26 Columbia Avenue, Takoma Park
[HPC Case # 37/03-12G]
Takoma Park H.D.

HISTORIC PRESERVATION COMMISSION

Isiah Leggett
County Executive

Leslie Miles
Chairperson

Date: March 15, 2012

MEMORANDUM

TO: Diane R. Schwartz Jones, Director
Department of Permitting Services

FROM: Josh Silver, Senior Planner
Historic Preservation Section
Maryland-National Capital Park & Planning Commission

SUBJECT: Historic Area Work Permit #591774, solar panel installation

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The Montgomery County Historic Preservation Commission (HPC) has reviewed the attached application for a Historic Area Work Permit (HAWP). This application was **approved** at the March 14, 2012 meeting.

The HPC staff has reviewed and stamped the attached construction drawings.

THE BUILDING PERMIT FOR THIS PROJECT SHALL BE ISSUED CONDITIONAL UPON ADHERENCE TO THE ABOVE APPROVED HAWP CONDITIONS AND MAY REQUIRE APPROVAL BY DPS OR ANOTHER LOCAL OFFICE BEFORE WORK CAN BEGIN.

Applicant: Jennifer Park

Address: 26 Columbia Avenue, Takoma Park

This HAWP approval is subject to the general condition that the applicant will obtain all other applicable Montgomery County or local government agency permits. After the issuance of these permits, the applicant must contact this Historic Preservation Office if any changes to the approved plan are made. Once the work is complete the applicant will contact the staff person assigned to this application at 301-563-3400 or joshua.silver@mncppc-mc.org to schedule a follow-up site visit.

RETURN TO: DEPARTMENT OF PERMITTING SERVICES
255 ROCKVILLE PIKE, 2nd FLOOR, ROCKVILLE, MD 20850
240/777-6370

DPS - #8

HISTORIC PRESERVATION COMMISSION
301/563-3400

#591774

APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Person: Rolli Bells

Daytime Phone No.: 301-728 4003

Tax Account No.: _____

Name of Property Owner: JENNIFER PARK Daytime Phone No.: 301-404-0124

Address: 26 COLUMBIA AVE TAKOMA PARK MD 20912
Street Number *City* *Staet* *Zip Code*

Contractorr: ROLAND BELLS / PHOENIX ENGINEERING Phone No.: 301-728-4003

Contractor Registration No.: 99932

Agent for Owner: ROLAND BELLS Daytime Phone No.: 301-728-4003

LOCATION OF BUILDING/PREMISE

House Number: 26 Street: COLUMBIA AVE

Town/City: TAKOMA PARK Nearest Cross Street: _____

Lot: _____ Block: _____ Subdivision: _____

Liber: _____ Folio: _____ Parcel: _____

PART ONE: TYPE OF PERMIT ACTION AND USE

1A. CHECK ALL APPLICABLE:

☐ Construct ☐ Extend ☒ Alter/Renovate

☐ Move ☐ Install ☐ Wreck/Raze

☐ Revision ☐ Repair ☐ Revocable

CHECK ALL APPLICABLE:

☐ A/C ☐ Slab ☐ Room Addition ☐ Porch ☐ Deck ☐ Shed

☒ Solar ☐ Fireplace ☐ Woodburning Stove ☐ Single Family

☐ Fence/Wall (complete Section 4) ☐ Other: _____

1B. Construction cost estimate: $ 30 000

1C. If this is a revision of a previously approved active permit, see Permit # _____

PART TWO: COMPLETE FOR NEW CONSTRUCTION AND EXTEND/ADDITIONS

2A. Type of sewage disposal: 01 ☐ WSSC 02 ☐ Septic 03 ☐ Other: _____

2B. Type of water supply: 01 ☐ WSSC 02 ☐ Well 03 ☐ Other: _____

PART THREE: COMPLETE ONLY FOR FENCE/RETAINING WALL

3A. Height _____ feet _____ inches

3B. Indicate whether the fence or retaining wall is to be constructed on one of the following locations:

☐ On party line/property line ☐ Entirely on land of owner ☐ On public right of way/easement

I hereby certify that I have the authority to make the foregoing application, that the application is correct, and that the construction will comply with plans approved by all agencies listed and I hereby acknowledge and accept this to be a condition for the issuance of this permit.

_____ 2-21-12
Signature of owner or authorized agent *Date*

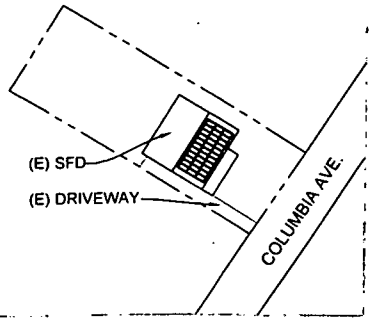
Approved: X *For Chairperson, Historic Preservation Commission*

Disapproved: _____ Signature: _____ Date: 3/15/12

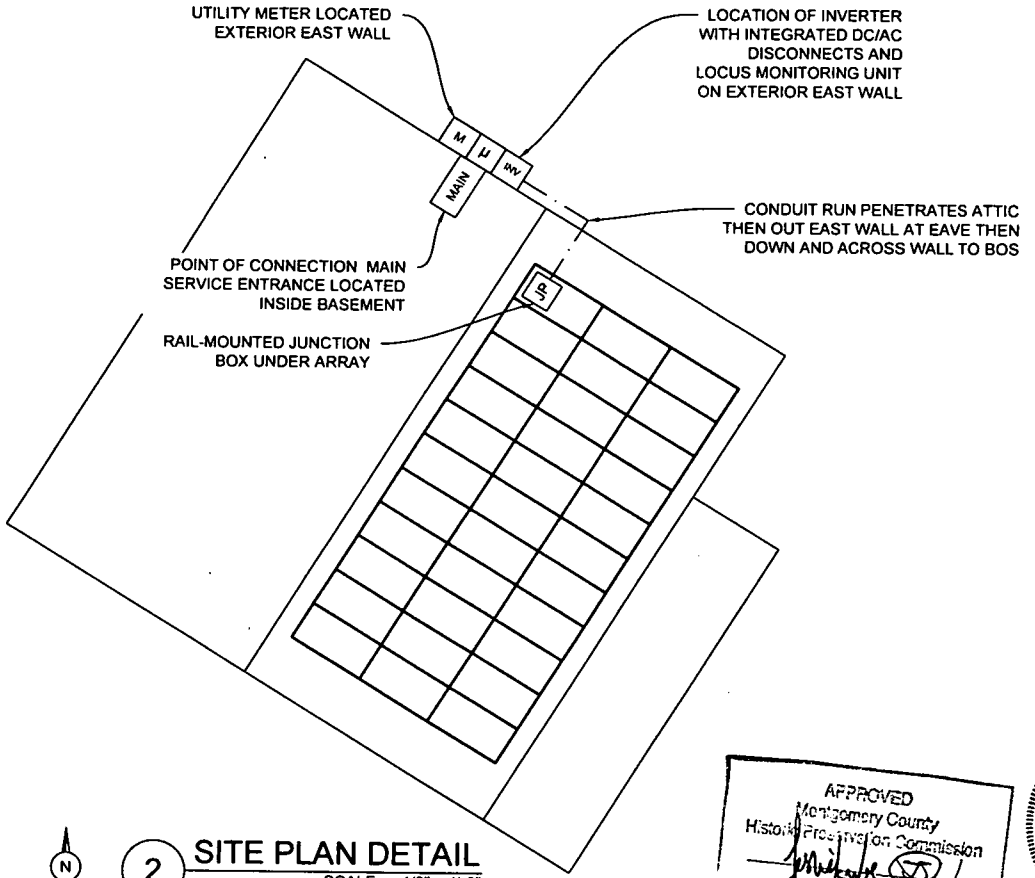
Application/Permit No.: 591774 Date Filed: 2/22/12 Date Issued: _____

Edit 6/21/99

SEE REVERSE SIDE FOR INSTRUCTIONS



1 SITE PLAN
SCALE : 1/64" = 1'-0"



2 SITE PLAN DETAIL
SCALE : 1/8" = 1'-0"

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL BE IN ACCORDANCE WITH THE MOST RECENT NATIONAL ELECTRIC AND BUILDING CODES AND STANDARDS, AS AMENDED BY LOCAL JURISDICTION.

JURISDICTIONAL INFORMATION:
JURISDICTION: MONTGOMERY COUNTY
ADDRESS: 255 ROCKVILLE PIKE
ROCKVILLE, MD 20850
PHONE NUMBER: 240.777.6262

SYSTEM SUMMARY

THIS GRID TIED 6.105 KW DC, 5.27 KW CEC AC ROOF MOUNTED SOLAR ELECTRIC SYSTEM WITHOUT ENERGY STORAGE COMPONENTS CONSISTS OF:
(33) SUNTECH POWER STP185S-24/ADB+
(1) KACO BLUEPLANET 5002XI

NOTES TO INSTALLER:
CONDUIT PENETRATES ROOF TO ATTIC THEN EXITS AT EAVE ON EAST WALL THEN RUN DOWN AND ACROSS TO INVERTER WITH INTERGRATED AC/DC DISCONNECT, AND LOCUS MONITORING UNIT ON EXTERIOR EAST WALL NEXT TO UTILITY METER. PUNCH THRU EAST WALL TO POINT OF CONNECTION IN MSP ON INTERIOR EAST WALL BEHIND MAIN UTILITY METER. PLACE 35A 2P PV AND LOCUS BREAKER AT BOTTOM OF BUS BAR. CAT5 IS FROM INVERTER ON EXTERIOR EAST WALL TO MSP IN FINISHED BASEMENT WHERE ROUTER IS LOCATED.

NOTE: BALANCE OF SYSTEM (BOS) EQUIPMENT SHOWN FOR REFERENCE TO LOCATION ONLY - NOT TO SCALE

APPROVED
Montgomery County
Historic Preservation Commission

STATE OF MARYLAND
JAMES A. KOPPENHAVER
16053
PROFESSIONAL ENGINEER

KEY:

PROPERTY LINE	INVERTER
CONDUIT RUN	SUBPANEL
STRUCTURES	DC DISCONNECT
DRIVEWAY	AC DISCONNECT
SOLAR MODULE	PV PRODUCTION METER
MAIN SERVICE	JUNCTION BOX
METER	MONITORING UNIT
	COMBINER BOX
	ROOF OBSTRUCTION

SHEET NUMBER	SHEET TITLE
0.1	COVER & SITE PLAN
1.1	ARRAY 1 & STRUCTURAL
2.1	ELECTRICAL DIAGRAM
2.2	ELEC. CALCULATIONS
3.1	LABELS

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

By: David Phife Date:11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 5802393. Planset

COVER AND SITE PLAN

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

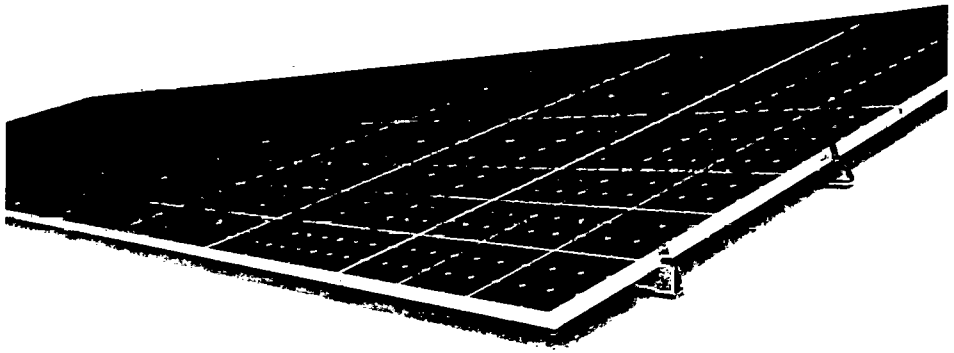
DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	
DESIGNED BY:	DAVID PHIFE		
CONTACT:	510.496.5573		
REVIEWED BY:	NICOLE THOMPSON		
DC kW STC:	6.105 kW		
SHEET SIZE:	11X17		

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV0.1

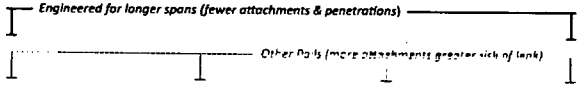
IRONRIDGE
Solar Mounting Made Simple

Roof Mounts



IronRidge Roof Mount System is a reliable, comprehensive, and feature rich photovoltaic mounting solution. Anchored by the XRS (Standard) and XRL (Light) rails, the IronRidge Roof Mounts platform includes all of the components necessary for supporting virtually any commercial or residential roof mount installation, regardless of roof type or pitch.

IronRidge Rails: Less Material, Faster Installation, Minimized Risk of Leaks



Key Features

Longest Spans In The Industry Allows Fewest Required Attachment Points

Minimal Attachments Points Reduces Total Installed Costs And Liability

Unique Curved Profile Of The XRS Increases Strength And Enhances Aesthetic Design

Backed By Industry Leading Warranty 10 yr. Limited Product, 5 yr. Finish

PE Certified For Most States

Multiple Attachment Options Supports Tilt Or Flush Mounting, Works With Most Any Brand Of Solar Panel

Versatile Design Can Be Used In Ground Mount, Roof Mount, or Large Array Applications

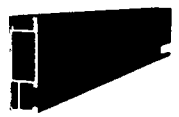
Best Customer Service And Support

XRS Rail (Standard)

- Unique shape and profile allow for spans over 13'
  Cantilever can be 40% of span length
  Attractive structural design, suitable for residential or commercial applications
- 6105-T5 extruded aluminum (anodized)

XRL Rail (Lightweight)

- Light, cost effective rail system supports spans up to 8'
- Cantilever can be 40% of span length
- 6105-T5 extruded aluminum (anodized)



Splices (Internal)

Can be installed at same location as an attachment

- Does not require additional attachments to support the splice

www.ironridge.com

IRONRIDGE
Solar Mounting Made Simple

Roof Mounts

Maximum Span Chart:

Wind Speed	XR Standard Rail (XRS) Snow Loads							XR Light Rail (XRL)				
	0 psf	10 psf	20 psf	30 psf	40 psf	50 psf	60 psf	0 psf	10 psf	20 psf	30 psf	40 psf
90 mph	13.5'	12.5	10.5	10.0	9.0	8.5	7.5	8	7	6	5.5	5
100 mph	13.5	12.5	10.5	10.0	9.0	8.5	7.5	8	7	6	5.5	5
110 mph	13	12.5	10.5	10.0	9.0	8.5	7.5	7.6	7	6	5.5	5
120 mph	12	12	10.5	10.0	9.0	8.5	7.5	7	7	6	5.5	5
130 mph	11	11	10.5	10.0	9.0	8.5	7.5	6.5	6.5	6	5.5	5
140 mph	10	10	10	9.5	9.0	8.5	7.5	6	6	6	5.5	5
150 mph	9.6	9.5	9.5	9.5	8.5	8	7.5	5.5	5.5	5.5	5.5	5

Roof Zone 1, Flush Mount Only
Slope = 6" / ft.
Exposure category B
Module length: 77"

Building mean roof height = 30'
Clearance between roof and rail: 2"
End Cant Span: 40% (adj. interior span)
Middle 1/3 span rail splice not permitted

* For more information visit www.ironridge.com to receive official specifications as well as charts for tilt applications and exposure categories.

Attachments

- Adjustable L feet (4 pack kits)
- Adjustable tilt leg kits(5° to 45°)
- Aluminum standoffs flush mount (3", 4", 6", 7")
- Steel standoffs - tilt (4",6")

Clamps

- Panel Sizes 1.22" to 2.33"
- Mid clamps, only 1/4" between panels
- Available in hex or t-bolt
- All hardware stainless steel

End Caps

Protect against collection of debris while providing a finished look for XRS and XRL rails

Wire Clips

Accommodates up to eight 6mm panel wires or an Enphase wire harness

Why IronRidge

Experience - Designing/manufacturing solar mounting products since 1996

Single Source - Roof mounts, ballasted mounts, large arrays, and more; *a solution for your specific application*

Customer Satisfaction - Customer service and technical support to help you succeed

On-line Resources Available:

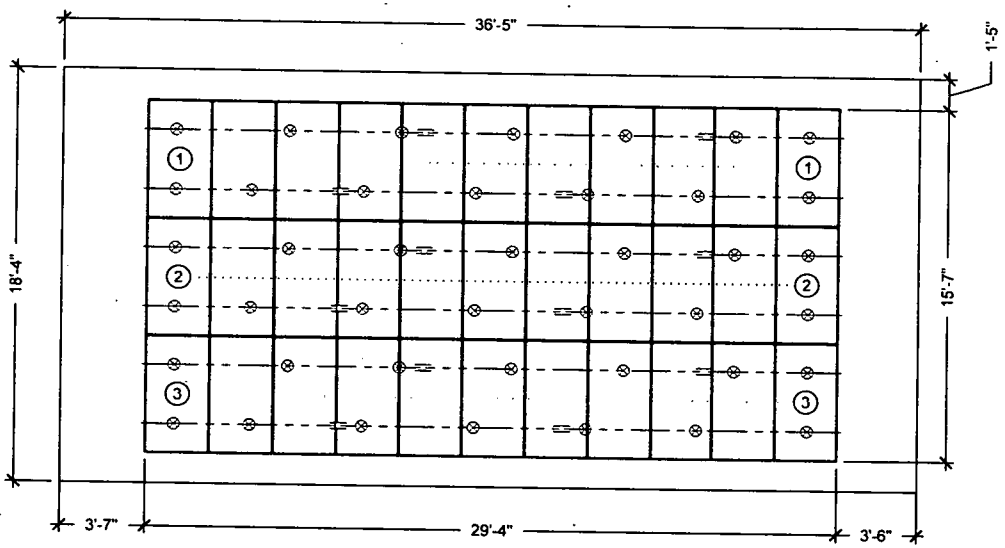
- Video Tutorials
- Product Configurators
- Product Certifications
- Installation Guides
- Data Sheets
- Reseller Locator

Sales: 800-227-9523
sales@ironridge.com

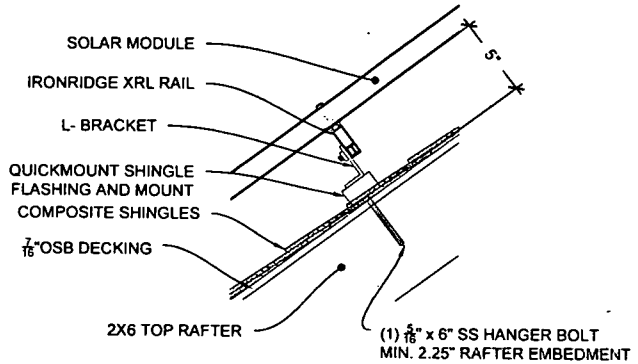
www.IronRidge.com
1435 Baechtel Road
Willits, CA 95490

APPROVED
Mendocino County
Historical Landmarks Commission
3/15/12

www.ironridge.com



1 ARRAY 1 - LAYOUT
AZIMUTH: 121° TN SCALE : 3/16" = 1'-0"



3 MOUNT DETAIL
SCALE : 1 1/2 "=1'0"

MODULE SPECS
(33) SUNTECH POWER STP185S-24/ADB+

MODULE WEIGHT:	34.1 LBS
MODULE LENGTH:	62.2"
MODULE WIDTH:	31.8"

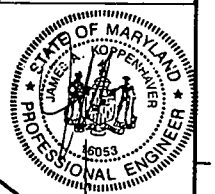
ROOF 1 SPECS

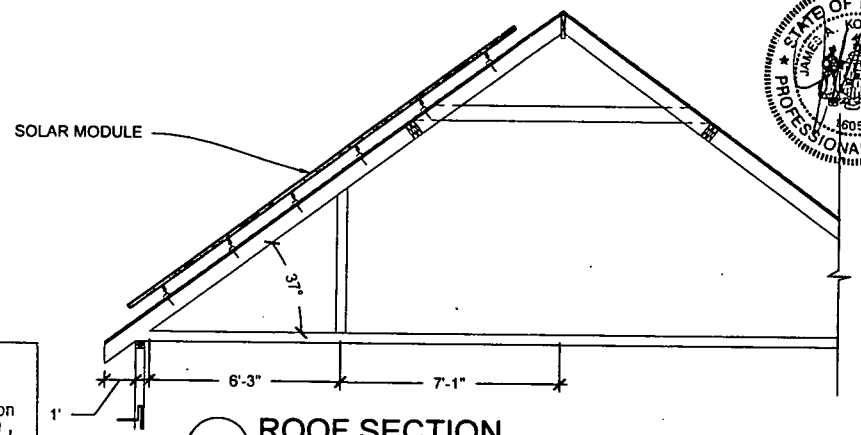
RAFTER SIZE:	2x6
RAFTER SPAN:	6'10"
RAFTER SPACING:	24" OC
ROOF MATERIAL:	COMPOSITE SHINGLES

ARRAY 1 SPECS

NUMBER OF MODULES:	33
TOTAL MODULE WEIGHT:	1125.3 LBS
RACKING WEIGHT:	217.8 LBS
ARRAY WEIGHT:	1384.9 LBS
ARRAY AREA:	453.3 SQFT
ARRAY DEAD LOAD:	3.1 LBS/SQFT
NUMBER OF MOUNTS:	42
LOAD PER MOUNT:	33.0 LBS
ROOF PITCH:	37°
ROOF HEIGHT (ft):	25

SYMBOL KEY:
- MOUNT
- RAIL
- RAFTERS
- ROOF
- SOLAR MODULE
- RAIL SPLICE
- STRING CONFIG.





2 ROOF SECTION
SCALE : 1/4 "=1'0"

APPROVED
Montgomery County
Historic Preservation Commission
3/15/12

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

By: David Phife Date:11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 58023\5. Planset

ARRAY 1 & STRUCTURAL

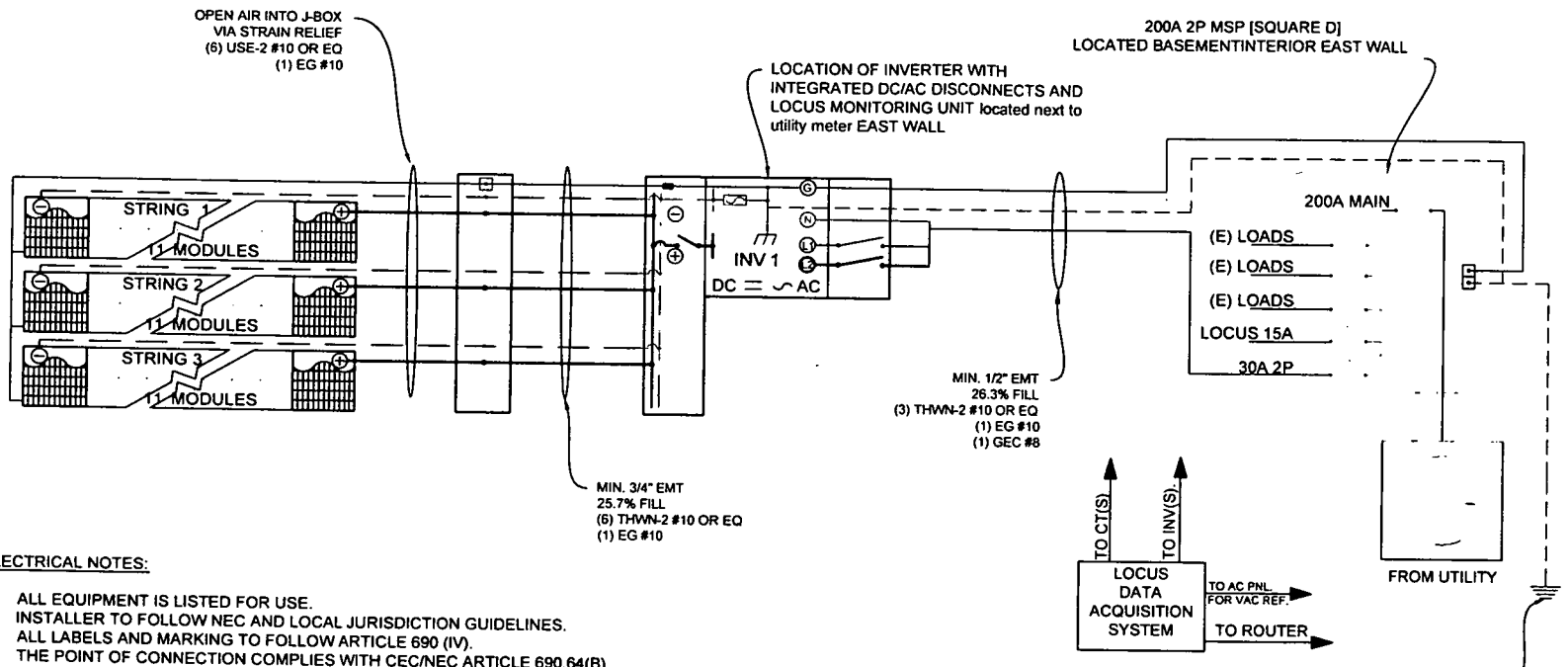
PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	
DESIGNED BY:		DAVID PHIFE	
CONTACT:		510.496.5573	
REVIEWED BY:		NICOLE THOMPSON	
DC kW STC:		6.105kW	
SHEET SIZE:		11X17	

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV1.1



MODULE ELECTRICAL SPECS

(33) SUNTECH POWER STP185S-24/ADB+

SHORT CIRCUIT CURRENT (Isc):	5.43 A
OPEN CIRCUIT VOLTAGE (Voc):	45 V
OPERATING CURRENT (IMP):	5.09 A
OPERATING VOLTAGE (VMP):	36.4 V
MAX SERIES FUSE RATING	15 A
STC RATING:	185 W
CEC PTC RATING:	167.2 W

DESIGN CONDITIONS

HIGHEST 2% DB DESIGN TEMP. (°C):	34 °C
MIN. MEAN EXTREME ANNUAL DB (°C):	-12 °C

INVERTER 1 SPECS

(1) KACO BLUEPLANET 5002XI

RATED WATTS (EACH):	5000 W
AC OPERATING VOLTAGE:	240 V
AC OPERATING CURRENT:	24 A
MODULES PER STRING:	11
INVERTER EFFICIENCY:	95.5 %

INTEGRATED AC & DC DISCONNECT SWITCH

INVERTER 1 STRINGING (690.53)

MAX POWER POINT CURRENT (IMP):	15.3 A
MAX POWER POINT VOLTAGE (VMP):	400.4 V
MAX SYSTEM VOLTAGE (VOC) 690.7(A)1:	557.3 V
SOURCE CIRCUIT CURRENT (ISC) 690.8(A)1:	6.8 A
MAX SHORT CIRCUIT CURRENT (ISC) 690.8(A)2:	20.4 A

ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. INSTALLER TO FOLLOW NEC AND LOCAL JURISDICTION GUIDELINES.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV).
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATION.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LINE SIDE AND THE AC UTILITY WIRES ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 600VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED WITH TIN PLATED DIRECT BURIAL RATED LAY IN LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE CONDITIONS.

STATE OF MARYLAND
JAMES A. KOPPENHAVER
6053
PROFESSIONAL ENGINEER

ELECTRICAL KEY:

- BREAKER
- SWITCH
- SCREW TERMINAL
- FUSE
- SPLICE
- EARTH GROUND
- CHASSIS GROUND
- GEC
- EGC

IMPORTANT

BACKFED SOLAR BREAKER(S) SHALL BE INSTALLED AT THE END OF THE CIRCUIT OR FURTHEST AWAY FROM THE MAIN BREAKER.

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

By: David Phife Date: 11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 580230 Plans\

ELECTRICAL DETAIL

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	
DESIGNED BY:		DAVID PHIFE	
CONTACT:		510.496.5573	
REVIEWED BY:		NICOLE THOMPSON	
DC kW STC:		6.105 kW	
SHEET SIZE:		11X17	

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV2.1

DC WIRE SIZE:

SOURCE CIRCUIT [690.8(A)(1)] (Isc): Isc * 1.25
OUTPUT CIRCUIT [690.8(A)(2)] (Isc): Isc * 1.25 * # STRINGS
MIN. DC WIRE AMPACITY:
[690.8(a), 690.8(b), 210.19(A)1, 215.2(A), 110.14(C)]:
THE MAXIMUM OF:
1. (Isc * 1.25) / (CONDITIONS OF USE)
2. (Isc * 1.25 * 1.25)
DERATE WIRE FOR TERMINALS DEPENDING UPON TEMP.

AC WIRE SIZE:

INVERTER OUTPUT [690.8(A)] (Isc): INV. OUTPUT * 1.25
MIN. AC WIRE AMPACITY:
[690.8(a), 690.8(b), 210.19(A)1, 215.2(A), 110.14(C)]:
THE MAXIMUM OF:
1. (INV. OUTPUT * 1.25)
2. (INV. OUTPUT) / CONDITIONS OF USE
DERATE WIRE FOR TERMINALS DEPENDING UPON TEMP.

GROUNDING SIZE:

GEC
NEC 690.47
Sized per Table 250.66 for AC
Sized per Table 250.166 for DC
DC EGC
Table 250.122
Use 1.56 * Isc * # strings (if applicable)
AC EGC
NEC 250.122
Sized based on OCPD.

MAXIMUM SYSTEM VOLTAGE:

NEC2008/2011 requires to use manufacturers Coefficient if available

Method A: Voc * # of modules in series * NEC Coefficient
Method B: {[(T min °C - 25°C) * V/°C] + Voc} * # of modules in series

120% RULE:

NEC2008: [690.64(B)2
NEC2011: 705.12(D)2
MINIMUM BUS BAR OR CONDUCTOR =
TOTAL NUMBER OF BREAKERS FEEDING / 1.2

OCPD SIZING:

MIN DC: ISC * 1.56
MIN AC: INV. OUTPUT * 1.25

VOLTAGE DROP:

(2KID/CM)/VOLTAGE * 100 = VOLTAGE DROP %
K = 12.9 FOR COPPER
I = CURRENT (IMP OR OUTPUT AC)
D = DISTANCE IN FEET, ONE WAY
CM = CIRCULAR MILS

AC wire size	Inverter 1
Quantity:	1
Conductors in Raceway:	3
Nipple (less than 24"):	NO
Wire Rating (°C):	75
Terminal Rating (°C):	60
Conduit Fill derating:	1
Highest 2% DB design temp (°F):	93.2
Tempterature Correction factor:	0.94
Inverter Rated output Current (690.8(A)):	24
Method A: 1.25*Continuous Current (215.2) (A):	30
Method B: Max. Circuit Current with conditions (A):	25.53
Min. Ampacity required (A):	30.00
Wire sized pre-terminal comparison (AWG):	#10
Wire size ampacity post-terminal comparison (A):	35
Minimum Wire Size (AWG):	#10

DC wire size	Location 1	Location 2
Number Strings Combined:	1	1
Conductors in Raceway:	6	6
Nipple (less than 24"):	NO	No
Wire Rating (°C):	90	90
Terminal Rating (°C):	90	90
Conduit Height Off of Roof:	0.5" - 3.5"	0.5" - 3.5"
Conduit Fill derating:	0.8	0.8
CorrectedHighest 2% DB design temp (°F):	133.2	133.2
Tempterature Correction factor:	0.71	0.71
Maximum Circuit Current (690.8(A))(IpvMax):	6.79	6.7875
Method A: 1.25*Continuous Current (215.2) (A):	8.48	8.484375
Method B: Max. Circuit Current with conditions (A):	11.95	11.9498239
Min. Ampacity required (A):	11.95	11.9498239
Wire sized pre-terminal comparison (AWG):	#14	#14
Wire size ampacity post-terminal comparison (A):	25	25
Minimum Wire Size (AWG):	#14	#14

Max. System Voltages	INV1 MPPT1
Modules Per string:	11
Min. Mean Extreme Annual DB (°F):	10
NEC 2008/2011 temp. correction factor:	1.16
Manufacturers Cof of Temp (V/°C):	-0.153
Temperature Difference (°C):	-37
Module Voc (V):	45
Max System Voltage:	557.3 V

120% Rule	Amperage
Main Panel OR Sub Buss (A):	200
Main Breaker (A):	200
Allowable Input Breaker (A):	40

DC EGC Size	
Min. amperage:	8.47
Min. EGC size:	#14

AC EGC Size	
Min. amperage:	30.00
Min. EGC size:	#10

DC Fuse Size	
Min. amperage:	8.47
Min. fuse size if needed:	10A Fuse

APPROVED
Montgomery County
Historic Preservation Commission
3/15/12

STATE OF MARYLAND
JAMES A. KOPP
PROFESSIONAL ENGINEER
16093

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108 W 14TH ST
FREDERICK, MD 21701
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By: David Phife Date: 11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 580235. Planset

CALCULATIONS

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	
DESIGNED BY:	DAVID PHIFE		
CONTACT:	510.496.5573		
REVIEWED BY:	NICOLE THOMPSON		
DC kW STC:	6.105 kW		
SHEET SIZE:	11X17		

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV2.2

1

NEC 690.5(c)
PLACE THIS LABEL ON INVERTER(S) OR NEAR GROUND-FAULT INDICATOR (ON INVERTER(S) U.O.N.)

2

NEC 690.17
PLACE THIS LABEL ON ***ALL*** DISCONNECTING MEANS WHERE ENERGIZED IN AN OPEN POSITION

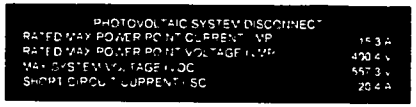
3

NEC 690.64(B)(7)
PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT (I.E. MAIN PANEL (***AND*** SUBPANEL IF APPLICABLE))
THIS LABEL IS ONLY NECESSARY WHEN BREAKERS FEEDING PANEL EXCEEDS 100% OF BUSS RATING.

4

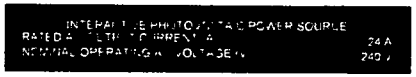
NEC 690.53 & NEC 690.14(C)(2)
PLACE THIS LABEL ON ***ALL*** PHOTOVOLTAIC DC DISCONNECTING MEANS (ON INVERTER IF INTEGRATED DC DISCONNECTS ***AND*** AT SEPARATE DC DISCONNECT IF APPLICABLE)

INVERTER 1 DISCONNECT



5

NEC 690.54
PLACE THIS LABEL AT "INTERACTIVE POINT OF INTERCONNECTION" (AT MAIN SERVICE PANEL ***AND*** SUBPANEL IF APPLICABLE)



ALL LABELS AND MARKINGS SHALL BE ATTACHED ACCORDING TO REQUIREMENTS BY NEC AND THE LOCAL AHJ. THE AHJ MAY HAVE SPECIAL LABEL REQUIREMENTS BEYOND THE SCOPE OF THIS DOCUMENT. THIS MAY ENCOMPASS LANGUAGE INCLUDING, BUT NOT LIMITED TO, THAT FOUND IN NEC ARTICLES 690.5 (C), 690.14 (C)(2), 690.17, 690.53,690.35(F), 690.54, 690.64(B)(7) and 705.10

APPROVED
Montgomery County
Historic Preservation Commission
3/15/12

STATE OF MARYLAND
JAMES A. KOPPENHAVER
6053
PROFESSIONAL ENGINEER

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

By: David Phife Date:11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 582310, Planset

LABELS

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

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SHEET SIZE:		11X17	

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

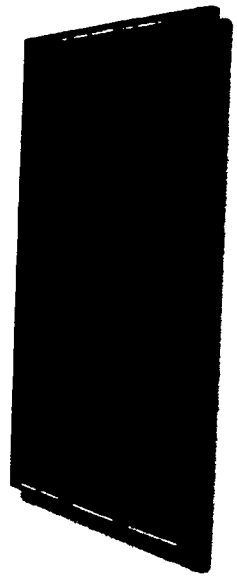
PV3.1

STP185S - 24/Adb+
STP180S - 24/Adb+

SUNTECH
Solar powering a green future™

185 Watt
MONOCRYSTALLINE SOLAR MODULE

Suntech Black Label™ modules are exclusively designed and engineered for homeowners who seek a rooftop solar solution that combines visual aesthetics with excellent efficiency.



Features

- **14.5%** — High module conversion efficiency (up to 14.5%), through superior manufacturing technology
- **0-5W** — Guaranteed 0-5W positive power output tolerance ensures high reliability
- **<1%** — Proprietary Gallium-F22 doping process dramatically reduces initial light-induced degradation to <1%, thus delivering better power and performance over time
- **2400Pa 5400Pa** — Entire module certified to withstand high wind loads (2400 Pascal) and snow loads (5400 Pascal) *

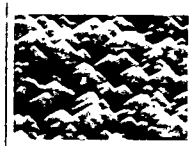
Trust Suntech to Deliver Reliable Performance Over Time

- World's leading manufacturer of crystalline silicon photovoltaic modules
- Unrivaled manufacturing capacity and world-class technology
- Rigorous quality control meeting the highest international standards : ISO 9001: 2008 and ISO 14001: 2004
- Certification and standards: IEC 61215, IEC 61730, conformity to CE

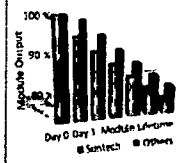
Industry-leading warranty

- 25 year transferrable power output warranty: 5 year/95%, 12 year/90%, 18 year/85%, 25 year/80% **
- Based on nominal power
- Warrants 6.7% more power than the market standard over 25 years
- 5 year material and workmanship warranty

* Please refer to Suntech Standard Module Installation Manual for details.
** Please refer to Suntech Product Warranty for details.



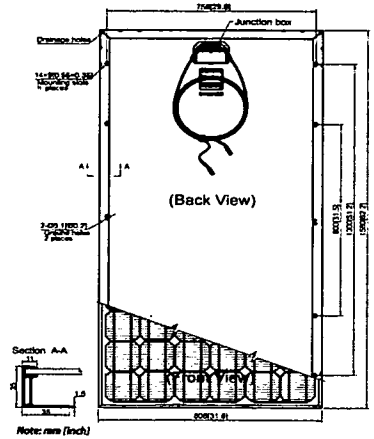
Patented surface pyramids enhance sunlight absorption by redirecting reflected light to other areas on the cell surface to be reabsorbed



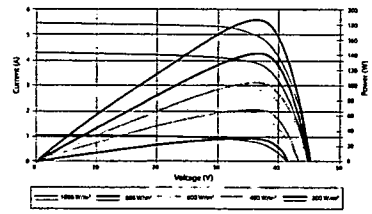
Suntech cells feature a breakthrough process that replaces traditional boron doping with gallium doping. The effect of initial light-induced degradation is dramatically reduced, leading to greater power output over the entire module lifetime.

Graph is for illustration only and does not imply any guarantee of module performance. Please check warranty for details.

STP185S - 24/Adb+
STP180S - 24/Adb+



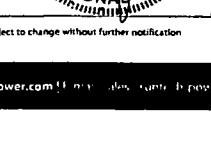
Current-Voltage & Power-Voltage Curve (185S-24)



Temperature Characteristics

Nominal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of Pmax	-0.48 %/°C
Temperature Coefficient of Voc	-0.34 %/°C
Temperature Coefficient of Isc	0.037 %/°C

Dealer (or Installer)



Specifications are subject to change without further notification

Electrical Characteristics

STC	STP185S-24/Ad+	STP180S-24/Ad+
Optimum Operating Voltage (Vmp)	36.4 V	36.0 V
Optimum Operating Current (Imp)	5.09 A	5.00 A
Open - Circuit Voltage (Voc)	45.0 V	44.8 V
Short - Circuit Current (Isc)	5.43 A	5.39 A
Maximum Power at STC (Pmax)	185 W	180 W
Module Efficiency	14.5 %	14.1 %
Operating Temperature	-40 °C to +85 °C	-40°C to +85°C
Maximum System Voltage	600 V DC	600 V DC
Maximum Series Fuse Rating	15 A	15 A
Power Tolerance	0/+5 W	0/+5 W

STC: Irradiance 1000 W/m², module temperature 25 °C, AM=1.5

NOCT	STP185S-24/Ad+	STP180S-24/Ad+
Maximum Power (W)	137 W	133 W
Maximum Power Voltage (V)	33.2 V	32.9 V
Maximum Power Current (A)	4.11 A	4.05 A
Open Circuit Voltage (Voc)	41.3 V	40.9 V
Short Circuit Current (Isc)	4.39 A	4.30 A
Efficiency Reduction (from 1000 W/m² to 200 W/m²)	<4.5%	<4.5%

NOCT: Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

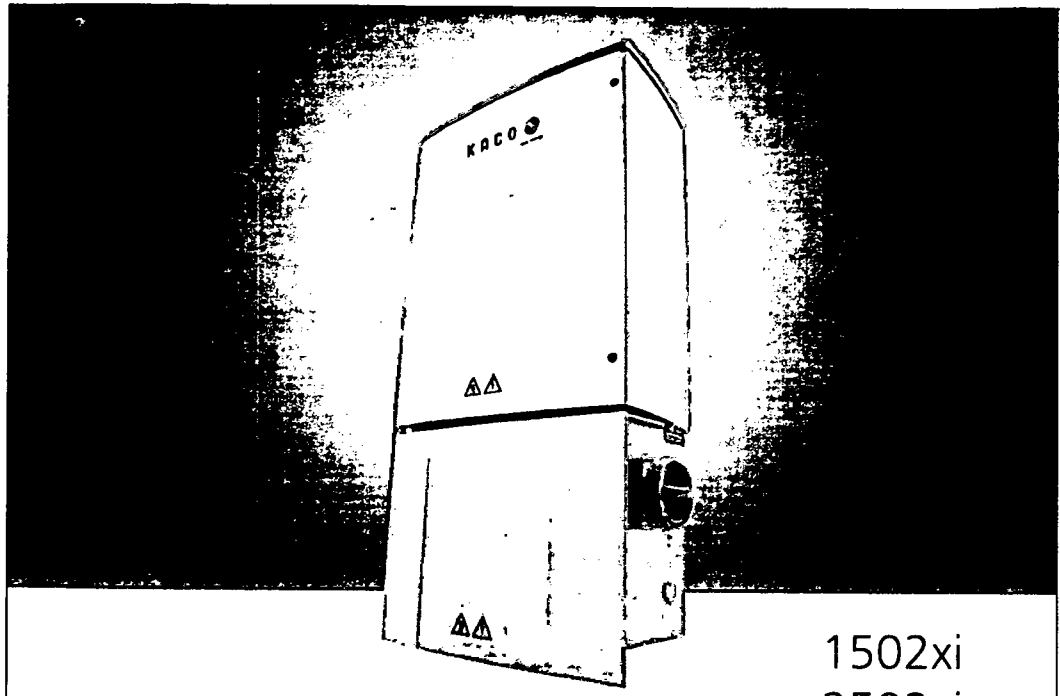
Mechanical Characteristics

Solar Cell	Monocrystalline 125 x 125 mm (5 inches)
No. of Cells	72 (6 x 12)
Dimensions	1580 x 808 x 35mm (62.2 x 31.8 x 1.4 inches)
Weight	15.5 kgs (34.1 lbs.)
Front Glass	3.2 mm (0.13 inches) tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67 rated
Output Cables	H+S RADOX® SMART cable 4.0 mm² (0.006 inches²), symmetrical lengths (-) 1000 mm (39.4 inches) and (+) 1000 mm (39.4 inches), H4 connectors (MC4 compatible)

Packing Configuration

Container	20' GP	40' GP
Pieces per pallet	26	26
Pallets per container	12	28
Pieces per container	312	728

Montgomery County Historic Preservation Commission
3/15/12



KACO blueplanet 02xi series grid-tied inverters

1502xi
2502xi
3502xi
5002xi

- Highest efficiency in their class - over 95.5%
- Programmable LCD display with night switch
- Plug and play web monitoring option
- Lockable NEC compliant AC/DC disconnect
- Field selectable grid voltage (240 / 208 V_{AC})
- Field selectable positive or negative grounding
- Convection cooled aluminum housing - high reliability
- NEMA 3R enclosure - for indoor or outdoor installation
- 1/2" or 3/4" knockouts on sides, bottom & rear of unit
- ***easy***Install light weight installation bracket
- ***easy***Link data interface includes RS485 connection
- ***easy***Swap 10 year warranty with service reimbursement

*tested to UL 1741, IEEE 1547, CSA 22.2

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[illegible] County
Historic [illegible] Commission
3/15/12

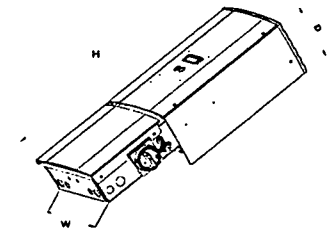
KACO new energy.

The KACO 02xi blueplanet series - the latest generation of PV inverters.

- Refined power electronics increase operational efficiency, increase CEC efficiency to 95.5% on all units and improve reliability.
- All inverters include a factory assembled connection box which includes an NEC compliant AC/DC disconnect switch.
- The inverters can be easily and safely removed from the connection box to allow field service.
- The connection box allows conduit to connect from both sides, the bottom or the rear for increased installation flexibility. Using the rear knockouts will hide all conduits for a clean install.
- Field selectable grid voltages 240 / 208 VAC (220 VAC for Mexico) with or without neutral sensing.
- Field selectable positive or negative grounding simplify installs and create more opportunities to use the KACO blueplanet inverters.
- Convenient PV system monitoring with integrated plug and play ethernet web monitoring option reduces lifetime system costs by ensuring optimal system performance.
- Easy to use push button interface to configure the inverter and access stored PV data on the blueplanet LCD screen. Night illumination switch backlights display for access to production data when the inverter is in standby mode.
- Light weight design makes the inverters less expensive to ship and easier to handle than other comparably sized inverters.

Model number		blueplanet 1502xi	blueplanet 2502xi	blueplanet 3502xi	blueplanet 5002xi
Input data (DC)					
DC operating range (MPP)		125 - 400 V	200 - 450 V	200 - 510 V	200 - 510 V
Max. DC input voltage		550 V	550 V	550/600* V	550/600* V
Nominal DC input current		14.3 A	13.5 A	18.5 A	26.5 A
Max. DC input Isc current		21.45 A	21.45 A	28 A	40 A
Output data (AC)					
Max. continuous output power (CEC)		1500 W	2500 W	3500 W	5000 W
Max. over-current protection		15 A	20 A	25 A	30 A
Max. continuous current	240 V	8 A	12 A	16 A	24 A
	208 V	8 A	12.5 A	17 A	24 A
AC operating range	240 V	211 - 264 V			
	208 V	184 - 226 V			
	220 V	198 - 242 V (for Mexico)			
Frequency		60 Hz (59.3 – 60.5 Hz)			
CEC rated efficiency	240 V	95.5%	95.5%	95.5%	95.5%
	208 V	95%	95%	95.5%	95%
Additional data					
AC/DC disconnect ratings		AC: 300 V - 36 A / DC: 600 V - 40 A			
Cooling		True convection - ultimate reliability (5002xi - fan assisted)			
DC reverse polarity protection		YES			
Ground fault protection		Integrated ground fault detector/interrupter (GFDI)			
Grounding		Field selectable positive or negative ground option			
Visual displays		Backlit LCD w/ convenient night switch & push button controls			
Included accessory interfaces		*easy*Link RS485 & S0 port			
Ambient temp @ max AC power		-5°F - +104°F -20°C - + 40°C			
Thermal protection		Yes			
Noise emissions		< 35 dB (silent operation)			
Night power consumption		0.3 W			
Warranty		Standard *easy*Swap 10 years			
Certifications					
Safety compliance		UL 1741, IEEE 1547, NEC, CSA 22.2 No.107.1-01			
Communications compliance		FCC Part 15 Class B			

* - Unit will only feed power if the PV voltage is less than 550Vdc



Mechanical Specifications				
Model	Height (H)	Width (W)	Depth (D)	Weight
1502xi	30 in.	14 in.	8 1/4 in.	42 lbs
2502xi	32 in.	14 in.	8 1/4 in.	52 lbs
3502xi	35 7/8 in.	14 in.	9 1/2 in.	69 lbs
5002xi	35 7/8 in.	14 in.	9 1/2 in.	70 lbs
Enclosure	NEMA 3R			

Download the KACO calc string sizing tool from www.kaco-newenergy.com.

- Distributed by:

STATE OF MARYLAND
JAMES KORPENWAGER
6053
PROFESSIONAL ENGINEER

KACO new energy.

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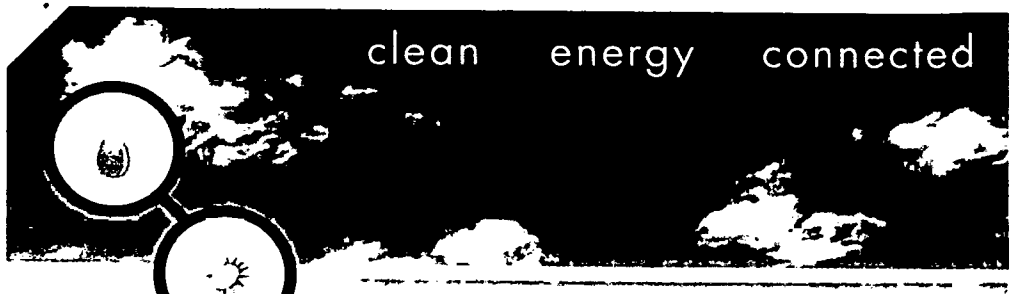

Our product is a web-based monitoring and performance optimization platform that integrates with any type of distributed energy system.

The Locus Smart Monitoring platform combines revenue-grade metering hardware and web-based software into a scalable energy generation and usage monitoring service. The platform works with any current or future type of power inverter, collecting performance data continuously and uploading it to Locus' servers. Both installation professionals and their end-users can then log on to customized portals giving them real-time access to system information.

Automated SREC and Compliance Reporting

The systems you install are generating valuable Solar Renewable Energy Credits. Normally, these would need to be manually recorded and then transmitted to a state agency or public utility commission on a regular basis for the useful life of the system.

Smart Monitoring enables you to automate this task, while at the same time reducing any requirements for an audit/true-up to ensure that the numbers being recorded match what the system actually is producing.

This revenue-grade accuracy and report automation helps to ensure that the environmental and economic benefits of your installed systems are being maximized.

Performance Optimization

In addition to monitoring, the Locus platform continually runs patent-pending diagnostic algorithms to identify underperforming systems. Catastrophic system degradations such as inverter or string failures are unusual and generally easy to diagnose.

It is the non-catastrophic degradation such as unanticipated shading, pollen/dust accumulation, etc. that can go unnoticed for long periods of time and significantly affect system efficiency.

By providing a set of customizable and automated diagnostics, Locus enables installers to proactively optimize system performance.

Fleet Management

For installers who manage multiple installations, we offer a suite of tools to increase the efficiency of fleet management:

- Customizable system performance alerts
- Quick links to 24-hour, monthly and lifetime fleet data
- Interactive map showing locations of your system fleet

LOCUS ENERGY

www.locusenergy.com
1-877-LOCUS-EN

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Conservation Commission
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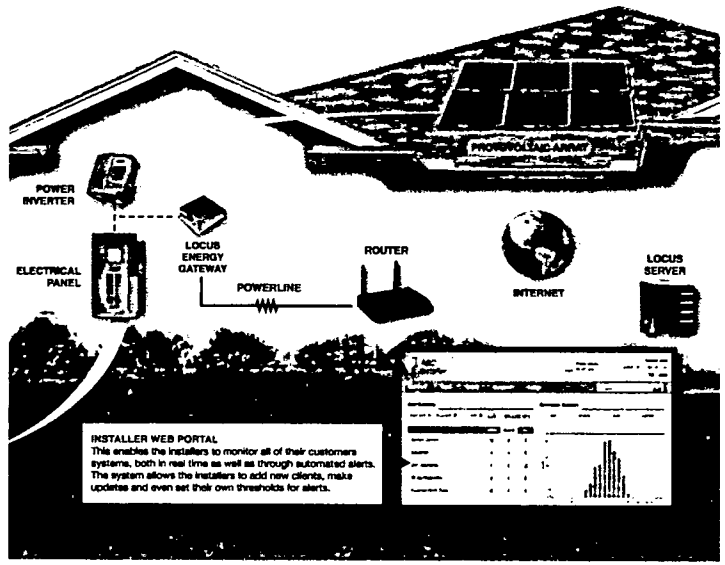


Plug and Play integration	• Quick setup for new and retrofit installations • Works with any type of power inverter • Gateway can simultaneously measure PV, solar thermal & building demand
Intuitive interface	• Dashboard view displays status of entire install base at a glance • Easy to drill-down to specific clients and systems • White-labeled client portal allows installers to offer branded web-based monitoring to end-users
Robust diagnostics and reporting	• Continuous system performance monitoring and diagnostics - automatically spots degradation • User-configurable voltage and current alerts • Downloadable performance graphs and spreadsheets

STATE OF MARYLAND
JAMES A. KOPPENHAVER
PROFESSIONAL ENGINEER

technical specs

▸ Voltage Inputs
- 0.5-264 Volts Line To Neutral or Line to Line
- Universal Voltage Input
- Input Withstand Capability 4k VAC
- Single Phase

▸ Current Inputs
- Specified CTs for 0-600 Amps
- Pass through wire diameter: 0.75" or 1.25"

▸ Communications
- Wired via Ethernet
- Wireless via IEEE 802.g Wi-Fi
- Wireless range – up to 150 feet
- Wired range – up to 1000 feet

▸ Environmental Rating
- Storage: (-20 to +70)° C
- Operating: (-20 to +70)° C
- Humidity: to 95% RH Non-Condensing Indoor use only without cabinet
- Built in mounting brackets
- NEMA 12 boxes available for exterior use

▸ Data Storage
- 1 device/5 min. increments: 2 mos
- 1 device/15 min. increments: 6 mos.
- 5 devices/15 min. increments: 2 mos

▸ Power Supply
- 85 to 264 Volts AC 50/60 Hz Universal Input

▸ Standard Communications
- RS232 Ports (Back Plate)
- RS485 Modbus Port (Front Plate)
- Ethernet RJ45
- USB

▸ Dimensions and Shipping
- Weight: 1 lb 10 oz
- Basic Unit: H2.0 x W6.5 x L6.5

▸ Compliance:
Certified by TUV Rheinland of North America
- ANSI C12.20 (0.5% Accuracy)
- IEC 61010 (Safety)
- FCC 15 Part B
- IEC 60068-2-27 (Mechanical shock)
- IEC 60068-2-6 (Mechanical Vibration)
- CFR 47 ANSI C63.4 (Radiated emissions)

▸ Warranty:
- 5 years limited warranty for power-meter, data logger

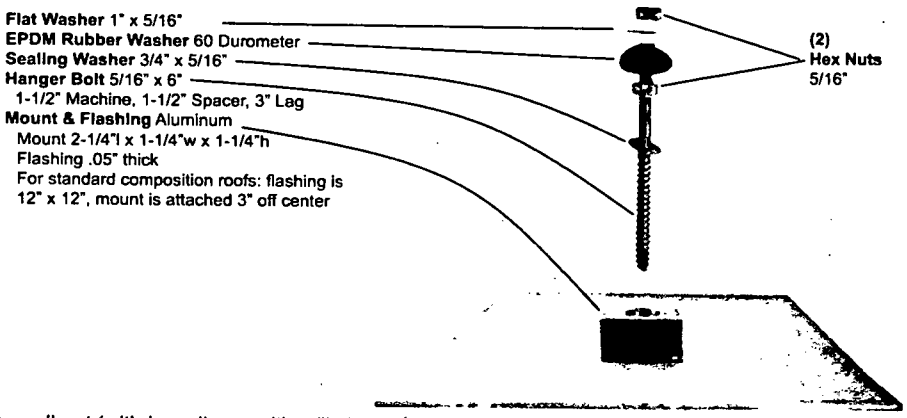
Quick Mount PV®

Your *Solution* in Mounting Products

Solar • H_2O • Conduit • HVAC • Custom

Composition Mount Specifications

Quick Mount PV® is an all-in-one waterproof flashing and mount to anchor photovoltaic racking systems, solar thermal panels, air conditioning units, satellite dishes, or anything you may need to secure to a new or existing roof. It is made in the USA of all aluminum and includes stainless steel hardware. It works with all standard racks, installs seamlessly and saves labor by not needing to cut away any roofing, will out live galvanized 2 to 1, and is a better low-profile mount.



Lag pull-out (withdrawal) capacities (lbs) in typical lumber:

	Specific gravity	Lag Screw Specifications: 5/16" shaft per 3" thread depth	Lag Screw Specifications: 5/16" shaft per 1" thread depth
Douglas Fir, Larch	.50	798	266
Douglas Fir, South	.46	705	235
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	705	235
Hem, Fir	.43	636	212
Hem, Fir. (North)	.46	705	235
Southern Pine	.55	921	307
Spruce, Pine, Fir	.42	615	205
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	..50	798	266

Sources: Uniform Building Code; American Wood Council
Notes: 1) Thread must be embedded in a rafter or other structural roof member.
2) Pull-out values incorporate a 1.6 safety factor recommended by the American Wood Council.
3) See IBC for required edge distances.

936 Detroit Ave Suite D, Concord, CA. 94518
Phone: (925) 687-6686 Fax: (925) 687-6689
Email: Info@quickmountpv.com www.quickmountpv.com

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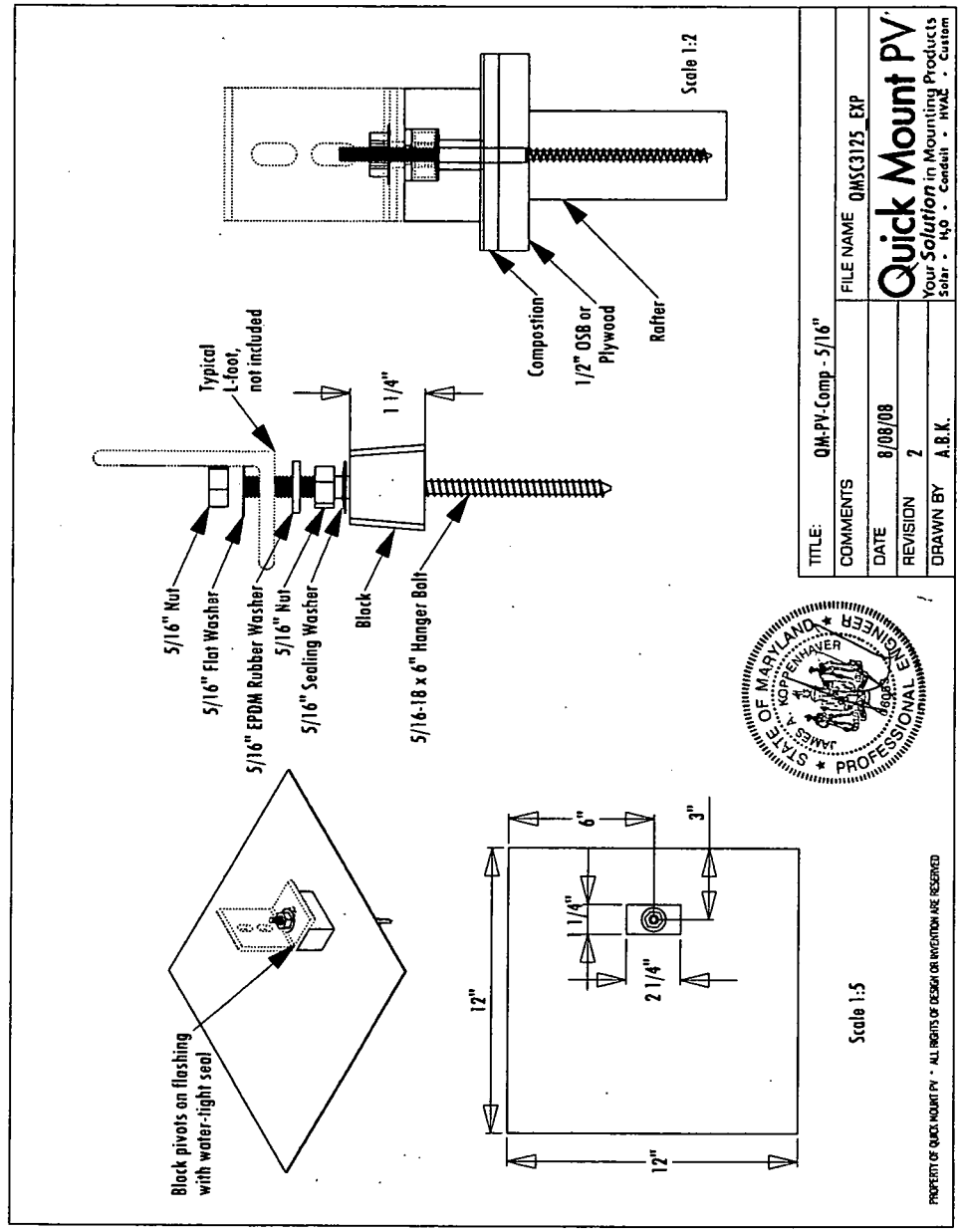
Montgomery County
Historic Preservation Commission
3/15/12



EXPEDITIED
MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION
STAFF REPORT

Address:	26 Columbia Avenue, Takoma Park	**Meeting Date:**	3/14/2012
Resource:	Non-Contributing Resource **Takoma Park Historic District**	**Report Date:**	3/7/2012
		Public Notice:	2/29/2012
Applicant:	Jennifer Park	**Tax Credit:**	None
Review:	HAWP	**Staff:**	Josh Silver
Case Number:	37/03-12G		
PROPOSAL:	Solar panel installation		

STAFF RECOMMENDATION

Staff recommends that the HPC **approve** this HAWP application.

ARCHITECTURAL DESCRIPTION

SIGNIFICANCE: Non-Contributing Resource within the Takoma Park Historic District
STYLE: Ranch
DATE: 1930-50s

PROPOSAL

The applicant is proposing to install 33 low-profile bracket mounted solar array panels on the southeast (front) roof slope of the house. The associated utility meter and power convertor units will be located on the north (right) side elevation.

APPLICABLE GUIDELINES

Montgomery County Code; Chapter 24A

(a) The commission shall instruct the director to deny a permit if it finds, based on the evidence and information presented to or before the commission that the alteration for which the permit is sought would be inappropriate, inconsistent with or detrimental to the preservation, enhancement or ultimate protection of the historic site or historic resource within an historic district, and to the purposes of this chapter.

(b) The commission shall instruct the director to issue a permit, or issue a permit subject to such conditions as are found to be necessary to insure conformity with the purposes and requirements of this chapter, if it finds that:
(1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or
(2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an

historic resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter; or

(3) The proposal would enhance or aid in the protection, preservation and public or private utilization of the historic site or historic resource located within an historic district in a manner compatible with the historical, archeological, architectural or cultural value of the historic site or historic district in which an historic resource is located; or

(4) The proposal is necessary in order that unsafe conditions or health hazards be remedied; or

(5) The proposal is necessary in order that the owner of the subject property not be deprived of reasonable use of the property or suffer undue hardship; or

(6) In balancing the interests of the public in preserving the historic site or historic resource located within an historic district, with the interests of the public from the use and benefit of the alternative proposal, the general public welfare is better served by granting the permit.

(c) It is not the intent of this chapter to limit new construction, alteration or repairs to any 1 period or architectural style.

(d) In the case of an application for work on an historic resource located within an historic district, the commission shall be lenient in its judgment of plans for structures of little historical or design significance or for plans involving new construction, unless such plans would seriously impair the historic or architectural value of surrounding historic resources or would impair the character of the historic district. (Ord. No. 9-4, § 1; Ord. No. 11-59.)

STAFF RECOMMENDATION

Staff recommends that the Commission **approve the HAWP application** as being consistent with Chapter 24A-8(b) (1) & (2);

(1) The proposal will not substantially alter the exterior features of an historic site or historic resource within an historic district; or

(2) The proposal is compatible in character and nature with the historical, archeological, architectural or cultural features of the historic site or the historic district in which an historic resource is located and would not be detrimental thereto or to the achievement of the purposes of this chapter; and

with the general condition that the applicant shall present the **3 permit sets of drawings to Historic Preservation Commission (HPC) staff for review and stamping** prior to submission for the Montgomery County Department of Permitting Services (DPS) building permits;

and with the general condition that the applicant shall notify the Historic Preservation Staff if they propose to make **any alterations** to the approved plans. Once the work is completed the applicant will contact the staff person assigned to this application at 301.563.3400 or joshua.silver@mncppc-mc.org to schedule a follow-up site visit.

RETURN TO: DEPARTMENT OF PERMITTING SERVICES
255 ROCKVILLE PIKE, 2nd FLOOR, ROCKVILLE, MD 20850
240/777-6370

DPS - #8

HISTORIC PRESERVATION COMMISSION
301/563-3400

591774

APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Person: Rollie Bells

FEB 21 2012

Daytime Phone No.: 301-788-4003

Tax Account No.: _____

Name of Property Owner: JENNIFER PARK Daytime Phone No.: 301-404-0134

Address: 26 COLUMBIA AVE TAKOMA PARK MD 20912
Street Number City Staet Zip Code

Contractor: ROLAND BELLS / PHOENIX ENGINEERING Phone No.: 301-788-4003

Contractor Registration No.: 99932

Agent for Owner: ROLAND BELLS Daytime Phone No.: 301-788-4003

LOCATION OF BUILDING/PREMISE

House Number: 26 Street: COLUMBIA AVE

Town/City: TAKOMA PARK FEB 21 2012 Nearest Cross Street: _____

Lot: _____ Block: _____ Subdivision: _____

Liber: _____ Folio: _____ Parcel: _____

PART ONE: TYPE OF PERMIT ACTION AND USE

1A. CHECK ALL APPLICABLE:

☐ Construct ☐ Extend ☒ Alter/Renovate

☐ Move ☐ Install ☐ Wreck/Raze

☐ Revision ☐ Repair ☐ Revocable

CHECK ALL APPLICABLE:

☐ A/C ☐ Slab ☐ Room Addition ☐ Porch ☐ Deck ☐ Shed

☒ Solar ☐ Fireplace ☐ Woodburning Stove ☐ Single Family

☐ Fence/Wall (complete Section 4) ☐ Other: _____

1B. Construction cost estimate: $ 30,000

1C. If this is a revision of a previously approved active permit, see Permit # _____

PART TWO: COMPLETE FOR NEW CONSTRUCTION AND EXTEND/ADDITIONS

FEB 21 2012

2A. Type of sewage disposal: 01 ☐ WSSC 02 ☐ Septic 03 ☐ Other: _____

2B. Type of water supply: 01 ☐ WSSC 02 ☐ Well 03 ☐ Other: _____

PART THREE: COMPLETE ONLY FOR FENCE/RETAINING WALL

3A. Height _____ feet _____ inches

3B. Indicate whether the fence or retaining wall is to be constructed on one of the following locations:

☐ On party line/property line ☐ Entirely on land of owner ☐ On public right of way/easement

I hereby certify that I have the authority to make the foregoing application, that the application is correct, and that the construction will comply with plans approved by all agencies listed and I hereby acknowledge and accept this to be a condition for the issuance of this permit.

_____ 2-21-12
Signature of owner or authorized agent *Date*

Approved: _____ *For Chairperson, Historic Preservation Commission*

Disapproved: _____ Signature: _____ Date: _____

Application/Permit No.: 591774 Date Filed: 2/22/2012 Date Issued: _____

Edit 6/21/99

SEE REVERSE SIDE FOR INSTRUCTIONS

3

THE FOLLOWING ITEMS MUST BE COMPLETED AND THE REQUIRED DOCUMENTS MUST ACCOMPANY THIS APPLICATION.

1. **WRITTEN DESCRIPTION OF PROJECT**

   a. Description of existing structure(s) and environmental setting, including their historical features and significance:

   GABLE ROOF, ASPHALT SHINGLES, BRICK SIDING, SEEMS RECENTLY NEW CONSTRUCTION, OSB SHEATHING, ELECTRICAL WIRES & SERVICE ARE NEW, PLUMBING IS PVC & COPPER, MOST BUILDING MATERIALS ARE FROM THE LAST 30 YEARS.

   b. General description of project and its effect on the historic resource(s), the environmental setting, and, where applicable, the historic district:

   ROOF MOUNTED SOLAR, NO EFFECT WILL BE MADE TO EXISTING FEATURES. HOWEVER, THEY WILL BE VISIBLE FROM THE STREET

2. **SITE PLAN**

   Site and environmental setting, drawn to scale. You may use your plat. Your site plan must include:

   a. the scale, north arrow, and date;

   b. dimensions of all existing and proposed structures; and

   c. site features such as walkways, driveways, fences, ponds, streams, trash dumpsters, mechanical equipment, and landscaping.

3. **PLANS AND ELEVATIONS**

   You must submit 2 copies of plans and elevations in a format no larger than 11" x 17". Plans on 8 1/2" x 11" paper are preferred.

   a. ***Schematic construction plans***, with marked dimensions, indicating location, size and general type of walls, window and door openings, and other fixed features of both the existing resource(s) and the proposed work.

   b. Elevations (facades), with marked dimensions, clearly indicating proposed work in relation to existing construction and, when appropriate, context. All materials and fixtures proposed for the exterior must be noted on the elevations drawings. An existing and a proposed elevation drawing of each facade affected by the proposed work is required.

4. **MATERIALS SPECIFICATIONS**

   General description of materials and manufactured items proposed for incorporation in the work of the project. This information may be included on your design drawings.

5. **PHOTOGRAPHS**

   a. Clearly labeled photographic prints of each facade of existing resource, including details of the affected portions. All labels should be placed on the front of photographs.

   b. Clearly label photographic prints of the resource as viewed from the public right-of-way and of the adjoining properties. All labels should be placed on the front of photographs.

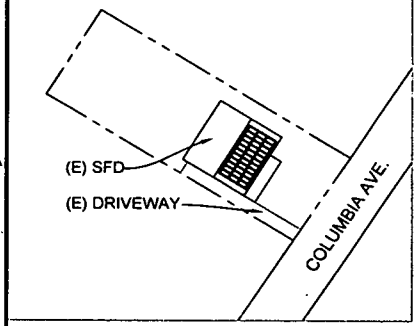
6. **TREE SURVEY**

   If you are proposing construction adjacent to or within the dripline of any tree 6" or larger in diameter (at approximately 4 feet above the ground), you must file an accurate tree survey identifying the size, location, and species of each tree of at least that dimension.

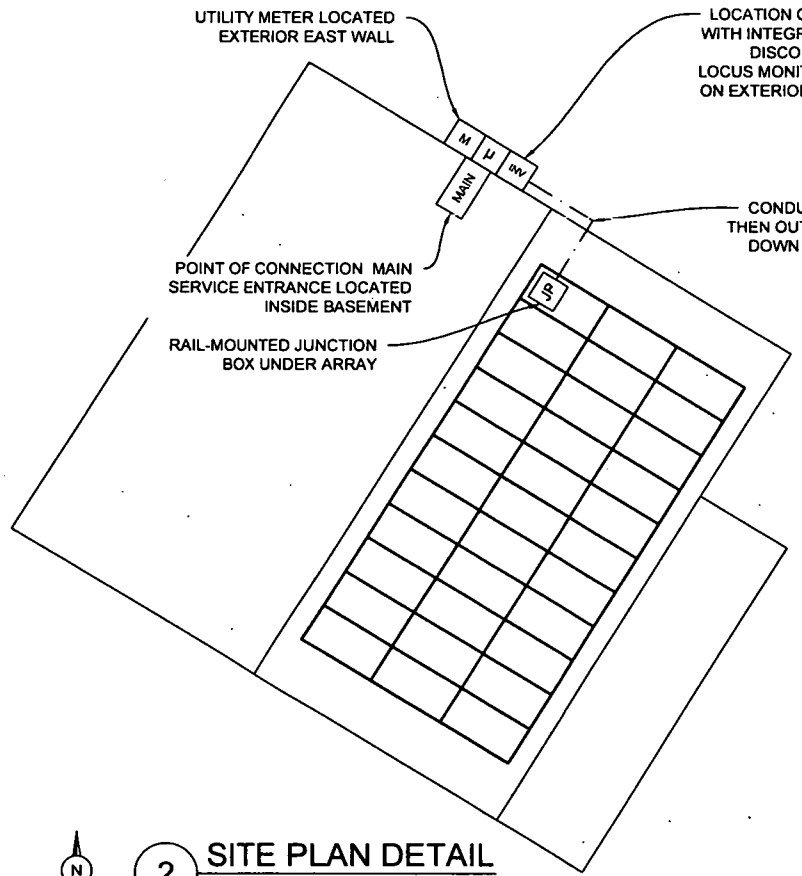
7. **ADDRESSES OF ADJACENT AND CONFRONTING PROPERTY OWNERS**

   For **ALL** projects, provide an accurate list of adjacent and confronting property owners (not tenants), including names, addresses, and zip codes. This list should include the owners of all lots or parcels which adjoin the parcel in question, as well as the owner(s) of lot(s) or parcel(s) which lie directly across the street/highway from the parcel in question. You can obtain this information from the Department of Assessments and Taxation, 51 Monroe Street, Rockville, (301/279-1355).

PLEASE PRINT (IN BLUE OR BLACK INK) OR TYPE THIS INFORMATION ON THE FOLLOWING PAGE.
PLEASE STAY WITHIN THE GUIDES OF THE TEMPLATE, AS THIS WILL BE PHOTOCOPIED DIRECTLY ONTO MAILING LABELS.



1 SITE PLAN
SCALE : 1/64" = 1'-0"



2 SITE PLAN DETAIL
SCALE : 1/8" = 1'-0"

THE INSTALLATION OF SOLAR ARRAYS AND PHOTOVOLTAIC POWER SYSTEMS SHALL BE IN ACCORDANCE WITH THE MOST RECENT NATIONAL ELECTRIC AND BUILDING CODES AND STANDARDS, AS AMENDED BY LOCAL JURISDICTION.

JURISDICTIONAL INFORMATION:

JURISDICTION: MONTGOMERY COUNTY
ADDRESS: 255 ROCKVILLE PIKE
ROCKVILLE, MD 20850
PHONE NUMBER: 240.777.6262

SYSTEM SUMMARY

THIS GRID TIED 6.105 KW DC, 5.27 KW CEC AC ROOF MOUNTED SOLAR ELECTRIC SYSTEM WITHOUT ENERGY STORAGE COMPONENTS CONSISTS OF:
(33) SUNTECH POWER STP185S-24/ADB+
(1) KACO BLUEPLANET 5002XI

NOTES TO INSTALLER:
CONDUIT PENETRATES ROOF TO ATTIC THEN EXITS AT EAVE ON EAST WALL THEN RUN DOWN AND ACROSS TO INVERTER WITH INTERGRATED AC/DC DISCONNECT, AND LOCUS MONITORING UNIT ON EXTERIOR EAST WALL NEXT TO UTILITY METER.
PUNCH THRU EAST WALL TO POINT OF CONNECTION IN MSP ON INTERIOR EAST WALL BEHIND MAIN UTILITY METER. PLACE 35A 2P PV AND LOCUS BREAKER AT BOTTOM OF BUS BAR.
CAT5 IS FROM INVERTER ON EXTERIOR EAST WALL TO MSP IN FINISHED BASEMENT WHERE ROUTER IS LOCATED.

NOTE: BALANCE OF SYSTEM (BOS) EQUIPMENT SHOWN FOR REFERENCE TO LOCATION ONLY - NOT TO SCALE

KEY:

PROPERTY LINE	INV INVERTER
CONDUIT RUN	SUB SUBPANEL
STRUCTURES	DC DC DISCONNECT
DRIVEWAY	AC AC DISCONNECT
SOLAR MODULE	PM PV PRODUCTION METER
MAIN MAIN SERVICE	JB JUNCTION BOX
M METER	MU MONITORING UNIT
	CB COMBINER BOX
	ROOF OBSTRUCTION

SHEET NUMBER	SHEET TITLE
0.1	COVER & SITE PLAN
1.1	ARRAY 1 & STRUCTURAL
2.1	ELECTRICAL DIAGRAM
2.2	ELEC. CALCULATIONS
3.1	LABELS

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

By: David Phife Date:11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 58023d. Planset

COVER AND SITE PLAN

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

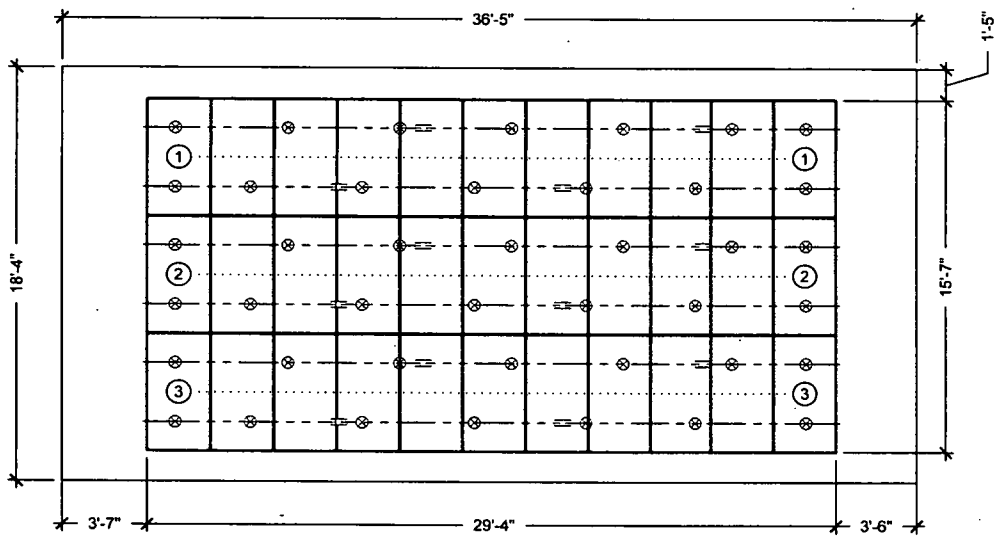
SUNGEVITY
SOLAR HOME SPECIALISTS

DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	
DESIGNED BY:		DAVID PHIFE	
CONTACT:		510.496.5573	
REVIEWED BY:		NICOLE THOMPSON	
DC kW STC:		6.105 kW	
SHEET SIZE:		11X17	

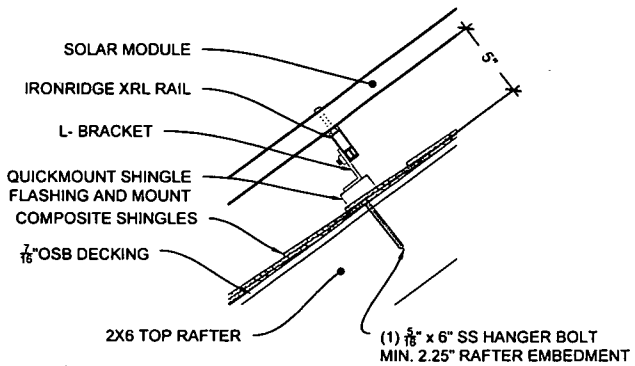
SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV0.1

5



1 ARRAY 1 - LAYOUT
AZIMUTH: 121° TN SCALE : 3/16" = 1'-0"



3 MOUNT DETAIL
SCALE : 1 1/2 "=1'0"

MODULE SPECS
(33) SUNTECH POWER STP185S-24/ADB+

MODULE WEIGHT:	34.1 LBS
MODULE LENGTH:	62.2"
MODULE WIDTH:	31.8"

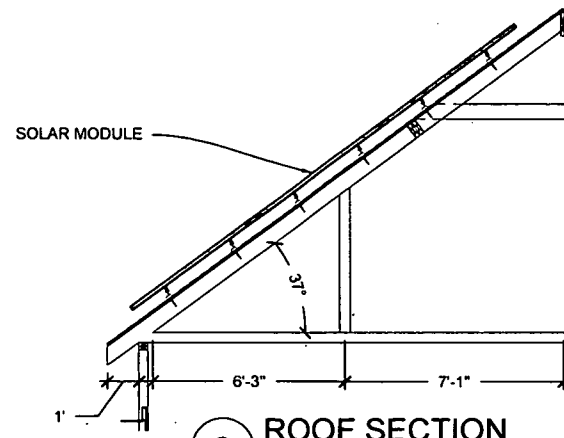
ROOF 1 SPECS

RAFTER SIZE:	2x6
RAFTER SPAN:	6'10"
RAFTER SPACING:	24" OC
ROOF MATERIAL:	COMPOSITE SHINGLES

ARRAY 1 SPECS

NUMBER OF MODULES:	33
TOTAL MODULE WEIGHT:	1125.3 LBS
RACKING WEIGHT:	217.6 LBS
ARRAY WEIGHT:	1384.9 LBS
ARRAY AREA:	453.3 SQFT
ARRAY DEAD LOAD:	3.1 LBS/SQFT
NUMBER OF MOUNTS:	42
LOAD PER MOUNT:	33.0 LBS
ROOF PITCH:	37°
ROOF HEIGHT (ft):	25

SYMBOL KEY:
- ⊗ MOUNT
- ---- RAIL
- RAFTERS
- —— ROOF
- ▭ SOLAR MODULE
- = RAIL SPLICE
- ⊙···⊙ STRING CONFIG.



2 ROOF SECTION
SCALE : 1/4 "=1'0"

STATE OF MARYLAND
JAMES A. KOPPELMAN
PROFESSIONAL ENGINEER

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

9

ARRAY 1 & STRUCTURAL

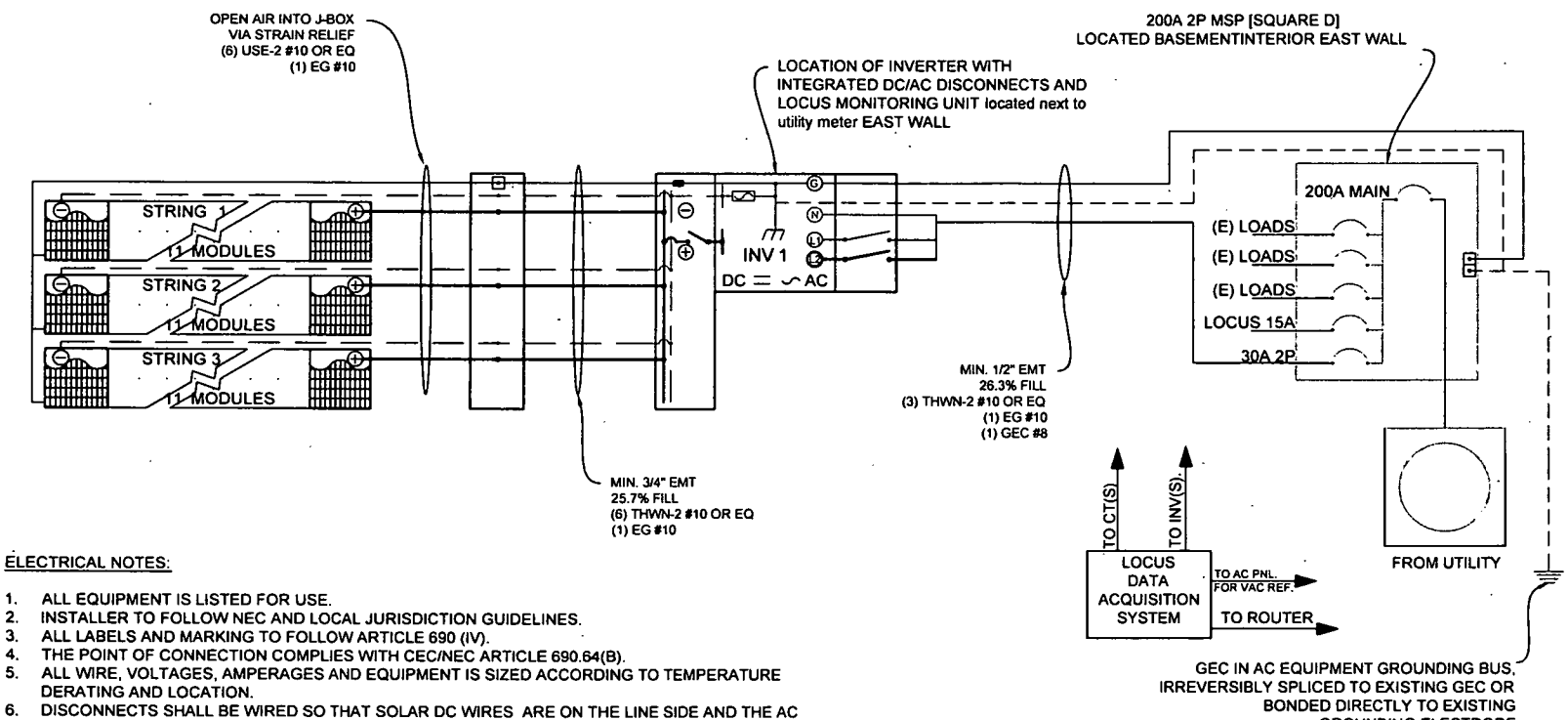
PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	
DESIGNED BY:		DAVID PHIFE	
CONTACT:		510.496.5573	
REVIEWED BY:		NICOLE THOMPSON	
DC kW STC:		6.105 kW	
SHEET SIZE:		11X17	

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV1.1



MODULE ELECTRICAL SPECS

(33) SUNTECH POWER STP185S-24/ADB+

SHORT CIRCUIT CURRENT (Isc):	5.43 A
OPEN CIRCUIT VOLTAGE (Voc):	45 V
OPERATING CURRENT (IMP):	5.09 A
OPERATING VOLTAGE (VMP):	36.4 V
MAX SERIES FUSE RATING:	15 A
STC RATING:	185 W
CEC PTC RATING:	167.2 W

DESIGN CONDITIONS

HIGHEST 2% DB DESIGN TEMP. (°C):	34 °C
MIN. MEAN EXTREME ANNUAL DB (°C):	-12 °C

INVERTER 1 SPECS

(1) KACO BLUEPLANET 5002XI

RATED WATTS (EACH):	5000 W
AC OPERATING VOLTAGE:	240 V
AC OPERATING CURRENT:	24 A
MODULES PER STRING:	11
INVERTER EFFICIENCY:	95.5 %

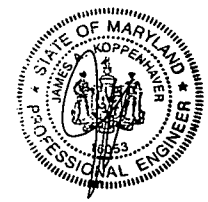
INTEGRATED AC & DC DISCONNECT SWITCH

INVERTER 1 STRINGING (690.53)

MAX POWER POINT CURRENT (IMP):	15.3 A
MAX POWER POINT VOLTAGE (VMP):	400.4 V
MAX SYSTEM VOLTAGE (VOC) 690.7(A)1:	557.3 V
SOURCE CIRCUIT CURRENT (ISC) 690.8(A)1:	6.8 A
MAX SHORT CIRCUIT CURRENT (ISC) 690.8(A)2:	20.4 A

ELECTRICAL NOTES:

1. ALL EQUIPMENT IS LISTED FOR USE.
2. INSTALLER TO FOLLOW NEC AND LOCAL JURISDICTION GUIDELINES.
3. ALL LABELS AND MARKING TO FOLLOW ARTICLE 690 (IV).
4. THE POINT OF CONNECTION COMPLIES WITH CEC/NEC ARTICLE 690.64(B).
5. ALL WIRE, VOLTAGES, AMPERAGES AND EQUIPMENT IS SIZED ACCORDING TO TEMPERATURE DERATING AND LOCATION.
6. DISCONNECTS SHALL BE WIRED SO THAT SOLAR DC WIRES ARE ON THE LINE SIDE AND THE AC UTILITY WIRES ARE ON THE LINE SIDE.
7. MAXIMUM VOLTAGE DOES NOT EXCEED 600VDC.
8. ALL MODULES AND RACKING SHALL BE GROUNDED WITH TIN PLATED DIRECT BURIAL RATED LAY IN LUGS USING STAINLESS STEEL HARDWARE, STAR WASHERS, AND THREAD FORMING BOLTS.
9. ALL EQUIPMENT SHALL BE GROUNDED, INCLUDING BONDING JUMPERS WHERE NECESSARY ACROSS RAIL SPLICE PLATES TO BOND INDIVIDUAL PIECES OF RAIL
10. ONLY COPPER (CU) CONDUCTORS SHALL BE USED. STRANDED OR SOLID WITH PROPERLY RATED CONNECTORS.
11. INVERTER(S) CONTAIN A GROUND FAULT DETECTION AND INTERRUPTION DEVICE.
12. ALL EQUATIONS ACCOUNT FOR WORST CASE CONDITIONS.



ELECTRICAL KEY:

- BREAKER
- SWITCH
- SCREW TERMINAL
- FUSE
- SPLICE
- EARTH GROUND
- CHASSIS GROUND
- GEC
- EGC

IMPORTANT

BACKFED SOLAR BREAKER(S) SHALL BE INSTALLED AT THE END OF THE CIRCUIT OR FURTHEST AWAY FROM THE MAIN BREAKER.

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

ELECTRICAL DETAIL

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

DRAWN BY	DATE	REV	PAGE NUMBER
DP	11/18/2011	0	

DESIGNED BY:	DAVID PHIFE
CONTACT:	510.496.5573
REVIEWED BY:	NICOLE THOMPSON
DC kW STC:	6.105 kW
SHEET SIZE:	11X17

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV2.1

By: David Phife Date: 11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 580235, Pleasant

DC WIRE SIZE:

SOURCE CIRCUIT [690.8(A)(1)] (Isc): Isc * 1.25
OUTPUT CIRCUIT [690.8(A)(2)] (Isc): Isc * 1.25 * # STRINGS
MIN. DC WIRE AMPACITY:
[690.8(a), 690.8(b), 210.19(A)1, 215.2(A), 110.14(C)]:
THE MAXIMUM OF:
1. (Isc * 1.25) / (CONDITIONS OF USE)
2. (Isc * 1.25 * 1.25)
DERATE WIRE FOR TERMINALS DEPENDING UPON TEMP.

AC WIRE SIZE:

INVERTER OUTPUT [690.8(A)] (Isc): INV. OUTPUT * 1.25
MIN. AC WIRE AMPACITY:
[690.8(a), 690.8(b), 210.19(A)1, 215.2(A), 110.14(C)]:
THE MAXIMUM OF:
1. (INV. OUTPUT * 1.25)
2. (INV. OUTPUT) / CONDITIONS OF USE
DERATE WIRE FOR TERMINALS DEPENDING UPON TEMP.

GROUNDING SIZE:

GEC
NEC 690.47
Sized per Table 250.66 for AC
Sized per Table 250.166 for DC
DC EGC
Table 250.122
Use 1.56 * Isc * # strings (if applicable)
AC EGC
NEC 250.122
Sized based on OCPD.

MAXIMUM SYSTEM VOLTAGE:

NEC2008/2011 requires to use manufacturers Coefficient if available

Method A: Voc * # of modules in series * NEC Coefficient
Method B: {[(T min °C - 25°C) * V/°C] + Voc} * # of modules in series

120% RULE:

NEC2008: [690.64(B)2
NEC2011: 705.12(D)2
MINIMUM BUS BAR OR CONDUCTOR =
TOTAL NUMBER OF BREAKERS FEEDING / 1.2

OCPD SIZING:

MIN DC: ISC * 1.56
MIN AC: INV. OUTPUT * 1.25

VOLTAGE DROP:

(2KID/CM)/VOLTAGE * 100 = VOLTAGE DROP %
K = 12.9 FOR COPPER
I = CURRENT (IMP OR OUTPUT AC)
D = DISTANCE IN FEET, ONE WAY
CM = CIRCULAR MILS

AC wire size	Inverter 1
Quantity:	1
Conductors in Raceway:	3
Nipple (less than 24"):	NO
Wire Rating (°C):	75
Terminal Rating (°C):	60
Conduit Fill derating:	1
Highest 2% DB design temp (°F):	93.2
Tempterature Correction factor:	0.94
Inverter Rated output Current (690.8(A)):	24
Method A: 1.25*Continuous Current (215.2) (A):	30
Method B: Max. Circuit Current with conditions (A):	25.53
Min. Ampacity required (A):	30.00
Wire sized pre-terminal comparison (AWG):	#10
Wire size ampacity post-terminal comparison (A):	35
Minimum Wire Size (AWG):	#10

DC wire size	Location 1	Location 2
Number Strings Combined:	1	1
Conductors in Raceway:	6	6
Nipple (less than 24"):	NO	No
Wire Rating (°C):	90	90
Terminal Rating (°C):	90	90
Conduit Height Off of Roof:	0.5" - 3.5"	0.5" - 3.5"
Conduit Fill derating:	0.8	0.8
CorrectedHighest 2% DB design temp (°F):	133.2	133.2
Tempterature Correction factor:	0.71	0.71
Maximum Circuit Current (690.8(A)(IpvMax):	6.79	6.7875
Method A: 1.25*Continuous Current (215.2) (A):	8.48	8.484375
Method B: Max. Circuit Current with conditions (A):	11.95	11.9498239
Min. Ampacity required (A):	11.95	11.9498239
Wire sized pre-terminal comparison (AWG):	#14	#14
Wire size ampacity post-terminal comparison (A):	25	25
Minimum Wire Size (AWG):	#14	#14

Max. System Voltages	INV1 MPPT1
Modules Per string:	11
Min. Mean Extreme Annual DB (°F):	10
NEC 2008/2011 temp. correction factor:	1.16
Manufacturers Cof of Temp (V/°C):	-0.153
Temperature Difference (°C):	-37
Module Voc (V):	45
Max System Voltage:	557.3 V

120% Rule	Amperage
Main Panel OR Sub Buss (A):	200
Main Breaker (A):	200
Allowable Input Breaker (A):	40

DC EGC Size	
Min. amperage:	8.47
Min. EGC size:	#14

AC EGC Size	
Min. amperage:	30.00
Min. EGC size:	#10

DC Fuse Size	
Min. amperage:	8.47
Min. fuse size if needed:	10A Fuse

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

By: David Phife Date: 11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 58023\5. Planset

CALCULATIONS

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

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CONTACT:	510.496.5573		
REVIEWED BY:	NICOLE THOMPSON		
DC kW STC:	6.105 kW		
SHEET SIZE:	11X17		

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

PV2.2

1

NEC 690.5(c)
PLACE THIS LABEL ON INVERTER(S) OR NEAR GROUND-FAULT INDICATOR (ON INVERTER(S) U.O.N.)

WARNING
ELECTRIC SHOCK HAZARD
IF A GROUND FAULT IS INDICATED, NORMALLY GROUNDED CONDUCTORS MAY BE UNGROUNDED AND ENERGIZED

2

NEC 690.17
PLACE THIS LABEL ON ***ALL*** DISCONNECTING MEANS WHERE ENERGIZED IN AN OPEN POSITION

WARNING
ELECTRIC SHOCK HAZARD
DO NOT TOUCH TERMINALS
TERMINALS ON BOTH THE LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION

3

NEC 690.64(B)(7)
PLACE THIS LABEL AT P.O.C. TO SERVICE DISTRIBUTION EQUIPMENT (I.E. MAIN PANEL (***AND*** SUBPANEL IF APPLICABLE))
THIS LABEL IS ONLY NECESSARY WHEN BREAKERS FEEDING PANEL EXCEEDS 100% OF BUSS RATING.

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE THIS OVERCURRENT DEVICE

4

NEC 690.53 & NEC 690.14(C)(2)
PLACE THIS LABEL ON ***ALL*** PHOTOVOLTAIC DC DISCONNECTING MEANS (ON INVERTER IF INTEGRATED DC DISCONNECTS ***AND*** AT SEPARATE DC DISCONNECT IF APPLICABLE)

INVERTER 1 DISCONNECT

PHOTOVOLTAIC SYSTEM DISCONNECT	
RATED MAX POWER POINT CURRENT (IMP)	15.3 A
RATED MAX POWER POINT VOLTAGE (VMP)	400.4 V
MAX SYSTEM VOLTAGE (VOC)	557.3 V
SHORT CIRCUIT CURRENT (ISC)	20.4 A

5

NEC 690.54
PLACE THIS LABEL AT "INTERACTIVE POINT OF INTERCONNECTION" (AT MAIN SERVICE PANEL ***AND*** SUBPANEL IF APPLICABLE)

INTERACTIVE PHOTOVOLTAIC POWER SOURCE	
RATED AC OUTPUT CURRENT (A)	24 A
NOMINAL OPERATING AC VOLTAGE (V)	240 V

ALL LABELS AND MARKINGS SHALL BE ATTACHED ACCORDING TO REQUIREMENTS BY NEC AND THE LOCAL AHJ. THE AHJ MAY HAVE SPECIAL LABEL REQUIREMENTS BEYOND THE SCOPE OF THIS DOCUMENT. THIS MAY ENCOMPASS LANGUAGE INCLUDING, BUT NOT LIMITED TO, THAT FOUND IN NEC ARTICLES 690.5 (C), 690.14 (C)(2), 690.17, 690.53,690.35(F), 690.54, 690.64(B)(7) and 705.10

STATE OF MARYLAND
JAMES A. KOPPENHAVER
6053
PROFESSIONAL ENGINEER

SUSTAINABLE ENERGY SYSTEMS, LLC
108 W 14TH ST
FREDERICK, MD 21701
PHONE: 3017884003

6

By: David Phife Date:11/23/2011 Location: C:\Users\dphife\Desktop\Park, Jennifer 58023\6. Planset

LABELS

PARK RESIDENCE
26 COLUMBIA AVE
TAKOMA PARK, MD 20912
301-404-0139 ACCT#: 58023

SUNGEVITY
SOLAR HOME SPECIALISTS

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DC kW STC:	6.105 kW
SHEET SIZE:	11X17

SUNGEVITY INC.
66 FRANKLIN ST
SUITE 310
OAKLAND, CA 94607

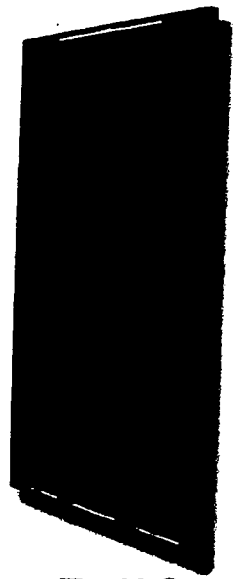
PV3.1

STP185S - 24/Adb+
STP180S - 24/Adb+

SUNTECH
Solar powering a green future™

185 Watt
MONOCRYSTALLINE SOLAR MODULE

Suntech Black Label™ modules are exclusively designed and engineered for homeowners who seek a rooftop solar solution that combines visual aesthetics with excellent efficiency.



Features

- High module conversion efficiency (up to 14.5%), through superior manufacturing technology
- Guaranteed 0-5W positive power output tolerance ensures high reliability
- Proprietary Gallium-F22 doping process dramatically reduces initial light-induced degradation to <1%, thus delivering better power and performance over time
- Entire module certified to withstand high wind loads (2400 Pascal) and snow loads (5400 Pascal) *

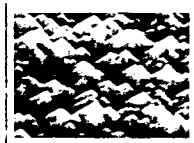
Trust Suntech to Deliver Reliable Performance Over Time

- World's leading manufacturer of crystalline silicon photovoltaic modules
- Unrivaled manufacturing capacity and world-class technology
- Rigorous quality control meeting the highest international standards : ISO 9001: 2008 and ISO 14001: 2004
- Certification and standards: IEC 61215, IEC 61730, conformity to CE

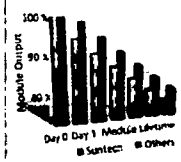
Industry-leading warranty

- 25 year transferrable power output warranty: 5 year/95%, 12 year/90%, 18 year/85%, 25 year/80% **
- Based on nominal power
- Warrants 6.7% more power than the market standard over 25 years
- 5 year material and workmanship warranty

* Please refer to Suntech Standard Module Installation Manual for details.
** Please refer to Suntech Product Warranty for details.



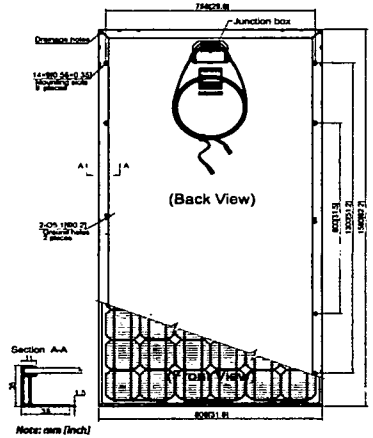
Patented surface pyramids enhance sunlight absorption by redirecting reflected light to other areas on the cell surface to be reabsorbed



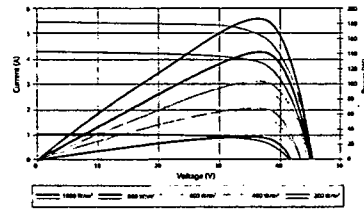
Suntech cells feature a breakthrough process that replaces traditional boron doping with gallium doping. The effect of initial light-induced degradation is dramatically reduced, leading to greater power output over the entire module lifetime.

Graph is for illustration only and does not imply any guarantee of module performance. Please check warranty for details.

STP185S - 24/Adb+
STP180S - 24/Adb+



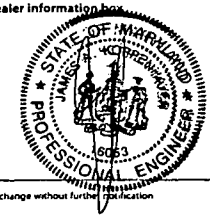
Current-Voltage & Power-Voltage Curve (185S-24)



Temperature Characteristics

Nominal Operating Cell Temperature (NOCT)	45±2°C
Temperature Coefficient of Pmax	-0.48 %/°C
Temperature Coefficient of Voc	-0.34 %/°C
Temperature Coefficient of Isc	0.037 %/°C

Dealer information box



Specifications are subject to change without further notification

Electrical Characteristics

STC	STP185S-24/Ad+	STP180S-24/Ad+
Optimum Operating Voltage (Vmp)	36.4 V	36.0 V
Optimum Operating Current (Imp)	5.09 A	5.00 A
Open - Circuit Voltage (Voc)	45.0 V	44.8 V
Short - Circuit Current (Isc)	5.43 A	5.29 A
Maximum Power at STC (Pmax)	185 W	180 W
Module Efficiency	14.5 %	14.1 %
Operating Temperature	-40 °C to +85 °C	-40°C to +85°C
Maximum System Voltage	600 V DC	600 V DC
Maximum Series Fuse Rating	15 A	15 A
Power Tolerance	0/+5 W	0/+5 W

STC: Irradiance 1000 W/m², module temperature 25 °C, AM=1.5

NOCT	STP185S-24/Ad+	STP180S-24/Ad+
Maximum Power (W)	137 W	133 W
Maximum Power Voltage (V)	33.2 V	32.9 V
Maximum Power Current (A)	4.11 A	4.05 A
Open Circuit Voltage (Voc)	41.3 V	40.9 V
Short Circuit Current (Isc)	4.39 A	4.30 A
Efficiency Reduction (from 1000 W/m² to 200 W/m²)	<4.5%	<4.5%

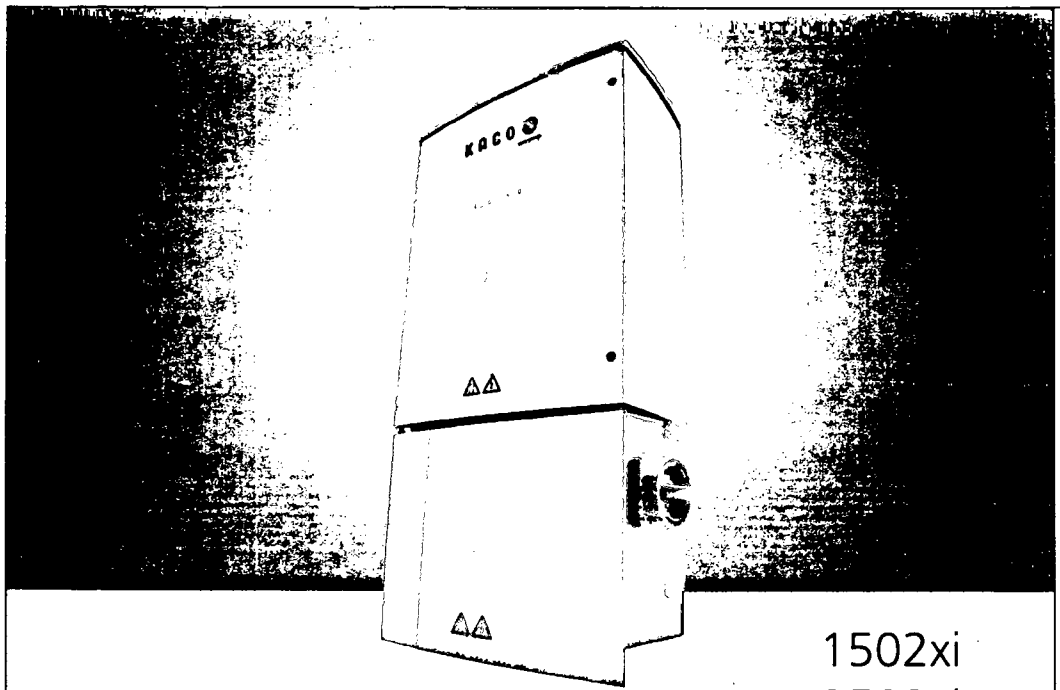
NOCT: Irradiance 800 W/m², ambient temperature 20 °C, wind speed 1 m/s

Mechanical Characteristics

Solar Cell	Monocrystalline 125 x 125 mm (5 inches)
No. of Cells	72 (6 x 12)
Dimensions	1580 x 808 x 35mm (62.2 x 31.8 x 1.4 inches)
Weight	15.5 kgs (34.1 lbs.)
Front Glass	3.2 mm (0.13 inches) tempered glass
Frame	Anodized aluminium alloy
Junction Box	IP67 rated
Output Cables	H+S RADOX® SMART cable 4.0 mm² (0.006 inches²), symmetrical lengths (-) 1000 mm (39.4 inches) and (+) 1000 mm (39.4 inches), H4 connectors (MC4 compatible)

Packing Configuration

Container	20' GP	40' GP
Pieces per pallet	26	26
Pallets per container	12	28
Pieces per container	312	728



KACO blueplanet 02xi series grid-tied inverters

1502xi
2502xi
3502xi
5002xi

- Highest efficiency in their class - over 95.5%
- Programmable LCD display with night switch
- Plug and play web monitoring option
- Lockable NEC compliant AC/DC disconnect
- Field selectable grid voltage (240 / 208 V_{AC})
- Field selectable positive or negative grounding
- Convection cooled aluminum housing - high reliability
- NEMA 3R enclosure - for indoor or outdoor installation
- 1/2" or 3/4" knockouts on sides, bottom & rear of unit
- *easy*Install light weight installation bracket
- *easy*Link data interface includes RS485 connection
- *easy*Swap 10 year warranty with service reimbursement

*tested to UL 1741, IEEE 1547, CSA 22.2

TÜV Rheinland of North America, Inc. US

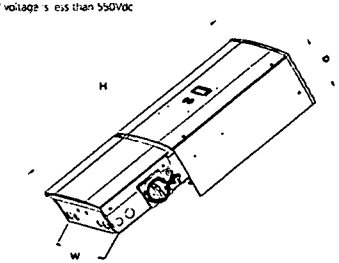
KACO new energy.

The KACO 02xi blueplanet series - the latest generation of PV inverters.

- Refined power electronics increase operational efficiency, increase CEC efficiency to 95.5% on all units and improve reliability.
- All inverters include a factory assembled connection box which includes an NEC compliant AC/DC disconnect switch.
- The inverters can be easily and safely removed from the connection box to allow field service.
- The connection box allows conduit to connect from both sides, the bottom or the rear for increased installation flexibility. Using the rear knockouts will hide all conduits for a clean install.
- Field selectable grid voltages 240 / 208 VAC (220 VAC for Mexico) with or without neutral sensing.
- Field selectable positive or negative grounding simplify installs and create more opportunities to use the KACO blueplanet inverters.
- Convenient PV system monitoring with integrated plug and play ethernet web monitoring option reduces lifetime system costs by ensuring optimal system performance.
- Easy to use push button interface to configure the inverter and access stored PV data on the blueplanet LCD screen. Night illumination switch backlights display for access to production data when the inverter is in standby mode.
- Light weight design makes the inverters less expensive to ship and easier to handle than other comparably sized inverters.

Model number		blueplanet 1502xi	blueplanet 2502xi	blueplanet 3502xi	blueplanet 5002xi
Input data (DC)					
DC operating range (MPP)		125 - 400 V	200 - 450 V	200 - 510 V	200 - 510 V
Max. DC input voltage		550 V	550 V	550/600* V	550/600* V
Nominal DC input current		14.3 A	13.5 A	18.5 A	26.5 A
Max. DC input Isc current		21.45 A	21.45 A	28 A	40 A
Output data (AC)					
Max. continuous output power (CEC)		1500 W	2500 W	3500 W	5000 W
Max. over-current protection		15 A	20 A	25 A	30 A
Max. continuous current	240 V	8 A	12 A	16 A	24 A
	208 V	8 A	12.5 A	17 A	24 A
AC operating range	240 V	211 - 264 V			
	208 V	184 - 226 V			
	220 V	198 - 242 V (for Mexico)			
Frequency		60 Hz (59.3 – 60.5 Hz)			
CEC rated efficiency	240 V	95.5%	95.5%	95.5%	95.5%
	208 V	95%	95%	95.5%	95%
Additional data					
AC/DC disconnect ratings		AC: 300 V - 36 A / DC: 600 V - 40 A			
Cooling		True convection - ultimate reliability (5002xi - fan assisted)			
DC reverse polarity protection		YES			
Ground fault protection		Integrated ground fault detector/interrupter (GFDI)			
Grounding		Field selectable positive or negative ground option			
Visual displays		Backlit LCD w/ convenient night switch & push button controls			
Included accessory interfaces		*easy*Link RS485 & S0 port			
Ambient temp @ max AC power		-5°F - +104°F	-20°C - + 40°C		
Thermal protection		Yes			
Noise emissions		< 35 dB (silent operation)			
Night power consumption		0.3 W			
Warranty		Standard *easy*Swap 10 years			
Certifications					
Safety compliance		UL 1741, IEEE 1547, NEC, CSA 22.2 No.107.1-01			
Communications compliance		FCC Part 15 Class B			

* - Unit will only feed power if the PV voltage is less than 550Vdc



Mechanical Specifications

Model	Height (H)	Width (W)	Depth (D)	Weight
1502xi	30 in	14 in.	8 1/4 in.	42 lbs
2502xi	32 in	14 in	8 1/4 in	52 lbs
3502xi	35 7/8 in.	14 in.	9 1/2 in	69 lbs
5002xi	35 7/8 in.	14 in	9 1/2 in.	70 lbs
Enclosure	NEMA 3R			

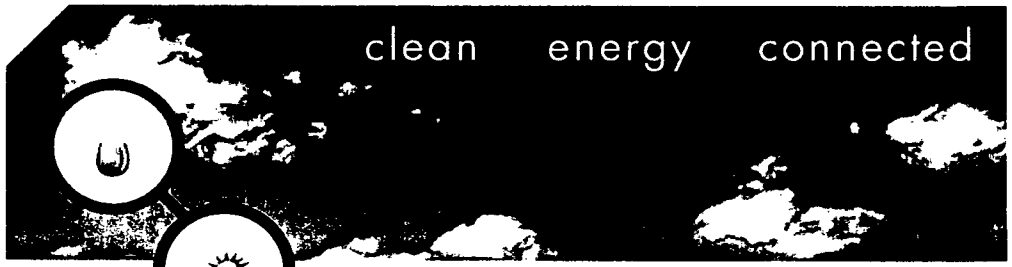
Download the KACO calc string sizing tool from www.kaco-newenergy.com.

Distributed by:

STATE OF MARYLAND JAMES A. KOPPENHAVER PROFESSIONAL ENGINEER 6053

KACO new energy.

T: +1 (866) 522 6765 • F: +1 (415) 931 1688
kacoinfo@kaco-newenergy.com • www.kaco-newenergy.com



Locus Smart Monitoring

Our product is a web-based monitoring and performance optimization platform that integrates with any type of distributed energy system.

The Locus Smart Monitoring platform combines revenue-grade metering hardware and web-based software into a scalable energy generation and usage monitoring service. The platform works with any current or future type of power inverter, collecting performance data continuously and uploading it to Locus' servers. Both installation professionals and their end-users can then log on to customized portals giving them real-time access to system information.

Automated SREC and Compliance Reporting

The systems you install are generating valuable Solar Renewable Energy Credits. Normally, these would need to be manually recorded and then transmitted to a state agency or public utility commission on a regular basis for the useful life of the system.

Smart Monitoring enables you to automate this task, while at the same time reducing any requirements for an audit/true-up to ensure that the numbers being recorded match what the system actually is producing.

This revenue-grade accuracy and report automation helps to ensure that the environmental and economic benefits of your installed systems are being maximized.

Performance Optimization

In addition to monitoring, the Locus platform continually runs patent-pending diagnostic algorithms to identify underperforming systems. Catastrophic system degradations such as inverter or string failures are unusual and generally easy to diagnose.

It is the non-catastrophic degradation such as unanticipated shading, pollen/dust accumulation, etc. that can go unnoticed for long periods of time and significantly affect system efficiency.

By providing a set of customizable and automated diagnostics, Locus enables installers to proactively optimize system performance.

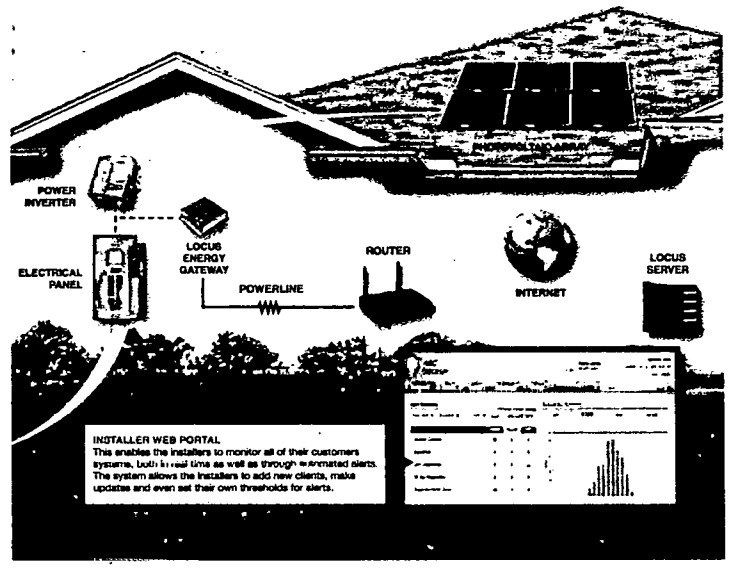
Fleet Management

For installers who manage multiple installations, we offer a suite of tools to increase the efficiency of fleet management:

- Customizable system performance alerts
- Quick links to 24-hour, monthly and lifetime fleet data
- Interactive map showing locations of your system fleet

www.locusenergy.com
1-877-LOCUS-EN

LOCUS ENERGY



Plug and Play integration	• Quick setup for new and retrofit installations • Works with any type of power inverter • Gateway can simultaneously measure PV, solar thermal & building demand
Intuitive interface	• Dashboard view displays status of entire install base at a glance • Easy to drill-down to specific clients and systems • White-labeled client portal allows installers to offer branded web-based monitoring to end-users
Robust diagnostics and reporting	• Continuous system performance monitoring and diagnostics - automatically spots degradation • User-configurable voltage and current alerts • Downloadable performance graphs and spreadsheets

technical specs

> Voltage Inputs
- 85-264 Volts Line To Neutral or Line to Line
- Universal Voltage Input
- Input Withstand Capability 4k VAC
- Single Phase

> Current Inputs
- Specified CTs for 0-600 Amps
- Pass through wire diameter: 0.75" or 1.25"

> Communications
- Wired via Ethernet
- Wireless via IEEE 802.g Wi-Fi
- Wireless range – up to 150 feet
- Wired range – up to 1000 feet

> Environmental Rating
- Storage: (-20 to +70)° C
- Operating: (-20 to +70)° C
- Humidity: to 95% RH Non-Condensing Indoor use only without cabinet
- Built in mounting brackets
- NEMA 12 boxes available for exterior use

> Data Storage
- 1 device/5 min. increments, 2 mos
- 1 device/15 min. increments: 6 mos.
- 5 devices/15 min. increments, 2 mos

> Power Supply
- 85 to 264 Volts AC 50/60 Hz Universal Input

> Standard Communications
- RS232 Ports (Back Plate)
- RS485 Modbus Port (Front Plate)
- Ethernet RJ45
- USB

> Dimensions and Shipping
- Weight: 1 lb 10 oz
- Basic Unit: H2.0 x W6.5 x L6.5

> Compliance:
Certified by TUV Rheinland of North America
- ANSI C12.20 (0.5% Accuracy)
- IEC 61010 (Safety)
- FCC 15 Part B
- IEC 60068-2-27 (Mechanical shock)
- IEC 60068-2-6 (Mechanical Vibration)
- CFR 47 ANSI C63.4 (Radiated emissions)

> Warranty:
- 5 years limited warranty for power-meter, data logger

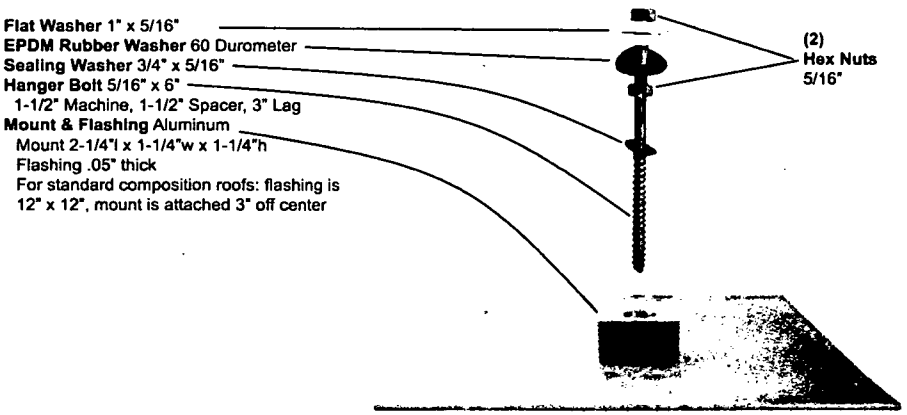
Quick Mount PV®

Your *Solution* in Mounting Products

Solar • H_2O • Conduit • HVAC • Custom

Composition Mount Specifications

Quick Mount PV® is an all-in-one waterproof flashing and mount to anchor photovoltaic racking systems, solar thermal panels, air conditioning units, satellite dishes, or anything you may need to secure to a new or existing roof. It is made in the USA of all aluminum and includes stainless steel hardware. It works with all standard racks, installs seamlessly and saves labor by not needing to cut away any roofing, will out live galvanized 2 to 1, and is a better low-profile mount.



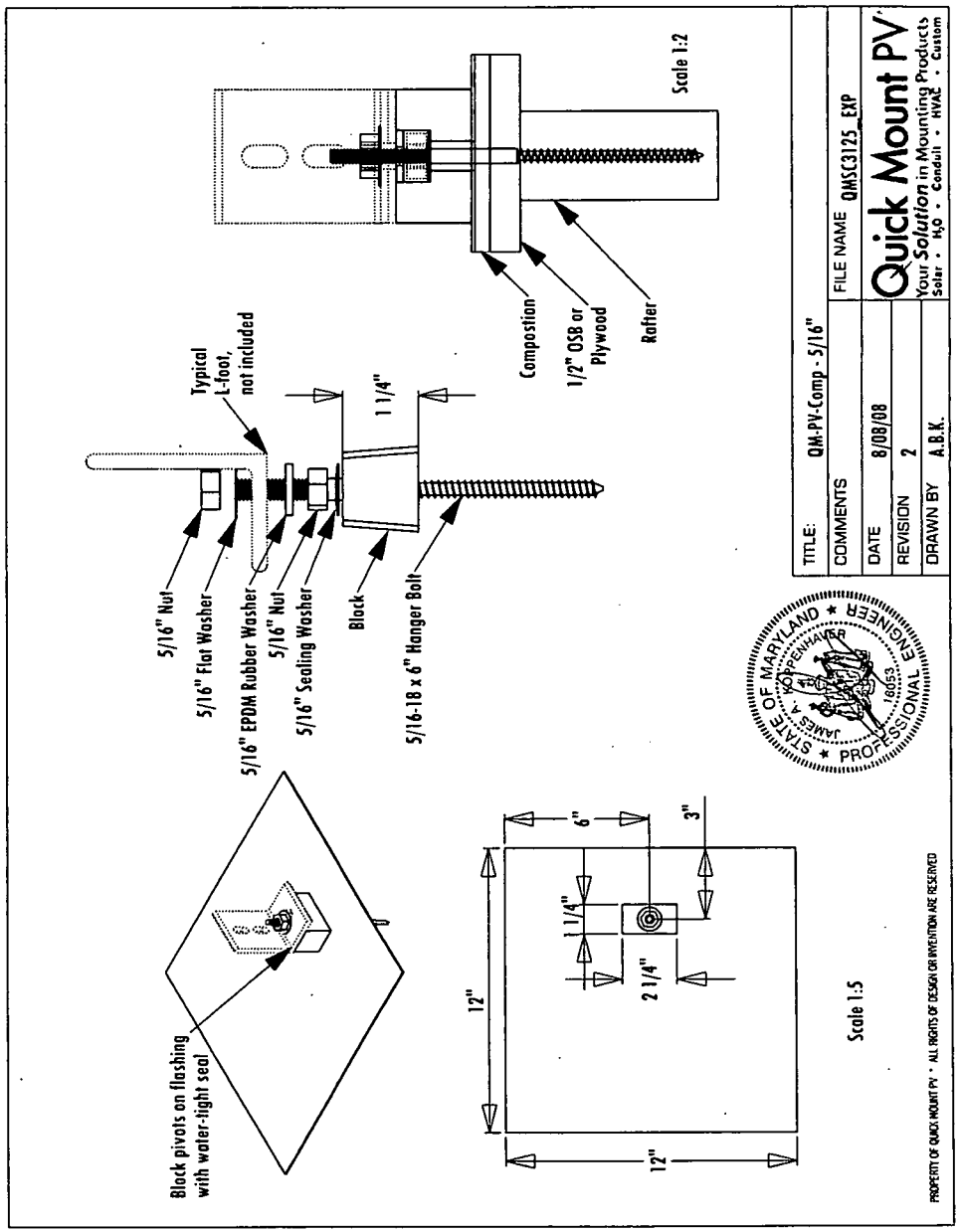
Lag pull-out (withdrawal) capacities (lbs) in typical lumber:

	Specific gravity	Lag Screw Specifications: 5/16" shaft per 3" thread depth	Lag Screw Specifications: 5/16" shaft per 1" thread depth
Douglas Fir, Larch	.50	798	266
Douglas Fir, South	.46	705	235
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	705	235
Hem, Fir	.43	636	212
Hem, Fir. (North)	.46	705	235
Southern Pine	.55	921	307
Spruce, Pine, Fir	.42	615	205
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	..50	798	266

Sources: Uniform Building Code; American Wood Council
Notes: 1) Thread must be embedded in a rafter or other structural roof member.
2) Pull-out values incorporate a 1.6 safety factor recommended by the American Wood Council.
3) See IBC for required edge distances.

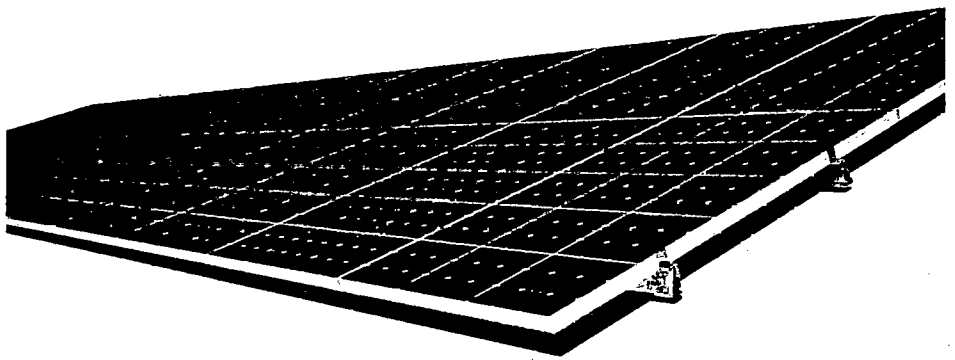
936 Detroit Ave Suite D, Concord, CA. 94518
Phone: (925) 687-6686 Fax: (925) 687-6689
Email: info@quickmountpv.com www.quickmountpv.com

13



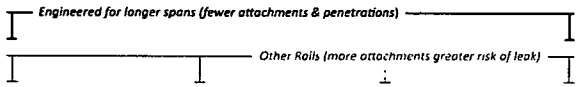
IRONRIDGE
Solar Mounting Made Simple

Roof Mounts



IronRidge Roof Mount System is a reliable, comprehensive, and feature rich photovoltaic mounting solution. Anchored by the XRS (Standard) and XRL (Light) rails, the IronRidge Roof Mounts platform includes all of the components necessary for supporting virtually any commercial or residential roof mount installation, regardless of roof type or pitch.

IronRidge Rails: Less Material, Faster Installation, Minimized Risk of Leaks



Key Features

Longest Spans In The Industry Allows Fewest Required Attachment Points

Minimal Attachments Points Reduces Total Installed Costs And Liability

Unique Curved Profile Of The XRS Increases Strength And Enhances Aesthetic Design

Backed By Industry Leading Warranty 10 yr. Limited Product, 3 yr. Finish

PE Certified For Most States

Multiple Attachment Options Supports Tilt Or Flush Mounting, Works With Most Any Brand Of Solar Panel

Versatile Design Can Be Used In Ground Mount, Roof Mount, or Large Array Applications

Best Customer Service And Support

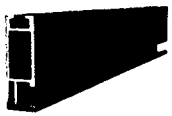
XRS Rail (Standard)

Unique shape and profile allow for spans over 13'

- Cantilever can be 40% of span length
- Attractive structural design, suitable for residential or commercial applications
- 6105-T5 extruded aluminum (anodized)

XRL Rail (Lightweight)

- Light, cost effective rail system supports spans up to 8'
- Cantilever can be 40% of span length
- 6105-T5 extruded aluminum (anodized)



Splices (Internal)

- Can be installed at same location as an attachment
- Does not require additional attachments to support the splice

IRONRIDGE
Solar Mounting Made Simple

Maximum Span Chart:

Wind Speed	XR Standard Rail (XRS) Snow Loads							XR Light Rail (XRL)				
	0 psf	10 psf	20 psf	30 psf	40 psf	50 psf	60 psf	0 psf	10 psf	20 psf	30 psf	40 psf
90 mph	13.5'	12.5	10.5	10.0	9.0	8.5	7.5	8	7	6	5.5	5
100 mph	13.5	12.5	10.5	10.0	9.0	8.5	7.5	8	7	6	5.5	5
110 mph	13	12.5	10.5	10.0	9.0	8.5	7.5	7.6	7	6	5.5	5
120 mph	12	12	10.5	10.0	9.0	8.5	7.5	7	7	6	5.5	5
130 mph	11	11	10.5	10.0	9.0	8.5	7.5	6.5	6.5	6	5.5	5
140 mph	10	10	10	9.5	9.0	8.5	7.5	6	6	6	5.5	5
150 mph	9.6	9.5	9.5	9.5	8.5	8	7.5	5.5	5.5	5.5	5.5	5

Roof Zone 1, Flush Mount Only
Slope = 6" / ft.
Exposure category B
Module length: 77"

Building mean roof height = 30'
Clearance between roof and rail: 2"
End Cant Span: 40% (adj. interior span)
Middle 1/3 span rail splice not permitted

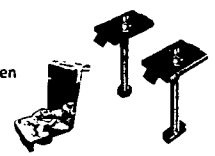
- For more information visit www.ironridge.com to receive official specifications as well as charts for tilt applications and exposure categories.

Attachments

- Adjustable L feet (4 pack kits)
- Adjustable tilt leg kits(5° to 45°)
- Aluminum standoffs flush mount (3", 4", 6", 7")
- Steel standoffs - tilt (4",6")

Clamps

- Panel Sizes 1.22" to 2.33"
- Mid clamps, only 1/4" between panels
- Available in hex or t-bolt
- All hardware stainless steel



End Caps

Protect against collection of debris while providing a finished look for XRS and XRL rails

Wire Clips

Accommodates up to eight 6mm panel wires or an Enphase wire harness

Why IronRidge

Experience - Designing/manufacturing solar mounting products since 1996

Single Source - Roof mounts, ballasted mounts, large arrays, and more; *a solution for your specific application*

Customer Satisfaction - Customer service and technical support to help you succeed

On-line Resources Available:

- Video Tutorials
- Product Configurators
- Product Certifications
- Installation Guides
- Data Sheets
- Reseller Locator

Sales: 800-227-9523
sales@ironridge.com

www.IronRidge.com
1435 Baechtel Road
Willits, CA 95490

James A. Koppenhaver, P.E.
304 Logan Avenue, Wyomissing, PA 19610
(484) 794-9949 fax (610) 775-2160

December 1, 2011

To: Sustainable Energy Systems, LLC
108 W. 14th Street
Frederick, MD 21701

Project: Solar Energy System Installation

Location: Park Residence
26 Columbia Avenue
Takoma Park, MD 20912

Re: Structural Certification for Solar Energy System's Rooftop Appurtenances

To Whom It May Concern:

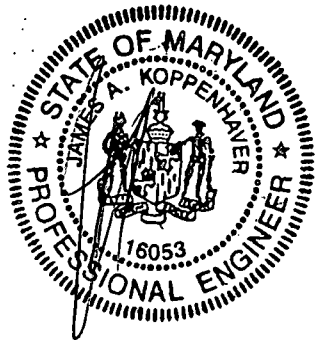
The purpose of this letter is to certify that the existing roof framing is adequate to support the additional loads from solar panels at the above location.

I have analyzed the structural framing of the existing roof with the additional loading to account for the proposed solar panel application. Deflection and stresses within the structural components remain within the allowable for the existing roof. Structural support is provided for the solar panels in accordance with 2009 IRC and ASCE 7, with horizontal and uplift loads from wind and seismic, vertical loads from snow and ice, and dead loads of existing and new components.

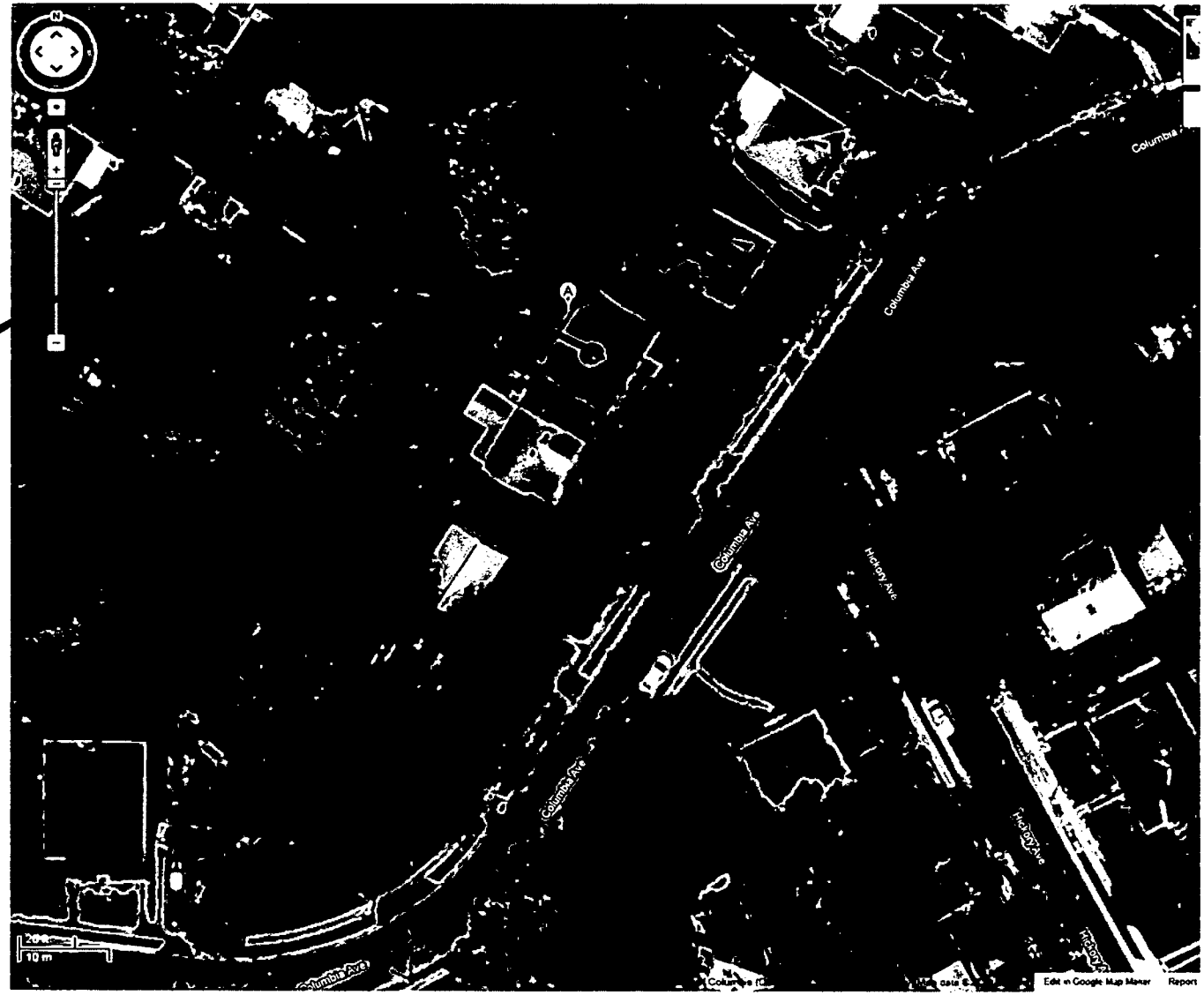
From the analyses and as evidenced by previous roof loads withstood, the existing structure is certified to be structurally adequate to support the reactions of the solar panels in addition to the original design loading. Also the wind analysis concluded that the existing structure is adequate to support the uplift pressures and strengthening or stiffening of the roof framing is not required. The dead-load of the solar panel assembly in this assessment is approximately 3.0 psf.

Taking into consideration the risk to building and land, it is my professional opinion, with a reasonable degree of engineering certainty and probability, that the structural integrity of the roof framing will remain sound with the solar panel installation. Should you have any questions with regard to the information contained in this letter, please do not hesitate to contact me.

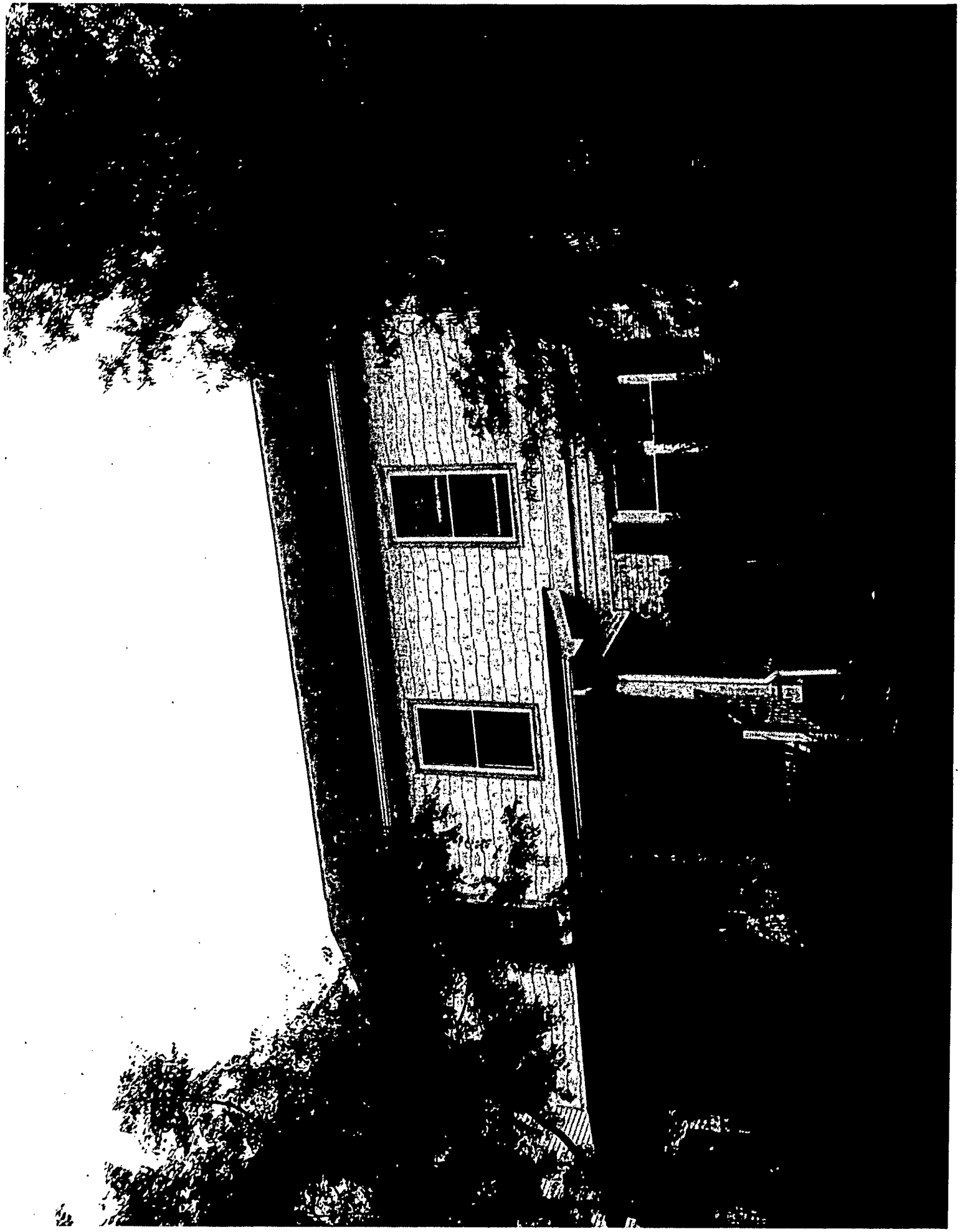
Submitted,



Professional Certification.
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 16053, Expiration Date: 06-04-2012, per Code of Maryland Regulations 09.23.03.10



26 COLUMBIA AVENUE



James A. Koppenhaver, P.E.
304 Logan Avenue, Wyomissing, PA 19610
(484) 794-9949 fax (610) 775-2160

December 1, 2011

To: Sustainable Energy Systems, LLC
108 W. 14th Street
Frederick, MD 21701

Project: Solar Energy System Installation

Location: Park Residence
26 Columbia Avenue
Takoma Park, MD 20912

Re: Structural Certification for Solar Energy System's Rooftop Appurtenances

To Whom It May Concern:

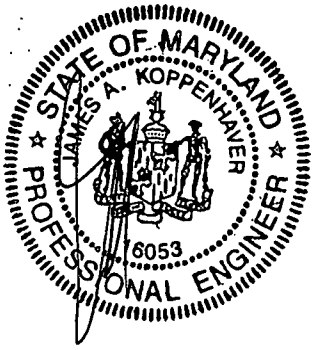
The purpose of this letter is to certify that the existing roof framing is adequate to support the additional loads from solar panels at the above location.

I have analyzed the structural framing of the existing roof with the additional loading to account for the proposed solar panel application. Deflection and stresses within the structural components remain within the allowable for the existing roof. Structural support is provided for the solar panels in accordance with 2009 IRC and ASCE 7, with horizontal and uplift loads from wind and seismic, vertical loads from snow and ice, and dead loads of existing and new components.

From the analyses and as evidenced by previous roof loads withstood, the existing structure is certified to be structurally adequate to support the reactions of the solar panels in addition to the original design loading. Also the wind analysis concluded that the existing structure is adequate to support the uplift pressures and strengthening or stiffening of the roof framing is not required. The dead-load of the solar panel assembly in this assessment is approximately 3.0 psf.

Taking into consideration the risk to building and land, it is my professional opinion, with a reasonable degree of engineering certainty and probability, that the structural integrity of the roof framing will remain sound with the solar panel installation. Should you have any questions with regard to the information contained in this letter, please do not hesitate to contact me.

Submitted,



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