MONTGOMERY COUNTY HISTORIC PRESERVATION COMMISSION
STAFF REPORT

Address:	5 Columbia Ave., Takoma Park	**Meeting Date:**	12/4/2019
Resource:	Contributing Resource **Takoma Park Historic District**	**Report Date:**	11/27/2019
Applicant:	Annie Kneedler & Sam Bryson	**Public Notice:**	11/20/2019
Review:	HAWP	**Tax Credit:**	n/a
Case Number:	37/03-19HHH	**Staff:**	Dan Bruechert
Proposal:	Solar Panel Installation		

RECOMMENDATION

Staff recommends that the Historic Preservation Commission **approve** the HAWP application

PROPERTY DESCRIPTION

SIGNIFICANCE: Contributing Resource to the Takoma Park Historic District
STYLE: Vernacular
DATE: c.1880s

The subject house is a two-story, T-shaped house, with shiplap siding, original two-over-two wood sash windows, a brick foundation throughout, and an asphalt shingle roof. The house has been heavily modified including alterations to the front porch, a small addition in the southwest corner of the house and a two-story addition to the south. As the house sits at the intersection of Columbia Ave. and Pine Ave., it is highly visible from two elevations.

Figure 1: 5 Columbia Ave. is located at the southeast corner of Pine and Columbia Aves.

BACKGROUND

The HPC reviewed and approved a comprehensive house rehabilitation and addition to the subject property in January 2019. Once construction began it was discovered that the building, including its windows and principal structural members, had degraded significantly and the applicants returned for revisions later in 2019 to allow for revisions to the HAWP to allow for additional stabilization and rehabilitation work.

PROPOSAL

The applicant proposes to install 24 roof mounted solar panels.

APPLICABLE GUIDELINES

When reviewing alterations and additions for new construction to Contributing Resources within the Takoma Park Historic District, decisions are guided by the Takoma Park Historic District Design Guidelines (*Design Guidelines*) and Montgomery County Code Chapter 24A (*Chapter 24A*) and the Secretary of the Interior's Standards for Rehabilitation (*The Standards*).

Takoma Park Historic District Design Guidelines

There are two very general, broad planning and design concepts which apply to all categories. These are:

> The design review emphasis will be restricted to changes that are at all visible from the public right-of-way, irrespective of landscaping or vegetation (it is expected that the majority of new additions will be reviewed for their impact on the overall district), and,
>
> The importance of assuring that additions and other changes to existing structures act to reinforce and continue existing streetscape, landscape, and building patterns rather than to impair the character of the district.

Contributing Resources should receive a more lenient review than those structures that have been classified as Outstanding. This design review should emphasize the importance of the resource to the overall streetscape and its compatibility with existing patterns rather than focusing on a close scrutiny of architectural detailing. In general, however, changes to Contributing Resources should respect the predominant architectural style of the resource. As stated above, the design review emphasis will be restricted to changes that are *at all visible from the public right-of-way*, irrespective of landscaping or vegetation.

> All exterior alterations, including those to architectural features and details, should be generally consistent with the predominant architectural style and period of the resource and should preserve the predominant architectural features of the resource; exact replication of existing details and features is, however, not required,
>
> Minor alterations to areas that do not directly front on a public right-of-way such as vents, metal stovepipes, air conditioners, fences, skylights, etc. – should be allowed as a matter of course; alterations to areas that do not directly front on a public way-of-way which involve the replacement of or damaged to original ornamental or architectural features are discouraged, but may be considered and approved on a case-by-case basis,
>
> Major additions should, where feasible, be placed to the rear of existing structures so that they are less visible from the public right-of-way; additions and alterations to the first floor at the front of a structure are discouraged, but not automatically prohibited,
>
> While additions should be compatible, they are not required to be replicative of earlier architectural styles,

Original size and shape of window and door openings should be maintained, where feasible,

Some non-original building materials may be acceptable on a case-by-case basis; artificial siding on areas visible to the public right-of-way is discouraged where such materials would replace or damage original building materials that are in good condition,

Alterations to features that are not visible from the public right-of-way should be allowed as a matter of course,

All changes and additions should respect existing environmental settings, landscaping, and patterns of open space.

Montgomery County Code, Chapter 24A Historic Resources Preservation

(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

(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.

Secretary of the Interior's Standards for Rehabilitation

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.
9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportions, and massing to protect the integrity of the property and its environment.
10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

STAFF DISCUSSION

The applicant proposes to install 24 roof-mounted solar panels to the house at the corner of Columbia and Pine Avenues. The panels will be on two roof surfaces: the flat-roofed rear addition, and towards the rear of the east slope of the front-facing gable. Staff finds the proposal is compatible with the character of the house and surrounding district and recommends approval.

At the rear of the house, the applicant proposes installing sixteen flat mounted solar panels. These panels will be hidden from view by the cornice and will not be visible from the public right-of-way, even though the house is on a corner lot. Staff finds that the *Design Guidelines* dictate this portion of the proposal should be approved as a matter of course under lenient scrutiny.

The remaining eight solar panels are proposed for the eastern slope of the front-facing gable. The proposed placement is to the rear of the chimney on this elevation set back more than one bay. These

panels will be installed flat to the roof using a Snapnrack system. Utilizing this system will make the mounting clips virtually invisible, leaving only the solar panels visible. Staff finds the solar panels in the proposed location appropriate. The typical requirement for solar panels on front gable roofs is they need to be set back one bay from the front wall plane. The east elevation of this house is only two bays deep, and the proposed solar panels are set a significant distance from the front bay on this elevation. Staff finds that this proposal will not have a significant impact on the surrounding district (per the *Design Guidelines*), is clearly new and completely reversable (complying with Standards 9 and 10).

Additionally, Staff would like to recognize that the City of Takoma Park and Montgomery County have issued climate emergencies, determining that it is imperative to restore a safe climate and make strides to eliminate greenhouse gas emissions. Staff finds that under these resolutions, approval of the proposal is additionally supported under 24A-8(b)(6).

Staff recommends approval of this HAWP.

STAFF RECOMMENDATION

Staff recommends that the Commission **approve** the HAWP application under the Criteria for Issuance in *Chapter 24A-8(b)(1), (2)* and *(6)*, having found that the proposal will not substantially alter the exterior features of the historic resource and is compatible in character with the district and the purposes of *Chapter 24A*; and with the *Secretary of the Interior's Standards for Rehabilitation #2, #9, and #10,*

and with the general condition that the applicant shall present the **3 permit sets of drawings, if applicable, 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 final project design details, not specifically delineated by the Commission, shall be approved by HPC staff or brought back to the Commission as a revised HAWP application at staff's discretion;

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 dan.bruechert@montgomeryplanning.org to schedule a follow-up site visit.

[redacted]

DPS - #8

HISTORIC PRESERVATION COMMISSION
301/563-3400

APPLICATION FOR HISTORIC AREA WORK PERMIT

Contact Email: SAM.BRYSON@GMAIL.COM Contact Person: SAM BRYSON

Daytime Phone No.: 202-340-2924

Tax Account No.: _____

Name of Property Owner: SAMUEL BRYSON/ANNE KNEEDLER Daytime Phone No.: 202-340-2924

Address: 5 COLUMBIA AVE TAKOMA PARK MD 20912
Street Number *City* *State* *Zip Code*

Contractor: SOLAR ENERGY SERVICES, INC Phone No.: 410-923-6090

Contractor Registration No.: MHIC # 93756

Agent for Owner: _____ Daytime Phone No.: _____

LOCATION OF BUILDING/PREMISE

House Number: 5 Street: COLUMBIA

Town/City: TAKOMA PARK Nearest Cross Street: PINE AVE

Lot: P13 Block: 18 Subdivision: 0025

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: $ 25,000

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.

SB
Signature of owner or authorized agent

11/9/2019
Date

Approved: _____ *For Chairperson, Historic Preservation Commission*

Disapproved: _____ Signature: _____ Date: _____

Application/Permit No.: _____ Date Filed: _____ Date Issued: _____

Edit 6/21/99

SEE REVERSE SIDE FOR INSTRUCTIONS

846245

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:

   THE EXISTING STRUCTURE IS AN HISTORIC FARMHOUSE AND IS A CONTRIBUTING RESOURCE IN THE TAKOMA PARK HISTORIC DISTRICT. THE PROPERTY HAS UNDERGONE SIGNIFICANT RENOVATION IN THE LAST 6 MONTHS TO RESTORE IT TO HABITABILITY. THIS SIGNIFICANT RENOVATION IS STILL IN PROCESS, BUT IS NEARING COMPLETION.

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

   WE SEEK TO INSTALL AN ARRAY OF SOLAR PANELS ON THE HOUSE IN A MANNER THAT IS CONSISTENT WITH HPC GUIDELINES.

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.

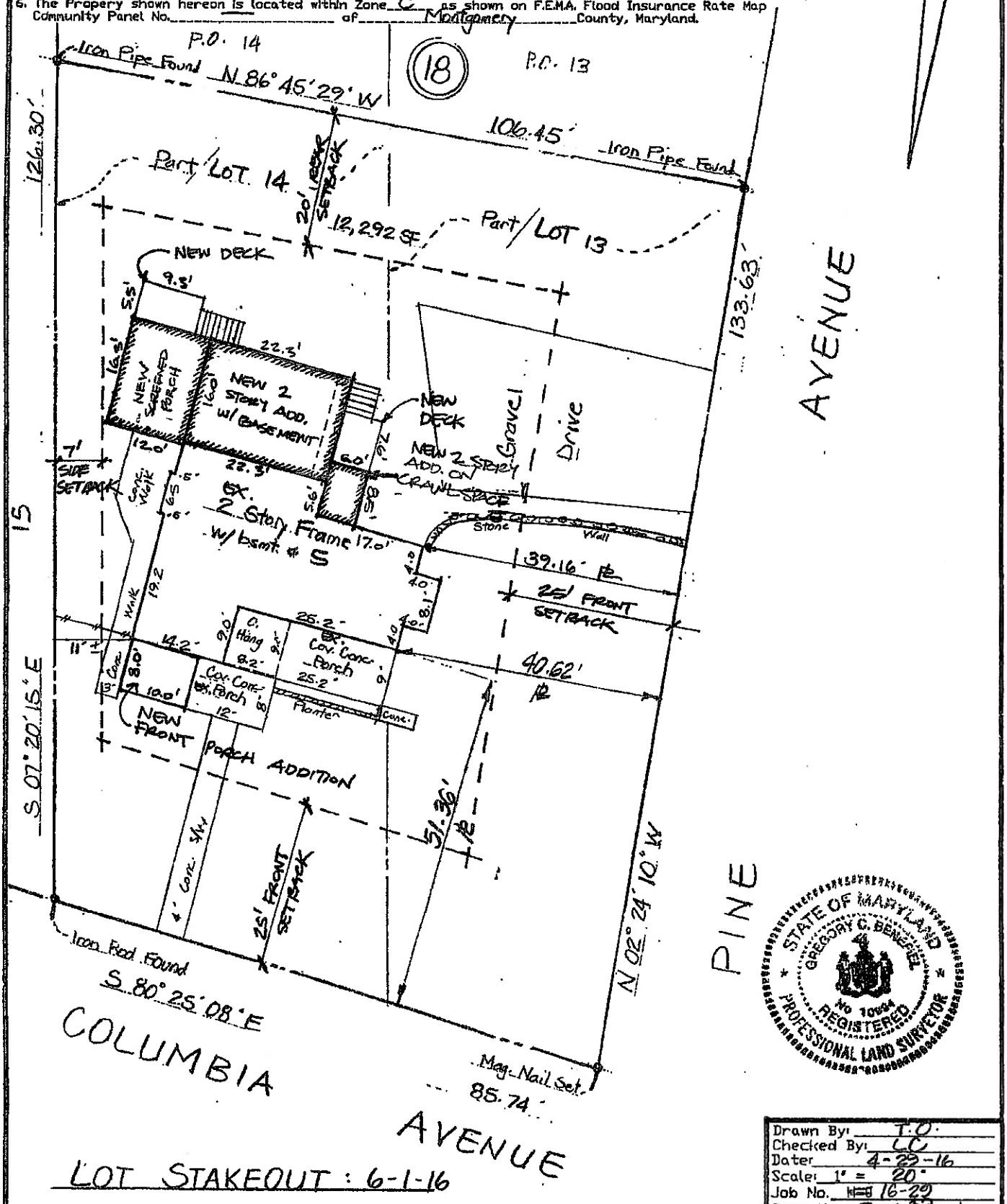
PLEASE PRINT (IN BLUE OR BLACK INK) OR TYPE THIS INFORMATION ON THE FOLLOWING PAGE.
PLEASE STAY WITHIN THE GUIDES OF THE TEMPLATE. AS THIS WILL BE PHOTOCOPIED DIRECTLY ONTO MAILING LABELS.

HAWP APPLICATION: MAILING ADDRESSES FOR NOTIFING
[Owner, Owner's Agent, Adjacent and Confronting Property Owners]

Owner's mailing address	**Owner's Agent's** mailing address
5 COLUMBIA AVE TAKOMA PARK, MD 20912	
Adjacent and confronting Property Owners mailing addresses	
7 COLUMBIA AVE TAKOMA PARK, MD 20912	8 PINE AVE TAKOMA PARK, MD 20912
1 PINE AVE TAKOMA PARK, MD 20912	5 PINE AVE TAKOMA PARK, MD 20912
7105 CARROLL AVE TAKOMA PARK, MD 20912	8 COLUMBIA AVE TAKOMA PARK, MD 20912

NOTES:

1. ~~This plat is not intended for use in the establishment of property lines, but prepared for the exclusive use of the present property owner(s) of record and/or those who purchase, mortgage or guarantee the title within six months from the date hereof and as to them I warrant this house location survey.~~
2. ~~For title purposes only.~~
3. No title report furnished at this time, subject to all easements and rights of ways of record.
4. Property corners have ~~not~~ been set with this survey. Property information was taken from the best available records.
5. ~~This location plat is not to be used for the construction of fences or other improvements. A boundary Survey and lot stakeout would have to be preformed to determine the location of all property lines as shown.~~
6. The Propery shown hereon is located within Zone C as shown on F.E.M.A. Flood Insurance Rate Map Community Panel No. _____ of Montgomery County, Maryland.



STATE OF MARYLAND
GREGORY C. BENEFIEL
No 10884
REGISTERED
PROFESSIONAL LAND SURVEYOR

LOT STAKEOUT : 6-1-16

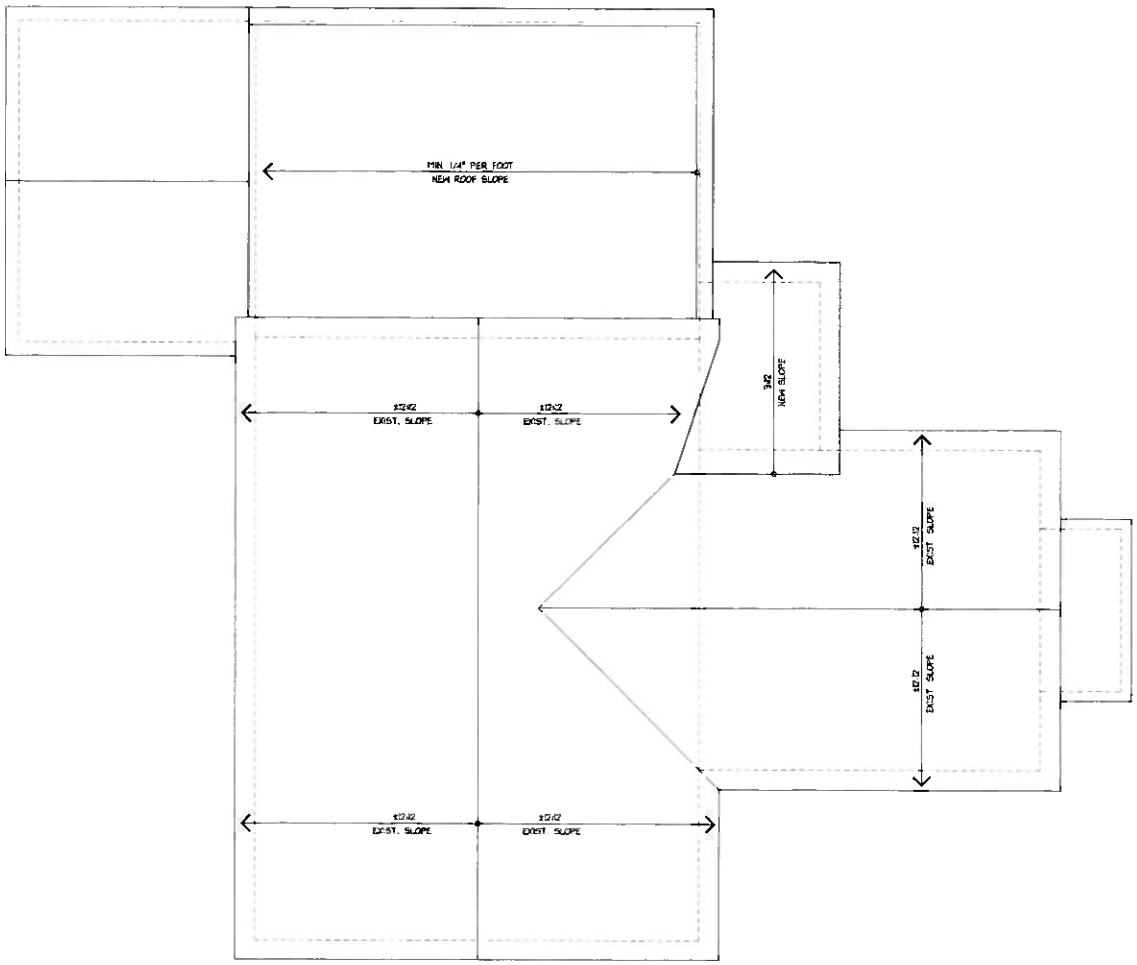
Drawn By:	T.O.
Checked By:	LC
Date:	4-29-16
Scale:	1" = 20'
Job No.	16-29
Case No.	J. W. Branch

PROPOSED EAST ELEVATION

PROPOSED NORTH ELEVATION

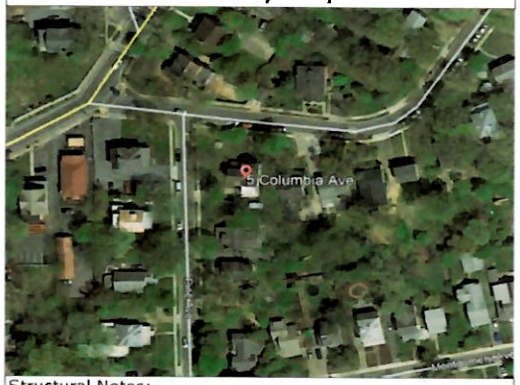
PROPOSED SOUTH ELEVATION

PROPOSED WEST ELEVATION



1 / A1.4 PROPOSED ROOF PLAN
1/4" = 1'-0"

Vicinity Map



Structural Notes:
1. All work is to be done in a professional manner and in accordance with standard practice and shall be in strict compliance with manufacturers specifications and/or recommendations.

2. The general and sub-contractors shall carefully examine the drawings, inspect the site, and acquaint themselves with all governing ordinances, laws, and otherwise familiarize themselves with all matters that may affect performance of the work.

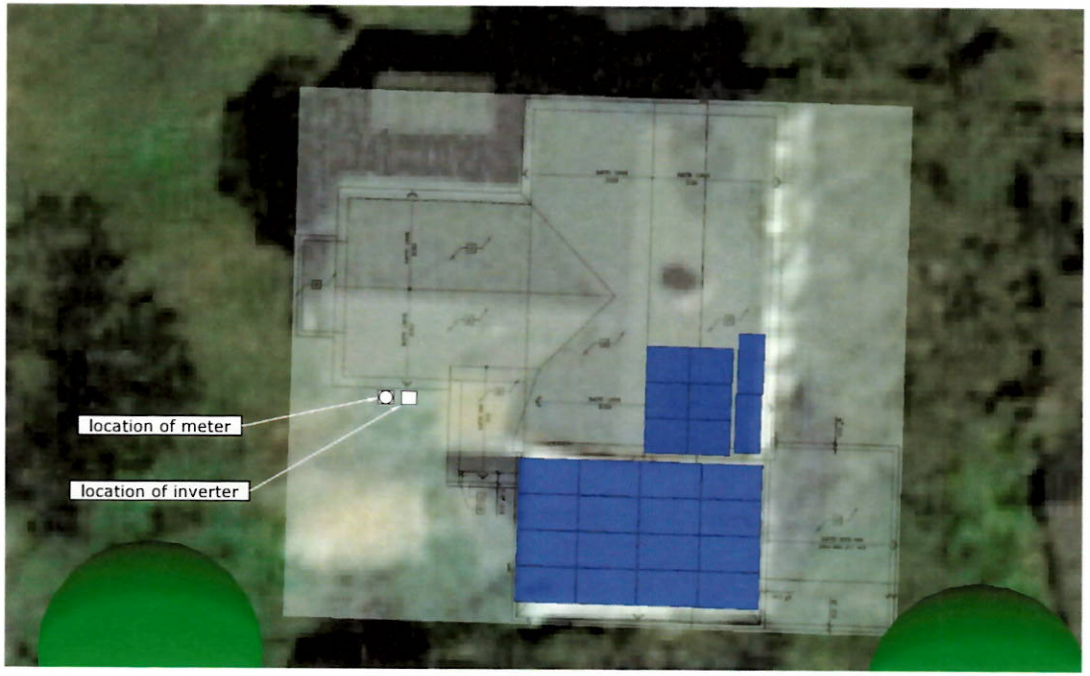
Data
IBC 2015
Snow design load 30 psf
Wind load 120 mph ultimate @ 3 second gusts
Seismic Category B

Applicable Codes:
-INTERNATIONAL BUILDING CODE / 2015
-INTERNATIONAL FIRE CODE / 2015
-NATIONAL ELECTRIC CODE / 2014

Professional Certification
I hereby certify that these documents were prepared or approved by me, and I am a duly licensed professional engineer under the laws of the State of Maryland.
License Number: 8998
Expiration date: 2/3/2021

Wolfman & Associates, P.C.
8720 Georgia Ave. #908
Silver Spring, MD 20910

Project Overview
not to scale



N

System Description

MODULE TYPE	REC 320W
QUANTITY	34
SYSTEM SIZE	8.64 kW
ROOF TYPE	shingle
PITCH	45°, 0°
STRUCTURE	rafter/truss
AZIMUTH	91°
MOUNTING SYSTEM	Snap n' Rack
INVERTER(S)	SolarEdge 7.6 kW

REVISIONS
NO. BY REMARKS

Solar Energy Services, Inc.
1514 Jabez Run, Suite # 103 Millersville Maryland, 21108

Kneedler Residence
5 Columbia Ave.
Takoma Park, MD

S 001

SOLAR'S MOST TRUSTED REC

REC TWINPEAK 2 MONO SERIES

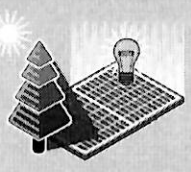
PREMIUM SOLAR PANELS WITH SUPERIOR PERFORMANCE

REC TwinPeak 2 Mono Series solar panels feature an innovative design with high panel efficiency and power output, 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 2 Mono panels are ideal for residential and commercial rooftops worldwide.

NOW WITH NEW WARRANTY!

MORE POWER OUTPUT PER M²

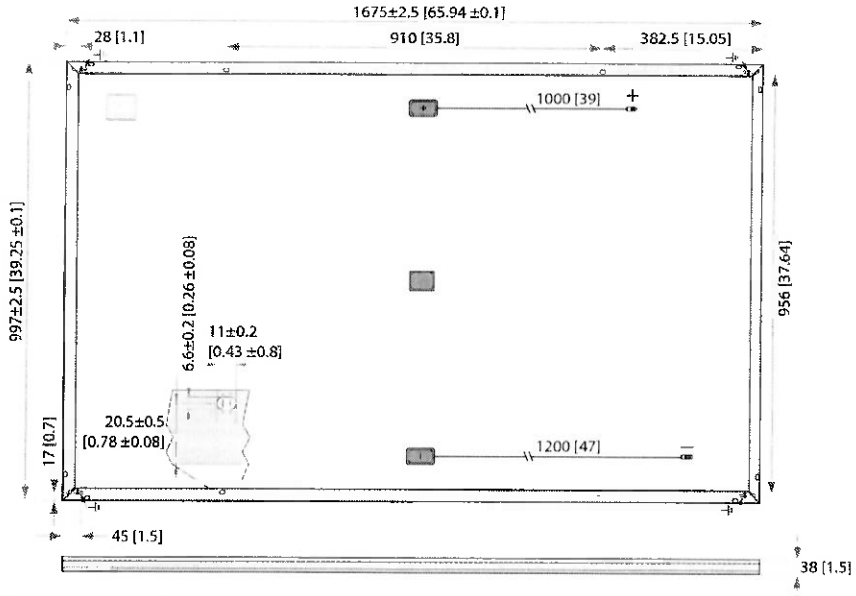


IMPROVED PERFORMANCE IN SHADED CONDITIONS

100% PID FREE

REDUCES BALANCE OF SYSTEM COSTS

REC TWINPEAK 2 MONO SERIES



Measurements in mm [in]

19.2% EFFICIENCY

20 YEAR PRODUCT WARRANTY

25 YEAR LINEAR POWER OUTPUT WARRANTY

GENERAL DATA

Cell type:	120 half-cut mono-Si p-type PERC cells 6 strings of 20 cells in series
Glass:	3.2 mm solar glass with anti-reflection surface treatment
Backsheet:	Highly resistant polyester polyolefin construction
Frame:	Anodized aluminum
Junction box:	3-part, 3 bypass diodes, IP67 rated in accordance with IEC 62790
Cable:	4 mm² solar cable, 1.0 m + 1.2 m in accordance with EN 50618
Connectors:	Stäubli MC4 PV-KBT4/PV-KST4 (4 mm²) in accordance with IEC 62852, IP68 only when connected
Origin:	Made in Singapore

ELECTRICAL DATA @ STC

Product code*: RECxxxTP2M					
Nominal Power - P_{MPP} (Wp)	300	305	310	315	320
Watt Class Sorting - (W)	-0/+5	-0/+5	-0/+5	-0/+5	-0/+5
Nominal Power Voltage - V_{MPP} (V)	33.0	33.3	33.5	33.7	33.9
Nominal Power Current - I_{MPP} (A)	9.10	9.17	9.26	9.36	9.45
Open Circuit Voltage - V_{OC} (V)	39.5	39.7	39.8	39.9	40.0
Short Circuit Current - I_{SC} (A)	9.70	9.80	9.90	10.05	10.17
Panel Efficiency (%)	18.0	18.3	18.6	18.9	19.2

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 a 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.

MAXIMUM RATINGS

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

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

ELECTRICAL DATA @ NMOT

Product code*: RECxxxTP2M					
Nominal Power - P_{MPP} (Wp)	224	228	232	236	240
Nominal Power Voltage - V_{MPP} (V)	30.5	30.8	31.0	31.2	31.4
Nominal Power Current - I_{MPP} (A)	7.35	7.41	7.48	7.56	7.64
Open Circuit Voltage - V_{OC} (V)	36.5	36.7	36.8	36.9	37.0
Short Circuit Current - I_{SC} (A)	7.84	7.92	8.00	8.12	8.22

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.

TEMPERATURE RATINGS*

Nominal Module Operating Temperature:	44.9°C (±2°C)
Temperature coefficient of P_{MPP}:	-0.37 %/°C
Temperature coefficient of V_{OC}:	-0.28 %/°C
Temperature coefficient of I_{SC}:	0.04 %/°C

*The temperature coefficients stated are linear values

CERTIFICATIONS

IEC 61215, IEC 61730 & UL 1703, IEC 62804 (PID)
IEC 62716 (Ammonia Resistance), IEC 61701 (Salt Mist Level 6),
ISO 9001:2015, ISO 14001:2004, OHSAS 18001:2007

WARRANTY

20 year product warranty
25 year linear power output warranty
Max. performance degression of 0.7% p.a. from 97.5% in year 1
See warranty conditions for further details

MECHANICAL DATA

Dimensions:	1675 x 997 x 38 mm
Area:	1.67 m²
Weight:	18.5 kg

take-e-way take-e-way WEEE-compliant recycling scheme

Specifications subject to change without notice

Ref: NE-05-07-16 Rev- C 12.18

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

REC

www.recgroup.com

CHEM LINK
POLYMER INNOVATION

E-CURB™ SYSTEM
SOLAR PENETRATION SEALS

Technical Data Sheet | **Polyether Technology** | **CSI Section No. 07 12 13**

CHEM LINK
Construction & Maintenance
Telephone: 800-826-1681
Fax: 269-679-4448
353 E. Lyons Street
Schoolcraft, MI 49087
www.chemlink.com

Last Revision: 04/22/16
Document No. DS1350S

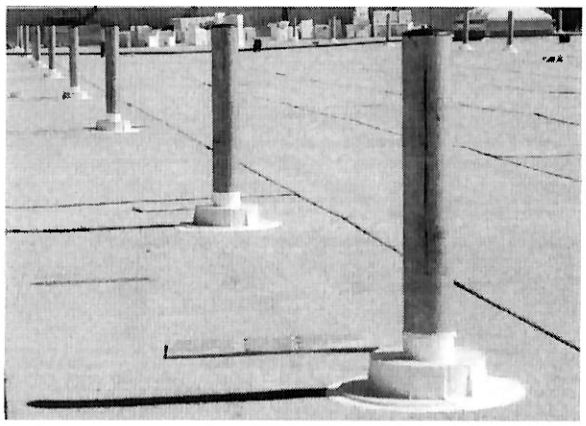
Product Description
E-Curb penetration seals replace old-style metal pitch pans with versatile, precast components and pourable sealants. CHEM LINK'S **E-Curb** system can usually be installed in under 15 minutes and never requires flashing or mechanical attachment.

E-Curbs are designed for use on granulated modified bitumen, asphalt and coal tar B.U.R. (built up roofing). **E-Curbs** are specified for PVC, EPDM, PIB, and TPO single ply roofing membranes. TPO Primer is required for use with TPO single-ply roof membrane.

When installed properly, this system forms a durable, waterproof rubber seal around penetrations. An extended manufacture warranty against leaks is activated with submittal of a completed warranty card.

Special Characteristics
- Rapid installation - "Slip-fit" light weight curb design reduces labor significantly.
- Excellent adhesion to most roofing materials.
- No flashing or mechanical attachment required.
- Service Temperature -40°F to 200°F (-40°C to 93°C)
- **1-Part®** accommodates movement and is suggested for use on all granulated membranes and details with excessive movement.
- For sloped roof applications, substitute **DuraLink 50™** non-slump adhesive/sealant for **1-Part** and **M-1®**

Restrictions
- Please contact customer service for application guidelines with temperatures below 32°F (0°C).
- Do not apply if rain is anticipated within 4 hours.
- Do not use on Hypalon or smooth APP modified bitumen membrane. For smooth APP, torch down a target of granulated APP before installation.
- TPO Primer must be used for TPO applications.
- Do not prime bonding surfaces with asphalt primer.
- Do not use asphalt cement as a "night sealant". Use **M-1** for this purpose.
- **E-Curb** kits are designed to contain enough **1-Part** to fill each curb with displacement in consideration. Refer to our penetration calculator under contractor resources at chemlink.com to verify volumes.



E-Curb System Components
- **E-Curb** exterior rings, straights, and corners.
- **M-1** Structural Adhesive/Sealant used for bonding the **E-Curb** components, sealing and priming the penetration.
- **1-Part** "moisture cure" pourable sealer, used to form a durable, water-tight seal around the roof penetration.

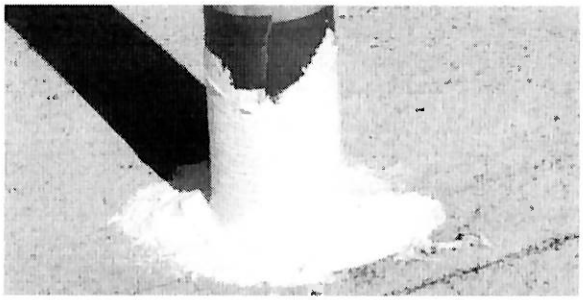
E-Curb precast form components are composed of light weight nylon resin. The **E-Curb** is 2-inches high and is available in a variety of shapes and sizes.
Standard sizes include bisected circular pieces with inside diameters of 3, 4, 5, 6 or 9 inches; corner pieces with a 2-inch radius; straight pieces in 3-inch or 8-inch lengths; and a 4.5" x 3.4" rectangle. The outer surface is impervious to ice, corrosion, UV (ultraviolet) light and ponding water.

M-1 Structural Adhesive/Sealant is a durable, self-fixturing moisture cure mastic. Cartridges of **M-1** are supplied in each **E-Curb** Kit. Components are also sold separately.

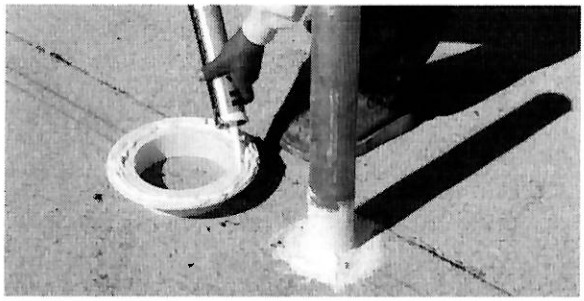
1-Part is a highly flexible, self-leveling moisture cure pourable sealer that eliminates mixing. It is also 100% solid rubber, has a very low VOC content, will not melt or shrink, and is resistant to deterioration. It is supplied in 10.1-oz and 28-oz cartridges or 1/2 gallon pouches. Unused sealant can be capped and reused.

SWR INSTITUTE | American Architectural Manufacturers Association | NATIONAL ROOFING CONTRACTORS ASSOCIATION MEMBER | ISO 9001:2008

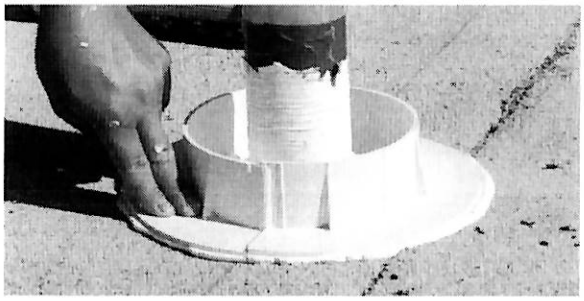
Step 1
Remove all previously applied caulk, mastic, cement, asphalt, and other contaminants from penetrations with a wire brush. Clean all smooth substrates with isopropyl or denatured alcohol. Brush away all gravel or loose granules. Seal the base of each penetration with **M-1**. Coat penetrations with **M-1** to 3" above the roof line.



Step 2
Hold a section of **E-Curb**, flat side up, and apply a 1/4" bead of **M-1** to the entire bottom perimeter. Apply 1 additional 1/4" bead of **M-1** down the center of the section. Do not tool the beads flat. Place the **E-Curb** section on the roof surface to form a half circle around the penetration(s). Press down firmly until **M-1** extrudes from the outside edges.



Step 3
Apply **M-1** to the second section of **E-Curb** as described above. Place the second section of curb on the roof surface to form a circle with the first section. Press firmly in place until excess adhesive extrudes from the outside edges. Apply a bead of **M-1** around the outside base of the installed **E-Curb**, and tool to form a smooth fillet. For non **E-Curb** penetrations seals, add **M-1** to scarf joint surfaces and tool smooth.



Step 4
Cut tip off **1-Part** cartridge at widest point on plastic nozzle and pierce the foil seal. Insert into caulking gun and pump **E-Curb** full. When using a **1-Part pouch**, remove cap, pour, squeeze out excess air, and reseal. **Note:** To provide an adequate rubber seal, maintain a 1" distance between penetrations and inside edge of the **E-Curb**.

All properties described in this document are derived from testing conducted in laboratory conditions. Properties and performance will vary depending on environmental conditions and application technique. Test and evaluate to determine appropriate usage. Visit www.chemlink.com for the Safety Data Sheet, Technical Data Guides and full warranty for this product.

LIMITED WARRANTY: ***CHEM LINK*** warrants this product's performance, provided it is properly stored and applied within 1 year. If this ***CHEM LINK*** material is proved to be defective, return remaining product and purchase receipt for refund or replacement of product exclusive of labor or cost of labor. This is the sole and exclusive remedy for defects or failure of this product. User must read and follow the direction of the current Technical Data Guide and SDS prior to product use. User determines suitability of product for intended use and assumes all risks. Manufacturer shall not be liable for damages (including consequential or incidental damages) in excess of the purchase price, except where such exclusion or limitation is prohibited by state law. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WRITTEN OR ORAL, STATUTORY, EXPRESS OR IMPLIED INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE; except for the above express warranty given by manufacturer, the product is sold with all faults. ***CHEM LINK*** SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS. This warranty gives you specific legal rights, and you may also have other rights in the U.S. which vary from state to state. For warranty claim information, call 800-826-1681.

CHEM LINK

Series 100

The Installers Choice for Residential Solar Mounting

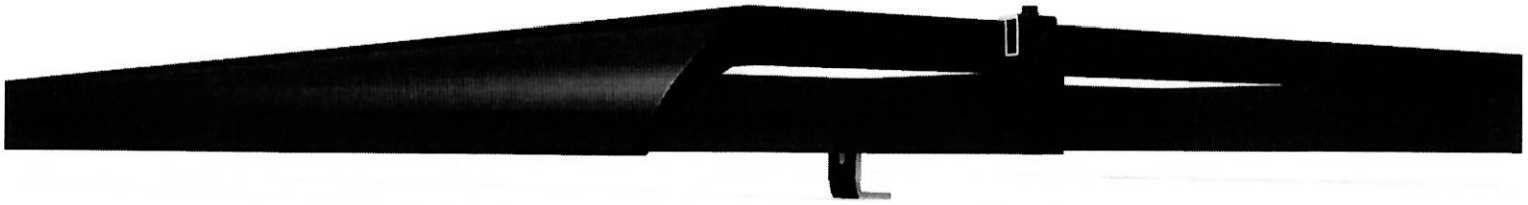
- Entire Mounting System from Single Manufacturer under 1 Warranty
- Snap-in features make the install process intuitive and fast
- Industry Leading Technical Support Services for Every Customer
- The Most Comprehensive UL 2703 Listing in the Industry

Start Mounting Solar on Your Roof Today

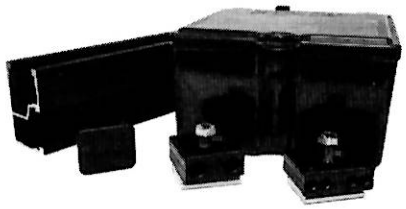
RESOURCES	snapnrack.com/resources
DESIGN	snapnrack.com/configurator
WHERE TO BUY	snapnrack.com/where-to-buy

The SnapNrack Series 100 Roof Mount System

is designed to provide the lowest total install cost of any residential mounting system.



The top-of-the-line features of the SnapNrack mounting system reduce install times and labor cost while eliminating the need for service calls creating the lowest install lifecycle cost of any mounting system.

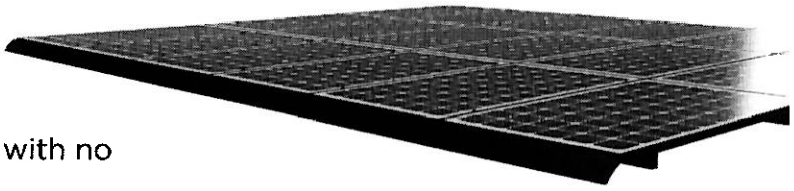


Wire Management

- Products such as the standard rail channel keep wires neatly organized providing a clean finished look to every install
- Industry's largest offering of wire management accessories include snap in junction box, 4-wire and trunk cable clamps, as well as conduit clamps for both composition shingle and tile roofs.

Undeniable Aesthetics

- Render the mounting system invisible by using Universal End Clamps that fasten modules while remaining hidden underneath the array
- Array skirt provides a sleek look and attractive design to the front of the array
- Rail-based system provides rigid structure tucked away underneath array with no unsightly mounts at the top or bottom



Quality. Performance. Innovation.

SnapNrack solutions are focused on simplifying the installation experience through intuitive products and the best wire management in the industry.

SnapNrack
Solar Mounting Solutions

877-732-2860 **www.snapnrack.com** **contact@snapnrack.com**

Power Optimizer

For North America

P320 / P340 / P370 / P400 / P405 / P505

POWER OPTIMIZER

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety

/ Power Optimizer
For North America
P320 / P340 / P370 / P400 / P405 / P505

Optimizer model (typical module compatibility)	P320 (for 60-cell modules)	P340 (for high-power 60-cell modules)	P370 (for higher-power 60 and 72-cell modules)	P400 (for 72 & 96-cell modules)	P405 (for thin film modules)	P505 (for higher current modules)	
INPUT							
Rated Input DC Power[1]	320	340	370	400	405	505	W
Absolute Maximum Input Voltage (Voc at lowest temperature)	48		60	80	125	83	Vdc
MPPT Operating Range	8 - 48		8 - 60	8 - 80	12.5 - 105	12.5 - 83	Vdc
Maximum Short Circuit Current (Isc)	11			10.1		11	Adc
Maximum DC Input Current	13.75			12.63		17.5	Adc
Maximum Efficiency	99.5						%
Weighted Efficiency	98.8					98.6	%
Overvoltage Category	II						
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)							
Maximum Output Current	15						Adc
Maximum Output Voltage	60				85		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)							
Safety Output Voltage per Power Optimizer	1 ± 0.1						Vdc
STANDARD COMPLIANCE							
EMC	FCC Part15 Class B, IEC61000-6-2, IEC61000-6-3						
Safety	IEC62109-1 (class II safety), UL1741						
RoHS	Yes						
INSTALLATION SPECIFICATIONS							
Maximum Allowed System Voltage	1000						Vdc
Compatible Inverters	All SolarEdge Single Phase and Three Phase inverters						
Dimensions (W x L x H)	129 x 153 x 27.5 / 5.1 x 6 x 1.1			129 x 153 x 33.5 / 5.1 x 6 x 1.3	129 x 159 x 49.5 / 5.1 x 6.3 x 1.9	129 x 162 x 59 / 5.1 x 6.4 x 2.3	mm / in
Weight (including cables)	630 / 1.4			750 / 1.7	845 / 1.9	1064 / 2.3	gr / lb
Input Connector	MC4[2]						
Output Wire Type / Connector	Double Insulated, MC4						
Output Wire Length	0.95 / 3.0		1.2 / 3.9				m / ft
Input Wire Length	0.16 / 0.52						m / ft
Operating Temperature Range	-40 - +85 / -40 - +185						°C / °F
Protection Rating	IP68 / NEMA6P						
Relative Humidity	0 - 100						%

[1] Rated STC power of the module. Module of up to +5% power tolerance allowed
[2] NEC 2017 requires max input voltage be not more than 80V
[3] For other connector types please contact SolarEdge

PV System Design Using a SolarEdge Inverter[4][5]		Single Phase HD-Wave	Single phase	Three Phase 208V	Three Phase 480V	
Minimum String Length (Power Optimizers)	P320, P340, P370, P400	8		10	18	
	P405 / P505	6		8	14	
Maximum String Length (Power Optimizers)		25		25	50[6]	
Maximum Power per String		5700 (6000 with SE7600-US - SE11400-US)	5250	6000[7]	12750[8]	W
Parallel Strings of Different Lengths or Orientations		Yes				

[4] For detailed string sizing information refer to http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
[5] It is not allowed to mix P305/P505 with P320/P340/P370/P400 in one string
[6] A string with more than 30 optimizers does not comply with NEC rapid shutdown requirements; fault voltage will be above the 30V requirement
[7] For SE3000-US/SE3800-US/SE5000-US/SE6000-US: It is allowed to install up to 7,900W per string when 2 strings are connected to the inverter (3 strings per unit for SE5x/6x-US) and when the maximum power difference between the strings is up to 1,000W
[8] For SE7600-US/SE9000-US/SE10000-US/SE11400-US: It is allowed to install up to 15,000W per string when 2 strings are connected to the inverter (3 strings per unit for SE6/8/10-US/SE10K-US) and when the maximum power difference between the strings is up to 2,000W

CE RoHS

Single Phase Inverter with HD-Wave Technology

for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

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Single Phase Inverter with HD-Wave Technology for North America

SE3000H-US / SE3800H-US / SE5000H-US / SE6000H-US/ SE7600H-US / SE10000H-US / SE11400H-US

	SE3000H-US	SE3800H-US	SE5000H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	
OUTPUT								
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	6000 @ 240V 5000 @ 208V	7600	10000	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min.-Nom.-Max. (211 - 240 - 264)	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min.-Nom.-Max. (183 - 208 - 229)	-	✓	-	✓	-	-	✓	Vac
AC Frequency (Nominal)	59.3 - 60 - 60.5							Hz
Maximum Continuous Output Current @240V	12.5	16	21	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	-	-	48.5	A
GFDI Threshold	1							A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes							
INPUT								
Maximum DC Power @240V	4650	5900	7750	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	-	-	15500	W
Transformer-less, Ungrounded	Yes							
Maximum Input Voltage	480							Vdc
Nominal DC Input Voltage	380				400			Vdc
Maximum Input Current @240V	8.5	10.5	13.5	16.5	20	27	30.5	Adc
Maximum Input Current @208V	-	9	-	13.5	-	-	27	Adc
Max. Input Short Circuit Current	45							Adc
Reverse-Polarity Protection	Yes							
Ground-Fault Isolation Detection	600kΩ Sensitivity							
Maximum Inverter Efficiency	97	97.2						%
CEC Weighted Efficiency	97						97.5 @ 240V 97.5 @ 208V	%
Nighttime Power Consumption	< 2.5							W
ADDITIONAL FEATURES								
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional), Cellular (optional)							
Revenue Grade Data, ANSI C12.20	Optional[1]							
Rapid Shutdown - NEC 2014 and 2017-690.12	Automatic Rapid Shutdown upon AC Grid Disconnect							
STANDARD COMPLIANCE								
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07							
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)							
Emissions	FCC Part 15 Class B							
INSTALLATION SPECIFICATIONS								
AC Output Conduit Size / AWG Range	3/4" minimum / 14-6 AWG					3/4" minimum / 14-4 AWG		
DC Input Conduit Size / # of Strings / AWG Range	3/4" minimum / 1-2 strings / 14-6 AWG					3/4" minimum / 1-3 strings / 14-6 AWG		
Dimensions with Safety Switch (HxWxD)	17.7 x 14.6 x 6.8 / 450 x 370 x 174					21.3 x 14.6 x 7.3 / 540 x 370 x 185		in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4		26.2 / 11.9	38.8 / 17.6		lb / kg
Noise	< 25					< 50		dBA
Cooling	Natural Convection							
Operating Temperature Range	-40 to +140 / -25 to +60[2] (-40°F / -31°C option)							°F / °C
Protection Rating	NEMA 3X (Inverter with Safety Switch)							

For other regional settings please contact SolarEdge support.
A higher current source may be used; the inverter will limit its input current to the values stated.
Revenue grade inverter P/N: SExxxH-US000NNC2.
For power de-rating information refer to: https://www.solaredge.com/sites/default/files/temperature-derating-note-na.pdf
40 version P/N: SExxxH-US040NNU4

RoHS

SolarEdge Overview

solaredge
architects of energy™

SolarEdge provides distributed solar power harvesting and PV monitoring systems. The company's technology maximizes power generation for residential, commercial and large-scale PV systems. The SolarEdge portfolio of products includes power optimizers, highly reliable PV inverters and a web portal for module-level monitoring and fault detection.

Up to 25% more energy

Increased energy yield & faster return on investment through module-level MPPT

- No module power mismatch loss
- No partial shading loss
- No soiling mismatch loss
- No aging mismatch loss

Cost efficient maintenance

Full visibility of system performance & remote troubleshooting

- Module-level performance data
- Presentation of complete system on virtual site map
- Automatic alerts on system issues
- Easy access via web browser from computer or smartphone

Constraint free design

Maximum space utilization with minimum design time

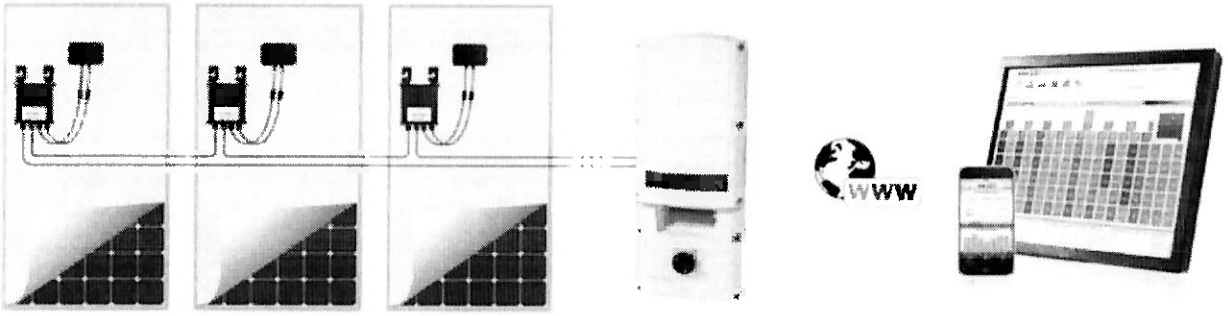
- Modules on different orientation and tilts in the same string
- Different module types in a single string
- Strings of different lengths connected to same inverter
- Longer strings - up to 25 modules per string

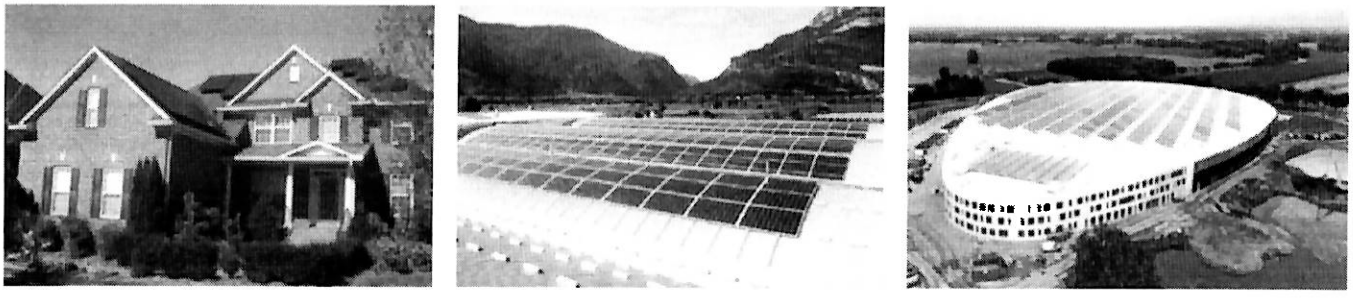
SafeDC™ - DC safety

Safety during installation, maintenance, firefighting & other emergencies

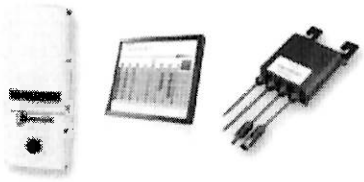
- Installation: safe string voltage - until inverter & AC supply are turned on
- Maintenance: safe string voltage - automatic once inverter is turned off
- Emergency: safe string voltage - automatic after grid disconnection

SolarEdge solution overview



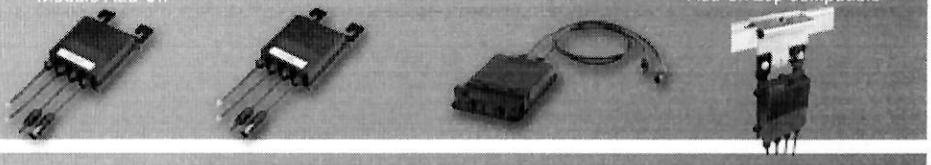


SolarEdge Overview

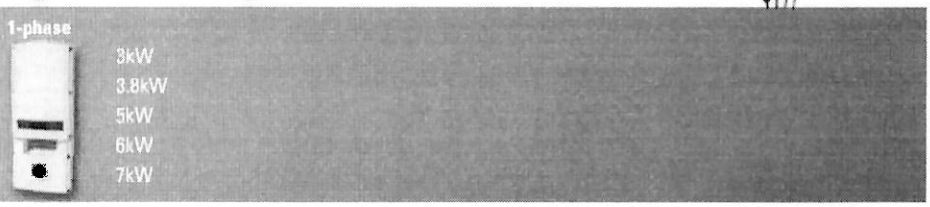


SolarEdge Products

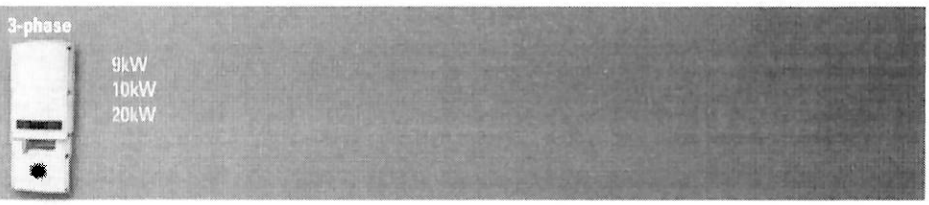
Power Optimizers



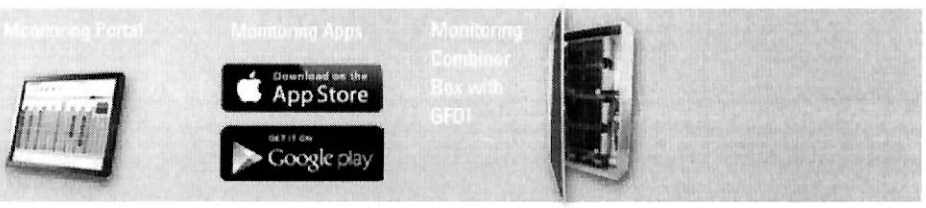
Single Phase Inverters



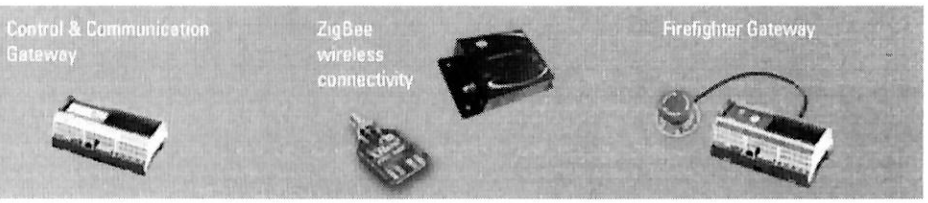
Three Phase Inverters



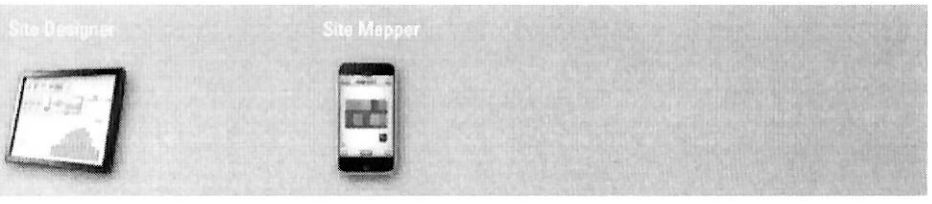
Monitoring



Communication Accessories



Installer Tools



About SolarEdge

With more than 1,800,000 units shipped (>450MW) to over 40 countries worldwide, SolarEdge is the established leader in the rapidly growing field of DC power optimization. SolarEdge maintains strategic partnerships across the PV value chain, from module manufacturers to integrators, in Europe, the USA and APAC and employs over 230 people across the globe.

■ **USA** ■ **Germany** ■ **Italy** ■ **France** ■ **Japan** ■ **China** ■ **Australia** ■ **Israel**

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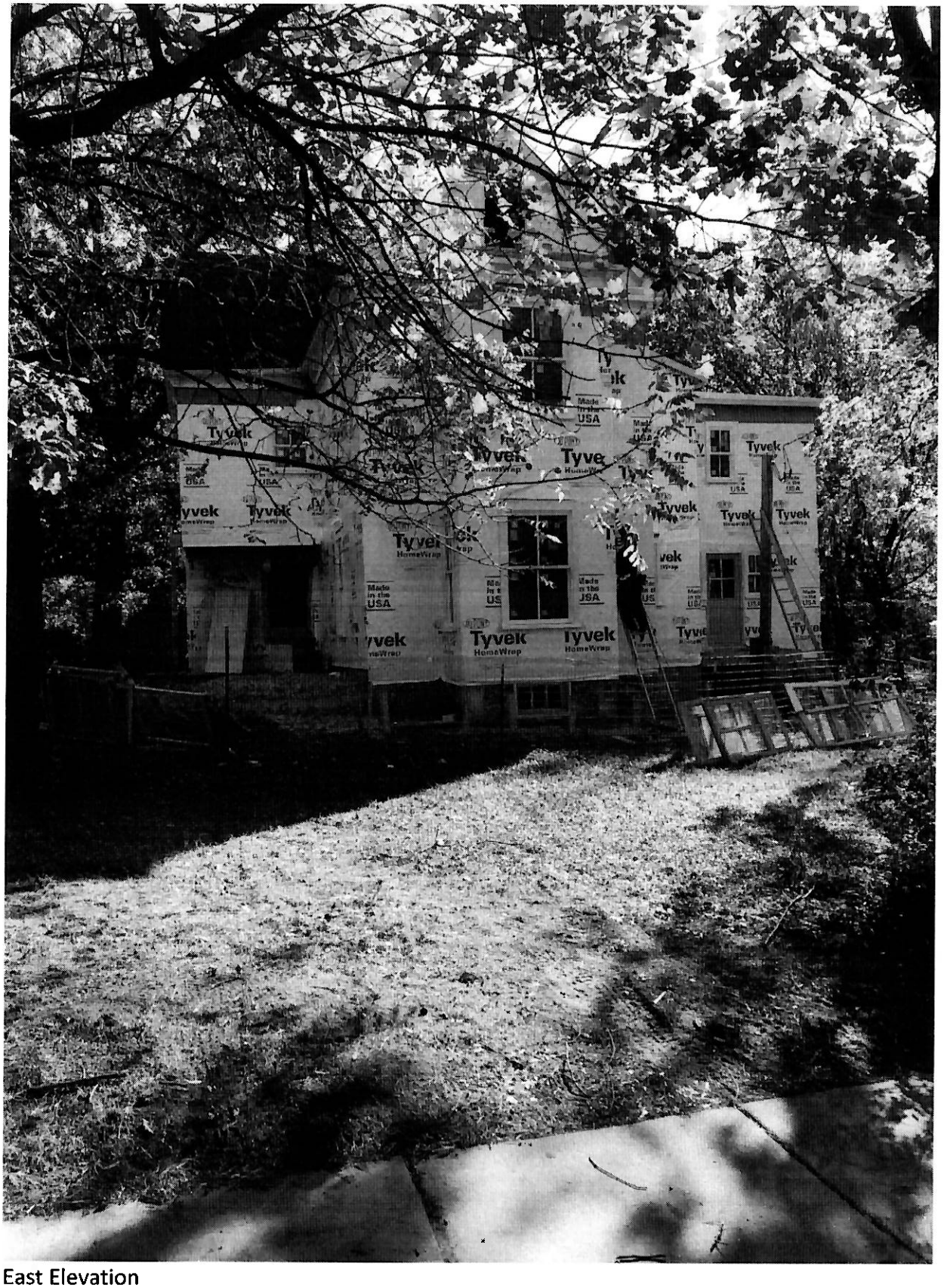
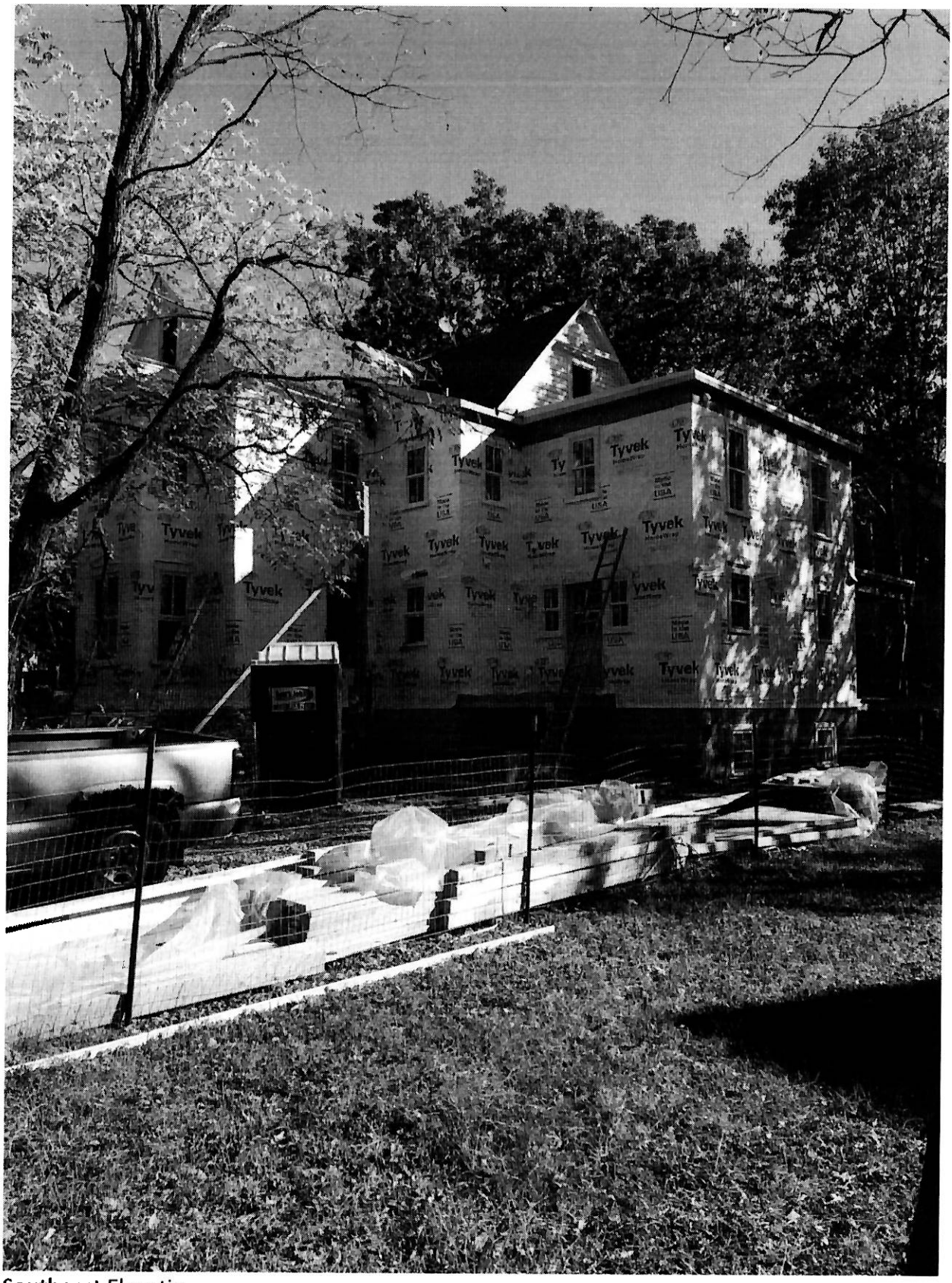
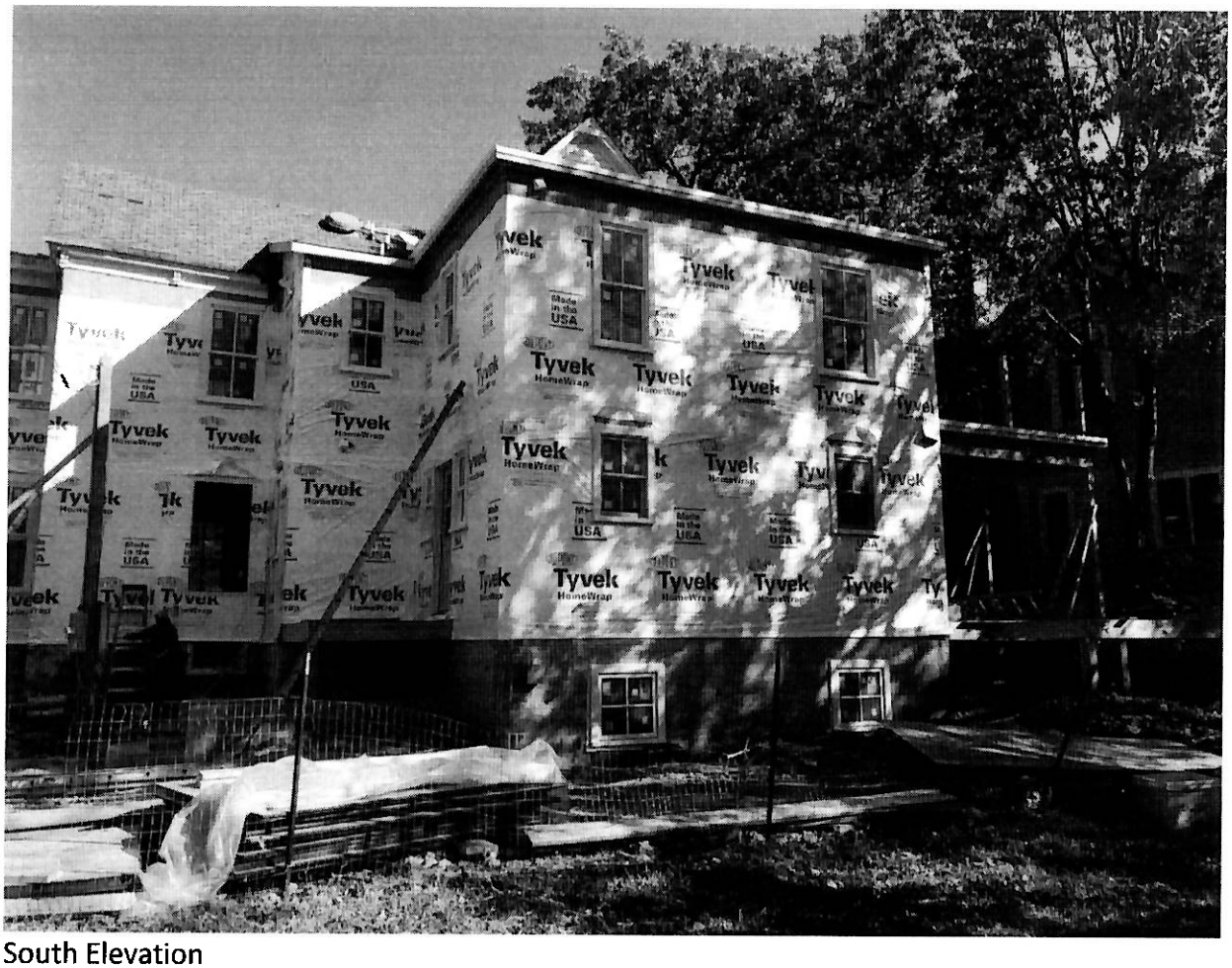
North Elevation



East Elevation



Southeast Elevation



South Elevation