CITY OF WASHINGTON

PLANNING & DEVELOPMENT DEPARTMENT
301 Walnut St. · Washington, IL 61571
Ph. 309-444-1135 · Fax 309-444-9779
http://www.washington-illinois.org
joliphant@ci.washington.il.us

MEMORANDUM

TO:	Mayor Manier and City Council
FROM:	Jon R. Oliphant, AICP, Planning & Development Director
SUBJECT:	First Reading Ordinance – StraightUp Solar Special Use Request, 320 N. Summit Drive
DATE:	May 18, 2018

Summary: StraightUp Solar has submitted a special use application on behalf of Ryan Riech, who is the property owner at 320 N. Summit Drive. The special use is required in order to install a roof-mount solar array on the roof of an accessory structure per the recently approved solar energy ordinance. It would be located on the detached garage on the southern portion of the property. Staff recommends approval of this request.

Background: The property is approximately 3.48 acres and is zoned R-1A (Single-Family Residential). A detached garage was constructed on the south side of the property in 2017, directly north of where Roxbury Lane is stubbed. A 19.32 KW solar photovoltaic array is proposed to be located on the south-facing garage roof. It would be comprised of 56 345-watt panels and cover approximately 49.12% of the roof, which is slightly less than the maximum allowable 50% coverage. Please note that the application was submitted with an original intention of having 63 345-watt panels (as referenced in the structural engineer's letter), which exceeded the 50% coverage requirement. It was later reduced in order to comply with that regulation. This is proposed to be located on the garage in order to maximize exposure on the primary south-facing roof on the property.

A licensed structural engineer has attested that the roof is capable of supporting the proposed array. The City's electrical inspector has reviewed the attachments and has consented to this construction if the special use is approved. While a building permit would need to be issued if the special use is approved, the submitted attachments are thus far in conformance with the solar energy regulations. It would be installed in accordance with the adopted 2012 International Building Code.

Staff anticipates seeing more demand for solar projects, particularly roof-mount residential arrays. This follows approval of the Illinois Future Energy Jobs Act, which provides incentives for the installation of renewable energy projects. The proposed use would not appear to be detrimental to the public's health, safety, or general welfare nor would it diminish property values or the use and enjoyment of properties in the vicinity. Based on all of these factors, staff would recommend that the special use request be approved.

The Planning and Zoning Commission held a public hearing on this at its meeting on May 2 and unanimously recommended approval. This is scheduled for a first reading ordinance on May 21 and a second reading on June 4.

Enclosures

ORDINANCE NO. _____

(Synopsis: Adoption of this ordinance would allow for a roof mount solar energy system to be installed on an accessory structure at 320 N. Summit Drive)

AN ORDINANCE GRANTING A SPECIAL USE TO ALLOW A ROOF MOUNT SOLAR ENERGY SYSTEM TO BE INSTALLED ON AN ACCESSORY STRUCTURE AT 320 N. SUMMIT DRIVE

WHEREAS, the City of Washington Zoning Ordinance adopted February 20, 1961, as amended, provides for a special use for the allowance of roof mount solar energy systems on accessory structures within §154.727 where conditions are met; and

WHEREAS, a petition has been filed with the City of Washington and referred to the Planning and Zoning Commission requesting such a special use for the installation of a roof mount solar energy system on an accessory structure at 320 N. Summit Drive; and

WHEREAS, public notice in the form required by law was given of the public hearing, and the Planning and Zoning Commission held such a public hearing on May 2, 2018, and has recommended such a special use; and

WHEREAS, the Planning and Zoning Commission has made its findings and recommendations concerning the special use permit and the corporate authorities have duly considered said findings and recommendations and find that the special use procedures have complied with the Washington Zoning Code:

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF WASHINGTON, TAZEWELL COUNTY, ILLINOIS, that:

Section 1. The reports, findings, and recommendations of the Planning and Zoning Commission are herein incorporated by reference as the findings of the City Council, as completely as if fully recited herein at length. Also, all exhibits submitted at the public hearing are hereby incorporated by reference as fully as if attached hereto. The City Council further finds that the proposed special use is in the public good and in the best interest of the City and its residents and is consistent with and fosters the purposes and spirit of the City of Washington Zoning Code. The special use granted will not be detrimental to the public health, safety, morals, comfort and general welfare, nor shall it be injurious to the use and enjoyment of other properties in the vicinity, nor substantially diminish or impair property values within the neighborhood.

Section 2. That the following described property owned by Teresa and Ryan Reich be granted a special use permit for the installation of a roof mount solar energy system on an accessory structure and legally described as follows:

SEC 20 T26N R3W TRACT I PT OF LOT C (EXC 42.18 X 125 & 42.18 X 137.1 TRACTS) NW 1/4

PIN: 02-02-20-100-056

Section 3. That the City Zoning Officer be directed to issue any permits to allow the installation on the above-described property in compliance with this special use ordinance.

Section 4. That the Zoning Map of the City of Washington, Tazewell County, Illinois, be amended so as to conform to the Special Use Permit granted herein.

Section 5. That this ordinance shall be in full force and effect from and after its passage, approval, and publication as required by law.

PASSED AND APPROVED this _____ day of _____, 2018.

AYES _____

NAYS _____

ATTEST:

_____
Mayor

_____
City Clerk

CITY OF WASHINGTON

TAZEWELL COUNTY, ILLINOIS

LOCATION MAP

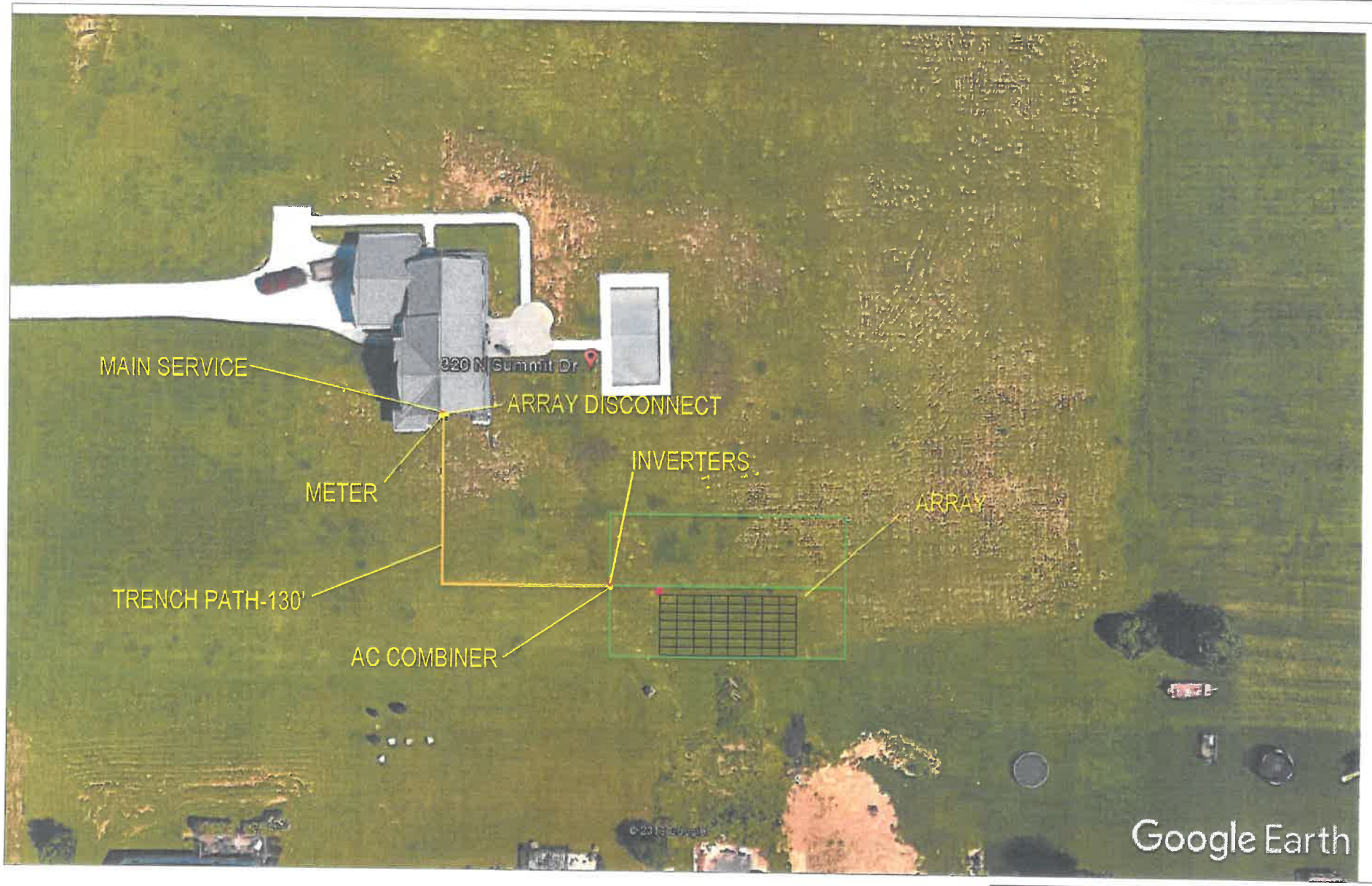
N
W E
S

Legend

- AG-1 (Agriculture)
- CE (Country Estates)
- R-1A (Single Family Residential)
- R-1 (1-2 Family Residential)
- R-2 (Multifamily Residential)
- C-1 (Local Retail)
- C-2 (General Retail)
- C-3 (Service Retail)
- I-1 (Light Industrial)
- I-2 (Heavy Industrial)

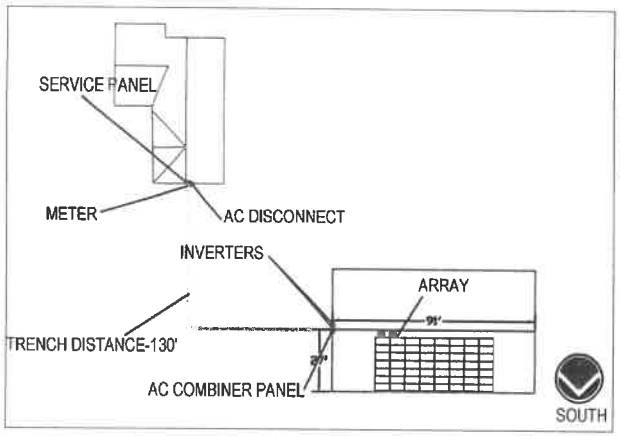
Prepared by the City of Washington Department of Planning and Development

Printed: April 24, 2018



(56) REC 345 WATT PANELS

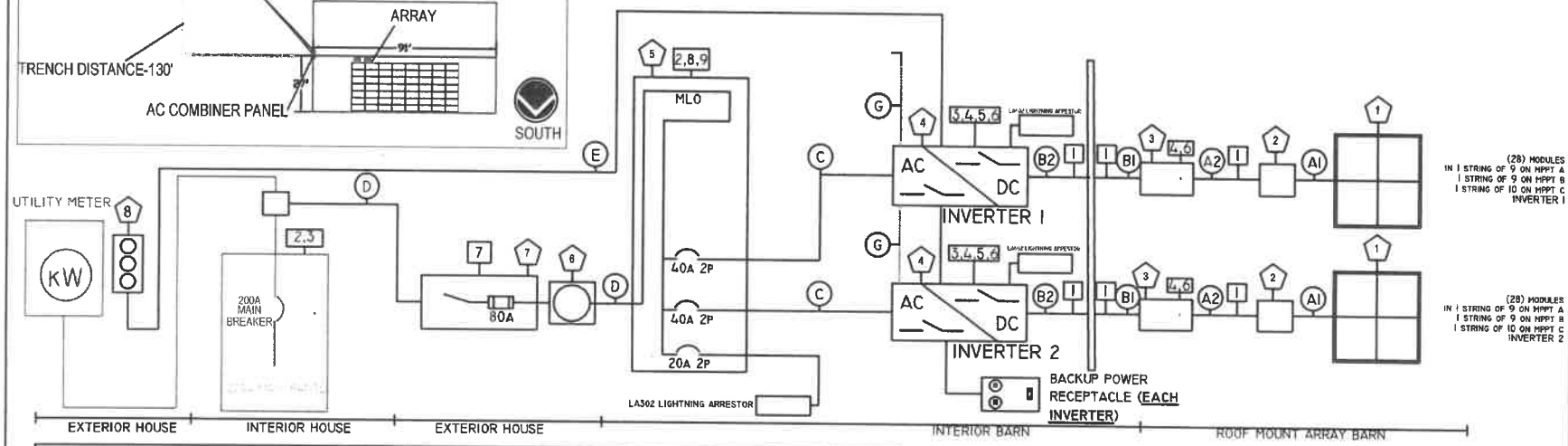
StraightUp SOLAR 10330 PAGE INDUSTRIAL BLVD, ST LOUIS, MO 63132 P 314-218-2663	SITE PLAN DESIGNERS PRANAV MODAK JOSH HILL	SHEET NO. D1
PROJECT NAME	RIECH, RYAN	
PROJECT ADDRESS	320 N Summit Dr Washington, IL 61571	
SYSTEM SIZE (KW)	19.32	



DC POWER SOURCE INVERTER 1		
Operational Current	26.76	A
Operational Voltage	387.0	V
Maximum Current	35.1	A
Maximum Voltage	530.6	V

DC POWER SOURCE INVERTER 2		
Operational Current	26.76	A
Operational Voltage	387.0	V
Maximum Current	35.1	A
Maximum Voltage	530.6	V

RAPID SYSTEM SHUTDOWN PLACARD
THIS SOLAR SYSTEM HAS RAPID SYSTEM SHUTDOWN. THE RAPID SYSTEM SHUTDOWN BOX IS LOCATED ON THE UPPER LEFT CORNER OF THE SOUTH FACING SOLAR ARRAY



LABELS

#	LABEL TYPE	LABEL TEXT
1	PHOTOVOLTAIC POWER SOURCE (MAX 10' SPACING ON EXPOSED RACEWAY)	PHOTOVOLTAIC POWER SOURCE
2	INVERTER OUTPUT CONNECTION	WARNING: DUAL POWER SOURCE. SECOND SOURCE IS PHOTOVOLTAIC SYSTEM .
3	PV SYSTEM DISCONNECT	PHOTOVOLTAIC SYSTEM DISCONNECT
4	ELECTRIC SHOCK HAZARD	WARNING ELECTRIC SHOCK HAZARD.DO NOT TOUCH TERMINALS.TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION
5	DC POWER SOURCE	SEE DC POWER SOURCE TABLE
6	UNGROUNDED CONDUCTOR WARNING	WARNING: ELECTRIC SHOCK HAZARD.THE DC CONDUCTORS OF THIS PHOTOVOLTAIC SYSTEM ARE UNGROUNDED AND MAY BE ENERGIZED
7	PV POWER SOURCE	PHOTOVOLTAIC AC DISCONNECT MAX AC OUTPUT CURRENT: 64 AAC NOM AC OPERATING VOLTAGE: 240 VAC
8	INVERTER OUTPUT CONNECTION	WARNING: INVERTER OUTPUT CONNECTION. DO NOT RELOCATE THIS OVERCURRENT DEVICE
9	SOLAR CIRCUITS ONLY	SOLAR AC USE ONLY.NO OTHER CIRCUITS TO BE ADDED.

CONDUCTOR SCHEDULE

CONDUCTOR #	CONDUCTORS	CU/AL	TYPE	LOCATION	% CONDUIT FILL	TOTAL APPROX DISTANCE (ft)
A1	6-#10, 1-#6G, BUNDLED IN FREE AIR	CU	PV WIRE	ARRAY	N/A	500
A2	4-#8, 1-#6G + (1) 600V 18-5 TC-ER CABLE BUNDLED IN FREE AIR	CU	PV WIRE	ARRAY	N/A	40
B1	4-#8, 1-#10G + (1) 600V 18-5 TC-ER CABLE IN 1" C	CU	THWN 2	EXTERIOR/INTERIOR	29%	60
B2	6-#10, 1-#8G, (1) 600V 18-5 TC-ER CABLE IN 1" C	CU	THWN 2	EXTERIOR/INTERIOR	28%	15
C	3-#8, 1-#8G, 1" C	CU	THWN 2	INTERIOR	17%	20
D	3-3, 1-#6G, 1-1/2" C	CU	THWN 2	TRENCHED	17%	130
F	(1) 600V 18-5 TC-ER CABLE IN 3/4" CONDUIT	CU		TRENCHED		130
G	ETHERNET CABLES					

POINT OF INTERCONNECTION

PV & UTILITY INTERCONNECTION VIA LINE-SIDE CONNECTION. PV DISCONNECT MUST BE LOCATED WITHIN 4' OF THE TAP AND WITHIN 10' AND WITHIN SIGHT OF UTILITY METER. SOLAR PANEL COMBINED EGC/GEC TO RUN CONTINUOUS TO LINE SIDE TAP. BOND NEUTRAL TO GROUND IN SOLAR AC DISCONNECT

EQUIPMENT LIST

#	EQUIPMENT	MANUFACTURE PART #	QUANTITY
1	345 WATT REC PANELS	REC 345-TP2	56
2	SMA RAPID SHUTDOWN KIT	RSDBOX-DUSI61523	2
3	HOFFMANN JUNCTION BOX	A12106PHC	2
4	SMA 7700 WATT INVERTER	SMA 7.7	2
5	125A MLO AC COMBINER PANEL 120/240V, 12 SPACE, NEMA 3R		1
6	REVENUE GRADE METER		1
7	GE 100A 120/240 2 POLE SINGLE PHASE FUSED AC DISCONNECT.NEMA 3R	TH3223R	1
8	RAPID SYSTEM CONTROLLER	RSDBOX-DUSI61523	1

GENERAL NOTES

SPECIAL CONSIDERATIONS FOR TRANSFORMER-LESS SYSTEM
WHILE NEITHER CURRENT -CARRYING CONDUCTOR IS GROUNDED ,EQUIPMENT GROUNDING IS STILL REQUIRED
DC CONDUCTORS CANNOT BE WHITE AS THEY ARE NOT GROUNDED .RED OR BLACK ARE PERMITTED
ROOFTOP EXPOSED CONDUCTORS MUST BE PV WIRE WITH CORRESPONDING CONNECTORS,NOT USE 2 PLACARDING WILL COMPLY WITH NEC AND UTILITY REQUIREMENTS INCLUDING NEC 690.35F

EXISTING EQUIPMENT INDICATED BY GRAY LINES
PLACARDING WILL COMPLY WITH NEC AND UTILITY REQUIREMENTS

ALL EQUIPMENT MUST BE RATED FOR AVAILABLE FAULT CURRENT AND INSTALLED ACCORDING TO MANUFACTURER'S INSTRUCTIONS.

GROUND MODULE FRAME AND ARRAY RACKING PER MANUFACTURERS' SPECIFICATIONS

THIS DESIGN COMPLIES WITH 2017 NEC. ALL EQUIPMENT SHALL BE LISTED BY UL OR EQUIVALENT.ALL EQUIPMENTS SHALL BE INSTALLED PER 2011 NEC REQUIREMENTS

DESIGNERS
PRANAV MODAK
JOSH HILL

StraightUp SOLAR
10330 PAGE INDUSTRIAL BLVD,
ST LOUIS, MO 63132
P 314-218-2663

DRAWING TITLE
ONE LINE

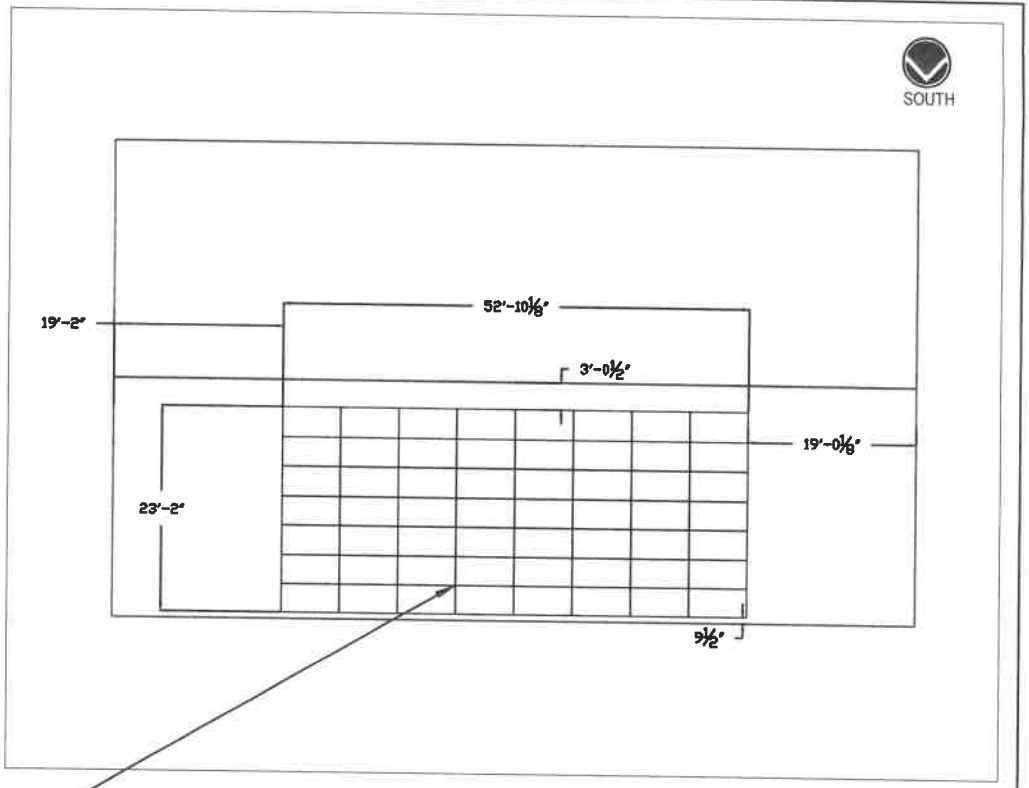
SHEET NO.
D.2

PROJECT NAME	RIECH, RYAN
PROJECT ADDRESS	320 N Summit Dr Washington, IL 61571
SYSTEM SIZE (KW)	19.32

ROOF INFORMATION:
1 LAYER OF CORRUGATED METAL ON 2X4 24" O.C PURLINS. ROOF SLOPE-18°

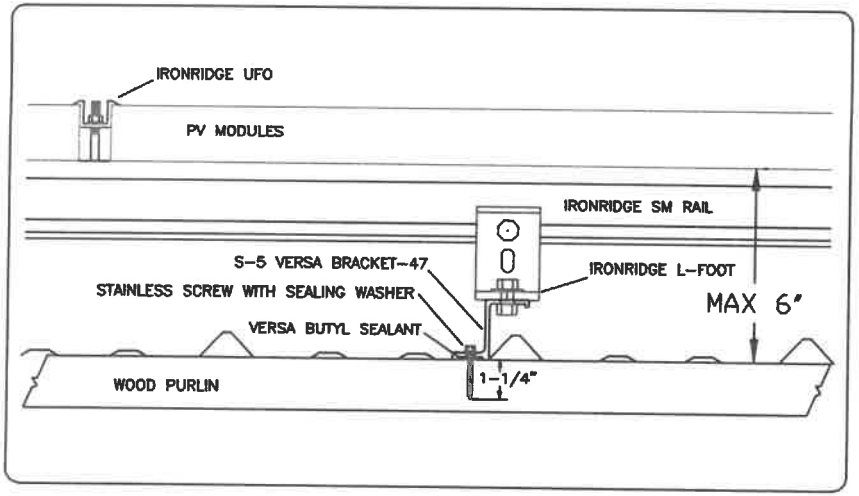
MOUNTING SYSTEM INFORMATION:
IRONRIDGE SOLARMOUNT ENGINEERED RACKING SYSTEM WITH S5 VERSA ATTACHMENTS

TOTAL WEIGHT OF PV MODULES AND RACKING HARDWARE LBS	3018
MINIMUM NUMBER OF ATTACHMENT POINTS	64
WEIGHT PER ATTACHMENT POINT (LBS)	47.1
MANUFACTURER'S MAXIMUM SPACING BETWEEN ATTACHMENT POINTS ON A RAIL (FT)	6.5
PLANNED SPACING (FT)	6
TOTAL ARRAY SURFACE AREA (SQ FT)	1207.2
DISTRIBUTED WEIGHT OF PV MODULE ON ROOF (LBS/SQ FT)	2.5
% of roof area covered with PV System	49.12



56 REC 345 WATT MODULES	19.32	KW
MODULE DIMENSIONS	77.8" X 39.4"	

CUSTOMER CONTACT INFO:RYAN RIECH-317-345-8738



S-5-VERSA

StraightUp SOLAR
10330 PAGE INDUSTRIAL BLVD,
ST LOUIS, MO 63132
P 314-218-2663

DETAILED ROOF LAYOUT

DESIGNERS: PRANAV MODAK, JOSH HILL

SHEET NO. D3

PROJECT NAME	RIECH, RYAN
PROJECT ADDRESS	320 N Summit Dr Washington, IL 61571
SYSTEM SIZE (KW)	19.32

CITY OF WASHINGTON, ILLINOIS

APPLICATION FOR SPECIAL USE

To have a complete application for a special use, you must submit the following:

- Signed and completed application
- Plat showing subject property and all adjacent properties – See below for plat requirements
- Ownership documentation (lease, deed, mortgage, etc.)
- Accurate legal description obtained from the Warranty Deed
- Application fee of $100 payable to the City of Washington

Address or location of property: 320 N Summit Drive Washington, IL 61571

Property Tax ID (PIN) number: 02 - 02 - 20 - 100 - 056

Current zoning classification of the property: 40 Improved Residential

Current use of the property: Single Family Residential

What is the Special Use for? Installation of a grid-tied, roof mount, 24.84 KW solar PV array.

How will you meet other requirements of the zoning code (such as parking or landscaping, if applicable)? _____

Name of Applicant: StraightUp Solar Phone Number of Applicant: (314) 218-2663 x 283

Address of Applicant: 10330 Page Industrial Blvd. St. Louis, MO 63132

Owner of Property: Robert Ryan Riech

Address of Owner: 320 N Summit Drive Washington, IL 61571

I would like to receive correspondence by: ____ Mail X Email Email address: Ryan.Riech@gmail.com

PLAT REQUIREMENTS: Your special use plat must show:

- Building or site plan layout and locations of proposed special uses, including square footage
- Adjacent properties, rights-of-way, streets, roads, railroads, waterways, and other physical features

PUBLIC HEARING: Your case will be referred with staff's recommendation to the next regularly scheduled Planning and Zoning Commission meeting for a public hearing. The Planning and Zoning Commission meets the first Wednesday of every month at 6:30 p.m at the Washington District Library meeting room at 380 N. Wilmor Road. At the Planning and Zoning Commission meeting, you will present your request. A special use cannot be recommended by the Planning and Zoning Commission unless the Commission finds, based upon the application and evidence presented at the public hearing, that all of the following conditions have been met:

1) The special use will not be detrimental to or endanger the public health, safety, morals, comfort, or general welfare; 2) The special use will not be injurious to the use and enjoyment of other property in the immediate vicinity, or substantially diminish or impair property values; 3) The special use will not impede development of surrounding property; 4) Adequate utilities, access roads, drainage, or necessary facilities will be provided; 5) Adequate ingress and egress provided to minimize traffic congestion in public streets; 6) The special use will conform to all other application regulations of the zoning district; and 7) If the special use would not otherwise be acceptable, the Planning Commission may recommend certain conditions be met to make the use acceptable, such as, but not limited to: landscape screening or fencing, specific hours of operation, night lighting or lighting restrictions, parking area requirements, signage restraints, outdoor storage limitations.

Certification: *To the best of my knowledge, the information contained herein, and on the attachments, is true, accurate, and correct, and substantially represents the existing features and proposed features. Any error, misstatement, or misrepresentation of material fact or expression of material fact, with or without intention, shall constitute sufficient grounds for the revocation or denial of the proposed Special Use.*

Valerie A. Corey — *Signature of Applicant* — 4-5-18 — *Date*

R. Ryan Riech — *Signature of Owner* — 4-5-18 — *Date*

After receiving a completed application, the City Clerk will file notice of your request with the local newspaper and with the adjoining property owners. If you have any questions, please contact Jon Oliphant, Planning & Development Director at (309) 444-1135.

FOR OFFICE USE ONLY Case No.: _____

Plat Submitted? Y / N Date: _____

Documentation of Authority Submitted: _____

Commission Action: _____

Fee Paid? Y / N / N/A Amount: _____ Date: _____

Landscaping Plan Submitted? Y / N / N/A Date: _____

Date to go before the Planning and Zoning Commission: _____

Ordinance Review: (first reading) _____ (second reading) _____

Tazewell County, Illinois

generated on 4/5/2018 4:54:59 PM CDT

Parcel

Parcel ID	Alt. PIN	Parcel Address	Data as of
02-02-20-100-056		320 N SUMMIT DR, WASHINGTON	3/31/2018

Tax Payer Information

Tax Payer	RIECH ROBERT R & MORRELL-RIECH TERESA J
Tax Payer Address	320 N SUMMIT DR WASHINGTON IL 615710000
Transfer Date	08/04/2015

Location Information

GIS		**Section & Plat**	
District No.	02021	**State Assigned District No.**	020
Township No.	002,	**Routing No.**	
Parcel Address	320 N SUMMIT DR, WASHINGTON	**Legal Desc.**	SEC 20 T26N R3W TRACT I PT OF LOT C (EXC 42.18 X 125 & 42.18 x 137.1 TRACTS) NW 1/4 3.48 AC

Parcel Information

Property Class Code	40 IMPROVED RESIDENTIAL LOT
Neighborhood Code	213
Neighborhood Factor	108.00
Neighborhood Type	
Street or Road Code	

Topography

Level	N
High	N
Low	N
Rolling	N
Swampy	N
Flood Hazard	
Waterfront Property Type	

Services

Water	
Sewer	
Gas	
Electricity	N
Sidewalk	
Alley	N

AL-IMAN Group, LLC
Engineering • Construction • Management

Ms. Valerie Corey
Straight Up Solar
10330 Page Industrial Ct.
St. Louis, MO 63132
O: 314-218-2663

January 15, 2018

RE: Riech Residence – 320 N Summit Drive, Washington, IL 61571
AIG Job # 18.803

Ms. Corey:

We have reviewed the proposed solar array drawings and the structure(s) at the above referenced address. The array consists of (63) solar modules on the structure, mounted on an Iron Ridge racking system with attachments to the structure at 6'- 6" on center, maximum.

We hereby certify that the existing structure, with the addition of the proposed solar energy devices, is capable of supporting the design loads in accordance with the 2012 International Building Code (and all previous versions) and ASCE 7-10.

We have attached the calculation for the critical roof member – a 2" x 4" purlin, checked for bending stress and deflection in accordance with ASCE 7-10.

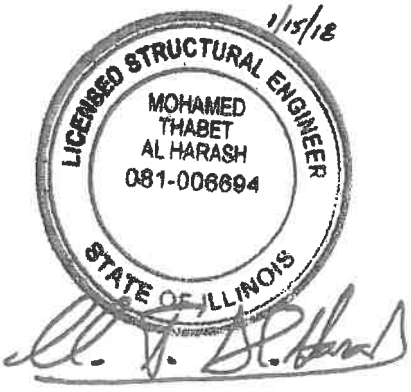
Please feel free to contact us should you have any comments or questions

Respectfully yours,

Mohamed T. AL HARASH

Dr. Mohamed T. AL HARASH, Sc.D., P.E., S.E. - NCEES
Director of Operations

CC: Matthew Boyce, PE
Project Structural Engineer



2318 Woodson Road # 140007 Saint Louis, MO 63114
Tel. 314.739.0515 Fax 253 399 0377
al-imangroup@yahoo.com www.al-imangroup.com

Riech Residence
Critical Roof Member
2x4 Purlin
Dead Load 11 psf (with solar)
Ground Snow 20 psf

Title :
Dsgnr:
Description :

Scope :

Job #
Date: 11:23AM, 15 JAN 18

Timber Beam & Joist

Description

Timber Member Information

Base allowables are user defined

Timber Section		
Beam Width	in	2.000
Beam Depth	in	4.000
Le: Unbraced Length	ft	8.00
Timber Grade		Mixed Southern Pine, No.2 2 to 4
Fb - Basic Allow	psi	1,300.0
Fv - Basic Allow	psi	175.0
Elastic Modulus	ksi	1,400.0
Load Duration Factor		1.150
Member Type		Manuf/Pine
Repetitive Status		Repetitive

Center Span Data

Span	ft	8.00
Dead Load	#/ft	22.00
Live Load	#/ft	28.00

Results

Ratio = 0.5374

Mmax @ Center	in-k	4.80
@ X =	ft	4.00
fb : Actual	psi	900.0
Fb : Allowable	psi	1,674.8
		Bending OK
fv : Actual	psi	34.5
Fv : Allowable	psi	201.3
		Shear OK

Reactions

@ Left End	DL	lbs	88.00
	LL	lbs	112.00
	Max. DL+LL	lbs	200.00
@ Right End	DL	lbs	88.00
	LL	lbs	112.00
	Max. DL+LL	lbs	200.00

Deflections

Ratio OK

Center DL Defl	in	-0.136
L/Defl Ratio		707.1
Center LL Defl	in	-0.173
L/Defl Ratio		555.6
Center Total Defl	in	-0.309
Location	ft	4.000
L/Defl Ratio		311.1

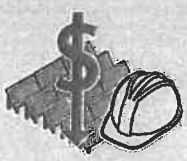
SOLAR'S MOST TRUSTED REC

REC TWINPEAK 2S 72 SERIES

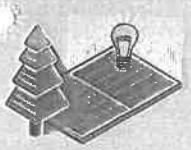
PREMIUM SOLAR PANELS WITH SUPERIOR PERFORMANCE

REC TwinPeak 2S 72 Series solar panels feature an innovative design with the higher panel efficiency of polycrystalline cells, enabling customers to get the most out of the space used for the installation.

Combined with industry-leading product quality and the reliability of a strong and established European brand, REC TwinPeak 2S 72 panels are ideal for commercial rooftops worldwide.



REDUCES BALANCE OF SYSTEM COSTS

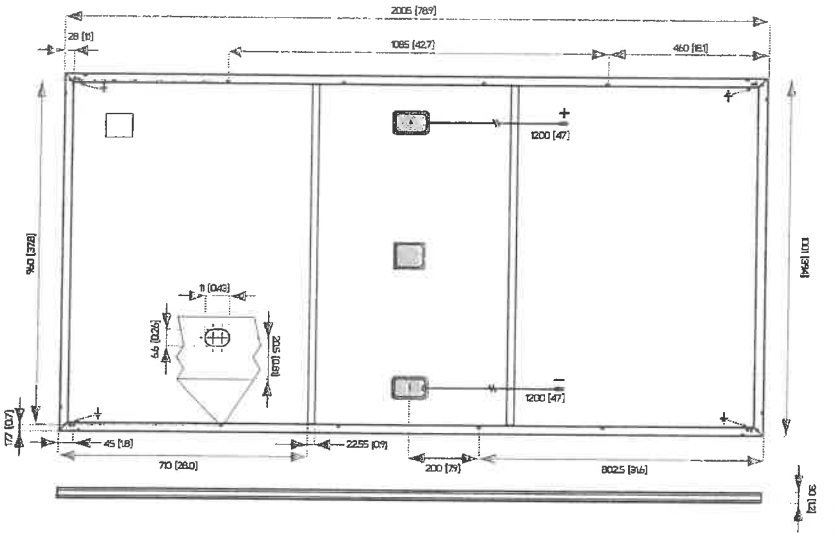


IMPROVED PERFORMANCE IN SHADED CONDITIONS

INDUSTRY-LEADING LIGHTWEIGHT 72-CELL PANEL

100% PID FREE

REC TWIN PEAK 2S 72 REC



Measurements in mm [in]

17.7%	EFFICIENCY
10	YEAR PRODUCT WARRANTY
25	YEAR LINEAR POWER OUTPUT WARRANTY

GENERAL DATA

Cell type:	144 half-cut multicrystalline PERC cells 6 strings of 24 cells in series
Glass:	3.2 mm solar glass with anti-reflection surface treatment
Backsheet:	Highly resistant polymeric construction
Frame:	Anodized aluminum
Support bars:	Anodized aluminum
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790
Cable:	4 mm² solar cable, 1.2 m + 1.2 m in accordance with EN 50618
Connectors:	Tonglin TL-Cable01S-F (4 mm²) (1500V) Tonglin TL-Cable01S-FR (4 mm²) (1000V) in accordance with IEC 62852, IP68 only when connected
Origin:	Made in Singapore

ELECTRICAL DATA @ STC

Product code*: RECxxxTP2S 72						
Nominal Power - P_{MPP} (Wp)	330	335	340	345	350	355
Watt Class Sorting - (W)	-0/+5	-0/+5	-0/+5	-0/+5	-0/+5	-0/+5
Nominal Power Voltage - V_{MPP} (V)	38.1	38.3	38.5	38.7	38.9	39.1
Nominal Power Current - I_{MPP} (A)	8.67	8.75	8.84	8.92	9.00	9.09
Open Circuit Voltage - V_{OC} (V)	46.0	46.2	46.3	46.5	46.7	46.8
Short Circuit Current - I_{SC} (A)	9.22	9.52	9.58	9.64	9.72	9.78
Panel Efficiency (%)	16.5	16.7	16.9	17.2	17.4	17.7

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. At low irradiance of 200 W/m² at least 95% of the STC module efficiency will be achieved.
*Where xxx indicates the nominal power class (P_{MPP}) at STC indicated above, and can be followed by the suffix XV for 1500 V rated modules.

ELECTRICAL DATA @ NMOT

Product code*: RECxxxTP2S 72						
Nominal Power - P_{MPP} (Wp)	244	252	257	260	264	268
Nominal Power Voltage - V_{MPP} (V)	34.9	35.5	35.7	35.8	36.0	36.2
Nominal Power Current - I_{MPP} (A)	6.99	7.10	7.19	7.25	7.32	7.39
Open Circuit Voltage - V_{OC} (V)	42.3	42.8	42.9	43.1	43.2	43.3
Short Circuit Current - I_{SC} (A)	7.44	7.74	7.79	7.84	7.90	7.95

Nominal module operating temperature (NMOT: 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 indicated above, and can be followed by the suffix XV for 1500 V rated modules.

MAXIMUM RATINGS

Operational temperature:	-40 ... +85°C
Maximum system voltage:	1000 V / 1500 V
Design load (+): snow Maximum test load (+):	367 kg/m² (3600 Pa)* 550 kg/m² (5400 Pa)
Design load (-): wind Maximum test load (-):	163 kg/m² (1600 Pa)* 244 kg/m² (2400 Pa)
Max series fuse rating:	25 A
Max reverse current:	25 A

*Safety factor 1.5

TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44.6°C (±2°C)
Temperature coefficient of P_{MPP}:	-0.36 %/°C
Temperature coefficient of V_{OC}:	-0.30 %/°C
Temperature coefficient of I_{SC}:	0.066 %/°C

*The temperature coefficients stated are linear values

CERTIFICATIONS

IEC 61215, IEC 61730 & UL 1703; MCS 005, IEC 62804 (PID)
IEC 62716 (Ammonia Resistance), IEC 60068-2-68 (Blowing Sand)
IEC 61701 (Salt Mist level 6), UNI 8457/9174 (Class A), ISO 11925-2 (Class E) ISO 9001: 2015, ISO 14001: 2004, OHSAS 18001: 2007

take-e-way WEEE-compliant recycling scheme

WARRANTY

10 year product warranty
25 year linear power output warranty
(max. degression in performance of 0.7% p.a.)
See warranty conditions for further details.

MECHANICAL DATA

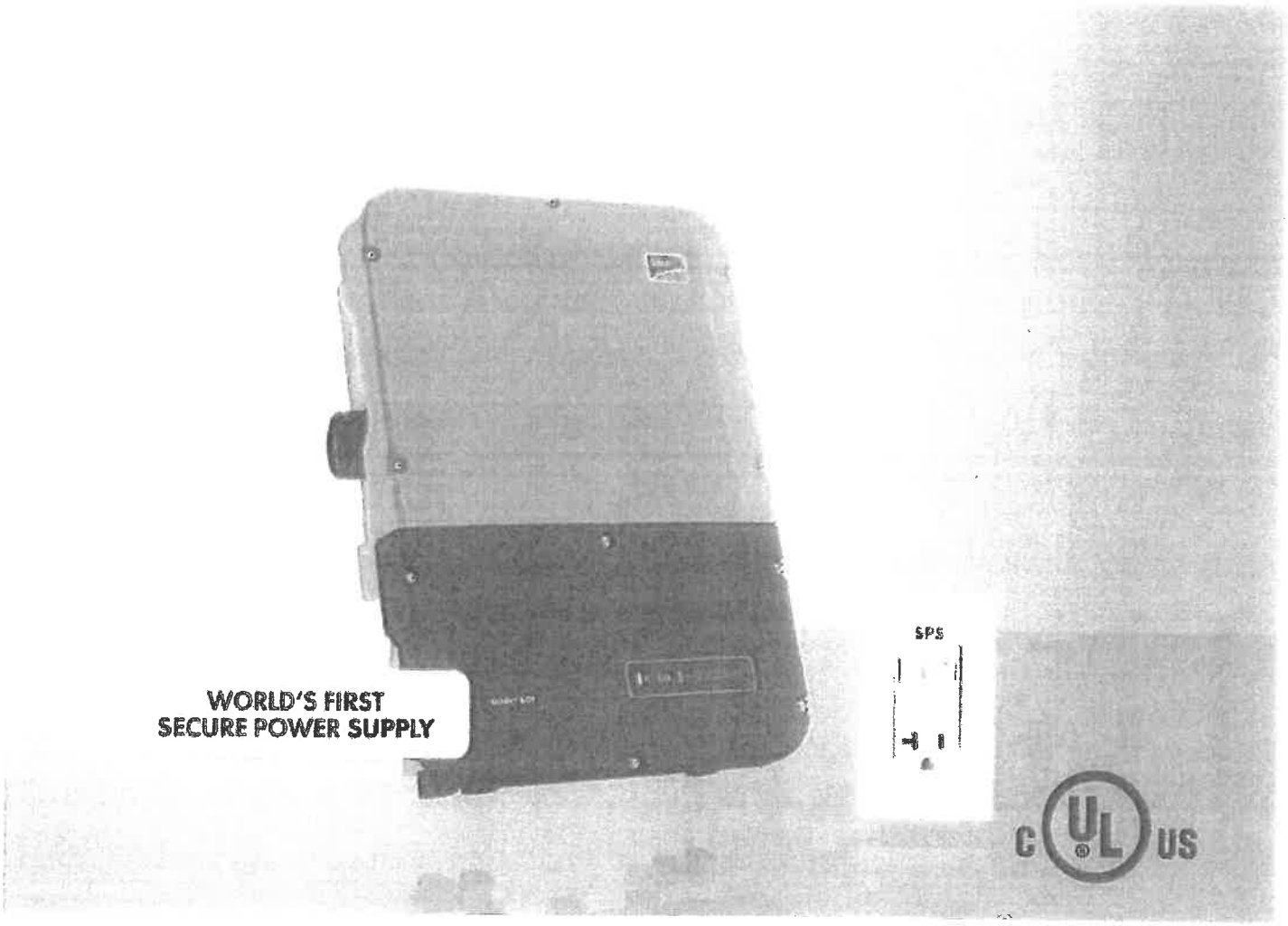
Dimensions:	2005 x 1001 x 30 mm
Area:	2.01 m²
Weight:	22 kg

Specifications subject to change without notice.
Ref: NE-05-07-13 Rev - C 07.17

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 more than 2,000 people worldwide, producing 1.4 GW of solar panels annually.

REC

www.recgroup.com



Value-Added Improvements

- 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

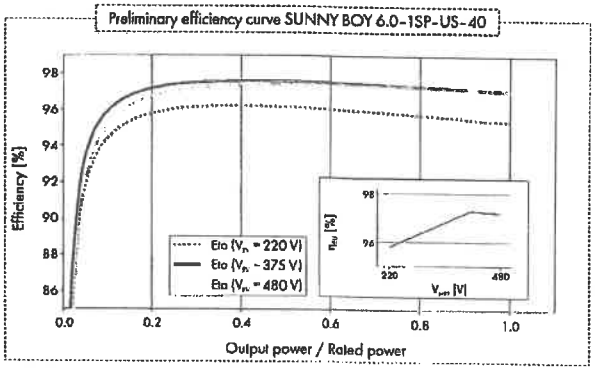
Reduce costs across your entire residential business model

The residential PV market is changing rapidly, and we understand that your bottom line matters more than ever. That's why we've designed a superior residential solution that will help you decrease costs throughout all stages 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 is working to help your business operate more efficiently.

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	26 kg (57 lb)					
Packaging weight	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						
Secure Power Supply	●					
Display (2 x 16 characters)	●					
Interfaces; Ethernet / WLAN	● / ●					
Sensor module / External WLAN antenna	O / O					
Warranty: 10 / 15 / 20 years	●/O/O					
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 O Optional features – Not available	Data at nominal conditions NOTE: US inverters ship with gray lids.					
Type designation	SB3.0-1SP-US-40		SB3.8-1SP-US-40		SB5.0-1SP-US-40	
Accessories						

Sensor module
MD.SEN-US-40

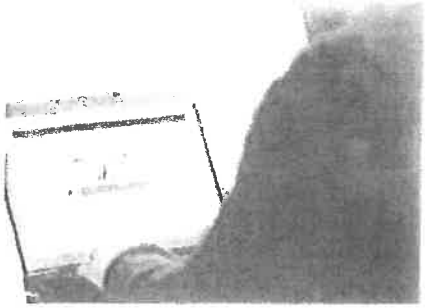
External WLAN antenna
EXTANT-US-40



Technical data	Sunny Boy 6.0-US		Sunny Boy 7.0-US		Sunny Boy 7.7-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max usable DC power	5400 W	6200 W	6900 W	7200 W	6900 W	7950 W
Max. DC Voltage	600 V					
Rated MPP Voltage range	220 - 480 V		245 - 480 V		270 - 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	3 / 1					
Output (AC)						
AC nominal power	5200 W	6000 W	6660 W	7000 W	6660 W	7680 W
Max. AC apparent power	5200 VA	6000 VA	6660 VA	7000 VA	6660 VA	7680 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	25.0 A	25.0 A	32.0 A	29.2 A	32.0 A	32.0 A
Power factor (cos φ)	1					
Output phases / line connections	1 / 2					
Harmonics	< 4 %					
Efficiency						
Max. efficiency	97.2 %	97.6 %	97.1 %	97.5 %	97.1 %	97.5 %
CEC efficiency	96.5 %	97 %	96.5 %	97 %	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	26 kg (57 lb)					
Packaging weight	30 kg (66 lb)					
Operating temperature range	- 25°C ...+60°C					
Noise emission (typical)	36 dB(A)				45 dB(A)	
Internal power consumption at night	< 5 W					
Topology	Transformerless					
Cooling concept	Convection				Fan	
Features						
Secure Power Supply	●					
Display (2 x 16 characters)	●					
Interfaces: Ethernet / WLAN	● / ●					
Sensor module / External WLAN antenna	o / o					
Warranty: 10 / 15 / 20 years	●/o/o					
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 o Optional features – Not available	Data at nominal conditions NOTE: US inverters ship with gray lids.					
Type designation	SB6.0-1SP-US-40		SB7.0-1SP-US-40		SB7.7-1SP-US-40	

SAME NAME, NEW GAME

The Sunny Boy 3.0-US through 7.7-US are once again raising the bar by offering improved performance, enhanced features, and most importantly, an economical approach to residential solar. Your business model is a value chain. The new Sunny Boy-US series can help you stay competitive in an increasingly price sensitive residential market by driving down costs across all of your business operations.



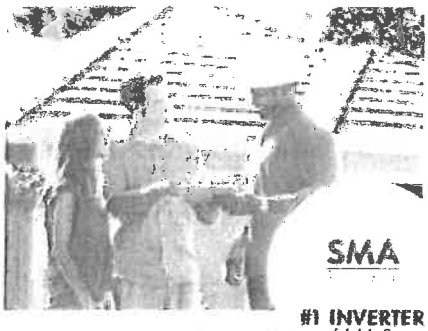
SIMPLE, FLEXIBLE DESIGN

Speed the completion of customer proposals and maximize the efficiency of your design team with the Sunny Boy-US series, which provides a new level of flexibility in system design by offering:

» Hundreds of stringing configurations and multiple independent MPPTs

» SMA's proprietary OptiTrac™ Global Peak shade mitigation technology

» Diverse application options including on- and off-grid compatibility



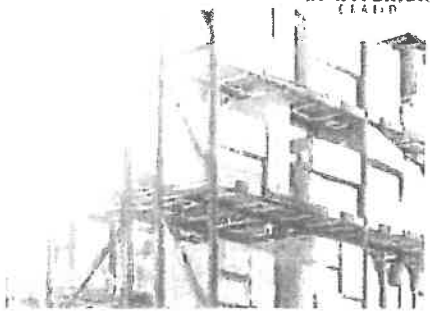
VALUE-DRIVEN SALES ENABLEMENT

SMA wants to enable your sales team by arming them with an abundance of feature/benefit support. Show your customers the value of the Sunny Boy-US series by utilizing:

» Secure Power Supply, now with 2,000 W of opportunity power in the event of a grid outage, as an increased value-add or upsell opportunity

» SMA's 35 year history and status as the #1 global inverter manufacturer instills homeowners with peace of mind and the long-term security they demand from a PV investment

» An economical solution for shade mitigation and the challenges of complex roofs

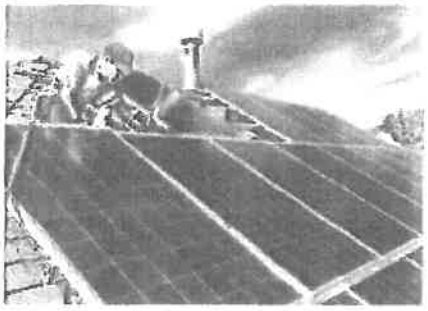


IMPROVED STOCKING AND ORDERING

Ensure that your back office business operations run smoothly and succinctly while mitigating potential errors. The Sunny Boy-US series can help achieve cost savings in these areas by providing:

» An integrated DC disconnect that simplifies equipment stocking and allows for a single inverter part number

» All communications integrated into the inverter, eliminating the need to order additional equipment



STREAMLINED INSTALLATION AND COMMISSIONING

Expedite your operations in the field by taking advantage of the new Sunny Boy's installer-friendly feature set including:

» Direct access via smartphone and utilization of SMA's Installation Assistant, which minimizes time/labor spent in the field and speeds the path to commissioning

» Improved communication—no need to install additional equipment

» Integrated DC disconnect that simplifies onsite logistics and eliminates the need to install a separate disconnect unit, speeding overall installation time

SUPERIOR SERVICE

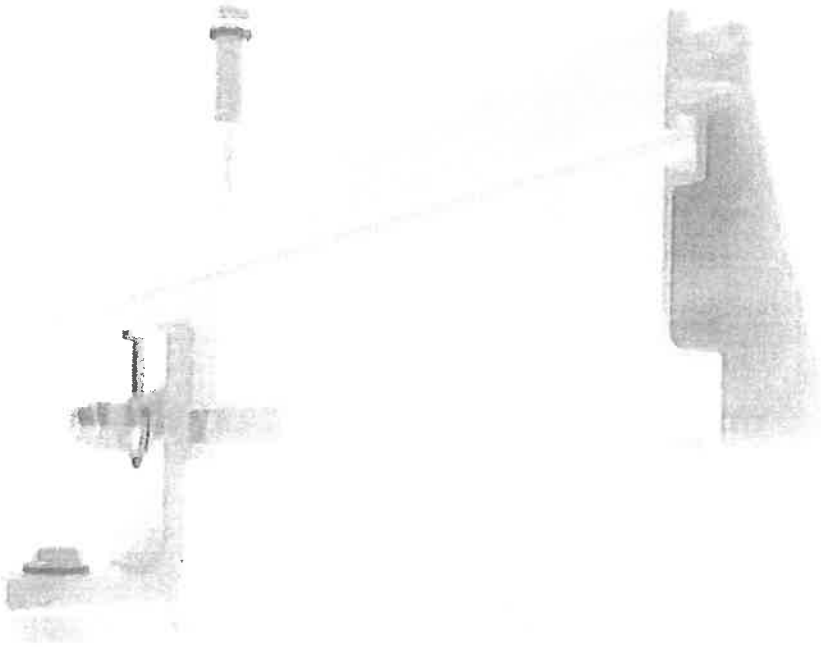
SMA understands the factors that contribute to lifetime PV ownership cost, that's why the Sunny Boy-US series was designed for maximum reliability and backstopped by an unmatched service offering. Benefit from:

» The new Sunny Boy's two-part enclosure concept that separates the connection unit from the power unit, which allows for simple, expedited servicing

» The #1 service team in the PV industry, as recognized by IMS research, with experience servicing an installed base of more than 40 GW

IRONRIDGE

Flush Mount System



IronRidge builds the strongest mounting system for pitched roofs in solar. Every component has been tested to the limit and proven in extreme environments.

Our rigorous approach has led to unique structural features, such as curved rails and reinforced flashings, and is also why our products are fully certified, code compliant and backed by a 20-year warranty.

Strength Tested

All components evaluated for superior structural performance.

Class A Fire Rating

Certified to maintain the fire resistance rating of the existing roof.

UL 2703 Listed System

Meets newest effective UL 2703 standard.

PE Certified

Pre-stamped engineering letters available in most states.

Design Assistant

Online software makes it simple to create, share, and price projects.

20-Year Warranty

Twice the protection offered by competitors.

XR10 Rail

A low-profile mounting rail for regions with light snow.

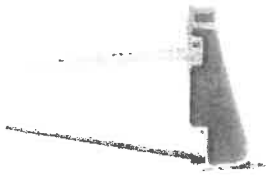
- 6' spanning capability
- Moderate load capability
- Clear & black anod. finish

XR100 Rail

The ultimate residential solar mounting rail.

- 8' spanning capability
- Heavy load capability
- Clear & black anod. finish

XR1000 Rail



A heavyweight mounting rail for commercial projects.

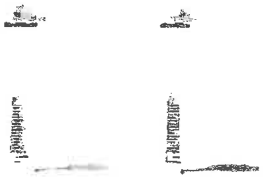
- 12' spanning capability
- Extreme load capability
- Clear anodized finish

Bonded Splices

All rails use internal splices for seamless connections.

- Self-drilling screws
- Varying versions for rails
- Forms secure bonding

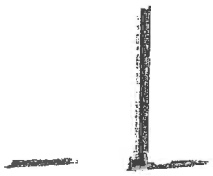
UFOs



Universal Fastening Objects bond modules to rails.

- Fully assembled & lubed
- Single, universal size
- Clear & black finish

Stopper Sleeves



Snap onto the UFO to turn into a bonded end clamp.

- Bonds modules to rails
- 6 different sizes
- Clear & black anod. finish

Grounding Lugs

Connects array to equipment ground.

- Low profile
- Single tool installation
- Mounts in any direction

Microinverter Kit

Mount MIs or POs to XR Rails.

- Bonds devices to rails
- Kit comes assembled
- Listed to UL 2703

FlashFoot

Anchor, flash, and mount with all-in-one attachments.

- Ships with all hardware
- IBC & IRC compliant
- Certified with XR Rails

Bonded L-Feet

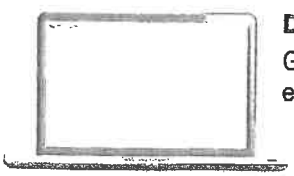
Drop-in design for rapid rail attachment.

- Bonding hardware included
- Forms secure rail connection
- Clear & black anod. finish

Standoffs

Raise Flush Mount System to various heights.

- Works with vent flashing
- Ships assembled
- 4" and 7" Lengths



Design Assistant

Go from rough layout to fully engineered system. For free.

NABCEP Certified Training

Earn free continuing education credits, while learning more about our systems.

S-5!®

The Right Way!

VersaBracket™

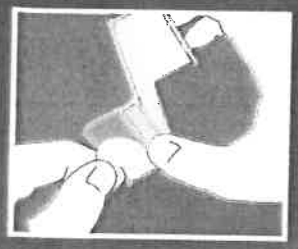
VersaBracket™ can be used to mount almost anything to an exposed-fastened roof system and is compatible with almost any trapezoidal exposed-fastened profile. No messy sealants to apply! No chance for leaks! The VersaBracket comes with factory-applied butyl sealant already in the base, and the S-5!® patented reservoir conceals the sealant from UV exposure, preventing drying and cracks.

Installation is simple! VersaBracket is mounted in the flat of the panel, directly into the supporting structure of the roof, i.e. wood decking, wood or steel purlins or trusses. No surface preparation is necessary; simply wipe away excess oil and debris, peel the release paper from the base, align, and apply. Secure through the pre-punched holes using the appropriate screws for the supporting structure.

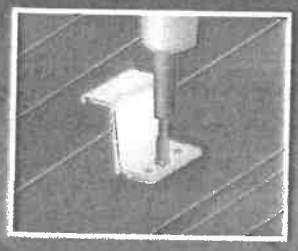
VersaBracket is so strong, it will even support heavy-duty applications like snow retention. For exposed-fastened trapezoidal profiles, the VersaBracket is the perfect match for our ColorGard® snow retention systems (for corrugated roofs use CorruBracket™). VersaBracket is extremely economical and facilitates quick and easy installation.

1

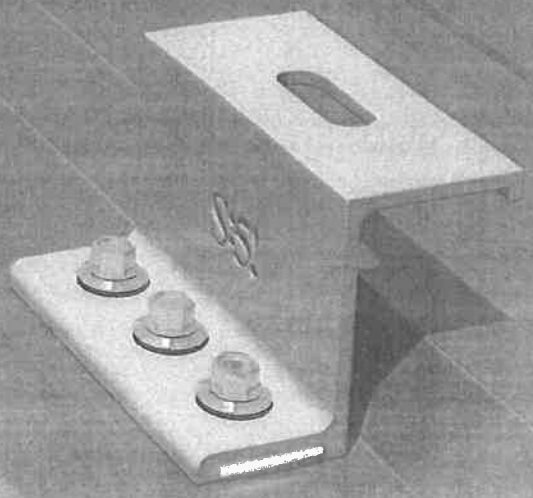
2



3



VersaBracket™



S-5!® VersaBracket™ is the right way to attach almost anything to exposed-fastened roof profiles, including PV through rail methods.

The right way to attach almost anything to metal roofs!

888-825-3432 | www.S-5.com

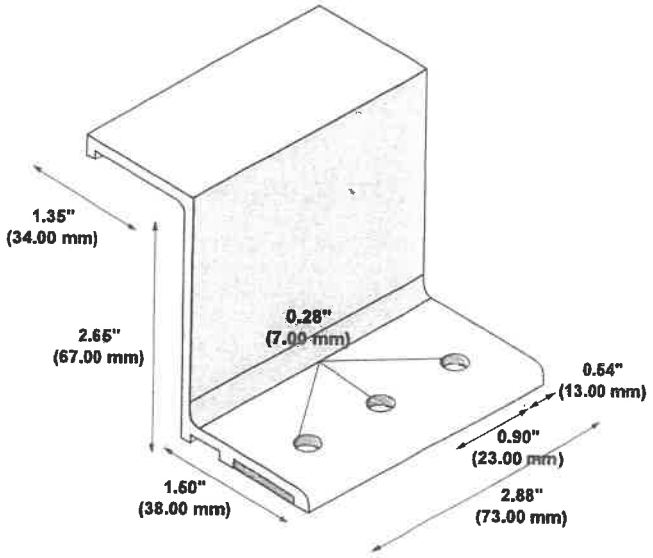
S-5!®
The Right Way!

VersaBracket™ can be used for almost any attachment need, including S-5!® ColorGard®, on all types of exposed-fastened metal roofing. No messy sealants to apply. The factory-applied butyl sealant waterproofs and makes installation a snap!

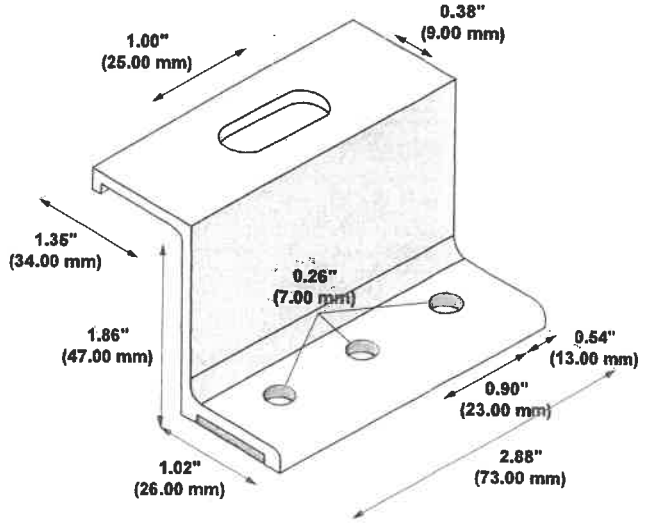
To accommodate various rib heights, **VersaBracket™** comes in two heights—the 2.65" VersaBracket-67™ and the 1.86" VersaBracket-47™. The VersaBracket-67 mounting face has no holes or slots; thus, ancillary items are typically secured using self-tapping screws. The VersaBracket-47 comes with a 1" slot on top as the standard part. Other hole and slot configurations available with minimum purchase requirements (contact your distributor for available configurations). Each VersaBracket comes with factory-applied butyl sealant in the base. A structural aluminum attachment bracket, VersaBracket is compatible with most common metal roofing materials. For design assistance, ask your distributor, or use our web-based calculator at **www.S-5.com** for job-specific system engineering and design of your next snow retention project. Also, please visit our website for more information including CAD details, metallurgical compatibilities, and specifications.

The VersaBracket has been tested for load-to-failure results on wood decking, metal, and wood purlins. The independent lab test data found at www.S-5.com can be used for load-critical designs and applications. S-5!® holding strength is unmatched in the industry.

VersaBracket-67™



VersaBracket-47™

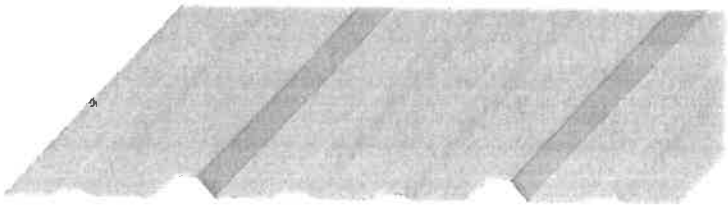


3 holes are provided for versatility. Some installations require only 2 fasteners. See the load table on the S-5! website and the installation instructions for more details.

Due to varied applications, mounting hardware is not furnished with part.

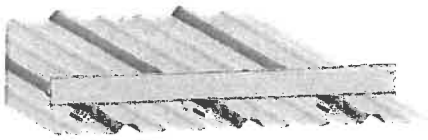
Please note: All measurements are rounded to the second decimal place.

Example Profile



Example Applications

ColorGard



S-5!® Warning! Please use this product responsibly!

Products are protected by multiple U.S. and foreign patents. For published data regarding holding strength, bolt torque, patents and trademarks visit the S-5! website at www.S-5.com.

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