CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

August 29, 2023

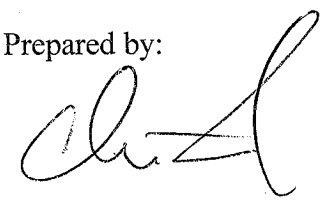
ACOUSTICAL ANALYSIS

LANCASTER CLEAN ENERGY CENTER AND

GREEN HYDROGEN ELECTROLYSIS PLANT

CITY OF LANCASTER

Prepared by:



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SUMMARY

This analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed Lancaster Clean Energy Center and Green Hydrogen Electrolysis Plant project located in the City of Lancaster. A list of requirements and recommendations is given in the following summary. Details are discussed in the body of the report.

A. EXTERIOR NOISE CONTROL

Exterior noise control measures are neither required nor proposed.

B. INTERIOR NOISE CONTROL

The buildings shall be constructed, as a minimum, in accordance with the outline of Table 3 found in the body of the report. This will be adequate for all office areas of the project when located more than 150 feet from a major roadway.

C. VENTILATION

This analysis assumed that all office windows and doors are kept closed. If the allowable interior noise levels are met by requiring that windows and doors be kept closed, then the design of the structures must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the office area noise reduction.

D. UNIT-TO-UNIT NOISE CONTROL

Common wall assemblies between office areas and manufacturing/warehousing areas are subject to the CalGreen Sound Transmission Class (STC) requirements. The plans provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, either of which rate at least STC 40, be incorporated into the building plans:

(1) One layer 1/2" direct nailed drywall, 2" by 4" wood studs, R-13 fiberglass insulation, one layer 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-24-69, 1969, 16f, Owens/Corning Fiberglas, STC 40)

(2) One layer 1/2" drywall screwed to 3 5/8" metal studs, R-11 fiberglass insulation, one layer 1/2" drywall screwed to studs (Owens/Corning Fiberglas, OCF 426, 1967, 16f, Owens/Corning Fiberglas, STC 44).

E. PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an interior noise limit of 50 dBA Leq(1 hour) means that exterior noise sources will remain audible on the interior of a structure.

Due to quality control and other field related problems, the code minimum laboratory rating of STC 40 for common wall assemblies does not guarantee that all common wall assemblies will pass a field test. In fact, there is a 50% chance that half of all laboratory rated STC 40 common wall assemblies could fail field tests. An STC 40 rated assembly will produce around 35 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit to unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

F. PROJECT NOISE

Project noise levels could potentially impact the nearest residential uses around the perimeter of the project site. However, the majority of the project site will create only low levels of noise and should not impact any residential uses. The only area of the site that could potentially create high noise levels would be the Green Hydrogen Electrolysis Plant. An analysis of the proposed project equipment could not be performed as the equipment specifications were

not yet available. Thus, it is highly recommended that an acoustical review of the proposed equipment be performed once this equipment is specified.

G. CONSTRUCTION NOISE

Short term construction noise impacts at the nearest residential uses is likely to be unavoidable. Thus, noisy construction phase operations shall be scheduled to minimize the durations of such operations in proximity to the nearest residential uses.

1.0 INTRODUCTION

This report presents the results of a noise impact and design study of the proposed Lancaster Clean Energy Center and Green Hydrogen Electrolysis Plant project to be located in the City of Lancaster. This report includes a discussion of the expected exterior community noise environment and the recommendations for control of exterior noise in the interior office spaces and project noise at the nearest residential uses.

A vicinity map showing the general location of the project site is presented in Exhibit 1 – Site Location Map. An aerial photograph of the existing project area is shown on Exhibit 2. The project boundaries and the nearest noise sensitive uses are shown on Exhibit 3. The project consists of mainly industrial equipment to be used to produce liquid hydrogen.

2.0 APPLICABLE NOISE CRITERIA

The City of Lancaster and the California Green Building Standards (CalGreen) require all non-residential projects to conform to the requirements of Table 1.

TABLE 1

APPLICABLE NOISE CRITERIA (1)

Exterior	None
Interior	50 dBA Leq(1 hour)
Unit-to-Unit	STC 40

(1) Please see Noise Rating Methods (Appendix 1) for an explanation of the commonly applicable acoustical terminology. The interior noise limit applies only to office areas.

3.0 AMBIENT NOISE LEVELS

The proposed project site is quite large and various residential uses exist along the site perimeter. As the project is dependent on sunlight for power, the majority of the project facilities will operate only during daylight hours. Since these operations could impact the nearby residential uses, the existing daytime ambient conditions at the Receptor locations shown on Exhibit 3 were calculated from the existing traffic counts published in the Lancaster General Plan. The calculations are contained in Appendix 2. The calculation results are given in Table 2.

TABLE 2

EXISTING DAYTIME AMBIENT NOISE LEVELS(1)
AT NEAREST RESIDENTIAL USES

LOCATION	DESCRIPTION	LEVEL
1	West side of 40th Street East from East Avenues K8 to K12	48 dBA Leq
2	West side of 40th Street East north of East Avenue K	53 dBA Leq
3	End of 46th Street East south of East Avenue J	47 dBA Leq
4	South of East Avenue K east of 65th Street East	52 dBA Leq
5	East side of 50th Street East from East Avenues K4 to K8	58 dBA Leq
6	Southeast corner of 50th St East and East Avenue L	59 dBA Leq
7	North side of East Avenue L from 40th St to 45th St East	57 dBA Leq

(1) As aircraft operations can be sporadic, the contribution of aircraft noise was not included in the ambient noise levels.

4.0 DESIGN NOISE LEVELS

4.1 ROADWAYS

The expected future roadway noise impacts upon the project site were projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. These include the roadway cross-section (e.g. number of lanes), the roadway active width, the average daily traffic (ADT), the vehicle travel speed, the percentage of auto and truck traffic, the roadway grade, the angle of view, the site conditions ("hard" or "soft" site), and the percentage of average daily traffic that flows each hour throughout a 24 hour period.

The forecast traffic volumes were obtained from the City of Lancaster General Plan. The percentage of truck traffic was taken from a standard arterial mix. The same source was used to project the distribution by time of day. The input data is listed in Table 3.

TABLE 3

TRAFFIC INPUT DATA

	% DAY	% EVENING	% NIGHT	% VOLUME
Autos	75.51	12.57	9.34	100.0
Medium Trucks	1.56	0.09	0.19	100.0
Heavy Trucks	0.64	0.02	0.08	100.0

Volume = 16,000 ADT on East Avenues J, J8, K and L
= 16,000 ADT on 40th Street East and 50th Street East

Speed = 50 MPH (posted) on 40th Street East, East Avenues J8 and K
= 55 MPH (posted) on 50th Street East, East Avenues J and L

The calculations are contained in Appendix 3. The calculations yield 100 foot design noise levels of 66 dBA Leq(1 hour) for 40th Street East, 67 dBA Leq(1 hour) for 50th Street East, 67 dBA Leq(1 hour) for East Avenue J, 65 dBA Leq(1 hour) for East Avenue J8, 66 dBA Leq(1 hour) for East Avenue K, and 67 dBA Leq(1 hour) for East Avenue L.

4.2 RAILROAD

There are no railroad operations in the vicinity of the project site. Railroad noise will not impact the site.

4.3 AIRCRAFT

The Palmdale Airport/Plant 42 General Plan Airport Noise Contours are shown on Exhibit 4. Exhibit 4 shows the site to lie along the 65 dBA CNEL noise contour with levels ranging from about 62 dBA CNEL at the east end of the project site to 66 dBA CNEL at the west end of the project site.

4.4 COMBINED NOISE SOURCES

The roadway and aircraft noise sources will combine on the project site. Thus, future exterior noise levels will range from a low of 68 dBA Leq(1 hour) at the east end of the project site up to a high of 70 dBA Leq(1 hour) at the west end of the site.

5.0 MITIGATION MEASURES

5.1 EXTERIOR

Neither the City of Lancaster nor CalGreen require exterior noise mitigation for non-residential projects. No exterior noise mitigation is proposed.

5.2 INTERIOR

The City's and CalGreen exposure criteria for new non-residential construction require that the interior noise environment, attributable to outside noise sources, be limited to 50 dBA Leq(1 hour) in all office spaces. Manufacturing and warehousing areas are not subject to the interior noise limit. Analysis and recommendations for control of outdoor-to-indoor noise intrusion are presented in this section.

The exterior-to-interior noise reduction expected for the planned construction was based on a detailed analysis of sample rooms and units planned for the development. Calculations of the expected typical noise reduction performance were performed for sample rooms. The analysis was based on the typical spectra expected for the primary sources of community noise impact, the typical octave-band transmission loss for each

element in the planned building shell, the relative square footage of each element of the planned building shell, the expected typical interior surface treatment, and the acoustical absorption coefficient for each interior surface treatment. Corrections for the "A" Weighted room absorption factors are also included.

Each component of the building shell (e.g. exterior wall, windows, doors, etc.) provides a different amount of transmission loss for each "A" Weighted octave- band of community noise. With the knowledge of the building shell components and their individual octave band transmission loss values for the noise sources, calculations of the composite building shell transmission loss can be made for each room.

The characteristics of the basic building shell are listed in Table 4.

TABLE 4

BASIC BUILDING SHELL CHARACTERISTICS

PANEL	CONSTRUCTION
Exterior Wall	Tilt-up concrete -- OR -- Steel siding over metal studs, fiberglass insulation, 5/8" drywall
Windows/Doors	1/4" fixed in storefront frame
Roof	Built-up or steel roof sheathing over 1/2" plywood, fiberglass insulation 5/8" drywall
Floor	Carpeted

Table 4 construction minimums will provide at least 20 dBA of exterior-to-interior noise reduction. Thus, Table 4 construction will provide compliance with the 50 dBA Leq(1 hour) interior noise limit for all buildings exposed to exterior noise levels as high as 70 dBA Leq(1hour). Since the highest exterior noise levels on the project site are not expected to exceed 66 dBA Leq(1 hour), Table 4 construction should be adequate for all office areas on the project. No additional interior noise reduction measures are necessary.

5.3 VENTILATION

If interior allowable noise levels are met by requiring that office area windows be unopenable or remain closed, then the design of the structure must also specify a

ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the office area noise reduction.

5.4 UNIT-TO-UNIT NOISE CONTROL

Common wall assemblies between office areas and manufacturing/warehousing areas are subject to the CalGreen Sound Transmission Class (STC) requirements. The plans provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, either of which rate at least STC 40, be incorporated into the building plans:

(1) One layer 1/2" direct nailed drywall, 2" by 4" wood studs, R-13 fiberglass insulation, one layer 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-24-69, 1969, 16f, Owens/Corning Fiberglas, STC 40)

(2) One layer 1/2" drywall screwed to 3 5/8" metal studs, R-11 fiberglass insulation, one layer 1/2" drywall screwed to studs (Owens/Corning Fiberglas, OCF 426, 1967, 16f, Owens/Corning Fiberglas, STC 44).

5.5 PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an interior noise limit of 50 dBA Leq(1 hour) means that exterior noise sources will remain audible on the interior of a structure.

Due to quality control and other field related problems, the code minimum laboratory rating of STC 40 for common wall assemblies does not guarantee that all common wall assemblies will pass a field test. In fact, there is a 50% chance that half of all laboratory rated STC 40 common wall assemblies could fail field tests. An STC 40 rated assembly will produce around 35 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit to unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

6.0 PROJECT NOISE SOURCES

The project will introduce mechanical noise sources that could potentially impact the residential uses near the boundaries of the project site. Automobiles, medium and heavy trucks will travel onto and off the site as well as maneuver around the site. As the vehicle speeds will be significantly slower than traffic on area roadways, on site vehicle traffic will be significantly less noisy and indistinguishable from traffic on area roadways.

The project mechanical equipment could potentially impact the nearest residential uses. Most of the project will be large fields of solar panels. The primary noise source at the solar panels fields will be the "Inverter" units that take the direct current (DC) electrical power produced by the photovoltaic panels and convert it to alternating current (AC) electrical power for transfer to the local electrical grid. A similar project installed Sungrow SG 125HV 125 kW inverters in a 16 unit array on a concrete pad. The manufacturer data for these inverters is contained in Appendix 4. The manufacturer reports a single unit noise output level of 53.7 dBA at a distance of 1 meter (3 feet). An array of 16 inverters could produce a combined noise level of 65.7 dBA at a distance of 1 meter (3 feet). Using a point source propagation rate of 6 dB per doubling of distance, the combined noise level at a distance of 50 feet would be 41.3 dBA. This is below the lowest daytime ambient noise level of 47 dBA Leq calculated for Receptor 3. Such inverter arrays should not impact any of the nearest residential uses as long as the arrays are installed at least 50 feet from any project boundary.

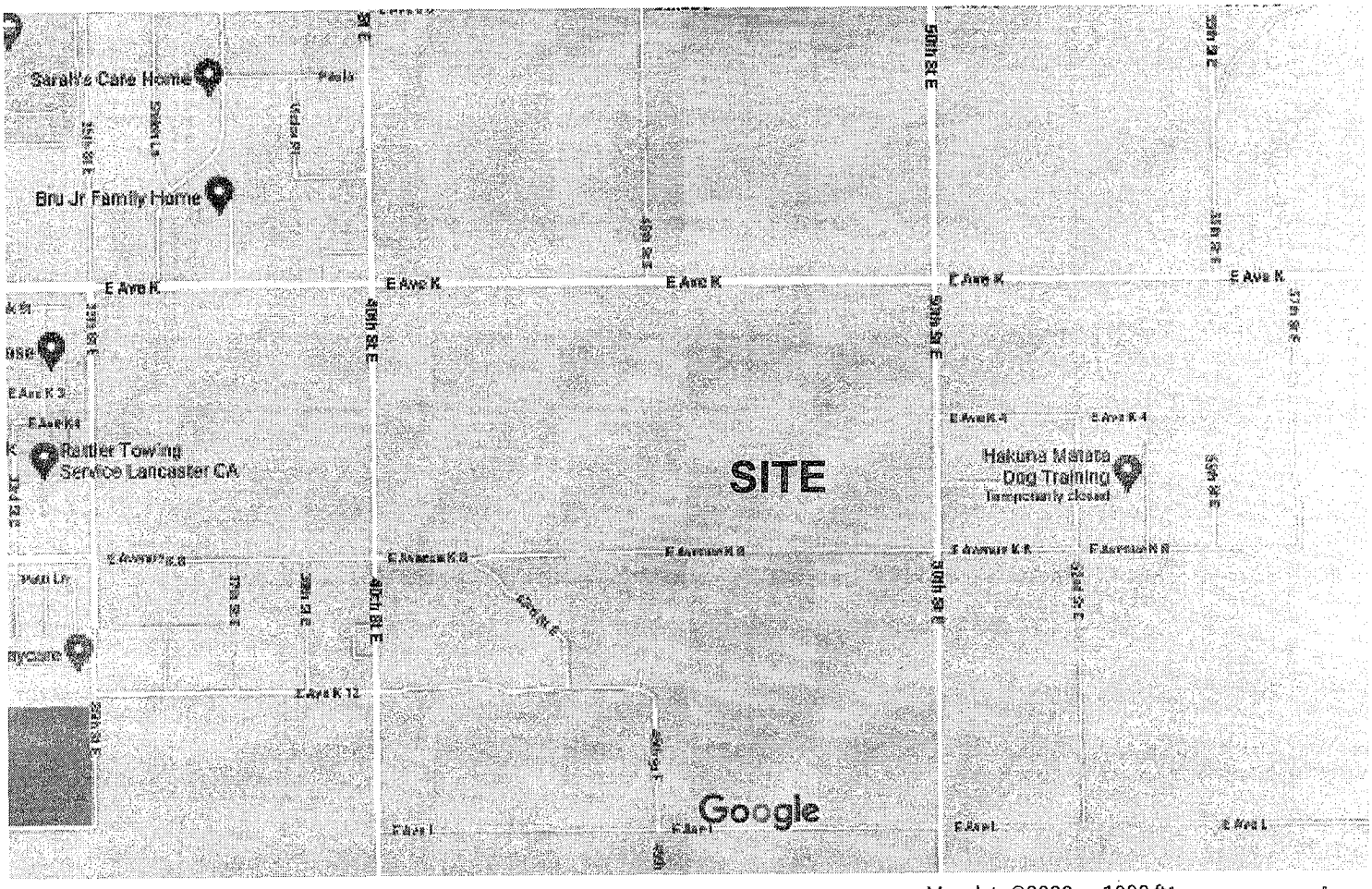
The Green Hydrogen Electrolysis Plant could install equipment that could create more noise than the solar panel inverters. Such equipment could impact the residential uses across 50th Street East. Due to their proximity to 50th Street East, these residential uses are already exposed to daytime exterior noise levels around 58 dBA Leq. This means that project mechanical equipment could produce noise levels as high as 74 dBA Leq at a distance of 50 feet and not exceed the existing ambient. As the project is designed to use electrolysis to produce the liquid hydrogen, it is unlikely that any of the proposed equipment will produce noise levels this high. However, as an equipment list was not yet available for this analysis, it is highly recommended that an acoustical review be performed once the proposed equipment is specified.

7.0 CONSTRUCTION NOISE

The construction phase of the project will produce noise levels that could potentially impact the nearest residential uses around the perimeter of the project site. The residential uses are exposed to daytime exterior noise levels as low as 47 dBA Leq (Receptor 3). Worst-case construction activities (likely grading operations in this instance) could produce noise levels as high as 84 dBA Leq at a distance of 50 feet. It would take a distance of 3,000 feet for such construction noise to approach the existing ambient at Receptor 3. Thus, some construction noise impacts will be unavoidable. The only way to mitigate construction noise with the distances involved will be to schedule the loudest construction activities to be completed within the shortest time possible to minimize such impacts.

EXHIBIT 1
SITE LOCATION

Google Maps



Map data ©2023 1000 ft

EXHIBIT 2
AERIAL PHOTO

Google Maps

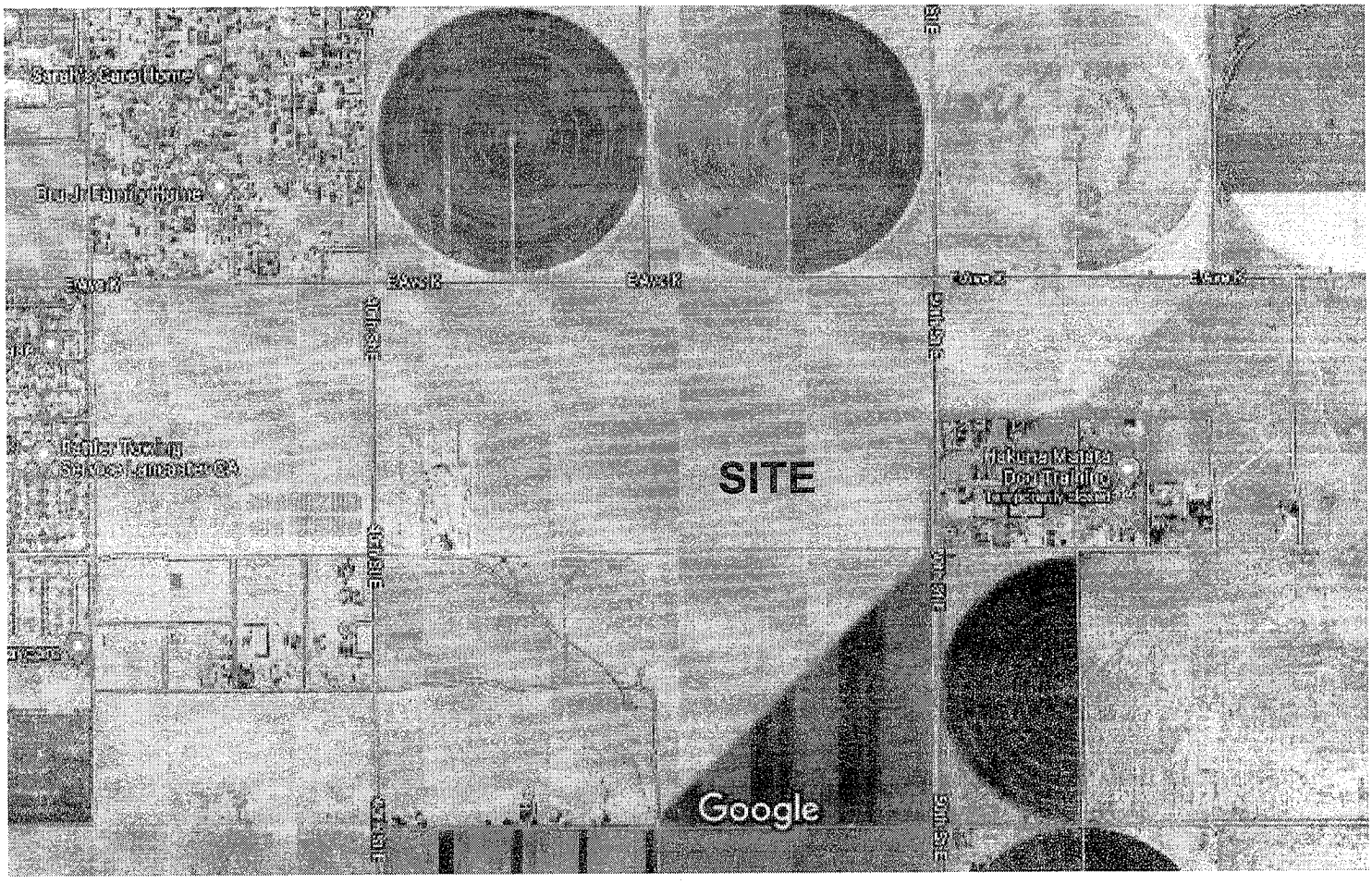


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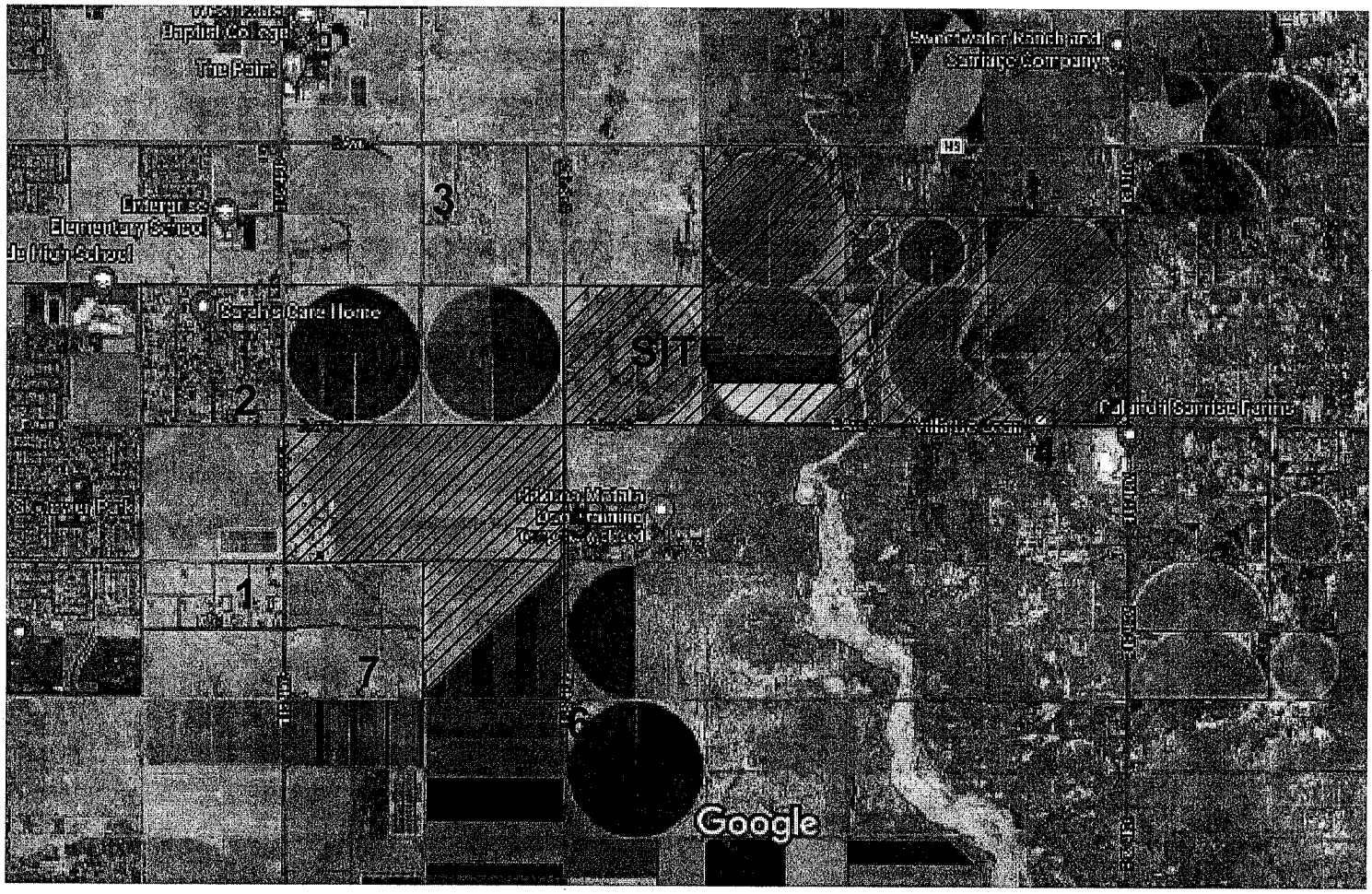
EXHIBIT 3
PROJECT BOUNDARIES AND NEAREST NOISE SENSITIVE RECEIVERS

Google Maps



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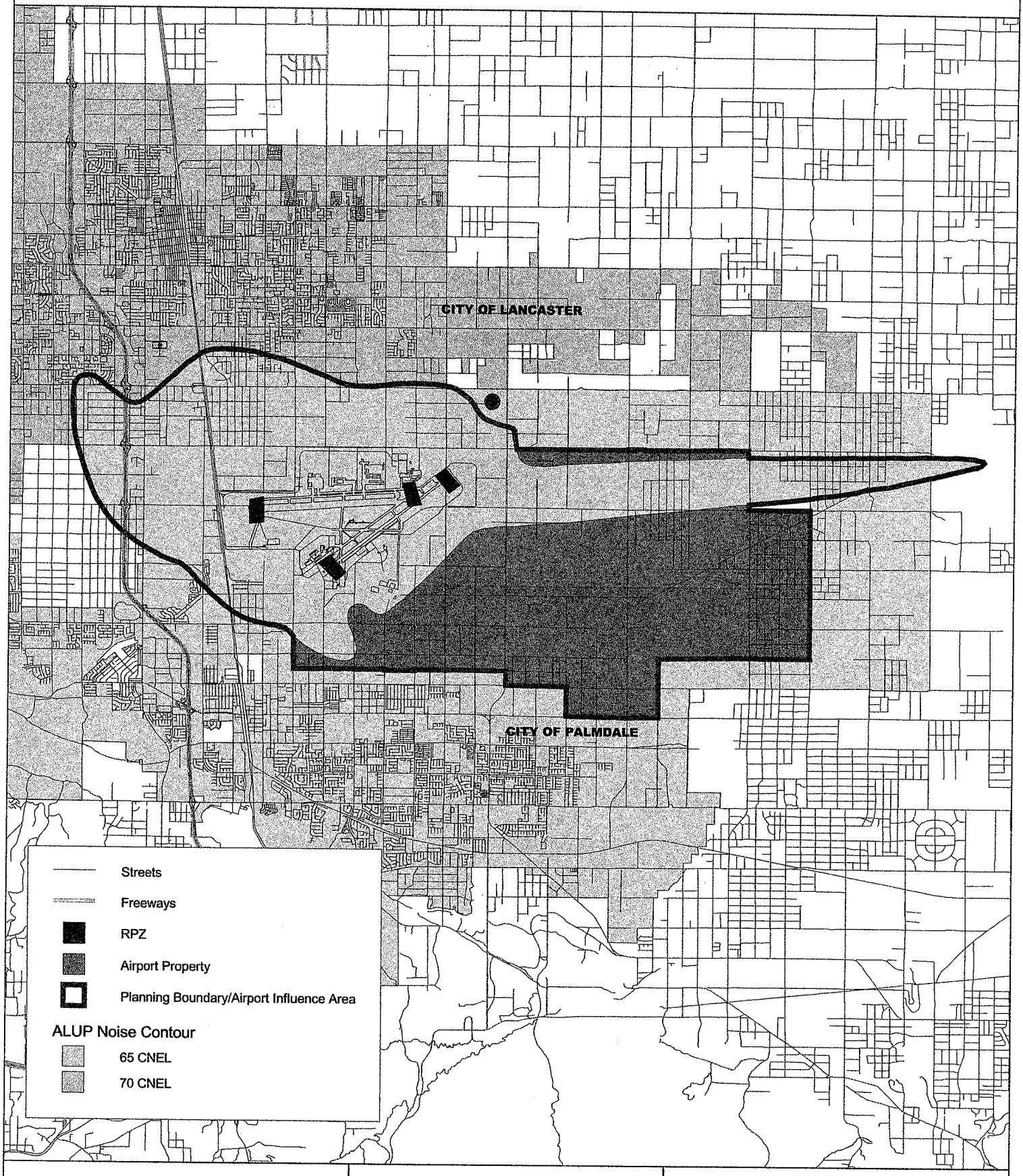
Map data ©2023

EXHIBIT 4

PALMDALE AIRPORT / USAF PLANT 42



LOS ANGELES COUNTY
AIRPORT LAND USE COMMISSION
320 W. Temple Street
Los Angeles, CA 90012
(213) 974-6425

AIRPORT INFLUENCE AREA

0 4000 8000 12000 Feet

N

5/13/03

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APPENDIX 1

NOISE RATING METHODOLOGY

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NOISE RATING METHODOLOGY

The A-weighted decibel (dBA) or "A" scale on a sound level meter is typically used for environmental noise measurements because the weighting characteristics of the "A" scale approximate the subjective response of the human ear to a broad frequency band noise source by discriminating against the very low and very high frequencies of the audible sound spectrum.

Since community noise is seldom constant, varying from moment to moment and throughout the day, the "A" weighted noise level needs to be further described to provide meaningful data. The Environmental Protection Agency, the Federal Department of Transportation, several foreign countries and many private consultants are now using three time-exceeded percentile figures to describe noise, which are:

(1) L_{90} is the noise level that is exceeded 90 percent of any sample measurement period (such as 24 hours) and is often used to describe the background or ambient noise level.

(2) L_{50} is the noise level that is exceeded 50 percent of any sample measurement period. It is generally considered to represent the median noise level.

(3) L_{10} is the noise level that is exceeded 10 percent of any sample measurement period. It is a good descriptor of fluctuating noise sources such as vehicular traffic. It indicates the near-maximum noise levels that occur for groups of single noise events. Being related to the subjective annoyance to community noise, the L_{10} is a good design tool in the planning of acoustical barriers.

More recent noise assessment methods are based on the equivalent energy concept where Leq(x) represents the average energy content of a fluctuating noise source over a sample measurement period. The subscript (x) represents the period over which the energy is computed and/or measured. Current practice references the time quantity to either one (1) hour, eight (8) hours, or twenty-four (24) hours. When referenced to one (1) hour, Leq is also called the HNL (Hourly Noise Level).

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Since Leq is the summation of the functional products of noise level and duration, many different combinations of noise levels, duration times and time histories can produce similar Leq values. Thus a value of Leq(24) equals 50 means only that the average noise level is 50 dB. During that 24-hour period, there can be times when the noise level is higher than 50 dB and times when it is lower than 50 dB.

If the period of the measurement is only a single event, the energy content is not averaged. The energy expression for a single event is simply the sum of the functional product of the noise level and duration time of the event. This term is called the Le or SENEL (Single Event Noise Exposure Level). The summation of Le values averaged over one hour is Leq(1), over eight hours is Leq(8), over 24 hours is Leq(24), etc.

Leq is further refined into Ldn (Level Day-Night) and CNEL (Community Noise Equivalent Level), where noise that occurs during certain hours of the day are weighted (or penalized) in an attempt to compensate for the general perception that such noise is more annoying during these time periods (typically evening and nighttime hours).

(1) Ldn is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a ten (10) dBA weighting penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. The Ldn is a noise rating method recommended by the Environmental Protection Agency because it takes into account those subjectively more annoying noise events that occur during normal sleeping hours.

(2) CNEL is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a five (5) dBA penalty for noise that occurs during the evening hours between 7:00 PM and 10:00 PM, and a ten (10) dBA penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. For typical highway vehicular traffic situations, computer analysis has shown that the Ldn and CNEL values correlate within 0.5 dBA.

The percentile figures L_{10}, L_{50} and L_{90} can be directly scaled from a graphical recording of the measured noise sample over a particular time period. These figures can also be measured directly using modern automatic noise measuring equipment. Measurement of the parameters Le, Leq, Ldn and CNEL requires even more sophisticated and correspondingly expensive noise measuring equipment. As a result, engineers have devised ways of estimating Leq (and hence, Ldn) using standard instrumentation and methods.

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APPENDIX 2

EXISTING AMBIENT NOISE CALCULATIONS

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FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :AVENUE L FROM 40TH ST EAST TO 45TH ST EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	35	35	35
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 2200

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	56.03	54.27	48.21	54.13	57.40
MEDIUM TRK.	49.87	43.50	41.97	47.58	50.64
HEAVY TRK.	51.68	42.65	43.90	49.30	52.37
TOTAL	58.10	54.89	50.27	56.03	59.23

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	59.23
75	56.59
100	54.71
125	53.26
150	52.07
175	51.07
200	50.20
225	49.43
250	48.75
275	48.12
300	47.56
325	47.04
350	46.55
375	46.10
400	45.68
450	44.92
500	44.23
550	43.61
600	43.04
650	42.52
700	42.04

6

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :AVENUE L AT 50TH STREET EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 1500

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	59.89	58.12	52.06	57.98	61.25
MEDIUM TRK.	52.90	46.53	45.00	50.60	53.67
HEAVY TRK.	52.88	43.85	45.10	50.50	53.57
TOTAL	61.35	58.56	53.52	59.32	62.54

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	62.54
75	59.90
100	58.02
125	56.57
150	55.38
175	54.38
200	53.51
225	52.74
250	52.05
275	51.43
300	50.86
325	50.34
350	49.86
375	49.41
400	48.99
450	48.22
500	47.54
550	46.92
600	46.35
650	45.83
700	45.35

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FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :50TH STREET EAST S/O AVENUE L
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 6100

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	65.98	64.21	58.15	64.08	67.34
MEDIUM TRK.	58.99	52.62	51.10	56.70	59.77
HEAVY TRK.	58.97	49.94	51.19	56.59	59.66
TOTAL	67.44	64.65	59.61	65.42	68.63

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	68.63
75	65.99
100	64.11
125	62.66
150	61.47
175	60.47
200	59.60
225	58.83
250	58.14
275	57.52
300	56.96
325	56.44
350	55.95
375	55.50
400	55.08
450	54.32
500	53.63
550	53.01
600	52.44
650	51.92
700	51.44

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FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :50TH STREET EAST N/O AVENUE K-8
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 6100

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	65.98	64.21	58.15	64.08	67.34
MEDIUM TRK.	58.99	52.62	51.10	56.70	59.77
HEAVY TRK.	58.97	49.94	51.19	56.59	59.66
TOTAL	67.44	64.65	59.61	65.42	68.63

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	68.63
75	65.99
100	64.11
125	62.66
150	61.47
175	60.47
200	59.60
225	58.83
250	58.14
275	57.52
300	56.96
325	56.44
350	55.95
375	55.50
400	55.08
450	54.32
500	53.63
550	53.01
600	52.44
650	51.92
700	51.44

4

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :AVENUE K W/O 70TH STREET EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 5200

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	64.12	62.36	56.30	62.22	65.48
MEDIUM TRK.	57.31	50.94	49.41	55.01	58.08
HEAVY TRK.	57.67	48.64	49.89	55.29	58.36
TOTAL	65.69	62.83	57.86	63.66	66.87

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	66.87
75	64.23
100	62.36
125	60.90
150	59.71
175	58.71
200	57.84
225	57.07
250	56.39
275	55.77
300	55.20
325	54.68
350	54.19
375	53.74
400	53.32
450	52.56
500	51.87
550	51.25
600	50.68
650	50.16
700	49.68

3

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :AVENUE J-8 AT 45TH STREET EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	35	35	35
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 1000

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	52.61	50.84	44.78	50.71	53.97
MEDIUM TRK.	46.44	40.08	38.55	44.15	47.22
HEAVY TRK.	48.25	39.22	40.47	45.87	48.94
TOTAL	54.67	51.46	46.85	52.61	55.81

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	55.81
75	53.16
100	51.29
125	49.84
150	48.65
175	47.64
200	46.77
225	46.01
250	45.32
275	44.70
300	44.13
325	43.61
350	43.13
375	42.68
400	42.26
450	41.49
500	40.81
550	40.18
600	39.62
650	39.10
700	38.61

3

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :AVENUE J AT 45TH STREET EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 7100

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	66.64	64.87	58.81	64.74	68.00
MEDIUM TRK.	59.65	53.28	51.75	57.36	60.42
HEAVY TRK.	59.63	50.60	51.85	57.25	60.32
TOTAL	68.10	65.31	60.27	66.07	69.29

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	69.29
75	66.65
100	64.77
125	63.32
150	62.13
175	61.13
200	60.26
225	59.49
250	58.80
275	58.18
300	57.62
325	57.09
350	56.61
375	56.16
400	55.74
450	54.97
500	54.29
550	53.67
600	53.10
650	52.58
700	52.10

2

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :40TH STREET EAST N/O AVENUE K
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 3500

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	62.40	60.64	54.58	60.50	63.77
MEDIUM TRK.	55.59	49.22	47.69	53.29	56.36
HEAVY TRK.	55.95	46.92	48.17	53.57	56.64
TOTAL	63.97	61.11	56.14	61.94	65.15

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	65.15
75	62.51
100	60.64
125	59.18
150	57.99
175	56.99
200	56.12
225	55.35
250	54.67
275	54.05
300	53.48
325	52.96
350	52.47
375	52.03
400	51.60
450	50.84
500	50.15
550	49.53
600	48.96
650	48.44
700	47.96

2

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :EAST AVENUE K W/@ 40TH STREET EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 8400

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	66.21	64.44	58.38	64.30	67.57
MEDIUM TRK.	59.39	53.02	51.50	57.10	60.17
HEAVY TRK.	59.76	50.73	51.98	57.38	60.45
TOTAL	67.77	64.91	59.94	65.74	68.95

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	68.95
75	66.31
100	64.44
125	62.98
150	61.80
175	60.79
200	59.92
225	59.16
250	58.47
275	57.85
300	57.28
325	56.76
350	56.28
375	55.83
400	55.41
450	54.64
500	53.95
550	53.33
600	52.77
650	52.24
700	51.76

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :SOLAR FARM
SITE LOCATION :LANCASTER
DESCRIPTION :40TH STREET EAST AT AVENUE K-8
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 900

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	56.51	54.74	48.68	54.60	57.87
MEDIUM TRK.	49.69	43.32	41.80	47.40	50.47
HEAVY TRK.	50.06	41.03	42.27	47.68	50.75
TOTAL	58.07	55.21	50.24	56.04	59.25

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	59.25
75	56.61
100	54.74
125	53.28
150	52.10
175	51.09
200	50.22
225	49.45
250	48.77
275	48.15
300	47.58
325	47.06
350	46.58
375	46.13
400	45.71
450	44.94
500	44.25
550	43.63
600	43.07
650	42.54
700	42.06

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 3

FUTURE TRAFFIC NOISE CALCULATIONS

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PHONE: 714-805-0115

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :LANCASTER CLEAN ENERGY CENTER
SITE LOCATION :LANCASTER
DESCRIPTION :40TH STREET EAST
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 16000

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	69.00	67.24	61.18	67.10	70.37
MEDIUM TRK.	62.19	55.82	54.29	59.89	62.96
HEAVY TRK.	62.56	53.52	54.77	60.18	63.24
TOTAL	70.57	67.71	62.74	68.54	71.75

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	71.75
75	69.11
100	67.24
125	65.78
150	64.59
175	63.59
200	62.72
225	61.95
250	61.27
275	60.65
300	60.08
325	59.56
350	59.08
375	58.63
400	58.21
450	57.44
500	56.75
550	56.13
600	55.56
650	55.04
700	54.56

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME	:LANCASTER CLEAN ENERGY CENTER
SITE LOCATION	:LANCASTER
DESCRIPTION	:50TH STREET EAST
SITE TYPE	:SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100
VOLUME	16000		

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	70.17	68.40	62.34	68.26	71.53
MEDIUM TRK.	63.18	56.81	55.28	60.88	63.95
HEAVY TRK.	63.16	54.13	55.38	60.78	63.85
TOTAL	71.63	68.84	63.80	69.60	72.82

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	72.82
75	70.18
100	68.30
125	66.85
150	65.66
175	64.66
200	63.79
225	63.02
250	62.33
275	61.71
300	61.14
325	60.62
350	60.14
375	59.69
400	59.27
450	58.50
500	57.82
550	57.20
600	56.63
650	56.11
700	55.63

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :LANCASTER CLEAN ENERGY CENTER
SITE LOCATION :LANCASTER
DESCRIPTION :EAST AVENUE J
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100
VOLUME	16000		

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	70.17	68.40	62.34	68.26	71.53
MEDIUM TRK.	63.18	56.81	55.28	60.88	63.95
HEAVY TRK.	63.16	54.13	55.38	60.78	63.85
TOTAL	71.63	68.84	63.80	69.60	72.82

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	72.82
75	70.18
100	68.30
125	66.85
150	65.66
175	64.66
200	63.79
225	63.02
250	62.33
275	61.71
300	61.14
325	60.62
350	60.14
375	59.69
400	59.27
450	58.50
500	57.82
550	57.20
600	56.63
650	56.11
700	55.63

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME	:LANCASTER CLEAN ENERGY CENTER
SITE LOCATION	:LANCASTER
DESCRIPTION	:EAST AVENUE J8
SITE TYPE	:SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100
VOLUME	14000		

	----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----				
	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	68.42	66.66	60.60	66.52	69.79
MEDIUM TRK.	61.61	55.24	53.71	59.31	62.38
HEAVY TRK.	61.98	52.94	54.19	59.60	62.66
TOTAL	69.99	67.13	62.16	67.96	71.17

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	71.17
75	68.53
100	66.66
125	65.20
150	64.01
175	63.01
200	62.14
225	61.37
250	60.69
275	60.07
300	59.50
325	58.98
350	58.50
375	58.05
400	57.63
450	56.86
500	56.17
550	55.55
600	54.98
650	54.46
700	53.98

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :LANCASTER CLEAN ENERGY CENTER
SITE LOCATION :LANCASTER
DESCRIPTION :EAST AVENUE K
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	50	50	50
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 16000

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	69.00	67.24	61.18	67.10	70.37
MEDIUM TRK.	62.19	55.82	54.29	59.89	62.96
HEAVY TRK.	62.56	53.52	54.77	60.18	63.24
TOTAL	70.57	67.71	62.74	68.54	71.75

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	71.75
75	69.11
100	67.24
125	65.78
150	64.59
175	63.59
200	62.72
225	61.95
250	61.27
275	60.65
300	60.08
325	59.56
350	59.08
375	58.63
400	58.21
450	57.44
500	56.75
550	56.13
600	55.56
650	55.04
700	54.56

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :LANCASTER CLEAN ENERGY CENTER
SITE LOCATION :LANCASTER
DESCRIPTION :EAST AVENUE L
SITE TYPE :SOFT

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100

VOLUME 16000

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	70.17	68.40	62.34	68.26	71.53
MEDIUM TRK.	63.18	56.81	55.28	60.88	63.95
HEAVY TRK.	63.16	54.13	55.38	60.78	63.85
TOTAL	71.63	68.84	63.80	69.60	72.82

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	72.82
75	70.18
100	68.30
125	66.85
150	65.66
175	64.66
200	63.79
225	63.02
250	62.33
275	61.71
300	61.14
325	60.62
350	60.14
375	59.69
400	59.27
450	58.50
500	57.82
550	57.20
600	56.63
650	56.11
700	55.63

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

APPENDIX 4

INVERTER MANUFACTURER DATA

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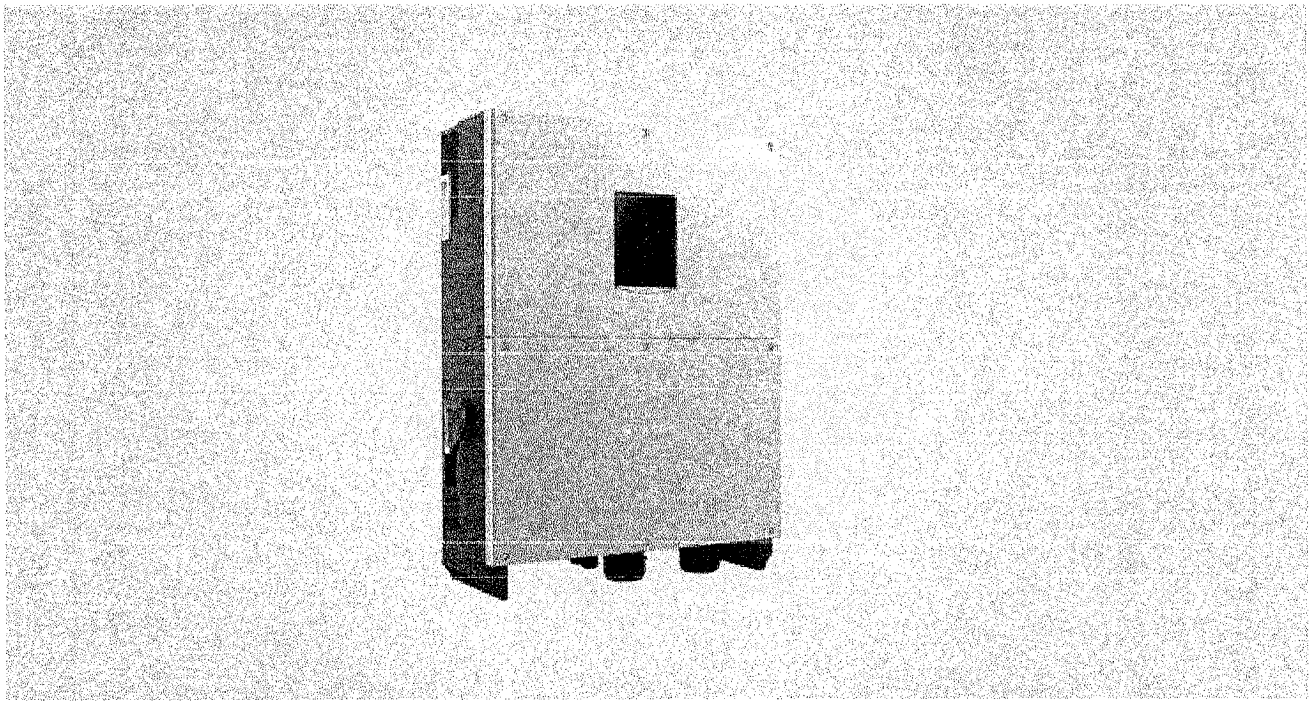
PHONE: 714-805-0115

SG125HV

SUNGROW
Clean power for all

String Inverter for 1500 Vdc System



HIGH YIELD

- Patented five-level topology, max. efficiency 98.9 %, European efficiency 98.7 %, CEC efficiency 98.5 %
- Full power operation without derating at 50 °C
- Patented anti-PID function

EASY O&M

- Virtual central solution, easy for O&M
- Compact design and light weight for easy installation

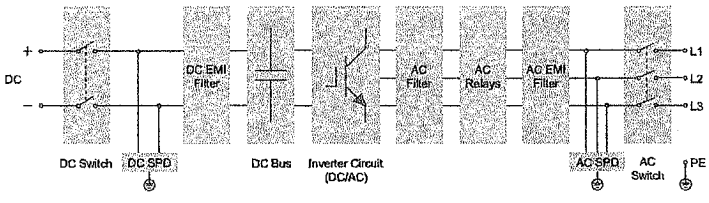
SAVED INVESTMENT

- DC 1500V,AC 600V, low system initial investment
- 1 to 5MW power block design for lower AC transformer and labor cost
- Max.DC/AC ratio up to 1.5

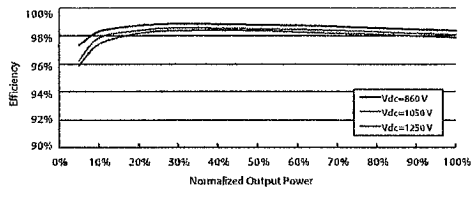
GRID SUPPORT

- Compliance with both IEC and UL safety,EMC and grid support regulations
- Low/High voltage ride through(L/HVRT)
- Active & reactive power control and power ramp rate control

CIRCUIT DIAGRAM



EFFICIENCY CURVE



Type designation	SG125HV
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Start-up input voltage	860 V / 920 V
Nominal PV input voltage	1050 V
MPP voltage range	860 – 1450 V
MPP voltage range for nominal power	860 – 1250 V
No. of independent MPP inputs	1
No. of DC inputs	1
Max. PV input current	148 A
Max. DC short-circuit current	250 A
Output (AC)	
AC output power	125 kVA @ 50 ℃
Max. AC output current	120 A
Nominal AC voltage	3 / PE, 600 V
AC voltage range	480 – 690 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 – 55 Hz, 60 Hz / 55 – 65 Hz
THD	< 3 % (at nominal power)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading - 0.8 lagging
Feed-in phases / connection phases	3 / 3
Efficiency	
Max. efficiency / European efficiency	98.9% / 98.7%
CEC efficiency	98.5%
Protection	
DC reverse connection protection	Yes
AC short-circuit protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
DC switch	Yes
AC switch	Yes
Q at night function	No
Anti-PID function	Yes
Overvoltage protection	DC Type II / AC Type II
General Data	
Dimensions (W*H*D)	670*902*296 mm 26.4"*35.5"*11.7"
Weight	76 kg 167.5 lb
Isolation method	Transformerless
Degree of protection	IP 65 NEMA 4X
Night power consumption	< 4 W
Operating ambient temperature range	-30 to 60 ℃ (> 50 ℃ derating) -22 to 140 ℉ (> 122 ℉ derating)
Allowable relative humidity range (non-condensing)	0 – 100 %
Cooling method	Smart forced air cooling
Max. operating altitude	4000 m (> 3000 m derating) 13123 ft (> 9843 ft derating)
Display / Communication	LED, Bluetooth+APP / RS485
DC connection type	OT or DT terminal (Max. 185 mm² 350 Kcmil)
AC connection type	OT or DT terminal (Max. 185 mm² 350 Kcmil)
Compliance	UL1741, UL1741SA, IEEE1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part15 Sub-part B Class A Limits, California Rule 21, IEC 62109-1/-2, IEC 61000-6-2/-4, IEC 61727, IEC62116, BDEW, EN50549,VDE-AR-N 4110:2018, VDE-AR-N 4120:2018, UNE 206007-1:2013, P.O.12.3, UTE C15-712-1:2013, CEI 0-16:2017, IEC 61683, PEA, NTCO
Grid Support	LVRT, HVRT, ZVRT, active & reactive power regulation, PF control, soft start/stop