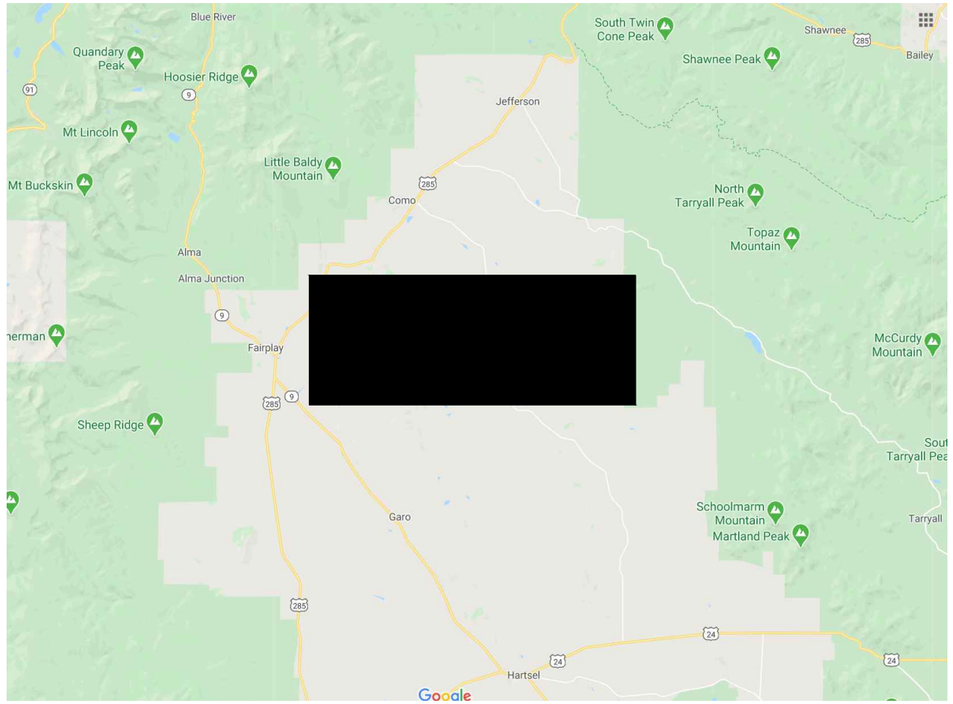
PV PROJECT - 4.8kWdc w/ENERGY STORAGE

1 PROPERTY ASSESOR MAP - PROJECT LOCATION
NTS



2 AERIAL MAP - PROJECT LOCATION
NTS

SCOPE OF WORK

THESE PLANS ARE FOR THE INSTALLATION OF AN OFF GRID GROUND MOUNTED PHOTOVOLTAIC (PV) SYSTEM.

GOVERNING BUILDING CODES

1. 2012 INTERNATIONAL BUILDING CODE, IBC
2. 2012 INTERNATIONAL RESIDENTIAL CODE, IRC
3. 2012 INTERNATIONAL FIRE CODE, IFC
4. 2011 NATIONAL ELECTRICAL CODE, NEC
5. IEEE 1547
6. ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES
7. UL STANDARDS
   - 7.1. RACKING - UL 2703
   - 7.2. PV MODULE - UL 1703
   - 7.3. INVERTER - UL 1741

DESIGN SPECIFICATIONS

1. AHJ - *Park County Building Department
2. UTILITY - N/A
3. BUILDING RISK CATEGORY II
4. DESIGN WIND SPEED (ULT) - 110MPH
5. DESIGN SNOW LOAD - 60PSF
6. EXPOSURE CATEGORY - C
7. MAX ARRAY HEIGHT - 30
8. ARRAY TILT - 34°

PV SYSTEM SPECIFICATIONS

1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US
3. AZIMUTH:180°
4. ARRAY TILT:34°

PV INSTALLATION OVERVIEW

ELECTRICAL

a. POINT OF CONNECTION: LOAD
b. MAX INV OUTPUT CURRENT: 24A
c. PV AC DEDICATED OCPD RATING: 30
d. UTILITY AC DISCONNECT REQ'D: --

Sheet List Table

Sheet Number	Sheet Title
PV01	COVER
PV02	NOTES
PV03	PLOT PLAN
PV04	E_PV SITE PLAN
PV05	LINE DIAGRAM
R01	MODULE DATASHEET
R02	INVERTER DATASHEET
R03	BATTERY DATA SHEET
R04	BACKUP GATEWAY

Contractor Info
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Project Type - Photovoltaic

Project Location:
[redacted]RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
01_J. DOE_COVER.DWG

Sheet Number and Title:
PV01 - COVER

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	ALM	----	10/20/20

Design

PV01

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INSTALLATION NOTES

1. THE EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURES INSTALLATION INSTRUCTIONS.
2. THE ACTUAL LOCATION OF THE ARRAY AND PLACEMENT OF THE MECHANICAL ANCHORS ARE SUBJECT TO VARIANCES DEPENDING ON SITE CONDITIONS AND/OR GROUND OBSTRUCTIONS. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SPECIFICATIONS BEFORE COMMENCING.
3. ALL OUTDOOR EQUIPMENT SHALL BE RAIN TIGHT WITH MINIMUM NEMA3-R RATING.
4. ALL LOCATIONS ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
5. ALL WORK SHALL COMPLY WITH THE BUILDING CODES SET FORTH BY THE GOVERNING JURISDICTION.
6. ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY THE NATIONAL FIRE CODE, NFC AND THE NATIONAL ELECTRICAL CODE, NEC.

GENERAL PV SITE NOTES

1. PV ARRAY NOT TO DISRUPT ATTIC VENTS OR PLUMBING VENTS. ARRAY TO SPAN OR EXTEND TERMINATION PLUMBING VENTS WITHOUT ANY IMPACT ON THEIR FUNCTIONALITY.
2. PANELS WILL NOT EXCEED THE OVERALL HEIGHT OR GROUND PITCH OF THE EXISTING STRUCTURE.

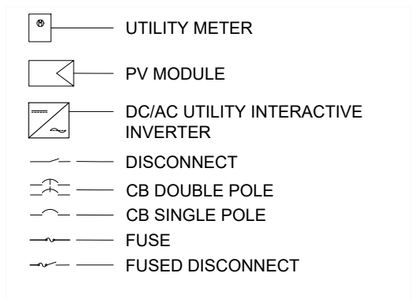
ABBREVIATIONS

(E) - EXISTING
(N) - NEW
TYP - TYPICAL
NTS - NOT TO SCALE
MIN - MINIMUM
MAX - MAXIMUM
AC - ALTERNATING CURRENT
DC - DIRECT CURRENT
PV - PHOTOVOLTAIC
MOD - PV MODULE
INV - DC/AC PV INVERTER
POC - POINT OF CONNECTION(PV)
RSB - RAPID SHUTDOWN BOX
CB - CIRCUIT BREAKER (EX. 20A/2P CB - 20AMP 2-POLE CIRCUIT BREAKER)
C - CONDUIT
OCP - OVERCURRENT PROTECTION
OCPD- OVERCURRENT PROTECTION DEVICE
MSD - MAIN SERVICE DISCONNECT
DISC - DISCONNECT
MSP - MAIN SERVICE PANEL
SP - SUB PANEL
PLP - PROTECTED LOADS PANEL
MLO - MAIN LUG ONLY
MB - MAIN BREAKER
EGC - EQUIPMENT GROUNDING CONDUCTOR
GEC - GROUNDING ELECTRODE CODUCTOR
GES - GROUNDING ELECTRODE SYSTEM

ELECTRICAL NOTES

1. INSTALLATION TO BE COMPLIANT WITH NFPA 1 & NFPA70 (NATIONAL ELECTRICAL CODE)
2. THE INVERTER HAS INTEGRATED GROUND AND NO DC GEC IS REQUIRED. THE DC CIRCUIT IS ISOLATED AND INSULATED FROM GROUND AND MEETS THE REQUIREMENTS OF 690.35 (UNGROUNDED PHOTOVOLTAIC POWER SYSTEMS)
3. THE EXACT LOCATION OF NEW ELECTRICAL EQUIPMENT AND CONDUIT RUN RELATING TO THIS PROJECT IS SUBJECT TO CHANGE AND WILL BE DETERMINED ON SITE BY THE CONTRACTOR
4. THE PV SYSTEM IS EQUIPPED WITH A RAPID SHUTDOWN SYSTEM AND SATISFIES THE REQUIREMENTS OF THE NEC SEC. 690.12
5. ALL EQUIPMENT TO BE LISTED OR LABELED FOR ITS APPLICATION(UL OR OTHER APPROVED LISTINGS)
   - 5.1. PV MODULE - UL1703
   - 5.2. INVERTER - UL1741
   - 5.3. RACKING SYSTEM - UL2703
6. GROUNDING
   - 6.1. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED PER THE REQUIREMENTS OF NEC ARTICLES 250 & 690
   - 6.2. MODULE BONDING METHOD SHALL BE INTEGRATED GROUNDING MID CLAPS. REFER TO MANUFACTURES SPECIFIC INSTRUCTIONS FOR PROPER BONDING TECHNIQUES.
   - 6.3. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES SHALL BE RATED FOR DIRECT BURIAL
   - 6.4. EGC SHALL BE SIZED IN ACCORDACE WITH 250.122 AND ARRAY EGC'S SMALLER THAN 6AWG SHALL COMPLY WITH 250.120(C)
7. ALL CONDUCTORS ARE COPPER, UNLESS SPECIFIED OTHERWISE
8. ALL CONDUIT, RACEWAYS, AND JUNCTION BOXES SHALL BE SIZED ACCORDING TO THE APPLICABLE CODE IF THE SIZE IS NOT SPECIFIED.
9. SIGNAGE SHALL BE APPLIED ACCORDING TO GOVERNING BUILDING CODES AND LOCAL JURISDICTIONS SPECIFIC REQUIREMENTS.
10. EQUIPMENT INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURE AS SPECIFIED BY NEC.
11. CALCULATION OF MAXIMUM CIRCUIT CURRENT FOR THE SPECIFIC CIRCUIT SHALL BE CALCULATED IN ACCORDANCE WITH 690.8(A)(1) THROUGH (A)(5). CONDUCTOR AMPACITY SHALL BE SIZED TO NOT CARRY LESS THAN THE LARGER OF 690.(B)(1) OR (2)
12. DC PV SOURCE AND DC OUTPUT CURRENT CIRCUITS ON OR INSIDE A BUILDING SHALL BE CONTAINED IN METAL RACEWAYS, TYPE MC METAL-CLAD CABLE THAT COMPLIES WITH 250.118(10), OR METAL ENCLOSURES FROM THE POINT OF PENETRATION OF THE SURFACE OF THE BUILDING OR STRUCTURE TO THE FIRST READILY ACCESSIBLE DISCONNECTING MEANS.(690.31(G))
13. ACCESS TO BOXES; JUNCTION, PULL, AND OUTLET BOXES LOCATED BEHIND MODULES OR PANELS SHALL BE SO INSTALLED THAT THE WIRING CONTAINED IN THEM CAN BE RENDERED ACCESSIBLE DIRECTLY OR BY DISPLACEMENT OF A MODULE(S) SECURED BY REMOVABLE FASTENERS AND CONNECTED BY FLEXIBLE WIRING SYSTEM.(690.34)
14. PV POINT OF CONNECTION. THE OUTPUT OF AN INTERCONNECTED ELECTRIC POWER SOURCE SHALL BE CONNECTED AS SPECIFIED IN 705.12(A),(B),(C), OR (D).

SYMBOLS



STRUCTURAL NOTES

1. THE EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURES INSTALLATION INSTRUCTIONS.
2. ENSURE ALL PRODUCTS ARE APPROPRIATE FOR THE INSTALLATION, ENVIRONMENT, AND ARRAY UNDER SITE'S LOADING CONDITIONS
3. ENSURE PROVIDED INFORMATION IS ACCURATE. ISSUES RESULTING FROM INACCURATE INFORMATION ARE THE INSTALLERS RESPONSIBILITY.
4. THE EFFECT OF SEISMIC LOADS (FOR ALL CATEGORIES A-F) HAVE BEEN DETERMINED TO BE LESS THAN THE EFFECT DUE TO WIND LOADS IN ALL LOAD CONDITIONS AND COMBINATIONS.
5. DIAGONAL BRACING REQUIRED WHEN 2" PIPING USED; DIAGONAL BRACING NOT SHOWN IN DETAIL VIEW 4
6. THE STRUCTURE IS A SIMPLE COLUMN(PIER) AND BEAM(CROSS PIPE) SYSTEM. THE TOPS OF THE PIERS ARE CONNECTED IN THE E-W DIRECTION BY THE CROSS PIPES WHICH CANTILEVER OVER AND EXTEND PAST THE END PIERS. THE CROSS PIPES ARE CONNECTED BY PROPRIETARY IRONRIDGE XR1000 RAILS SPANNING UP AND DOWN THE SLOPE WHICH CANTILEVER OVER AND EXTEND PAST THE TOP AND BOTTOM CROSS PIPES. THERE ARE TYPICALLY TWO RAILES PER COLUMN OF MODULES. THE MODULES ARE CLAMPED TO THE RAILS BY THE IRONRIDGE MODULE MOUNTING CLAMPS.

LOAD INFORMATION

1. FOUND ON PV06

Contractor Info

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Project Type - Photovoltaic

Project Location:

J D RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS

1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
02_J. DOE_NOTES.DWG

Sheet Number and Title:
PV02 - NOTES

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	ALM	----	10/20/20

Design

PV02

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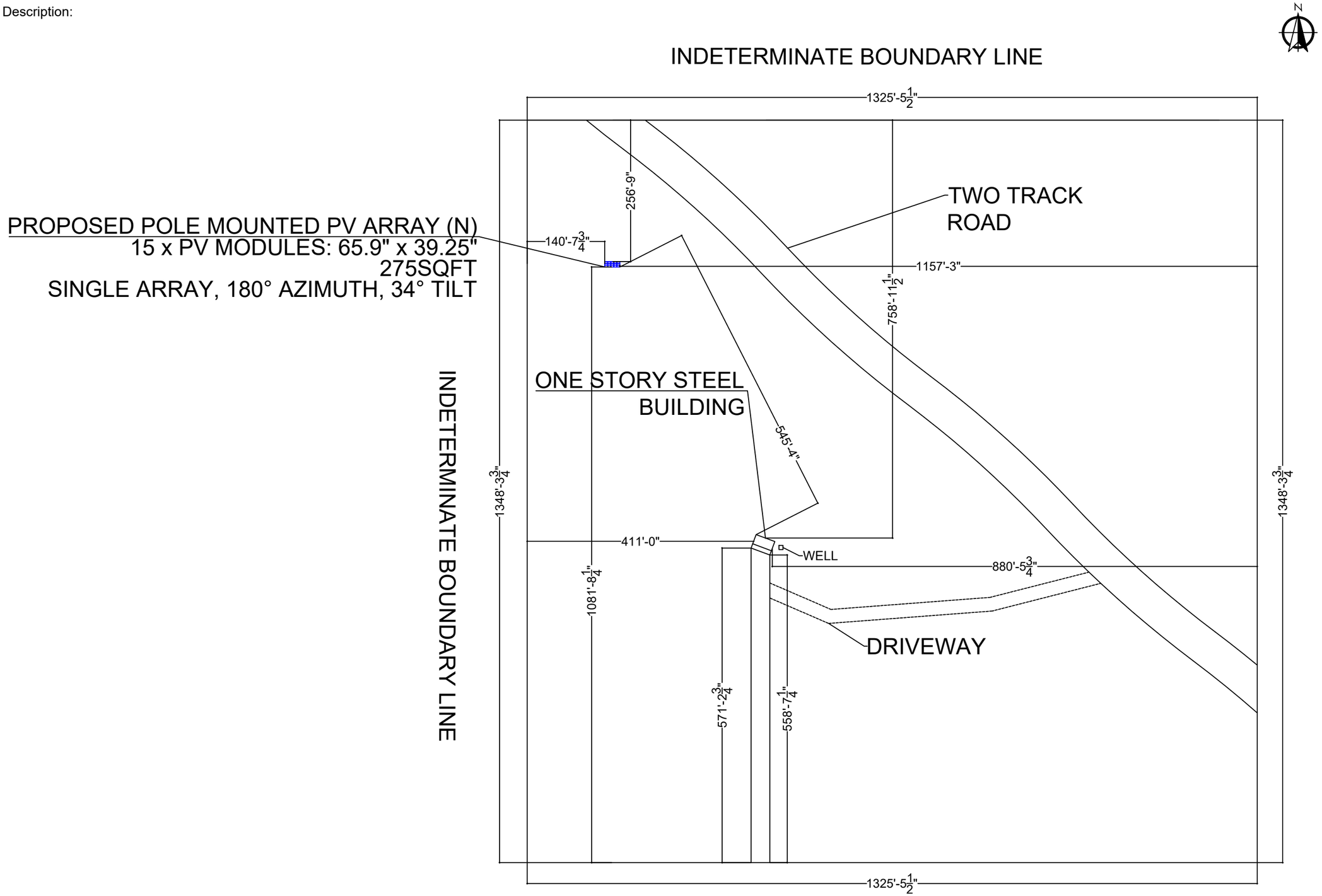
Legal Description:



3 PLOT PLAN - --

Scale: 1" = 40'

Contractor Info
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Project Type - Photovoltaic

Project Location:
RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
02_J. DOE_PLOTPLAN.DWG

Sheet Number and Title:
PV03 - PLOT PLAN

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	DCG	----	10/20/20

Design

PV03

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NEC LABEL NOTES:

1. THE WARNING SIGN(S) OR LABEL(S) SHALL COMPLY WITH NEC 110.21(B)
2. LABELS SHALL BE SUITABLE FOR THE ENVIRONMENT WHERE THEY ARE INSTALLED.
3. LABELS TO BE A MIN LETTER HEIGHT OF 3/8" AND PERMANENTLY AFFIXED.
4. LABELS SHALL ALSO COMPLY WITH THE SPECIFIC REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.

WARNING
ELECTRIC SHOCK HAZARD

TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION

LABEL 1 - NEC 690.13(B)
APPLY TO DISCONNECTS

WARNING: PHOTOVOLTAIC POWER SOURCE

LABEL 2 - NEC 690.31(G)(4)
APPLY TO EXPOSED RACEWAYS, CABLE TRAYS, OTHER WIRING METHODS, COVERS, ENCLOSURES OF PULL BOXES, AND J-BOXES. SPACING BETWEEN LABELS OR MARKINGS SHALL NOT BE MORE THAN 10FT APART.

PHOTOVOLTAIC SYSTEM DC DISCONNECT

MAX SYSTEM VOLTAGE: 480VDC
MAX CIRCUIT CURRENT: 20A

LABEL 3 - 690.53
APPLY TO DC DISCONNECT/INVERTER

PHOTOVOLTAIC SYSTEM
AC DISCONNECT
RATED AC OUTPUT CURRENT: 24A
NOMINAL OPERATING VOLTAGE: 240VAC

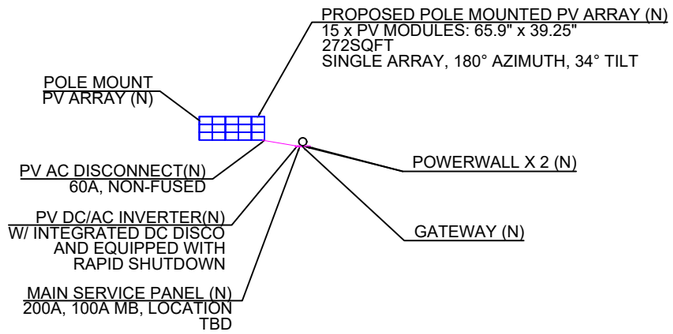
LABEL 4 - NEC 690.54
APPLY TO MAIN PV AC DISCONNECT

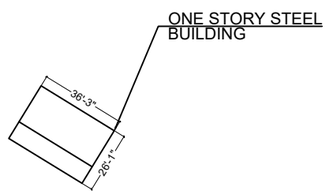
WARNING:
DUAL POWER SUPPLY
SOURCES: UTILITY GRID AND PV SOLAR ELECTRIC SYSTEM

LABEL 5 - NEC 705.12(B)(3)
APPLY TO MSP

WARNING:
POWER SOURCE OUTPUT CONNECTION: DO NOT RELOCATE THIS OVERCURRENT DEVICE

LABEL 6 - NEC 705.12(B)(2)(3)(b)
APPLY TO BACK-FED BREAKER, IF APPLICABLE





4 PV SITE PLAN W/ MODULE LAYOUT
Scale: 1/64" = 1'-0"

N

Contractor Info
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Project Type - Photovoltaic

Project Location:
J. DOE RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
03_2017NEC_E_PV SITE LAYOUT.DWG

Sheet Number and Title:
PV04 - E_PV SITE PLAN

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	ALM	----	10/20/20

Design

PV04

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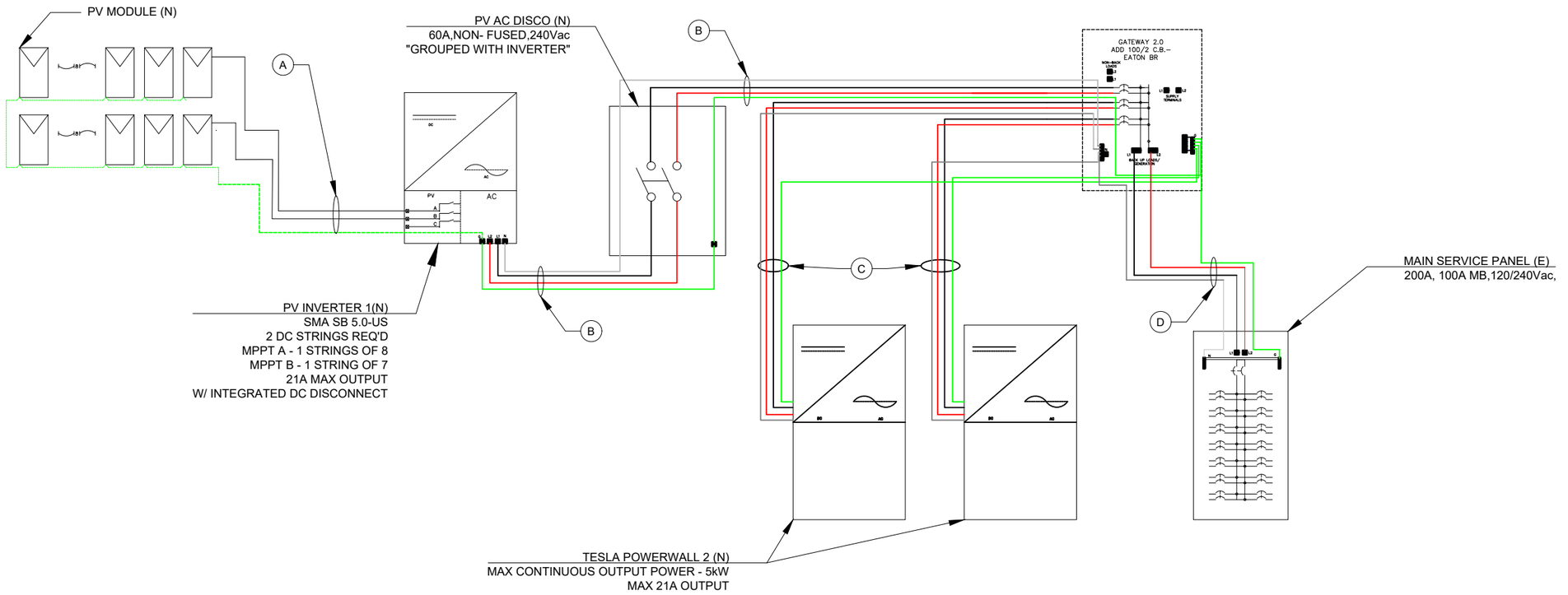
Project Details				PV Module Data		
Project Name	J. DOE pv			Model Number	REC320NP Black	
Project Location				Nominal Output @ STC, Pmp	320	Wdc
Module -	15	REC	REC320NP Black	Open Circuit Voltage, Voc	40.3	Vdc
Inverter -	1	SMA	5.0-US	Max Power Point, Vmp	34.2	Vdc
Utility -	240	Vac		Short Circuit Current, Isc	10.22	A
DC Rating	4.8	kW		Max Power Point Current, Imp	9.37	A
AC Rating	4.08	kW		VOC Temp Coeff	-0.27	%/°C
Min. Ambient Temp, °C	-24		-11.2 °F	Dimensions, LxWxH (in)	65.9 x 39.25 x 1.1	
Max. Ambient Temp, °C	36		96.8 °F	Weight	39.7	lbs

String Inverter Data				PV Source Circuit Calculations			
Model Number	5.0-US			# of strings	2	Inverter #1	
Max DC Power(STC)	5.15	kWdc			MPPT A		
Operating Voltage Range	100 - 550	Vdc		String #	2		
Min./Start Voltage	100/125	Vdc		Modules per string	8	7	
Max Input Voltage	600	Vdc		Watts/String	2560	2240	
Total Max DC Current	54	A		Op. Current/String	9.74	9.74	
Max Output Power	5000	Wdc		Op. Voltage/String	263	230	
Max. Cont. Output Current	24	A		Total Number of Modules		15	
CEC Efficiency	97	%		Maximum System Power		4,800	Wdc
Dimensions, LxWxH (in)	21.1 x 28.5 x 7.8			Voltage Correction Factor, Low °C		1.1372	
Weight	66	lbs		Voltage Correction Factor, High °C		0.9692	
	MPPT1	MPPT2		Min. String Voltage		223	Vdc
Usable Current per MPPT	10	10	A	Max System Voltage		365	Vdc
Max Array Isc per MPPT	18	18	A	Source Circuit Current, Isc		10.32	A
Max Current per terminal	15	15	A	Max Source Circuit Current		13	A
MPP Voltage Range	220 - 480	220 - 480	Vdc				



Conduit and Conductor Schedule						
Tag	**Description and Conductor Type**	**Min. Conductor Gauge**	**Number of Conductors**	**Typical Conduit Type**	**Min. Conduit Size**	**Max one way length (ft)**
A	Mods to inv, PV Wire	12AWG	2 x (+,-)	FREE AIR	N/A	2
B	inv to Gtwy, THWN-2	10AWG	L_1, L_2, N, G	PVC, EMT, or FMC	3/4"	10
C	Powerwall to C.B., THWN-2	10AWG	L_1, L_2, N, G	PVC, EMT, or FMC	3/4"	40
D	Gtwy to Load panel, THWN-2	3AWG	L_1, L_2, N, G	PVC, EMT, or FMC	11/4"	5

PV Source Ckt			Inverter Out Ckt		
Distance above roof	1/2 in.-3 1/2 in.	310.15(B)c	PV Disconnect (AC)		
Amb. Temp. Adder for Rooftops (°F)	40		Design temperature (°F)	94	
Design temperature (°F)	136.8		Max Ambient Temp. Range (°F)	87-95	310.15(B)(2)(a)
Adjusted Temp. Range for Roof	132-140	310.15(B)(2)(a)	Temp. Rating of Conductor	75°C	
Temp. Rating of Conductor	90°C		No. of Current Carrying Cond.	<4	310.15(B)(3)(a)
No. of Current Carrying Cond.	<4	310.15(B)(3)(a)	AC Max Output Current	21.0	690.8(A)(3)
Max Source Circuit Current	15	690.8(A)(5)	AC Max Output Current * 125%	26.3	690.8(B)
Max Source Circuit Current * 125%	18.8	690.8(B)(1)	Overcurrent Protection (A)	30	
Amb. Temp Correction Factor	0.71	310.15(B)(2)(a)	Amb. Temp Correction Factor	0.94	310.15(B)(2)(a)
Raceway Fill Adjustment Factor	100%	310.15(B)(3)(a)	Raceway Fill Adjustment Factor	100%	310.15(B)(3)(a)
Cond. Gauge (AWG)	12	310.15(B)(16)	Cond. Gauge (AWG)	10	310.15(B)(16)
Cond. Allowable Ampacity (Amps)	30		Cond. Allowable Ampacity (Amps)	35	
Cond. Adjusted Ampacity (Amps)	21		Cond. Adjusted Ampacity (Amps)	33	

Contractor Info

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Project Type - Photovoltaic

Project Location:

RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
04_J. DOE_LINE DIAGRAM.DWG

Sheet Number and Title:
PV05 - LINE DIAGRAM

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	DCG	----	----

Design

PV05

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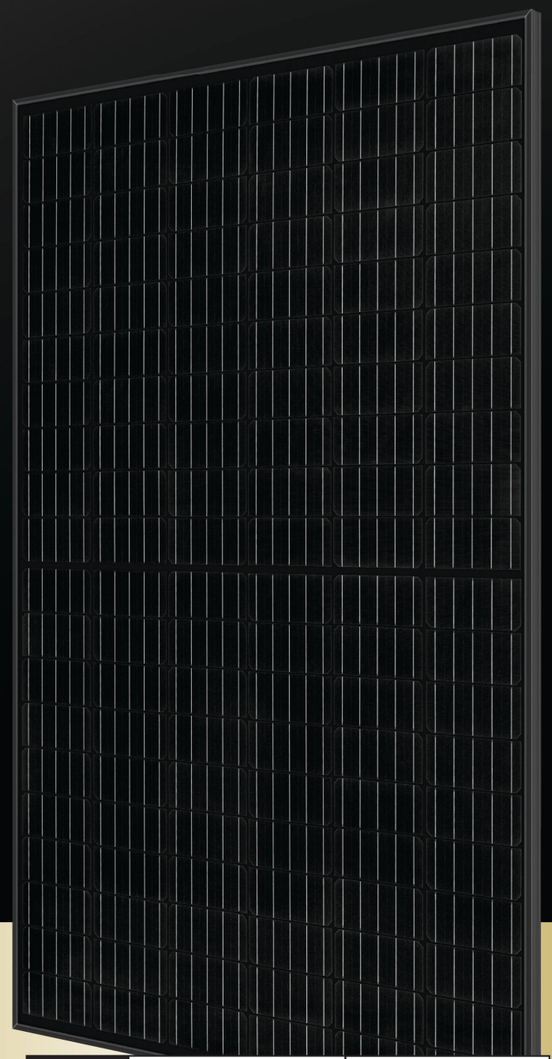
SOLAR'S MOST TRUSTED

REC

REC N-PEAK BLACK SERIES

PREMIUM FULL BLACK MONO N-TYPE SOLAR PANELS WITH SUPERIOR PERFORMANCE



MONO N-TYPE: THE MOST EFFICIENT C-SI TECHNOLOGY

NO LIGHT INDUCED DEGRADATION

SUPER-STRONG FRAME UP TO 7000 PA SNOW LOAD

FLEXIBLE INSTALLATION OPTIONS

IMPROVED PERFORMANCE IN SHADED CONDITIONS

GUARANTEED HIGH POWER OVER LIFETIME

325 WP POWER

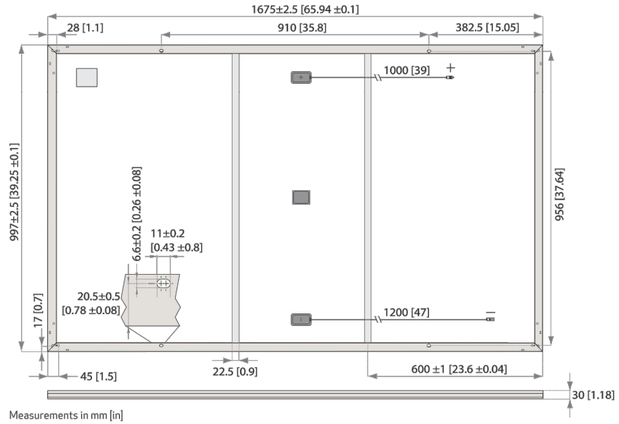
20+5 YEAR PRODUCT WARRANTY

0.5% ANNUAL DEGRADATION OVER 25-YEAR POWER WARRANTY

REC CERTIFIED SOLAR PROFESSIONAL

PHOTON BROTHERS

REC N-PEAK BLACK SERIES



Measurements in mm [in]

ELECTRICAL DATA @ STC	Product code*: RECxxxNP Black			
Nominal Power - P_{MPP} (Wp)	310	315	320	325
Watt Class Sorting - (W)	-0/+5	-0/+5	-0/+5	-0/+5
Nominal Power Voltage - V_{MPP} (V)	33.6	33.9	34.2	34.4
Nominal Power Current - I_{MPP} (A)	9.24	9.31	9.37	9.46
Open Circuit Voltage - V_{OC} (V)	40.2	40.5	40.8	41.0
Short Circuit Current - I_{SC} (A)	10.01	10.09	10.18	10.27
Panel Efficiency (%)	18.6	18.9	19.2	19.5

Values at standard test conditions (STC: air mass AM 1.5, irradiance 1000 W/m², temperature 25°C), based on a production spread with a tolerance of V_{OC} & I_{SC} ±3% within one watt class. * Where xxx indicates the nominal power class (P_{MPP}) at STC above.

ELECTRICAL DATA @ NOCT	Product code*: RECxxxNP Black			
Nominal Power - P_{MPP} (Wp)	234	238	241	245
Nominal Power Voltage - V_{MPP} (V)	31.1	31.4	31.7	31.9
Nominal Power Current - I_{MPP} (A)	7.51	7.56	7.62	7.69
Open Circuit Voltage - V_{OC} (V)	37.3	37.5	37.8	38.0
Short Circuit Current - I_{SC} (A)	8.01	8.07	8.14	8.22

Nominal operating cell temperature (NOCT: air mass AM 1.5, irradiance 800 W/m², temperature 20°C, windspeed 1 m/s).
* Where xxx indicates the nominal power class (P_{MPP}) at STC above.

CERTIFICATIONS

Pending: UL 1703 (Fire type 2); IEC 61215, UL/IEC 61730, IEC 62804 (PID), IEC 61701 (Salt Mist), IEC 62716 (Ammonia), ISO 9001: 2015, ISO 14001: 2004, OHSAS 18001: 2007

WARRANTY

20 year product warranty*
25 year linear power output warranty, maximum degression in performance of 0.5% p.a., giving 86% at end of year 25.

See warranty conditions for further details.

+ 5 year extended product warranty available through participating REC Certified Solar Professionals.

GENERAL DATA

Cell type:	120 half-cut n-type mono c-Si cells 6 strings of 20 cells in series
Glass:	0.13" (3.2 mm) solar glass with anti-reflection surface treatment
Backsheet:	Highly reflective and resistant polymeric construction (black)
Frame:	Anodized aluminum (black)
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790
Cable:	12 AWG (4 mm²) PV wire, 39 + 47" (1 m + 1.2 m) in accordance with EN 50618
Connectors:	Stäubli MC4 PV-KBT4/KST4, 12 AWG(4 mm²) in accordance with IEC 62852 IP68 only when connected
Origin:	Made in Singapore

MECHANICAL DATA

Dimensions:	65.9 x 39.25 x 1.1" (1675 x 997 x 30 mm)
Area:	17.98 ft² (1.67 m²)
Weight:	39.7 lbs (18 kg)

MAXIMUM RATINGS

Operational temperature:	-40 ... +85°C
Maximum system voltage:	1000 V
Design load (+): snow Maximum test load (+):	4666 Pa (97.5 lbs/ft²)* 7000 Pa (146 lbs/ft²)*
Design load (-): wind Maximum test load (-):	1600 Pa (33.4 lbs/ft²)* 2400 Pa (50 lbs/ft²)*
Max series fuse rating:	25 A
Max reverse current:	25 A

* Calculated using a safety factor of 1.5
* See installation manual for mounting instructions

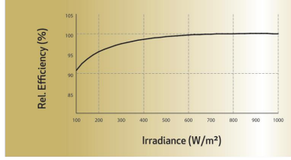
TEMPERATURE RATINGS *

Nominal Operating Cell Temperature:	44°C (±2°C)
Temperature coefficient of P_{MPP}:	-0.35 %/°C
Temperature coefficient of V_{OC}:	-0.27 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

*The temperature coefficients stated are linear values

LOW LIGHT BEHAVIOUR

Typical low irradiance performance of module at STC.



Founded in Norway in 1996, REC is a leading vertically integrated solar energy company. Through integrated manufacturing from silicon to wafers, cells, high-quality panels and extending to solar solutions, REC provides the world with a reliable source of clean energy. REC's renowned product quality is supported by the lowest warranty claims rate in the industry. REC is a Bluestar Elkem company with headquarters in Norway and operational headquarters in Singapore. REC employs around 2,000 people worldwide, producing 1.5 GW of solar panels annually.

REC

www.recgroup.com

Ref: NE-05-11-03-Rev - B 01.19

Contractor Info
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Project Type - Photovoltaic

Project Location:
[redacted]RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
R01_H-Q.PEAK G5 305-330.DWG

Sheet Number and Title:
R01 - MODULE DATASHEET

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	DCG	----	----

Design

R01

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SUNNY BOY
3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Value-Added Improvements
- Superior integration with SMA's MLPE Power+ Solution
- World's first Secure Power Supply* now offers up to 2,000 W
- Full grid management capabilities ensure a utility-compliant solution for any market

Reduced Labor
- New Installation Assistant with direct access via smartphone minimizes time in the field
- Integrated disconnect simplifies equipment stocking and speeds installation

Unmatched Flexibility
- SMA's proprietary OptiTrac™ Global Peak technology mitigates shade with ease
- Multiple independent MPPTs accommodate hundreds of stringing possibilities

Trouble-Free Servicing
- Two-part enclosure concept allows for simple, expedited servicing
- Enhanced AFCI technology reduces false tripping while improving sensitivity in real arcs

SUNNY BOY
3.0-US / 3.8-US / 5.0-US / 6.0-US / 7.0-US / 7.7-US

Reduce costs across your entire residential business model

The residential PV market is changing rapidly. Your bottom line matters more than ever–so we've designed a superior residential solution to help you decrease costs at every stage of your business operations. The Sunny Boy 3.0-US/3.8-US/5.0-US/6.0-US/7.0-US/7.7-US join the SMA lineup of field-proven solar technology backed by the world's #1 service team, along with a wealth of improvements. Simple design, improved stocking and ordering, value-driven sales support and streamlined installation are just some of the ways that SMA helps your business operate more efficiently. And, Sunny Boy's superior integration with the innovative Power+ Solution means installers have even more flexibility in addressing their toughest challenges.

www.SMA-America.com

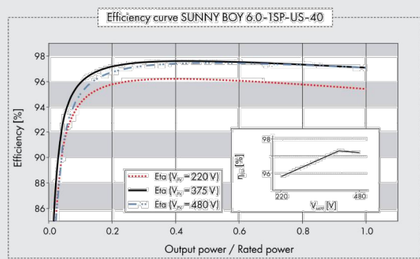
Technical data	Sunny Boy 3.0-US		Sunny Boy 3.8-US		Sunny Boy 5.0-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max. usable DC power	3100 W	3100 W	3450 W	4000 W	5150 W	5150 W
Max. DC voltage	600 V					
Rated MPP voltage range	155 - 480 V		195 - 480 V		220 - 480 V	
MPPT operating voltage range	100 - 550 V					
Min. DC voltage / start voltage	100 V / 125 V					
Max. operating input current per MPPT	10 A					
Max. short circuit current per MPPT	18 A					
Number of MPPT tracker / string per MPPT tracker	2/1				3 / 1	
Output (AC)						
AC nominal power	3000 W	3000 W	3330 W	3800 W	5000 W	5000 W
Max. AC apparent power	3000 VA	3000 VA	3330 VA	3800 VA	5000 VA	5000 VA
Nominal voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V	183 - 229 V	211 - 264 V
AC grid frequency	60 Hz / 50 Hz					
Max. output current	14.5 A	12.5 A	16.0 A	16.0 A	24.0 A	24.0 A
Power factor (cos φ)	1					
Output phases / line connections	1 / 2					
Harmonics	< 4 %					
Efficiency						
Max. efficiency	97.2 %	97.6 %	97.2 %	97.5 %	97.2 %	97.5 %
CEC efficiency	96 %	96.5 %	96.5 %	96.5 %	96.5 %	97 %
Protection devices						
DC disconnect device	●					
DC reverse polarity protection	●					
Ground fault monitoring / Grid monitoring	●					
AC short circuit protection	●					
All-pole sensitive residual current monitoring unit (RCMU)	●					
Arc fault circuit interrupter (AFCI)	●					
Protection class / overvoltage category	I / IV					
General data						
Dimensions (W / H / D) in mm (in)	535 x 730 x 198 (21.1 x 28.5 x 7.8)					
Packaging dimensions (W / H / D) in mm (in)	600 x 800 x 300 (23.6 x 31.5 x 11.8)					
Weight / packaging weight	26 kg (57 lb) / 30 kg (66 lb)					
Operating temperature range	- 25°C ...+60°C					
Noise emission (typical)	39 dB(A)					
Internal power consumption at night	< 5 W					
Topology	Transformerless					
Cooling concept	Convection					
Features						
Ethernet ports	2					
Secure Power Supply	●*					
Display (2 x 16 characters)	●					
WLAN	●					
Sensor module / External WLAN antenna	○ / ○					
Warranty: 10 / 15 / 20 years	●/○/○					
Certificates and approvals	UL 1741, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA V22.2 107.1-1					
● Standard features ○ Optional features – Not available	Data at nominal conditions		NOTE: US inverters ship with gray lids.		* Not functional with Power+ Solution	
Type designation	SB3.0-1SP-US-40		SB3.8-1SP-US-40		SB5.0-1SP-US-40	

Accessories

Sensor module MD.SEN-US-40

External WLAN antenna EXTANT-US-40

SMA Rooftop Communication Kit ROOFCOMMKIT-P1-US



Contractor Info
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Project Type - Photovoltaic

Project Location:
J. DOE RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
R02_INVERTER_SE-H.DWG

Sheet Number and Title:
R02 - INVERTER DATASHEET

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	DCG	----	----

Design

R02

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POWERWALL

Tesla Powerwall is a fully-integrated AC battery system for residential or light commercial use. Its rechargeable lithium-ion battery pack provides energy storage for solar self-consumption, time-based control, and backup.

Powerwall's electrical interface provides a simple connection to any home or building. Its revolutionary compact design achieves market-leading energy density and is easy to install, enabling owners to quickly realize the benefits of reliable, clean power.

PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240 V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Total Energy	14 kWh
Usable Energy	13.5 kWh
Real Power, max continuous	5 kW (charge and discharge)
Real Power, peak (10 s, off-grid/backup)	7 kW (charge and discharge)
Apparent Power, max continuous	5.8 kVA (charge and discharge)
Apparent Power, peak (10 s, off-grid/backup)	7.2 kVA (charge and discharge)
Maximum Supply Fault Current	10 kA
Maximum Output Fault Current	32 A
Overcurrent Protection Device	30 A
Imbalance for Split-Phase Loads	100%
Power Factor Output Range	+/– 1.0 adjustable
Power Factor Range (full-rated power)	+/– 0.85
Internal Battery DC Voltage	50 V
Round Trip Efficiency[1,3]	90%
Warranty	10 years

[1]Values provided for 25°C (77°F), 3.3 kW charge/discharge power.
[2]In Backup mode, grid charge power is limited to 3.3 kW.
[3]AC to battery to AC, at beginning of life.

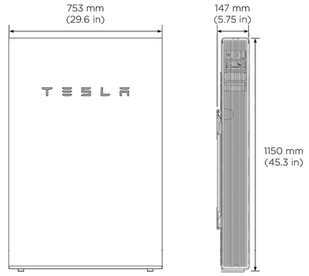
COMPLIANCE INFORMATION

Certifications	UL 1642, UL 1741, UL 1973, UL 9540, IEEE 1547, UN 38.3
Grid Connection	Worldwide Compatibility
Emissions	FCC Part 15 Class B, ICES 003
Environmental	RoHS Directive 2011/65/EU
Seismic	AC156, IEEE 693-2005 (high)

MECHANICAL SPECIFICATIONS

Dimensions[1]	1150 mm x 755 mm x 147 mm (45.3 in x 29.6 in x 5.75 in)
Weight[1]	114 kg (251.3 lbs)
Mounting options	Floor or wall mount

[1]Dimensions and weight differ slightly if manufactured before March 2019. Contact Tesla for additional information.



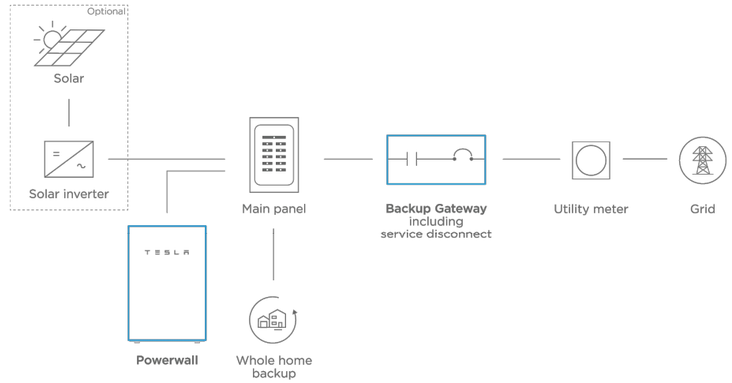
ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–20°C to 50°C (–4°F to 122°F)
Recommended Temperature	0°C to 30°C (32°F to 86°F)
Operating Humidity (RH)	Up to 100%, condensing
Storage Conditions	–20°C to 30°C (–4°F to 86°F) Up to 95% RH, non-condensing State of Energy (SoE): 25% initial
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R
Ingress Rating	IP67 (Battery & Power Electronics) IP56 (Wiring Compartment)
Wet Location Rating	Yes
Noise Level @ 1m	< 40 dBA at 30°C (86°F)

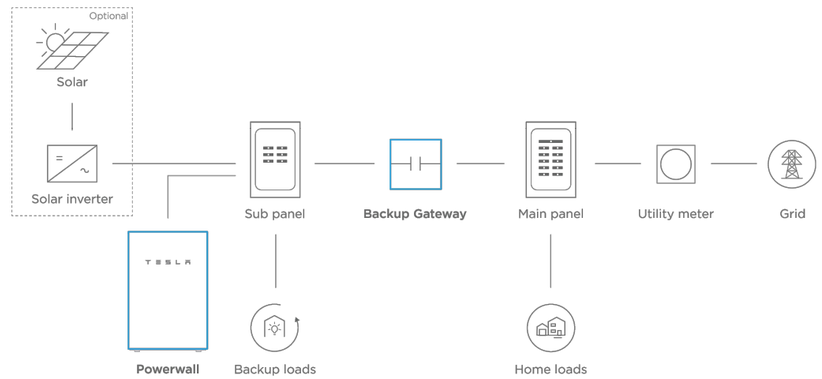
TESLA.COM/ENERGY

TYPICAL SYSTEM LAYOUTS

WHOLE HOME BACKUP



PARTIAL HOME BACKUP



NA - BACKUP - 2019-06-11

TESLA.COM/ENERGY

Contractor Info
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Project Type - Photovoltaic

Project Location:
RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
R01_BATTERY DATASHEET.DWG

Sheet Number and Title:
R03 - BATTERY DATA SHEET

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	DCG	----	----

Design

R03

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POWERWALL

Backup Gateway 2

The Backup Gateway 2 for Tesla Powerwall provides energy management and monitoring for solar self-consumption, time-based control, and backup.

The Backup Gateway 2 controls connection to the grid, automatically detecting outages and providing a seamless transition to backup power. When equipped with a main circuit breaker, the Backup Gateway 2 can be installed at the service entrance. When the optional internal panelboard is installed, the Backup Gateway 2 can also function as a load center.

The Backup Gateway 2 communicates directly with Powerwall, allowing you to monitor energy use and manage backup energy reserves from any mobile device with the Tesla app.

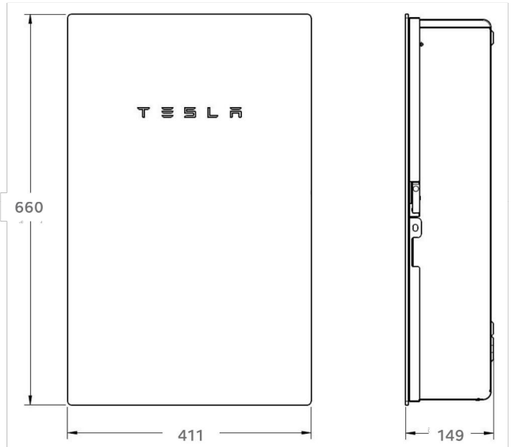
PERFORMANCE SPECIFICATIONS

AC Voltage (Nominal)	120/240V
Feed-In Type	Split Phase
Grid Frequency	60 Hz
Current Rating	200 A
Maximum Input Short Circuit Current	10 kA[1]
Overcurrent Protection Device	100-200A; Service Entrance Rated[1]
Overvoltage Category	Category IV
AC Meter	Revenue accurate (+/- 0.2 %)
Primary Connectivity	Ethernet, Wi-Fi
Secondary Connectivity	Cellular (3G, LTE/4G)[2]
User Interface	Tesla App
Operating Modes	Support for solar self-consumption, time-based control, backup, and off-grid
Backup Transition	Automatic disconnect for seamless backup
Modularity	Supports up to 10 AC-coupled Powerwalls
Optional Internal Panelboard	200A 6-space / 12 circuit Eaton BR Circuit Breakers
Warranty	10 years

[1] When protected by Class J fuses, Backup Gateway 2 is suitable for use in circuits capable of delivering not more than 22kA symmetrical amperes.
[2] The customer is expected to provide internet connectivity for Backup Gateway 2; cellular should not be used as the primary mode of connectivity. Cellular connectivity subject to network operator service coverage and signal strength.

MECHANICAL SPECIFICATIONS

Dimensions	660 mm x 411 mm x 149 mm (26 in x 16 in x 6 in)
Weight	20.4 kg (45 lb)
Mounting options	Wall mount, Semi-flush mount



COMPLIANCE INFORMATION

Certifications	UL 67, UL 869A, UL 916, UL 1741 PCS CSA 22.2 0.19, CSA 22.2 205
Emissions	FCC Part 15, ICES 003

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Operating Humidity (RH)	Up to 100%, condensing
Maximum Elevation	3000 m (9843 ft)
Environment	Indoor and outdoor rated
Enclosure Type	NEMA 3R

Contractor Info
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Project Type - Photovoltaic

Project Location:
RESIDENCE
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Parcel Number: --
Assessor Phone # (719) 836-4255

PV SYSTEM SPECIFICATIONS
1. PV MODULE: 15 x REC 320NP Black; 4.8kWdc
2. INVERTER: SB 5.0-US

File Name:
R02_GATEWAY DATASHEET.DWG

Sheet Number and Title:
R04 - BACKUP GATEWAY

Sheet Size:
ANSI full bleed B (17.00 x 11.00 Inches)

Drawing history

no.	drawn by	revision	date
01	DCG	----	----

Design

R04

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