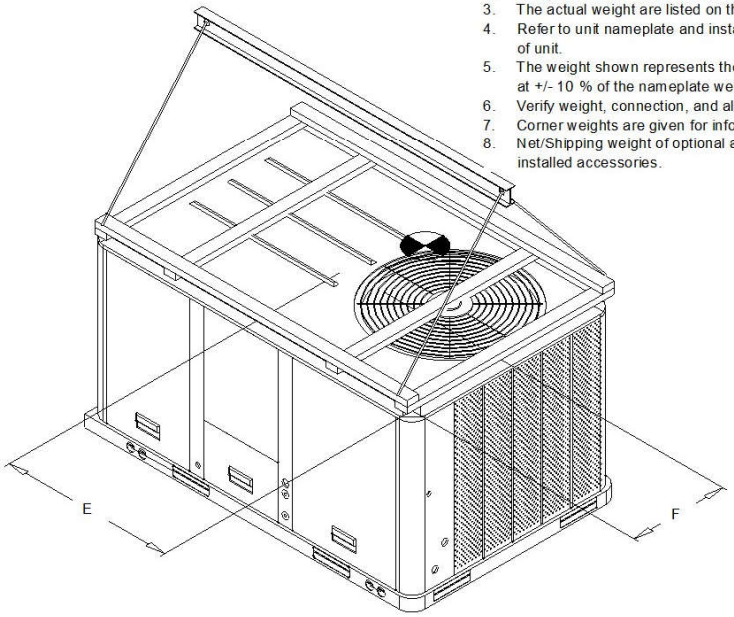
CORNER WEIGHT

INSTALLED ACCESSORIES NET WEIGHT DATA

ACCESSORY	WEIGHTS
ECONOMIZER	
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	
POWER EXHAUST	
THROUGHT THE BASE ELECTRICAL/GAS (FIOPS)	
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	
UNIT MOUNTED DISCONNECT (FIOPS)	
POWERED CONVENIENCE OUTLET (FIOPS)	
HINGED DOORS (FIOPS)	
HAIL GUARD	
SMOKE DETECTOR, SUPPLY / RETURN	
NOVAR CONTROL	
STAINLESS STEEL HEAT EXCHANGER	
REHEAT	
ROOF CURB	

BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITIY	
SHIPPING	NET	(A)	356.0 lb	(C)	289.0 lb	(E) LENGHT	(F) WIDTH
1453.0 lb	1259.0 lb	(B)	371.0 lb	(D)	242.0 lb	54"	27"

NOTE:
1. All weights are approximate.
2. Weights for options that are not list refer to Installation guide.
3. The actual weight are listed on the unit nameplate.
4. Refer to unit nameplate and installation guide for weights before scheduling transportation and installation of unit.
5. The weight shown represents the typical unit operating weight for the configuration selected. Estimated at +/- 10 % of the nameplate weight. .
6. Verify weight, connection, and all dimension with installer documents before installation.
7. Corner weights are given for information only.
8. Net/Shipping weight of optional accessories should be added to unit weight when ordering factory or field installed accessories.



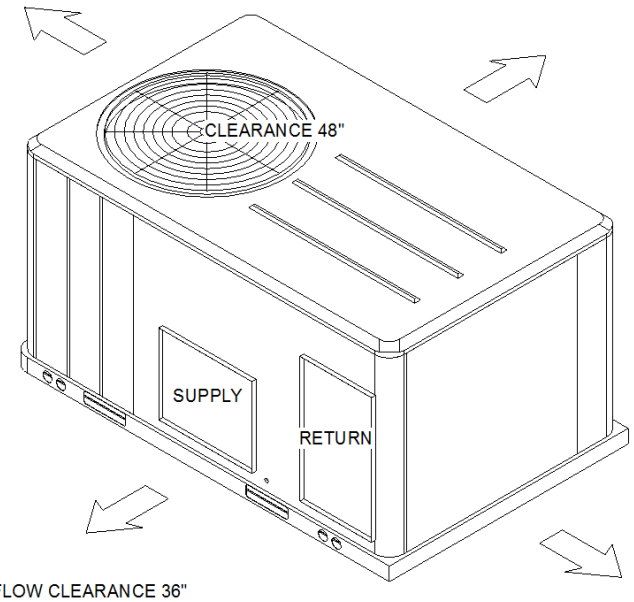
PACKAGED GAS / ELECTRICAL

RIGGING AND CENTER OF GRAVITY

CLEARANCE FROM TOP OF UNIT 72"

CLEARANCE 36"

CLEARANCE 48"



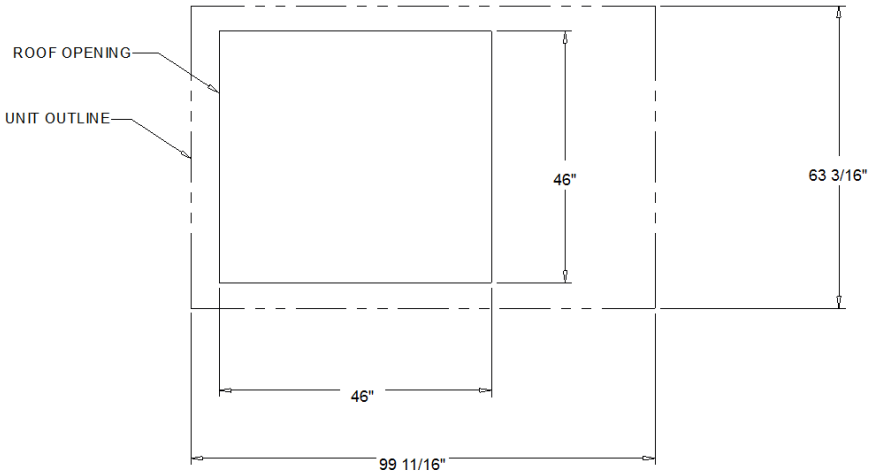
DOWNFLOW CLEARANCE 36"

HORIZONTAL CLEARANCE 18"

CLEARANCE 36"

PACKAGED GAS / ELECTRIC

CLEARANCE



PACKAGED GAS / ELECTRIC

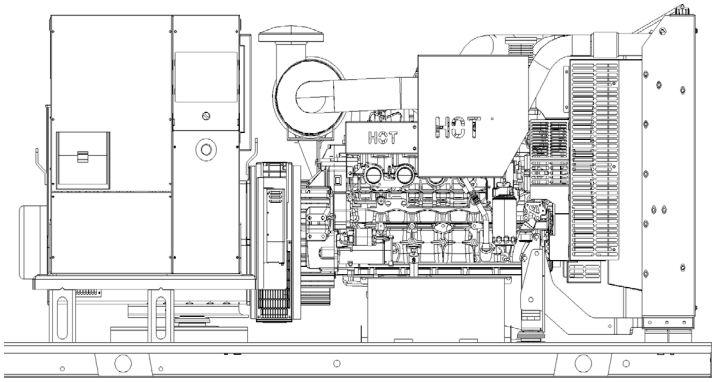
DOWNFLOW TYPICAL ROOF OPENING

Heavy Duty Industrial DIESEL GENERATOR

MODEL
HDI-130F

130kW/60Hz//1800RPM

60Hz STANDBY POWER RATINGS



VOLTAGE VAC	120/240V	120/208V	139/240V	277/480V	347/600V
RATING	Standby	Standby	Standby	Standby	Standby
PHASE	1	3	3	3	3
PF	1.0	0.8	0.8	0.8	0.8
HZ	60	60	60	60	60
KW	128	130	130	129.4	129.4
KVA	128	162.5	162.5	161.8	161.8
AMPS	533	451	391	195	156

Description

HIPOWER® Heavy Duty Industrial generators are an efficient, reliable and versatile source of back-up electrical power that have been designed to operate in the most extreme working conditions. All HIPOWER® Heavy Duty Industrial generators combine an innovative design and the use of high quality materials that provide the user with the most dependable power that can be relied on for non-stop power with easy to operate controls.

Powered by a radiator-cooled, industrial FPT Diesel engine that meets current Environmental Protection Agency (EPA) TIER 3 exhaust emission regulations, driving a single bearing, four-pole, three-phase alternator, with IP23 protection. The Emergency Power kVA rating is given with a 125 degree °C alternator winding temperature rise.

HIPOWER® Features and Benefits

FTP Diesel Engine: Long-life, heavy-duty, 4-cycle, direct injection engine for economy of operation and maximum reliability and durability.

Cooling: Radiator with belt driven pusher fan.

Air Filter: Heavy-duty replaceable element air-cleaner.

Alternator: Single bearing, rotating field, self-excited, self-ventilated, 12-wire re-connectable, 60Hz brushless alternator and Class H insulation. Automatic voltage regulator (AVR) providing close voltage regulation and skVA starting capability for electric motor loads.

Enclosure: Fully sound attenuated enclosure, manufactured using 7-gauge steel and thicker for the base; 12-gauge and 14-gauge for the enclosure, Interpon

A4700 primer, in combination with Interpon 600 series coatings, are designed for exterior exposure and offers excellent light and weather resistance exceeding 1400-hr salt spray test. A 1" thick layer of durable sound insulating, oil and fire resistant foam material is installed all around the inside of the enclosure to allow high-pressure water cleaning. Vertical air discharge for quiet operation. Wide steel lockable access doors with rubber seals, easy access for maintenance and service activities, lift off Die Cast Zinc hinges textured black powder coat and corrosion resistant hardware and fasteners.

Exhaust: Low noise, steel residential-type exhaust silencer with rain cap.

Fuel Filtration: Standard and secondary water separator with visible level on fuel filters.

Controls: Digital control panel with manual and automatic start and stop features. Many programmable automatic functions for local and remote controls with LED lights and tamper proof engine hour recorder.

Certification: Generator set is UL 2200 Listed and CSA certified and meets ISO 8528-5.

Codes and Standards Compliances used where applicable

HDI130F - 130Kw
Heavy Duty Industrial

APPLICATION DATA

ENGINE SPECIFICATION		LUBRICATION SYSTEM	
Manufacturer	FPT - Iveco	Oil pan capacity - gal (L)	3.2 (12)
Model	N67TM1X	Oil pan capacity with filter - gal (L)	4.5 (17.2)
EPA certified	Tier 3	Ol cooler	Liquid
Crankshaft speed	1,800 rpm	Recommended lubricating oil grade	SAE 10W-30 / ACEA E3/E5 (refer to owners manual)
Type	Diesel, 4-stroke	Oil consumption at full load	< 0.1% of fuel consumption
Injection	Direct	Oil pressure – psi (kPA)	72.6 (500)
Aspiration	Turbocharged aftercooled air/air	**ENGINE ELECTRICAL SYSTEM**	
Number of Cylinders	6	Starting motor voltage	12 volt
Cylinder arrangement	In-line	Cold Cranking Amps - minimum	650 Amp
Displacement CID (liters)	408.9 (6.7)	Battery charging Alternantor	90 Amp
Bore and Stroke ins (mm)	4.1 x 5.2 (104 x 132)	Battery capacity	650CCA 850CA 115RC GROUP SIZE 24F
Nominal power	198.5 hp		
Cooling	Liquid		
Governor	Electronic		
Governor Regulation Class	ISO 8528 Part 1 Class G3		
Frequency Regulation	Isochronous		
Starting motor & alternator	12 Volt		
Compression ratio	17.5:1		
Air cleaner type	Heavy duty - single cartridge		
ALTERNATOR SPECIFICATION			
Manufacturer	STAMFORD		
Model 120/240V Single phase	UCI274F		
Model 120/208V Three phase	UCI274F		
Model 277/480V Three phase	UCI274E		
Model 347/600V Three phase	UCI274E		
Alternator Type	Four pole, rotating field		
Excitation System	Brushless		
Power factor	0.8		
Number of leads	12 leads, reconnectable		
Stator Pitch	2/3		
Insulation	Class H		
Windings – Temperature Rise	Class F (125/40° C)		
Enclosure (IEC-34-S)	IP23		
Bearing	Single, sealed		
Coupling	Flexible disc		
Amortisseur windings	Full		
Voltage regulation – no load to full load with MX341 AVR	± 1%		
TIF	<50		
Radio Frequency Emissions compliance	Meets requirements of most industrial and commercial applications		
Line harmonics	5% maximum		

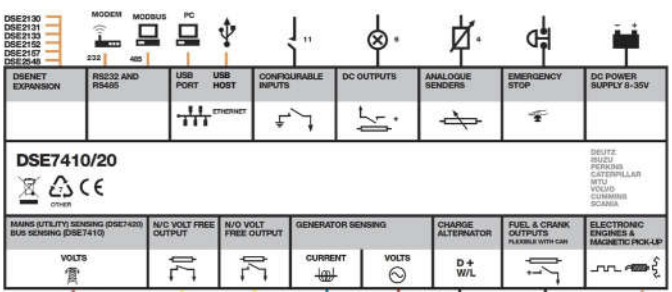
HDI130F - 130Kw
Heavy Duty Industrial

STANDARD FEATURES

Enclosure (If selected)	Engine System	Fuel System
Rust-Proof Fastener with Nylon Washers Protect Finish	Oil Drain Extension	Primary Fuel Filter
High Performance Sound-Absorbing Material (L1)	Air Cleaner	Flexible fuel lines
Gasketed Doors	Fan Guard	**Generator set**
Air Discharge Hoods for Radiators-Upwards Pointing	Factory Filled Oil	80% Rated Main Line Circuit Breaker
Lift Off Door Hinges	Battery Charging Alternator	Separation of Circuits – Multiple Breakers (load center)
Stainless Steel Lockable Handles	**Alternator Systems**	Separation of Circuits – High / Low Voltage
Textured Polyester Powder Coat	12 Leads (3-Phase, Non 600V)	Internal Genset Vibration Isolation
Cooling System	Class H Insulation Material	Wrapped Exhaust Piping
Factory-Installed Radiator	Vented Rotor	Standard Factory Testing
Radiator Drain Extension	2/3 Pitch	2 Year/2000 hours Limited Warranty
50/50 Ethylene Glycol Antifreeze	Full Load Capacity Alternator	Silencer Mounted in the Discharged Hood (Enclosed Only)
Electrical Systems	Protective Thermal Switch	Emergency Stop
Battery Cables and Battery Tray	Permanent Magnet Excitation	
Batteries	Skewed Stator	

CONTROL SYSTEM

- Charge alternator failure alarm
- 4-Line back-lit LCD text display
- Front panel editing with PIN protection
- Customizable status screens
- Power save mode
- 11 configurable inputs
- 8 configurable outputs
- Flexible sensor inputs
- Configurable timers and alarms
- "Protections disabled" feature
- kW protection
- Reverse power (kW) protection
- LED and LCD alarm indication
- Power monitoring (kWh, kVAr, kVAh, kVArh)
- Load switching (load shedding and dummy load outputs)
- Independent Earth Fault trip
- Fuel usage monitor and low fuel alarms
- Configurable display languages
- User selectable simultaneous RS232, RS485 & Ethernet communications
- MODBUS RTU & TCP support
- Configurable MODBUS pages
- Fully configurable via DSE Configuration Suite PC software
- Data logging to assist with fault finding
- PLC editor allows user configurable funcions to meet specific application requirements
- Licence-free PC software
- Multiple date and time scheduler
- DSENet® expansion compatible



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- 3 configurable maintenance alarms
- Multiple date and time scheduler
- Configurable event log (250)

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CONFIGURABLE OPTIONS

ENCLOSURE	ENGINE SYSTEM	ELECTRICAL SYSTEM
Open Skid	Oil heater	Battery Warmer
Weather Enclosure	120V-1ph Water Jacket Heater (with Isolation Valves)	10A Battery Charger
Level 1 Sound attenuated	208V-3ph Water Jacket Heater (with Isolation Valves)	6A Battery Charger
Level 2 Sound attenuated	**CIRCUIT BREAKER OPTIONS**	10 Positions Load Center (100Amps)
ALTERNATOR SYSTEM	LSI Electronic trip 80% and 100% rated	Remote ESTOP with N3R break glass
Anti-condensation heater	LSIG Electronic trip 80% and 100% rated	120V GFCI receptacle
Alternator upsizing	Second Main Line Circuit Breaker	10A Relay common alarm
Rheostat	Mechanical Lugs	10A Run Relay
MX321 AVR	Shunt trip	8 Leds Remote Anounciator on Surface mounted Box
	Auxiliary Contacts for Main and Secondary Breaker	16 Leds Remote Anounciator on Surface mounted Box
		24 Leds Remote Anounciator on Surfacee mounted Box

GENERATOR SET
Extended Factory Load Testing
Extended Warranty
Seismic Mounts

ENGINEERED OPTIONS

ENCLOSURE	ENGINE SYSTEM	ELECTRICAL SYSTEM
Snow Hood (only with L2)	Fluid Containment Pan	AC/DC Enclosure Lighting Kit with Timer
Air Outlet Gravity dampers		Enclosure Heater
Air Inlet motorized dampers (only with L2)		240V Twist lock receptacle
CIRCUIT BREAKER OPTIONS	**CONTROL SYSTEM**	**GENERATOR SET**
3rd Breaker system	Spare inputs (x4) / output (x4)	Special Testing
Shunt Trip on 3rd Breaker	DSE8610 - Parallel controller with motorized CB	**ALTERNATOR SYSTEM**
Auxiliary contact on 3rd Breaker	DSE2130 - DSENet Input Expansion Module	Tropical coating
FUEL TANK	DSE2157 - DSENet Output Expansion Module	
Custom Size – 72hr and 96hr	DSE855 - DSENet USB to Ethernet ModBus TCP/ IP Communication Module	
Custom type to meet State spec.	DSE892 - DSENet USB to Ethernet ModBus TCP/ IP - SNMP Comm. Module	
Vent Extentions	DSE2520 - Remote Display Module	
Overfill Protection Valve		

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OPERATING DATA

FUEL SYSTEM	
Recommended fuel	# 2 - ULSD
Fuel supply line, min. ID mm(in.)	9.5 - (3/8")
Fuel return line,min. ID, mm (in.)	9.5 - (3/8")
Max. lift, fuel pump, type, m (ft)	TBD
Fuel filter	Secondary 5 Microns @ 98% Efficiency

FUEL CONSUMPTION		(Standby Power Rating)
100% load	US gallons/hour (L/hr)	10 (38)
75% load	US gallons/hour (L/hr)	7.5 (28.5)
50% load	US gallons/hour (L/hr)	5 (19)
25% load	US gallons/hour (L/hr)	2.5 (8)

COOLING SYSTEM		
Engine cooling air flow	cfm (m3/min)	8,052 (228)
Alternator cooling flow	cfm (m3/min)	1,307 (37)
Combustion air flow	cfm (m3/min)	389 (11)
Total cooling air flow (engine+alternator+combustion)	cfm (m3/min)	9,748 (276)
Total cooling capacity	US gallons (liters)	3.96 (15)
Max. Operating Temperature	°F (°C)	122 (50)

EXHAUST		
Exhaust gas flow	cfm (m3/min)	910 (25.8)
Max. Exhaust temp at full load degrees	°F (°C)	896 (480)
Max. permissible back pressure	in H2O (kPA)	20 (5)

Starting Capabilities (sKVA)

	120/240V (1PH)					277/480V					208/240V					347/600V				
Alternator	10%	15%	20%	25%	30%	10%	15%	20%	25%	30%	10%	15%	20%	25%	30%	10%	15%	20%	25%	30%
Standard	85	140	190	255	325	115	185	260	350	445	100	165	230	310	400	115	185	265	350	450
Upsized	105	165	230	305	395	135	215	305	405	520	170	265	380	500	640	125	200	280	380	485

Circuit Breaker

	120/240V (1PH)	277/480V	120/208V	120/240V	347/600V
Make and model	ABB T6N600TW	ABB XT3NU3200AFF000XXX	ABB T5N600BW	ABB T5N400TW	ABB XT3NU3175AFF000XXX
Amps	600 A	200 A	600 A	400 A	150 A

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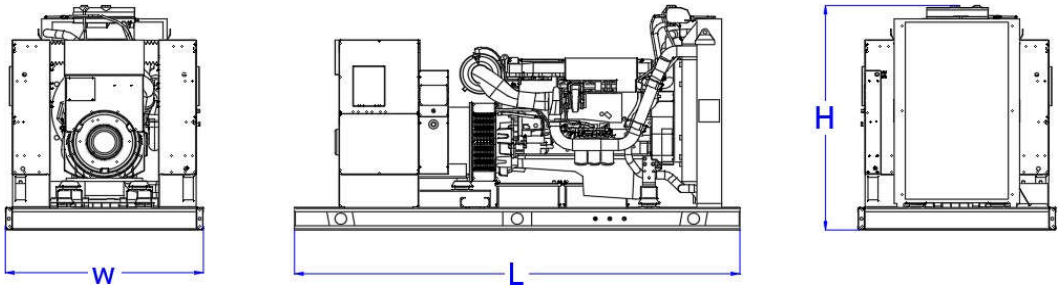
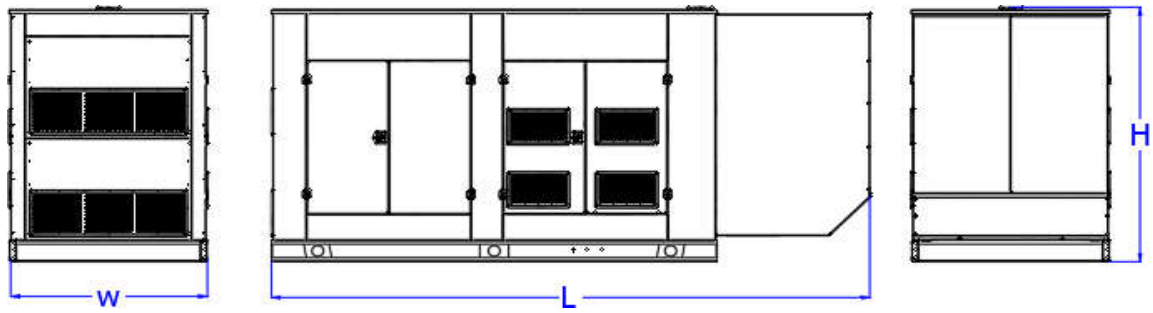
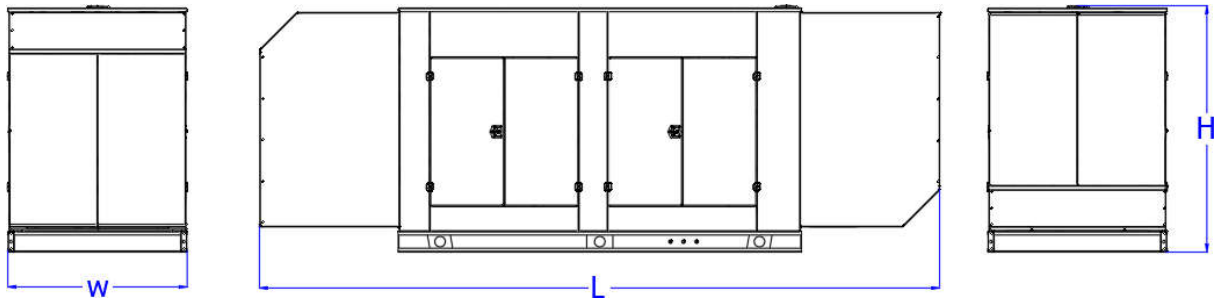
DIMENSIONS, WEIGHTS & SOUND LEVELS



CONFIGURATION	RUN TIME (HOURS)	USABLE CAPACITY (Gal.)	L = Length	W = Width	H = Height	Weight lbs	dBA
OPEN SET	No Tank	-	109"	46.3"	53"	3,120	N/A
	34	330	166"	46.3"	18"	1,700	
	68	660	166"	46.3"	34"	2,400	



CONFIGURATION	RUN TIME (HOURS)	USABLE CAPACITY (Gal.)	L = Length	W = Width	H = Height	Weight lbs	dBA
WEATHER ENCLOSURE / LEVEL 1 ENCLOSURE	No Tank	-	142.1"	46.3"	60.1"	4,500 / 4,520	77 / 74
	34	330	166"	46.3"	18"	1,700	
	68	660	166"	46.3"	34"	2,400	



CONFIGURATION	RUN TIME (HOURS)	USABLE CAPACITY (Gal.)	L = Length	W = Width	H = Height	Weight lbs	dBA
LEVEL 2 ENCLOSURE	No Tank	-	175.2"	46.3"	60.1"	4,620	71
	34	330	199.2"	46.3"	18"	1,700	
	68	660	199.2"	46.3"	34"	2,400	

* All measurements are approximate and for estimation purposes only. Weights are without fuel tank. Sound levels measured at 23ft (7m) and does not account for ambient site conditions.

Intertek

Conforms to UL STD 2200
Certified to CSA STD C22.2#100
Certified to CSA STD C22.2#14